

The Solar AppTainers

by ERM Energies

Flexible containerized solar power solutions for local development



Many developing countries and insulated or insular territories lack economical and social development opportunities due to a lack of a clean and proper energy supply.

Those conditions contribute to the exile of populations, looking for opportunities to pay their own way.



ERM Automatismes, French leader in vocational training solutions and electrical offgrid systems

ERM Automatismes (ERM) is a 45-employees company founded in 1990, in the south of France.

Since **1990**, ERM has designed and manufactured **multi-disciplinary didactic machines** sold all over the world.

In **2006**, ERM opened a new department called ERM Energies dedicated to renewable energies. Quickly, this branch specialized its activities in **off-grid systems**. In **2013**, ERM Energies launched its **first design of containerized solar units**. The objective was to make reliable and efficient power plants for both offgrid electrification and associated services (desalinization, potabilisation of water).

ERM has implemented its design successfully in several African countries and continuously add new applications to its containerized system :

- *Solar FabTainer* (Open fabrication and training workshop): Industrialisation Stage
- *Solar DesalTainer* (Water desalination) : Three units deployed in Mauritania in 2016
- *Solar PotableTainer* (Water potabilisation): Early Design Stage
- *Solar BackupTainer* (Electrical grid Back-up) : One unit deployed in Burkina Faso in 2017 (via Red Cross of Monaco)
- *Solar IceTainer* (Ice production) : Ongoing project in Mauritania
- *Solar ColdTainer* (Solar Cold rooms): Early Design Stage

The Solar FabTainers are open fabrication and training workshops. They include a solar power supply for lighting, tools and computers, and a complete set of training materials. If needed, they can be moved from an area to another.

This concept is a **bottom-up agile solution** to key challenges of developing countries:

- 1- Allowing inhabitants to **repair objects and manufacture local products** for economical development or personal needs
- 2- **Providing technical skills for young people** to help them finding a job

Each **Solar FabTainer** is provided with curricula and exercises to develop the vocational skills in the selected technical fields. The training sets and curricula are designed in cooperation with French and African experts in vocational training.

