

COMET-ME 2019 ANNUAL REPORT

REPORT ON ACTIVITIES THROUGH JUNE 2020 AND SPECIAL 10TH ANNIVERSARY EDITION

Comet-ME 2019 Annual Report

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An amendment enacted by the Israeli Knesset as part of the governmental campaign against Israeli civil society obliges us to point that most of the sources for Comet-ME's budget are donations from foreign governmental entities. Needless to say, we are proud to have on our list of donors democracies who share with us the belief that electricity and clean water are basic human rights for all people, and specifically for those living under military occupation.

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During our tenth anniversary year we planned and implemented system upgrades for several micro-grids installed by Comet-ME in the south Hebron hills. These systems were among the first micro-grids installed by Comet-ME, in 2010-2011. Over the years, these communities have grown and new families have been connected—a testament to the long-term impact and sustainability of Comet-ME's work and approach, as well as to the growth and resilience of the communities in the face of continued hardship. The upgrades entailed replacement of old batteries and upgrading of both the electronics and the solar array for the systems, bringing these systems up to Comet-ME's latest standards and ensuring many more years of reliable service for the communities.

ABOUT US

EXECUTIVE SUMMARY

This Annual Report takes us through June 2020, covering the completion of our installation project cycle while also relating to our response to the COVID-19 pandemic in the West Bank in the second quarter of 2020.

Over the past year, in which we marked ten years since Comet-ME's founding, our team completed another ambitious round of off-grid energy and water installations, bringing renewable energy services to 282 households and 1,903 individuals in 11 Palestinian-Bedouin communties in Area C of the occupied Palestinian territories. We installed 5 micro-grids, 155 family-based solar systems, and 40 household water pumping, distribution, and filtrations systems.

In our maintenance and monitoring programs, we planned and implemented major upgrades for seven of Comet-ME's earliest micro-grids in the south Hebron hills, a testament to community resilience and growth, as well as the long-term impact and sustainability of Comet-ME's work and approach over the past decade. This upgrade drive has been done alongside year-round maintenance activities for a growing install base

spread over an increasingly large geographical area. In our water quality monitoring program we continued to deepen our understanding and methods, reaching impressive results in particular among veteran bio-sand filter users.

On the legal front, we faced multiple challenges from the Israeli authorities and continue to formulate legal and diplomatic responses to these and to provide protection to the thousands of beneficiaries who depend on our facilities for their basic energy and water services.

The past year was also a turning point in the development of Comet-ME's Solar Magnetic Plunger Pump. On the technical side we reached stable pump operation with an upgraded control system, and set up a test rig including a borehole simulating real-world conditions. On the business development side we visited a successful agricultural project in Ethiopia and are planning for a pilot project in Africa in 2021. Our efforts continue to be motivated by the growing interest in solar pumping throughout the global south and the clear relevance to the UN Sustainable Development Goals.

WHO WE ARE

Comet-ME is an Israeli-Palestinian organization providing renewable energy and clean-water services to off-grid communities in Area C of the occupied Palestinian territories. We are a joint initiative of Israelis and Palestinians who believe that barriers of hostility can be overcome by working shoulder to shoulder toward a common cause, to build a better future for our peoples.

Initially a volunteer initiative, Comet-ME conducted its first installations in 2006 and formally incorporated as a public benefit company in Israel in September 2009. Our work over the past more than a decade has developed out of a long-standing relationship and commitment to the marginalized Palestinian communities in Area C. Today, we are a vertically integrated utility, providing basic energy services to 1,100 households in 90 communities, encompassing over 7,000 people. In 2013 we entered the field of off-grid water pumping and filtration solutions, and since then have brought our clean-water services to 300 households throughout our energy install base.

Comet-ME is the leading provider of sustainable rural electrification services for Area C communities and an innovator in the field of offgrid water pumping technologies. Over a decade of experience in the field, we have seen how the provision of basic energy and water services to the marginalized communities in Area C has proven to be an effective means for community empowerment and economic development, helping communities remain and live in dignity on their lands.

