IMPACT

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Image Source: © Scott Wallace / World Bank

SOLAR SYSTEMS BRING LIGHT TO REMOTE AREAS OF YEMEN

A $250,000 ESMAP grant helped support the reengagement of the World Bank in the Yemeni power sector through the $50 million IDA-funded Yemen Emergency Electricity Access Project. ESMAP-funded studies were used to determine the potential impact of off-grid solar power in Yemen, to understand the willingness of consumers to pay for those connections, and how to facilitate sales and market credit to rural and peri-urban households for small-scale solar home systems. ESMAP also supported the design and implementation of activities to finance those systems through subsidized microfinance packages, and increase sales to women by modifying eligibility requirements to address lack of documentation to access credit and by holding consultations to inform women about the benefits of solar products. The project is on target to surpass 100,000 households and electrify around 500 schools and health facilities and 40 water wells—reaching 3.2 million+ beneficiaries. It serves as a model for similar projects in other fragile, conflict, and violence-affected (FCV) countries.

THE CHALLENGE OF ACCESSING ELECTRICITY IN YEMEN AMIDST CONFLICT

Accessing electricity has always been challenging for households in Yemen. Little more than two-thirds of the poor had access to electricity when it was last formally measured in 2014. This is the lowest rate in the Middle East. Things deteriorated even further when Yemen's civil war broke out in mid-2014. In March 2015, the country's largest power plant in Marib, responsible for powering most of the country, went offline. The high price of power from private generators and frequent fuel shortages meant that most Yemenis were thrown into the dark and critical services became severely constrained.

To cope with the collapse of the country's public utility, people relied on neighbors who had diesel-powered generators or turned to batteries, candles, kerosene, and firewood—which exposed them to health risks such as black smoke. In the absence of public utilities, private sector companies saw an opportunity and several firms stepped in and started importing cheap solar photovoltaic (PV) systems. The number of solar importers in the country multiplied, while many small electronic retailers started selling solar home kits, encouraged by surging demand. Solar panels started dotting rooftops in Yemeni towns and cities—but with no access to finance, the costs put the technology beyond the reach of critical facilities including hospitals and schools and the most vulnerable populations in rural areas.

Even before the conflict, commercial retail and consumer banking was limited. During the conflict, the microfinance institution (MFI) sector has proved to be more resilient than banks in the face of crisis due to its more diverse portfolio and has been highlighted as a success story. The MFIs were able to sustain their operations and develop new business lines, in particular financing for solar, with solar loans making up 5 to 20 percent of total lending portfolios among assessed MFIs. Most solar lending had been extended to wealthier households, farmers, and small and medium enterprises, and mostly limited to urban areas. The World Bank identified that, with the right support, MFI distribution and lending for solar could be extended into rural and peri-urban areas—which are estimated to account for two-thirds of Yemen's estimated population of 27 million—and to those with no bank accounts, particularly women.

Public Disclosure Authorized

THE WORLD BANK'S YEMEN EMERGENCY ELECTRICITY ACCESS PROJECT

The Yemen Emergency Electricity Access Project (PDO) began in May 2018, funded by a $50 million grant from IDA, the body of the World Bank that helps the world's poorest countries. It is being implemented in partnership with the United Nations Office for Project Services (UNOPS) and in collaboration with the local private sector, including MFIs, solar equipment suppliers, and local distributors and installation technicians with the requisite skills.

Among several objectives, the project aims to de-risk the sale of off-grid solar home systems to households and to finance power for vital basic services, improving access to electricity for vulnerable Yemenis in rural and outlying urban areas.

