



# 2014 Annual Report





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Comet-ME is an Israeli-Palestinian organization providing basic energy and clean-water services to off-grid communities using environmentally and socially sustainable methods. We facilitate social and economic empowerment of some of the poorest and most marginalized communities in the occupied Palestinian territories through the installation of renewable energy systems (wind and solar), provision of clean water services, capacity building, and reliable maintenance.

Our work has developed out of a long-standing relationship and commitment to the vulnerable Palestinian communities in the south Hebron hills. Initially a voluntary initiative, Comet-ME carried out its first installations in 2006, and formally incorporated in Israel as a public benefit company in September 2009. Today, we are a vertically integrated utility, providing basic energy services to 20 communities encompassing over 1,500 people. In 2013 we entered the field of off-grid water pumping and filtration solutions, and in 2014 began providing clean-water services to the households in our energy install base. Comet-ME is currently the leading provider of sustainable rural electrification services in the region, and an innovator in the field of off-grid water technologies.





## Who we are

### Founders

Elad Orian  
Noam Dotan

### Energy project manager

Ahmad Almasry

### Maintenance manager

Waseem Aljabari

### Technicians

Jalal al-Tamimi  
Moatasem Hadalin

### Community liaison

Ezra Nawi

### Water project manager

Abd Aljawad Qabajah

### Water lab technician

Ahmad Sayareh

### Organizational development

Tamar Cohen

### Financial management

Hadar Gafni

### Board of directors

Dr. Dan Rabinowitz  
Dr. Danielle Shani  
Libby Lenkinsi

### Oversight committee

Yossi Mosel  
Yoav Lahan





## Where We Work

We work in an area called Masafer Yatta in the south Hebron hills, home to several thousand Palestinian farmers and shepherds living in caves and tents. Often referred to as the “cave-dwellers,” the people in these communities subsist on non-mechanized agriculture and herding. The region is arid (with an average annual rainfall of less than 250mm) which makes survival a difficult task.

Making life even more difficult is the Israeli occupation. Most of the south Hebron hills region is defined as Area C under the Israeli-Palestinian Interim Agreement, meaning that it is under full Israeli military and civil control. Area C constitutes 62% of the West Bank and is the only remaining land and agricultural reserves for a viable future Palestinian state and economy.

The planning regime imposed by Israel in Area C severely discriminates against the Palestinian population: Jewish settlements — all of which are considered illegal under international law and some even by the Israeli government — enjoy electricity, running water, sewerage systems, and access roads. Palestinian communities that have lived on their lands for generations and generations, on the other hand, are denied these basic services.

The poverty and marginalization of these communities is thus a product of the political situation more than of geography, climate, or the economy. Our work is motivated by the desire to alleviate the unnecessary suffering imposed on these communities by conflict and political violence.

Damaged Solar Panels in Bir al-Eid



On Wednesday evening, March 26, 2014, five solar panels from Comet-ME's mini-grid in the Palestinian community of Bir al-Eid were vandalized by settlers.

*“The systems we built are the only source of power for the fifty people living in this community, since Israel denies them access to the electricity grid. [...] The solar panels are vital to maintain basic sanitary conditions, connecting the community to the outside world, generating income and empowering women. We expect the Israeli authorities, who possess military and civil control in this area, to find the people who did this and bring them to trial. Most importantly — we expect the Israeli authorities to protect Palestinian communities in area C from settler violence and provide them with a safe living environment.”* – Elad Orian, Comet-ME co-founder and general manager.





Photos: Guy Butavia





## How We Work

Technology is knowledge and knowledge is power. We recognize that in highly technological projects such as ours, knowledge dissemination is an integral part of community empowerment. We therefore base our work on three core principles.

### Community participation

We consider the communities we serve as both partners and beneficiaries. We invest in direct and long-term contact with the residents, and we use a work model that is based on substantial and meaningful community participation, ownership, and training at every stage of the process.



### Local sourcing

Comet-ME procures inputs from local manufacturers whenever possible. Most of the installation materials are purchased from suppliers in Yatta, Hebron, and Ramallah. Building the wind turbines ourselves is a central aspect of our work. By developing the knowledge and practice in the field of renewable energy we invest in local tech infrastructure.

We apply this principle to human resources as well. Comet-ME employs and trains a team of Palestinian engineers, project managers, and technicians, who in turn train local community members in basic maintenance and diagnostics. We are developing a local knowledge base that serves as a source for future development.

Training brochure

### Open source

All technological details of our systems are available in the public domain. Our partnership strategy extends to a global network of practitioners. Sharing our experience with and benefiting from that of global partners such as Engineers Without Borders, Wind Empowerment association, the UN Sustainable Energy for All Practitioner Network, and the Centre for Affordable Water and Sanitation Technology, Comet-ME is part of a uniquely short loop of technology development and implementation. Lessons learned in the south Hebron hills can serve communities in Africa; developments made in student labs in the US can find their way to the field within weeks.