Wood and carpentry

Metal

Mechanics

Leather

Sewing



Electronics

Electricity

Solar Maintenance

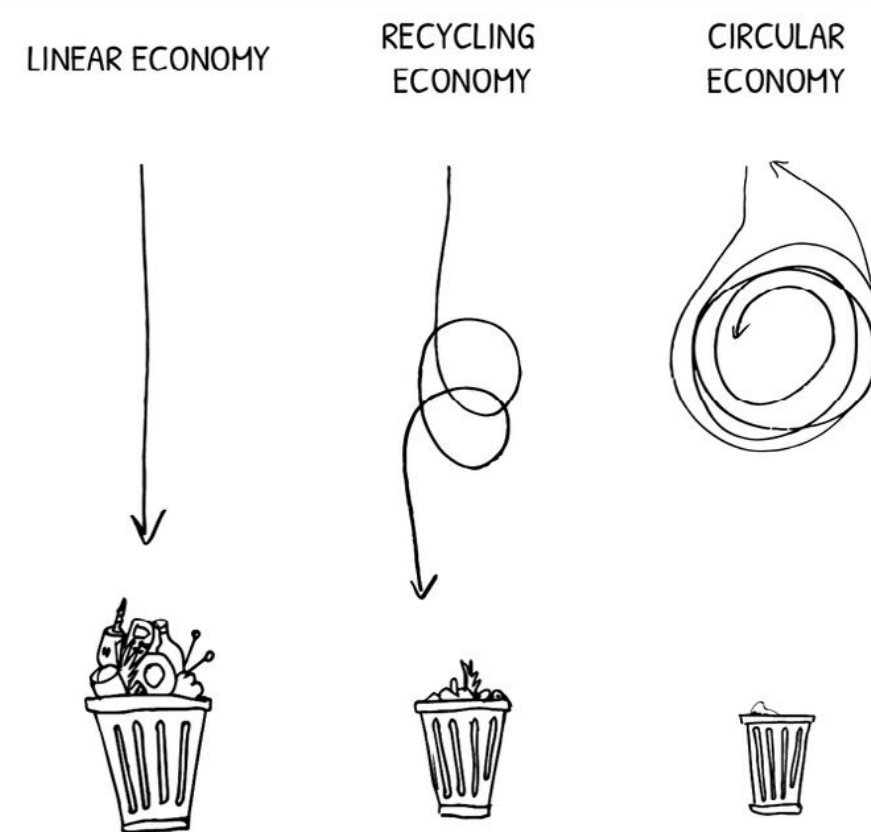
Cooking

Transformation of crop products



Clean and affordable energy

Only 19% of the African Sub-Saharan rural population have access to electricity. When it exists, its supply is low and not reliable.



Circular economy

Maintenance of manufactured objects is limited due to a lack of tools allowing their repair or their recycling down the line.



Access to a quality vocational training

43% of the African population is under 15 years old. Their access to quality education, especially to vocational trainings, is a major problem.



Craftsmanship and local economy

The capacity of the handicraft production is limited by the lack of access to manual and electrical fabrication tools.

The Solar WaterTainers: Water desalination and potabilization

For **The Solar WaterTainers**, ERM Energies has worked closely with **water desalination** and **potabilization** experts to design energy efficient RO (Reverse Osmosis) and pumping solutions that could be containerized.

The solar system, the pumping station and the water treatment plant are in the same container, **saving transport and handling costs**, and making sure that all the systems work together efficiently.

The design of the treatment plant is based upon water analysis and can be adjusted to the needs (potable water, industrial applications, breeding, irrigation...).



The Solar BackUpTainers: Off-Grid and On-grid Back-Up systems for hospitals and vital premises

The Solar BackUpTainers bring an answer to critical problems in many developing countries and Insular territories. In such areas, the **medical** staff is facing big difficulties dealing with emergencies because there is **no power** or because the **power is not reliable**. Performing a caesarean section in the dark or any other act of surgery is, even for trained staff, an act of bravery. Generators are scarce and most of the time not reliable.

ERM Energies has done some surveys in several hospitals and we have found that the problems could easily be solved with **solar energy and a bit of storage**. And they could be solved for a long time, needing almost **no maintenance** and no further expenses from the Administration (less or no fuel which drastically reduces power bills).

We have included **remote monitoring** in our units and our local partners can intervene whenever needed. Containerized solutions can be put outside of the vital premises saving building space.



The Solar FoodTainers provide the “green” generation of cold and ice for the conservation and transport of crops, fish and breeding productions.

Food preservation and storage is an issue in many tropical countries. Losses are **expensive** and tainted products are a **health danger**.

ERM Energies has worked closely with refrigeration experts too. Adapting the refrigeration and ice making units to the variability of solar power. Our integrated units therefore reach top class efficiencies and unbeaten reliability.



