



COMMUNITY
ENERGY
TECHNOLOGY
IN THE MIDDLE EAST

2011 Annual Report



IN THE MIDDLE EAST

0/1 Introduction		Comet-ME is an Israeli-Palestinian organization providing basic energy services to off-grid communities using environmentally and socially sustainable models. We facilitate social and economic empowerment of some of the poorest and most marginalized communities in the Occupied Palestinian Territories through installation of renewable energy systems (wind and solar), capacity building and reliable maintenance.
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COMMUNITY	9	Our work developed out of long-lasting relationships and commitment to the marginalized Palestinian communities in South Mount Hebron. 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. In 2010 we have grown into a vertically integrated utility, providing basic energy services to 12 communities. In 2011 we expanded our services to six additional communities, providing clean electricity to approximately 1,300 people.
ENERGY	16	
TECHNOLOGY	19	Today, Comet-ME is the leading provider of sustainable rural electrification services in the region and a key player in the field of off-grid renewable energy infrastructure. We partner with aid organizations and technological initiatives around the globe to get the best results on the ground. Comet-ME is committed to providing basic energy services to all off-grid Palestinian communities in South Mount Hebron.
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Comet-ME Growth

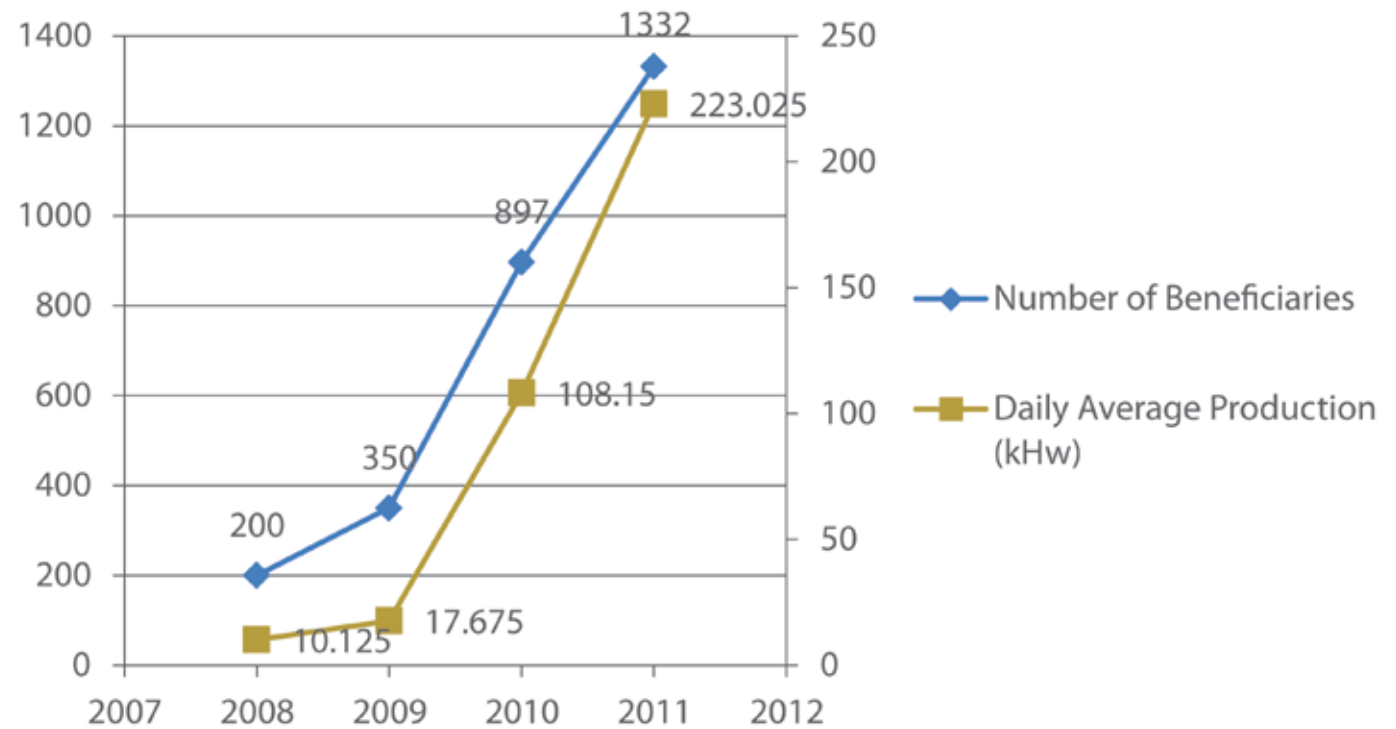


Chart shows the total number of people connected to power through Comet-ME's systems and the total average daily amount of energy produced by Comet-ME's systems since 2008.

