

# Sustainable energy access

Energy for humanitarian response and  
sustainable development.

# The energy progress report

## Tracking SDG 7

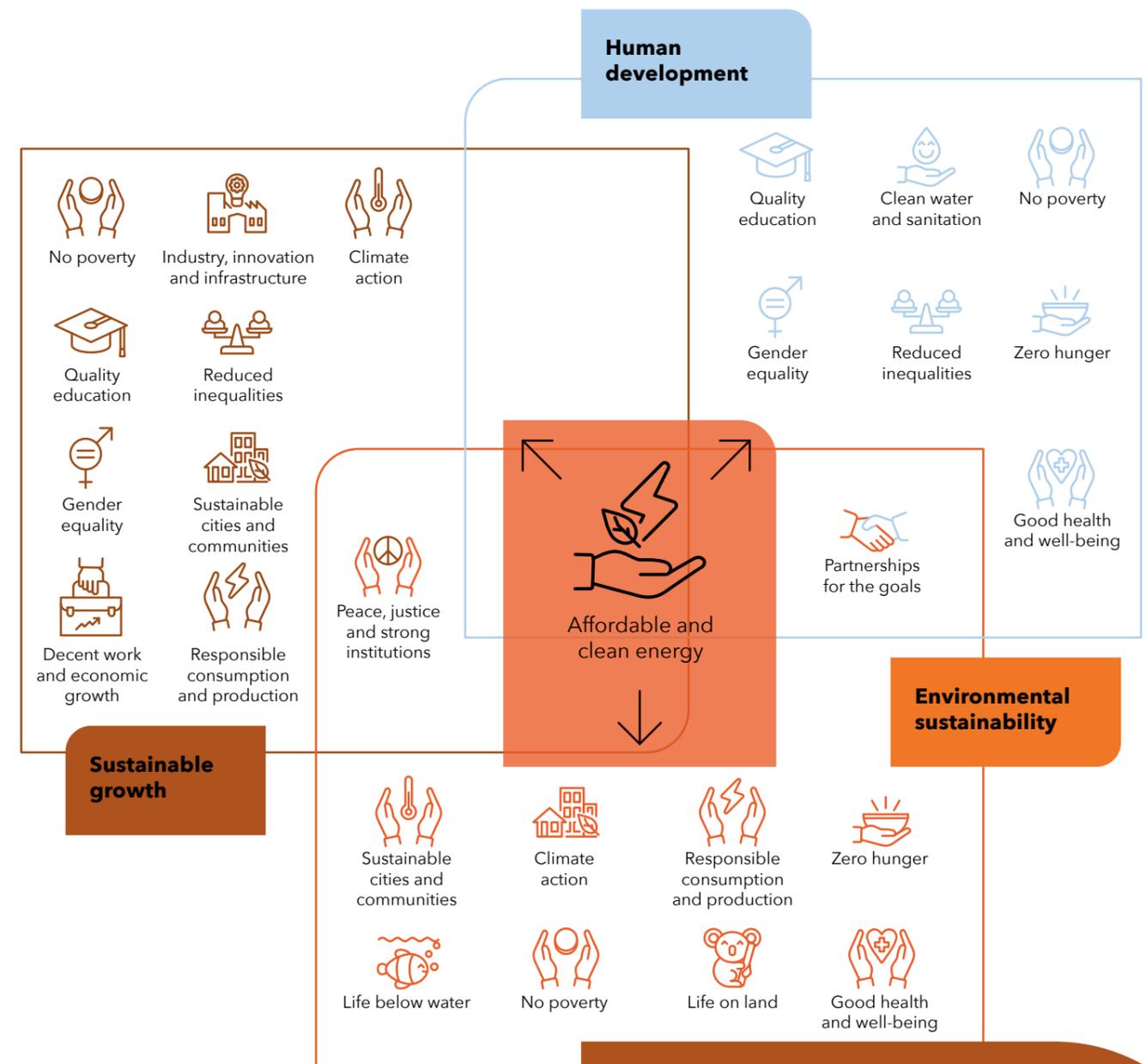
**Sustainable Development Goal 7 (SDG 7) calls for affordable, reliable, sustainable and modern energy for all, being one of its main targets to greatly/significantly increase the share of renewable energy in the global energy mix.**

The global advance of electrification accelerated slightly in recent years. However, the population still without access to electricity was 789 million in 2018\*. These numbers nevertheless fall short of the gains needed to achieve the goal of universal access to electricity by 2030. Under current and planned policies before the start of the COVID-19 crisis, it is estimated that about 620 million people will remain without access in 2030, 85 percent of them in Sub-Saharan Africa<sup>(1)</sup>. There is still a long way ahead and the COVID-19 crisis will have a negative impact in these estimations.

