



State of Palestine

Environment Quality Authority (EQA)

Climate Technology Centre & Network

*“Technology Roadmap for the Implementation of Climate Action
Plans in Palestine”*

Policy Assessment Report

Version 1

September 2019

Deloitte Tohmatsu Financial Advisory LLC

Eco Consult

Contents

Acronyms	3
1. Introduction	5
2. Policy framework overview	6
3. Policies, strategies, and plans relevant to climate change	7
4. Policies, strategies, and plans relevant to the energy sector	11
5. Policies, strategies, and plans relevant to the agriculture sector	17
6. Policies, strategies, and plans relevant to the water and wastewater sectors	23
7. Policies, strategies, and plans relevant to the transport sector	27
8. Policies, strategies, and plans relevant to the solid waste sector	30
9. Policies, strategies, and plans relevant to other technologies	33
10. Conclusion and recommendations	34
Annex 1 – references	35
Annex 2 – objectives and policies of national agricultural sector strategy	36

Acronyms

BAU	Business-As-Usual
CSA	Climate-Smart Agricultural
CTCN	Climate Technology Center and Network
DRR/M	Disaster Risk Reduction and Management
EQA	Environmental Quality Authority
EU	European Union
EV	Electrical Vehicle
GHG	Greenhouse Gas
GHI	Global Horizontal Irradiance
GPS	Global Positioning System
GWh	Gigawatt-hours
INCR	Initial National Communication Report
kWh	Kilowatt-hours
LGUs	Local Government Units
MOA	Ministry of Agriculture
MOH	Ministry of Health
MOLG	Ministry of Local Government
MONE	Ministry of National Economy
MOT	Ministry of Transportation
MW	Megawatt
NAP	National Adaptation Plan
NDC	Nationally Determined Contributions
NEEAP	National Energy Efficiency Action Plan
NGO	Non-Governmental Organization
NPA	National Policy Agenda

NREAP	National Renewable Energy Action Plan
PENRA	Palestinian Energy and Natural Recourse Authority
PERC	Palestinian Energy Regulatory Council
PNA	Palestinian National Authority
PV	Photovoltaic
PWA	Palestinian Water Authority
SWH	Solar Water Heating
SWOT	Strengths, Weaknesses, Opportunities, Threats
UNFCCC	United Nations Framework Convention on Climate Change
US	United States
WASH	Water, Sanitation and Hygiene

1. Introduction

The State of Palestine is vulnerable to the impacts of climate change with severe implications for its economy. Impacts significant to the region include decreased precipitation, significant warming, more frequent extreme weather events, and rise in sea level. These could lead to greater water scarcity, decreased agricultural productivity, and water saline intrusion.

The Palestinian Government is committed to addressing these climate change vulnerabilities while, at the same time, achieving its national development and policy objectives. This is reflected in its submissions to the United Nations Framework Convention on Climate Change (UNFCCC) namely, Initial National Communication Report (INCR), National Adaptation Plan (NAP) and Nationally Determined Contribution (NDC).

To achieve sustainable economic development while contributing to the reduction of greenhouse gas emissions, it is important to prioritize various adaptation and mitigation measures through the development and diffusion of climate friendly technologies. To achieve this goal, it requires the establishment of strategic plans, policies, and legislations and/or laws. In order to identify relevant technologies which could be applied in Palestine and implemented to achieve the country's climate change mitigation and adaptation objectives, there is a need to understand the regulatory environment under which technologies will be introduced and potential regulatory gaps for their introduction.

It is important to emphasize that Palestine remains under the Israeli occupation. Palestine is thus constrained, in terms of both financial resources and jurisdiction. This shapes its policies and priorities. However, the Palestinian government is committed to taking actions to address climate change and has developed a number of policies to support its commitment. This report identifies and assesses the current policy and regulatory environment in Palestine in relation with sectors and technologies identified and prioritized for the technology roadmap. The report also identifies how prioritized technologies will contribute to achieving Palestine sectoral strategies as well as addressing gaps in introduction of these technologies. Findings of this report will identify policy measures required to introduce prioritized technologies for the development of the technology roadmap.

2. Policy framework overview

Palestine has committed to address climate change through climate change mitigation and adaptation actions. It has prepared a number of initiatives and used significant financial and human resources to enhance sustainable development. Policy development and its generated legislations, laws, and programs are crucial in achieving sustainable development goals for any country. In Palestine, ministries and/or authorities, such as Palestinian Water Authority (PWA), are responsible for drafting and implementing policies in their own sectors. In some cases, the ministry, which is leading the sector, needs to collaborate with other related ministries, authorities, Non-Governmental Organizations (NGOs), private sector, and/or other institutional bodies. In some cases, for transversal issues, such as climate change, large groups of institutions and/or ministries are involved, which may lead to the creation of a national committee, who, then, leads the policy development.

In Palestine, the National Development Plan (2017-2022) is the latest national strategy and consists of two key components. The first component is the National Policy Agenda (NPA), which is a high-level policy document that sets out the national vision, priorities and policies. The second component sets out 18 national sector strategies, along with three cross-sectoral strategies. Each strategy shows the sector's strategic objectives, outcomes and policies that all stakeholders will aim to achieve by 2022. The national strategies also include all governmental programs, specifying their objectives, standards, outputs and functions.

Twenty ministers and directors of governmental institutions lead teams from within the ministries or bodies, along with national teams consisting of relevant state and civil society organizations, universities, as well as experts that collaborated to prepare the 18 sector strategies and the three cross-sectoral strategies. Sectoral strategies include agriculture, culture, heritage, education, employment, energy, health, housing, communication and information technologies, international relations, justice, local government, national economy, public finance management, security, social protection, tourism and antiquities, transport and communications, water and wastewater. Cross-sectoral strategies include gender equality, environment and youth.¹

Every sectorial committee and/or ministry is responsible of preparing their legislations and laws with collaboration with all other related parties. Legislations and laws, then, require the approval of the Palestinian council of ministers, and later on, the approval from the Palestinian parliament. Figure 1 illustrates the process described above.

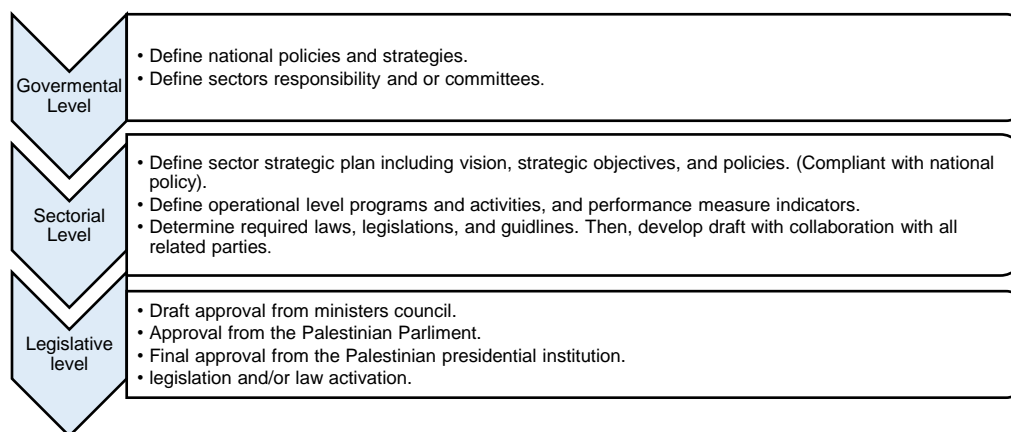


Figure 1 Policy, legislation, and law framework

¹ Ministry of Agriculture. National Agricultural Sector Strategy (2017-2022), Resilience and Sustainable Development. 2016.

3. Policies, strategies, and plans relevant to climate change

The Environmental Quality Authority (EQA) is the authority leading the efforts to develop and adopt a climate change policy at the national level. It has collaborated with related ministries, authorities and other parties to develop a number of strategies and policies pertaining to climate change, such as the NDC, the NAP and the Climate Change Adaptation Strategy Report for Palestine, among others.

The main document guiding climate change mitigation and adaption in Palestine is the NDC. In general, NDCs detail contributions of each country to reduce greenhouse gas (GHG) emissions as well as efforts on adaptation to climate change, agreed under the Paris Agreement. In the case of Palestine, the NDC details its contribution to climate change mitigation both quantitatively and qualitatively. For developing countries, they can obtain international support for the actions/targets included in their NDC. Therefore, many developing countries' NDCs include mitigation outcomes or actions conditional, either partially or fully, on the receipt of international support.

For Palestine, the mitigation component of the NDC is consistent with both the INCR and sectoral strategies. In addition, due to the uncertainty of Palestine's political future imposed by the current Israeli occupation, Palestine prepared its mitigation contribution in the NDC for two scenarios which are based on the independence scenario and the status-quo scenario:

- Independence scenario: ending the Israeli occupation, in which Palestine achieves independence and will be able to exercise full control over its resources; or
- Status quo scenario: the continuation of the Israeli occupation of Palestine.

These scenarios were also used for energy and emission modelling in the INCR, which assessed possible GHG emission reductions under both scenarios. The NDC set out mitigation outcomes for Palestine, for both scenarios:

- Independence scenario: 24.4 percent reduction by 2040 relative to Business-As-Usual (BAU), conditional on international support in the form of finance, technology transfer, and capacity building; or
- Status quo scenario: 12.8 percent reduction by 2040 relative to BAU, conditional on international support in the form of finance, technology transfer, and capacity building.

The NDC presents all mitigation actions that were prioritized within the INCR (both the 'realistic' mitigation actions and 'all' mitigation actions) and specifies actions that are implementable based on condition that they receive international support. These actions are identified as solar photovoltaic, energy efficiency in buildings, use of waste for cement production, use of waste for electricity generation, reduction of methane from landfill, energy efficient lighting, hybrid electric vehicles, compressed natural gas powered vehicles, modal shift programs, and afforestation.

