Power Solutions for telecom applications

Energy Solutions Provider
AN ENERGY SOLUTION

SDMO is renowned as one of the top manufacturers of generating sets worldwide. SDMO’s single-industry strategy enables it to offer the largest range on the market, a reliable and long-lasting source of energy, conforming to the most stringent standards. Its ranges and services undergo continuous improvement, allowing them to meet even the most exacting energy requirements. This strategy of constant innovation allows SDMO to meet the dual challenge of naturally controlled energy, both from an economic and an environmental point of view. By relying on the proximity of its distribution network, the largest possible number can have access to electricity.

In addition to its role as an industrial manufacturer of generating sets, SDMO is now positioning itself as a serious energy supplier.

Energy Solutions Provider

WHATEVER
THE ENERGY REQUIRED

Whether you require emergency power to be able to cope with potential power cuts (e.g. hospitals, shopping centres) or continuous power when conventional electrical grids are faulty (power plants), SDMO will be able to offer you a large range of performance products which meet all the requirements of the market. This range comprises 3 main categories:

- **Standard products**
  (Portable Power, Residential Power, Power Products and Rental Power)
- **Expertise and Services**
  (Power Solutions, Training, Spare Parts, Technical Assistance)
- **Related products**
  (Nexys, Telys, Kerys command/control units)
In order for SDMO to continue to grow and expand into new markets, it relies on:
• a distribution network present in over 150 countries,
• 8 overseas subsidiaries,
• 5 offices,
• 7 sales offices and 3 regional divisions in France.

The responsiveness of the company is based on its development of 5 storage platforms which, in co-operation with the subsidiaries, constitute an efficient commercial network.

The links forged with the Kohler group have strengthened SDMO’s standing amongst its customers through a strategy of synergistic installations.

The production plants in Brest are organised according to product lines relating to the product range offer:
• a production site for Portable Power generating sets and for Power Products with lower power.
• a production site for Power Products, Rental Power and Power Solutions ranges.

A dedicated laboratory, 69 test platforms (from 40 to 4000 kVA) and a training academy complement the available equipment with perfect consistency.

SDMO strengthens its position as a reliable and responsive partner through an overall synergy between the industrial teams and sales and marketing departments: prescription, responsiveness, and presence in key markets.
Proactive engineering for specific applications

From the simplest of installations to the most complex, with the Power Solutions range, the engineering department at SDMO will strive to accommodate all requests, regardless of energy requirements. The department’s international experience coupled with its involvement in some of the most groundbreaking projects seen on the planet are proof of this.

**ENGINEERING: A GLOBAL PROCESS**
- understanding
- analysing the exact requirements
- offering real solutions
- integrating innovative solutions
- designing complete programs
- carrying out the installation
- following up with technical inspections

**ADDITIONAL TEAMS**
SDMO’s expert technicians and engineers are trained to master the latest design and analysis tools. They have access to advanced 3D modelling software incorporating a very precise structural calculation module.
SDMO’s test engineers also use a state-of-the-art technique for analysing sound emissions - sound intensity measurement - which, used in conjunction with modal analysis for determining vibrational frequencies, enables them to carry out particularly delicate work in this sensitive field.
Energies in synergy

The Engineering Department is made up of close to 100 engineers and technicians and assists you in the development of your project, both from a technical and sales point of view.

Each project follows a proven process, from the preliminary review, through to maintenance of the installation. A succession of pre-established steps, managed by all our teams, offers all the guarantees for flawless efficiency.

1. PRELIMINARY REVIEW
Consultation, analysis and feasibility...

The definition of the customer’s needs is ensured by the complementary areas of expertise that the SDMO teams possess, combined with a range of engineering tools such as the Sizing Program.

If necessary, a project plan as well as an initial study and calculation notes can be implemented and added to the specifications.

2-ORDER
Costing, proposal and validation ...

Once the best solution has been determined based on energy needs, technical constraints and the financial resources available, the project is transferred to the relevant SDMO departments.

This handover is carried out using a complete dossier containing all the technical and contractual data.

3-STUDY
Planning, calculation and projection...

