

✓ Alternative options for power supplies of BTS plants

For a sufficient operation of BTS telecom systems reliable energy sources are required. The energy can be supplied from a local utility grid, from Diesel gensets, wind turbines or from advanced solar electric power supplies. In contrast to supplies from the grid the diesel gensets and the Photovoltaic (PV) systems must be individually designed in respect to their energy generation and to the load profiles.

Photovoltaic power supplies for Telecom applications have to be designed always for the month with the worst weather conditions in order to ensure a reliable supply all over the year. For the design the average daily sums of the global irradiation are used and calculated to an optimised tilt angle. This tilt angle will vary depending on the site (longitude, latitude, altitude) of the installation. The tilt angle will also depend on the available space at site, this means, that we as system designer have to find a good compromise between the installation area, tilt angle and size of the solar generator.

The energy converted from light by means of the solar generator according to the photovoltaic principal has to be stored for the consumption during nights and for periods of bad weather. For the storage of the required energy specially modified lead acid batteries - so called solar batteries - have to be used. The design of the battery is also important to guarantee a long life time and a secured operation.

Beside the technical solutions the most importance for the user is the question to the economical operation and the availability of sources (sun, wind, energy from grid or Diesel). The question can be answered easily by means of a simple cost calculation. But therefore the designer has to take into consideration the initial and the running costs over the lifetime of the optional systems. For example, the costs of the gensets (including the costs for operators), the cost of laying the cables with there increasing energy costs during operation time and so on must be calculated.

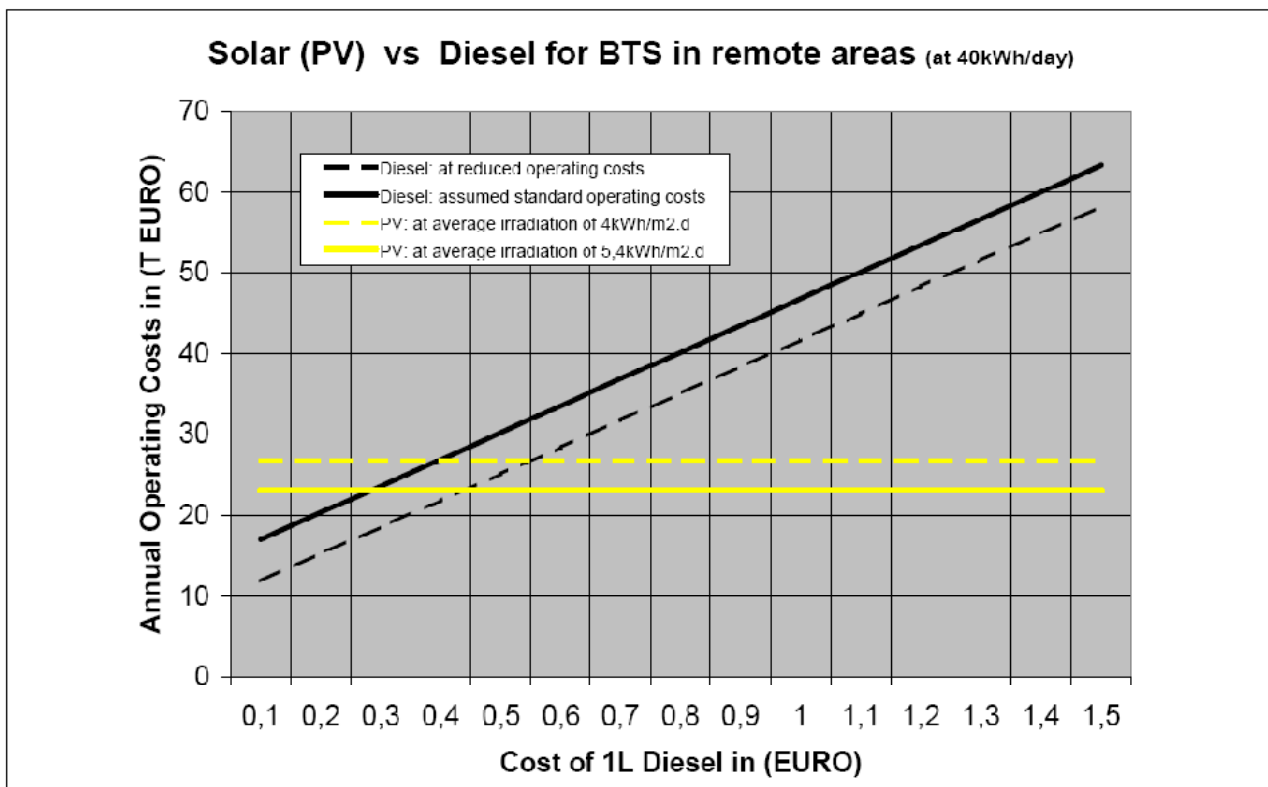
The most disadvantages of Diesel-Aggregates are:

- ◆ dependence of fuel – world-wide increase of oil prices – limited resources in future
- ◆ transport to the sites – long distances and cost intensive transports
- ◆ storage of the fuel at site- safety problems – explosions, vandalism etc.
- ◆ no unintended operation is possible - high personal cost
- ◆ high maintenance cost – oil, filters etc.
- ◆ limited life-time of Diesel motors – change of motors every two years
- ◆ pollution – noise, heat and dirt

The most advantages of Solar Systems are:

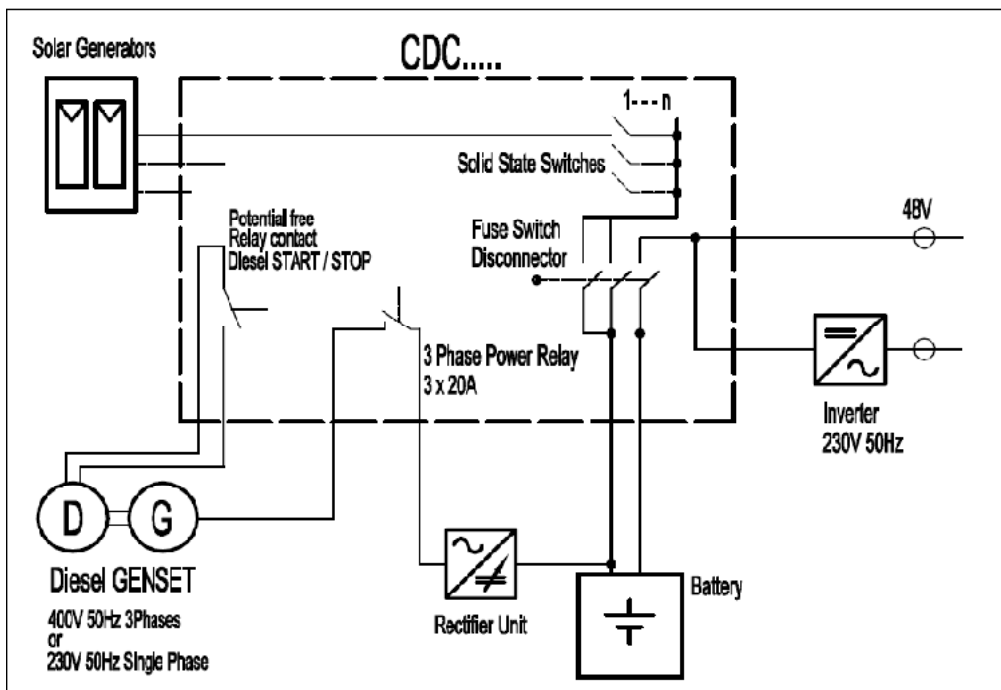
- ◆ independence of oil and gas
- ◆ most economic operation – lower running costs
- ◆ unintended operation – normally no operation personal is required
- ◆ long lifetime – only the batteries must be changed every 5 years
- ◆ now pollution, no noise, no dirt

✓ Economical Consideration



Annuity calculation on the basis of:

Interest rate = 5% - Assumed life time = 16 years - Increase of DIESEL price = 3% per year



Basic Block Diagram: In this case with a DIESEL GENSET as a Power Back up like has been realized for the Saudi Rail Company by SET company