

Isolated Solar PV Microgrids

- Electrical Engineering, PhD study is on renewable energy systems, with a focus on **isolated solar PV microgrids**. These systems may be deployable, of varying size, and may be thought of as a component of distributed generation. (*Note: Depending on their application, they may also be connected to existing grid infrastructure.*)
- Isolated solar PV microgrids are a challenge since both their DC generation & load demand (AC or DC) may be highly variable, or even intermittent.
- For reliable power delivery, isolated systems must include **energy storage**.
- Additionally, a strong emphasis must be placed on smart grid design and intelligent energy management algorithms to deliver energy with maximum efficiency.



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*Note: Photos are of a ReGenerator unit,
provided by ZeroBase Energy, LLC*

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- The applications of **deployable, isolated solar PV microgrids** are many:
 - **Disaster Relief** (FEMA) when existing grid infrastructure is damaged due to Mother Nature (earthquakes, tornadoes, hurricanes, etc.)
 - **Military Applications** – small-scale Special Ops missions, reconnaissance, initial base establishment, communications, etc.
 - **Temporary Power Quality Improvements** to improve grid stability, power factor correction, etc.
 - **Remote Power Delivery** for contractors working in off-grid locations
 - **Tertiary / Critical Generation for Electric Utility Providers** to aid in meeting peak demand to avoid rolling blackouts or load-shedding
- Drawbacks are **cost, reliability, solar generation intermittency**, etc.
- This research may align with **Pecan Street, Inc.**'s research interests. Access to their database provides real-time data on a large solar PV array (Dell Children's Hospital - 30kW) as well as a multitude of smaller housing arrays (2-4 kW) which are distributed across a large area. This provides for excellent distributed generation study.



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