### Energy impact for the rest of the SDG and Solutions

To achieve SDG 7, connecting households to the national grid is not enough to spur social and economic development. Instead, energy must be available in a reliable and affordable manner not only for households but also for local businesses and public services. New opportunities are being offered through improvements in and the declining costs of decentralized renewable energy technologies for delivering energy access specifically to remote areas and in displacement settings. Nevertheless, vast challenges remain in providing reliable and affordable electricity access to remote locations. SDG 7 is closely interlinked with and indispensable for achieving most of the other SDG targets<sup>(2)</sup>.

The achievement of modern energy access for all is related to most of the SDGs and is key in developing the pathways necessary to keep the increase in global temperature well below 2 degrees Celsius.



## Reliable solutions contributing towards a sustainable energy for all

**Solar home systems, hybrid standalone systems and minigrids** are powerful solutions for rural distributed electrification in isolated areas. At least 30 million people in developing countries have gained energy access through solar home systems in latest years.

<sup>(1)</sup> IEA, IRENA, UNSD, World Bank, WHO. 2020. Tracking SDG 7: The Energy Progress Report. World Bank, Washington DC. © World Bank

<sup>(2)</sup> IRENA (2019), Renewables for refugee settlements: Sustainable energy access in humanitarian situations, International Renewable Energy Agency, Abu Dhabi.

# This is studer

**More than 2 GW installed in the world.**

**Innovation, quality and service.**

Studer manufactures the power electronics that are the core element in smart battery-based energy management systems. For more than 30 years our products are designed, manufactured, assembled and tested at our factory in Sion, Switzerland.

## Our mission

An integral approach to maximize the complete system lifetime



**10-year warranty** in battery based power electronics.



**When we participate in a project we take an active role. We are committed to collaborate with our partners along the project lifetime.**

Lucien Debons, Head of sustainable energy access & International Organisations Facilitator



**Studerconnect** provides professionals with an online platform on which to place and track orders, among other services.

**Studercare** combines the options for extended warranty and preferential access to support.

**Studerfinance** offers tailored financial solutions to help professionals carry out their projects.

**Studertechnics** provides priority technical support and a network of accredited centres worldwide.

**Innovation is what drives studer's priorities.**

**Studerlab** is studer's innovation and research incubator. We develop special applications and solutions for specific applications. We have implemented several innovation projects related to the decentralized electrification.

**Studerskills** is a platform where we have developed learning sessions, including practical training. These sessions are targeted to accompany our clients along the path of their challenging projects. In addition, we developed tailored training sessions for specific needs. Studer participates regularly in international conferences and exhibitions contributing to making available the relevant technology for achieving common goals.

## studerservice

With the purchase of a studer product, basic services such as after-sales service, warranty, technical support and project support are included.

In addition, a range of specific professional services has been developed to meet the needs of current markets.

# How does an offgrid solar system work?

## Renewable energy sources

Solar energy is rapidly growing, forecasted to become the world's largest source of electricity by 2050.

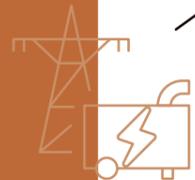
Other renewable energy sources such as wind and hydro can be easily incorporated in the system.



## Hybrid solution

**Generator:** A combination of a hybrid PV/genset is by far the best solution for offgrid electrification when needs are over 1-2kWh/day.

**Grid:** many rural and some urban areas depend on unreliable grid power. A solar generator provides stable power to compensate weak grids and a secured energy backup during blackouts.



## Storage

The central element of an offgrid solar system, the battery storage allows to have stable energy 24h.

Battery technology is evolving fast, our system can smoothly integrate every battery technology. From new efficient lead-acid batteries, to saltwater or lithium batteries in order to match every energy demand.