The client’s dedicated SDMO contact person sets up the project. Plans, diagrams, calculations, scheduling, technical documentation... everything is validated in complete transparency.
4-IMPLEMENTATION
Manufacturing, testing and delivery...

The manufacturing of generating sets, containers, and command and control panels is carried out in line with the order. Equipment testing on test benches guarantees its reliability. Various additional services can be included by SDMO’s Power Solutions teams for the client’s peace of mind: packaging for delivery to the site, construction of stone or metal buildings, equipment installation, soundproofing, etc.

5. COMMISSIONING
Startup, initial testing and adjustments...

During commissioning, an initial test is carried out in terms of the equipment unit’s operation (mechanical and electrical) before on-load tests can guarantee completely safe operation. SDMO is able to offer its services throughout the world thanks to its solid network of skilled and responsive teams: technicians and technical inspectors work to support its sister company BES, along with distributors and partners who can perform these services in SDMO’s name.

6-MAINTENANCE
Assistance, training and monitoring...

Backed by an extensive network of approved agents, SDMO is able to ensure all its customers receive quick and efficient technical assistance. Command/control system, electrotechnical and mechanical innovations, every year the SDMO training unit shares its expertise on the subject of generating sets. Guaranteeing the longevity of its installations throughout the world, the Spare Parts department responds to requests as quickly as possible, offering over 40,000 numbered parts, including GenParts (SDMO brand).
Telecoms solutions flowchart
SDMO can provide solutions tailored to every situation, environment and budget.

<table>
<thead>
<tr>
<th>NETWORK BACKUP</th>
<th>ISOLATED SITES</th>
</tr>
</thead>
<tbody>
<tr>
<td>SOLUTION 1</td>
<td>SOLUTION 2</td>
</tr>
<tr>
<td>SOLUTION 3</td>
<td>SOLUTION 4</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>1 Generating set + network</th>
<th>2 Generating sets</th>
<th>1 Generating set + batteries</th>
<th>1 Generating set + batteries + solar panels</th>
</tr>
</thead>
<tbody>
<tr>
<td>Application</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>all power ratings</td>
<td>all power ratings</td>
<td>power ratings from 0.5 to 5 kW</td>
<td>power ratings from 0.5 to 3 kW</td>
</tr>
</tbody>
</table>

**PROS**
- low CAPEX<sup>(2)</sup>
- long equipment service life
- easy to transport
- low CAPEX<sup>(2)</sup>
- easy to transport
- low OPEX<sup>(3)</sup>
- reduction in the generating set’s consumption and running time (approximately 5 hours/day)
- very quick return on investment (around 1 year)
- very long maintenance interval (no more than 1 or 2 interventions per year)
- very low OPEX<sup>(3)</sup>
- long battery service life
- maximum reduction in the generating set’s consumption and running time (approximately 3 hours/day)
- quick return on investment (around 2 year)
- 1 maintenance intervention per year

**CONS**
- high OPEX<sup>(3)</sup>
- use of the generating set at low efficiency
- high maintenance frequency
- high OPEX<sup>(3)</sup>
- use of the generating set at low efficiency
- high maintenance frequency
- high CAPEX<sup>(3)</sup>
- batteries require replacement
- high CAPEX<sup>(3)</sup>
- batteries require replacement

<sup>(1)</sup> based on network quality
<sup>(2)</sup> CAPEX = capital expense (start-up investment)
<sup>(3)</sup> OPEX = operational expense (operational costs)
SOLUTION 1

Generating set + network

In this configuration, the installations are supplied directly by the electrical network. The generating set is therefore present as a safety measure. It takes over the electrical power supply in the event that the main network is cut off, using a normal/emergency switch (ATS).

