

# The national plan for energy efficiency and rationalization of consumption

## Preface

The PA set forth a national plan for energy efficiency and rationalization of consumption. The goal of the plan is to achieve the rationalization goal adopted in the energy sector national plan which aims at achieving energy supply of at least 5% of total electricity demand in different sectors by 2020. This goes along with regional and international efforts known as “the Arabic framework for improving consumption efficiency by the final consumer” which was passed in 2010 by the Arab energy ministers’ council.

Considering the current and 2020 total electricity consumption and contemporary electricity prices, then the achievement of the mentioned goal means reaching an energy supply of approx. 384 GWh/year by 2020, this will lead to saving at least \$55m / year of total electricity cost in Palestine and reducing CO<sub>2</sub> emissions by 285,000 ton/year.

In order to achieve this goal, a group of procedures and arrangements must be adopted. Those arrangements are allocated on a time framework of three years per phase. Moreover, each phase includes a group of indicators to measure progress through conducting a comprehensive review at the end of each phase before proceeding to the next phase. It is worth noting that PENRA already started a pilot phase in 2010 – 2011, which included various activities in the field of increasing energy efficiency and rationalizing consumption, the pilot phase included auditing industrial, government and service entities in addition to other related activities.

## The national plan for energy efficiency and rationalization of consumption: Phase I (2012-2014)

The national plan for energy efficiency and rationalization of consumption will be executed over three phases between 2012 and 2020 in order to achieve the overall goal of providing a total of 5% of electricity supply per annum by 2020\*.

The current average energy consumption and the forecasted energy consumption of different sectors up to 2020 were taken into consideration as per the following table:

Table (1): current and forecasted average energy consumption in different sectors ( 2010 – 2020)

| Sector   | 2010 consumption (GWh) |            | 2020 consumption (GWh) |            |
|--|------------------------|------------|------------------------|------------|
|  | GWh                    | %          | GWh                    | %          |
| Industrial   | 427                    | 9          | 950                    | 11         |
| Buildings (residential, services, commercial, general..) | 3324                   | 70         | 6048                   | 70         |
| Other (agricultural, water pumping..)                    | 47                     | 1          | 259                    | 3          |
| Distribution network losses                              | 950                    | 20         | 1383                   | 16         |
| <b>Total consumption (GWh)</b>                           | <b>4748</b>            | <b>100</b> | <b>8640</b>            | <b>100</b> |

\* Based on PENRA’s 2009 study concerning forecasted electricity loads and consumption up to 2030

Based on the above, and within the framework of cooperation with the league of Arab states, the international expert assigned by the energy efficiency project financed by the EU and the studies prepared by PENRA, the expected supply to be achieved over the three phases is as follows:

- Phase I (2012- 2014) : providing 43GWh of total electricity consumption over this phase.
- Phase II (2015 – 2017): providing 137GWh of total electricity consumption over this phase.
- Phase III (2018 – 2020): providing 204GWh of total electricity consumption over this phase.

The following table indicates the allocation of supply over the three phases:

Table (2): energy supply over the three phases allocated on target sectors

| Sector             | Target supply |            |            |                       |
|--------------------|---------------|------------|------------|-----------------------|
|                    | 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                     |
| <b>Total (GWh)</b> | <b>43</b>     | <b>137</b> | <b>204</b> | <b>384</b>            |

### Policies suggested to achieve the plan

The following procedures and arrangements should be adopted in order to achieve the target of the national plan for energy efficiency and rationalization of consumption:

- Setting legal, financial and incentive systems and the related technical standards in order to ensure energy efficiency and rationalization of consumption.
- Providing the sources of financing and the arrangements required to implement the program.
- Activating and supporting participation in the program and the related regional activities in a manner consistent with national priorities for developing the energy sector in Palestine.
- PENRA should set regulations. for monitoring electricity consumption by type of subscription and amount of consumption.

### The proposed programs for Phase I (2012- 2014):

- Raising public awareness and training workers in the energy sector on the optimal energy consumption which contributes to the sustainable development and supports the Palestinian economy.
- Executing national energy consumption rationalization programs and projects in distribution, commercial, residential and industrial sectors.
- Imposing an energy audit program in the industrial and commercial sectors within preset energy consumption standards.
- Imposing an energy audit program for all government entities and executing the results and recommendations of audits performed by the energy and environment research centre, and providing the required sources of financing.
- Establishing a laboratory for examining electrical equipment in a manner that serves local market needs.
- Cooperating with regional and international efforts in minimizing CO emissions through participating in international energy programs, projects and councils in line with benefiting the Palestinian energy sector.

### The entities participating in executing the plan and their respective roles

The execution of the plan's three phases is the responsibility of the parties and entities participating in the plan, the roles and responsibilities of those entities is illustrated in the following table.