### Battery lifetime optimization

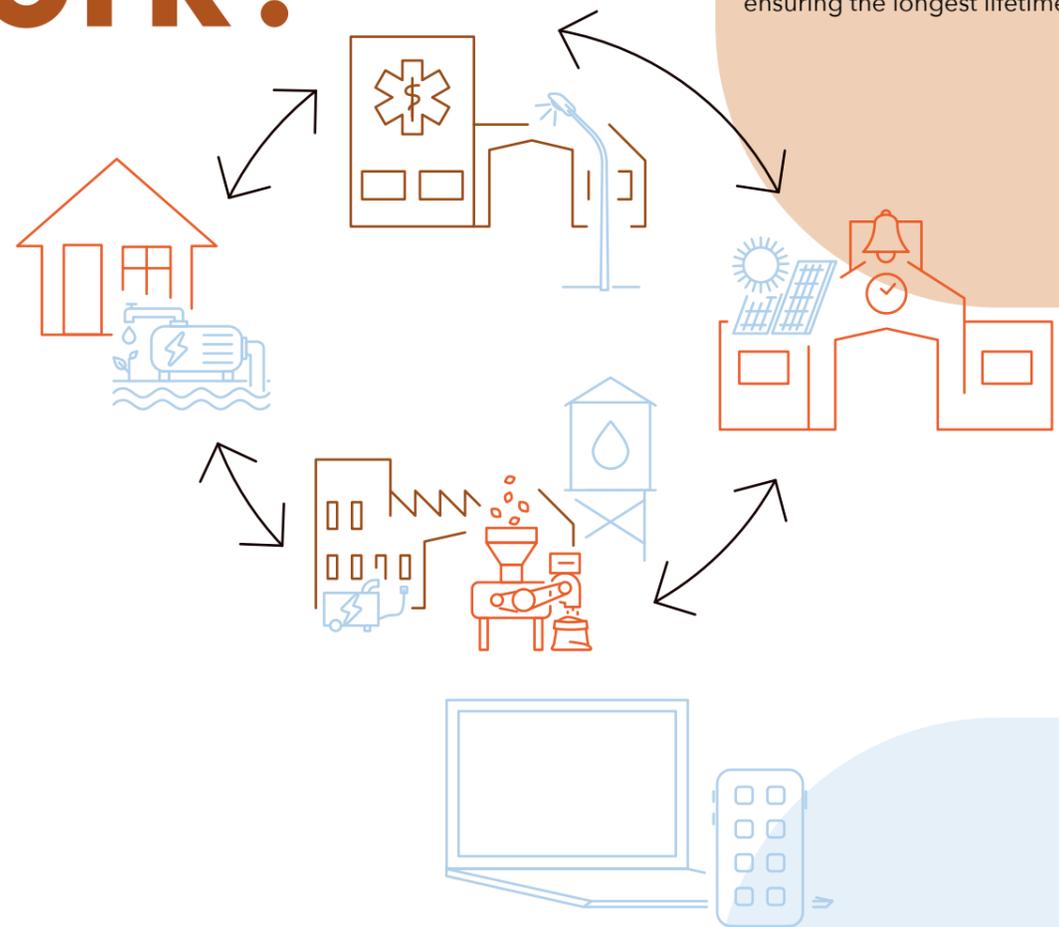
Our main goal is to maximize battery lifetime and therefore reduce system costs over the project life. Studer battery chargers are the most versatile ones to adapt to every battery price requirement. In addition, we have developed the BLO algorithm to protect battery from deep discharge, saving up to 25% of the battery costs.



Solar system

**A hybrid solar system combines different renewable energy sources (solar, wind and hydro), an energy storage solution and/or a diesel/gas generator.**

During the day, solar modules generate electricity that is either used directly to power appliances or stored in batteries. At night, the stored energy is used when needed. By including a generator to compensate for occasional additional energy needs, the dimensioning of the battery bank and renewable energy source is more accurate and the system more efficient and reliable.



## Reliability in the long term

Our more than 30 years experience in battery-based systems positions our solutions as the most reliable energy system in the market.

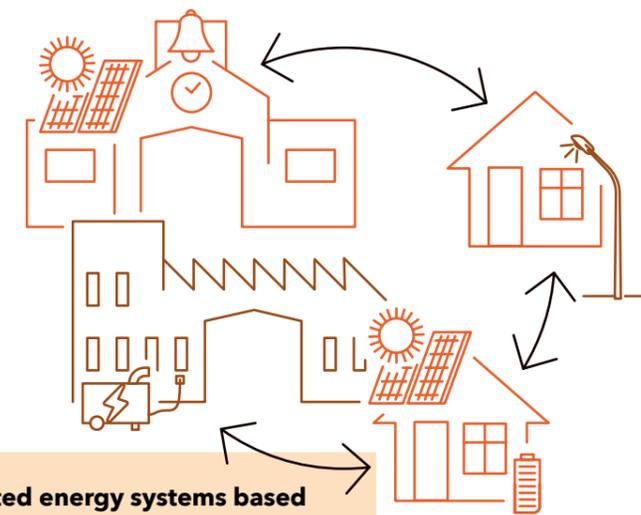
With an eye on the initial capital investment, the levelized cost of energy during the project lifetime is what drives us. Our high quality and robust system proposals provides the best return on investment ensuring the longest lifetime.

