autarsys

Ready made storage solutions for Communities and Island Electrification

Autarsys ESS

- Samsung Lithium-Ion NCM Batteries:
- 1,4 MW / 5,2 MWh
- Maschinenfabrik Reinhausen Inverter: 1,6 MW

August, 3. 2017

PI Business Setup

Overview

- **Enervinci - Philippines**
  - Project Development
  - Hybrid System O&M
- **Autarsys – Berlin (Germany)**
  - State-of-the-art Energy Storage System Engineering
  - Hybrid System Engineering, Design and Commissioning
- **Cenag Solar - Philippines**
  - Solar System Engineering and Construction

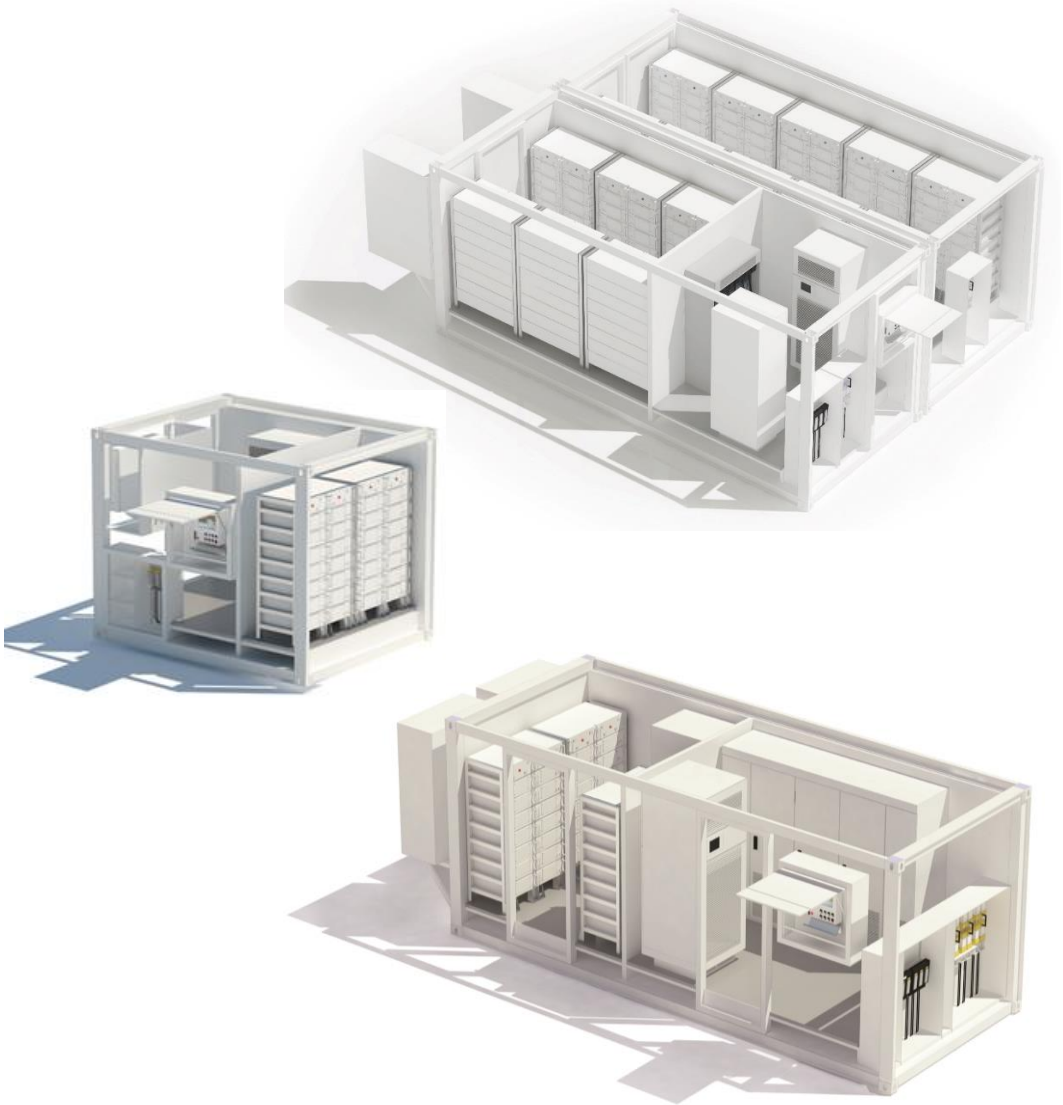
↳ Renewable Energy For Everybody

ESS Benefits

Overview of applications and benefits

- Frequency Stabilization
  - ↳ ESS absorbs and injects power in order to keep grid frequency within pre-set limits!
- Spinning Reserve
  - ↳ ESS kept ad an adequate charge level to ensure fast response to generation or transmission outages!
- Capacity Firming
  - ↳ ESS smoothes output and controls the ramp rate of solar or wind power generation!
- Peak Shaving
  - ↳ ESS to be installed close to loads and shifts expensive peak loads to low tariff times!
- Power Quality
