Evidence-Driven Utility Policy with Regard to Storm Hardening Activities: A Model for the Cost-Benefit Analysis of Underground Electric Distribution Lines

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Public Utility Research Center

Research

Expanding the body of knowledge in public utility regulation, market reform, and infrastructure operations (e.g. benchmarking studies of Peru, Uganda, Brazil and Central America)

Education

Teaching the principles and practices that support effective utility policy and regulation (e.g. PURC/World Bank International Training Program on Utility Regulation and Strategy offered each January and June)

Service

Engaging in outreach activities that provide ongoing professional development and promote improved regulatory policy and infrastructure management (e.g. in-country training and university collaborations)

The Body of Knowledge on Infrastructure Regulation

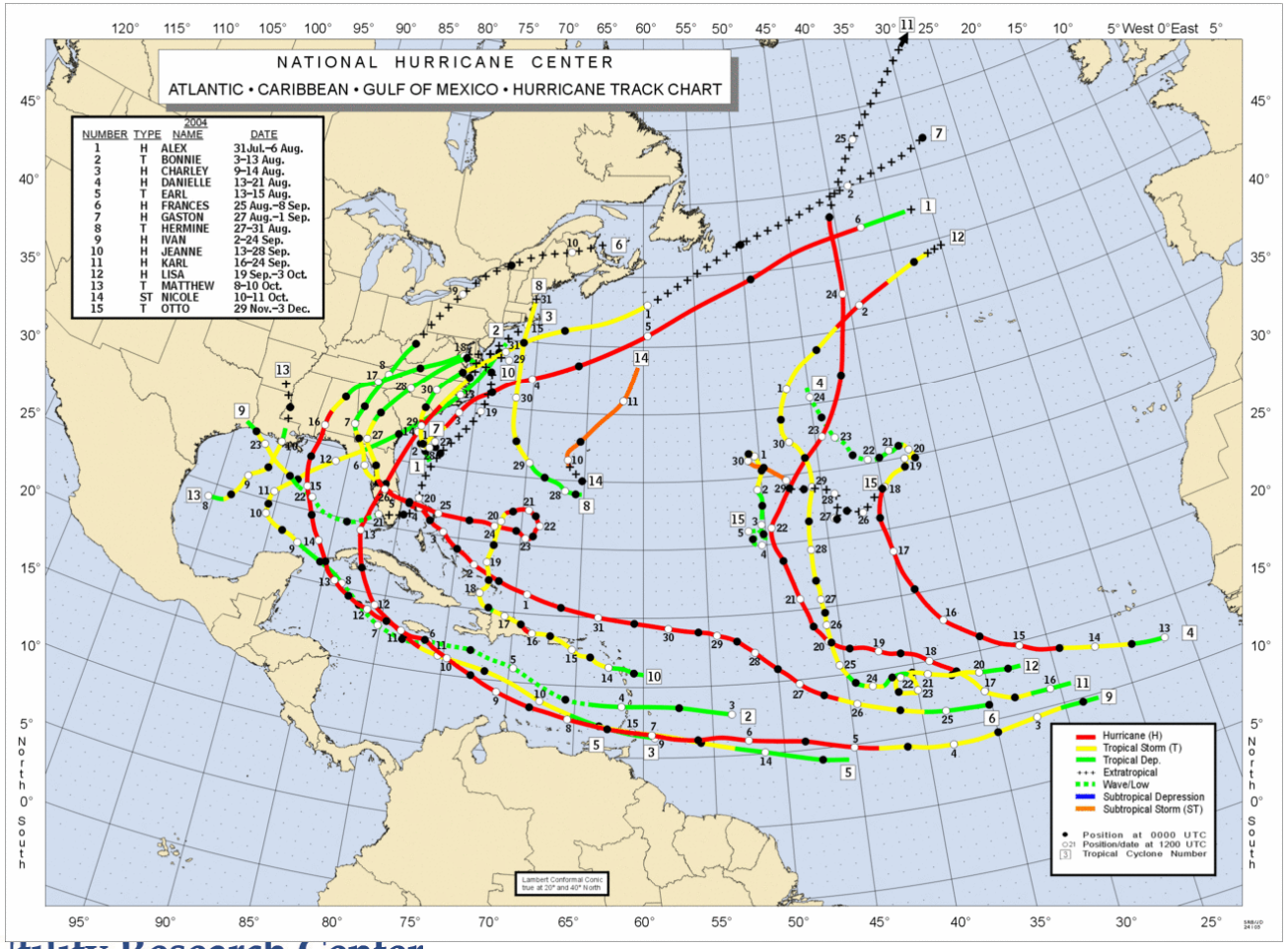
Acknowledgements

I want to thank the Florida Electric Cooperative Association, the Florida Municipal Electric Association, Florida Power & Light, Florida Public Utility Company, Gulf Power, Lee County Electric Cooperative, Progress Energy Florida, and Tampa Electric Company for their generous support of this initiative.