PV plant



Electronics & Storage



Cold Room



Ice Machine

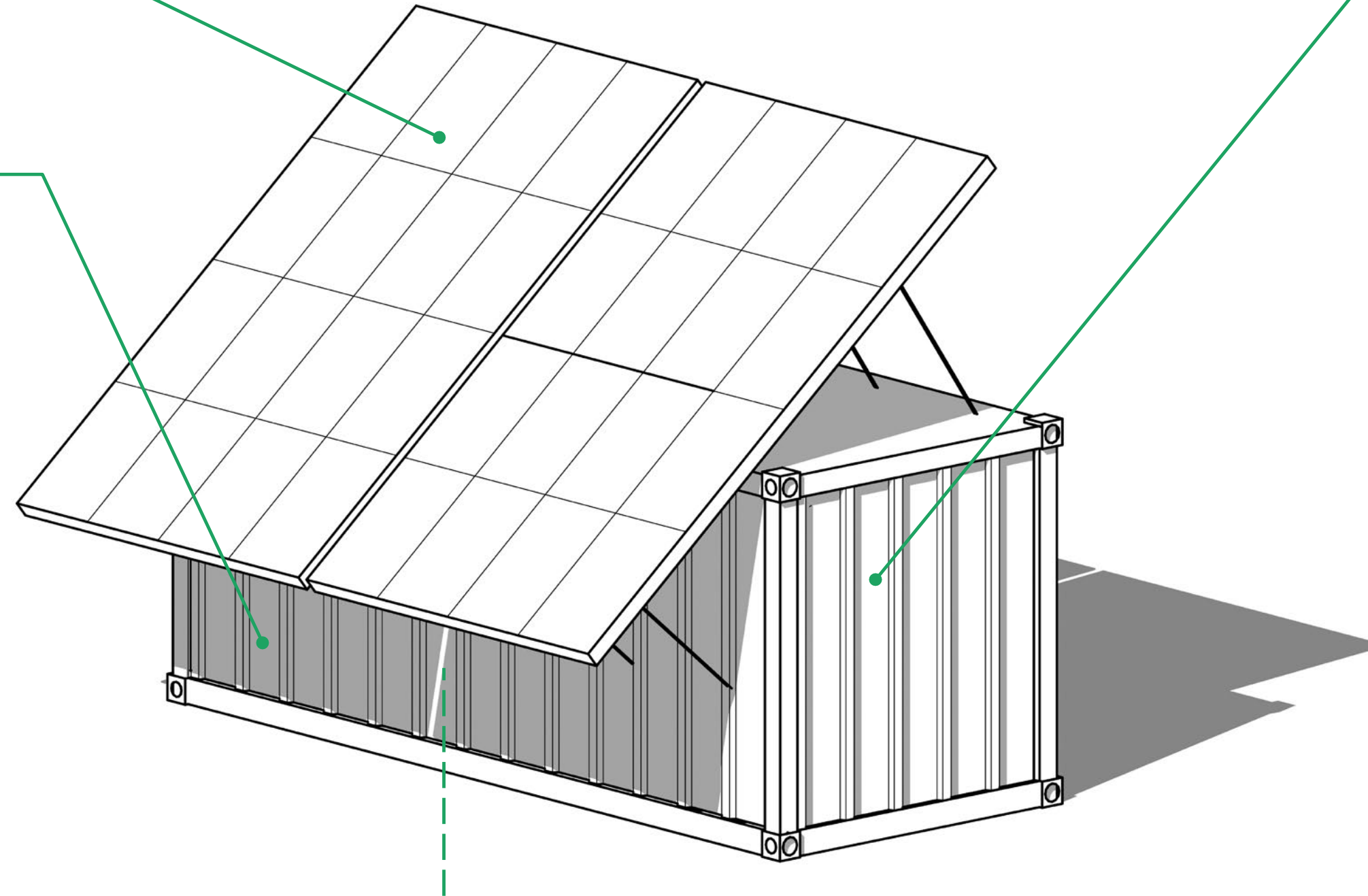


Solar panels

- 3kWp of photovoltaic modules and more if necessary.

Front area

- Common electronics devices such as a fridge to preserve medication of other heat-sensible products.
- Power plugs for lightings, TVs, phone chargers... on site.
- Tools storage area in a secured space.



Back area (key locked)

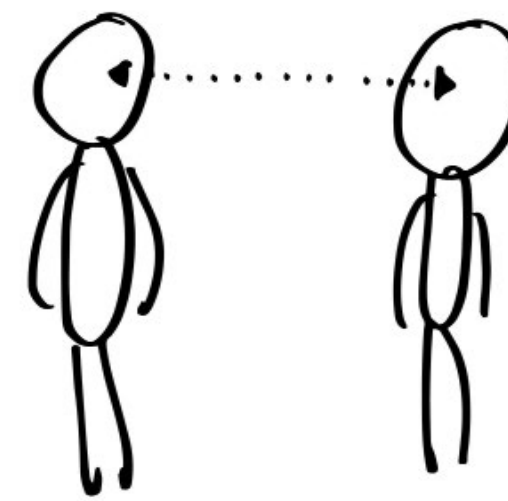
- Battery storage (460Ah in 48V or more if necessary) located in a secured space in the back of the container.
- Electrical cabinet
- Power electronics components (controller, inverter)

This configuration can *produce, store and distribute* electricity all year long to cover an average of 9000Wh per day.

