

INTERNET ARCHIVE

Wayback Machine

https://www.gwu.edu/~eemnews/previousissues/sp15_art6.html [Go]

[1 capture](#)

2 Sep 2016



▼ About this capture

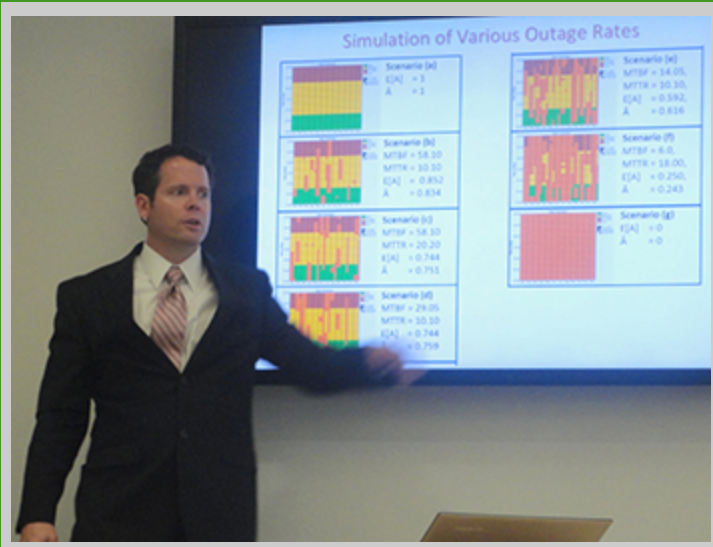
*Engineering Management & Systems Engineering;
School of Engineering & Applied Science*

Main Menu

- Home
- Previous Issues
- Students
- Alumni
- EEM
- EMSE
- Environmental Professionals
- Events
- Links
- Contact Us



Patrick Murphy Defends Doctoral Dissertation



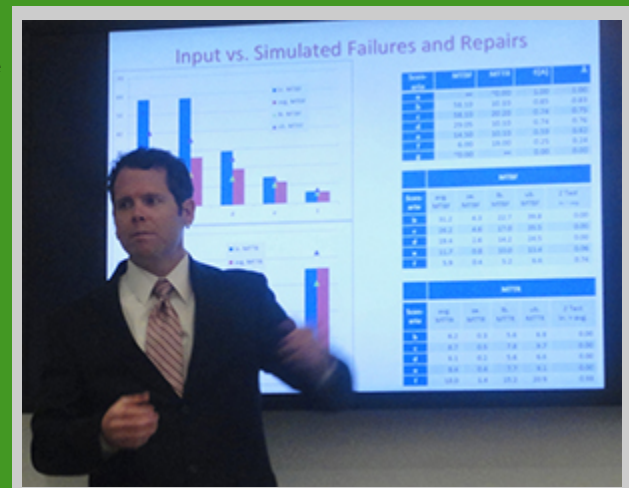
Patrick Murphy successfully defended his doctoral dissertation on April 8, 2015. The title of Patrick's dissertation is "A method for determining the cost of highly available electricity considering grid unavailability: A case study and applied analysis in Uganda."

People in developing countries have limited access to electricity, especially in rural and remote areas. Uganda provides a typical example of an under-electrified

country, with less than 12% of Ugandans having access.

As electricity consumption is correlated with economic development, the lack of access to electricity is a key obstacle to achieving economic growth. Techniques for improving access to electricity include grid extension and distributed energy resources, but the tradeoff between grid extension and distributed generation requires a better understanding of the impacts of grid unreliability.

To address the lack of electricity access, Patrick developed a new method for simulating unreliable electric grids. The method was then used to determine the cost of reliable electricity; to calculate the distance at which grid extension and DER have the same cost, a point known as the economic distance limit (EDL). He then analyzed the impact of grid sell-back prices on electricity cost and EDL. From the simulation results, linear approximations of some of the key outputs were developed, which provides a method for rapidly calculating electricity costs and EDL without the need to perform numerous simulations.



Patrick adapted the HOMER model (Hybrid Optimization Model for Electric Renewables) in this work to address unreliable electricity from the grid and develop a method for determining optimal system configurations and predicting electricity costs for reliable power generation in regions with unreliable grid electricity. He demonstrated the method for a village in Uganda, but the method holds universally. Results indicate that diesel is the most economical choice, but slight increases

in diesel and decreases in PV (photovoltaics) prices make solar/diesel hybrid systems competitive. Improved reliability increases cost, but the increase of can be justified for users needing more reliability.

A paper summarizing Patrick's work can be seen at this [link](#).

Prof. Johan R. van Dorp served as Patrick's research advisor. Other committee members included Profs. Jonathan Deason, Ekundayo Shittu, Thomas Mazzuchi and EEM doctoral graduate Ariel Castillo.



George Washington University - School of Engineering and Applied Science
EMSE 2012