The following report reviews what we have accomplished through 2011, our principles, methodologies, and plans for the future.



Simre // Tomer Appelbaum

Founders

Elad Orian

Noam Dotan

Project manager

Ala Qawasmi

Community

liaison

Ezra Nawi

Field

coordinators

Waseem al-Jabari

Jalal al-Tamimi

Organizational

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Adar Grayevsky

Dr. Danielle Shani

Yossi Mosel

Yoav Lahan

Roni Segoly

0/3 Where we work

Masafer Yatta, a remote area in the southern part of mount Hebron, is home to a population of several thousand Palestinian farmers and shepherds living in shanty-like villages composed of huts, caves and tents. These people, often referred to as 'cave-dwellers', subsist on non-mechanized agriculture and herding. Geographically, the region is located on the verge of the desert which affects its climate, fauna and flora. An average annual rainfall of about 280mm and drought in recent years along with limited water sources make survival in this region a difficult task.

The harsh natural conditions are exacerbated by the political conditions of occupation. Most of the region was marked as "Area C" in the agreements between Israel and the PLO. This means that both military and civil control is in the hands of the Israeli authorities and that the Palestinian Authority cannot provide the local population with basic services or infrastructure. Since the 1980s, 15 Jewish settlements and outposts have been built in the region, some on appropriated land. These settlements, even those considered illegal by the Israeli government, enjoy modern water, sewage and electricity infrastructure. Meanwhile, the rural Palestinian communities adjacent to them suffer recurring harassments, house demolitions, sabotage and violence at the hands of settlers and Israeli authorities.

This poverty and marginalization, and in particular the absence of energy infrastructure, is a product of the political situation more than of geography or economics. Our work is motivated by the desire to alleviate the unnecessary suffering imposed on these communities by conflict and political violence.





0/4 How we work

Comet-ME is a vertically integrated implementing agency, which means we manage the process from conception to completion. Through direct and long-term involvement with the communities, we gain a better understanding of community needs and are able to achieve long-term sustainability of the renewable energy infrastructure.

We consider the communities we serve as both partners and clients. Our goal is to provide them with energy services that suit their needs in a way that is socially and economically sustainable. We do this through direct and long-term contact with the communities and a work model that allows for substantial and meaningful community participation and ownership at every stage of the process.

Comet-ME strongly believes in open source design and local manufacturing. Whenever possible, we source components from local craftsmen, including the wind turbines, which are “home-brewed”.

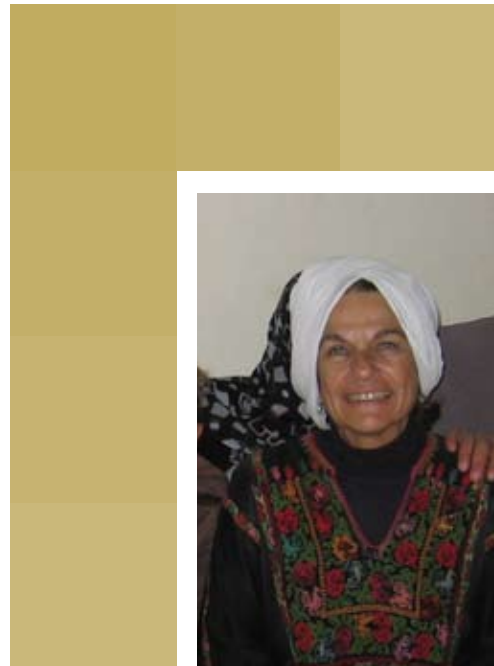




COMMUNITY

partnership,
empowerment,
impact

Comet-ME is committed to providing services that are not only environmentally, but also socially and economically sustainable. In 2011 we endeavored to deepen our understanding of the impact of our work on various aspects of community life, and use these insights to improve our methodologies. Based on research and observations, we identified specific areas where electricity produces positive change. We used these observations to develop models for evaluation and learning.



Social anthropologist Shuli Hartman joined Comet-ME between September 2011 and February 2012 to conduct field research exploring the impact of electrification on community life. Her observations are documented in a special report and serve as a foundation for Comet-ME's continuous learning and improvement process. The quotes below are taken directly from Hartman's report, showing some of the key areas in which our work influences life in the communities.



AREAS OF IMPACT

Comfort and quality of life

Greater comfort is the most common way community members describe the benefits of electricity. Having the comfort of electricity access in the rural dwellings creates a sense of home and normalcy. Families are now able to spend quality time together in the evenings, with artificial illumination extending the waking hours and television providing a form of entertainment that the whole family can enjoy together.



"Today, with electrification, life begins to look different. The TV is turned on every night, some places have computers, light bulbs illuminate the domestic space and for the young ones, the temptation to stay in the city has decreased..."



