

Connecticut Legislature Tropical Storm Irene Hearing September 19, 2011

I. Restoration & Communication Processes

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- B. Severity of Irene

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- C. Damage to the Electric System
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 - 2. Example Damage Across One of Our Towns
 - 3. Examples Damage on One Circuit in One Town
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- III. Best Practices, Plan for the Future
- IV. Results and Lessons Learned

Restoration & Communications Processes





We began planning many days before the storm ... here are some examples:

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		Storm Center Open Impact & Damage Prediction Developed	Cre	WS	NEMAG Call Acquire KCP&L Line Crews And Lewis Line Clearance Crews	State EO Storm Preparatio Complete)n
Mon 8/22 Tue	e 8/23	Wed 8/24	Thu	8/25	Fri 8/26	Sat 8/27	Sun 8/28
 8/25: Towns Notif. to Plan for 4-7 Day Outages 8/25: Muni. Liaison at EOC Pre-Storm Prep Meetings 8/25: Town Notif. of UI Conting. Plans 8/25- Safety training for fire departments 				8/25-26 UI News Release: Storm & Outage 8/25-26 UI Conducts radio/Print/TV interviews			8/27: Outbound Calling for Medical Hardship Customers
	Storm P Irene Predicted to Impact UI Mon 8/22 Tue 8/25: Towns Notified for 4-7 Day Outage 8/25: M Pre-Ste 8/25: Town Notified	Predicted to Impact UI Mon 8/22 Tue 8/23 8/25: Towns Notif. to P for 4-7 Day Outages 8/25: Muni. Pre-Storm P 8/25: Town Notif. of U	Storm PlanOpen Impact & Damage PredictedPredictedPrediction Developedto Impact UIDevelopedMon 8/22Tue 8/23Wed 8/248/25: Towns Notif. to Plan for 4-7 Day Outages8/25: Muni. Liaison at EOC Pre-Storm Prep Meetings8/25: Town Notif. of UI Conting. Plans	Ul ActivatesStorm PlanOpenCreStorm PlanImpact & AvailIreneDamagePredictedPredictionto Impact UIDevelopedMon 8/22Tue 8/23Wed 8/24Thu8/25: Towns Notif. to Planfor 4-7 Day Outages8/25: Muni. Liaison at EOCPre-Storm Prep Meetings	Of Activates Storm PlanOpen Impact & AvailableIrene PredictedDamage PredictionOn Impact UIDevelopedMon 8/22Tue 8/23Wed 8/24Thu 8/258/25: Towns Notif. to Plan for 4-7 Day Outages8/28/25: Muni. Liaison at EOC Pre-Storm Prep Meetings8/28/25: Town Notif. of UI Conting. Plans	UI Activates Storm PlanStorm Center OpenCall No CrewsAcquire KCP&L Line AvailableIrene PredictedDamage Prediction DevelopedAnd Lewis Line Clearance CrewsImpact UIDevelopedInterfection CrewsMon 8/22Tue 8/23Wed 8/24Thu 8/258/25: Towns Notif. to Plan for 4-7 Day Outages8/25-26 UI News Release: Storm & Ou 8/25: Town Notif. of UI Conting. Plans8/25-26 UI Con radio/Print/TV	UI Activates Storm PlanStorm Center OpenCall No CrewsAcquire KCP&L Line CrewsState EOC StormIrene PredictedDamage Prediction o Impact UIDamage Prediction DevelopedAnd Lewis Line Clearance CrewsComplete Line Clearance CrewsMon 8/22Tue 8/23Wed 8/24Thu 8/25Fri 8/26Sat 8/278/25: Towns Notif. to Plan for 4-7 Day Outages8/25: Muni. Liaison at EOC Pre-Storm Prep Meetings8/25-26 UI News Release: Storm & Outage 8/25: Town Notif. of UI Conting. Plans8/25-26 UI Conducts radio/Print/TV interviews

Irene was an <u>extreme</u> event ...



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Rainfall Map National Weather Service - Eastern Region Hydrometeorological Event Display



Storm Severity:

- 3-6" of rain
- Wind gusts > 60 mph (2 am to 2pm Su.)

Severity of Irene

Tidal Flooding

Communications During the Event:

- Storm updates every few hours to Selectman/Mayors/Legislators and EOC Directors. The Company began using social media to disseminate information.
- Multiple news releases per day:
 - Status of electric system
 - Updates on restoration progress and goals.
- UI personnel gave 106 separate interviews with electronic, print, radio and television outlets – local, regional and national.

Damage Across UI's Electric System

... and the damage to the electric system was also <u>extreme</u>.

