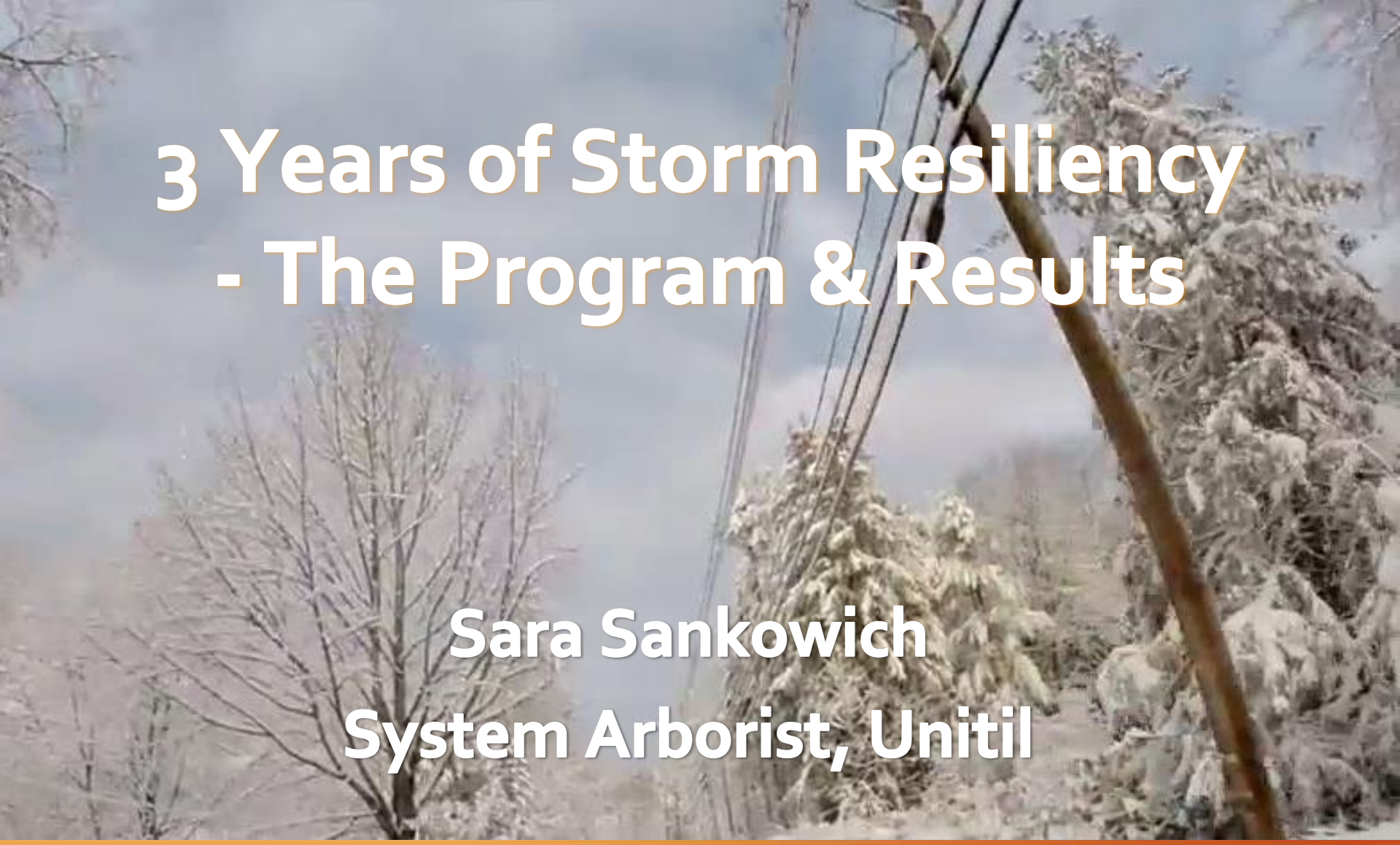

3 Years of Storm Resiliency - The Program & Results

Sara Sankowich
System Arborist, Unitil

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Unitil Overview

- System Overhead Distribution
  - NH ~ 75,000 customers
  - MA ~ 30,000 customers
  - NH ~ 1,180 miles
  - MA ~ 420 miles