THE TEAM

Founders and Directors Elad Orian, General Manager Noam Dotan, Technical Manager

Operations Manager Asmahan Simry

Project Manager Waseem Alja'bari

Maintenance Manager Dahham Abu Aram

Energy Installation Manager Musab Shrouf

Water Installation Manager Moatasem Hadalin

Technicians Muhammad Aqeel, Ibrahim Mkhamreh, Khalil Shehadah Abu Sabha, Ali Hamamdeh, Ma'moun A'jeweh, Hammam al-Joundi

Water Expert Ahmad Saya'reh

Public Health Researcher Dr. Anwaar Lahalih **Design Engineer** Ryan Brand

Organizational Development Officer Tamar Cohen

Financial Manager Basheer Abu Baker, CPA

BOARD OF DIRECTORS

Dr. Dan Rabinowitz Dr. Danielle Shani Dr. Michal Givoni Aya Shoshan

OVERSIGHT COMMITTEE

Yossi Mossel Dr. Yoav Lehahn



Photo Tomer Appelbaum

WHERE WE WORK

Comet-ME works exclusively in Area C of the occupied Palestinian territories. Area C, as defined under the Oslo II accords, constitutes 62% of the West Bank and is under full Israeli military and civil control, including all matters pertaining to planning, construction, and development. Area C is the only remaining land and agricultural reserves for a viable future Palestinian state and economy, but most of the land has been allocated for the benefit of Israeli settlements and the Israeli military. The discriminatory planning regime imposed by Israel, harassment and violence by settlers, and restrictions placed by the military, are tantamount to a policy of pushing the Palestinian population out of Area C and into Areas B and A to make way for Israeli development and settlement expansion.

Our work targets rural off-grid farming and herding communities, both land-owning fellaheen as well as Bedouin communities, most of whom were expelled from the Nagab desert after 1948. The inhabitants of the mostly arid regions we work in subsist on non-mechanized agriculture and herding. The harsh climate and the palpable effects of climate change and desertification are compounded by an extremely difficult political reality by which the communities live disconnected from all infrastructure, including access roads, electricity, and running water. For these communities, the distance from the grid is not geographical but political—with electricity and water lines running literally meters above their heads and below their feet to connect nearby illegal Israeli settlements and outposts.





HOW WE WORK

Comet-ME is a unique hybrid of technological start-up, humanitarian development agency, and political grassroots human rights organization, while functioning day to day as a mini-utility for offgrid Palestinian communities in Area C. Our work is based on the following principles:

RENEWABLE ENERGY

The leader in rural electrification in the occupied Palestinian territories, Comet-ME designs, installs, and maintains renewable energy systems (wind and solar) that provide of practitioners. Sharing our experience with and electricity 24/7, 365 days a year. Our renewable energy installations range in size from singlefamily systems to community-scale micro-grids, designed according to the needs and situation of each community. The energy systems provide 2.5 to 3 kWh daily per household—enough for illumination, refrigeration (of food and medicine), cell-phone charging, television, radio, and computers, water pumping, and use of basic appliances, in particular washing machines and butter churns.

OPEN SOURCE

All technological details of our energy systems are available in the public domain. Our partnership strategy extends to a global network benefiting from that of global partners, Comet-ME is part of a uniquely short loop of technology development and implementation. Thus, lessons learned in the West Bank can serve communities in Africa, just as developments made in student labs in the US can find their way to the field within weeks.

LOCAL SOURCING

APPROPRIATE TECHNOLOGIES

We espouse a dynamic, needs-driven approach to our technological solutions, based on a continuous cycle of needs assessment, research and development, piloting, wide-scale implementation, and user feedback.

By investing in local West Bank tech infrastructure, we help develop local knowledge and practice in the field of renewable energy. Comet-ME procures inputs from local manufacturers whenever possible. We purchase components for installation and maintenance from suppliers in Yatta, Hebron, and Ramallah and contract with local workshops to manufacture some of the custom-designed components of our systems.

Opposite page: The team assembles the metal base for a solar panel array, produced by a local manufacturer according to Comet-ME's design.

Photo Tomer Appelbaum



COMMUNITY

Community participation and trust-building based on substantial and meaningful community participation, ownership, training, and capacitybuilding at every stage of the process. Our team of Palestinian and Israeli engineers, project managers, and technicians trains local community members in basic maintenance and diagnostics, helping to develop a local knowledge base that serves as a source for future development.

SUSTAINABILITY AND SERVICE

Functioning as a mini-utility company for offgrid communities in Area C, Comet-ME ensures the sustainability of all of its past installations through reliable maintenance and management of systems.