  - ↳ ESS eliminates short voltage sags – power system failures or start up of large motors!
- Uninterruptable Power Supply
  - ↳ ESS can bridge the gap in supply of a mains failure or black outs!
- Load Leveling
  - ↳ ESS store power during low load periods and releases it in periods of high demand ⇨ no expensive peakers!
- Voltage Stabilization
  - ↳ ESS injects or absorbs both active and reactive power!

Made for a renewable energy future



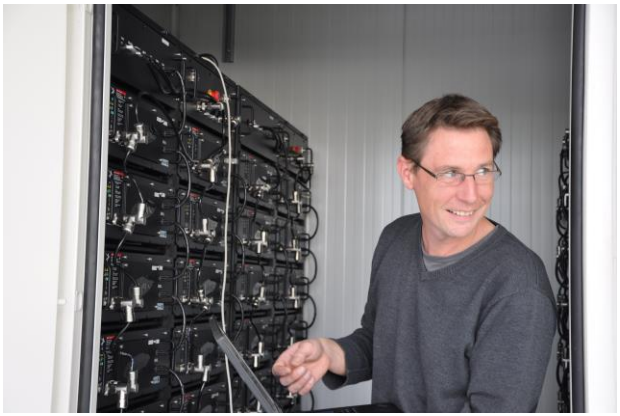
1. Li-Ion battery technology
2. Grid-forming battery inverters
3. 20 years lifetime 10 years guarantee
4. Efficient energy management system
5. Satellite interface for genset control
6. Remote monitoring system
7. Sealed housing is suitable for use under harsh conditions
8. Modular design, scalable from 30 kW – 50 MW

Partnership

Strategic partnership with our suppliers

Battery system (e.g. Samsung):

- **DoD 95%,** guarantee 10 years@4000 cycles, C-rate up to 4C
- **Bankable** warranty offer with Samsung
- **Serviceable** (single modules can be replaced by 2 persons on-site)
- **Expandable** due to modularity of inverter design



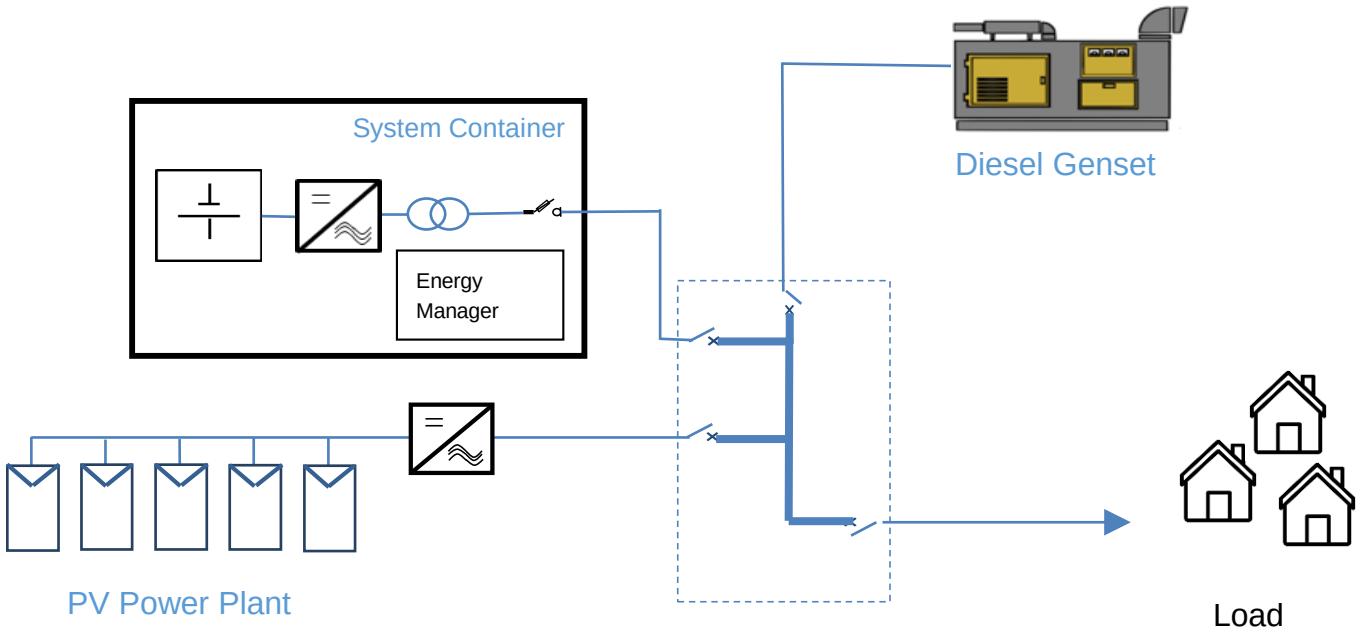
Battery Inverter (Maschinenfabrik Reinhausen):