Unitil Vegetation Management

- Cycle Pruning – 5 year cycle
- Hazard Tree Mitigation Program
- Mid-Cycle Program
- Forestry Reliability Program
- "Core Work"
  - Customer requests
  - Make-safe jobs
  - Emergency / Trouble work
  - Hot Spot work

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Climate as VM Programs implemented

Increasing frequency and severity of severe storms

- Windstorm – Feb 2010
- Hurricane Irene – Aug 2011
- "Snowtober" – Oct 2011
- Hurricane Sandy – Oct 2012
- Blizzard "Nemo"– Feb 2013
- Severe Thunderstorms -2014
- Heavy Wet Snow – Nov 2015

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Northeast Climate

- Changing customer expectations
- Decreasing tolerance toward outages lasting more than three days
- Increased reliance on technology
- Economic loss in the community drives extreme behavior

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Unitil Response

Storm Resiliency Program (SRP)

- Companion program to VMP
- Select circuits only
- Critical sections of 3 phase only
- Ground-to-sky clearing
- Intensive Risk Tree Assessment & Removal

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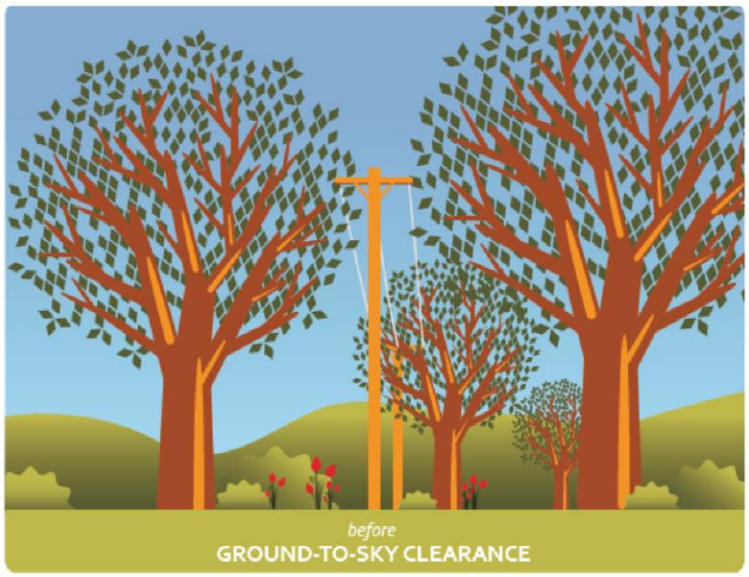
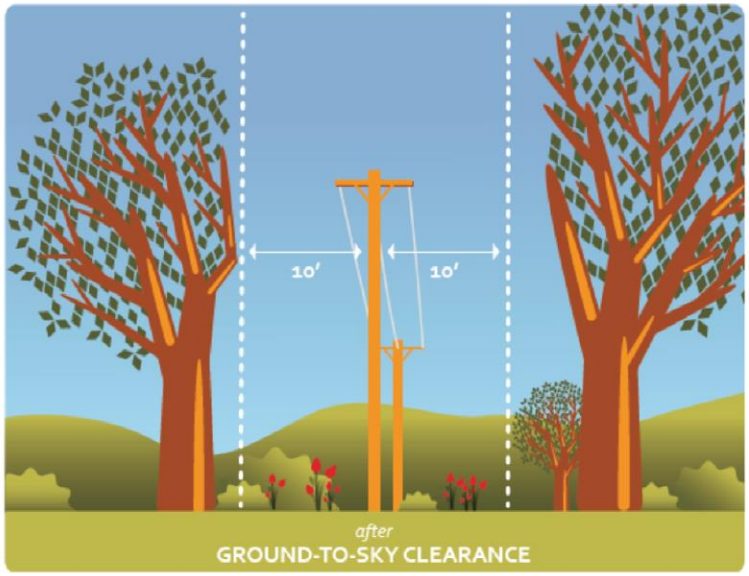
Storm Resiliency – Pilot began May 2012