## 2014 Activities Overview . . . . .

### Comet-H2O: Water Program

This year at Comet-ME was under the sign of H2O. Comet-ME's water program comes to complete the energy-water nexus for the communities we serve. Based on renewable energy from the communities' solar and wind energy grids, the core of the program is the installation of household water pumping, distribution, and multi-stage filtration systems to provide clean water for household, herd, and agricultural use.



photo: Tomer Appelbaum



## Defining the Problem

Water is one of the most acute problems facing the off-grid, rural communities in the occupied Palestinian territories. The communities residing in the south Hebron hills subsist primarily on herding and non-mechanized agriculture and rely on rainwater harvesting and cistern storage for water supply. Families subsist on as little as 20 liters of water per capita per day—one fifth of the amount recommended by the World Health Organization. Many families exhaust their water supply early in the summer and need to purchase water in tanks and transport it to their dwellings. The price they pay can reach 8 to 10 times the tariff of grid-connected users. Thus the expenses on water become a major financial burden on the family.

In addition to the existential and financial problem of insufficient annual water quantity, the quality of the water collected in the cisterns is very low and often unsafe for human consumption. The runoff into the cisterns is contaminated with organic waste, a situation that is exacerbated by the fact that the livestock are brought to drink next to the cisterns. The state of health, especially children's health, in these communities is directly affected by the poor quality of the drinking water.

Finally, family cisterns in the south Hebron hills are usually not equipped with mechanized pumping capacity, and water is pumped and carried manually, much of this burden falling upon the women. Much time and effort is put into managing the household water supply, time that could be put to other productive uses.



Drawing water from the cistern // Guy Butavia





## Project Vision

The H2O project aims to provide a household-level water solution that addresses the need for improved water quality and easy distribution, while also addressing the issue of water scarcity. The household water pumping, distribution, and filtration systems are simple to use and maintain. They are socially sustainable because they build on and improve, without seeking to override traditional family water-management practices.



## Easing Labor

The renewable-energy-based pumping of water from the cisterns to the dwellings considerably reduces the amount of time and labor devoted to bringing water to the home. The impact of this is most palpable for the women. The vast improvement in the efficiency of household water management will generate new possibilities for the families, in terms of agricultural and economic development, education, women's empowerment, and leisure.

In 2014 we refined the design of the household water systems, completed our second pilot H2O project, and began the installation of the household clean-water suites in the communities. See the video on our H2O Pilot Project [here](#).



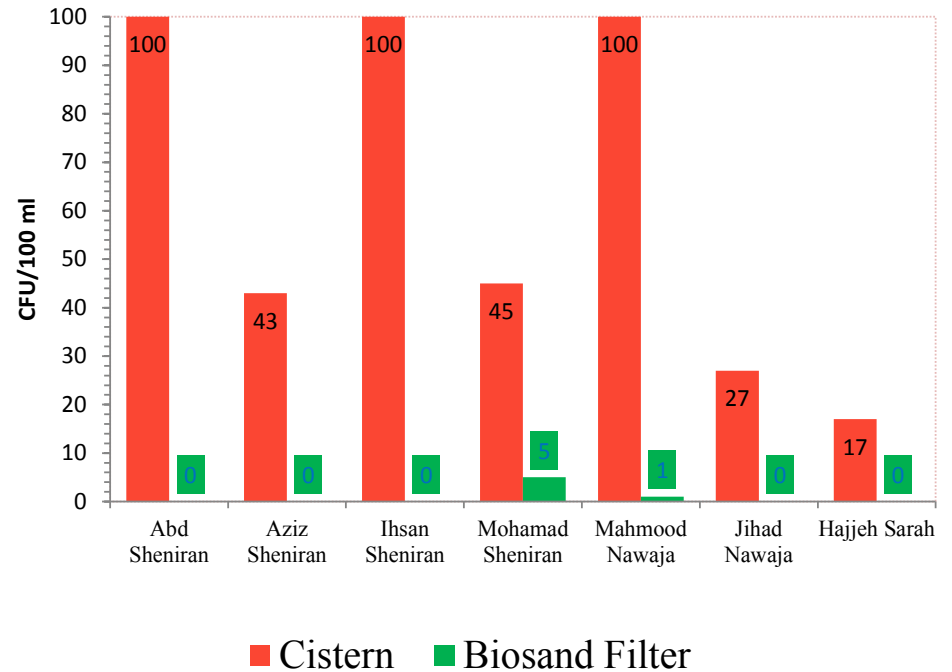


## Improvement in Water Quality

Comet-ME's household water systems improve water quality in several ways:

- Distribution of water in pipes reduces exposure to the open air and to warmer temperatures and thus slows the growth of microbiological contamination.
- Installation of taps for watering the herds near the home and away from the cisterns reduces the contamination of the cisterns from animal droppings.
- The multi-stage filtration process supplies clean water for herd and household use. One tap in each household is equipped with a slow-sand filter for human consumption.

The Biosand Filter is efficient for high quality water production



Microbiological pollution is measured in units known as CFU per 100ml. Biological pollution levels in cisterns in the south Hebron hills can regularly reach levels of 100 CFU/100ml or more, whereas potability standards in developing countries begin at 10 CFU/100ml and below, and WHO and developed nations standards are 0 CFU. The drastic improvement in water quality has an impact on community health, in particular for women and children.

## Launching Comet-ME's wide-scale water program

After our second successful pilot project, we began our first community-wide implementation of the water program, installing household water pumping, distribution, and filtration systems for more than 20 families as well as the community school and clinic in the communities of Wadi el-Rachim and Susya.