BUY-IN PHILOSOPHY

Beneficiaries pay an electricity bill based are integral to our approach. Our work model is on metered use according to the same tariff paid by grid-connected users in Palestine and Israel—0.55 ILS/kWh. Because usage is capped at 2.5 kWh/day/household, users pay no more than 40 ILS (12 USD) per month, a manageable cost even for the most vulnerable families. Nonetheless, paying for electricity creates a sense of ownership and contributes to maintenance costs for the systems and to the eventual replacement of major components. Beneficiaries also make a contribution of about 7% of the cost of their water systems and 1/3 of the cost of the energy-efficient refrigerators that Comet-ME subsidizes as part of our energy installations.





On September 28, 2019 we celebrated Comet-ME's 10th anniversary, welcoming over 200 guests—partners, supporters, friends, and community members—to our Center for Appropriate Technologies in the South Hebron Hills.

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Photo Tomer Appelbaum

THE FIRST FIVE YEARS 2009-2014

Eleven years ago, in the southern part of mount Hebron, in an area known as Masafer Yatta, a population of several thousand Palestinian farmers and shepherds lived in shanty-like villages and in caves and tents. They had lived there on their land for generations, with no electricity or running water. This region would become the focus of Comet-ME's installations in the first five years. Little did we imagine that our work would play a central role in a veritable revolution in the lives of the people there. By 2014 Comet-ME would provide reliable renewable energy services to 24 communities and more than 1,500 people.



HYBRID WIND & SOLAR SYSTEMS

The hybrid wind/solar systems installed by Comet-ME in the south Hebron hills offer a uniquely appropriate technology, allowing the communities to make the most of the abundant natural resources of the region. The wind comes up as the sun goes down. Thanks to their robust design (built in-house, using a modified <u>Hugh</u> <u>Piggott</u> open source design), Comet-ME's turbines have been reliably serving the communities for the past decade.

Photo Eduardo Soteras



VOLUNTEER SPIRIT

Comet-ME's first official installation cycle (winter 2009-2010) was conducted with the help of volunteers from the Hebron Vocational Training Center, under the guidance of Issa Amro. Comet's founders, along with the team of volunteers, slept for a month in the village of Tuba, which served as our base for the entire project period, during which we installed four micro-grids throughout the rural periphery of Yatta (Masafer Yatta). Two of the volunteers eventually became Comet-ME staff members and one of them is today Comet-ME's Project Manager.

Photo Eduardo Soteras



COMET-ME CENTER

In 2012 we inaugurated our Center for Appropriate Technologies in Qawawis, south Hebron hills. The Center serves as our base of operations, training and volunteer facility, workshop and warehouse, development center for appropriate rural development technologies, and a space for people to come together and work out concrete solutions that can be implemented on the ground.

Photo Tomer Appelbaum



FIRST DEMOLITION ORDERS

In 2012, the Israeli authorities issued demolition orders to nine of our systems, targeting solar panel arrays, wind turbines, and electricity rooms. Since then we have received demolition orders on 20 of our micro-grids, threatening the more than 2,000 people who depend on these systems for livelihood, lighting, and refrigeration. Ever since we have taken a three-pronged approach, combining legal, diplomatic, and advocacy efforts to protect the systems from demolition and to ensure the continued provision of electricity to the communities.

Photo Tomer Appelbaum



Sa'ir

"Thanks to electricity, the day is longer, generally lasting until 10:00 or 11:00 at night. Evening life now includes social content—the entire family gathers in the room/tent where the television is located, and together they watch their favorite series: Bedouin soap operas from Saudi Arabia and Jordan, portraying sheep growers—their customs, loves and passions, wars and celebrations. The sociocultural norms and lifestyles resemble those of the people watching. The heroes, male and female, become the topic of conversation, their accomplishments and failures provide a kind of framework for relating to people's own lives here at home. Between one series and another, people watch Egyptian, Turkish and sometimes Indian films. Occasionally they listen to the news and see advertising, another way to learn about things in nearby countries, things that perhaps they themselves can aspire to have or to accomplish."