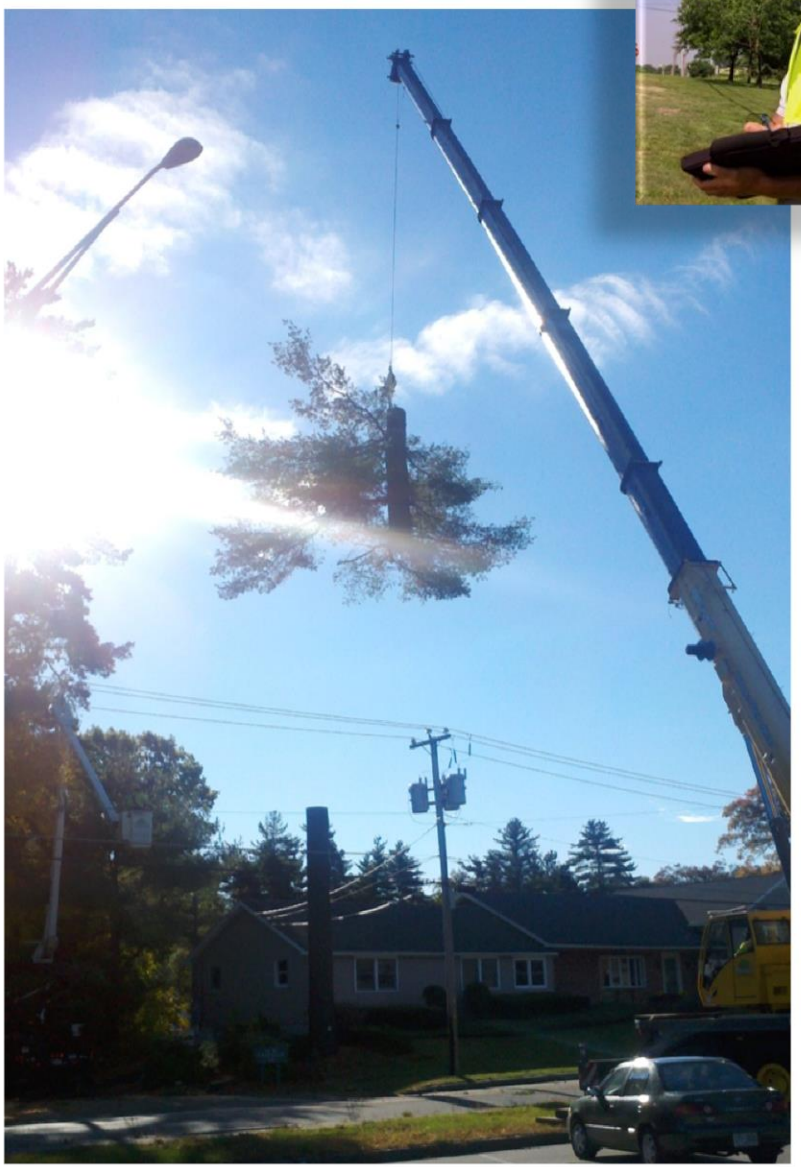
Planning phase – looked at utility and town desires

