Disposal of scraped PV Modules – A Challenge

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One article that caught my attention recently led me to share with you some important aspects of adopting environmentally friendly technologies, particularly in the energy sector. One is an observation by Mr Lu Fang, Secretary General, Photovoltaic Division, China Renewable Energy Society. Fang's article is about deploying solar panels in a massive way in field. The key takeaway from the article is that one should be careful in adopting an idea in a holistic manner and not as a knee jerk action to the environmental problems that arise out of our present energy practices. While it is certainly true that such green technology should be adopted for the benefit of the society and mother earth, it should also be kept in mind to avoid certain side effects in deploying such new technologies. This is much like the modern medicine where a lot of study, research, testing and evaluation of a new drug before it is widely deployed in the field.

PV Modules (Panels):

PV panels have normally a 20 ~ 25 year life after which it is to be discarded. There is a degradation of the modules performance over time and it is better to check and ask of a performance warranty from the EPC (Engineering, Procurement and Commissioning) service provider. Almost all reputed PV Module manufacturers provide such guaranty. Fang notes in his article that the cumulative capacity of retired panels in China would reach 70 GW (70,000 MW) by 2034, i.e., in another 15 years. In terms of the power plant size, this would amount to a generating capacity that is 3 times the size of the Three Gorges Hydro Electric Station, the world's largest hydro power project. This is also about 4 times the present power requirement of Tamilnadu alone. Similar situation would arise in India as well in the next 20 years.

By 2050 he estimates the discarded panels to reach up to 20 million tones, which is 2000 times the weight of Eiffel Tower! China presently hosts the world's largest number of solar power plants. It has a total capacity close to 80 GW, almost twice as that of USA. India is fast catching up with a target of 100 GW to be in place in another 5 years. Both China and India are deploying solar power generating systems at a furious pace, nearly defying conventional wisdom in their efforts to power their fast developing economies, while simultaneously ensuring a balanced approach to diversify their energy supply structure on one hand and the need to meet the rather heavy commitments that they have made with regard to containing their carbon foot print as per the Paris Convention on Climate Control in 2016. Strategically both these countries are weary of depending too much on Oil, Gas and Coal supplies.

Compared to a hydro-electric, coal, oil or gas fired turbines or nuclear power stations, the life of the solar plant is rather less, even though it is 25 years. According to US Department of Energy, the factors that causes deterioration of performance and loss of power are:

- High temperatures
- Weight of snow collected on the panels during snow storms
- Dust storms which could lead to material fatigue on the surface of the panels and electric faults in the internal circuitry.
- Manufacturing related quality issues.
- Ageing

The generally used crystalline silicon panels contain metals like Aluminium, Lead and Copper and the cells are made up of silicon wafers and are wrapped around by plastic sheet. The plastic is mostly PVA (Poly Vinyl Acetate). The thin film panels have no plastic sheet but has chemicals and materials like Cadmium. Recycling and recovering such materials is a tricky process and require sophisticated technologies and equipments. In the next 20 to 30 years there is going to be a huge amount of waste which is not going to be easy to recycle.

More over the solar plants, the mega sized ones, are often located in a poor and rural areas while the sophisticated recycling industries will be in developed regions, Transporting the bulky panels would add to the cost of waste disposal. Additionally, labour and power are required for the recycling process. All these have to be factored in the life cycle costs of the solar panels and the planners and EPC contractors and the government people should not just go by the initial costs alone. The time bomb is ticking and it is already high time that engineers, technologists, environmentalists, bureaucrats take cognisance of the issue. Otherwise it would be an unmitigated disaster for the future generations. India, particularly has a poor track record in such matters. A typical example is the unorganised and ill planned growth of dyeing industry and chemical and leaner industries around major rivers which have been almost killed. Such a scenario should not be repeated with solar panels. Particularly for Rameswaram island which we are planning to make as an ideal example, we should take note of such disasters lying low at present and which could become an overwhelming issue in the next 25 to 30 years. Again Rameswaram could become a shining example in deploying green energy but also in methodical disposal of the waste, recovery and recycling of hazardous materials of the solar panels. A comprehensive policy for such initiatives should be put in place by the Green Rameswaram committee and the civic authorities in a time bound manner. We owe it to the future generations!

As a company committed to protecting the environment and contribute to global greening, Basil has tied up with its solar module vendor on these issues of recovery and recycling of wastes from the panels at the end of the 25 year life period.