Table 1 summarizes intended mitigation actions, and their anticipated GHG emission reductions under both scenarios.²

Table 1 Summary of conditional mitigation actions includes in the NDC, its quantities and percentage

Conditional mitigation actions	Independence scenario, emissions reduction ktCO ₂ eq	Status quo scenario, emissions reduction ktCO ₂ eq
--------------------------------	---	---

² PNA. Implementation Roadmap for the Nationally Determined Contributions (NDC) Under United Nations Framework Convention on Climate Change.

Building energy efficiency	510	0
Reduction of methane from landfill	290	290
Energy from waste for cement	110	110
Solar PV	2,900	635
Energy from waste for electricity generation	3	0.5
Lighting efficiency	334	12
Use of natural gas for vehicles	42.5	0
Hybrid electric vehicles	39	24.6
Transport modal shift	145	0
afforestation	9	9
Total	4,383 (24.4%)	1,081 (12.8%)

The NDC is also consistent with the NAP and Climate Change Adaptation Strategy Report for Palestine. It details Palestine's vulnerabilities in terms of climate change and possible adaptation actions. This is supported by previous work completed under the Climate Change Adaptation Strategy Report for Palestine, in which the main goal is to "identify the most effective means by which the Palestinian National Authority (PNA) can enhance the capacity of the Palestinians to cope with current and future climate hazards."

Palestine expects that climate change will affect the water and agricultural sectors. Projections indicate that precipitation decrease and significant increases in temperature will lead to higher insecurity levels for food and water in the region. For the coming 40-50 years projections, regional climate change trends are likely to include a fall in annual average precipitation, an increased incidence of drought, and an increase in the frequency of extreme events.

Generally, climate change impacts negatively affect human and economic development in a number of key areas, including agriculture and food security, water resources, coastal zones, public health, and disaster risk reduction. Above all, these impacts will affect citizens with already high social vulnerability and dependent to a large degree on external humanitarian and development assistance.

The major impacts of climate change on agriculture in Palestine include, more frequent droughts and increased desertification, changes in economic viability of crops, increased crop water requirements, decline in grazing ranges and stocks, and higher food prices.

In this context, the PWA pointed out that Palestinians struggle more with water shortage than water scarcity, and indicating that climate change will exacerbate the effects of Israel's current monopoly on regional water sources. PWA is focusing its efforts to reduce the effects of water shortage on communities served by the Israeli network, areas near the separation wall, and Area C communities. In order to mitigate effects of water shortage, PWA established filling points, water tankers brought in, and supporting NGOs have been working to develop more efficient rainwater harvesting systems. PWA considered these actions to be under the category of crisis management.

Long-term adaptation measures include construction of harvesting structures, floodwater capture, reallocation of freshwater used for agriculture, more reliance on using recycled water for irrigation, small-scale wastewater treatment, public awareness and outreach efforts, and desalination plants.

Another point of concern related to climate change is the potential impact of decreased precipitation and sea level rise on the coastal aquifer in Gaza. Over-pumping of groundwater, in addition to saltwater intrusion, could severely affect the communities who rely almost exclusively on the coastal aquifer for their water needs. PWA, in collaboration with coastal Management Water Utility and local municipalities, took few measures to help mitigate the effects of water pollution, such as mixing sources of safe and unsafe water, in order provide water that is at a marginally safer quality level. In addition to that, farmers have shifted agricultural production to crops, such as dates, which are able to tolerate water with a higher salinity

level.³

The EQA proposed adaptation measures also categorized under proactive (planned) as opposed to reactive actions. Examples of proactive actions at the governmental level include national policies for strengthening food and water security, while reactive state responses include post-event infrastructure reconstruction and water rationing. It is important to note that, while any national strategy for climate adaptation should stress proactive actions to reduce the severity of climate change impacts, the uncertainties in forecasting climate hazards mean that reactive responses will always also be necessary. These can usually only be considered in the context of particular events. However, the areas with highest risk can be anticipated and responsible national bodies need to consider and prepare guidance on reactive response options.

There are relevant policies, strategies and plans that exist in Palestine that address negative impacts of climate change, both in terms of mitigation and adaptation. Palestine's NDC and NAP reflect these policies and strategies and are based on and consistent with the country's national and sectoral development strategies. The NDC and NAP lists technology specific mitigation and adaptation measures that the country intends to undertake. The table below details the relationship between prioritized technologies and the NDC.

Table 2 Summary of prioritized technologies and relevance to the NDC

Sector	Technologies	Relationship with the NDC
Energy	➤ National grid assessment and electricity grid upgrade	➤ Electricity grid upgrade, provision of reliable energy supply
	➤ Various applications of photovoltaic (PV) technologies	➤ Solar photovoltaic, solar water heaters, generation of solar electricity for medium / large scale commercial / industrial application, use of renewable energy such as solar to reduce imported energy, providing reliable energy supply
	➤ Energy efficiency	➤ Energy efficient lighting, energy efficiency of buildings, implementation of energy efficiency measures, reducing energy consumption through introduction of modern production technologies, conducting energy audits, promoting green buildings
	➤ Solar water heating	➤ Promote increased use of solar thermal energy including solar water heaters
Agriculture	➤ Climate smart agriculture (precision agriculture)	➤ Climate-smart production practices, enhancing agricultural value chain, greenhouse management
	➤ Efficient irrigation	➤ Enhance community level irrigation schemes and infrastructure, improve water-use efficiency, enhancing agricultural value chain, supporting improvements in efficient use of water in women's private small scale agricultural projects. Precision irrigation, computerized irrigation and fertilization systems.
	➤ Resilient animal fodder	➤ Increase the availability of animal fodder, enhancing agricultural value chain
	➤ Conservation agriculture	➤ Minimize soil erosion, increase available water in the soil profile
	➤ Water harvesting	➤ Improve water-use efficiency and using alternatives water resources, rain-water harvesting, enhance the use of additional and alternative water resources for non-domestic resources, develop and improve

³ Friends on the Earth – Middle East FoEME. Palestinian Climate Change Policy. 2010.

		storm-water systems
Water and Wastewater	➤ Rain water harvesting	➤ Rain-water harvesting, enhance the use of additional and alternative water resources for non-domestic resources, develop and improve storm-water systems at different scales
	➤ Water resources monitoring technologies	➤ Improved water-use efficiency
	➤ Wastewater collection, treatment plants, and cesspits and advanced wastewater treatment technologies	➤ Improved water supply through wastewater collection and treatment systems
Transport	➤ Upgrade of the existing vehicle fleet	➤ Hybrid electric vehicles, compressed natural gas powered vehicles, upgrade the vehicle fleet, control the technical condition of vehicles and periodic maintenance
	➤ Public transport (modal shift)	➤ Modal shift programs, public transport
Solid Waste	➤ Waste sorting	➤ Improving waste collection system, 3R
	➤ Composting	➤ Improving waste collection system, 3R
	➤ Recycling	➤ Improving waste collection system, 3R
Others	➤ Provision of beach nourishment, reclamation and beach drift rehabilitation	➤ Provision of beach nourishment, reclamation and beach drift rehabilitation
	➤ Development of water, food and sanitation monitoring and safety systems using high technology related to health	➤ Development of water, food and sanitation monitoring and safety systems using high technology related to health

Although both the NDC and NAP enumerates intended mitigation and adaptation measures as well as technology specific measures that the country intends to implement, there is a lack of clear guidance or strategy on achieving these specific measures. To address this, there is a need to develop strategies and plans by building on the objectives of the NDC and NAP, and elaborating on Palestine's action plan for climate change. In this context, the development of Palestine's Technology Roadmap will serve this purpose as a first step, which will guide the country in prioritizing technologies for the implementation of the objectives of the NDC and NAP.

4. Policies, strategies, and plans relevant to the energy sector

Sector overview

The energy sector plays a vital role in developing national economy and providing employment opportunities. In Palestine, energy sources can be classified into three main types, namely the energy generated by petroleum and natural gas derivatives, electricity, and renewable energy, which includes solar power, wind power, and energy generated from burning wood, peat, among others. Except for renewable energy sources, Palestine almost completely depends on fuel imports from Israel. In 2008, Palestinian dependence on Israel constituted 87.7 percent of total electricity consumption, including 97.7 percent in the West Bank and 68.1 percent in Gaza. At the same year, domestic electricity generation comprised 9.7 percent of local consumption in Palestine. 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.

Gas and petroleum energy comprise 51 percent of total consumption in the local market, which is supplied as fuel for vehicles, heating and cooling systems, shops, and factories. These sources suffer from 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, given that they match United States (US) and European Union (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. As a result, 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 is not currently met by imports from Egypt and Jordan. Additionally, Palestine has no storage capacity and imports gas and petroleum almost on a daily basis⁴.

Previous national surveys and studies show a significant growth in Palestinian energy sector. Average available power annual growth equals to 5.8 percent, while average annual energy consumption growth equals to 7 percent. The Palestinian Energy and Natural Recourse Authority (PENRA) conducted a number of studies forecasting energy demand until 2030. Table 3 shows the results of their prediction regarding electric energy⁵.

Table 3 Palestine electric energy demand growth prediction (2017-2030)

Year	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030
Power (MW)	1221	1291	1365	1441	1521	1605	1690	1790	1885	1970	2065	2160	2220	2335
Energy (TWh)	5.28	5.67	6.05	6.49	6.93	7.41	7.92	8.47	9.05	9.65	10.31	11	11.77	12.85

In Gaza, 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 percent, or about 40 megawatts, compared to the local demand. Additionally, the electricity generated by the Gaza Electricity Generation Plant is expensive due to reliance on diesel imports. Lack of appropriate infrastructure of transmission networks, coupled with insufficient fuel, limits the ability to exploit the plant's maximum capacity.

However, renewable energy is also recognized as a promising source of energy in Palestine by national strategy documents, such as the Palestinian national energy strategy 2017-2022. In this document, PENRA stated that the energy sector's vision is to build comprehensive and integrated national energy system

⁴ PNA. Palestinian National Plan (2011-2013) – Energy Sector Strategy.

⁵ PENRA. Comprehensive National Strategy for Energy Sector in Palestine. 2016.

which is capable of securing energy from different sources that is enough to fulfill comprehensive sustainable development requirements. It also stated that the system will reflect real cost of providing and distributing energy, and utilizing all available local energy resources, especially clean renewable sources that are efficient, reliable, and compliant with international quality standards necessary for social and economic development. It further states that technologies used to secure energy needs must be up to date and compliant with international environmental standards. The strategy also elaborates on specific objectives and policies for energy efficiency.