Table (3): the roles of the entities in executing the plan

| Entity   | Role   |
|--|--|
| PENRA/ energy and environment research centre (through the energy efficiency department) | <ul style="list-style-type: none"><li>• Executing the programs of the national plan for energy efficiency and rationalization of consumption through coordination between participating entities.</li><li>• Establishing a laboratory for examining electricity equipment and assigning its management to the center of energy and environment studies.</li><li>• Reporting and giving recommendations to the cabinet regarding progress and barriers.</li></ul> |
| PERC   | <ul style="list-style-type: none"><li>• Monitoring performance and evaluating the execution of the plan's programs.</li></ul>  |
| Ministry of finance  | <ul style="list-style-type: none"><li>• Financing the energy audit program for government entities and adopting tax and custom programs that promote importing of energy saving equipment.</li></ul>   |
| Ministry of planning   | <ul style="list-style-type: none"><li>• Supporting the execution of the plan through steering grants to finance private programs</li></ul>   |
| Ministry of national economy/ institution of standards                                   | <ul style="list-style-type: none"><li>• Encouraging local production of energy saving equipment, supporting the use of these equipment in the industrial sector and monitoring the adherence to standards regarding energy saving equipment.</li></ul>   |
| Environment quality authority  | <ul style="list-style-type: none"><li>• Supporting the application of the standards of heat isolation mechanisms in buildings and the application of legislations and laws regarding reducing polluting gas emissions and ensuring the application of energy efficiency systems.</li></ul>   |
| DisCo's  | <ul style="list-style-type: none"><li>• Improving the efficiency of distribution networks and applying the standards and raising public awareness regarding energy efficiency and rationalization of consumption.</li></ul>  |

**The national plan for energy efficiency and rationalization of consumption: Phase I (2012-2014)**

Table (4): Phase I of The national plan for energy efficiency and rationalization of consumption

| Sector                 | Activity  | Saving/ year |                | Saving up to 2020 (USD in millions) | Cost (USD in millions) |                   | Source of financing   |
|------------------------|---|--------------|----------------|-------------------------------------|------------------------|-------------------|---|
|                        |   | GWh          | USD (million ) |                                     | Cost of program        | Cost of execution |   |
| Industrial             | Energy audit on 10 factories                                | 2.5          | 0.375          | 2.635                               | 0.03                   | -                 | <ul style="list-style-type: none"> <li>• Program financing through AFD and the government</li> <li>• Execution financing through stakeholders (private sector)</li> </ul> |
|                        | Installing approx. 1000sqm of concentrated solar heaters    | 2            | 0.3            | 2.1                                 | 0.01                   | 0.8               |   |
|                        | Improving performance factor (PF)                           | 4            | 0.6            | 4.2                                 | 0.01                   | 0.06              |   |
| Service and commercial | Energy audit on 2 hotels                                    | 4            | 0.6            | 4.2                                 | 0.006                  | 0.9               | <ul style="list-style-type: none"> <li>• Program financing through AFD and the government</li> <li>• Execution financing through stakeholders (private sector)</li> </ul> |
|                        | Energy audit on 2 private hospitals                         | 6            | 0.9            | 5.6                                 | 0.006                  | 0.2               |   |
|                        | Energy audit on 2 residential compounds                     | 0.4          | 0.06           | 0.42                                | 0.006                  | 0.05              |   |
|                        | Distributing 10,000 energy saving bulbs for street lighting | 2.7          | 0.405          | 2.835                               | 0.005                  | 0.1               |   |

|   |  |   |      |      |      |     |  |
|---|--|---|------|------|------|-----|--|
|   | Designing and executing energy consumption reduction stickers project                      | - | -    | -    | -    | -   |  |
|   | Installing approx. 1000sqm of concentrated solar heaters                                   | 4 | 0.6  | 4.2  | 0.01 | 0.7 |  |
| Ministries and general entities (non-ministerial) | Energy audit on 10 ministerial and non-ministerial buildings and executing recommendations | 5 | 0.75 | 5.25 | 0.05 | 0.2 | <ul style="list-style-type: none"> <li>• Program financing through AFD and the government</li> <li>• Execution financing through the government</li> </ul> |
|   | Energy audit on 5 public hospitals and executing recommendations (pilot projects)          | 6 | 0.9  | 5.6  | 0.05 | 0.3 |  |
|   | Energy audit on 2 public universities and executing recommendations (pilot projects)       | 3 | 0.45 | 3.15 | 0.01 | 0.1 |  |
|   | Installing approx. 2000sqm of concentrated solar heaters                                   | 8 | 1.2  | 8.4  | 0.01 | 1.4 |  |