## Remote monitoring

A reliable remote control and monitoring system will facilitate the energy management, allowing the integration of smart strategies. Different options for monitoring are available, both centralized for the management as distributed for user interface, with dedicated communication lines or LoRA.



# Minigrid



**Distributed energy systems based on renewable energy sources for large demand requirements around 20-250kW.**

## Small solar systems

**A range of small solar systems is available to match the demand, the typical systems are from 275W to 1-2kW.**

A small solar system often referred as solar home system (SHS) is an independent electrification system for individual or household use.

Having a standard AC output with 220Vac or 120Vac and allowing to use any standard AC appliance with the system, the **small solar system** facilitates the local appropriation of the technology.

Deploying SHS programs will incur having a financial and business model around the systems and users. We collaborate with several service providers in order to adapt the technology to the relevant business model, according to tariffs schemes, pay as you go (PAYG), leasing and others.

## Modular solar systems

**A full range of flexible solar hybrid energy systems in single phase or in three-phase from 1kW to 100kW with a powerful transfer switch.**

Solar systems are often situated in remote areas where the dependence on the system is critical, making the robustness and reliability of the installed products of utmost importance.

The scalability and modularity of studer products enables the system to evolve with its user needs, making it a smart and flexible energy source and compatible with a range of different energy sources.

Our devices, the multifunctional battery inverters and MPPT solar charge controllers, are suited to build a long-lasting solution for offgrid electrification.

A successful installation should always be adapted to its context and build upon the community's commitment. Solar installations are about empowering the beneficiaries and making the best out of electricity.

Innovation is our core value and what drives us toward the future. As part of our latest product range, the next3 is an all in one device with an outstanding performance in terms of weight, volume and power.

The digitalization in combination with the best hardware opens a full range of new possibilities integrating new technologies and AI algorithms. Studer is ready to play a key role for tomorrow's smart energy management.

The energy component is a key element for humanitarian response and development projects, given the transversal impact that energy has in health, education, food security, productive uses, etc. and is proving to be a success in developing countries. As part of our engagement towards sustainable development, Studer has been involved in several projects with NGO's and international organisations, as battery-based system provider and expert.

Our role as system provider is to deliver the relevant technology to best match the project requirements. In order to reach this objective, our technical team is constantly working in the technology evolution towards the specific needs of these sectors.



#### Offgrid street lighting

Offgrid system powering street lighting in desertic harsh environment in Egypt



#### Rural electrification

Offgrid system powering agricultural machines, irrigation pumps and household lighting in Jharkand, India



#### Eurosolar programme

600 solar generator kits for the electricity supply of community services: communication and internet facilities, schools, health centers, etc. in Bolivia, El Salvador, Ecuador, Guatemala, Honduras, Nicaragua, Paraguay, Peru



# Sustainable development and humanitarian response

#### A technology provider and project partner

Manufacturing power electronics for battery-based systems is our core business. The power electronics are the central part of the system, coordinating the energy and power transformations from the different sources. Our technology is also the core of the energy management strategy, with the integration of smart technologies in energy conversion, making energy monitored, controlled and conserved at its best.

We have realized that an energy system represents an energy infrastructure (the components) with a technical service (electricity) that goes along with a series of soft elements: social use of electricity, business models, finance, training, operation and maintenance. These elements have the same impact as the technology itself for proving a system successful.

At studer we are aware of the field reality and we have understood that we should play a deeper role in energy projects. Therefore our technology is also accompanied by a series of services for contributing along the project and actively increase our engagement along the full lifecycle.

#### From professionals to professionals

Setting up an energy system for suiting a defined energy demand is part of our dna. We acknowledge the importance of the experience from the field together with the local context, where we can provide our technical experience that can contribute to implement a global development project or address specific problems in a humanitarian context. By building private and public partnership this can be achieved, participating as project partners and enlarging our engagement not as initial technology provider but as technology contributor for a smart energy platform along the project lifetime.

We focus on building simple solutions to simple problems in complex context and situations.