Several benefits arise from the pre-equipped Solar Container designed and manufactured by ERM Energies:

- **Quick deployment** and implementation.
- **Optimal reliability**: the equipment is setup and tested before the actual implementation.
- The container answers existing standards of the country it'll be implemented in and can be certified by a third party control organization.
- **The mobility is conserved**: the container can still be moved and be use to transport some project's equipment.





1.

Manufacturing and technology transfer

The container supplying the solar energy is a recycled container, converted in France, at ERM Energies. In The Solar FabTainers, the one with the fabrication workshop is a recycled container, converted in France or locally (If possible) according to the specific needs.

Depending on the progress of the project, our long-term ambition is to implement a 100% local transformation of the containers dedicated to the workshop, following the blueprints designed by ERM R&D team.



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Exploded view diagram of a container chassis showing the following components and their reference numbers:

- Roof Panel (4.2.10)
- Front End Frame (4.1.8)
- End (4.1.7)
- Top Side Rail (4.1.9)
- Rear End Frame (4.1.5)
- Door Assembly (4.3)
- Flooring (4.2.16)
- Joint Strip (4.1.12)
- Forklift Pocket (4.1.13)
- Side Panel (4.1.11)
- SI (4.1.10)

4.

Training of users

The ERM experts move to the deployment site to ensure the necessary training for a smooth usage of the Solar and Application Containers.

5.

Long-term technical maintenance and support

They're organized and treated by ERM local workforce or the technical referents of the local partner trained by ERM experts.