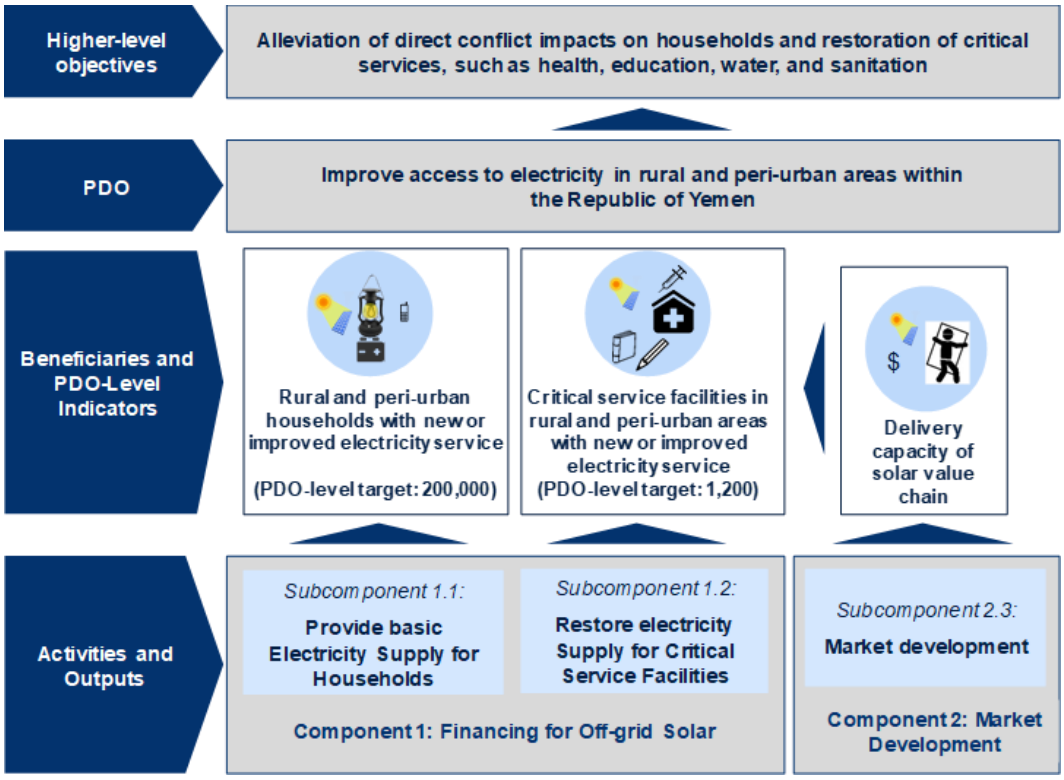
It works to expand availability of solar PV systems through subsidized microfinance packages for households and grant funding to critical public services facilities including health facilities and COVID-19 isolations units, schools, and drinking water wells. The public critical services component is delivered through separate contracts for engineering, procurement, and construction, and for operations and maintenance (O&M). The World Bank and UNOPS developed standardized designs, with scope to slightly customize the systems based on the specific requirements of the site. Tenders were issued and local contractors were recruited to install the systems as well as to provide O&M as needed for the duration of the project. Training, capacity building, and oversight of the local contractors is also provided under the project.

Working with the local solar supply chain, the project has relied heavily on the existing network of MFIs with their proven ability to deliver off-grid solar systems to rural and peri-urban areas in this challenging operating environment.

In the first three years of project implementation, UNOPS imported the solar lights and home systems and made them available to MFIs, who then marketed and sold them, before repaying around 10 percent of the cost of goods. Once familiar with the business model, the larger MFIs became willing to make upfront investments to purchase stock and partner with distributors—which is currently happening as the project transitioned in 2020 from an in-kind grant to a results-based financing approach.

The project has three components: (1) financing for off-grid solar, (2) implementation support and market development, and (3) improving the country's response capacity in the event of an emergency.

PROJECT COMPONENTS AND THEIR CONTRIBUTION TO MEETING THE PROJECT'S DEVELOPMENT OBJECTIVES (PDO)



> Investing in solar has made Yemen's electricity more resilient, reduced the dependence on fossil fuels for critical service facilities, and created jobs in the private sector. Solar can deliver what Yemenis need more than ever — quick and innovative energy solutions to help ease the crisis.
>
> *Joern Torsten Huenteler, World Bank Energy Specialist & former project Task Team Leader*

Image Source: ©World Bank / UNOPS

ESMAP GRANTS HELPED SUPPORT REENGAGING IN THE YEMENI POWER SECTOR & PROJECT DESIGN

A critical piece in designing the World Bank project was determining the true reach of solar power in Yemen, which was gained through a comprehensive market assessment and analysis of solar PV conducted by the Regional Center for Renewable Energy and Energy Efficiency (RCREEE) in 2017.