Security

Electricity creates a sense of security. It enables a vision of permanence and functionality, which is rare for communities living under constant threat. Cell phone access and night illumination contribute to personal safety.



“The situation of the elderly has improved significantly. Light in the toilet room and pathway makes reaching them at night much safer, medicine is stored in the refrigerator, and the TV can be turned on during the afternoon. As long as there is no need of hospital care, the elderly grandfather can remain in the place where he grew up and feels most at home.”

Poverty Alleviation

Electricity improves economic conditions by providing ways to increase family revenues and decrease expenditures. Electric appliances improve the efficiency and quality of dairy production, costs of carbon-based energy are eliminated, and expensive water consumption is reduced through the use of washing machines. Some communities reported a 15% increase in cheese production, and a 50% increase in the market price of cheese following electrification.

Women well-being

Women are the main beneficiaries of Comet-ME's work. Electric appliances save hours of arduous labor traditionally assigned to women. Women have more free time for leisure, tending to the children, and other housework. Improved access to cell phones allows greater freedom to communicate with friends and relatives, thus increasing women's sense of independence.



"Taryakhna – we are relieved, say the women on life with electricity. Now they can breathe, smile, spend time with the younger children and still work all day and finish their duties before dark."

Health

Electricity contributes to human health by removing hazards and improving communication channels. The dangerous use of kerosene lamps is eliminated, food sanitation is improved, medicine is kept in the refrigerator, and cell phones provide a line of communication in case of medical emergency.



Education

Wide use of television and radio opens a window into the world and allows community members in these isolated locations to connect and feel part of the wider society. Access to information and exposure to a wide scope of events and perspectives helps bring down walls of exclusion and segregation. Artificial light enables children to study at night, and the introduction of advanced technologies into the community triggers the interest of young community members, who develop knowledge and skills in the field.



"In a society with such strict definition of social roles and spaces, the common space created around the television at night enables a kind of conversation that, although preserves the traditional hierarchy... opens up a window to talk about their own lives, about binding norms, and even a space for imagination and aspiration. There is humor, giggling and laughter, sometimes criticism, and there is a place for dreams."

Environmental sustainability

Electricity generated by the sun and wind provides a clean and sustainable alternative to polluting energy produced by diesel generators. Carbon emissions are eliminated and greater energy independence is achieved.



"For those who live so close to the forces of nature and are dependent on them for water, sun, pasture and survival, for those who stand helpless in the face of drought, [renewable energy] creates a new kind of relations with nature, a bit more active, 'participatory,' 'in dialogue,' somewhat more egalitarian."



Lighting Communication Refrigeration Washing Churning General presence
of electricity



Comfort / Quality of Life



Security



Poverty Alleviation



Women Well-being



Health and Sanitation



Education



Environment



ENERGY

Efficiency,
robustness,
sustainability



The key to using energy for development is in identifying the communities' needs and matching them with the appropriate technology. Hybrid wind and solar systems like the ones we build offer a uniquely appropriate solution, as they allow the communities to make the most out of these abundant natural resources. South Mount Hebron is considered the best area for wind-based energy between the Jordan River and the Mediterranean. Moreover, the wind and sun complement each other during different hours of the day. The wind usually picks up in the afternoons, as the sun sets down.

Renewable energy solutions are undoubtedly preferable to carbon-based generators. Although costs of installation are higher, on the long run wind and solar systems are more economical, as they eliminate diesel and transportation costs and require low maintenance.