- Ready for on-grid and off-grid applications
- **Modularity** – in steps of 30 kVA - and 87,5 kVA each inverter module is able to control it´s sample of battery modules independently
- Easy replacement and maintenance
- Scalable and flexible design opportunities

Spare part availability of minimum 10 years

Typical Single Line Diagram for Rural Electrification

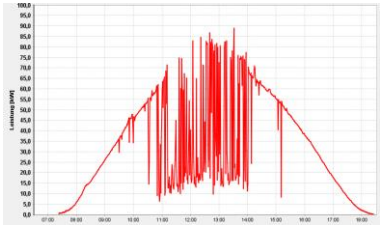
- Energy management demands diesel plant
- Energy management limits power from PV if needed
- Control of active and reactive power
- Harmonic cancellation
- Monitoring of grid impedance
- Remote measurement Input / Output (MIO)
- ESS is the dominating voltage source
- Droop is dynamic adjusted
- ESS supplies inrush and short circuit current

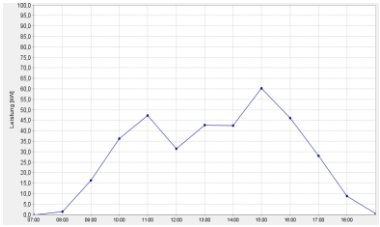


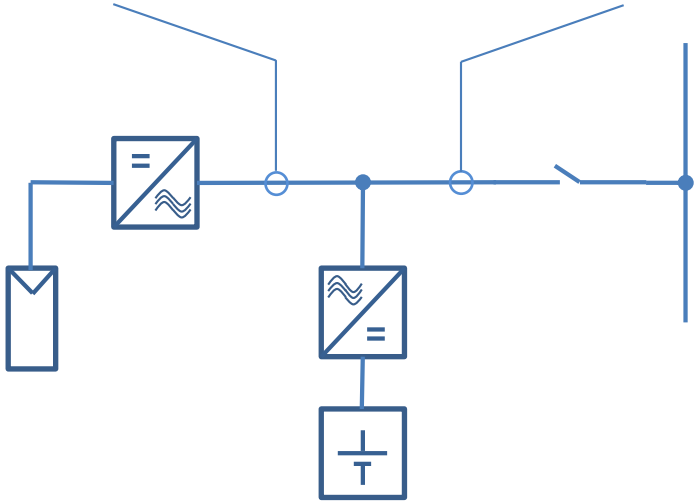
Hybrid PV system technology

Integration of fluctuating sources into the grid

- Smoothing of the fluctuation
- Ramping limitation (up and down)
- Peak power reduction
- Time shifting of the generation
- Voltage correction at the connection point



