The Solar Myths

WHITE PAPER

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INTRODUCTION

There are several anecdotal statements and misconceptions on solar power and its practical limitations for household electricity generation or infrastructure solutions. It will be shown that the photovoltaic industry is no longer in its infancy and that life cycle net energy and CO^2 burden calculations give perfectly satisfactory results where climatic conditions allow enough irradiation.

SOLAR POWER MATTERS

The growth of the world's solar power systems has increased dramatically, the total concentrated photovoltaic market is expected to be worth US$266.0 million by 2014, growing at a CAGR of 33.0% from 2009 to 2014.

This should make it clear that solar power is very important, not just as a "green alibi", a minor addition to existing power solutions for wireless infrastructure and rural electrification, but a major tool to be reckoned with in all areas.

There is no need to wait for "new or better technologies" since the relevant building blocks are readily available here and now *(See ref. 1)*.

COAL VERSUS SOLAR IN ELECTRICITY GENERATION

It is thought provoking that one ton of sand to produce high grade silicon can produce just as much energy as 500 000 tons of coal. This puts the concept of CO^2 burden in a totally new light. It goes without saying that there has to be a break even point somewhere, where solar power can defeat coal as a source of electricity.

By 2010, leading solar electricity providers in Spain will be able to produce solar electricity for as low as 10 cents per kilowatt-hour (kWh) – equivalent to the delivered cost of electricity from a new coal power plant, according to Boston, Mass-based photovoltaic consulting firm Photon Consulting *(See ref. 2)*.

ENERGY AND CO^2 PAYBACK TIME FOR SOLAR PANELS

It has been claimed that the energy required to manufacture a solar panel can never be balanced by the useful energy it provides during its entire service life, while actually a modern crystalline silicon photovoltaic (PV) panel takes less than four years of service to balance the power needed in manufacturing.

Four years is only a small fraction of the lifetime of an average 130W-280W solar panel.

An estimated energy payback time (EPBT, the time it takes for a PV system to generate the amount of energy equal to that used in its production) for a solar module is only of 3.5 years for the low level of insolation in The Netherlands (1000 kWh/m2/yr). Jungbluth reported the life-cycle metrics of various PV systems (2000 vintage) under average insolation in Switzerland (1100 kWh/m2/yr).

Furthermore, the estimated greenhouse gas (GHG) emissions are in the range of 39–110g CO^2-equiv/kWh and EPBT of 3–6 years *(See ref. 3)*.

STORING ELECTRICAL ENERGY FROM SOLAR PANELS

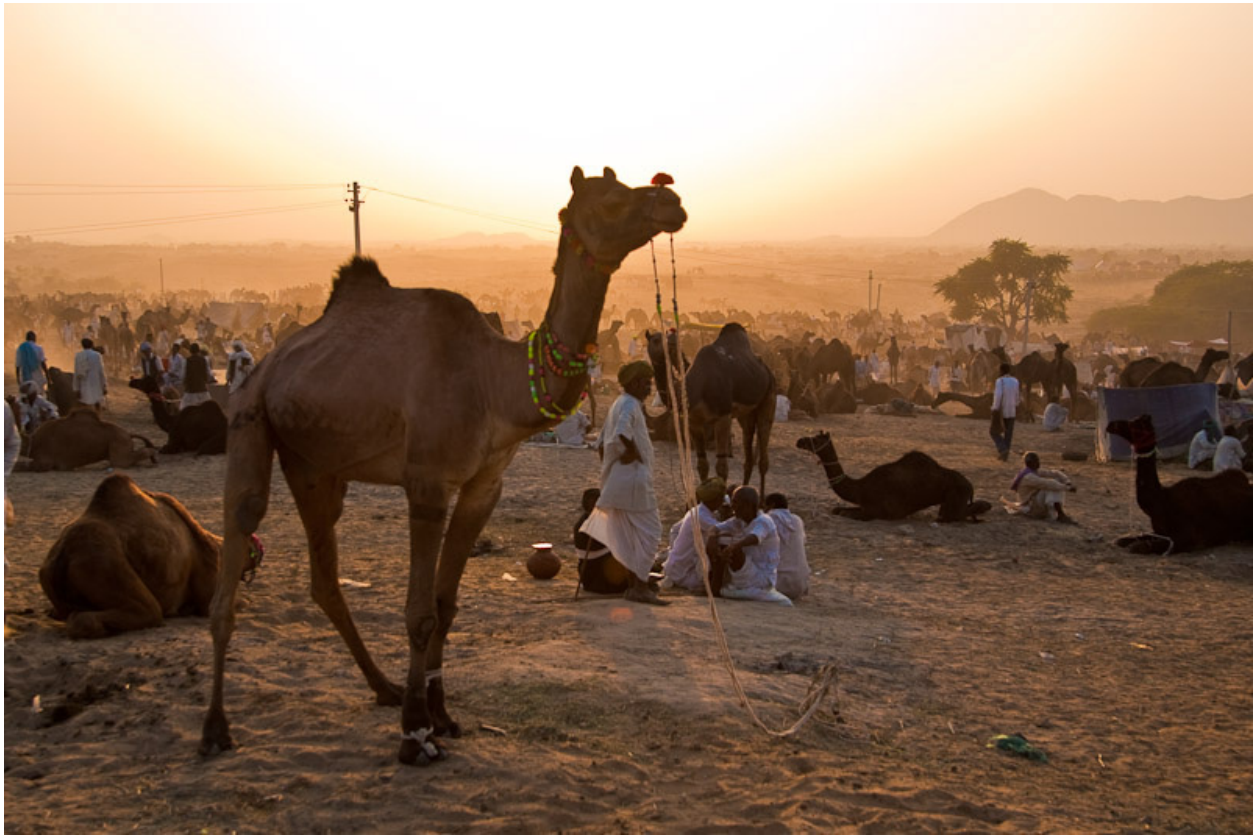
It has been claimed that conventional batteries leave a lot to be desired for storing solar power due to special cycling patterns and poor charge acceptance. Poor efficiency and poor charge acceptance in addition to self-discharge is occasionally mentioned.