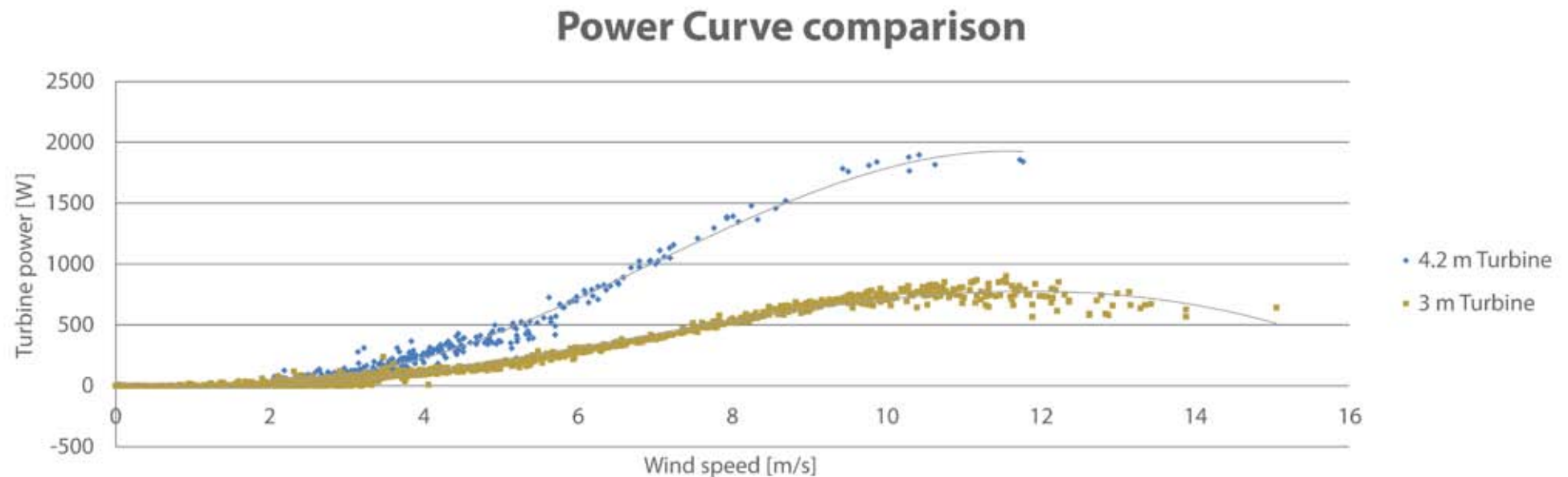
Solar and wind systems are different from regular electricity grids. Power production varies depending on time of day and weather conditions, and the batteries used to store power have a defined charging limit. Comet-ME develops creative and unique ways to match the possibilities of production with the needs of the communities, so that people can make the most out of the natural resources around them.

One of the unique solutions we developed is the meter system we use. In 2011 we designed and installed a world-first meter system produced especially for the needs of the communities we serve. Manufactured in China by special order, these meters allow the setting of a daily consumption limit per family.

This feature answers an important social challenge arising from the need to ration electricity consumption among community members. In regular power grids, users can consume as much electricity as they desire and pay accordingly. In our systems, users share a limited daily supply and are dependent on each other for proper use. Before the meters were installed, one person could easily shut down power for the entire community by simply connecting an electric kettle. The new meters prevent this situation from happening. They help us smooth the rationing process and avoid unnecessary social frictions.

The meters also help us manage our bill collection system. We charge regular electricity bills at a rate equivalent to that charged by the Palestinian national provider. We consider these payments crucial for the sustainability of the systems. The money collected is kept in a special fund dedicated to future battery replacement. In addition, bill payments provide an important incentive for the people of the communities to consume electricity rationally and develop a sense of responsibility and ownership. Our message is that electricity is not a gift, it requires active involvement and care by the people.

In 2011 we took a big step forward with our wind turbine technology. We successfully built and installed wind turbines that are 18 meters high and have a 4.2 meter blade diameter, a considerable upgrade from our previous 12 meter high model with a 3 meter blade diameter. The new turbines produce more than twice the energy generated by the old model, and are therefore able to serve much larger communities. They are also significantly more efficient and easy to control, and thanks to their robust design, they are expected to reliably serve the community for at least ten years, almost double the life span of our older models.



Blue dots marks energy produced by the new turbines in comparison to the old model, shown in yellow. In high wind this is almost three times the amount.



TECHNOLOGY

Infrastructure

for Knowledge

Dissemination

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 two core principles.

Open source

All technological details of our systems are available in the public domain. Our partnership strategy extends beyond the communities in which we work, to a global network of development and rural electrification practitioners. Sharing our experience with global partners, such as [Engineers Without Borders](#) and [Wind Empowerment association](#), creates a unique short loop of technology development and implementation. Lessons learned in South Mount Hebron can serve communities in Africa; developments made in student labs in the U.S. can find their way to the field within weeks.

Local sourcing

Comet-ME procures inputs from local manufacturers whenever possible. Most of the AC system components, the mounts for panels and turbines and the construction materials are purchased from suppliers in Yatta, Hebron and Ramallah. When technology is purchased internationally, we modify it to fit local needs, and share the know-how with our local partners.

Building the wind turbines ourselves is a central aspect of our work. Most of the materials for the turbines are purchased locally. By developing the knowledge and practice in the field of renewable energy we also invest in local technological infrastructure.

We apply this principle to human resources as well. Comet-ME trains and employs Palestinian electricians from Hebron, who also work with the local maintenance teams in the communities, teaching them how to perform basic maintenance and diagnostics. In this way we develop a local knowledge base that serves as a source for further development.