The RCREEE report showed there was a huge demand for solar energy—especially from poor households with no viable alternatives—and as of November 2016 solar PV systems had reached up to 50 percent of Yemen's households in rural areas and 75 percent in urban areas. This was proof that despite the crisis and its severe impacts on the functioning of the Yemeni economy, investments in the solar sector surged and an estimated $1 billion-plus had been invested in Yemen's residential solar PV systems between 2015 and 2017.

The RCREEE report's findings provided the analytical foundations for the World Bank to engage in the solar energy sector in Yemen. Specifically, the report helped identify MFI's as the most suitable partners for a World Bank intervention and rural households and public facilities (such as health clinics, schools, and water wells) as the most urgent priorities for grant support. The report also highlighted the need to prioritize quality-assured products to introduce into the solar market in Yemen. Based on these findings, the Bank project was designed, financed and implementation began.

The RCREEE study helped shape an ESMAP-financed follow-up market study about halfway through the project in 2019, the Electricity Access Expansion Opportunities and Solutions Report, which included results from phone surveys conducted by local consultants on gaps in electricity access and access to pay and helped with project strategy and implementation. The report's findings were presented at two ESMAP-supported workshops with RCREEE and the government of Yemen in 2018 and 2019.

In 2020, ESMAP financed the Yemen Power Support Recovery and Reconstruction Program to help determine the potential impact of solar power in Yemen, the willingness to pay for solar electricity connection, how best to facilitate sales and market credit to rural households for small-scale home solar systems and supported the overall design of the project. One thousand participants were surveyed, and the results were extrapolated to represent a larger group. The study was presented in the World Bank's Yemen portfolio review in November 2021.

Additionally, since the beginning of the project, a member of the ESMAP Lighting Global team has acted as an adviser to the World Bank project team on the household solar component. They have assisted with design of the in-kind grant

mechanism used under the first three Calls for Proposals (CfP), as well as the new results-based financing mechanism introduced under the 4th CfP. They have helped to design, monitor, and support a number of crucial studies including market assessments, MFI capacity assessments, and product quality assessments that have directly informed the project's approach to the provision of financial and technical support and has informed the design of the project's phase 2 operation, currently under preparation. They have also supported a range of other activities, including the awareness-raising campaign, technical and business development training, and quality guidelines for the wider component-based solar market.

CAPACITY-BUILDING ACTIVITIES & PROMOTING FINANCIAL INCLUSION AND ACCESS TO SOLAR ENERGY AMONG WOMEN

To help close gender gaps in the energy sector, the ESMAP Gender and Energy program focuses on women's employment and leadership, women's productivity and livelihoods, and women's access to modern energy services. In coordination with the Bank's regions, the program generates and disseminates knowledge, provides operational support, and engages in partnerships and advocacy.

The World Bank project in Yemen is helping to break down obstacles to women's access to finance and lack of knowledge about the life-changing benefits of electricity. Although gender-focused activities were covered by the core IDA grant, ESMAP funded additional support to design and implement these activities.

By partnering with the MFIs on the benefits of banking for women and removing constraints or barriers women face—such as modifying eligibility requirements to address lack of documentation—and by working with Yemeni women themselves through consultations to inform them about the benefits of solar products, pathways were created to connect rural women to sustainable affordable energy solutions.

To reinforce these pathways, the project is also engaging with men with the help of influencers, such as community leaders, who can reiterate positive messaging about the role of women in decision making around solar power options. The CfPs were tailored to MFIs and potential distributing partners to be circulated in a way that would also reach women's organizations and cooperatives in rural and hard-to-reach areas and have enabled such organizations to present themselves to MFIs during the trainings. Incentives such as higher subsidies for MFIs sales to women also helped increase sales to female-headed households from 5 to 21 percent (as of November 2021).

Through gender-targeted solutions, the percent of female MFI staff has almost doubled, from 16 percent to 29 percent, increasing the number of female employees from 202 to 424. MFIs have continued to show interest in providing products and services relevant for women, and several have introduced samples of sewing machines that can be used on a small PV system for household use. Others have expressed interest in Pay-As-You-Go models, which improve the likelihood of women receiving home systems on credit, that will be piloted in the follow-on Emergency Electricity Access Project-Phase 2.