SOLUTION 2

2 Generating sets (without network)

When there is no electrical network, the configuration represented by 2 generating sets coupled together provides a 24/7 power supply. The BTS (Base Transceiver Station) is supplied alternately by each of the generating sets using a supply changeover switch date and time system (ATS). Each set backs up the other during phases when it is not running.
### Three phase

<table>
<thead>
<tr>
<th>GENERATING SETS (1)</th>
<th>kVA</th>
<th>Cos @ 0.8</th>
<th>Cons % L/h</th>
<th>GENERATING SETS (2)</th>
<th>kWe ISO 8528*</th>
<th>Cons % L/h</th>
<th>Engine type</th>
<th>CC</th>
<th>CC (L)</th>
<th>Type</th>
<th>Enclosure</th>
<th>Covered version ($)</th>
</tr>
</thead>
<tbody>
<tr>
<td>K9</td>
<td>8</td>
<td>9</td>
<td>2.0</td>
<td>K9U</td>
<td>8</td>
<td>9</td>
<td>2.5</td>
<td>KDW1003</td>
<td>3L</td>
<td>1.0</td>
<td>ECP-3S-1</td>
<td>M125</td>
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<tr>
<td>K12</td>
<td>11</td>
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<td>12</td>
<td>3.4</td>
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<td>4L</td>
<td>1.4</td>
<td>ECP-3L</td>
<td>M126</td>
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<tr>
<td>K16</td>
<td>15</td>
<td>16</td>
<td>3.7</td>
<td>K16U</td>
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<td>M126</td>
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<tr>
<td>K21</td>
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<td>4.6</td>
<td>K20U</td>
<td>18</td>
<td>19</td>
<td>5.2</td>
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<td>2.2</td>
<td>ECP28-1L</td>
<td>M126</td>
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<tr>
<td>J22</td>
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<td>22</td>
<td>5.0</td>
<td>J20U</td>
<td>18</td>
<td>18</td>
<td>6.5</td>
<td>3029DF120</td>
<td>3L</td>
<td>2.9</td>
<td>ECO28-1L</td>
<td>M127</td>
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<tr>
<td>J33</td>
<td>30</td>
<td>33</td>
<td>5.0</td>
<td>J30U</td>
<td>26</td>
<td>28</td>
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<tr>
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<td>12.0</td>
<td>J60U</td>
<td>55</td>
<td>60</td>
<td>14.5</td>
<td>4045TF120</td>
<td>4L</td>
<td>4.5</td>
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### Single phase

<table>
<thead>
<tr>
<th>GENERATING SETS (1)</th>
<th>kVA</th>
<th>Cos @ 0.8</th>
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<tr>
<td>-</td>
<td>-</td>
<td>-</td>
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<td>K9UM</td>
<td>8</td>
<td>9</td>
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<td>ECP-3-1</td>
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<tr>
<td>K10M</td>
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<td>10</td>
<td>2.5</td>
<td>K12UM</td>
<td>10</td>
<td>12</td>
<td>3.3</td>
<td>KDW1404</td>
<td>4L</td>
<td>1.4</td>
<td>ECP-3L</td>
<td>M126</td>
</tr>
<tr>
<td>K13M</td>
<td>12</td>
<td>13</td>
<td>3.7</td>
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<td>14</td>
<td>16</td>
<td>4.5</td>
<td>KDW1603</td>
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<td>1.6</td>
<td>ECP-3L</td>
<td>M126</td>
</tr>
<tr>
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<td>16</td>
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<td>ECP28L</td>
<td>M127</td>
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<td>-</td>
<td>-</td>
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<td>J20UM</td>
<td>18</td>
<td>20</td>
<td>6.5</td>
<td>3029DF120</td>
<td>3L</td>
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<td>J70UM</td>
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<td>442VS45</td>
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</tr>
</tbody>
</table>

### Solutions for everyone

- **ARDIC**
- **MONTANA**
- **LONG RUNNING**

### Accessories

- **ADDITIONS**
- **OPTIONS**
- **Solutions for everyone**

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1. Also available in the following voltages: 415/240 V - 380/220 V - 220/115 V
2. Also available in the following voltages: 440/240 V - 220/115 V - 220/127 V
3. ISO 8528 powers specified in compliance with the regulation in force
4. The dimensions and weights apply to a generating set specified in the price list, without options
5. PRP main power available continuously with variable load for an unlimited time in accordance with ISO 8528-1
6. EEP Emergency Standby Power available for supplying emergency power in variable load applications in accordance with ISO 8528-1, no overload available for this service
7. Dry weight - without fuel
"LONG RUNNING" OPERATION

This system means a service only has to be carried out every 2000 hours (compared to 250 hours with a standard motor), which gives an eightfold reduction in the maintenance frequency, leading to a significant reduction in operating costs (OPEX).