Wadi el-Rachim

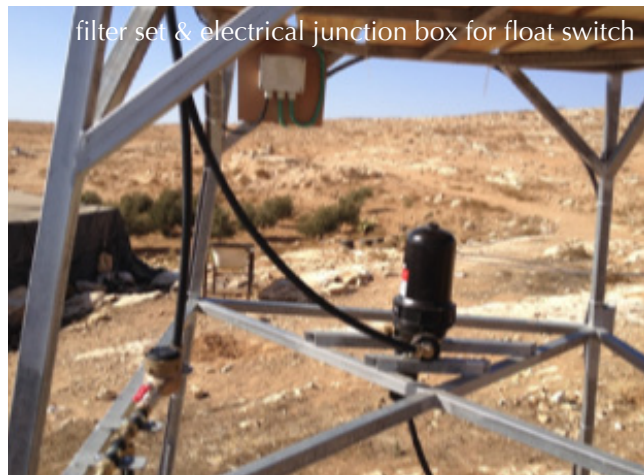




## Installing the Systems



Pump and priming tank assembled on top of cistern



filter set & electrical junction box for float switch



water meter and distribution network



## Regional Sustainability Team . . . . .

Comet-ME is committed to providing high-quality, long-term, reliable service to the communities in the south Hebron hills. Our Regional Sustainability Team is a central component of our methodology. The sustainability team is responsible for overseeing routine maintenance and conducting regular safety checks, monitoring and evaluation to ensure that the energy services Comet-ME provides match the needs of the communities. The team implements system upgrades, makes field visits, responds to emergency system failures, educates the community about proper use of the systems and basic diagnostics and maintenance tasks, and collects payments for the maintenance savings fund.



System upgrade in Tuba



- Total of 180 visits to installations in different communities
- 3 system upgrades
- 8 incidents of critical system problems resolved within 72 hours
- 13 visits made to extend the grid to new community structures
- 5 refrigerators fixed and 7 new refrigerators supplied to replace broken ones
- 17 new refrigerators subsidized for new families
- Bi-monthly collection of electricity bills in all communities
- Quarterly notification of communities to adjust solar panels angle to the sun
- Winter check of all communities
- Two training days for community supervisors held at Comet-ME center
- Training of community members in the target communities
- Energy-needs survey of 5 new communities for 2015 energy installations





Turbine repair, Wadi el-Rachim // Noam Dotan



## Fighting the Threat of Demolition

Lack of permitting for development projects in Area C is the most significant obstacle to rural development in the West Bank, including rural electrification and water projects such as Comet-ME's. Threat of demolition by the Israeli authorities and lack of permitting for new systems continue to be one of the most pressing challenges we face today.

Since 2012, Comet-ME has been fighting the threat of demolition to its systems. Out of our 20 systems, 16 are currently under concrete legal threat. More than 1,000 people depend on these systems for livelihood, lighting, and refrigeration. Through intensive efforts, we have been able to forestall the demolitions of our systems and prevent any demolitions from happening. In October, our case in the village of Maghayer al-Abeed reached the Israeli Supreme Court.



Maghayer al-Abeed // Tomer Appelbaum

*"The electricity system is a humanitarian relief object. The provision of electricity is necessary for the survival of the civilian population. Therefore, the installation is protected under international law and its demolition is prohibited."*

Attorney Michael Sfard, Petition to Israel's High Court of Justice for a temporary injunction against the demolition of the renewable energy system in Maghayer al-Abeed.

*"The lives of the residents of Maghayer al-Abeed are difficult indeed, but they don't have much of an alternative. The caves are their dwellings, the hills are their home, and their livelihoods and survival depend on the herd and the land. [...]Musa's and Shhada's families deal day in and day out with the chronic illnesses of their children and the burden of caring for aging parents. Electricity eases their lives in the most significant of ways, in particular with regard to the women's work, which is the central axis of their unique lifestyle.*

*Without electricity in the cave where the herd lives, without light in the family's cave-dwelling, without basic electrical appliances such as the butter churn, primitive washing machine, refrigerator, or television, without the ability to charge a cell-phone battery—the lives of the fate-stricken families would be almost unbearable, in particular after having become accustomed to these most rudimentary amenities over the past five years, the bare minimum without which it is difficult to imagine life in the 21<sup>st</sup> century."*

From the expert opinion of social anthropologist Shuli Hartman, submitted to the Israeli High Court of Justice along with the petition.