The national energy strategy 2017-2022 includes the following objectives:

- Increase local generated power and utilize local available resources to reduce dependence on imported energy;
- Increase energy proportion from local renewable energy sources in the net energy mix in order to reduce negative environmental consequences;
- Generate and consume energy efficiently through adopting energy conservation and reducing losses and consumption; and
- Achieve energy security through adopting resources diversity and regional connection with neighborhood countries' electric networks, thus enhance energy trading and exchange.

The national strategy document includes four main strategic goals with relevant strategic interventions that support each goal identified. Table 4 summarizes the strategic objectives and its corresponding interventions.

Table 4 Strategy objectives and interventions for the national energy sector

Strategic objectives	Defined interventions to achieve objective
1. Increase national capability in fulfilling and securing energy needs	1.1 Diversify energy sources and provide an energy strategic reserve. 1.2 Exchange electric energy with neighborhood countries through network connection projects.
2. Provide sufficient quantities of energy to consumers with technical and environmental standards that meet internationally recognized standards	2.1 Develop the transmission and distribution system. 2.2 Apply modern technologies and automate the monitoring and control of the energy transmission and distribution system. 2.3 Energy efficiency and conservation.
3. Establish efficient and effective energy sector institutions	3.1 Continue building and activating institutions working in the energy sector. 3.2 Comprehensive and integrated sector planning through unified policy framework. 3.3 Capacity building for employees of the energy sector working staff.
4. Enhance energy sector economic effectiveness	4.1 Deliver natural gas to the Gaza Electricity Generation Plant, and provide natural gas for building power generation plants in the West Bank. 4.2 Utilize natural gas discovered in Gaza coastal region, and expected petroleum resources in the West Bank. 4.3 Terminate the phenomena of net lending and fuel smuggling from Israel. 4.4 Restructuring trading relationship (electricity importing) with Israeli electric generation company.

As shown in table 4, for each strategic objective, one or more interventions have been defined to achieve the objective. Additionally, to the national strategy document describes the required actions with its

performance indicators, either qualitative and/or quantitative, and a budget and time frame⁶.

Based on this national strategy, national renewable energy and national energy efficiency strategies were developed. For each of them, action plan was also developed. The National Energy Efficiency Action Plan (NEEAP) comprises these strategies, objectives and actions for implementation over three phases:

Strategies, objectives and actions are developed in NEEAP, which defined three implementation phases, aiming at:

1. Phase I (2012- 2014): Saving of 43 gigawatt hours (GWh) of total electricity consumption;
2. Phase II (2015-2017): Saving of 137 GWh of total electricity consumption; and
3. Phase III (2018-2020): Saving of 240 GWh of total electricity consumption.

Moreover, the plan allocated each phase targets over three main consumption sectors, which are industrial, buildings, and water pumping. Table 5 shows the targets allocation.

Table 5 Electricity saving over the three phases allocated on target sectors

Sector	Indicative Target			
	Phase I	Phase II	Phase III	2020 (overall target)
	GWh	GWh	GWh	GWh
Industrial	5	6	8	19
Buildings	38	130	195	363
Water pumping	-	1	1	2
Total (GWh)	43	137	204	384

The NEEAP, as described in the document, requires the development of specific policies:

1. Setting legal, financial, and incentive measures and the related technical standards in order to ensure energy efficiency and rationalization of electricity consumption;
2. Providing the sources of financing and the measures required to implement the program;
3. Promote the participation in programs and all related regional programs and activities in a manner consistent with national priorities for developing the energy sector in Palestine; and
4. Palestinian Energy Regulatory Council (PERC) should set regulations and measures related to conducting energy audits on consumers according to the size and type of service⁷.

Similarly, the National Renewable Energy Action Plan (NREAP) has also been developed. NREAP includes national targets that were determined for years 2020 and 2030 in terms of produced energy and shares (%) of the total generated energy. The national renewable energy strategic targets are:

1. 2020 target: 100 megawatt (MW), mostly PV;
2. 2030 target (scenario A): 300 MW including only Area A and B; or
3. 2030 target (scenario B): 500 MW including Area A, B, and C.

⁶ PENRA. Comprehensive National Strategy for Energy Sector in Palestine. 2016.

⁷ PENRA. The Palestinian National Energy Efficiency Action Plan (P-NEEAP). 2012.

It is important to emphasize that the plan aims to achieve 80 per cent of the 2030 targets with solar PV, 10 percent with wind, and 10 percent with biogas/biomass. NREAP also includes the rationale for the selection of specific technologies:

1. Solar PV: deployment of PV can be very fast, both for small- scale roof-top systems as well as for large / utility scale plants.
2. Onshore wind: while there is wind potential in mountains, wind development can only take place in Area C and therefore depends on approval from Israel. Thus, expected reasonable deployment is only expected after 2020.
3. Offshore wind: this is currently not an option for Palestine, not only because of contested sea rights but also because there is no concrete offshore wind development currently in the Mediterranean.
4. Geothermal: there are a few demonstration plants and studies, but apart from research and development projects, there is no specific support planned, and thus no significant development is to be expected.
5. Solid biomass like wood, charcoal, olive cake: those resources have been used and may further grow. However, there are no specific targets that have been set.
6. Solar Water Heating (SWH): Palestine already has a great number of SWH systems deployed. Further growth is limited by available rooftop space and there are no specific targets that have been set.
7. Biogas: this resource has potential to grow using waste, agricultural residues and animal waste.

Policy assessment for the technologies prioritized

For the energy sector, following technologies have been prioritized and have been selected for the policy assessment:

- National grid assessment and electricity grid upgrade;
- Various applications of PV technologies;
- Energy efficiency; and
- Solar water heating.

National grid assessment and electricity grid upgrade

Upgrading the Palestinian grid is crucial for the efficient distribution of electricity throughout its network meeting domestic demand, as well as to diversify energy sources and develop the integration of renewable energy sources as part of its energy mix.

Palestine's NPA 2017 – 2022 identifies sustainable development as one of strategic pillars, in which resilient communities development is identified as one of national priorities. Within this national priority, Palestine has identified expanding community access to reliable energy and increasing energy efficiency and reliance on renewable energy as policy interventions. This national priority is the basis for the development of the national energy strategy, which provides a more exhaustive overview of sector's strategic objectives and required policy interventions. The sector's national strategy identifies four specific objectives, as mentioned under the previous section on sectoral overview, in which objective 4 speaks directly to the need of grid upgrade, that would support achieving energy security through adopting resources diversity and regional

connection with neighboring countries' electric networks.

Grid upgrade is significantly important in improving energy efficiency and access to reliable energy as currently grid experiences limitations related to capacity and integration. Most importantly, this technology will be highly needed to meet other strategic objectives as the grid will need to be updated to accommodate increase in local generated power through renewable sources. This technology is also one of the enabling factors for energy trading and exchange, as noted in the strategy. This suggests that a strong policy environment exists in the sector already that would support the introduction of this technology, especially given that this technology is directly aligned with the sector's national objectives.

Various applications of PV technologies

With 3,000 sunshine hours per year and Global Horizontal Irradiance (GHI) over 2,000 kilowatt-hours (kWh) per meter squared, West Bank and Gaza rank amongst the world's top locations for construction of solar systems⁸. Moreover, amongst the available renewable energy sources, solar energy can be produced fully independently in Palestine.

Solar PV technologies link directly to sector's strategic objectives, objectives 1 and 2, of increasing local generated power from renewable energy sources and increasing the proportion of locally sourced energy in the net energy mix. Achieving these objectives will help reduce dependence on imported energy from Israel and reduce negative environmental consequences, in line with the strategy. This technology will support in achieving such outcomes.

In addition, the sector's national strategy further guided the development of two action plans, NEEAP and NREAP. The NREAP includes national targets for 2020 and 2030, which are:

4. 2020 target: 100 MW, mostly PV; and
5. 2030 target (scenario A): 300 MW including only Area A and B; or
6. 2030 target (scenario B): 500 MW including Area A, B, and C.

Importantly, the plan specifies that it aims to achieve 80 percent of the 2030 targets with solar PV, 10 percent with wind, and 10 percent with biogas/biomass. This signifies the importance of the application of solar PV technologies. This demonstrates that there is already a strong enabling policy environment present in Palestine that would support the introduction of these technologies related to solar PV. This will allow for an efficient introduction and implementation of these technologies in Palestine.

Energy efficiency

Achieving energy efficiency in Palestine is extremely important as the country is currently completely dependent on imported energy. In Palestine, buildings consume approximately 43 percent of the total energy consumption per year and this is expected to double by 2020. Additionally, buildings and construction is the fastest growing sector in Palestine, with 2,585 building licenses issued in the last quarter of 2017 in the West Bank.

Energy efficiency technologies is identified in meeting one of strategic objectives, objective 3, which aims to generate and consume energy efficiently through adopting energy conservation and reducing losses and consumption. Energy efficiency measures, through building and efficiency codes, will lead to energy conservation and loss reduction. This importance is emphasized in both the sector strategy and in the NPA, identified as a necessary policy intervention, to manage, protect and promote sustainable use and

⁸ Securing Energy for Development in West Bank and Gaza, World Bank, 2017

conservation of natural resources, including energy.

However, while this objective and policy intervention exist and align with the sector's national strategy, it is not yet implemented or mandated to further support the creation of an enabling environment for the introduction of this technology. In Palestine, buildings and construction codes and standards are still insufficient. Currently, there are still no mandatory standards for energy efficiency in buildings and no clear standards for green buildings. Thus, mandating the relevant policy and defining required standards for each building, will be extremely important to support the transfer and replicability of the technology in the country.