Fire Departments
Police Departments
Schools
Town Halls

Implementation







Results

Before

After

Results

Before

2015 – 3 Yrs After

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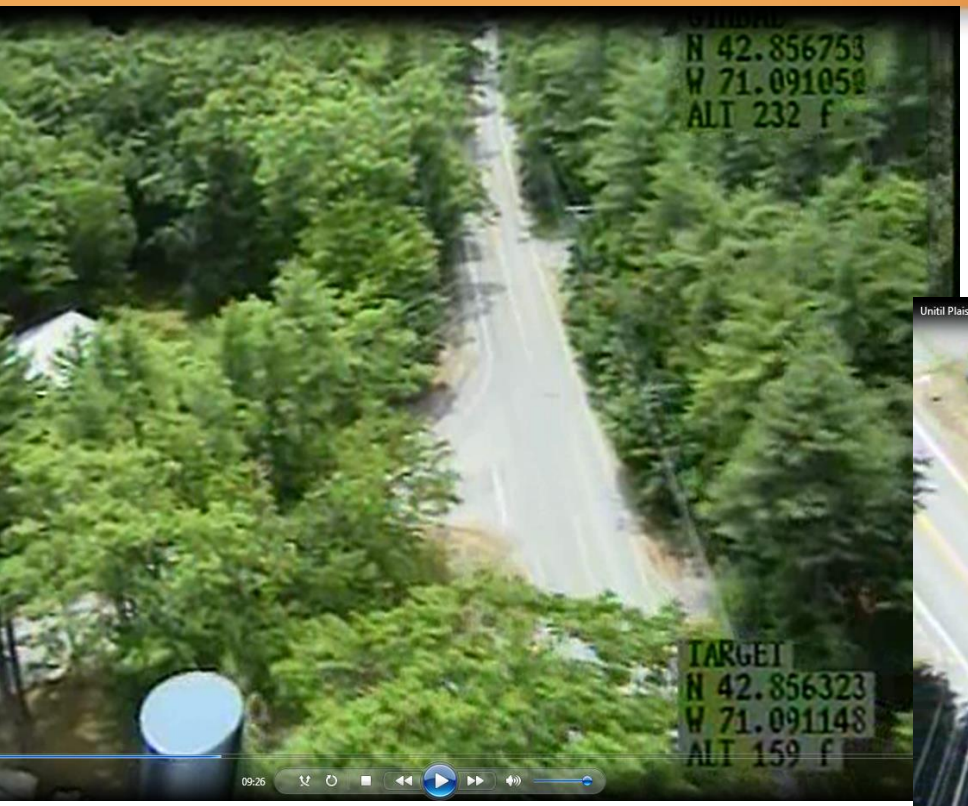
Results – Aerial Video Images



Before

After

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Results – Aerial Video Images

Before

After

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First test of Storm Pilot

- Hurricane Sandy – October 29, 2012 occurred while work being implemented
- *1 of 3 circuits almost complete*
- *1 circuit – tree work just being started (all trees marked for removal)*
- *1 circuit – tree work not yet started*

- *Field Review Immediately after storm passed*

Hurricane Sandy Outcomes

Almost Complete

- No circuit lockout
- 1 tree failure in the resiliency portion
- Tree was in negotiations with customer
- Obtained removal consent after event

Just Started (marked trees)