"Long running" generating sets are particularly well-suited to isolated telecoms sites, and are equipped with Lister Petter engines. Their low consumption guarantees significant savings on fuel. This saving can exceed 20% compared to the main engine manufacturers on the market.

THEFT PROTECTION FOR FUEL TANKS

To reduce the footprint and prevent any risk of fuel theft on-site, SDMO has developed three standard 600, 1000 and 2000 litre tanks, specially designed to be secured underneath SDMO generating sets, providing much appreciated autonomy.

Dimensions

<table>
<thead>
<tr>
<th>ENCLOSURE</th>
<th>EXCLUDING TANK (LXWXH [M])</th>
<th>WITH 600 L TANK</th>
<th>WITH 1000 L TANK</th>
<th>WITH 2000 L TANK</th>
</tr>
</thead>
<tbody>
<tr>
<td>M127</td>
<td>2.08x0.96x1.42</td>
<td>2.08x0.96x1.91</td>
<td>2.95x0.96x2.08</td>
<td>3.51x1.15x2.11</td>
</tr>
</tbody>
</table>

Different safety systems restrict access to filling, making siphoning impossible. This equipment, specially developed by SDMO for Telecoms applications, improves the profitability of investments, giving a significant reduction in operating costs (OPEX).
SOURCE INVERTERS - VERSO

From 35A to 160A, the VERSO is the SDMO changeover switch. Available in three phase and single phase versions, it integrates power detection and allows automatic/manual start-up of the generating set in the event of a mains power cut.

<table>
<thead>
<tr>
<th>VERSO S Single phase</th>
<th>VERSO S Three phase</th>
<th>VERSO D</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ratings</td>
<td></td>
<td></td>
</tr>
<tr>
<td>63A</td>
<td>100A</td>
<td>125A</td>
</tr>
<tr>
<td>160A</td>
<td>35A</td>
<td>63A</td>
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<tr>
<td>80A</td>
<td>100A</td>
<td>125A</td>
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<tr>
<td>160A</td>
<td>35A</td>
<td>63A</td>
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<td>80A</td>
<td>100A</td>
<td>125A</td>
</tr>
<tr>
<td>160A</td>
<td>35A</td>
<td>63A</td>
</tr>
<tr>
<td>Type</td>
<td>Single phase</td>
<td>Three phase</td>
</tr>
<tr>
<td>Nominal voltage/frequency</td>
<td>230V / 50-60Hz</td>
<td>127 / 230 V / 50-60Hz</td>
</tr>
<tr>
<td></td>
<td>230 / 400 V / 50-60Hz</td>
<td>230 / 400 V / 50-60Hz</td>
</tr>
<tr>
<td>Voltage drop tolerated</td>
<td>20% of the nominal voltage @230V</td>
<td>20% of the nominal voltage @400V</td>
</tr>
<tr>
<td>Protects against a change in the phase rotation direction</td>
<td>X</td>
<td>O</td>
</tr>
<tr>
<td>Protection in &quot;0&quot; position</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Lightning arrester</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Confirmation of mains return</td>
<td>●</td>
<td>●</td>
</tr>
<tr>
<td>EJP (for France only)</td>
<td>●</td>
<td>●</td>
</tr>
<tr>
<td>Protection index</td>
<td>IP54</td>
<td>IP31</td>
</tr>
<tr>
<td>Dimensions (l x w x h) in mm</td>
<td>305x101x150</td>
<td>385x385x193</td>
</tr>
</tbody>
</table>

Depending on your needs and your technical constraints, SDMO can offer a range of different source inverter models. To improve their robustness under extreme conditions, some options are also available on some models.

CHANGEOVER CABINET

For sites equipped with two generating sets coupled together (solution 2), SDMO recommends a changeover cabinet designed to easily manage the alternate operation of the generating sets. A timer system allows the running time to be split between the generating sets. So, in the event of a fault with one set, the other will immediately take over operation to ensure a continuous supply of power.