Solar water heating

Solar water heating (SWH) systems is currently a proven technology in Palestine. Palestine has already a significant number of SWH systems deployed, mostly in the residential sector, while limited in the service and industrial sectors. This technology is highly relevant in the Palestinian context as most of the electricity is supplied from external sources which the country has no control of, and thus fetch high costs, the most expensive compared with other countries in the region. With Palestine possessing high potential for solar energy, and the fact that the solar water heating technology is not constrained by the country's limitation on electricity supply, there is high rationale in prioritizing this technology. Additionally, there exist local manufacturers for solar water heating systems in Palestine.

Increasing locally generated power, from renewable energy sources, is an important objective for the sector. In addition, use and application of solar PV technologies is a priority for Palestine in meeting its renewable energy targets, as supported by the sector's national strategy and relevant energy efficiency action plans. NREAP clearly states that majority of targets will be met by solar PV energy production. This supports the creation of an enabling policy environment for the introduction of solar water heating technology in Palestine. However, while relevant regulation exists in supporting the technology, it is not yet implemented or mandated that would support the wide introduction and adoption of this technology. The regulation will need to be implemented in order to further enhance the enabling policy environment for effective introduction of this technology.

Summary

The above four technologies have been prioritized for the energy sector in meeting the sector's vision. From the policy standpoint, all of the prioritized technologies have required regulations and policies in place that would support the introduction of these technologies in Palestine. Additionally, these technologies all align directly with the sector's strategic objectives. Thus, these technologies are significant to achieving sector's objectives. However, in order to ensure effective introduction and implementation of these technologies, existing regulations will need to be implemented and mandated to further develop the enabling policy environment. This particularly applies to energy efficiency and solar water heating technologies.

5. Policies, strategies, and plans relevant to the agriculture sector

Sector overview

The Ministry of Agriculture (MOA) is the governmental body that leads agricultural development and is responsible for the formation of partnerships related to agriculture under which civil society and international institutions work. Since 1967, the agricultural sector, including all its various components and sub-sectors, is one of the most important pillars of Palestinian resilience. The agriculture sector provides employment, livelihood and food security source for a significant number of Palestinians and is considered as one of the most important pillars of Palestinian national economy. However, it is also a sector extremely fragile and vulnerable to climate change.

The Palestinian agriculture sector is diverse in terms of agricultural production. It benefits from the climatic variations in Palestine, and opportunities for irrigated crops and export cash crops, among others. These characteristics reflect the agricultural sector's ability to rapidly develop and effectively contribute in employment, as well as economic growth and development. In 2014, the value of agricultural production at constant prices was US\$ 540 million. The sector is in continuous decline since 2011, which recorded the highest value of agricultural production, up to US\$ 721.5 million.

Historically, the agricultural sector has played an important role in providing employment opportunities. Since 2006, the agricultural sector has witnessed significant decline in the number of agricultural workers, for both women and men, due to restrictions imposed on the sector's development and its low production. In 2006, the labor force in the agricultural sector accounted for 16.7 percent of the total labor force, 12.6 percent male and 35.1 percent female, respectively. This fell to 10.4 percent in 2014 and to 8.7 percent in 2015. The percentage of men working in the sector estimated to 7.8 percent of the total male workers in 2015, while 13.1 percent of the total female workers employed in agriculture, which indicates the relative importance of the agricultural sector for women.

The 2003 Agriculture Law No. 2, amended in 2005, constitutes the basic legal framework that regulates the sector, in addition to many agricultural by-laws adopted after the issuance of the Agriculture Law No. 2. Some of these by-laws include the Agricultural Pesticides by-law, Plant Product Smuggling by-law, Fodder by-law, Animal Recording and Identification by-law, Veterinary by-law, Animal health Control and Veterinary Quarantine by-law, Risk Prevention and Agricultural Insurance law, and the law of the Palestinian Agricultural Credit Institution. The adoption also included a by-law for the National Center for Research.

The MOA's strategic plan 2017-2022 vision is "sustainable agriculture; capable of competing locally and globally; and effectively contributes to strengthening food security, the bond between Palestinians and their land as well as their sovereignty over resources, towards building an Independent Palestinian State". The plan includes five strategic objectives:

1. Female and male farmers' resilience and steadfastness on their lands enhanced;
2. Natural and agricultural resources sustainably managed and better adapted to climate change;
3. Increased agricultural production, productivity, and competitiveness in local and international market, along with their contribution in gross domestic product and food security;
4. Female and male farmers and entrepreneurs access quality agricultural services needed for increasing value along agricultural value chains improved; and
5. Effective and efficient institutional and legal frameworks developed.

The national agriculture sector strategic objectives and its related strategic policies were prepared based

on Palestine’s national strategy⁹. Priorities and actions, such as water collection, water provision efficiency, agricultural disaster management, and afforestation address climate change mitigation and adaptation are highlighted in the sector strategy. Specifically, objective 2 in the sector strategy is directly linked to addressing climate change. Table 6 below details objective 2 from the national agricultural strategy.

Table 6 Objective 2 of National Agriculture Sector Strategy

Objective 2	Defined interventions
<p>Natural and agricultural resources sustainably managed and better adapted to climate change</p>	<p>2.1 Establish large water facilities in arable irrigated areas through the transfer of water or water collection or wastewater treatment and increase the efficiency of the available water.</p> <p>2.2 Provide the necessary support for land reclamation and agricultural road construction that link all agricultural land or lands that could be cultivated.</p> <p>2.3 Take measures and arrangements to adapt with or avoid the negative impact of climate change and natural disasters, particularly high temperatures and fluctuating precipitation or declining rain water.</p> <p>2.4 Intensify efforts of research and official institutions, local authorities and centers to protect the forests and natural reserves, as well as organize and develop pastures, protect agricultural biodiversity in all environmental areas in Palestine.</p> <p>2.5 Continue the greening of Palestine as a responsibility of all institutions, local authorities, schools and universities.</p> <p>2.6 Protect agricultural lands from urban expansion, especially in plain areas and high value agricultural lands.</p>

Palestine also developed the Agricultural Sector Climate Change Adaptation Action Plan 2018-2020. There are a number of priority interventions identified in this document:

- Enhance sustainable community-level irrigation schemes and infrastructure;
- Climate-smart agriculture;
- Improve water-use efficiency and using alternatives water resources;
- Land-use planning and management - greening, afforestation, and rangeland development;
- Agricultural disaster risk reduction and management (DRR/M);
- Improve livestock-production pens to serve livestock production; and
- Establishment of farmers' support to decrease the cost of agriculture production.

The plan is in line with the NAP and details the climate rationale for each intervention.

Despite what has been the achieved by the Agricultural Law No. 2, coupled with subsequent by-laws issued based on it, there is still an urgent need to prepare many of the regulations and instructions to complete the legal framework. The Palestinian legislative framework also suffers from outdated laws, dating from the era of the Ottoman Empire, the British Mandate and even from the Israeli occupation. Some of these laws are still in effect today, which consequently impedes the agricultural development processes. At the same time,

⁹ Ministry of Agriculture. National Agricultural Sector Strategy (2017-2022), Resilience and Sustainable Development. 2016.

the MOA's Strategic Plan 2017-2022 clearly defines the vision and objectives, as well as action plans for the agriculture sector of Palestine in achieving the sector's climate resilience. This can serve as the basis for the introduction of the prioritized technology for the agriculture sector and introducing the necessary regulations and incentive mechanisms to up-scale its implementation.

Policy assessment for the technologies prioritized

For the agriculture sector, following technologies have been prioritized and have been selected for the policy assessment:

- Climate smart agriculture (precision agriculture);
- Efficient irrigation;
- Resilient animal fodder;
- Conservation agriculture; and
- Water harvesting.

Climate smart agriculture (precision agriculture)

Climate change both directly and indirectly impacts agricultural productivity, ranging from changing rainfall patterns, drought, flooding and spread of pests and diseases. Climate-smart technologies have been applied in many parts of the world to manage climate change impacts on landscape such as, cropland, livestock, forests and fisheries. These technologies aim to achieve increased and sustainable productivity, enhanced resilience and reduced emissions. This is significantly important in the context of Palestine where agriculture plays an important role in the country's culture, food security, economy and employment. Most importantly, Palestine has identified applying climate-smart agricultural (CSA) practices to at least 50 percent of farmers by 2040 as a target in its NDC.

Palestine developed the Agricultural Sector Climate Change Adaptation Action Plan 2018-2020, which identifies a number of priority interventions. This includes climate-smart agriculture. This plan is in line with the NAP and details the climate rationale for the intervention. In addition, promoting and enforcing climate-smart and adaptive, biodiversity-protecting and desertification-combatting agricultural policies and technologies is one of policy interventions identified by the sector in meeting its strategic objective to sustainably manage its resources. As highlighted by the MOA, there is a large support for the use of climate smart agriculture technologies in Palestine, which is one of Palestine's priority actions as mentioned in the sectoral overview section. This suggests that there is a strong enabling policy environment for the introduction of this technology in Palestine.

Efficient irrigation

Improving irrigation efficiency aims at minimizing water use within the agricultural sector while continuing to maintain optimal crop productivity rates. Water efficient irrigation also provides a number of environmental and socio-economic benefits. High irrigation efficiency is becoming increasingly important due to the current decrease in available water resources and growing populations that drive expansion of agricultural activities¹⁰.

Technological advances for improved irrigation include more efficient irrigation systems where water release can be controlled so that crops receive only the amount needed. Other modern irrigation systems are self-

¹⁰ Climate Change Adaptation Technologies for Water: A practitioner's guide to adaptation technologies for increased water sector resilience (2017), UN Environment – DHI Centre, Climate Technology Centre and Network (CTCN) and the UNEP DTU Partnership

propelled and include wireless sensors and Global Positioning System (GPS) technology to improve site-specific and volumetric precision of water applications to match the needs of the soil and crops. Irrigation efficiency can also be improved through altering farming practices, such as crop rotation and conservation tillage that help improved soil moisture conservation¹¹.

Regular monitoring equipment and repairing damages/leakages in irrigation systems are also important in improving water use efficiency for crops. Improving access to information in regards to these measures, for example through farmer education programs, can help create incentive and influence the behavior of farmers toward greater water-efficient management or irrigation systems¹².