## Gathering International Support

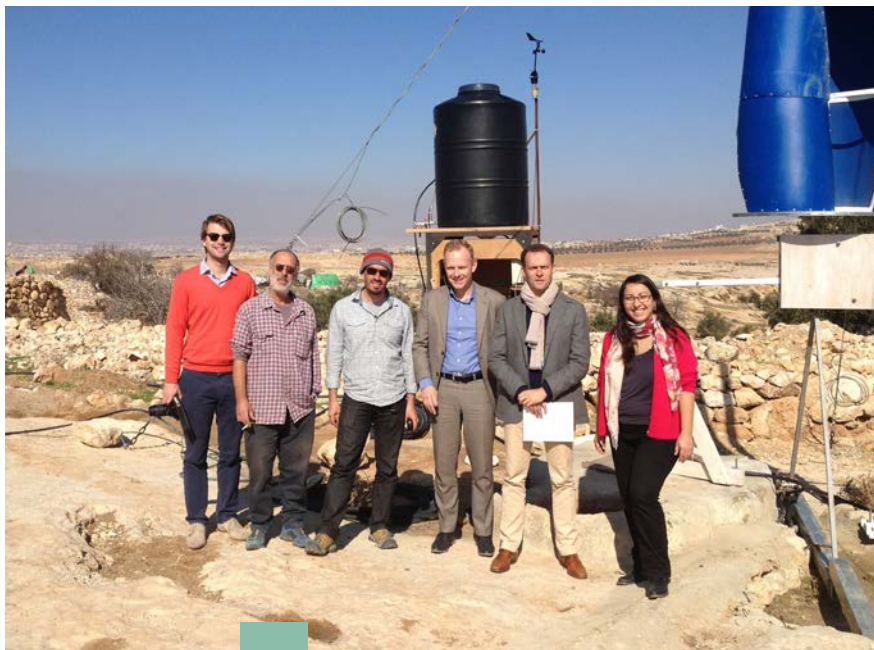
During the course of 2014, Comet-ME worked intensively on the legal and diplomatic fronts, advocating for the creation of a permitting avenue for future renewable energy systems under Israel's Civil Administration in the occupied Palestinian territories and raising awareness of the issue in the international diplomatic community. The strategy implemented including development of a legal plan, direct dialogue with the Israeli Civil Administration (ICA), lobbying of Israeli policy-makers, and international diplomacy.



Visit of US Consul General to Comet-ME Center

### Berlin Advocacy Tour

In July of this year, Elad Orian travelled to Germany to raise awareness of the situation of vulnerable communities in Area C and the barriers placed by Israel to development projects. Elad made a presentation before the Bundestag Committee for Economic Development and Cooperation and met with senior officials in the German Foreign Office who are responsible for the political and financial support of our projects, as well as officials from the Chancellery and representatives of several political parties.



Delegation from the Netherlands Representative Office at Comet-ME's Center

## Sharing Knowledge . . . . .

In 2014, our team members attended conferences in Israel-Palestine and abroad to share from Comet-ME's experience and to learn from others.

### **WindEmpowerment Association Conference Athens, November 2014**

Noam Dotan and Elad Orian represented Comet-ME at the conference of the WindEmpowerment Association (the international association for the development of locally built small wind turbines for sustainable rural electrification). Noam presented some of the technical issues we face, and Elad made a presentation about Comet-ME's work methodology and the political context of development in Area C.



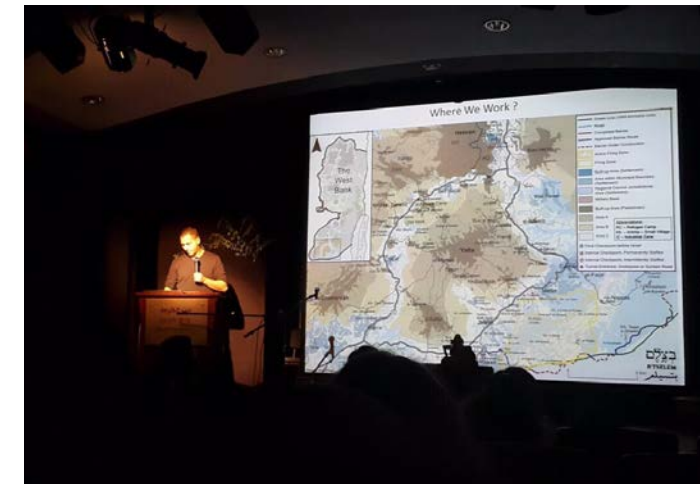
Elad presenting at the WindEmpowerment Association Conference

### **Engineers Without Borders Jerusalem, November 2014**

Noam and Elad attended the Engineers Without Borders conference and made a presentation about Comet-ME's sustainable energy projects.

### **A Window to Sustainability in the Palestinian Authority Haifa, October 2014**

Comet-ME's energy and water teams represented Comet at the "Window to Sustainability in the Palestinian Authority" conference. Comet-ME's Energy project manager Ahmad Almasry gave a presentation on sustainable infrastructure services for off-grid communities in Area C.