Damage:

 263 circuits w/ outages

ONDIMICS CONTRACTION

- 10,300 locations worked by crews
- 9,700 locations visited to assess damage
- 158,000 peak customers out



UI's Distribution System Outages* (UI's System: 443 circuits, 3,275 miles of O/H lines)

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Damage – An Example in One Town



UI's Distribution System in Fairfield

(Fairfield is served by numerous circuits - see colors above)



Damage in Fairfield:

- 570 interrupting devices reported open (circuit breakers, fuses, transformers)
- Each may have required 1 or more work locations to resolve.

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Damage – One Circuit, in One Town



Damage On One Circuit:

- In Eastern Fairfield
- Circuit 2686
- 70 Isolating devices reported open
- 113 work locations

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Damage – Single Locations



Example:

- Ferncliff Rd., Fairfield, CT
- Pole down
- Electric wires down
- Phone/Com wires down
- UG service to house damaged



Example:

- Catamount Rd., Fairfield, CT
- In addition to the damage ...
- Note how completely the tree canopy blankets the area.

Damage – Single Locations





- Substations affect large numbers of customers
- Permanent damage limited, but ...
- Impractical to work in station during the event (if that had been necessary)

Examples:

- Peak of storm roughly coincidental with high tide.
- Extensive flooding at two substation properties
- One of two flooded substations taken off line as a precautionary measure.
- Put back in service quickly



Assessment & Commencement of Repair

Assessment is critical ... and was performed exceptionally quickly ...

A DIVIERS OF STORATION



Sun.	Mon.	Tues.	Weci.	Th.
8/28	8/29	8/30	8/31	9/1

... It must be complete to:

- Identify quantity, location, nature of work
- Assign resources efficiently
- Provide information, predict restoration times

Much of the work required extensive coordination both within the company and among companies

Approximately **9,700 locations** were investigated by damage assessment crews

Example - Replace Broken Pole:

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Approximately **10,300 locations** were visited by overhead line crews, line clearance crews, and service crews

Communications – Irene Performance, Future Objective

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The ultimate objective: provide accurate status & predictions earlier ... both to government leaders and individuals.

Process / Information Disseminated	Su, 8/28	I)+1 \/I	D+2 T	D+3 W		D+4 F	D+5 Sa	D+6 Su
Damage Assessment								
Global Outage Predictions								
# of Outages by Town								
% Outages by Town								
# of Crews								
Location of Crews by Town	ана ан							
Daily Restoration by Town								
Street Locations, Daily Predictions		<u></u>						
Daily "Glide Path" to Done				ſ			-	
Individual Address/Customer Predictio	ns				1 2002 EXCH 0010			

Customers & government leaders want this to commence sooner, and our customers want us to advise them "we know you're out" so they're not wondering.

Best Practices, Enablers, Plan for the Future

Ultimate Objectives: (1) restore faster, (2) preserve current level of safety, (3) provide earlier, accurate status & predictions to individual

customers & government leaders.

CONTRACTION

	iers a government teauers.	March 2010	Irene	Short Term	Ult. Goal	
		Storm	(Today)	(<1 yrs)	(1-3 yrs)	
CG	Incident Command Structure*		•	V	The second se	
	Pessimistic Storm Damage Predictions*		V		V	-
	State & Municipal Communication Plan*		V	V	- Continues	: .
	Rapid Determination of Global Restoration Times*	~	14.00	· · · · · · · · · · · · · · · · · · ·	Valenteen	
Inabling Technolog (examples)	Optimal Restoration Strategy	V	Mana		Valence	
	Consistent & Correct Communications*		~		V	
	OMS & Call Center Upgrade & Integration		~		V	
	Mobility in Trucks				- Valence	
	Extend Two-Way Meter Deployment		V.		1 martin	
	External Outage Reporting Tools		V		North Contraction	
	Technology Enabled Damage Assessment					

*Included Recommendations from October 2010 Jacobs Report to DPUC

Results and Lessons Learned

Communications expectations are rising – we'll respond.



Outages, % of Peak

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INTERNATION IN

Lessons Learned

- As well as we did, <u>restoration could be shorter</u> <u>if damage can be reduced</u> ...
 - More aggressive tree management
- We <u>didn't always meet the information-</u> <u>expectations</u> of our customers and government leaders ...
 - Need to further develop and add methods & processes for conveying useful information.

Lessons Learned, Continued

- Event revealed <u>some technology</u>related weaknesses.
- We need to continue to improve <u>communication & coordination with</u> <u>towns</u>, especially during the early stages of the event.

Plan, Next Steps

- Conduct customer survey(s)
- Meet with each of our towns/cities
- Complete our after action assessment
- Accelerate UI's technology implementation plans (see slide 14).
 - During future event(s), at completion of the assessment phase, accelerate conversion of results/data to useful information and disseminate more rapidly.