Similar to precision agriculture, the sector's Climate Change Adaptation Action Plan identifies enhancing sustainable community-level irrigation schemes and infrastructure and improving water-use efficiency and using alternatives water resources as key policy interventions. This links directly to the sector's strategy in which, as one of defined interventions, increasing the efficiency of the available water is critical in meeting the objective of sustainable managing natural and agricultural resources. According to the MOA, there is already a regulation in place to decrease inefficiencies in water use for irrigation purpose. This suggests that there is an enabling policy environment already in place in Palestine to introduce this technology.

Resilient animal fodder

Recurring droughts and overgrazing in the West Bank have resulted in herders facing decreased access to grazing land, which increases their dependency on imported fodder and making them more vulnerable to fodder price volatility. To help address this issue, the use of hydroponic technology (soil-less plant propagation) by vulnerable herders and their cooperatives has been promoted in Palestine¹³. This provides them with a low-cost, high quality, sustainable source of fodder which is available year-round. In addition, current feed supply, whether in terms of quality or quantity, is still unable to cover the existing need.

A number of agricultural by-laws were adopted after the issuance of the Agriculture Law No. 2, including the fodder by-law that supports national standards and specifications of fodders. In addition, one of the sector's strategic objectives focus on increasing agricultural production, productivity, and competitiveness in local and international market, along with their contribution in gross domestic product and food security. In meeting this strategic objective, one of the policy priorities identified by the sector is to develop initiatives and national policies to reduce cost of production inputs, especially prices of fodders, fertilizers and pesticides. The existence of these relevant by-laws and policies are also confirmed by the MOA. This suggests that there is an enabling policy environment in place that supports the introduction of this technology in Palestine.

Conservation agriculture

Conservation agriculture is a farming system that maintains a permanent soil cover to assure its protection, avoids soil tillage, and cultivates a diverse range of plant species to improve soil conditions, reduce land degradation and increase water and nutrient use efficiency. It enhances biodiversity and natural biological processes above and below the ground surface for improved and sustained crop productivity¹⁴. Most importantly, conservation agriculture can enhance productivity of farmland already in use and can generate

¹¹ Climate Change Adaptation Technologies for Water: A practitioner's guide to adaptation technologies for increased water sector resilience (2017), UN Environment – DHI Centre, Climate Technology Centre and Network (CTCN) and the UNEP DTU Partnership

¹² Climate Change Adaptation Technologies for Water: A practitioner's guide to adaptation technologies for increased water sector resilience (2017), UN Environment – DHI Centre, Climate Technology Centre and Network (CTCN) and the UNEP DTU Partnership

¹³ Food and Agriculture Organization (FAO). "Alternative fodder production for vulnerable herders in the West Bank: Increasing profitability of livestock production to strengthen resilience to drought and market volatility within protracted crises". Resilience promising practice, 2015.

¹⁴ Food and Agriculture Organization (FAO). Conservation Agriculture. Accessed from <http://www.fao.org/3/a-i6169e.pdf>

land left in poor condition by past misuse¹⁵.

One of the strategic objectives for the sector's strategy plan is to sustainably manage natural and agricultural resources. Relevant policy intervention identified is to protect area of land cultivated or from land degradation expanded annually. In support of meeting this objective, the sector has developed Sustainable Use of Agricultural Land Strategy and drafted legislation and procedure manuals in the field of agricultural land management, soil fertility and use of fertilizers. In addition, a national strategy is currently in place for this technology which suggests that an enabling policy environment exists in introducing the technology. This technology also links to the sector's national strategic objective to sustainably manage natural and agricultural resources that adapt better to climate change. Therefore, there is a strong policy and directional support in the use and implementation of this technology in the Palestinian context.

Water harvesting

Water harvesting is a technique of developing surface water resources that can be used to provide water for livestock, for domestic use, and for agriculture. Rainwater conservation and harvesting for agriculture use provides opportunities to reduce the high risk of yield losses associated with low rainfall and uneven distribution throughout the season. This reduces the financial risks associated with crop failure¹⁶.

When water harvesting techniques are used for farming, the storage reservoir is the soil itself, hence eliminating the need to construct storage facilities. The appropriate choice of water harvesting techniques depends on the amount of rainfall and its distribution, soil type and depth, land topography, and local socioeconomic factors, and therefore these technologies are particularly site specific.

The basic principle is to capture precipitation falling in one area and transfer it to another, thereby increasing the amount of water available in the latter. The basic components of a water harvesting system are a catchment or collection area, the runoff conveyance system, a storage component and an application area.

Water harvesting, specifically rainwater harvesting, for agricultural use is highly relevant to the Palestinian context. Climate change provides additional stress to already limited rainfalls in the region. Additionally, drought and growing population will be challenging in meeting the agricultural need for the country. Use of alternative water resources, such as rainwater, has been identified as an important adaptation solution in Palestine's NDC.

Similar to efficient irrigation, one of the policy interventions identified for meeting the strategic objective of sustainably managing natural and agricultural resources is to increase and efficient management of the volume of water available to farmers and livestock breeders from traditional and non-traditional sources. The sector has already worked significantly to implement the application of water harvesting techniques at the experimental capacity. The MOA is also working closely with the private sector, non-governmental and farmers' organizations to implement projects relate to water harvesting interventions. In addition, a by-law currently exists which supports the application of water harvesting in Palestine, suggesting that a strong enabling policy environment exists to introduce the technology.

Low-carbon cold chain storage

Palestine's NAP emphasizes that the current post-harvesting storage techniques in the country are inadequate, such as the lack of large-scale grading and refrigerated cold storage. The impacts of climate change such as rising temperatures and more extreme weather events may increase post-harvest losses

¹⁵ Food and Agriculture Organization (FAO). Conservation Agriculture. Accessed from <http://www.fao.org/3/a-i6169e.pdf>

¹⁶ Baako, A.M. (2015). "Promoting On-Farm Water Harvesting and Conservation Techniques for Sustainable Agricultural Production Systems through Capacity Development of Field Extension Officers and Farmers". Journal of Developments in Sustainable Agriculture 10, pg. 55-60.

due to increased likelihood of spoilage and increased risk of pathogen or pest infestation. Conventional measures have been taken to address such losses such as increasing cooling and improving storage capacities. However, these measures translate into higher costs. There is a need to introduce lower-cost, low-carbon solution through cold chain technologies to improve food security and reduce GHG emissions.

Addressing food security is one of the five strategic objectives identified under the sector's strategic plan. The objective is to enhance natural and agricultural production, productivity, and competitiveness in local and international market while contributing to gross domestic product and food security. Food security is a critical priority when addressing impacts of climate change. This technology will allow for the necessary policy intervention that would provide food security for Palestine. Moreover, the technology's running cost is lower compared to other alternatives, and so, it will improve the competitive ability of Palestine's food supply chain against Israeli products. Therefore, the implementation of this technology is supported by an enabling policy environment, as supported by the sector's strategic plan.

Summary

The agricultural sector is one of the most important pillars of Palestinian resilience and national economy. The agriculture sector provides employment, livelihood and food security source for a significant number of Palestinians. However, it is also a sector extremely fragile and vulnerable to climate change.

The MOA has been actively working to implement the prioritized technologies. These technologies are identified as strategic and national priorities for the sector, and have been supported by the Climate Change Adaptation Action Plan and the sector's national strategy. Policies are already present in Palestine in introducing these prioritized technologies, creating a strong enabling policy environment within the sector. Prioritized technologies are also already present in Palestine, in small to experimental level, which also further support the applicability of these technology in the country.

6. Policies, strategies, and plans relevant to the water and wastewater sectors

Sector overview

Palestine depends mainly on four main groundwater basins, three in the West Bank and the fourth in Gaza strip. Although the average annual renewal feeding exceeds 700 million cubic meters, the average allowance of water withdrawal by the Israeli government is around 100 million cubic meters per year, which is much lower than the demand. It forces Palestinians to buy water for their shortage from the Israeli governmental company, Makarot. Ensuring water availability and security by protecting current resources from pollution and losses is a key issue for Palestine.

The PWA was established in 1996 according to the Law No. 2 – 1996. PWA's main responsibility is to build and develop Palestinian water sector institutions. The sector faces many challenges including the need to build institutions such as municipalities and Local Government Units (LGUs), as mentioned in the new water law in 2014. In addition, there is also a need to enable these institutions in doing their roles effectively. Main roles of water sector institutions are to provide services and develop infrastructure, and ensure water quality and fair spatial water distribution. PWA is essential in helping sector institutions in fulfilling their duties. PWA works as a centralized manager to ensure the harmony and development of different institutions. To ensure this, PWA developed and implemented a number of strategic plans, such as the 2017-2022 strategic plan for water, which is the guiding document for the water sector in Palestine.

PWA strategic plan's (2017-2022) vision is 'an organized water and wastewater sector, which contributes in building up the Palestinian Sovereignty and ensures the sustainability of water resources according to robust health, environmental, social and economic structures capable of achieving the essential and developmental requirements of the Palestinian people'.

Based on this vision, many strategic objectives were formulated. Table 7 describes the sector's main components, strategic objective for each component, and adopted policies to achieve each objective.