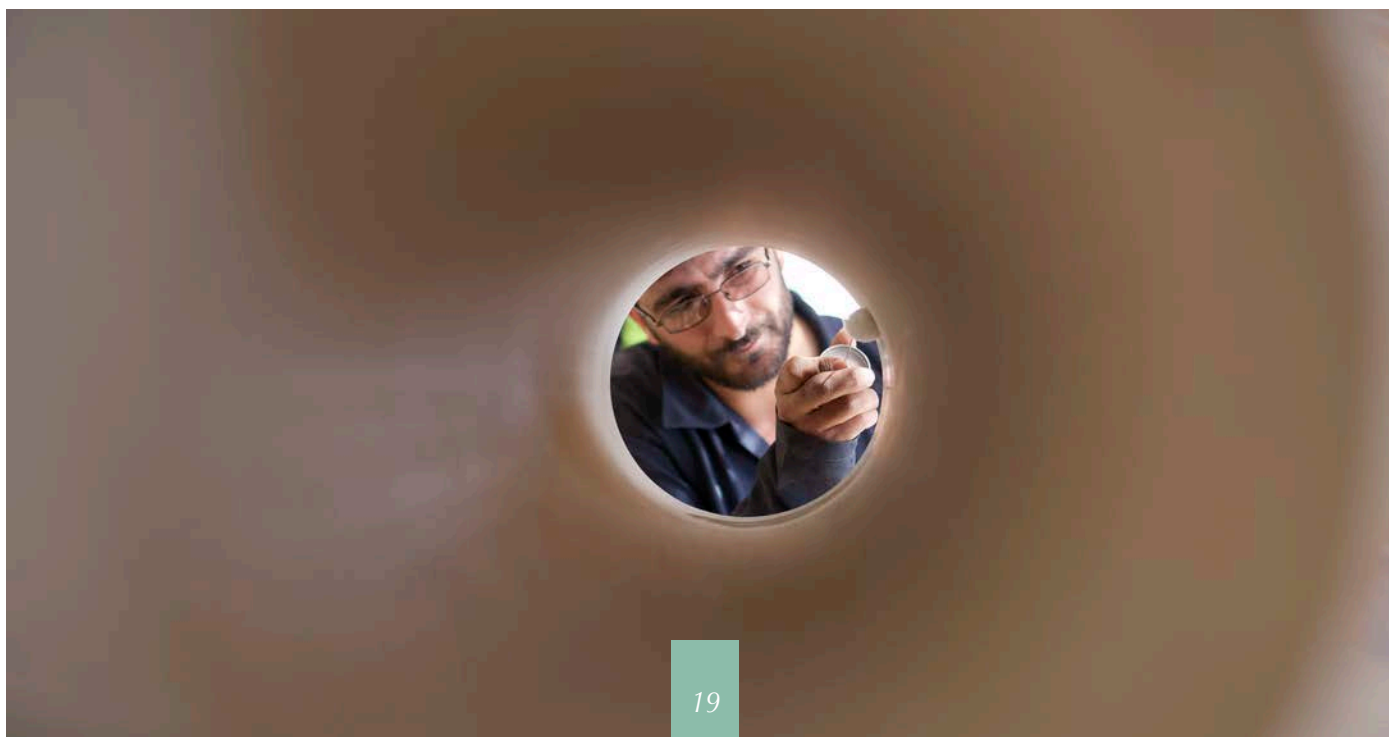


Ahmad presenting at the Window to Sustainability Conference





Photos:  
Tomer Appelbaum





## Celebrating Our Achievements . . . . .



In October, Comet-ME marked its 5<sup>th</sup> birthday, bringing 70 Palestinian, Israeli, and international guests to the Center to celebrate our achievements and look onward into the future. After the horrors of this summer's war, which left its scars on all of us, the gathering was a reaffirmation of the collaborative spirit that drives Comet-ME.



Photos: Tomer Appelbaum





Doll-Making Workshop // Tomer Appelbaum

*First we inflated a giant helium balloon.*



Hagit Keysar conducted a do-it-yourself aerial photography demonstration, giving us a grassroots view-from-above of the Center and the surrounding area. Developed by the [Public Lab for Open Technology and Science](#), this is an easy-to-use, affordable, visually and technically engaging technology that helps people leverage their knowledge with that of decision-makers.



*Then we hooked up a simple digital camera to the balloon, set it to continuous mode, and let the balloon go up in the air...*



*...guiding it with a string, as the camera took pictures at a frequency of about 1 shot per second.*

*The results were some breathtaking shots of the Center and the surrounding area.*



[source: flickr@fiestinx](#)