REMOTE MANAGEMENT

SDMO offers a range of solutions for remotely monitoring and managing the generating set. This allows you to monitor your bank of generating sets from your office. These solutions enable you to set up reports, optimise your trips and thereby reduce your operational costs.
Naturally controlled solutions

The depletion over the medium term of petroleum resources and the constant increase in energy demands highlight an economic reality of which SDMO is fully aware. By putting in place solutions which combine the various energy sources (generating set, battery, photovoltaics, etc.), and which can be configured across its ranges of products, SDMO gives you the opportunity to invest today in sustainable technology, at manageable running costs and with a reduced impact on the environment.

AN INTELLIGENT TELECOMS SOLUTION TO POWER YOUR BTS DIRECTLY [800 TO 5000 W]

As a response to the development in telecoms in remote and inaccessible areas, SDMO is offering turnkey solutions which can be set up quickly to provide a site with reliable power 24/7. These solutions use local sources of energy, thus limiting maintenance interventions and reducing fuel consumption by up to 80% for a return on investment in under 2 years. The SDMO hybrid solution is flexible, optimised for the individual conditions of each site and the capacity required. Researched and industrialised by energy professionals, this meets the most rigorous demands on the market.

TURNKEY SYSTEMS FOR RAPID DEPLOYMENT IN LARGE NUMBERS

Each SDMO hybrid system is assembled, configured and tested in the factory so it can be quickly connected to your telecoms equipment. It comes as a complete package:
- SDMO generating set
- AC/DC rectifiers
- storage batteries
- fuel tank
- power source control cabinet

THE WHOLE CYCLE IS FULLY MANAGED:
- optimisation of the generating set’s running time to optimally limit fuel consumption
- optimal switching of batteries in order to extend their service life, in particular using regular equalisation charges. This reduces the CAPEX and OPEX as much as possible.
Generating set + batteries

These systems allow the energy produced by the generating set to be stored. They reduce fuel consumption and the number of hours the generating set has to run, thereby reducing the number of maintenance operations and fuel tank refills to one or two per year.

The OPEX (operational expenses) can be considerably reduced. As a consequence, the return on investment is very quick.

Depending on the sizing required and the constraints of the project, the size of the container can be adapted. (Example: 10 foot container).

**ADVANTAGES:**
- turnkey solution
- easy to install
- quick deployment
- reduction in the running time of the generating set and consequently, the fuel consumption

TELECOMS SOLUTION 3
Generating set + batteries + solar panels

These systems allow the generating set’s power to be saved and to have an additional intake of solar power.

This means the number of hours the generating set has to run is reduced as much as possible and the battery life cycles are extended. With an equivalent system and load, the battery unit will therefore have a longer service life and consumption will be lower for the generating set.

Depending on the sizing required and the constraints of the project, the size of the container can be adapted. (Example: 10 foot container).

ADVANTAGES:
- turnkey solution
- easy to install
- quick deployment
- optimum reduction in the running time of the generating set and consequently, the fuel consumption
- extended battery service life
Smart Energy Center (SEC)

In the form of a case or cabinet, the SMART ENERGY CENTER provides a complete turnkey solution for managing energy resources for telecom operators. It combines existing SDMO tools with new system which enable alternative energy sources to be governed.

The standard SEC is fitted to our telecoms energy stations. It manages the supply cycle for energy from the various sources and ensures continuity of operation 24/7. The main components of this modular cabinet are as follows:

- an external AC power supply: the generating set
- an external DC power supply: the solar panels (optional)
- a battery cycle control unit which communicates with the generating set control unit
- rectifiers for transforming alternating current to direct current
- the distribution equipment required for the various energy outputs

The SEC is preconfigured in the factory to guarantee you the best results for your installation.

**Simplified description of the operation:**

1. The batteries are used to cover the energy requirements
2. The batteries reach a low charge level
   ⇒ The generating set starts up
3. The generating set supplies the charge while recharging the batteries until the recommended charging level is reached
4. Once the batteries are recharged, the generating set stops
5. On a regular basis, the system triggers equalisation charges
6. As an option, solar panels (solution 4) supply the charge and recharge the batteries as soon as the solar energy produced is sufficient.

**COMMUNICATION**

Communication is provided by an alarm report unit using dry contacts.