Table 7 Water and wastewater sector components, strategic goals, and objectives

Sector Component	Strategic goal	Objectives
Water resources	1. Integrated management and sustainable development of the water resources (quantitatively and qualitatively)	1.1 Increasing available water quantitatively and qualitatively (conventional and unconventional water resources) 1.2 Increasing the capacity of PWA in planning and management of water resources 1.3 Supporting national effort towards justifying the Palestinian rights in their water resources 1.4 Protecting water resources from pollution and depletion
Water supply	2. Improving the quality and reliability of water supply services as well as ensuring fair water distribution	2.1 Increasing water quantity provided to beneficiaries 2.2 Good and sustainable water supply for all citizens from safe water resources 2.3 Improving the efficiency of water distribution systems
Waste water	3. Improving wastewater services and structures (collection, treatment, and reuse)	3.1 Maintaining public health and protecting environment from pollution 3.2 Increasing the efficiency of wastewater systems (collection, transportation and treatment) 3.3 Increasing agricultural areas suitable for treated water irrigation from unconventional water resources 3.4 Providing an investment environment for private sector participation in this component

Sector Component	Strategic goal	Objectives
		3.5 Encouraging using clean energy resources in this component
Institutional Arrangements	4. Development of Water Sector institutions to reinforce Good Governance bases within an integrated legal and institutional Framework	4.1 Establishing and restructuring the different Water Sector institutions according to the new Palestinian Water Law 4.2 Increasing the capacity of Water Sector institutions and improving their roles and 4.3 Improving related Water Sector regulations.
Financial arrangement	5. Ensuring the financial sustainability of water utilities and water service providers	5.1 Reinforcing financial independence of water utilities and water providers 5.2 Increasing collectability efficiency and decreasing the public debt 5.3 Improving and applying regulations, guidelines, fees, and tariff systems to ensure financial sustainability 5.4 Promoting social Consciousness and strengthening rights and obligations approach (payment for services)

As shown in table 7, one of the objectives is the fair distribution of water and wastewater services between citizens. However, Palestinian communities are suffering from water shortage, with around 120 communities that contain 180,000 Palestinian inhabitants are without municipal water and wastewater networks services. Moreover, PWA studies and data analysis revealed that average losses in local networks reached 32 percent. A number of sub-objectives are associated with this objective, such as preparing integrated policies, strategies, and plans for water sector, and develop related procedures and legislations.

The plan also includes a special chapter to illustrate required programs and/or actions. For example, developing and protecting water resources according to integrated management concepts, developing alternative resources, and developing related policies and legislations are included in the list of required programs. Developing alternative water resources includes utilizing rain and surface water through water desalination projects.

One of those programs is the program related to developing policies and legislations, which states that there is a need to review and develop water sector-related legislations, and also to build, issue, and implement new legislations issued after the new water law was passed. In addition, the plan also states that preparing strategies and policies for building water sector institutions employees' capacity is crucial for developing the whole sector and achieving the strategic plan main objectives.

There are a number of achievement indicators developed for follow up and evaluation. For developing alternative resources program, the main indicator is the extra additional number of million cubic meters of water coming from alternative resources per year. For developing and enhancing effectiveness of the current resources, a percentage of rehabilitated agricultural wells per year is the main indicator. However, the program related to developing policies and legislations does not have any performance indicators, which suggests there will be not enough or suitable tools for evaluating the strategic plan in this program specifically. No numeric values exist even though the plan mentions that the main indicator is the percentage of prepared policies and legislations¹⁷.

Some of the strategy's priorities link with climate priorities and actions, such as improving water resources and supply, wastewater treatment and re-use, improving irrigation management and flood management.

¹⁷ PWA. National Water Sector Strategic Plan and Action Plan (2017-2022). 2016.

Finally, it is important to emphasize that the water strategic plan faces challenges related to agricultural sector's water needs. The MOA stated in its plan that rehabilitating new lands and developing the sector is one of its main strategic objectives. However, this requires a significant amount of water resources.

The PWA Strategic Plan 2017-2022 lays out Palestine's vision, strategic goals and objectives for the water and wastewater sector. However, further policies and regulations need to be developed based on this strategy, which will allow for specific technologies for the sector to be introduced and disseminated achieving its goals. Furthermore, as the water and wastewater sectors involve several governmental and non-governmental institutions, institutional fragmentation exists which results in the lack of coordination among these institutions.

Policy assessment for the technologies prioritized

For water and wastewater sectors, following technologies have been prioritized and have been selected for the policy assessment:

- Rain water harvesting;
- Water resources monitoring technologies; and
- Wastewater collection and treatment plant and advanced wastewater treatment technologies

Rainwater harvesting

Rapidly growing population and Israeli control over water and land resources have worsened Palestinian water supply and management issues. A large number of Palestinians suffer from shortages of drinking and agricultural water, especially during the summer when the water shortage is at its worst, and most of the households live isolated from the water network. The implementation of rainwater harvesting systems can allow these isolated households to have an independent access to water resources.

PWA's strategic plan 2017-2022 identified lack of available water resources as a priority issue related to water resources. In order to address this issue, integration of management and sustainable development of the water resources, both quantitatively and qualitatively, has been identified as a strategic goal. One of the objectives for this strategic goal includes increasing the availability of water, both quantitatively and qualitatively, from both conventional and unconventional water resources, including rainwater. Palestine is challenged with water shortage due to limited withdrawal limit imposed by Israel. Use of rainwater in meeting the water shortage would increase the total amount of water available for use by Palestinians. Thus, this technology is highly relevant for the sector. The Ministry of Local Government (MOLG) has also developed a regulation for rainwater harvesting, further encouraging the use of this technology in increasing the water availability. This suggests that there is an enabling policy environment in introduction the technology in Palestine for successful deployment of the technology in the country.

Water resources monitoring technologies

Water is one of the key components in both the Palestinian economy and the regional geopolitical setting. Moreover, West Bank and Gaza are facing significant and growing shortfalls in the water supply available for domestic use, and it is thus primordial to assure water security in Palestine. This can be done partly by implementing water resources monitoring systems to manage freshwater resources, collect essential information in characterizing the physical, chemical and biological status of water resources, and determine trends and changes over time.

Similar to the technology above, this technology has been proposed as a policy intervention to meet the strategic goal of integrating management and sustainable development of water resources. The necessary policy intervention is to monitor different water resources, both quantitatively and qualitatively, including

violations. This addresses the need to efficiently manage water resources in Palestine as availability of water is significantly limited and restricted by Israel. This suggests that an enabling environment exists that would support in introducing this technology.

Wastewater collection and treatment plan and advanced wastewater treatment technologies

The Government adopted the Palestinian National Water Strategy from 2013 to 2032, in which the importance of wastewater management and treatment is emphasized in the national policy, especially access to water and wastewater services, and sustainable wastewater management. Four wastewater treatment plants in Gaza and five wastewater treatment plants in the West Bank are already installed and operating.

Improving wastewater services and structure including collection, treatment and reuse is a strategic goal for the sector component related to water supply. This technology will be extremely important in maintaining public health and protecting environment from pollution, increasing the efficiency of wastewater systems and increasing the agricultural areas suitable for treated water irrigation from unconventional water resources. According to PWA, there are currently regulations in place on wastewater and wastewater management in Palestine, suggesting there is a supporting policy environment in place.

Summary

Palestine's water sector institutions are responsible for providing services, developing infrastructure, and ensuring water quality and fair water distribution spatially. PWA is essential in ensuring the harmony and development of different institutions. PWA has developed and implemented a number of strategic plans, such as the 2017-2022 strategic plan for water, which have identified above technologies as priority interventions in meeting its strategic goals. A number of policies and regulations are also already in place that would support the introduction of these technologies in Palestine. However, there is a need to clearly define roles and responsibilities in the sector among the different institutions to avoid the duplication of efforts and address coordination issues.

7. Policies, strategies, and plans relevant to the transport sector

Sector overview

The Palestinian transport sector is one of the most influential sectors in local economy. It serves citizens by providing their transportation needs between Palestinian lands and goods transportation. Moreover, this sector offers many investment and job opportunities.

The Ministry of Transportation (MOT) is responsible for managing and developing the sector with collaboration with other bodies. Moreover, it is responsible for determining the sector infrastructure, managerial frameworks, and legislative needs, including the development of midterm and long term strategic plans.

The MOT has reviewed their 2014-2016 strategic plan and highlighted main obstacles to achieving its strategic objectives. These included limited financial resources, Israeli settlements and the separation wall, the Oslo Accord security classification of lands (A, B, and C), and the absence of the Palestinian parliament. The Ministry, then, developed the 2017-2022 sector strategy.

The transport sector's 2017-2022 strategy vision is 'toward safe and effective transportation sector, fulfil citizen's needs, ensure international connection, enhance private sector role in investment, participate in achieving sustainable economy, and do not harm the environmental'. The vision identified four strategic objectives:

1. Integrated sector governance rules under international standards;
2. Provide safe transportation for users;
3. Provide transportation networks under international standards; and
4. Palestine as a major part of Arabic and international connection network with 10 percent of the total planned network length, where it will connect Palestine with Egypt and Jordan by the year 2017.

Five strategic policies have been defined in achieving the sector's strategic objectives. Moreover, the plan included definition of obstacles, programs with its financial situation and progress description, and a Strengths, Weaknesses, Opportunities, Threats (SWOT) analysis. Table 8 illustrates the strategic objectives for the transportation sector¹⁸.

¹⁸ Ministry of Transport. Sectorial Strategy for Transport 2017-2022. 2016.

Table 8 National transportation sector strategic objectives and policies

Strategic aims/objectives	Strategic Policies
<ol style="list-style-type: none"> 1. Integrated sector follow governance rules under international standards. 2. Provide safe transportation for users. 3. Provide transportation networks under international standards. 4. Enable Palestine to become a major part of Arabic and international connection network with 10 percent of the total planned network length, where it will connect Palestine with Egypt and Jordan by the year 2017. 	<ol style="list-style-type: none"> 1. Good quality services with acceptable time and price. 2. Ensure on-road safety. 3. Develop vehicles and drivers licensing standard to compile with international standards, especially European. 4. National comprehensive planning for the sector, and ensure efficient and effective internal and external connection. 5. Establish legislative and operational environment that fulfil international agreements participation requirements and human rights.

The sector strategy 2017-2022 for the transport sector defines the sector’s objectives and plans. However, there is a need to elaborate further in supporting policies that would allow specific technologies to achieve the country’s climate change objectives. In addition, there are several governmental institutions involved in the transport sector, particularly pertaining to road management. There is a need for a policy to be developed that would clearly define the roles and responsibilities of each institutions involved to avoid overlap and improve coordination.

Policy assessment for the technologies prioritized

For the transport sector, following technologies have been prioritized and have been selected for the policy assessment:

- Upgrade of the existing vehicle fleet;
- Public transport (modal shift);
- Flood prevention; new and existing transportation networks infrastructure should take into consideration rain water drainage solutions.