- Circuit lockout
- 2 tree failures of previously identified hazard trees

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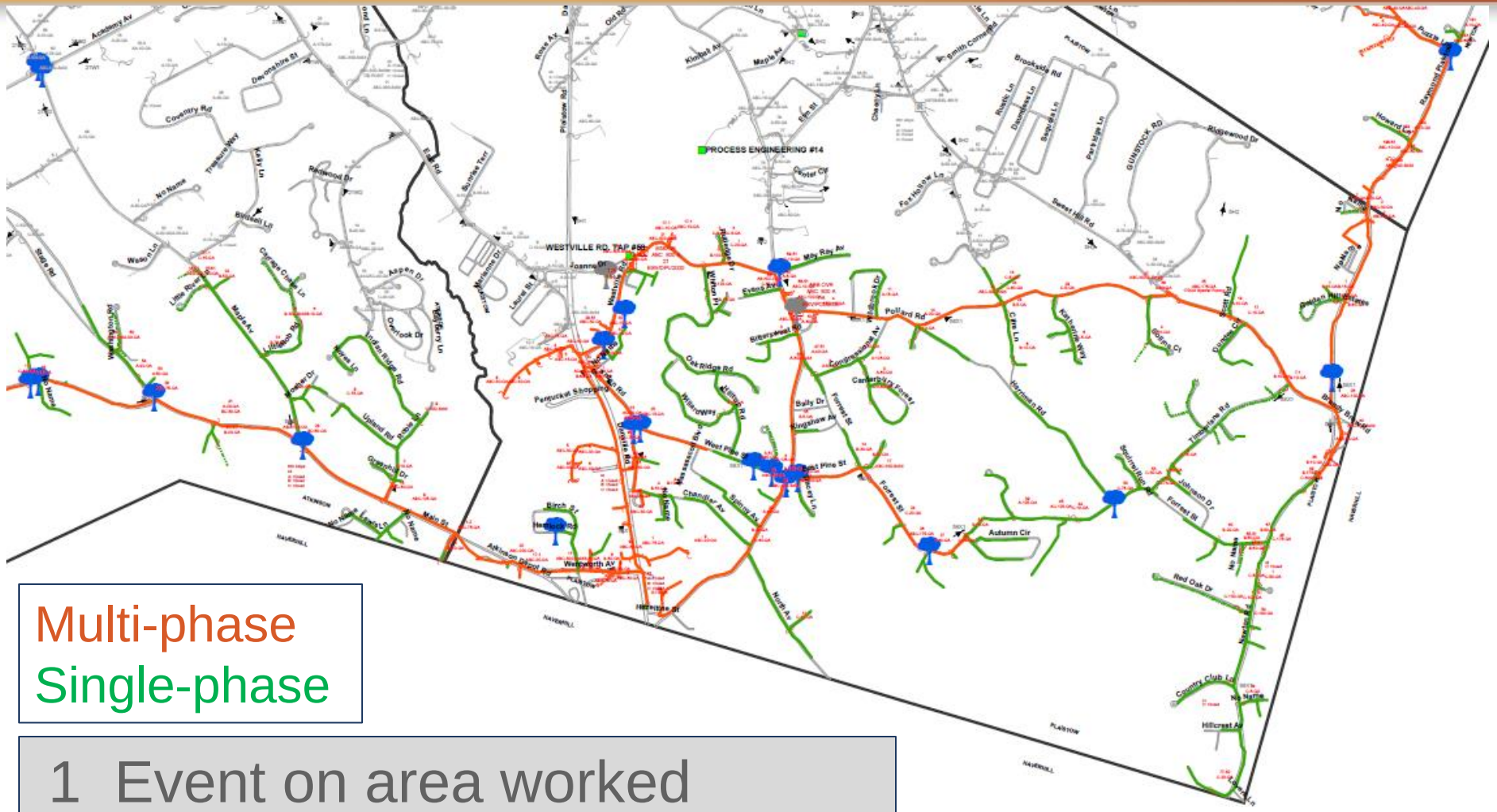
Circuit Specific – Sandy Tree Events

- Comparison of areas with storm pilot program vs. areas without



Multi-phase
Single-phase

1 Event on area worked
18 Events on areas not worked

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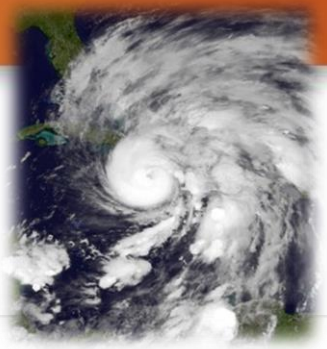
First Test - Customer Perception



Hurricane Sandy – October 2012

t @tgnh 6m

Thanks @Unitil for the intense tree removal in my town recently. I'm sure it's why we did not lose power!

View conversation

"Just wanted to let you know how wonderful it was not to lose power during the hurricane. I believe it was directly attributable to all the tree cutting and trimming Unitil did especially in the Pollard Road and Westville Road area. My husband and I had our home built here thirty seven years ago….this is the **first** big storm that I can remember that power remained on!! I know there is no assurance that this will be the norm but I think you are all striving hard to make it that way. Thanks so much!!" - Plaistow, NH Customer

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Regulatory Approval

- 2nd year of pilot in NH approved for 2013
- Made a case for a permanent program in 2014 which was approved conditionally until the next rate case.
- Formal Storm Resiliency Program (SRP) status.
- MA approved in 2013 rate case proceeding

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SRP Summary

Years: 2012 – 2014 (Massachusetts program began in 2014)

Storm Resiliency Work Details			
Year	**Completed Miles**	**# of Removals**	**Ave Removals per Mile**
2012	14.7	1,685	115
2013	32.3	2,271	70
2014	34.7	2,056	59
2014 (MA)	7.9	490	62
Total	**89.6**	**6,502**	**73**