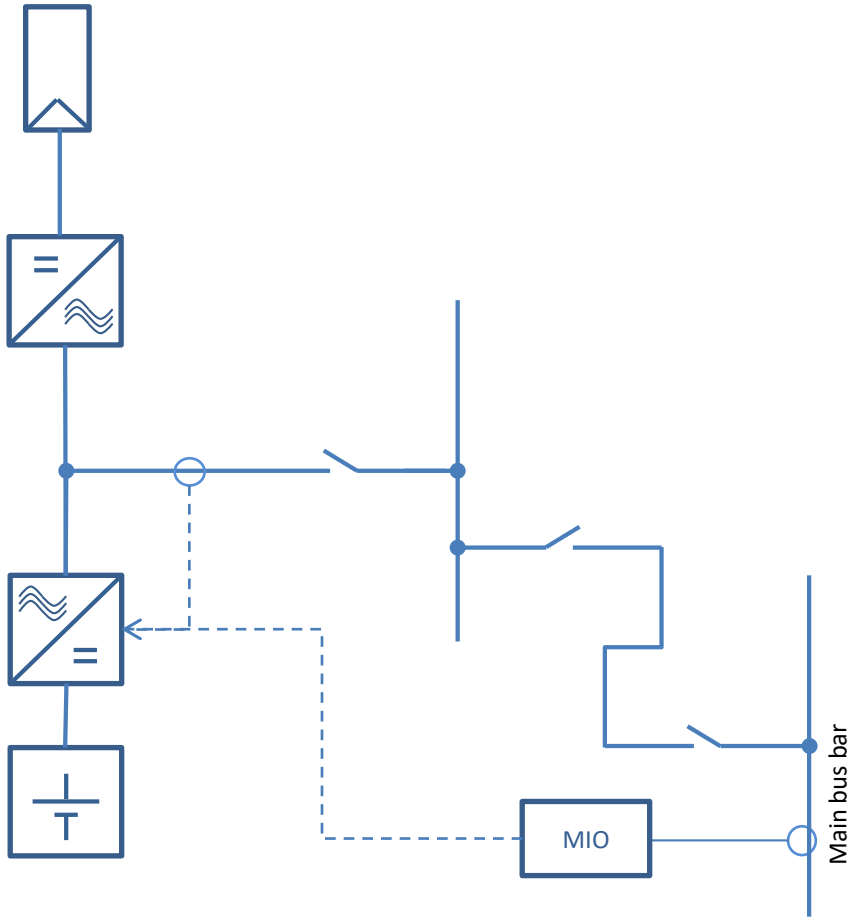




Hybrid PV system technology

On-Grid and weak grid application

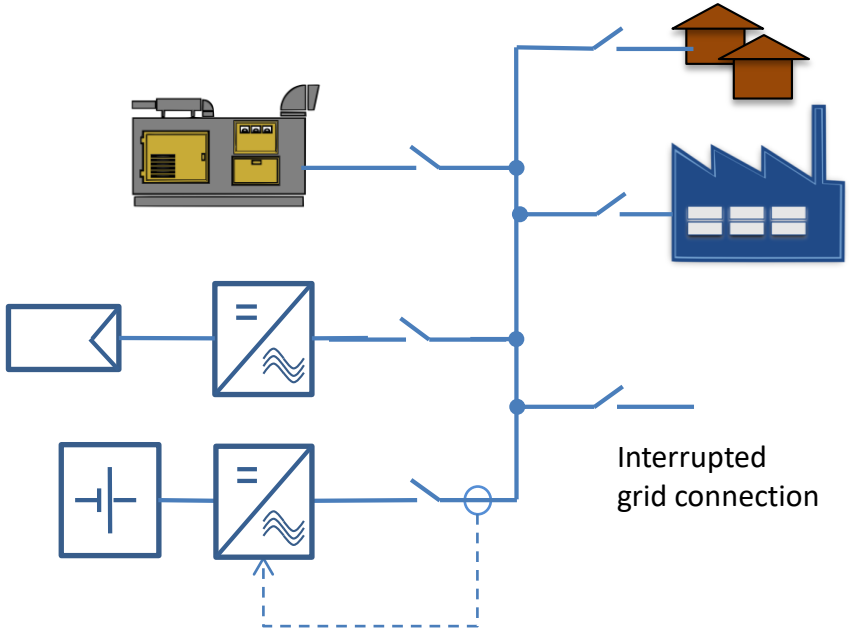
- Voltage correction at the grid connection point
- Control of active and reactive power
- Elimination of harmonics
- Grid impedance monitoring
- Brown-out protection
- Auto disconnect and re-synchronization
- Black-start capability