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-From the expert opinion of social anthropologist Shuli Hartman on the impact of Comet-ME's energy systems

Maghayer al-Abeed 2012 // Photo Tomer Appelbaum

COMET-H20 2013-PRESENT

In 2013, after five years of designing, installing, and maintaining off-grid renewable energy systems for communities in the south Hebron hills, we entered the field of sustainable off-grid water solutions. Water supply in the south Hebron hills is based on rainwater harvesting and is managed on a household level, around the family cistern. Unlike in our energy program, where we are able to produce and provide electricity with the help of the sun and the wind, in our water program we do not actually increase the households' annual water supply. Rather, we facilitate access to their existing resources and ensure the quality of the drinking water through household water pumping, storage, distribution, and filtration systems. Since 2014, these systems have been installed for nearly 300 households and over 2,000 people in 41 communities, dotting the landscape of the south Hebron hills.



TECHNICAL DEVELOPMENT

The technical challenge in developing the water systems was twofold: first, to integrate the electrical pump into the community's micro-grid; and second, to find a robust and sustainable filtration method. For the first, we worked with a local Israeli developer to develop a controller that would operate the electrical pump automatically, storing otherwise discarded energy from the community's micro-grid. For the second, we tested and evaluated various hi-tech filtration technologies until arriving at one of the simplest and most affordable of water filtration technologies, namely, the bio-sand filter, which we adapted from an open-source design from

Photo Tomer Appelbaum

PILOT PROJECTS

conducted two pilot projects, in January and May 2014. Community engagement in the pilot projects was crucial for the completion of the development process. A comprehensive needs survey and a series of community meetings were held in order to understand the needs and identify solutions suitable for the villages. Family members participated in the development process, providing constant input. As a result of the pilot testing and user feedback, we fine-tuned the system's design before wide-scale implementation, reaching 300 households in the south Hebron hills since then.

Photo Tomer Appelbaum



WATER QUALITY MONITORING

Comet-ME's water lab technician visits the communities on a rotating basis, reaching each community every 4-6 weeks and taking samples from the cisterns and biosand filters. The water samples are tested in Comet-ME's in-house microbiology lab, and a weekly internal report is produced, comparing the latest results with previous results in each household. This enables us to observe the adjustment of the bio-sand filters to changes in water quality input (such as following rainfall), determine whether localized treatment of the water is necessary, and adjust our strategy and methods over time. CAPACITY BUILDING

Having clean drinking water has a big health impact for children, the elderly, pregnant women, and people with chronic illnesses; and the quality of water depends on proper and regular usage of the filters. In 2018-19 we conducted a capacitybuilding campaign, raising awareness to waterrelated health issues and the importance of proper upkeep of the filters. We chose to target women specifically in this project because they are the family members responsible for the upkeep of the bio-sand filters, which provide water for drinking and cooking.

> Al 'Ubeidiya Beit Sahur

Beit Jala

Jerusalem



Traditionally the burden of obtaining water for domestic and animal consumption—in the case of the south Hebron hills, drawing water in buckets from rainwater cisterns—falls disproportionately on women and girls, who can spend hours lifting and moving as much as 1 ton of water each day. The electrical pumping and distribution of water to taps enabled by Comet-ME's household water systems greatly reduces this workload, empowering women while creating income-generating opportunities. Multi-stage filtration, culminating in the bio-sand filter, brings microbiologically contaminated water to first-world drinking standards, having a significant impact on community health.

South Hebron Hills 2019 // **Photo** Ryan Brand

THE SECOND FIVE YEARS 2015–2019

Since 2015, Comet-ME has seen remarkable growth in the geographical scope of activity and in organizational size and capacity. From a team of five in 2010, to eleven in 2014, in 2020 the organization has a team of seventeen—scientists, engineers, technicians, project managers, community outreach and administrative personnel. By the completion of our last round of installations, in June 2020, we have provided sustainable and reliable renewable energy services to 90 communities and more than 7,000 people, from the southernmost tip of the West Bank to as far north as the Ramallah region.

MANAGING A GROWING **INSTALL BASE**

A RANGE OF TECHNOLOGICAL SOLUTIONS



Photo Waseem Alja'bari

BANK BEDOUIN DIASPORA







//

Growing up in a-Tuwani, we lived in a regular house. In 2006, when I married Nasser and moved to Susya we lived in a tent, without running water or electricity. During my first pregnancy I had complications and had to stay in Yatta for a year until after I gave birth. In 2007 I returned to Susya and we built a kitchen and bedroom. We have slowly developed our home despite the restrictions by the Israeli military.

What does a regular day look like for you?

I wake up early, around 5 am, feed the sheep, bake bread, prepare breakfast for the children and get them ready for school, clean and straighten up the house, and cook lunch. Then the children come back from school and we eat together. In the afternoon we can relax, the families meet outside and spend time together.

