XXXXX Solar Electricity Generator Field Test

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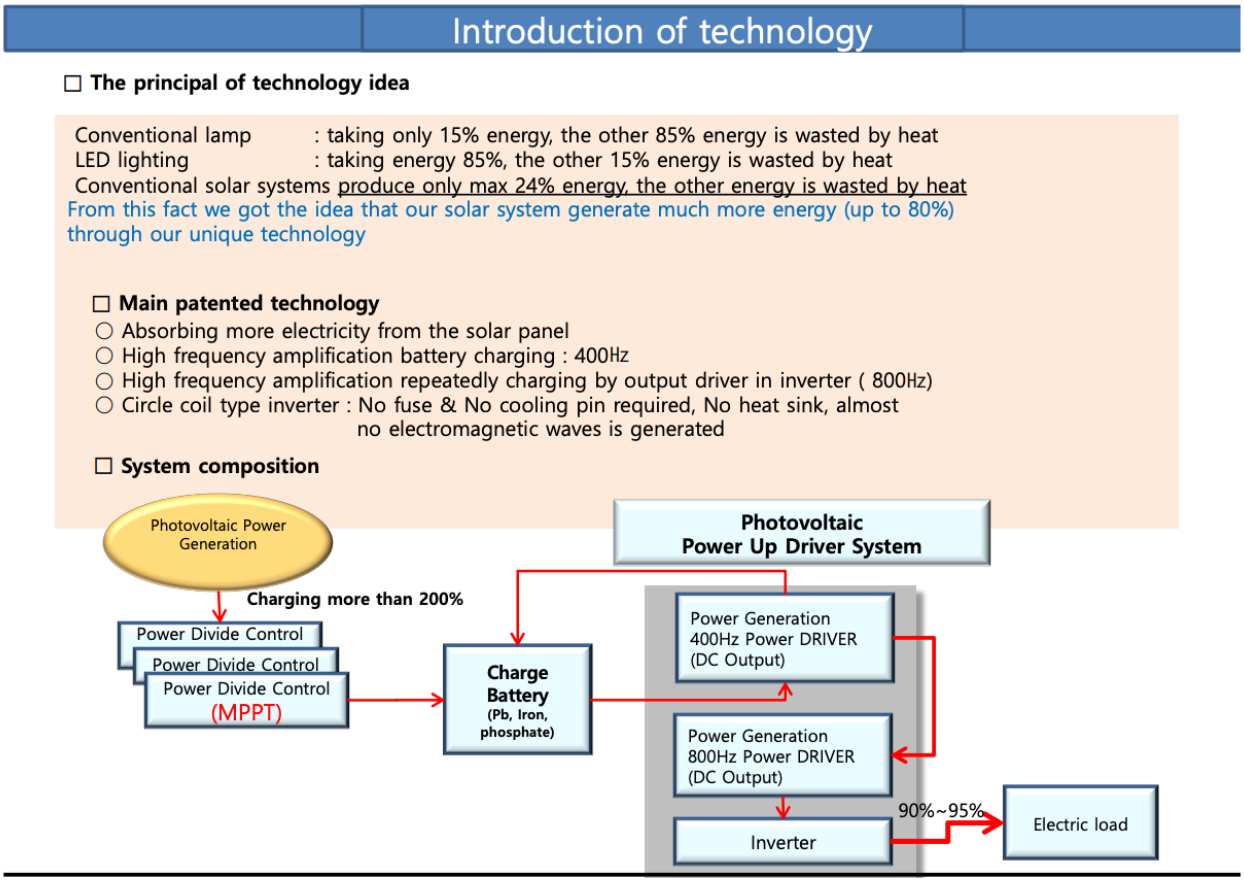
Notes:	Field Test of XXXXX Solar Electricity Generator Compiled by Jonathan Ramsden (Engineer) Green Infra Group https://greeninfragroup.com/

This test was carried out in order to determine the real time production of electricity from a XXXXX Solar Electricity Generator.

XXXXX claim that their innovative technology will generate between 4 and 10 times the amount of electricity per kW than any other conventional PV Solar Power system.

This test was carried out at the XXXXX HQ, S. Korea in order to verify these claims.

The XXXXX technology is outlined in the diagram below.



The test was carried out on a 24 kW XXXXX Generator with an 8 kW PV array. The generator was connected to a bank of Pb-gel batteries with a combined capacity of 48 kW.

It was noted that these batteries were 8 years old and still in prime condition with full charging capacity.

1. Daylight Generation Test – Appendix 1

1.1. The voltage and current of the PV-panel, the charger and the discharge of the battery varies in real time, which results in the fact that the measurements are difficult to measure simultaneously. The reason for this is the fact that the entire XXXXX complex is not connected to the electricity supply grid. XXXXX are completely self-sufficient in producing their own offgrid electricity.

1.2. The energy supplied by the PV module (8 kW) is compatible to the capacity of the charger (inverter), i.e. 12 kW. PV module is connected in 3 groups (one for each phase) for the test.