You can read more about Yemeni women accessing solar energy through the project in this blog.

PROJECT RESULTS

Throughout 2021, MFIs and local distribution suppliers saw an increase in sales, deliveries, installations of PV home systems, as well as an increase in female beneficiaries. The majority of sales have been in cash, rather than on credit.

As of February 2022, 81,332 households (of which over 23.6 percent are female-headed) have received solar PV home systems from 6 MFIs and sales are forecasted to surpass the end-target of 100,000 beneficiary households by 12 percent by May 2022.

The project targets for critical services facilities are:

- 234 schools, 243 health facilities and 40 water wells
- 23 COVID-19 isolation units
- 3.2 million+ beneficiaries
- 6,322.86 kWp estimated capacity to be installed

As of February 2022, 97 percent of the total targeted facilities have been energized benefiting over 3.1 million people, over 51 percent female. The remaining facilities are estimated to be finalized by March 2022; the project's closing date has been extended to December 30, 2022.

HOW HAS ELECTRICITY ACCESS CHANGED THE LIVES OF YEMENIS?

With the support of the World Bank and UNOPS, a team traveled to different areas and villages to learn about the impact of the project on the ground. Here are some examples:

School electrification increased attendance, participation, and learning

Ba Rasheed and Abu Baker Al-Razi Schools are two examples of the 234 schools that received solar systems as part of the program, reaching nearly 215,000 beneficiaries. With the availability of electricity, school attendance increased and students grew more motivated and better able to focus and participate due to fans providing relief from the heat, as well as benefiting from having lighting and computers to aid learning in the classrooms.

Image Source: ©UNOPS

Al-Salam Hospital is now open 24 hours a day due to solar power

The medical team previously had great difficulty treating patients in the hospital due to power cuts from the main electrical grid and the high cost of diesel. They couldn't open enough shifts during the day, and it was especially difficult to help women giving birth. Now, with solar power installed through the project they are open 24 hours a day. The hospital also opened a special unit for pregnant women and for training nurses.

Image Source: ©World Bank

Ghawar Al-Haj in Horour Village: Vaccination department in health center is now accessible

In the Horour-Dhamar Governorate in Yemen, all services at the health center previously had to stop by noon because of permanent power cuts from the main electric grid. Essentially, services collapsed when the public electricity supply worsened. Access to electricity has returned through the Emergency Electricity Project, bringing back health services. The Vaccination Department has benefited from solar energy as well as internal medical and obstetrics departments, and the center is now open 24 hours a day.