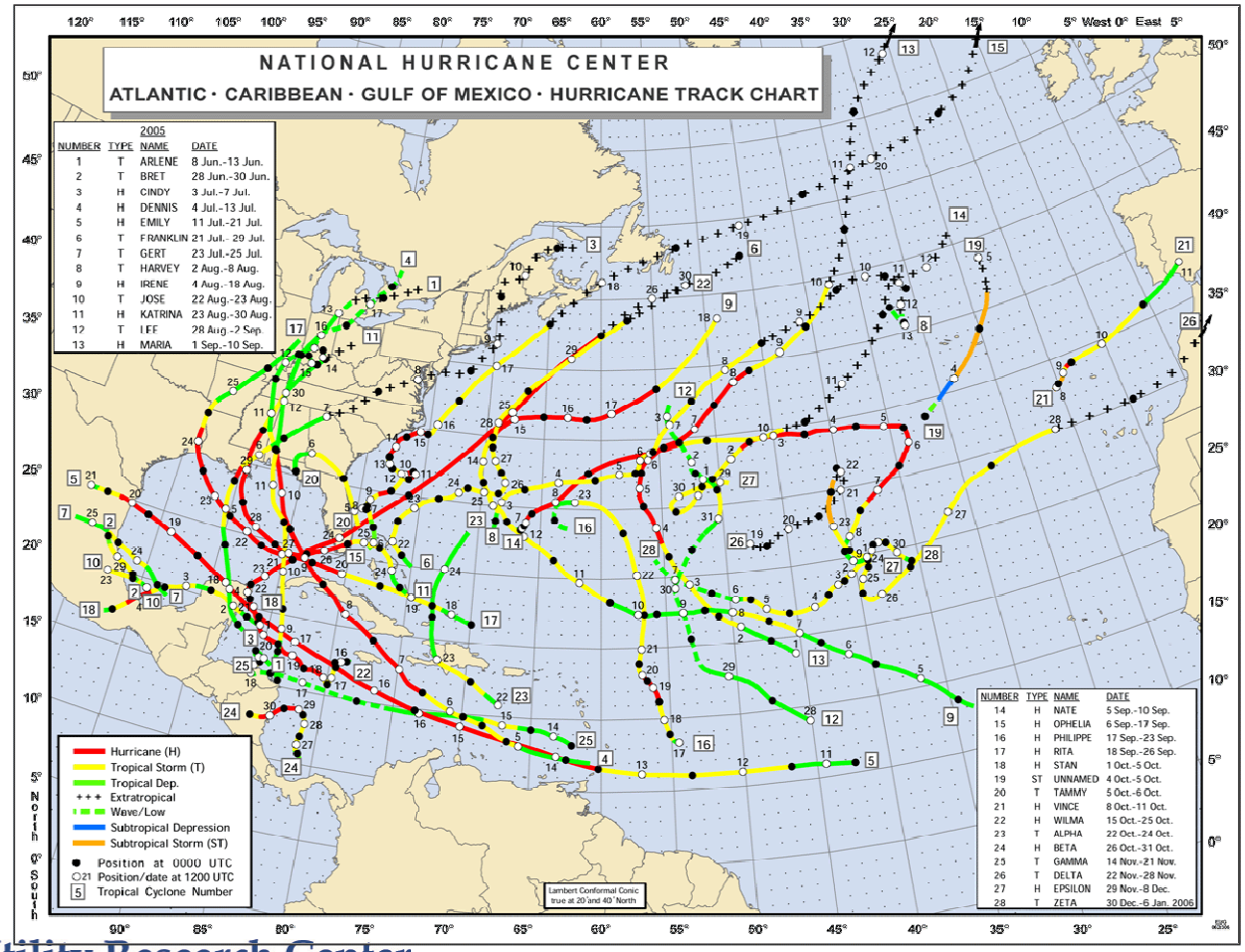
Summary

- The storm season of 2004 and 2005
- PSC workshop and collaborative effort
- Research initiatives
- Model for cost effectiveness of relocating power lines

2004 Atlantic Hurricane Season



2005 Atlantic Hurricane Season



Florida Storm Damage

Year	Named Storm	Damage (million $)
2004	Bonnie	0.100
	Charley	5,533.680
	Frances	5,602.120
	Ivan	4,090.400
	Jeanne	840.205
2005	Arlene	3.740
	Cindy	0.300
	Dennis	1,569.232
	Katrina	208.600
	Wilma	10,215.700
Total		28,064.077

Aftermath of the Seasons

- 10 named storms
- $28 billion in damages
- PSC convenes workshop for market participants, commission staff, and policymakers on January 23, 2006