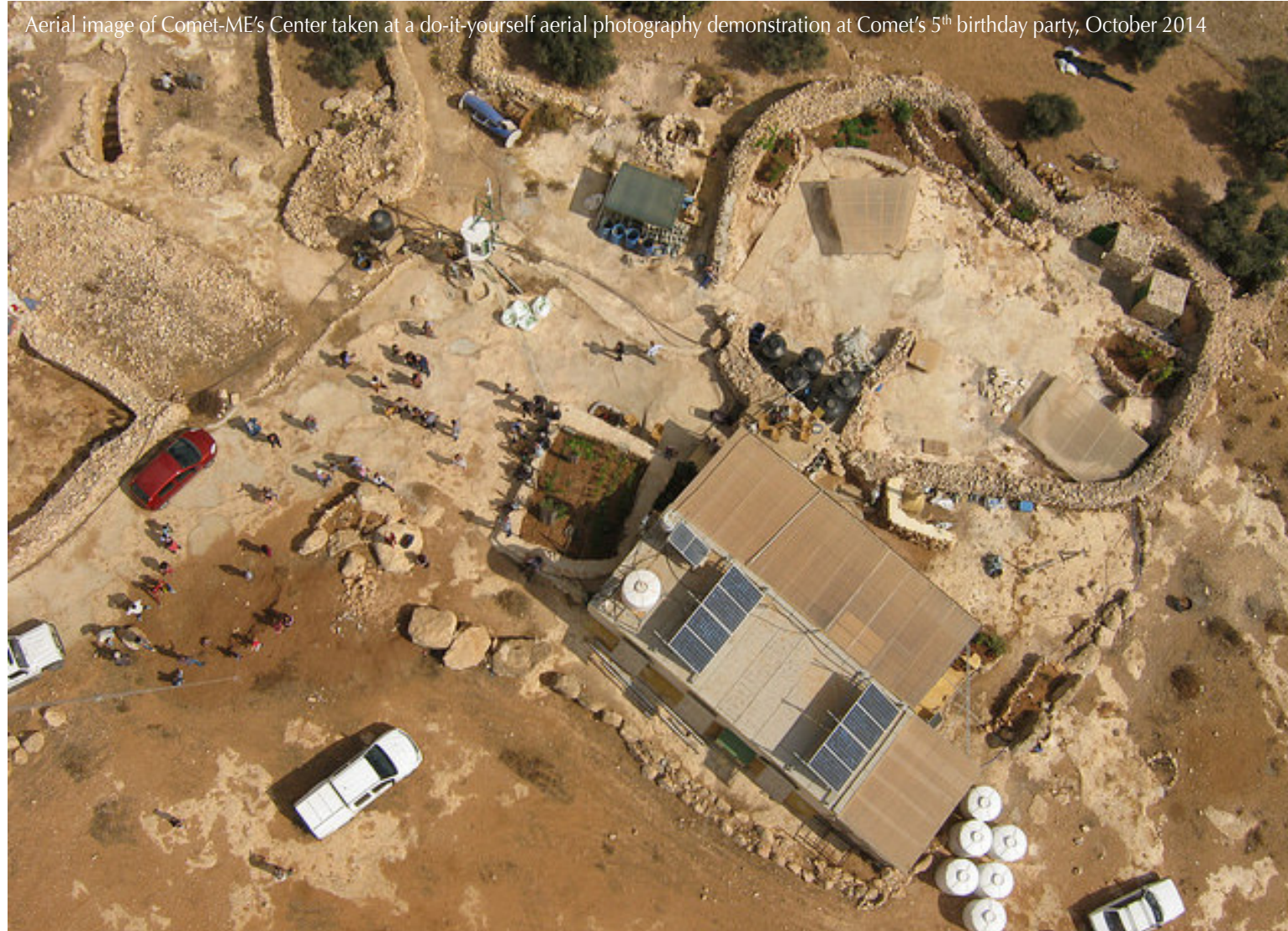


## The Comet-ME Center for Appropriate Technologies . . . . .

Comet-ME's Center for Appropriate Technologies in the south Hebron hills, inaugurated in December 2012, is the first and only Palestinian-Israeli technological center with expertise in renewable energy and sustainable development in Palestine. In the sustainable spirit of Comet-ME, our Center is designed based on ecological and sustainable principles and runs exclusively on green energy and self-collected rainwater.

Located in a renovated structure and two caves in one of our base communities, the Center serves as our regional base of operations for maintenance and installations activities, as well as workshop and warehouse, training center for staff and community supervisors, center for research and development for new rural development technologies, and a place for meetings and collaborations with other NGOs working in the region.

Aerial image of Comet-ME's Center taken at a do-it-yourself aerial photography demonstration at Comet's 5<sup>th</sup> birthday party, October 2014



[source: flickr@fiestinx](https://www.flickr.com/photos/fiestinx/)





### Community Trainings

The route to sustainability is long, but it is maintained by nurturing the relationship of trust between the Comet-ME team and the communities. Each of the communities has a community supervisor who is responsible for the routine upkeep of the energy systems and is the point person for Comet-ME's professional maintenance team. This year, the 20 volunteers from the communities participated in two training workshops at Comet-ME's center. The training sessions are a unique opportunity to strengthen the bonds with the communities we serve, while also providing them with the knowledge and skills they need to keep the systems functioning in the long term.



### Building Capacity



### In-House Turbine Maintenance

Early this winter we conducted an intensive repair of the 4.2-meter wind turbine at Comet-ME's center — fixing the tail hinge, replacing one blade, and adding an additional blade balance to align the turbine. In-house maintenance is one of the ways in which we build the knowledge and capacity of our team and continuously service our systems.



## Sustainable Spirit

In the sustainable spirit of Comet-ME, our Center runs exclusively on green energy and self-collected rainwater. This year we installed a new water system for the Center, just like the ones now being installed in the communities. We drink and water the garden with rainwater pumped from our cistern and filtered through the slow-sand filter.

Installing a new water system for the Center



## Appropriate Technological Solutions

### The Smart Controller

The “smart controller,” developed by Comet-ME, in collaboration with Orcon Technologies, Israel, uses excess energy from the community’s renewable energy grid to operate the water pump, thus completing the community’s water-energy nexus.



### The Slow-Sand Filter

When we began thinking about the best way to filter the rainwater harvested by the communities in the south Hebron hills for human, herd, and agricultural consumption, we explored all sorts of hi-tech solutions (UV filtration, chlorination, de-chlorination). Eventually, we settled on the most simple of technologies: slow-sand filtration. Using an open-source design from [CAWST – the Centre for Affordable Water Sanitation Technologies](http://www.cawst.org), we adapted the design of the slow-sand filter to the local market and developed a plastic-injection version of the filter container, which is now being produced for Comet-ME’s H2O project by a local Palestinian manufacturer.