Building capacity, building relationships



This is Saber, a welder at the Yatim welding shop in Yatta. He has been working as a welder since he was a young boy. With limited formal education, he has reached an extraordinary level of vocational expertise. We met Saber when we looked for a local craftsman to build the towers for our home-brewed wind turbines. As our technology became more advanced, so did our relationship with Saber deepened. Our 2011 projects required a higher level of sophistication and accuracy. Saber was an integral part of our team as we designed the towers together. The Yatim shop upgraded its machinery to live up to the task. Saber and the rest of the Yatim team worked hand in hand with us in the field as we installed the structures they manufactured. Together, we learned how to design, manufacture and install complex structures specifically engineered for renewable energy technology.



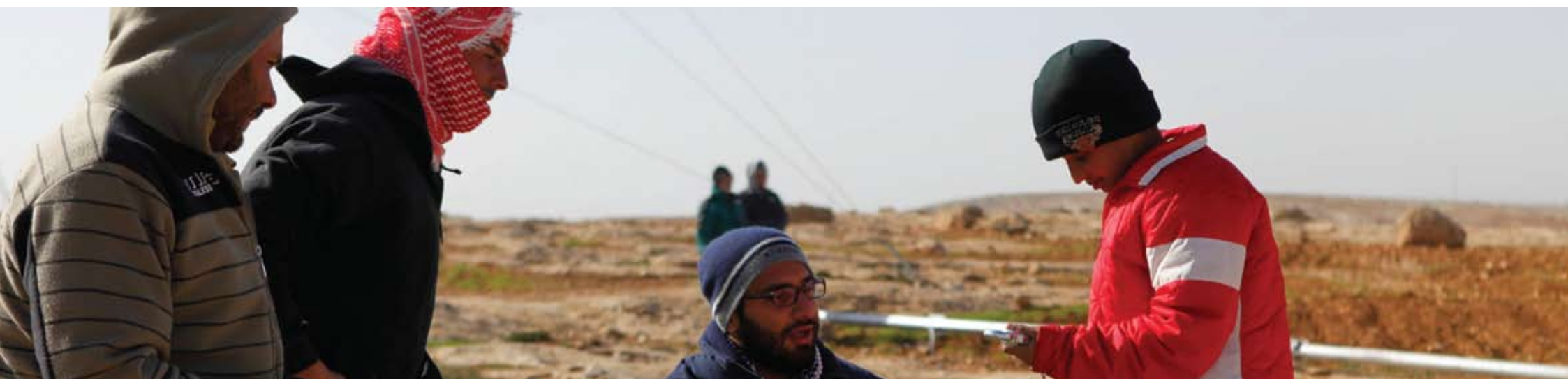
2011 Activities Overview

2011 has been a year of growth and learning for Comet-ME. We completed new installations in six communities: Sha'eb el Buttom, Gawawis, Simre, Tha'ale, Susya, and Abu-Kbeita. We now provide reliable sustainable electricity to a total of approximately 1,300 people, 635 of which were connected to electricity in 2011. All the communities are located in the area of Masafer Yatta in South Mount Hebron (see map), in Area C of the Occupied Palestinian Territories. In choosing the communities for installation, priority was given to the communities facing the most severe hardship due to occupation and political violence.