**AS STANDARD,** 7 alarm reports are available on terminals (generating set faults, low fuel level, battery, customer charge, solar charge controller, Smartpack, rectifiers). For a more in-depth analysis of operation by recovering the data recorded by the battery monitor, an Ethernet connection and a USB port are available on the front panel; it is also possible to log in to the battery monitor website.

Modbus communication is available as an option.

**OPTION DETAILS**

Upgrade Version of the Smart Energy Center

In addition to dry contacts, Modbus communication is available on terminals inside the Smart Energy Center. The Upgrade version also allows connection to the Smart Pack website and remote recovery of data, sent by SMS.
### Input data

<table>
<thead>
<tr>
<th>Geographical</th>
<th>Technical input data</th>
<th>General description of the required hybrid system</th>
<th>Additional data</th>
<th>Solar data</th>
</tr>
</thead>
<tbody>
<tr>
<td>Country</td>
<td>Mali</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>City</td>
<td>Bamako</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Latitude °N</td>
<td>12° 67</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Longitude °E</td>
<td>-7° 98</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Average outdoor temperature (°C)</td>
<td>35</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Altitude of the site (m)</td>
<td>396</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Type of installation</td>
<td>Indoor</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>With solar panels</td>
<td>Yes</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>No. of operating hours (h/day)</td>
<td>24</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Service life of batteries (h)</td>
<td>35</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Average power to be supplied (W)</td>
<td>1500</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Maximum power to be supplied (W)</td>
<td>1200</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Energy output voltage (V)</td>
<td>48</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Frequency of the generating set (Hz)</td>
<td>50</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>No. of generating set phases</td>
<td>3 (three phase)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fuel tank volume (L)</td>
<td>1000</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Optimum angle of inclination (°)</td>
<td>15</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Daily hours of sunlight within range of the panels (kWh/m²/j)</td>
<td>5.9</td>
<td></td>
<td></td>
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</tbody>
</table>

### Results and analysis of the different hybrid solutions

<table>
<thead>
<tr>
<th>Type of installation</th>
<th>Scenario options</th>
<th>Space requirements</th>
<th>CAPEX</th>
<th>OPEX</th>
<th>Technical Generators</th>
<th>Photovoltaic modules</th>
<th>Financial</th>
</tr>
</thead>
<tbody>
<tr>
<td>SOLUTION 2</td>
<td>conventional installation 2 KGE-generating sets at an isolated site</td>
<td>2 M126 enclosures</td>
<td>Base 100</td>
<td>4,383</td>
<td>18</td>
<td>-</td>
<td>-</td>
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<tr>
<td>SOLUTION 2 LONG RUNNING</td>
<td>conventional installation 2 LPG6 (Long Running) generating sets at an isolated site</td>
<td>-</td>
<td>115</td>
<td>4,383</td>
<td>3</td>
<td>-</td>
<td>-</td>
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<tr>
<td>SOLUTION 3</td>
<td>HPG 22-1200 with Long Running generating set</td>
<td>10 foot container</td>
<td>271</td>
<td>1,695</td>
<td>1</td>
<td>20</td>
<td>18</td>
</tr>
<tr>
<td>SOLUTION 4</td>
<td>HPG 22-1200-3 52 with Long Running generating set</td>
<td>10 foot container</td>
<td>364</td>
<td>996</td>
<td>3</td>
<td>22</td>
<td>18</td>
</tr>
</tbody>
</table>
Energy intake and operating rates

<table>
<thead>
<tr>
<th>SOLUTION 2</th>
<th>SOLUTION 2 LONG RUNNING</th>
<th>SOLUTION 3</th>
<th>SOLUTION 4</th>
</tr>
</thead>
<tbody>
<tr>
<td>Energy intake</td>
<td>% fossil fuel</td>
<td>100%</td>
<td>100%</td>
</tr>
<tr>
<td></td>
<td>% solar power</td>
<td>100%</td>
<td>100%</td>
</tr>
</tbody>
</table>

Operating rate

- Generating set
- Batteries
- Solar

ADVANTAGES OF HYBRID SOLUTIONS:
- 80% reduction in OPEX
- 90% reduction in generating set running time
- a single annual maintenance operation
- 3 tank refills per year
- return in investment in less than 2 years

Combined annual costs

start-up cost included in year 0
Base 100 = reference scenario
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