Upgrade of the existing vehicle fleet

The transport sector is one of the main causes for air pollution and greenhouse gas emissions. While the worldwide trend in addressing this is a high increase in the sales numbers of electrical vehicles (EVs), characterized by an increase in sales of cars by almost 60 percent in 2017¹⁹ (compared to 2016), this is not the case in Palestine as it seems that it has experienced slower rate in the increase of the number of sales of cars compared to this global trend. Palestine installed its first EV charging stations at the beginning of 2019, at the same time as full EVs started being sold for the first time in the country²⁰. Upgrading a large number of the existing vehicle fleet to hybrid/electric cars appears to be one of the potential solutions to tackle the pollution issue and a way for Palestine to keep up with the world’s eco-friendly approach regarding transport.

In supporting the introduction of this technology in Palestine, the MOT has already introduced regulations that promote electric vehicles in Palestine, and also for the related infrastructure. In addition, the Ministry offers relevant tax breaks and incentives that allow for the creation of a strong enabling policy environment

¹⁹ The \$6 Trillion Barrier Holding Electric Cars Back, 2018, Bloomberg

²⁰ Feature: Palestinians embrace eco-friendly cars as first electric car charging stations installed, 2019, Xinhua

for the technology.

Public transport (modal shift)

The system of public transportation in Palestine is divided into two main types: buses and taxis. However, bus, as a mode of transportation, only represent a small percentage of the total number of vehicles, at only about 0.3 percent in Gaza Strip alone. Efficiently encouraging public transportation can greatly decrease the level of congestion, resulting in reduction in GHG emissions. Therefore, initiating modal shift in public transportation, from taxis or privately owned vehicles to buses, is a priority policy intervention for the sector.

The MOT, as similar to other ministries, has a strategic national plan in place that identify strategic goals and objectives. Modal shift is a key climate change mitigation intervention and the Ministry has introduced relevant policy and regulations to support the introduction of this technology. While the Ministry cannot force the Palestinian population to adopt modal shift, supportive enabling policy environment exists for the technology implementation.

Flood prevention

Palestinians, especially those who live in the Gaza Strip, live with the threat of temporary displacement, property losses and health risks due to the flooding risk in winter. According to the Water, Sanitation and Hygiene Cluster (WASH), 60 communities in low-lying locations across Gaza, including 560,000 people, have been identified as being at risk of flooding, even from light rainfall²¹. Therefore, flood prevention represents a key issue not only for Palestine, but also for international humanitarian agencies. Nowadays, several technologies exist to prevent flooding.

However, flood prevention specific to road transportation networks is not supported under the existing policy environment. Upon further discussions and assessment with relevant stakeholders, it was agreed that this technology be considered as an inclusion to the broader prioritized technology of rainwater harvesting.

Summary

The transportation sector provides transportation needs between lands and for goods. The sector also provides many investment and job opportunities. For the climate change mitigation technology roadmap, the Ministry has prioritized two technologies mentioned above. As confirmed by the Ministry, the necessary policy environment exists in Palestine that would support the introduction of these technologies.

²¹ Poor infrastructure and lack of funding put over 560,000 people at risk of flooding in the Gaza Strip, 2017, OCHA. Accessed from <https://www.ochaopt.org/content/poor-infrastructure-and-lack-funding-put-over-560000-people-risk-flooding-gaza-strip>

8. Policies, strategies, and plans relevant to the solid waste sector

Sector overview

The solid waste sector in Palestine has developed significantly since the establishment of the Palestinian Authority. Law number 1 for local governorates in 1997, environmental law number 7 in 1997, and public health law in 2004 all contributed in developing the solid waste sector. In 2008, the national steering committee was established by the decision (12/53/29), issued by Palestinian prime minister, for preparing national strategy of solid waste management.

The national strategy's vision for the sector, as stated in 2017-2022 strategy, is 'an integrated and sustainable solid waste management that contributes in achieving social and economic benefits for Palestinians'. However, the sector still faces many legislative, organizational, technical, environmental, and financial obstacles. Moreover, lack of reliable related statistical data and the political situation adds complexity and obstacles to the development of the sector. This was emphasized in the solid waste sector strategy 2010-2014, which stated that a number of barriers were the result of the absence of legislative, organizational, and institutional frameworks. The previous strategy also emphasized that the absence of policies and strategies affected the Palestinian government's ability to develop suitable programs for developing the sector. Table 9 shows strategic objectives and interventions referred to in the national solid waste strategy 2017-2022.

Table 9 National solid waste sector strategic objectives and policies

Strategic aims/objectives	Strategic interventions
1. Effective legislative and organizational framework for managing solid waste	1.1 Update and improve the legislative framework to support integrate solid waste management. 1.2 Strengthen organizational framework for national institutions and enhance its integrated roles.
2. Strong institutions able to do its roles effectively	2.1 Building institutions capacities and experiences in the field of solid waste management.
3. Effective and environmentally safe solid waste management services.	3.1 Develop current collection and transportation services systems to enhance service effectiveness and quality and offer it to all citizens. 3.2 Safe, efficient, and effective disposal of solid wastes in environmental friendly regional landfills serving all communities or dispose solid waste in modern suitable high tech methods. 3.3 Enhance solid waste reduction, reuse, recycle, and energy generation before final disposal in regional landfills. 3.4 Prohibit using random landfills, close it or rehabilitate it gradually to limit its negative environmental and health consequences. 3.5 Reduce greenhouse gas emissions generated from solid waste related activities, and to reduce climate change effects.
4. Sustainable and financial effectiveness for solid waste management services and activities.	4.1 Reducing collection and transportation services costs. 4.2 Enhance self-financing principle and operational expenses cost recovery.
5. Suitable procedures and mechanisms for dealing with hazardous, medical, and special solid wastes.	5.1 Establish a following up system to evaluate and trace hazardous wastes and provide essential data for that purpose, and develop correct and safe procedures for its management, including separation, collection, transportation, and disposal. 5.2 Treating medical solid waste and reducing its environmental consequences before final disposal under the principle of "pollutant pay". 5.3 Reducing health and environmental negative impacts of special solid wastes.

6. Increase private sector involvement in solid waste management.	6.1 Enhance awareness and develop essential procedures and principles to establish a good investment environment to encourage the participation of private sector.
7. Increase community awareness and involvement.	7.1 Building deep awareness, environmental, social, and institutional knowledge related to solid waste sector and its consequences. 7.2 Raise students' environmental awareness and improve their attitudes and skills required to recycle solid wastes (such as recycling equipment and compost barrels).
8. Effective systems for information and monitoring.	8.1 Establish a unified national database.

Policy assessment for the technologies prioritized

For the solid waste sector, following technologies have been prioritized and have been selected for the policy assessment:

- Waste sorting;
- Composting; and
- Recycling.

Waste sorting

Palestine would greatly benefit from improving its solid waste sorting practices as about 50 to 55 percent are comprised of organic waste while the rest can be recycled. Having an effective and environmentally safe management of solid waste will allow for other waste handling alternative options such as recycling and composting technologies become for financially viable.

As per the sector's national strategy 2017 – 2022 identified above in table 9, there is a strategic objective in place that addresses the need for effective and environmentally safe solid waste management services. One of the strategic interventions in meeting this objective is to enhance solid waste reduction, reuse, recycle, and energy generation before final disposal in regional landfills, which would be met through effective waste sorting technology. To support this, the MOLG prepared a general strategy and policies that would meet the sector's strategic objective. However, as per the Ministry, there is a lack of detailed policies specifically on waste sorting that would further support the introduction of this technology. This is needed in order to create an environment that would enable successful implementation of waste sorting technology.

Composting

Composting effectively reduces the overall waste volume that ends up in landfills. As waste material required for the production of compost is organic, this consequently reduces the decomposition of organic waste in landfills thereby reducing greenhouse gas emissions. At the same time, the final product, compost, are valuable inputs to the soil and serves as fertilizer providing nutrients for agricultural products.

Similar to 6R – waste sorting, the sector's national strategy has a strategic objective to enhance effective and environmentally safe solid waste management services in Palestine in which a number of strategic policies are identified. However, as per the MOLG, while general strategy on solid waste management services and national standards and policies on composting material currently exist in Palestine, these policies and regulations have not been efficiently implemented. Therefore, while relevant policies, regulations and standards exist, there lacks an existence of an enabling policy environment for the introduction of this technology without the implementation of these policies and regulations.

Recycling

There are existing recycling facilities in Palestine. However, these are mainly small in scale and have limited capacities.

The sector's national strategic objectives identify the need to develop effective and environmentally safe solid waste management services. While this objective exists, along with a number of strategic policies, the MOLG confirmed that there are currently no regulations in place in Palestine specifically on recycling. This suggests that while strategic objectives exist, there is currently a lack of enabling policy environment to support the introduction of this technology.

Summary

The sector currently lacks in policies for waste management technologies related to recycling and composting. In introducing 6R waste sorting and recycling technologies, Palestine will need to develop relevant and detailed policies specifically to these technologies in order to create an enabling policy environment. For the composting technology, while regulations and policies exist, Palestine will need to prioritize to implement these regulations in order to enhance the current enabling policy environment.

9. Policies, strategies, and plans relevant to other technologies

For other technologies, following have been prioritized and have been selected for the policy assessment:

- Provision of beach nourishment, reclamation and beach drift rehabilitation; and
- Development of water, food and sanitation monitoring and safety systems using high technology related to health.

Provision of beach nourishment, reclamation and beach drift rehabilitation

The provision of beach nourishment, reclamation and beach drift rehabilitation has been identified as a key national priority for Palestine by the EQA. This technology is of significance to Gaza areas as there are implications to the people living in these areas. Impacts include effects and risks from floods. While the specific technology for this aspect needs to be further identified, it is highly important to Palestine.

This is a national priority to Palestine to ensure safety of the people in these areas from impacts of climate change. Therefore, there is a strong support in this aspect that suggests that an enabling policy environment exists in Palestine. However, a specific technology will need to be identified prior to proceeding for further consideration of this technology for the roadmap implementation. The discussion by stakeholders on potential technologies such as concrete barriers mentioned during the working group meeting will be referred to on the roadmap implementation report.