# Education and development

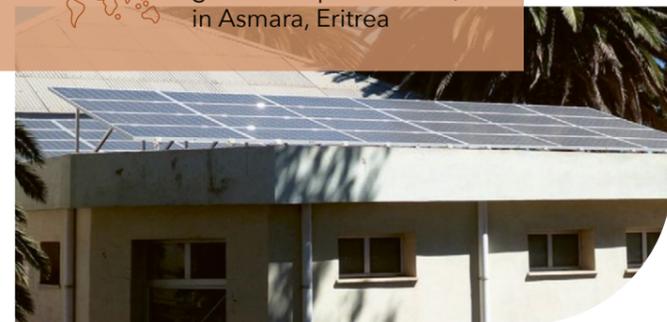
## The cross sectoral approach of energy and education

From our perspective, energy and education are related in terms of being a transversal component for human development. Energy projects are not an exception, education is a key activity for a successful project implementation. By taking a more active role in the projects we can also contribute on training activities. In every project that we participate in, there is a team in charge of the system, once the system is running. In order to ensure a successful operation, the commissioning, training and operation and maintenance stages are key.



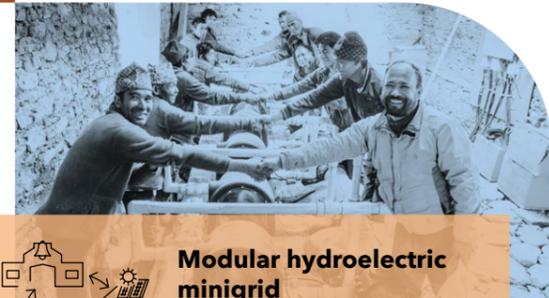
### Backup system

Orotta pediatric hospital with a backup system to compensate unreliable grid and replace diesel, in Asmara, Eritrea



### Offgrid border control

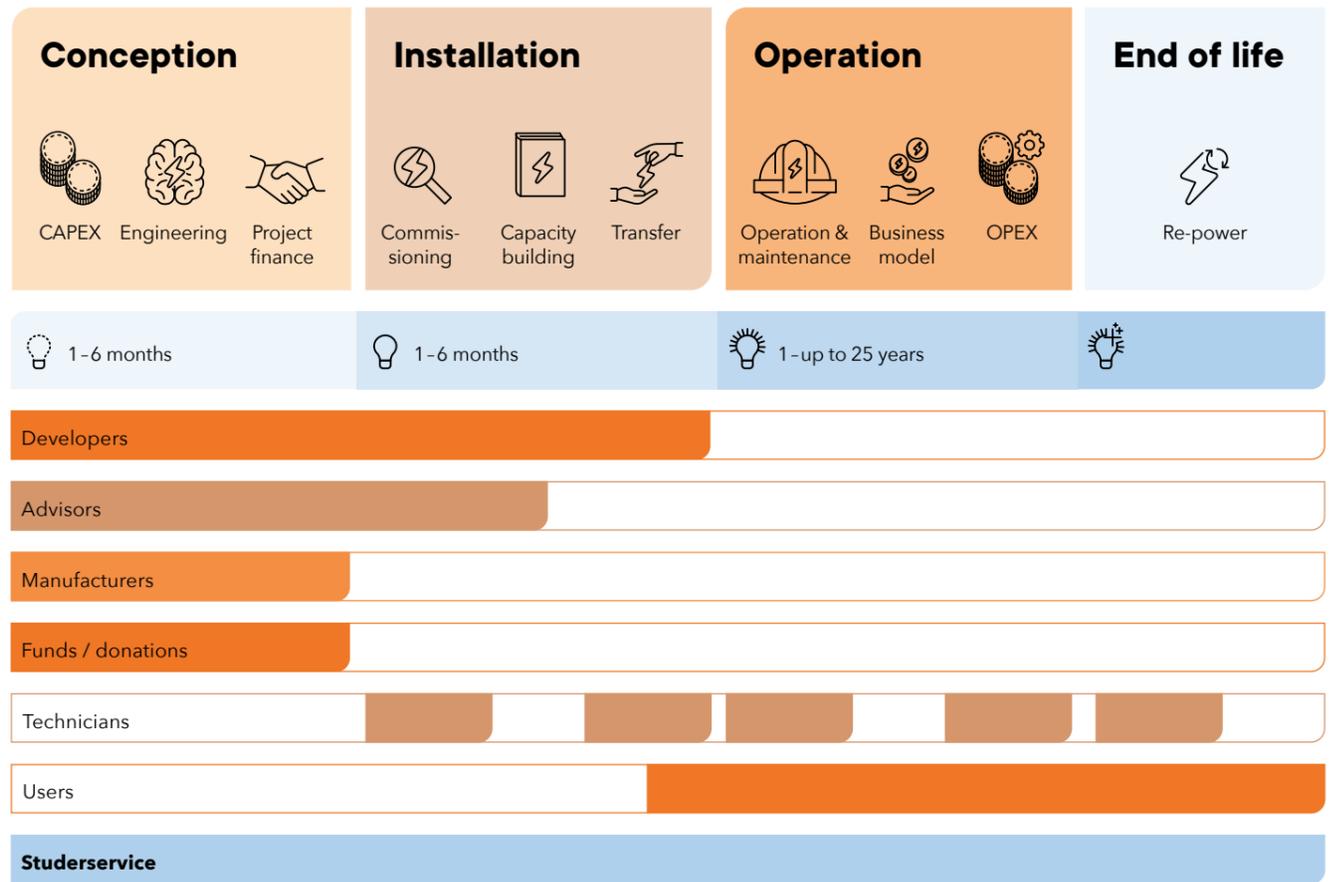
Standalone energy system supplying the OIM facilities on the Jordan border