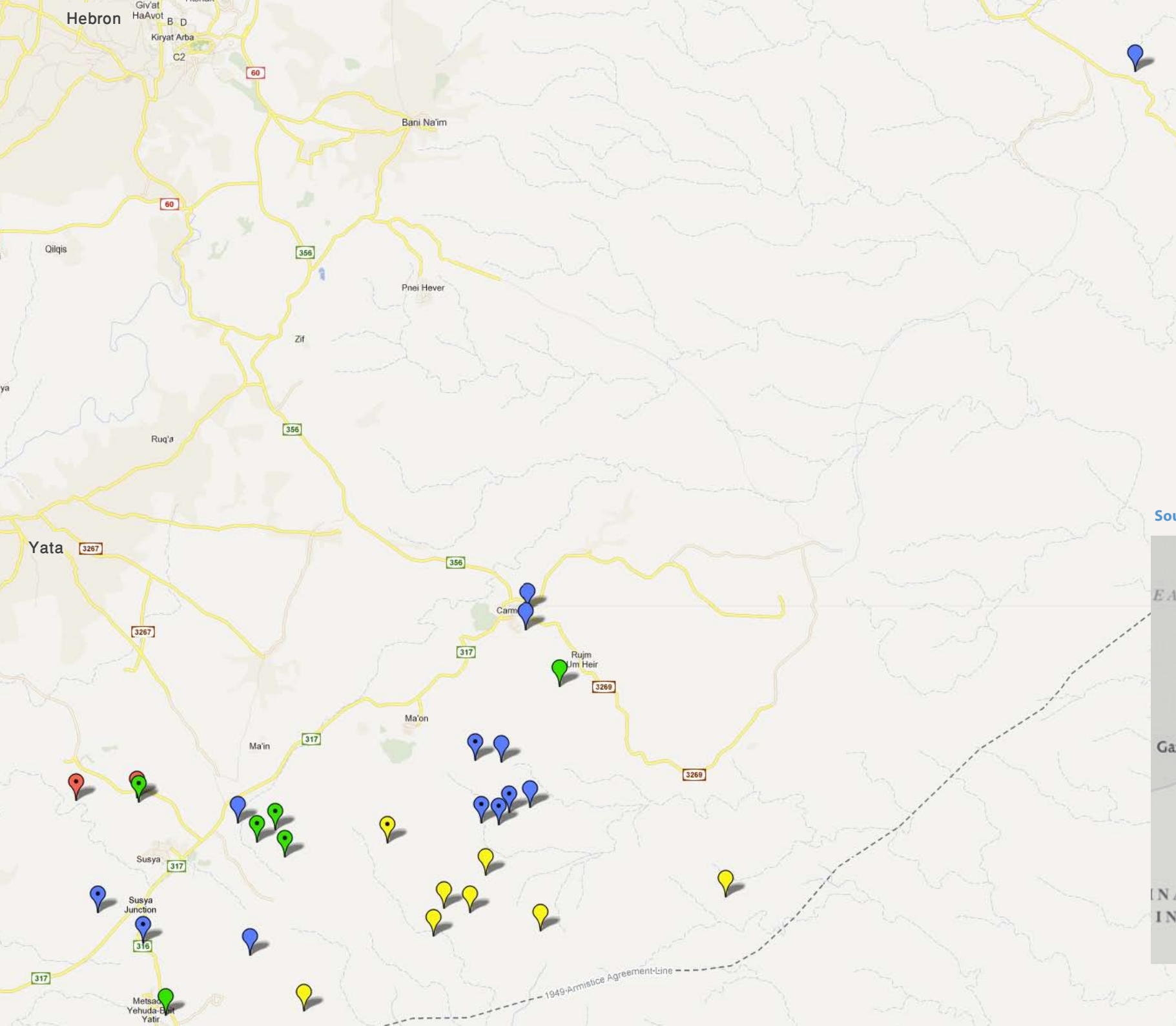
Project funded by German Foreign Office in cooperation with Medico International.

*Planned wind turbines pending installation.

COMMUNITY	Beneficiaries	Rated Power (kW)		Avg. Daily production (kWh)
		Wind	Solar	
<i>Sha'eb el Buttom</i>	250	5	8	45
<i>Gawawis</i>	40	1	0.675	7
<i>Simre*</i>	25		1.6	2
<i>Tha'ale</i>	80		6	30
<i>Susya*</i>	200		7.26	33
<i>Abu-Kbeita</i>	40		2.6	8
Total	635	6	25.135	125



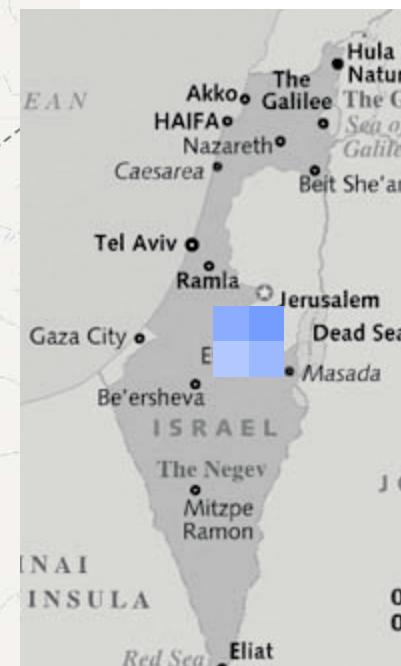


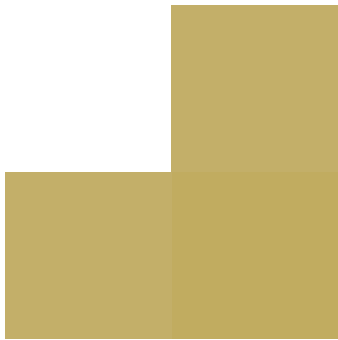


Map Legend:

- Up till 2009
- 2010
- 2011
- Surveyed communities
- Hybrid wind-solar
- Solar only

[South Mount Hebron region >>](#)





During 2011 we invested extensively in capacity building and collaboration with partner organizations. In February, Noam flew to Dakar to participate in the 2011 World Social Forum, where he met people from all over the world building wind turbines themselves. The workshop was hosted by the Dakar University, which runs a wind turbines project to power water pumps in Senegal.

The introduction of new technologies at Comet-ME required special training and knowledge acquisition. For this purpose, Elad visited Germany and Switzerland to participate in technologically-specific training workshops hosted by the manufacturers.