Development of water, food and sanitation monitoring and safety systems using high technology related to health

The development of water, food and sanitation monitoring and safety systems using advanced, high-end technology is essential in ensuring the health and well-being of the Palestinian population. Access to safe water, food and sanitation are human rights. In order to fulfill these rights, the institutions delivering these services need to be well-resourced and capable in ensuring that these resources are safe and properly managed. The development of monitoring and safety systems of these resources are essential. Such monitoring and safety systems will help reduce the country's vulnerability to major diseases related to water, food and sanitation.

One of the waste sector's strategic objectives speak to the need to implement suitable procedures and mechanisms for handling hazardous, medical and special solid wastes. Relevant policy interventions include establishment of follow-up system to evaluate and trace hazardous wastes and developing correct handling procedures and treating medical solid waste to reduce environmental impacts. This suggests that necessary policies are in place to support the introduction of this technology. In addition, the Ministry of Health (MOH) has implemented supporting policies. The Ministry of National Economy (MONE) has also prepared the draft Food Safety Law, which further support the policy environment for this technology.

Summary

The above technologies have been identified as priorities in addressing impacts of climate change. These technologies do not belong to any particular sector. Assessment suggests that relevant policies and programs are in place that would support the introduction of these technologies and that effective policy environment has been created.

10. Conclusion and recommendations

For prioritized technologies, relevant policies were assessed to identify policy gaps that would prohibit these technologies to be introduced in Palestine. Overall, policies generally exist in Palestine that support the creation of an enabling environment. This was also confirmed by relevant stakeholders. However, there are gaps for some technologies that will require implementation of these policies in order to enhance the enabling environment. In addition, for certain technologies and sectors, such as recycling in the waste sector, it will require development of a supporting policy. Table 10 below summarizes identified policy gaps for each prioritized technology.

As for next steps, it is recommended that, for technologies without supportive policy, policy is developed and implemented to create the policy environment needed for effective introduction in Palestine. For those technologies already supported by policies though without implementation, it is recommended that these policies are implemented and mandated before the technology roadmap can be implemented.

Table 10 Summary of prioritized technologies and relevant policy gaps

Sector	Technology	Policy gap
Energy	National grid assessment and electricity grid upgrade	• No or almost no policy gap; enabling environment exists
	Various applications of PV technologies	• No or almost no policy gap; enabling environment exists
	Energy efficiency	• Policy exists; however, it is not implemented or mandated
	Solar water heating	• Policy exists; however, it is not implemented or mandated
Agriculture	Climate smart agriculture (precision agriculture)	• No or almost no policy gap; enabling environment exists
	Efficient irrigation	• No or almost no policy gap; enabling environment exists
	Resilient animal fodder	• No or almost no policy gap; enabling environment exists
	Conservation agriculture	• No or almost no policy gap; enabling environment exists
	Water harvesting	• No or almost no policy gap; enabling environment exists
Water and wastewater	Rainwater harvesting	• No or almost no policy gap; enabling environment exists
	Water resources monitoring technologies	• No or almost no policy gap; enabling environment exists
	Wastewater collection and treatment plants and advanced wastewater treatment technologies	• No or almost no policy gap; enabling environment exists
Transportation	Upgrade of the existing vehicle fleet	• No or almost no policy gap; enabling environment exists
	Public transportation (modal shift)	• No or almost no policy gap; enabling environment exists
Waste	Waste sorting	• Policy exists; however, it lacks in details and not specific to waste sorting
	Composting	• Policy exists; however, it is not efficiently implemented
	Recycling	• Lack of policy
Others	Provision of beach nourishment, reclamation and beach drift rehabilitation	• No or almost no policy gap; this is a national priority
	Development of water, food and sanitation monitoring and safety systems using high technology related to health	• No or almost no policy gap; enabling environment exists

Annex 1 – references

Baako, A.M. (2015). “Promoting On-Farm Water Harvesting and Conservation Techniques for Sustainable Agricultural Production Systems through Capacity Development of Field Extension Officers and Farmers”. *Journal of Developments in Sustainable Agriculture* 10, pg. 55-60.

Climate Change Adaptation Technologies for Water: A practitioner’s guide to adaptation technologies for increased water sector resilience (2017), UN Environment – DHI Centre, Climate Technology Centre and Network (CTCN) and the UNEP DTU Partnership

Feature: Palestinians embrace eco-friendly cars as first electric car charging stations installed, 2019, Xinhua

Food and Agriculture Organization (FAO). “Alternative fodder production for vulnerable herders in the West Bank: Increasing profitability of livestock production to strengthen resilience to drought and market volatility within protracted crises”. *Resilience promising practice*, 2015.

Food and Agriculture Organization (FAO). *Conservation Agriculture*. Accessed from <http://www.fao.org/3/a-i6169e.pdf>

Friends on the Earth – Middle East FoEME. *Palestinian Climate Change Policy*. 2010.

Ministry of Agriculture. *National Agricultural Sector Strategy (2017-2022), Resilience and Sustainable Development*. 2016.

Ministry of Transport. *Sectorial Strategy for Transport 2017-2022*. 2016.

PENRA. *Comprehensive National Strategy for Energy Sector in Palestine*. 2016.

PENRA. *The Palestinian National Energy Efficiency Action Plan (P-NEEAP)*. 2012.

PNA. *Implementation Roadmap for the Nationally Determined Contributions (NDC) Under United Nations Framework Convention on Climate Change*.

PNA. *Palestinian National Plan (2011-2013) – Energy Sector Strategy*.

Poor infrastructure and lack of funding put over 56,000 people at risk of flooding in the Gaza Strip, 2017, OCHA

PWA. *National Water Sector Strategic Plan and Action Plan (2017-2022)*. 2016.

Securing Energy for Development in West Bank and Gaza, World Bank, 2017

The \$6 Trillion Barrier Holding Electric Cars Back, 2018, Bloomberg

Annex 2 – objectives and policies of national agricultural sector strategy

Strategic objectives	Defined Policies to achieve objective
1. Female and male farmers' resilience and steadfastness on their lands enhanced	1.1 Mobilize international support to restrain Israeli violations impeding agricultural developing, particularly restriction on access, and use of natural resources, borders, infrastructure demolition and uprooting of trees. 1.2 Institutionalize and develop technical and financial resources dedicated to the Risk Prevention and Agricultural Insurance Fund. 1.3 Provide suitable environment for agricultural production and development of youth and farmers in Area C, border areas and Jerusalem through continuous coordination with all parties to provide infrastructure services to farmers and producers in marginalized areas, as well as agricultural programs and projects for the poor, marginalized and women entrepreneurs. 1.4 Agricultural control on border crossings and the establishment of national reference laboratories. 1.5 Empowering farmers and producers to access different courts to get to their rights.
2. Natural and agricultural resources sustainably managed and better adapted to climate change	2.1 Establish large water facilities in arable irrigated areas through the transfer of water or water collection or wastewater treatment and increase the efficiency of the available water. 2.2 Provide the necessary support for land reclamation and agricultural road construction that link all agricultural land or lands that could be cultivated. 2.3 Take measures and arrangements to adapt with or avoid the negative impact of climate change and natural disasters, particularly high temperatures and fluctuating precipitation or declining rain water. 2.4 Intensify efforts of research and official institutions, local authorities and centers to protect the forests and natural reserves, as well as organize and develop pastures, protect agricultural biodiversity in all environmental areas in Palestine. 2.5 Continue the greening of Palestine as a responsibility of all institutions, local authorities, schools and universities. 2.6 Protect agricultural lands from urban expansion, especially in plain areas and high value agricultural lands.
3. Increased agricultural production, productivity, and competitiveness in local and international market, along with their contribution in gross domestic product and food security.	3.1 Guiding and supporting farmers' initiatives towards intensive and semi-intensive production systems, as well as the application of modern systems of agricultural production in line with the requirements of sustainable development. 3.2 Strengthening the role of applied research in official research centers and universities in developing extension services for both plant and livestock agriculture. 3.3 Improving communication between agricultural extension workers and veterinarians with respect to the transfer and dissemination of agricultural knowledge, proper agricultural planning and commitment in the agricultural calendar. 3.4 Development of agricultural products, for both plant and animal specifications. 3.5 Develop initiatives and national policies to reduce cost of production inputs, especially prices of fodders, fertilizers and pesticides. 3.6 Preservation of rural culture that is based on the cultivation of land with trees and crops, as well as breeding domestic animals as part of the household component.
4. Female and male farmers and entrepreneurs access quality agricultural services needed for increasing value along agricultural value chains improved.	4.1 Finding mechanisms to ensure access of small farmers, women and youth to funding with the aim of enhancing their current farmers and creating entrepreneurial agricultural businesses. 4.2 Empowering youth, women, farmers and entrepreneurs to access quality services in the field of agricultural business development and intensification of efforts to support entrepreneurship in the agricultural sector. 4.3 Highlight the role of women in agricultural work and their contribution to national output and enable them to strengthen their resources resulting from agricultural work and the Gross National Product (GNP), while empowering them to enhance their agricultural resources and income. 4.4 Enhancing information systems related to marketing, improving quality of products, activating control over the crossing, the promotion of national product and infrastructure development in marketing. 4.5 Allocation of human and physical resources capable of developing agricultural research that is based on the needs of farmers and extension workers. 4.6 Activation of procedures that ensure public health and phythosanitary.
5. Effective and efficient institutional and legal	5.1 Continuous lobbying of Palestinian decision-makers and international decision-makers, international, and United Nations organizations to allocate budgets for the agricultural sector that are coherent with the economic, social and political role of the sector.

<p>frameworks developed</p>	<p>5.2 Regular capacity building of all workers in the private sector, MoA, as well as agricultural councils and associations.</p> <p>5.3 Enhancing institutional environments, including premises, equipment and transportation for MoA employees, as well as that of councils, unions and cooperatives.</p> <p>5.4 Strengthening cooperation and exchange of knowledge between stakeholders towards achieving the strategy avoiding duplication, and developing results-based management approach.</p> <p>5.5 Continue and update legislations governing the agricultural sector.</p> <p>5.6 Joining conventions and international treaties and organizations that serve the National Policy Agenda and goals.</p>
-----------------------------	--