### Modular hydroelectric minigrid

Pilot hydro minigrid system for rural electrification in Jumla District, Nepal

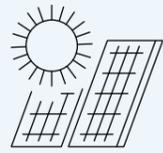
Through **studerskills** platform various online and hands on practical training are available, both for practitioners and technicians. Customized training programmes have helped to raise awareness among project managers and beneficiaries, capacity building for local technicians and operators.



In addition, we are running a range of training programmes with education facilities. Our educational kits can play a great role in building up not only technical capabilities but energy efficiency awareness.

## Energy kits for sustainable humanitarian and development projects

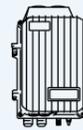
Renewable energy sources often referred to as clean energy are widely and globally available. Solar energy represent a great resource in many locations where development and humanitarian projects take place. However, the renewable resources are limited and the energy demand varies along the different context of every specific situation.



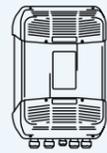
16 x solar polycrystalline modules, 2400Wp



Battery bank with 600Ah 48Vdc



1 x **variosting** vs 70 MPPT charge controller



1 x **xtender** xtm 4000-48 inverter/charger



1 x **rcc 03** studer remote control



Cabling & protections



1 x studer **bsp 500** battery status processor



1 x **xcom LAN** studer communication set for remote monitoring

In Peru there are many remotely situated villages. The government decided to set up 27 *Tambos*: a decentralised unit equipped with lighting and electricity to provide basic services for the inhabitants in surrounding villages.



### Customized solutions

Standardisation is not always possible. Our technology is flexible to adapt to every specific requirement and context.

Please do not hesitate to send us your request and we will provide a proposed solution for every specific case.



Studer with our international partners have developed a series of kits to facilitate and standardize the implementation of energy system in difficult settings. Studer technology advantage is the flexibility and adaptability which offers smart control of the energy system and demand. The demand design doubling during the operation or an inefficient maintenance reducing to half the production can be fatal. Our kits are conceived to protect the system from this.

A higher demand and/or a shorter production will result into the system turning off. In addition, our tools for monitoring and follow up the installations allow us to collect a precious data to understand system performance.

We propose energy kits in combination with the energy management tool for a follow up. The energy management tool will provide energy reports throughout the system lifetime allowing to understand user's energy behaviours in the field, anticipate issues and adjust deviations.

# A suitable system for different facilities

### Size of energy demand



**Educational facility**  
Small rural school using a small amount of power for light and computers.



**Health facility**  
Rural clinic using various amount of power for light and basic medical equipment.



**Administration facility**  
Project mission house using a lot of power for light, air conditioned, computers, communication satellites, ...

### Time of operation



**During the day**  
Constant consumption from 8 to 16h (8 am to 4 pm).



**24 h with variations**  
Constant consumption from 8 to 16h (8 am to 4 pm), during the night it is reduced for emergencies only.



**12 h**  
Constant consumption from 7 to 19h (7 am to 7 pm).

### Alimentation



No grid and no generator



No grid but an active generator



Grid supported by a generator

### Location & ressources



Solar



Solar



Solar and hydro

### Packages

Small solar system (1kW)

Hybrid solar system (5kW)

Hybrid 3 phase solar system (24kW)

## Built to last.

All our products are designed and manufactured in our factory in Sion in Switzerland. All our products include a 10-year warranty.

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ISO certified factory  
9001:2020/14001:2020.

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