How has the electricity changed your life?

Before the electricity system, women had to do all the daily chores by hand—laundry and churning milk to make cheese, which took many hours a day. Today I simply turn on the electric butter churn and do other things. We would have to cook every day because there was no way to refrigerate and store food. In the past we had to draw water from the cistern by hand. Today, we use the electric pump and water comes straight to the taps in their homes, and it's a lot healthier because of the filter.

Our main association with Susya is the danger of expulsion that hangs over your heads...

I recently returned from a speaking tour in the United States, where I met with students and teachers and leaders. I spoke about our life, our history, and the challenges we face, in particular the danger of demolition of our village. This is very important, and I hope I will have another opportunity to travel and make our voice heard.

COMMUNITY SUSYA POPULATION 16 HOUSEHOLDS, 104 PEOPLE INSTALLATION YEAR 2008 AND 2011; UPGRADES IN 2014, 2016

COMET-ME SYSTEMS SOLAR MICRO-GRID (10 KWP) WITH DIESEL BACKUP, 13 H20 SYSTEMS

Hajj Ziad was born in Bir al-Eid in 1957. His family settled here during the 50s after Israel began restricting their grazing areas close to the new border with the state of Israel. In the decades since the '67 war they have faced multiple expulsions, confiscation of their herds, demolitions, restrictions on grazing grounds, physical attacks and injuries, settler harassment, arrests, and protracted court cases.

In 2000 the last three remaining families in Bir al-Eid were evicted. A supreme court petition in the name of 20 residents led to a high court decision to allow the residents to return to the village. Five families decided to return. When they returned they discovered that the Civil Administration had restricted their living area between a declared military zone and state lands. Organizations such as OCHA and the International Red Cross provided the residents with tents. In early 2010 the Civil Administration issued 16 demolition orders. The residents submitted building

permit applications, but a year later 5 out of 16 tents were demolished.

Despite an injunction protecting the rest of the tents in the village, families began leaving Bir al-Eid because of the restrictions and obstacles they encountered.

Since January 2013 Ziad heads the lone remaining household in Bir al-Eid. He has a herd of 80 sheep, his wife makes yogurt and butter, and they sell their products to clients in Yatta, where his five grown children live. With regard to the connection to the Comet-ME electricity system, Ziad says that it was the most significant change they have experienced. With electricity 24 hours a day, life has become easier, in particular the laundry and production of milk products. Today they have leisure time and can watch television.

Their steadfast presence in Bir al-Eid, where he was born more than sixty years ago, is the only thing keeping the land from being taken over by the nearby Israeli outposts.





family compound.

//

Up until the 1960s, our families used to move from community to community in the area. In 1966 my grandfather bought this land. My father and uncles dug caves and built everything with their own hands. Over the decades life has developed; first we lived in tents, and now in Ten years ago, when the permanent structures; and people of Comet-ME came the caves are used for the to the area, they changed sheep.

In 2004 Jewish settlers took over our village. First they squatted for a few days but then they couldn't be removed. With the help of [Israeli activist] Ezra Nawi, we hired a lawyer and submitted land ownership papers. The legal proceedings took a year and four months, during which time the settlers couldn't be evicted and we couldn't return to our homes. People in

Taleb Nu'man Abu Aram Yatta accused us of selling The electricity project grandfather since 1966. The clerk [in the Israeli

Civil Administration] saw

the document, and told

us it was very valuable

and we must keep it safe.

The following morning

the military broke down

the settlers' caravans and

was born in 1968 in our lands to settlers. We has truly strengthened **Oawawis. He has five sons**, were ashamed to walk in the steadfastness of the and five daughters. Two of the street. We submitted people in the area, not his sons and their families an official Jordanian only in Qawawis. Families live alongside him in the document (Hujja in have returned to the Arabic) that proved that communities because of the land belonged to our what Comet-ME has done and continues to do.

> evacuated them, and our families returned. our lives. Life became easier, especially for the women and everything related to maintaining the household. Today they have washing machines and butter churns. The children can watch television in their free time, the houses have radios, people hear and are aware of what is going on in the world. In 2012 Comet-ME established its Center on land and in a structure owned by my uncle, Hajj Khalil.