Hybrid PV system technology

Energy management and power quality improvement

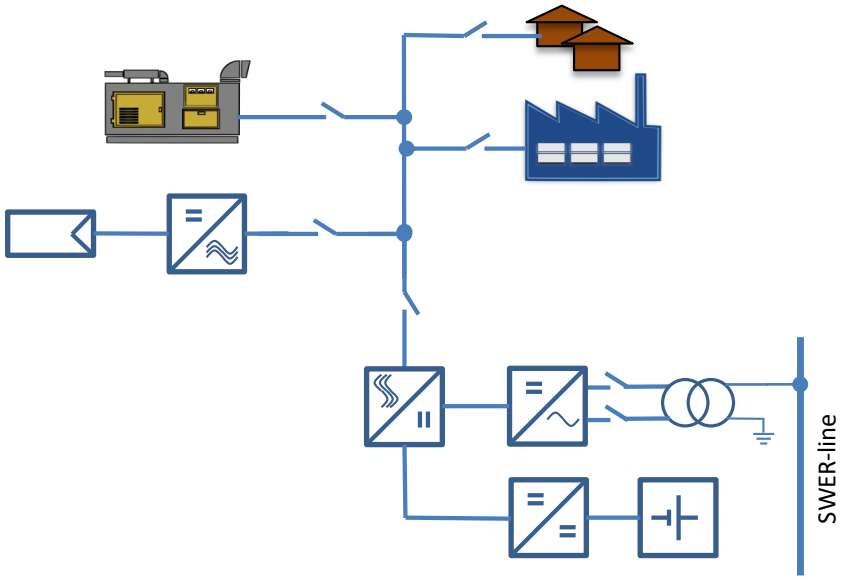
- ESS is the dominating voltage source
- Droop is dynamic adjusted
- ESS supplies inrush and short circuit current
- Energy manager demands diesel plant
- Energy manager limits PV-power when needed



3-phase supply connection to the SWER net

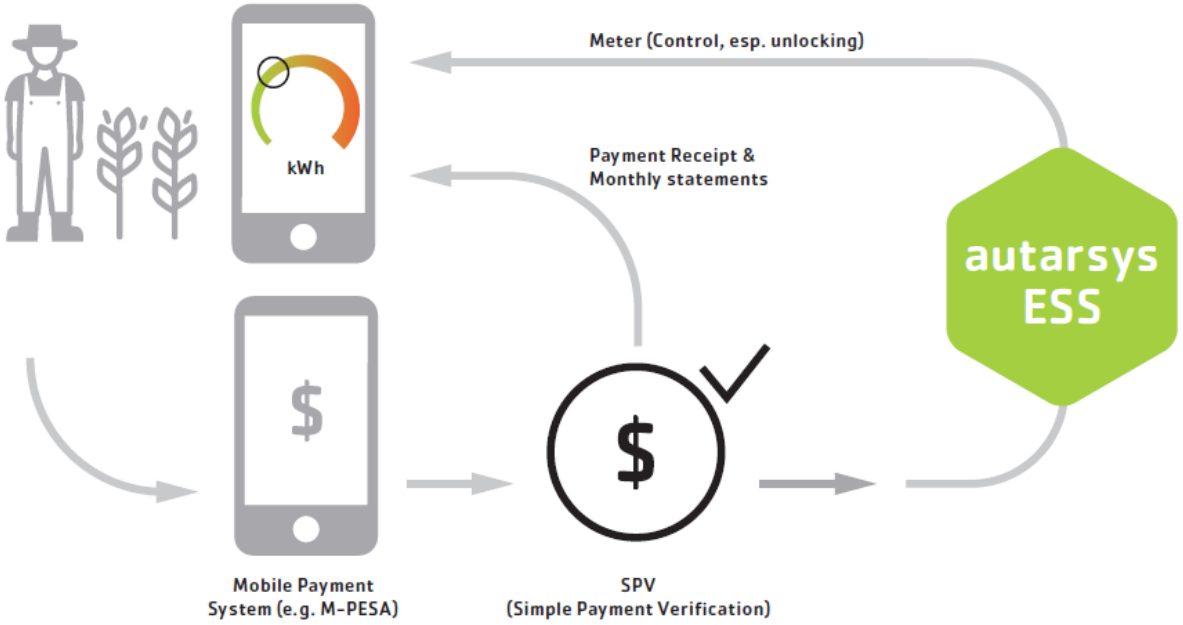
Energy management and power quality improvement

- ESS establishes 3-phase grid for local loads
- Online UPS functionality
- Scheduled power on the SWER line
- Voltage correction on the SWER line
- Power feed-in to SWER line on demand or when net metering is available



Pay as you Go: Energy when and where you want

Remote regions far away from the grid lack basic infrastructure. Mini and micro grid operators face difficulties in receiving payments for the energy delivered to consumers. The Autarsys ESS communication platform integrates smart meters with the Simple Payment Verification (SVP) system, enabling seamless energy delivery and a transparent payment method for it's customers.



Energy Supply for Qi-PALAWAN Resort

System Lay-out

- PV Installation: 40 kWp
- ESS (Energy Storage System): 124 kWh
- Diesel Genset: 25 kVA

Buisness Model

Overview

- Collaboration with local authorities in order to come up with the optimized design for rectification of deficiencies or expansion of increased power demands