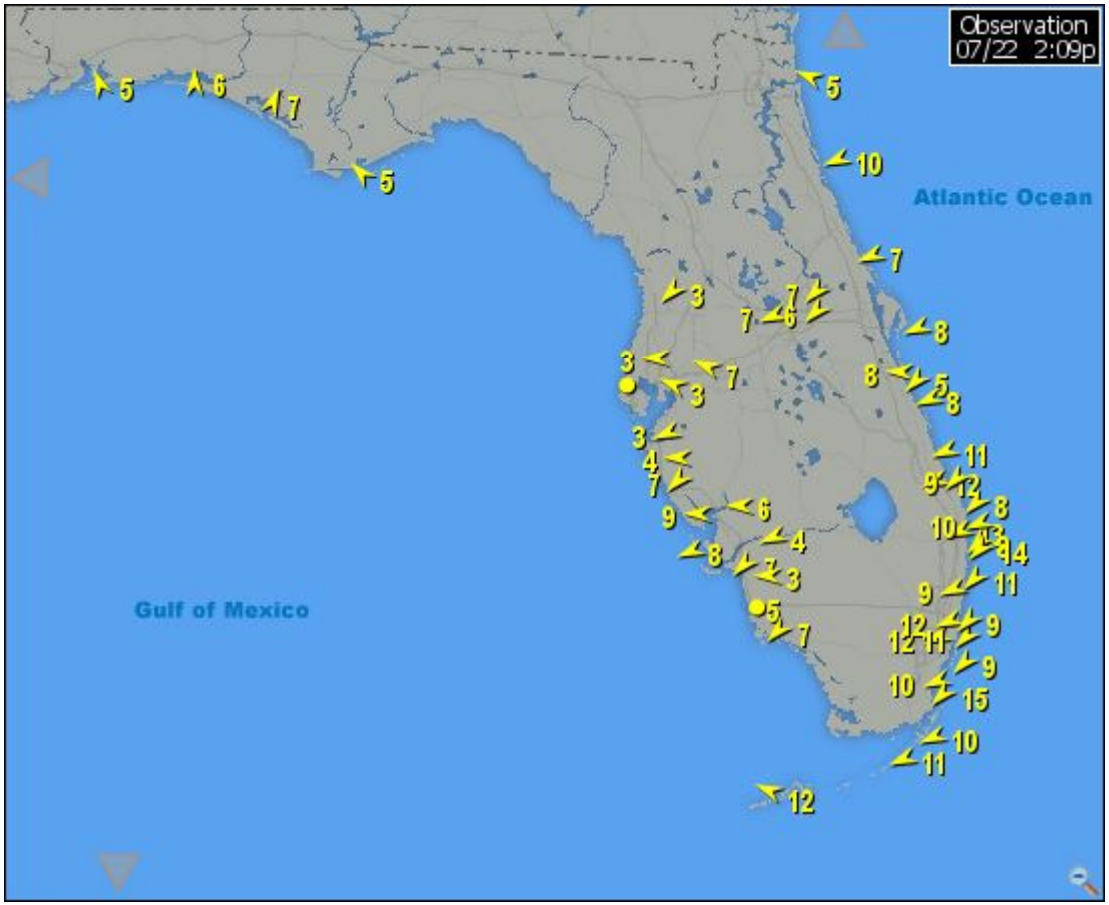
FPSC Order PSC-06-035 1-PAA-E1

Florida would be better served by consolidating utility resources through a centrally coordinated research and development effort with universities as well as research organizations. The purpose of such effort would be to further the development of storm resilient electric utility infrastructure and technologies that reduce storm restoration costs and outages to customers.