This year we also incorporated a new member into our team. Holder of an MSC in mechatronics engineering, Ala Qawasmi from Ramallah joined us as project manager, training on the job as we installed new systems in the summer and fall. At the end of the year, Ala was fully trained and prepared to lead our next renewable energy project.

At Comet-ME, we are proud to be involved in collaborative projects aimed at developing innovative technologies in the field of renewable energy. This year, we collaborated with Engineers Without Borders Princeton on two innovative projects.

The first project involves the adjustment and testing of a controller that enables freezers to be used as refrigerators. This technology helps us provide the communities with energy efficient refrigerators that save power and money. The controller is fully functional and was successfully installed in the village of Tuba in August.

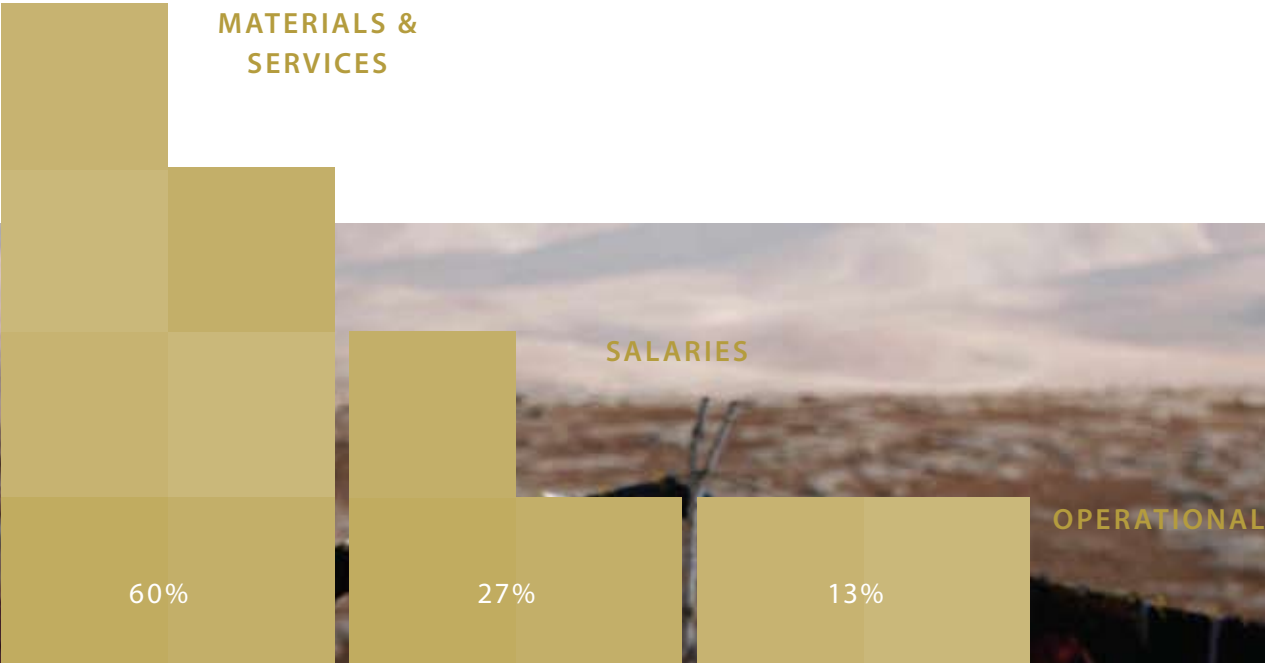
The second project is run in collaboration with Hanan Einav Levi, PhD candidate at the Technion studying optimal locations for wind turbines, and EWB Princeton. The project involves running blade simulations and wind tunnel tests specifically designed for Comet-ME self-manufactured wind turbines.

We are gladly continuing with our tradition of summer workshops in the Israel Institute of Technology, the Technion. Like in the previous year, we taught science students how to build and install a 2.4 meter turbine from conception to completion. The course was part of an Engineers Without Borders program on technologies for the developing world.

We are proud that in a development environment challenged by corruption and waste and daunted by conflict, we have been able to sustain an effective and lean organization, based on firm cooperation between Israelis and Palestinians. Out of our 2011 annual budget of 2,313,066 ₪, 27% was spent on salaries and 60% were used for materials and services directly benefiting the communities we serve.

As a leading rural electrification provider with a growing number of installations, Comet-ME's plan for 2012 focuses on local and regional capacity-building. We are preparing for the construction of a designated Comet-ME center in South Mount Hebron, serving as a regional base of operations, workshop and research and development center. We also plan to invest heavily in the adoption of new technologies, training of a designated maintenance team, and building local capacity for independent project design and implementation.