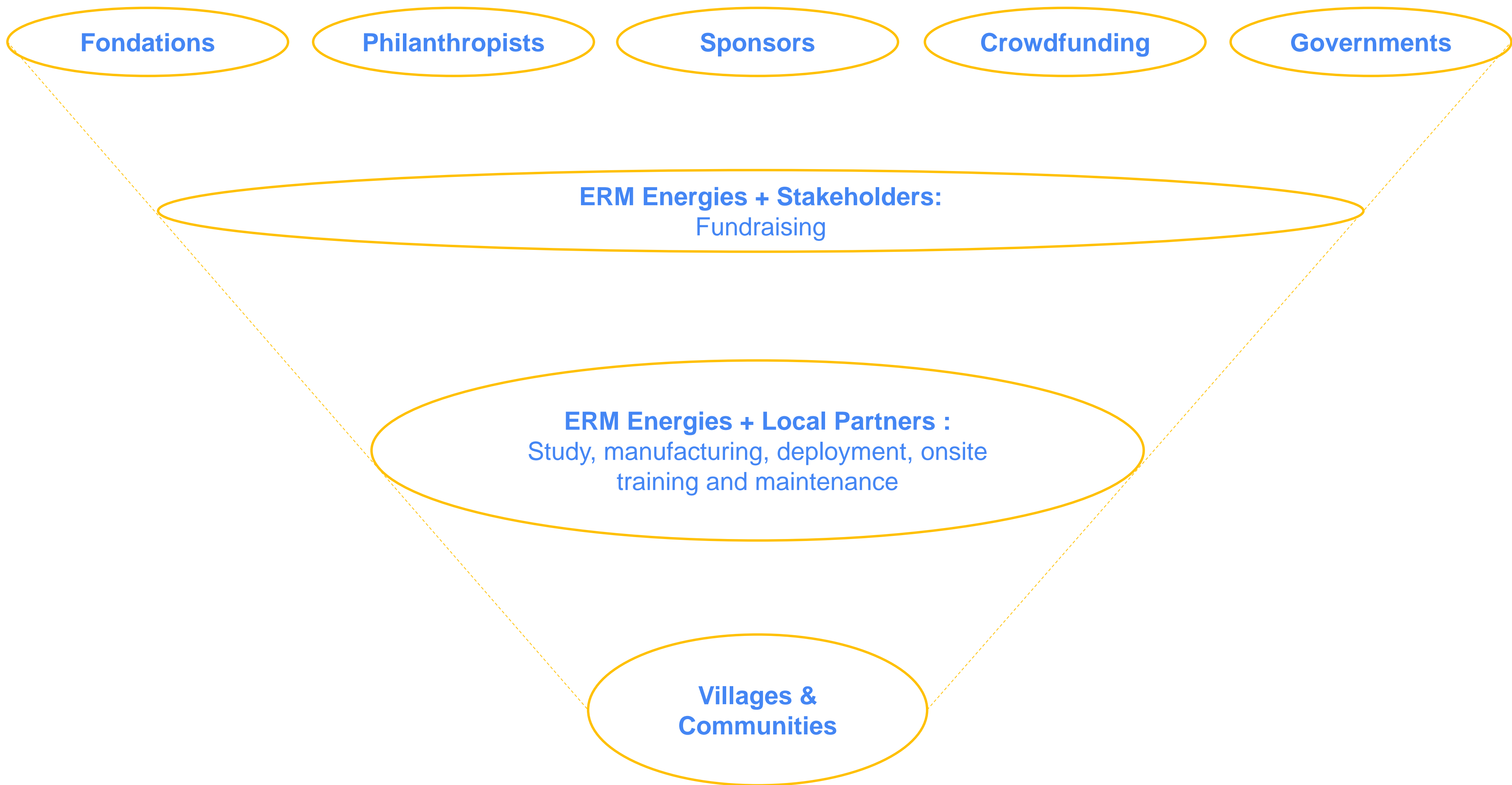


Such a project needs fundings for the pilot projects and further deployments.

We have these 3 short-term objectives with the first fundings :

- Set up two pilot projects (Infrastructure and materials) in Mali and Cameroun
- Hire a European Business Manager in charge of gathering fundings from Fondations, Philanthropists, Sponsors and Crowdfunding
- Develop a local network of project managers in Africa with priority to Guinea, Mauritania, Ivory Coast, Cameroun, Mali, Burkina Faso, Cameroun, countries in which we have already local connections. These managers will have in charge the local aspects of “The Solar AppTainers” project: Identification of communities, Local fundraising, Communication with governments and NGO, Project management, Maintenance...

Our mid-term goal is to deploy at least a dozen complete systems before the end of 2020.



The initiators of the project

Cyril Liotard



ERM Automatismes (Carpentras, Provence, France)

ERM Energies has 10 years of experience in the production of integrated and autonomous power solutions.

Firmly implemented on the African continent, ERM possesses the necessary knowledge to the transfer of technologies in the most isolated areas. With its division ERM Didactique, ERM also develop didactic solutions for vocational and technological training.

Pierre Échard



Catherine Bastide



Marco Marini



You should be an Artist (YsbaA)

The association UsbaA has for mission the support of the social and economical transformation, by the strengthening of artistic and artisanal practices in the developing countries. It gathers experts in sustainable development, in social innovation, in project management, in design and in fund raising.

International Partnership

In order to better meet the needs of the different projects, ERM and YsbaA can access a large network of international experts in numerous fields ranging from agriculture to housing, from health to mobility, from education to nutrition... ERM is already in contact with two important NGO networks in France (R20 France and Territoires Solidaires) and is looking for other contributors to the initiative.

Local Partnership

At the local level, ERM Energies partners with associated partners, private or public, who ensures the anchoring and sustainability of the project over time. They create the link between the project leaders and the community, and ensure the management of infrastructure over time.

For the **ERM Energies** team, it is unacceptable that people do not have **access to electricity, water, food quality or education** because they are in the middle of nowhere or don't have the funds.

Our organization wants to establish **sustainable partnerships** with NGOs, governments, foundations and companies to enable the realization of **practical projects based on renewable energies**.

We want to bring our experience and our know-how to enable people, in **any country in the world**, to have **better living conditions**.



ERM Energies
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