*“The filter container [...] is filled with layers of specially selected and prepared sand and gravel. The sand removes pathogens and suspended solids from contaminated drinking water. A biological community of bacteria and other micro-organisms grows in the top 2 cm of sand. This is called the biolayer. The micro-organisms in the biolayer eat many of the pathogens in the water, improving the water treatment.”*

(Source: CAWST - The Centre for Affordable Water and Sanitation Technology [www.cawst.org](http://www.cawst.org))



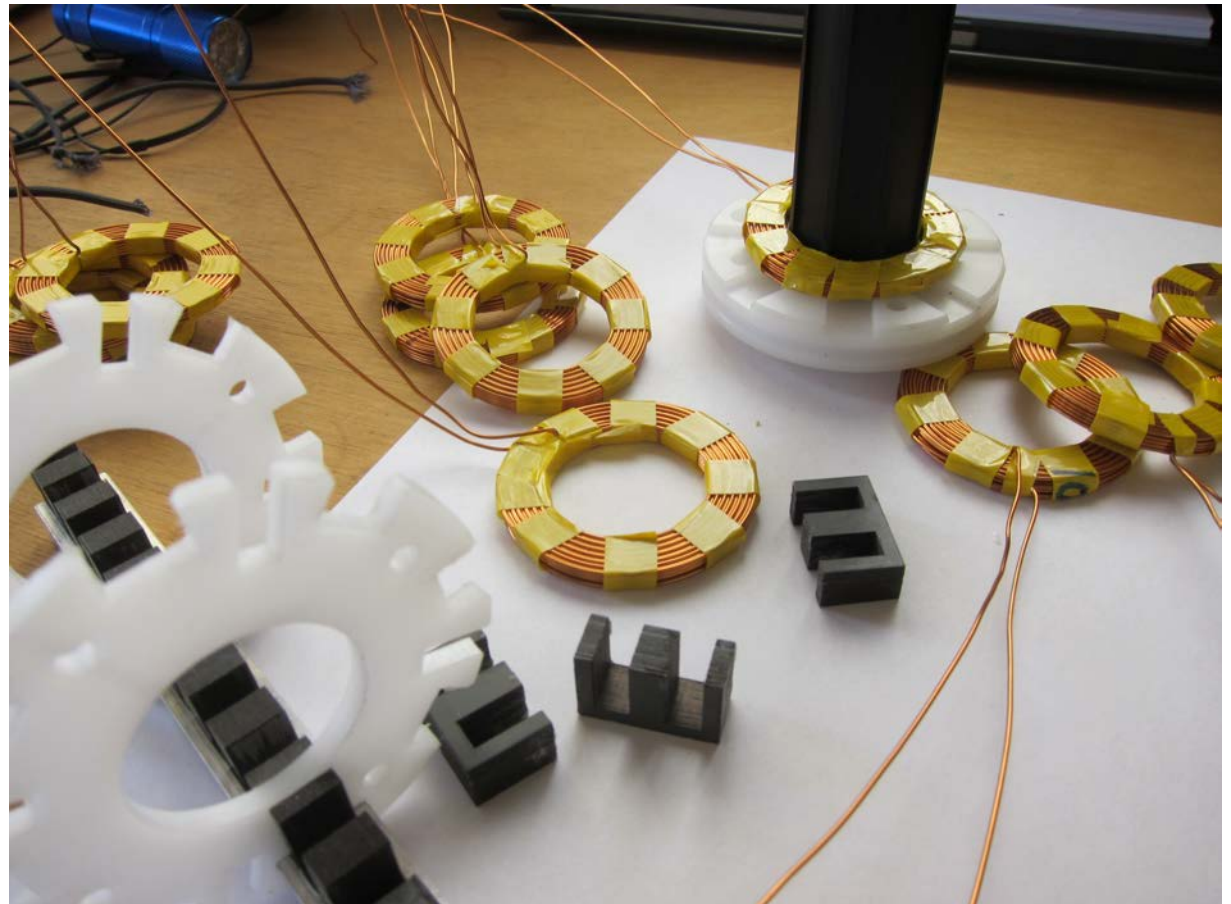
Photo: Tomer Appelbaum



## Research and Development

As an organization that is both highly technological and field-based, we are located in a unique position that allows us to integrate real needs with technology's promising possibilities. Many high-tech solutions currently produced in sophisticated overseas labs and factories fail to achieve large-scale adoption in developing areas because of real conditions on the ground. Our goal is to bridge this gap by developing appropriate technologies that are suitable to the capacities, resources, and needs of off-grid communities in developing areas.

