EXPECTED RESULT

Communities benefit from solar energy for sustainable livelihoods opportunities.

Access to Solar Energy Baseline - 2017
(random samples from 8 districts)

### Energy Sources in 8 Districts of 4 Governorates

<table>
<thead>
<tr>
<th>Energy Source</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Firewood</td>
<td>98%</td>
</tr>
<tr>
<td>Candles</td>
<td>35%</td>
</tr>
<tr>
<td>Dry-cell batteries</td>
<td>48%</td>
</tr>
<tr>
<td>LPG</td>
<td>25%</td>
</tr>
<tr>
<td>Electricity from interconnected grid</td>
<td>00%</td>
</tr>
<tr>
<td>Charcoal</td>
<td>55%</td>
</tr>
<tr>
<td>Crop residue</td>
<td>32%</td>
</tr>
<tr>
<td>Kerosene</td>
<td>18%</td>
</tr>
<tr>
<td>Solar PV system</td>
<td>08%</td>
</tr>
<tr>
<td>Electric generator set</td>
<td>10%</td>
</tr>
<tr>
<td>Animal dung</td>
<td>05%</td>
</tr>
<tr>
<td>Car battery charging</td>
<td>07%</td>
</tr>
<tr>
<td>Diesel</td>
<td>00%</td>
</tr>
</tbody>
</table>

- **Access to energy by health facilities**
  - Grid Electricity: 28%
  - Generator: 64%
  - Solar PV System: 9%

- **Access to energy by schools**
  - Grid Electricity: 23%
  - Generator: 69%
  - Solar PV System: 8%
Very few solar micro-businesses exist in the targeted communities and governorates for income generation.

90% of drinking water systems in all four governorates are motorized and so is irrigation.

Source: Solar Socio-Economic Assessment 2017, ERRY UNDP
OVERALL SOLAR PROGRAMMING

Integrated automatic chlorination unit to inject a specific amount of chlorine into the water tank before household distribution.

Integrated solar system to operate a submersible pump with a variety of capacities (7.5 kW, 15 kW, 18.5 kW, 22 kW and 26 kW).

Integrated solar system with a variety of capacities (1.2 kW, 1.8 kW, 2.7 kW and 3.6 kW).

Integrated solar system with a variety of capacities (1.2 kW, 1.8 kW, 2.7 kW and 3.6 kW) and provision of solar vaccine refrigerator.

Integrated solar system to operate a submersible pump with a variety of capacities (7.5 kW, 15 kW, 18.5 kW, 22 kW and 26 kW) to promote sustainable water resource management for irrigation and agricultural production.

Small solar system 30W equipped with 3 LED lamps, fans and phone charger.

Promote private sector through micro- and small businesses to decentralize access to solar services.

Support vulnerable women and youth for sustainable livelihood opportunities through decentralized microgrid services for access to clean energy.
INTERVENTIONS

Providing solar PV lantern to improve access to energy at HHs level

5,600 Individuals received PV lanterns including IDPs, returnees and host communities

Improving service delivery capacities in health centers / facilities and schools through solar energy solutions

176 Schools and health centers supplied solar systems to help reopen, benefiting 101,983 individuals

Equipping health centers and facilities with solar refrigerators to increase storage capacity, improving vaccination and immunization

72 Vaccine solar refrigerators installed ensuring beneficiaries have access to health and vaccination facilities, benefiting 36,000 individuals

Improving productive assets capacity through solar energy solutions for income generation

19 Solar systems provided to 15 productive assets and four market centers to prolong business hours, benefiting 9,300 individuals

Rehabilitating water systems through solar for drinking and irrigation facilities

8 Four solar drinking water systems with automated chlorination stations and four solar irrigation facilities established in Abyan (Kanfer), Hodeidah (Al Marawah) and Lahj (Lawder) to improve access to clean drinking water and sustainable irrigation facilities

Creating livelihood opportunities through solar energy

200 Micro-businesses established in Hajjah (Abs) and Lahj (Tuban) districts to create income generation opportunities and decentralized services such as electricity generation through solar micro-grid
IMPACT I

Solar lanterns have helped targeted IDPs, returnees and hosts to improve access to energy for day-to-day needs and helped save USD $67,000 from electricity expenditures.

Solar lanterns have also provided multiple benefits to targeted individuals such as prolonged business hours for income generation for vulnerable households.

72 vaccine solar refrigerators equipped in health centers / facilities have increased outpatient rate by 32%, improved vaccination and lowered default immunization rate by 94% and have increased savings from fossil fuel by USD $50,112 in a year.

FINDINGS
The solar intervention coverage, especially in the health sector, is much higher compared to other services.

The majority of the health units (55%) in Hajjah and Hodeidah are not functioning due to the lack of access to energy.

The solar intervention has improved the service delivery capacities of health centers / facilities and resumed emergency and critical services.

In Hajjah and Hodeidah, ERRY targeted 54% health centers / facility to improve the storage capacity, level of vaccination and immunization.

Source: ERRY UNDP Database and Quarterly Reports 2018
Installed Solar Drinking Water Facilities with automated chlorination system in an area where cholera outbreak occurred in 2016 and 2017. This is a preventive measure to avoid any future outbreak in the area and has benefited 4,000 individuals.

- 4 solar drinking water and cholera prevention systems were built in the cholera effected locations benefiting 6,039 individuals while improving access (within 500 meters) and quantity/quality (70 liters per person, per day chlorinated at source water) and saving of USD $22,490.

Source: ERRY UNDP Database and Quarterly Reports 2018 and ERRY Baseline 2017
FINDINGS

- 4 solar irrigation pump systems installation supported 80 small-scale farmers, improving their crop production and savings of USD $1,800 per pump from fossil fuel and maintenance.
200 solar micro-businesses were built to improve solar market and decentralized access to energy (electricity generation) for income generation opportunities through local market and solar micro-grid.
ERRY Joint Programme and Implementing Partners

FOR FURTHER CONTACT

Hyewon Jung | Economic Resilience and Recovery (ERRU) Unit, Team Leader, UNDP Yemen | hyewon.jung@undp.org
Arvind Kumar | ERRY Project Manager, UNDP Yemen | arvind.kumar@undp.org