GRID-BLACKOUT RESILIENT RETROFIT FOR ROOFTOP PV HOMES

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Problem and Solution Summary

In 2020, around 2.6 M roof-top PV customers with an avg. 6.9 kW setups were present in the USA. Existing roof-top PV homes of the USA fail to generate power if the utility grid fails, making the whole PV setup purposeless even with perfectly functioning PV panels, inverter(s), and household appliances. As a result, during the famous week-long grid blackout of Texas in Feb. 2021, even the roof-top PV homes remained powerless without electricity. The major events (hurricanes, tropical storms, etc.) caused an avg. two hr power interruption in 2013 and six hr in 2020, a 200% increase. The proposed retrofit is minimal in components (Fig. 1), a plug-and-play device, and easier to mount and install. The cost will be < 1%, making it viable for purchase and installation into the existing roof-top PV systems. This could provide the minimum power needed for running medical and critical appliances (200-400 W) under grid blackout. Moreover, setup for the demo day (Fig. 2) is readily available for testing the prototype.

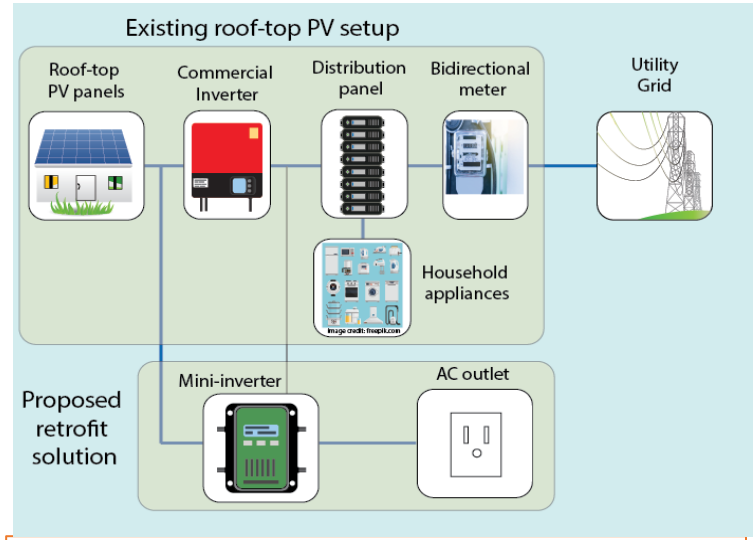

Figure. 1. Proposed retrofit solution for increasing the resiliency of roof-top PV homes under grid blackout conditions.

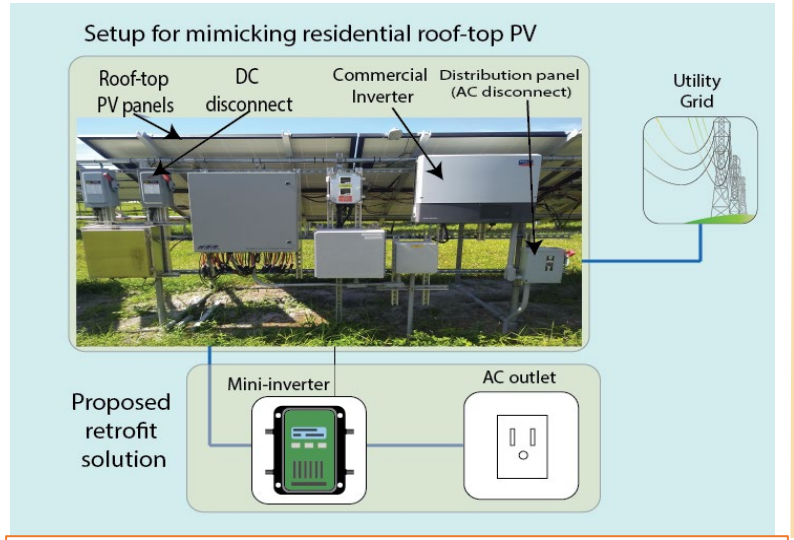

Figure. 2. Schematic of the setup for demonstrating the proposed retrofit solution on the Set! demo day. The complete PV setup is operational and readily available.

Key Personnel/Organizations

1. Dr. Manjunath Matam, UCF / FSEC, Cocoa, Florida.
2. Dr. Issa Batarseh, UCF/FSEC, Cocoa, Florida
3. Dr. Hubert Seigneur, UCF / FSEC, Cocoa, Florida.
4. Ryan Smith, Pordis LLC, Austin, Texas.

Budget and Timeline

Ready! Round prize: $50k

Key Milestones & Deliverables

Month 1:	Complete the design, retrofit and mini-inverter simulations; decide the prototype
Month 2:	Prototype fabrication; perform a series of indoor tests
Month 3:	Install the prototype on the demo setup; perform a series of tests; analyze results;
Month 4:	On Set! demo day, perform proof of concept tests; analyze results

Ready! Prize Impact

The prize impact is direct and immediate. The prize leads to the development of a prototype, testing it under actual conditions. Moreover, the prize recognizes the first solution to the grid-blackout problem with a minimal cost. Besides, the PV customer feedback will be collected.