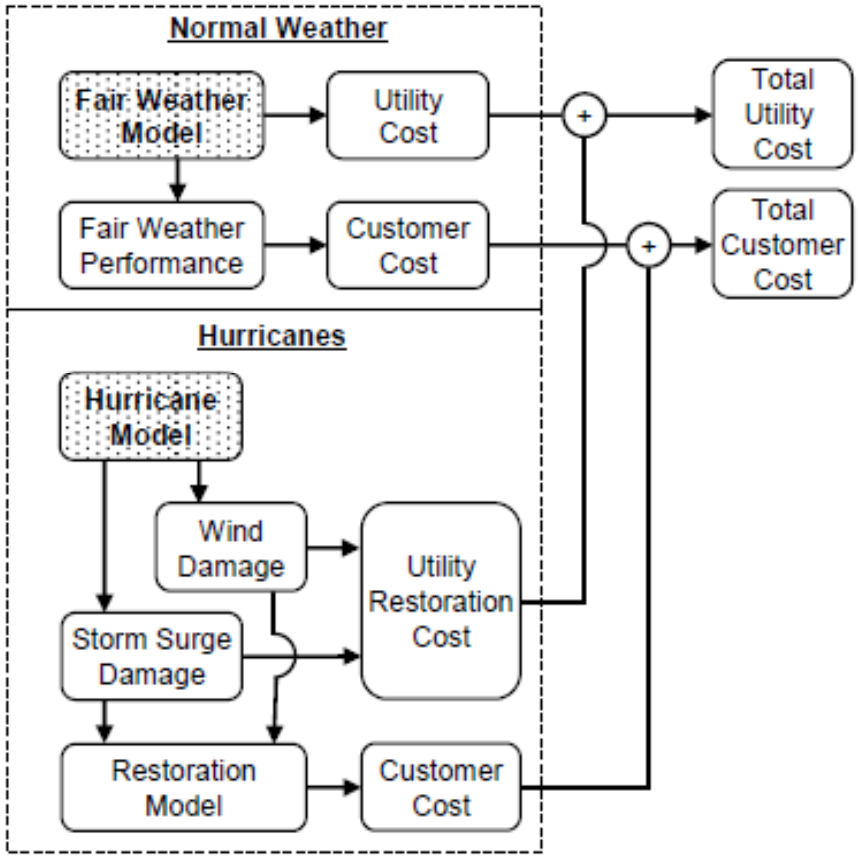
Cooperative Initiatives

- Vegetation management workshops for sharing best practices and discussing management issues
- Deployment of 50 high resolution wind monitoring stations throughout Florida
- Storm damage database
- Model to assess the cost effectiveness of relocating power lines under ground