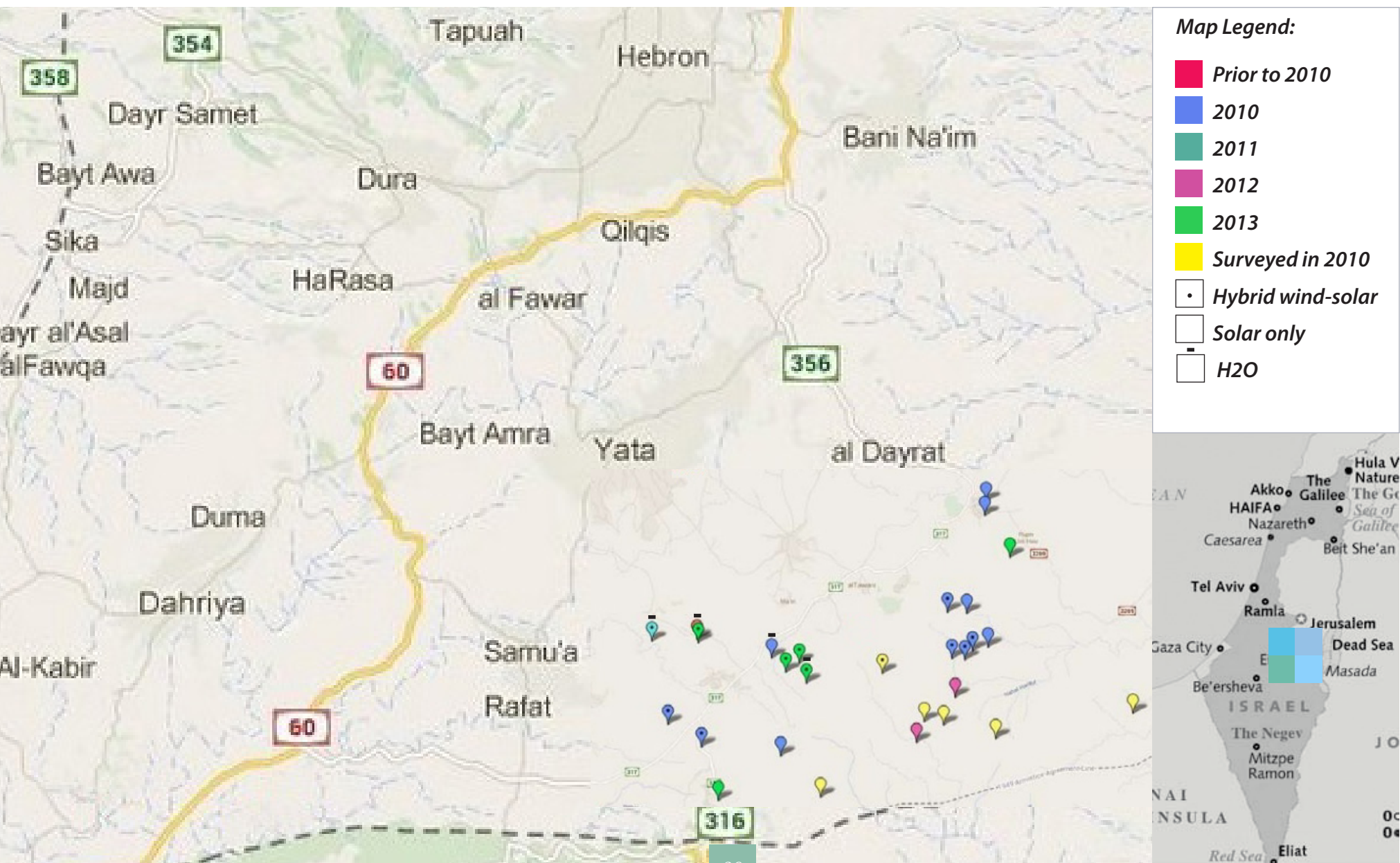
**Stand-alone solar water pumps** are a thriving and expanding segment of the global rural water-provision market. Existing solar pumps, although technically a very good solution to the problems of off-grid water provision, are often prohibitively expensive for poor farmers in the developing world. This year, Comet-ME has honed its research towards developing a stand-alone renewable-energy pump that can be easily and cheaply produced, implemented, and maintained in rural off-grid communities across the world. Our goal is to create an open-source design that can be shared, adapted, localized, and improved by local SMEs, NGOs and international development actors.







# Map of Installations



## Looking Ahead . . . . .

Comet-ME's plans for 2015 focus on two core activities: energy and water. In the area of energy, we are very excited to be embarking on a new installation project, expanding our renewable energy services to new communities in the south Hebron hills.

In our H2O program, we expand our installations of household water pumping, distribution, and filtration suites to 100 new households in our energy install base and will continue to research and implement our water augmentation projects.

In our pumping technologies program, we continue with our ongoing effort to develop and design a low-cost, reliable, and locally manufacturable solar pump. Our goal for 2015 is to create an open-source design that can be shared, adapted, localized, and improved by local SMEs, NGOs and international development actors.



Photo: Abd Aljawad Qabajah



photo: Tomer Appelbaum



## Thank You . . . . .

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

European Union Partnership for Peace Programme

Federal Republic of Germany

Netherlands Ministry of Foreign Affairs

Swedish Postcode Lottery Foundation

Irish Aid

Swiss Olive Oil Campaign

Rockefeller Brothers Foundation

Osprey Foundation

and many individual donors

### Partners and Supporters

Medico International  
Center for Emerging Futures

Clinton Global Initiative

CAWST – Centre for Affordable Water and Sanitation Technology  
Hugh Piggott and Scoraig Wind  
WindEmpowerment Association  
Prof. Jonathan Laronne, Ben Gurion University of the Negev

Bimkom – Planners for Planning Rights  
The Association for Civil Rights in Israel  
Rabbis for Human Rights, Israel  
Breaking the Silence  
Ta'ayush  
The Villages Group







Panoramic view from Comet's center // Josef Hermann

## Get Involved . . . . .



Our work is made possible through the generous donations of friends and supporters. Please consider supporting our work by making a donation <http://www.comet-me.org/donate.html>

Comet-ME is always looking for supporters, partners and volunteers. Please get in touch at [info@comet-me.org](mailto:info@comet-me.org)  
For more information visit our website [www.comet-me.org](http://www.comet-me.org)

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