|   |  |             |             |              |              |             |  |
|---|--|-------------|-------------|--------------|--------------|-------------|--|
| Awareness campaigns   | Conferences in 200 schools and distribution of flyers and posters to encourage rationalization of energy consumption                                       | 0.5         | 0.075       | 0.525        | 0.25         | -           | <ul style="list-style-type: none"> <li>• Program financing through AFD and the government</li> <li>• Execution financing through DisCo's (private sector)</li> </ul> |
|   | Conducting 75 workshops for energy consumers in municipalities and organizations   | 0.5         | 0.075       | 0.525        | 0.25         | -           |  |
| Energy efficiency labs  | Establishing laboratories for examining the equipment used in distributing and consuming energy  | -           | -           | -            | 0.02         | 1.2         | Financing the establishments of labs is available through the world bank   |
| Governmental monitoring on the equipment used in energy consumption | Imposing restraints on imported energy consumption equipment<br>Setting legislations and tax exemptions for encouraging imports of energy saving equipment | -           | -           | -            | -            | -           | -  |
| <b>Total</b>  |  | <b>48.6</b> | <b>6.69</b> | <b>49.74</b> | <b>0.273</b> | <b>6.01</b> |  |

\*energy prices were calculated based on current prices (USD0.15/kWh)

## Summary of the costs of The national plan for energy efficiency and rationalization of consumption (2012-2020)

The expected financial burdens of executing the national plan on the government are:

1. In phase I (2012-2014): the following table illustrates the costs of this phase starting with the execution of the saving program in general buildings:

Table (5): costs of phase I in general buildings

| <b>Sector</b>                | <b>Cost<br/>(USD in<br/>millions)</b> | <b>Savings<br/>(USD in<br/>millions)<br/>2012-2014</b> | <b>Government<br/>contribution<br/>(USD in<br/>millions)</b> | <b>Other sources<br/>(USD in<br/>millions)</b> |
|------------------------------|---------------------------------------|--|--|--|
| <b>Industrial</b>            | 0.91                                  | 8.935  | 0.05   | 0.86   |
| <b>Buildings</b>             | 1.983                                 | 17.255   | 0.015  | 1.968  |
| <b>General<br/>buildings</b> | 2.1                                   | 22.5   | 1.05   | 1.05   |
| <b>Energy labs</b>           | 1.22                                  | -  | 0.1  | 1.12   |
| <b>Other activities</b>      | 0.05                                  | 1.05   | -  | 0.05   |
| <b>Total</b>                 | <b>6.763</b>                          | <b>49.74</b>   | <b>1.215</b>   | <b>5.048</b>                                   |

\* savings will be annual as of 2014 (end of phase I) while investment costs are paid once

2. Based on current electricity prices (USD0.15/kWh) and costs of phase I, achieving a supply of 48.6GWh in phase I requires a government contribution of USD1.215m. The expected costs for achieving the overall goal (384GWh by 2020) are allocated on the three phases as illustrated in the following table.

Table (6): amount of energy saved and government contribution distributed on the three phases

| <b>Phase</b>          | <b>Energy<br/>saved<br/>(GWh)</b> | <b>Government<br/>contribution<br/>(USD in millions)</b> | <b>Saving/ year<br/>(USD in millions)</b> |
|-----------------------|-----------------------------------|--|---|
| Phase I (2012-2014)   | 48.6                              | 1.215  | 7.2                                       |
| Phase II (2015-2017)  | 137                               | 3.43   | 19  |
| Phase III (2018-2020) | 204                               | 6.9  | 28  |
| <b>Total</b>          | <b>384</b>                        | <b>11.545</b>  | <b>55.2</b>                               |

It is worth noting that the savings resulting from reduction of CO<sub>2</sub> emissions were not taken into consideration.

### Outputs and expected results of phase I:

- Setting a national renewable energy and rationalization of consumption policy, and setting regulatory and incentive procedures to motivate rationalization of consumption and the use and production of renewable energy.
- Incorporating renewable-energy awareness courses in the curriculums of schools.
- Establishing a department for energy efficiency and rationalization of consumption at the Palestinian center for energy and environmental studies.
- Installing around 4000sqm of large solar heaters in the governmental buildings and industrial sectors.
- Installing 10,000 high efficiency street lighting bulbs.

- Reducing dependency on the Israeli market in terms of energy supply, thus benefiting national economy, the environment and general health.
- Adopting the national energy efficiency sticker on locally produced or imported energy technologies.
- Establishing a laboratory for examining electricity equipment that is managed by the center of energy and environmental studies in line with local market requirements.
- Promoting clean and efficient energy in the Palestinian market, especially in the fields of lighting, heating and cooling, and raising the level of local production.
- Participating in international efforts for protecting the environment and limiting gas emissions.