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## LOWERING THE COST OF COMMUNITY BASED PHOTOVOLTAICS THROUGH THE DEVELOPING OF A SECONDARY MARKET WITH REFURBISHED PANELS AFFECTED BY HURRICANE MARIA

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To: comentarios@energia.pr.gov

Thu, Nov 16, 2017 at 6:05  
PM

Estimada Commission:

Me agrada que abran un espacio en busqueda de ideas concretas para mejorar la calidad y suministro de energia electrica en Puerto Rico, con vias de lograr mayor diversificacion de fuentes y mayor resiliencia en el sistema. Comparto con ustedes una pre-propuesta que vengo desarrollando desde nuestro espacio empresarial. Entiendo que podemos formar alianzas estrategicas para lograrlo.

### CONTEXT AND BACKGROUND

On 20<sup>th</sup> September 2017, Puerto Rico endured a catastrophic Category 5 hurricane which caused substantial damage to hundreds of photovoltaic arrays and projects in the island. It is likely that tens of thousands of photovoltaic panels are now thrown about as part of municipal garbage awaiting to be picked up by the local solid waste removal company and hauled off to the landfill. Recent imagery from aerial flights from the National Oceanic and Atmospheric Administration show that Humacao's solar farm suffered catastrophic damage with thousands of panels being ripped off from its ground

mount.

Guayama's Illumina solar farm with is a 20+ MW project suffered a similar fate according to aerial reconnaissance footage. Closer to the metropolitan area one could see damaged solar panels on the grounds of Fort Buchanan military base, Veteran's Administration Hospital and Bayamon's carport at Juan Ramon Loubriel Stadium. Anecdotal narratives in social media with pictures of their damaged solar roofs suggests that hundreds of residential and small business solar projects suffered damage as well.

An immediate question comes to mind, which is what to do with those tens of thousands of solar panels. Consider for example that even the most damaged ones, when you expose them to the sun and measure their voltage, they still produce a current and a voltage, which can be harnessed, stored and used to provide solar energy to run necessities in remote areas, agricultural and difficult urban areas where the power grid may take many months to fix.

At least since 2009, the European community has been alerting that starting in the year 2030, photovoltaic waste, from end of life cycle, is going to be an important solid waste disposal issue that many countries and markets will have to face. As a side note, Hurricane Maria sped up that timeline significantly in Puerto Rico. And in a comprehensive study named *End of Life Management-Solar Photovoltaic Panels*, the International Renewable Energy Agency (IRENA) concludes that

**"...PV panel waste presents a new environmental**

challenge, but also unprecedented opportunities to create value and pursue new economic avenues” and that “... sectors such as PV recycling will be essential in the world's transition to a sustainable, economically viable and increasingly renewable's based energy future”

The European community, via their Waste Electrical and Electronic Equipment Directive has gone as far as mandating that PV producers set up a collection network of photovoltaic panels at their end of life IOT better manage the stream of electronic waste and facilitate their recycling. IRENA estimates that by year 2050, 5,000 or so Gygawatts of Solar panels will have to be properly disposed of. To further add concern leachate tests in Japan, the US and Germany have shown traceable quantities of Cadmium and Lead in PV panels waste.

### SPECIFIC PROPOSAL ITEMS

- 1) Develop a detailed working plan for the recovery of a substantial quantity of the damaged photovoltaic panels that are in Puerto Rico because of the hurricane.
- 2) Incorporate a materials recovery process that can yield a good amount of high energy embedded glass, aluminum and copper. The recovery of rare elements such as Tellurium, Silver and Indium should also be explored with an eye for further incorporation of those elements into the manufacturing chain.

3) Refurbish those panels that are deemed fixable, that can still yield a reliable amount of current and create voltage when exposed to the sunlight. These refurbished panels can be the basis for a secondary market of photovoltaics that can dramatically reduce cost and make solar energy more accessible to the public at large.

4) Train a workforce to be gainfully employed in the photovoltaic collection, decommissioning, recycling and refurbishing industry. Create a curriculum and on the job training

5) Address the government (Environmental Quality Board and Solid Waste Disposal Authority) regarding the adoption of waste classification and regulatory framework for disposing of photovoltaic panels

6) Outreach and leverage with the Universities in Puerto Rico, both public and private to perform R & D into further optimization of recycling of photovoltaic panels

7) Identify European market that is willing to share information and perform a visit to their recovery and recycling facilities. Very possibly Germany. (has the most mature market of any European country)

8) Make a proposal of economic development to the government of Puerto Rico and to the Oversight Financial Control Board Strategic projects coordinator to facilitate the development of Private-Public Alliance to carry out the objectives of this proposal.

Estamos listos para formar un equipo donde esto se pueda convertir en una realidad. Quedo a su disposicion al [787 360-1981](tel:7873601981) para abundar y detallar mas sobre esta propuesta.

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