DCI Experience Abstract Submission

For more than 15 years, Davies Consulting Inc (DCI) has supported utility companies and their regulators and legislators in the US and Canada with its expertise in operations and maintenance of utility infrastructure. A recent example is DCI's selection by 19 utilities to develop life expectation curves for various classes of assets.

DCI's research abilities are highlighted by its extensive utility consulting experience, senior consultant qualifications, extensive database of utility best practices, analytical methodologies in support of strategic decision making, and support of utility companies through direct testimony in public utility service commission hearings. DCI's consultants all have advanced degrees and include a Wall Street Journal Scholar, a Jurist Doctor, a former Assistant Professor of Systems Engineering at the United States Military Academy, and a CPA and expert in Engineering Economics. This diverse set of capabilities and expertise uniquely positions DCI to be flexible and innovative in developing strategies and solutions pertaining to hardening the power distribution infrastructure against hurricane hazards.

DCI has supported reviews and development of emergency response and restoration process and strategies for many utility companies in the United States and Canada. Through our work, we have developed an extensive database to benchmark storm response performance across various major restoration efforts. This type of research and data analysis allows DCI to provide utility companies, regulators, and legislators with better projections of expected costs and restoration times for several variables of interest. Additionally, DCI regularly provides utility companies with advice regarding their infrastructure and ability to withstand various categories of hurricanes. DCI proposes to use available data in generating forecast and impact models using developed hardening factors. Although, establishing a database is one of the most significant and time-consuming areas for any research or analytical activity, DCI has archived its experience and research into a storm benchmark database which can be leveraged to aid the PURC efforts for storm hardening research. Working with Public Utility Research Center participants, DCI would further expand its database to easily facilitate the development of realistic system hardening storm damage factors. This in turn would allow utilities to develop realistic expectations of storm restoration costs, resource requirements, and restoration times after hardening of the system and make more informed strategic decisions as to where on the system to harden.

The objective of hardening a utility system is to reduce the expected damage to the system from a significant storm. It is likely cost prohibitive to harden an entire utility's system, so the focus of any hardening effort has to be on key portions of that system. The question is which are the key portions of the system. To harden the system, utility companies need to "know" the system being hardened. An understanding of a utility's transmission and distribution system begins by identifying the critical infrastructure items (hospitals, emergency operations centers, utility facilities, etc.), other community items (grocery stores, gas stations, schools, etc) and developing a defensible method of prioritizing the circuits that service these items into a hardening strategy. DCI's research

and analytical initiatives have resulted in the development of methodologies using portfolio analysis techniques and weighting algorithms to prioritize what circuits, sections and laterals, if any, on a system should be designated for hardening, as well as analyzing the cost and system reliability implications.

Vegetation management has always been a critical element in a utility's reliability and storm hardening strategy. It is unrealistic to believe that utility companies can simply eradicate all trees around power lines. Utility companies need to develop a vegetation management strategy that provides for sufficient line clearance and is cost-effective. Many variables affect this decision. DCI has a model that evaluates cost-effective vegetation management under normal conditions and has recently expanded it to determine the potential restoration costs associated with various vegetation management program alternatives. We propose working with the Research Center and utilities to further identify and refine effective vegetation management strategies that account for storms, the probabilities of severe storms, the probability of damage as a result of vegetation management decisions and the costs associated with different courses of action considered.

Storm hardening and storm restoration decisions need to be understood. DCI proposes improving its restoration strategy simulation model to allow utility companies to model system characteristics, model varying storm magnitudes that affect the system, and allowing "what-if" analyses of hardening different section of the distribution system. The insights gained from this type of research and analysis allows utility companies to make decisions by weighing known customer cultural values and operational restoration metrics with objective insights.

Finally, all of the elements of research need to be looked at individually and collectively. Tying all of the research elements together, DCI proposes to then define "value" in terms of damage avoidance associated with storm hardening and then perform a cost-benefit analysis of the derived value of hardening to the cost to implement. Using different outputs from individual studies, DCI would establish a methodology for utilities to have a holistic understanding of storm hardening, its elements and the impact to the system, as well as the impact to the utility company.