Actually, a modern lead-acid battery has a rather high charging efficiency. With proper system sizing that does not cause premature aging of batteries, there is no urgent need for new and very different battery technologies, unless higher energy density per weight and size is required. This means that off-grid solar power does not have to wait for new breakthroughs. Assuming size and weight are not primary concerns, the needed battery technology is available already *(See ref. 4)*.

SOLAR POWER AS A GLOBAL RESOURCE TO BE UTILIZED FURTHER

It has been stated that solar energy can't possibly provide more than a fraction of the energy needs of critical installations, let alone provide any appreciable amount of energy for the masses.

Actually no less than 3.8 times the global demand for energy can be provided by solar power alone *(See ref. 5)*.



CONCLUSIONS

Sustainability and robustness in all areas is key. Direct generation of electricity by solar power makes sense in all areas where solar irradiation conditions are acceptable, typically around and above 4 kWh/m^2/day as a yearly average.

The tools for electricity generation and storage exist today and typical payback times, both financial and environmental, is in the order of 3 to 5 years.

REFERENCES

1. *http://www.solardaily.com/reports/Global_Concentrated_PV_Market_Worth_266_Million_Dollars_By_2014_999.html*
2. *http://www.edn.com/article/CA6432171.html average of 4.0-4.2. [ref 1], [ref 2]*
3. *http://pubs.acs.org/doi/full/10.1021/es071763q*
4. *http://photovoltaics.sandia.gov/docs/PDF/batpapsteve.pdf*
5. *Source: Energy (r)evolution, A Sustainable Energy Outlook, EREC European Renewable Energy Council 2009 pg 28.*

ABOUT VNL

VNL makes the award-winning WorldGSM™ system, the solar powered turnkey GSM system specifically made for rural areas with ARPUs of less than $2. WorldGSM™ is the first commercially viable GSM system that can run independent of the power grid. It runs exclusively on solar power and requires no diesel generator backup. VNL's innovative Cascading Star Architecture™ places coverage and capacity specific to need, resulting in near zero OPEX and dramatically lower CAPEX.

VNL understands the significant challenges mobile operators experience deploying wireless network solutions in places where electrical grids are non-existent or unreliable, road access missing or is frequently difficult, where ARPUs are so low that the operators can't justify traditional GSM deployment strategies.

The bottom line is that mobile operators now have a way to provide mobile services to rural communities in the developing world – and still turn a profit. WorldGSM™ also opens up a new micro-telecom business model – involving microfinance – where operators can partner with local entrepreneurs to accelerate deployment and reduce costs.

The next billion subscribers will be coming from rural populations, away from saturated urban markets. VNL is changing the DNA of rural telecom by providing commercially viable new building blocks that will transform the way rural networks are built in the future.

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