COMET-ME 2011 BUDGET





THANK YOU

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

Medico International

Swiss Olive Oil Campaign

Dan Church Aid Denmark

Center for
Emerging Futures

IPCRI

Clinton Global Initiative

Federal Republic
of Germany

German Representative
Ramallah

Department for Foreign
Affairs Ireland

Ireland Department
of Foreign Affairs

New Zealand
Foreign Office

Hugh Piggott and
Scoraig Wind

Wind empowerment
association

Superwind Inc.

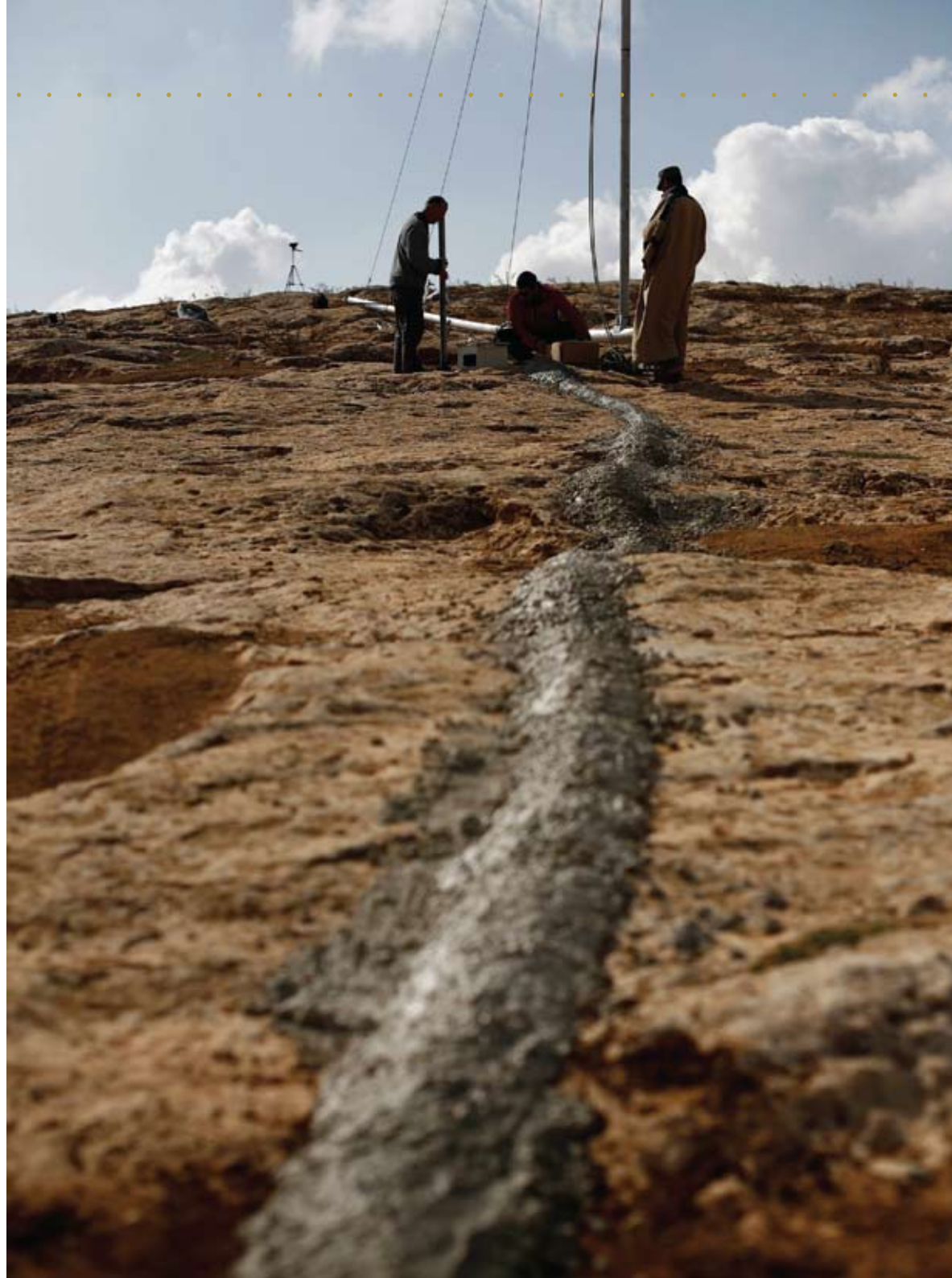
Bernard Amedai and
EWB international
EWB Denmark
EWB Princeton
EWB Technion





INVITATION

Our work is made possible through the generous donations of our friends and partners. Please consider supporting our work by making a [donation](#).



. . . GET INVOLVED

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