Photo Ryan Brand



COMMUNITY QAWAWIS TAH'T

POPULATION 6 HOUSEHOLDS, 20 PEOPLE THE SYSTEM ALSO POWERS THE COMET-ME CENTER FOR APPROPRIATE TECHNOLOGIES

INSTALLATION YEAR 2011; UPGRADES IN 2013, 2016 COMET-ME SYSTEMS HYBRID WIND/SOLAR MICRO-GRID (5 KWP SOLAR AND 2 KWP WIND); 3 H20 SYSTEMS



Photo Tomer Appelbaum



ENERGY PROGRAM

Comet-ME's renewable energy installations provide each beneficiary household with 2.5 kWh/day of electricity—enough for illumination, refrigeration (of food, water, medicine), cell-phone charging, television and radio, water pumping, fans, butter churns, and washing machines. The provision of reliable electricity services has manifold humanitarian and economic benefits for the communities, while increasing community security and resilience and helping the communities remain on their lands amidst a harsh political and social reality.

2019/2020 ENERGY INSTALLATIONS

Energy installations for the year reached a total of 1,903 beneficiaries in 11 vulnerable Palestinian communities in Area C of the occupied Palestinian territories. By the end of June 2020, following some delays and adjustment due to the COVID-19 situation in the West Bank, we completed the installation of renewable energy systems for 282 households. This included 5 hybrid solar/ diesel micro-grids, serving 127 households in 5 communities; and 155 family-based solar energy systems in 6 previously unserved communities as well as scattered households in communities which Comet-ME has served in the past.

ENERGY MAINTENANCE

During the year we planned and implemented system upgrades for seven micro-grids installed by Comet-ME in the south Hebron hills nearly a decade ago. These systems were among the first micro-grids installed by Comet-ME, in 2010-2011. Over the years, these communities have grown and new families have been connected. This community growth increased the demand on the systems, while the components, some a decade old, were in need of replacement and updating to the latest technologies. The upgrades entailed replacement of old batteries and upgrading of both the electronics and the solar array for the systems, bringing these systems up to Comet-ME's latest standards and ensuring many more years of reliable service for the communities.

Opposite page, top: The electricity rooms in Comet-ME's solar/diesel micro-grids contain a room for the batteries and electronics and a separate room for a back-up generator. In the long-term planning of the system, the generator will work minimally in the first years, primarily kicking in in periods of extended cloud-cover, and will work more as the batteries age, extending the overall lifetime of the system.

Opposite page, bottom: The extremely high temperatures experienced in the areas where we work can have a dramatic effect on the lifetime of the batteries and the functioning of the systems. This year we installed air conditioning units in 11 micro-grid electricity rooms. The A/C units have a thermostat and can be monitored remotely, consuming 1-1.5 kWh/day at the height of summer, not at the expense of the households' daily limit.

Photo Tomer Appelbaum

Photo Waseem al-Ja'bari





COMET-H20: WATER PROGRAM

Since 2013, Comet-ME has deployed over 300 renewable-energy-based water pumping, distribution, and filtration systems in the south Hebron hills, offering a household water-provision solution to families whose water supply is based on rainwater harvested in cisterns. The mechanical pumping and distribution of water from the cistern to taps in and around the home provides convenient access to water and vastly reduces the amount of time and labor dedicated to household water management. Multi-stage filtration, culminating in a bio-sand filter (BSF), installed in the kitchen of each home, brings microbiologically contaminated water to first-world drinking standards.

2019 WATER INSTALLATIONS

This past year we provided 40 households in veteran Comet-ME communities with our renewable-energy-based clean-water systems, reaching a total of 340 beneficiaries.

WATER-QUALITY MONITORING

- Increase in sampling frequency. We doubled the number of collected samples to almost 700 and reduced the intervals between sampling visits from 8-10 weeks to 6-8 weeks, including 50 bio-sand filters installed to replace broken or unused filters.
- Water quality results. Out of 667 samples collected, 83% of results were in the safe drinking level of <10 CFU/100 ml. In veteran households that have been using the BSF continually since 2017 or before, we reduced the number of bad results by another 2% (18% bad results in 2017, 13% in 2018, 11%

2019). And in six communities that have been using the BSFs since 2014/15 we achieved 100% good results.

• Awareness-raising campaign. Over the course of 2019, the water team (water expert and public health researcher) worked with the women in the households, in particular where there were bad results from the filters, instructing them on water-borne diseases, the importance of hygiene, and proper use and upkeep of the bio-sand filter in order to improve their water quality results.