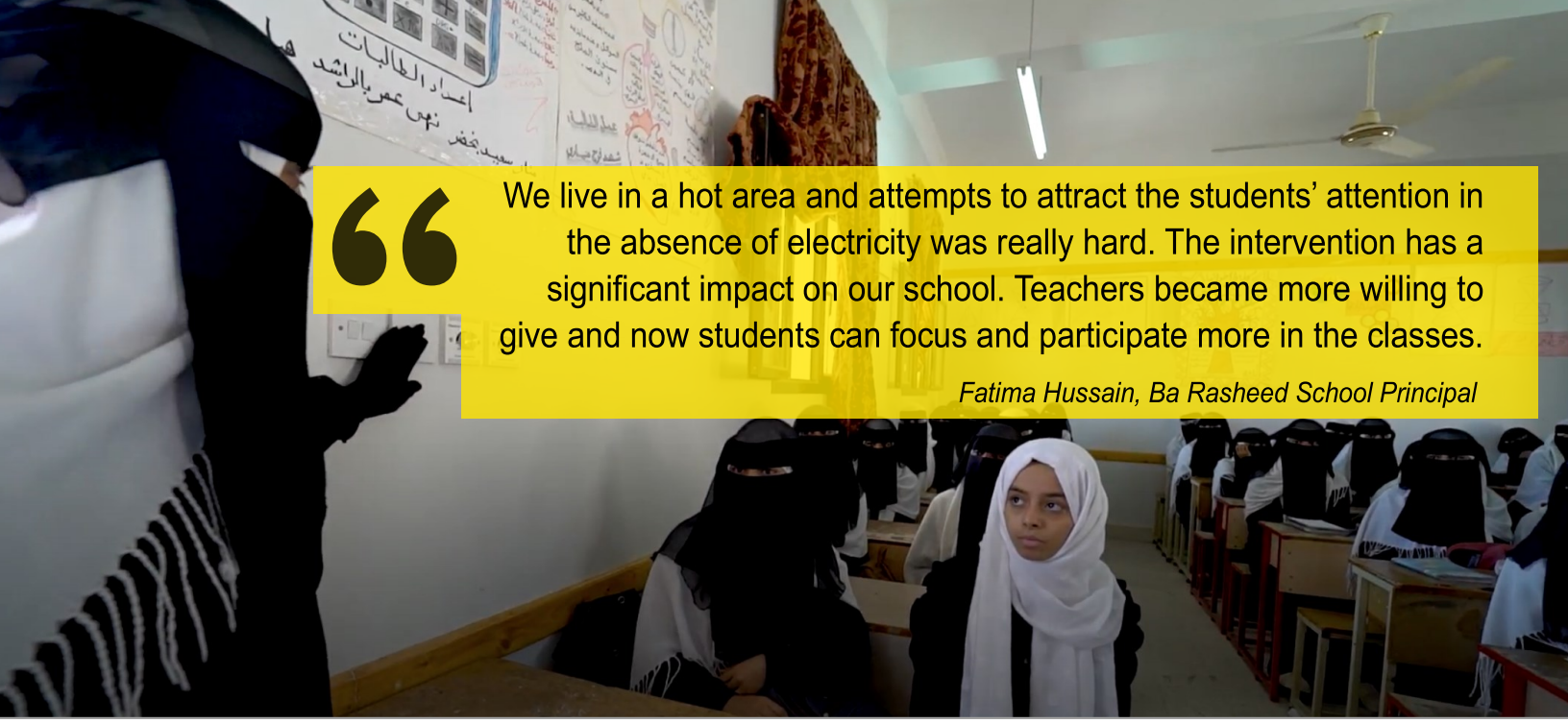
Image Source: ©World Bank

Khyzaran Kolib no longer has to walk five hours to get water thanks to solar power

In Hafyan, in Yemen's Taiz Governeroate, citizens of the Qullah village suffered for years from shortages of clean water. Khyzaran Kolib, an elderly woman from the village, used to spend a big portion of her day fetching water and carrying it back. Other sources of water nearby were often contaminated or filled with garbage and algae because there was no diesel to run the pumps to clean water sources. The emergency electricity project installed solar panels to harness energy that now pumps clean water and gets it to water-deprived rural communities.

Image Source: ©World Bank

Videos showing how solar power is helping Yemenis improve their lives cancan be viewed here.



> We live in a hot area and attempts to attract the students' attention in the absence of electricity was really hard. The intervention has a significant impact on our school. Teachers became more willing to give and now students can focus and participate more in the classes.
>
> *Fatima Hussain, Ba Rasheed School Principal*

Image Source: ©UNOPS

PARTNERSHIP BETWEEN THE WORLD BANK, UNOPS, & LOCAL PARTNERS

As the World Bank moves into FCV settings they rely on UN partners who have the operational capacity to work on the ground in challenging environments, such as in Yemen.

Through engaging with UNOPS, the project is able to have people on the ground and achieve considerable results in the short- and medium-term. UNOPS has the ability to move fast and the agility to adapt and reflect on what is the most secure way for sustainable interventions.

In turn, the World Bank has provided expertise that UNOPS operationalized in a Yemeni context. Tenders and implementation models were designed to match the skills and capacity of local MFIs and companies in Yemen, which proved to be extremely important to facilitate access to remote areas and safety and security during operations.

The project made it possible to do what no one agency could do on its own.

LOOKING FORWARD

The needs for renewable energy in Yemen are still enormous, but the project is proof that even in an extremely challenging environment extraordinary results can be achieved with minimum investment and maximum impact. The project serves as a model for other FCV contexts on what can be accomplished to deliver quality services on a large scale. In Yemen, there could be close to universal access to electricity in the next 5–10 years if progress continues to move in its current direction.

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