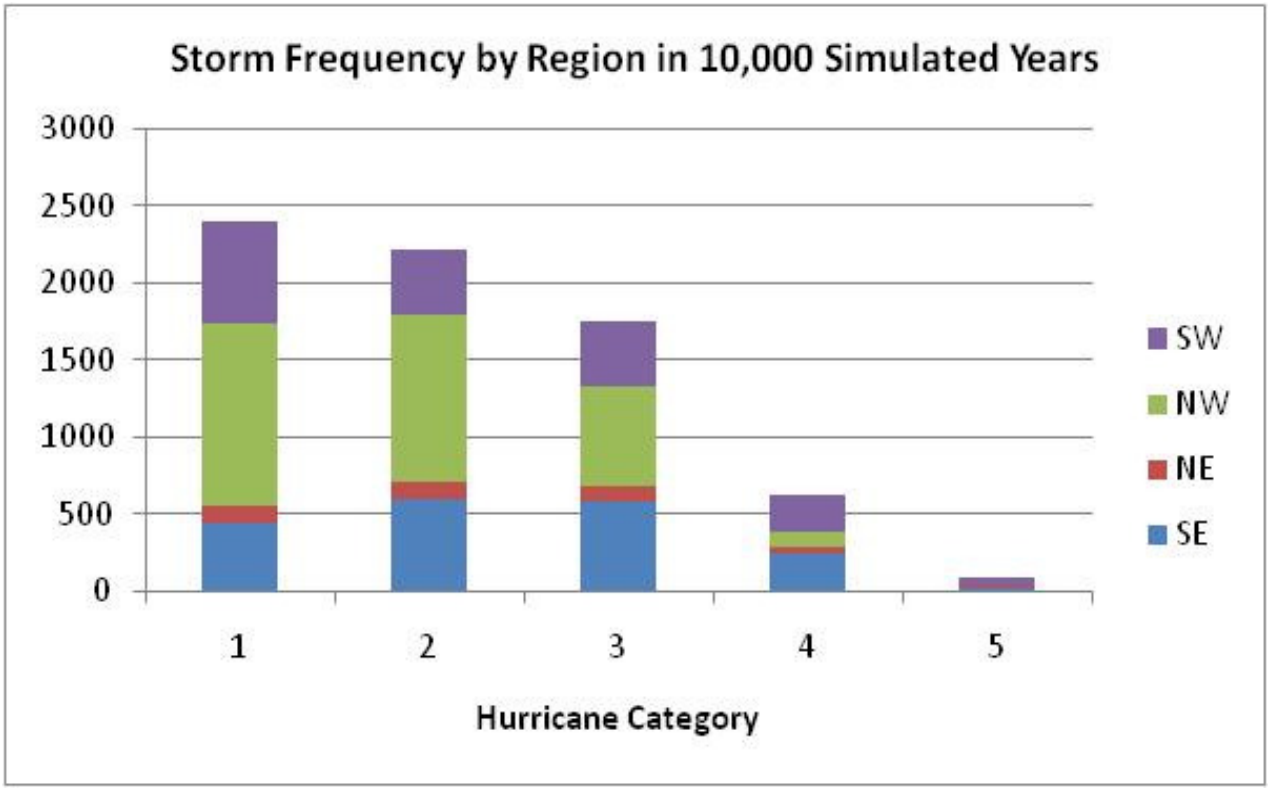
Wind Monitoring Stations



Underground Model Flowchart



Simulated Storm Frequency



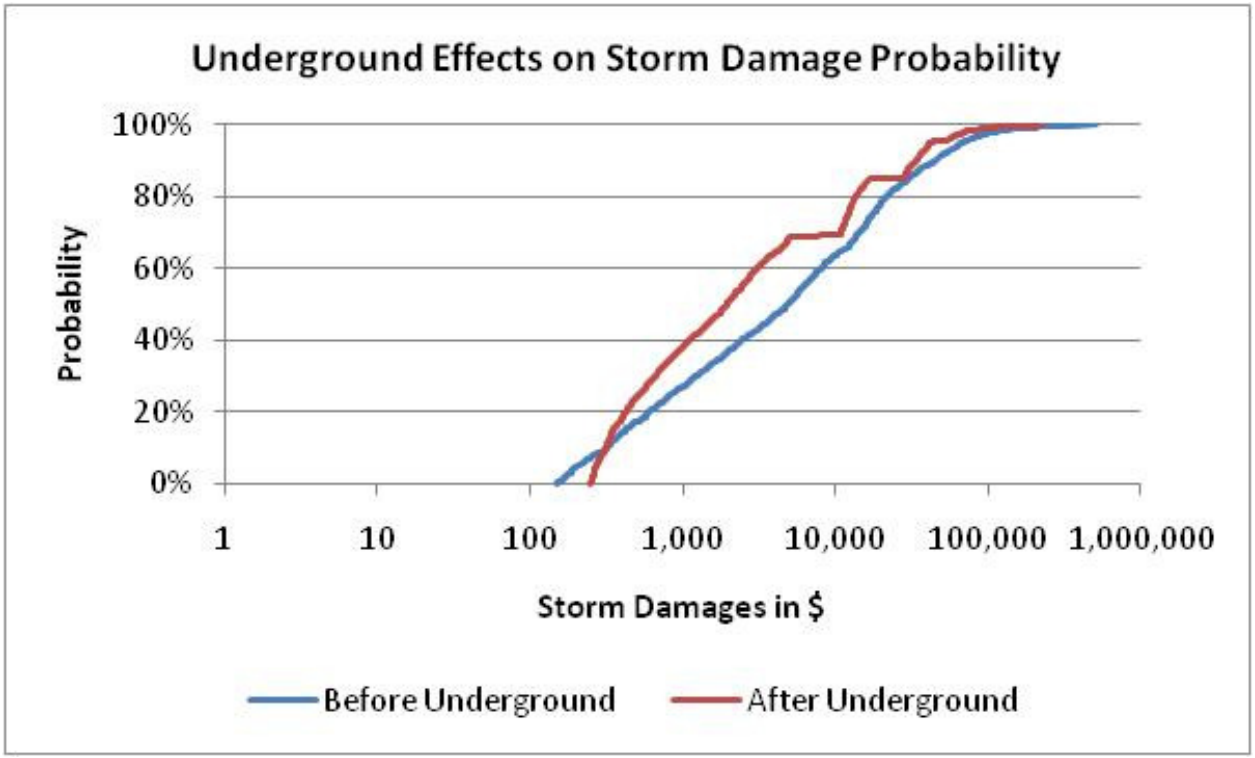
Model Output

- Probability distribution:
  - Restoration cost
  - Customer opportunity costs
  - Service interruptions
- Before and after relocation of power lines

Model Output

Utility Annual Cost	Before	After	Benefit
Equipment O&M	$65,000.00	$29,000.00	$36,000.00
Other O&M	$1,653.72	$3,564.00	($1,910.28)
Lost Revenue (Storm)	$15,011.14	$13,108.73	$1,902.41
Lost Revenue (Non-Storm)	$6,827.06	$2,730.19	$4,096.87
Repairs (Storm)	$2,679.56	$1,653.35	$1,026.21
Repairs (Non-Storm)	$14,240.00	$6,400.00	$7,840.00
Others	$0.00	$0.00	$0.00
Total	**$105,411.48**	**$56,456.27**	**$48,955.21**
Customer Opportunity Cost			
Storm	$296,847.74	$259,227.06	$37,620.68
Non-Storm	$135,005.95	$53,989.88	$81,016.08
Total	**$431,853.70**	**$313,216.93**	**$118,636.76**
Customer Reliability			
CMI (Storm)	5,956,809	5,201,883	754,926
CMI (Non-Storm)	2,709,150	1,083,409	1,625,741
Total	**8,665,958**	**6,285,292**	**2,380,667**

Storm Damage Probability



Benefit Varies by Location

Region	Southeast (Ft. Lauderdale)	Northeast (Jacksonville)	Southwest (Naples)	Northwest (Pensacola)
Storms Affecting Project Area in 10,000 Hurricane Years	1,778	806	427	896
Average Annual Damage before Hardening	$2,700	$900	$1,000	$2,500
Average Annual Damage after Hardening	$1,700	$600	$600	$1,700
Average Storm Damage before Hardening	$16,000	$12,000	$23,000	$29,000
Average Storm Damage after Hardening	$10,000	$8,000	$14,000	$19,000
95th Percentile Storm Damage before Hardening	$67,000	$57,000	$96,000	$85,000
95th percentile Storm Damage after Hardening	$42,000	$38,000	$64,000	$60,000

Conclusions

- Stakeholders can accomplish goals as a cooperative that they cannot achieve alone
- Regulatory leadership required to initiate this cooperative effort
- Cost effectiveness of relocating power lines depends on many factors – no easy answers
- Modeling effort can lead to better allocation of scarce utility resources

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