 Adjustment to design of water systems. Thanks to our intensive activity in the communities and with the women in particular, we were able to identify places where we could adjust the design of our systems in order to facilitate better use—from installing a designated tap over the bio-sand filter, to raising the water containers off the ground level. These are simple things that can have an impact on proper and regular use of the filters.

Top: Comet-ME's public health researcher explaining to a woman in the community about proper use and upkeep of the bio-sand filter. Bottom: The water team taking samples from the bio-sand filter in one of the communities, to be tested in our in-house lab. **Photos** Ryan Brand





RESEARCH & DEVELOPMENT

Over the past six years, Comet-ME has developed a simple, reliable, low-cost solar-powered water pump, which will offer a game-changing water-delivery solution for off-grid rural farmers and communities in the Global South. The Solar Magnetic Plunger Pump (SMPP) is a first-of-its-kind, double-action, submersible borehole piston pump designed for shallow aquifer pumping (with a pumping head in the range of 10-45 m) that can deliver 20-30 cubic meters a day, enough for irrigation of up to 1 hectare per day or for daily domestic usage for a small community. We are currently seeking partnerships and funding for piloting the SMPP in Africa in 2021.

TECHNICAL PROGRESS

- Upgraded the pump motor controller for robustness and reliability and to fit inside the pump itself, including a solar MPPT controller that harvests solar power in the most efficient way.
- Developed a unique pressure pulsation damper that eliminates the pressure pulsation typical of plunger pumps and that may cause damage to the pipes and irrigation system.
- Developed a simple R&D monitoring system to monitor the pump operation during tests. This system may be part of the pump pilot project.
- Built a new test setup to evaluate the pump performance and to run life cycle tests.

- **BUSINESS DEVELOPMENT**
- Patent granted and to be published as a valid patent in the US.
- Visited an agricultural project in Butajira, Ethiopia, under the auspices of Tikkun Olam Ventures (JDC).
- Developed a business plan and investors' deck and presented the project to potential investors.
- Extended our network of contacts in Africa, signing MOUs with potential partners for pilot projects and potential distributors for the pump.

Opposite page: A new prototype is installed inside a testing tank for evaluation. The testing tank allows the pump to run continuously on solar energy for testing performance as well as reliability over long testing periods.

Photo Ryan Brand





COVID-19 RESPONSE

energy installation and upgrade drive. The situation entailed major containment measures and restrictions on travel throughout the West Bank. With the rural Area C communities more isolated than ever, unable to access the towns and cities with any regularity for food supplies was absolutely urgent. Thanks to humanitarian coordination via the UN Office for the Coordination of Humanitarian Affairs in the occupied Palestinian territories, we were able to continue working in the communities delivering refrigerators, completing energy installations, and conducting urgent and preventative maintenance work, in order to ensure that the communities continue to receive reliable energy services in this critical time. Moreover, due to the economic hardships resulting from the crisis, we granted the households, across the board, a grace amount of 50 ILS on their electricity meters (enough for about 2 months of electricity).

At the time of publication of this report, as both Israel and Palestine are experiencing a second, even greater, wave of COVID-19, we are adjusting to the "new normal," planning and implementing our projects while following health and safety protocols in order to best ensure that we do not serve as a vector for the virus in and out of the communities or among the team.



Comet-ME is grateful for all the local and international donors, partners, research institutions and individuals who have made our work possible through support, advice, and collaboration.

Donors

Netherlands Ministry of Foreign Affairs German Foreign Ministry British Consulate General Jerusalem Irish Aid DanChurch Aid/Norwegian Church Aid Osprey Foundation Rockefeller Brothers Foundation Swiss Olive Oil Campaign

And to all the individual donors who have supported our work and placed their trust in us. Special thanks to our US-based fiscal sponsor, The Center for Emerging Futures

Sharing the challenge

Association for Civil Rights in Israel Bimkom – Planners for Planning Rights Breaking the Silence B'tselem CESVI Ecumenical Accompaniment Programme in Palestine and Israel (EAPPI) Haqel – Jews and Arabs in Defense of Human Rights Kerem Navot Michael Sfard Law Office Ta'ayush

Sharing knowledge

CAWST – Centre for Affordable Water and Sanitation Technology DelAgua Group Hugh Piggott and Scoraig Wind Wind Empowerment Association

GET INVOLVED

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