1.3. The test measurement between the PV-module and the MPPT charger indicated that the XXXXX generator generated 11.3 kW of electricity (appendix 1, grey shaded area). This is 404% more than that of a conventional generator (2.8 kW) i.e. 11.3/2.8 = 4.04.
It should be noted that generated electricity is automatically wasted out when the battery is fully charged. This phenomenon arises due to the fact that the XXXXX complex is not connected to the electricity supply grid. If the generator had been connected to the grid, then any surplus electricity would have been supplied to and bought by the grid operator.

1.4. Another phenomenon that arises due to the fact that the XXXXX complex is not connected to the electricity supply grid is the fact that more electricity is generated if the load is further increased. The higher the load the more the XXXXX Generator charges. The system absorbs more electricity when required due to XXXXX´s high efficiency charging technology.

1.5. The output voltage of the MPPT and the battery is set to 54V (this value is set by the controller).

1.6. The electricity generated is active power. This means that it is reactive and apparent power that is indicated on the measurement instrument. This value varies, therefore, in real time.

1.7. The measured battery voltage indicator declines a little initially when the load is increased, but then remains constant, even if the load is increased. This means more electricity is generated when more load is applied.

1.8. As a demonstration of the process in 1.7 above, a forklift truck was charged at a load of 36kW. This is which is 1.5 times the capacity of the generator/inverter! (The generator is power rated at 24kW). The voltage indicator remained constant at 53.5V during the entire the load and charging process which is 150% of the nominal capacity of the inverter. This process can last for 1-1 ½ hours before overloading the batteries.

1.9. It should be noted that the output of charger no. 2 is considerably lower than that of chargers no. 1 and 3. The PV-panels connected to charger no. 2 are connected in parallel and the PV-panels connected to chargers no. 1 and 3 are connected in series. This is to demonstrate that serial connection of the PV-panels is far more efficient and is to be preferred.

1.10. It should be noted that the system efficiency is higher (25%) when using lithium-phosphate and lithium-ion batteries than that of Pb (gel) batteries.

2. **Night Time Generation Test – Appendix 2**

2.1. The PV-array was in night mode, i.e. power off. The load was, on average, 6.3 kw (Aircon, lighting etc.). The XXXXX Generator is rated at 24 kW.

2.2. The battery output voltage was checked every 20 mins.

2.3. The battery output voltage indicated 50.7V~50.5V during the test.

2.4. This means that electricity was generated in order to support the load of 6.3 kW. The generator ran at 26% (6.3/24 = 0.26) of its inverter capacity (of 24 kW). The electricity is self-generated using XXXXX´s amplification by charging technology.

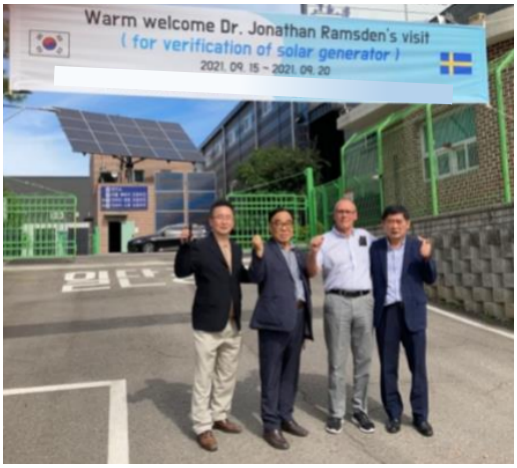
2.5. This implies that the self-generation of the generator is 6.3kW x 24hour = 127.2 kWh/day, which is 530% of the capacity of the inverter.

2.6. The load was then increased to 9.6 kW (more aircon). The battery voltage remained constant even when the load was 9.6 kW. This implies that the self-generation of the generator was 40% (9.6/24 = 0.40) of its inverter capacity (of 24 kW). The electricity is self-generated using XXXXX´s amplification by charging technology.

2.7. If the total-self generation quantity is as high as 24kW x 0.4 x 24 hours/day results in the generation of 230.4 kWh/day. Much of this generated electricity is automatically wasted if there is not enough battery capacity. If the generator, however, is connected to the grid and can supply and sell electricity then 230 kWh/day will be generated.

3. Summary of the total electricity generated during the two tests:
   3.1. Test1: 404% (see §1.3)
   3.2. Test2: 530% (see §2.5)
   3.3. In total: 934%
   3.4. Daytime production of electricity:
      3.4.1. 11.3 kW * 10 hrs * 360 days = 40 680 kWh per year
   3.5. Nighttime production of electricity:
      3.5.1. 9.6 kW * 12 hrs * 360 days = 41 472 kWh per year
   3.6. Total measured production of electricity:
      3.6.1. 40 680 + 41 472 = 82 152 kWh per year
   3.7. The solar generator generates 9.34~13.64 times more electricity than conventional solar plants.

4. **Conclusion**
   4.1. The XXXXX Solar Electrical generator was shown to be able to produce 82,152 kWh of electricity per year.



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