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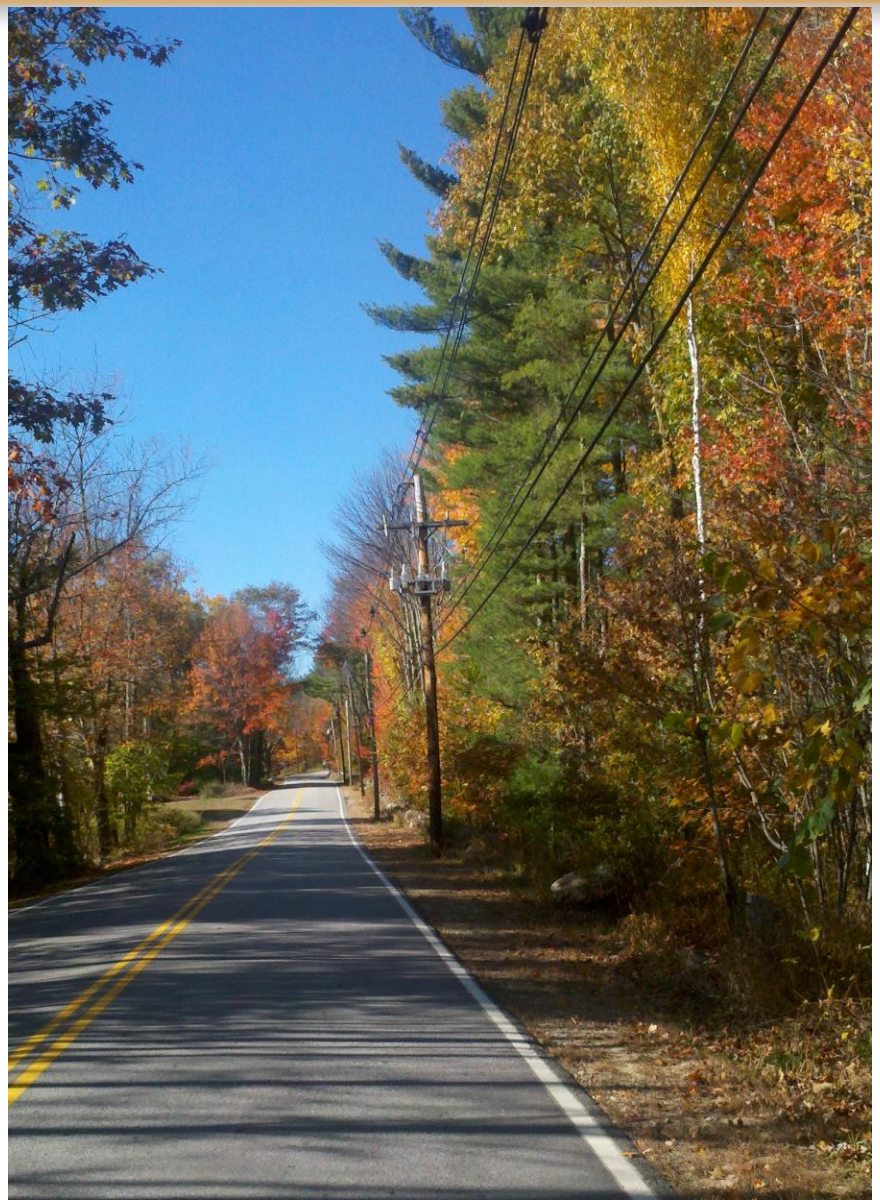
SRP 2013 – Before & After

Bow Bog Rd – Bow, NH



Second Test of SRP

-Thanksgiving 2014 – Heavy Wet Snow

Thursday, November 27, 2014

- Concord, NH area – **76% of customers without power**
- High Definition - Vehicle Mounted Video Capture
- Created a video presentation of the results
- https://youtu.be/rJzwHZmNAxM

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Second Test of SRP

-Thanksgiving 2014 – Heavy Wet Snow

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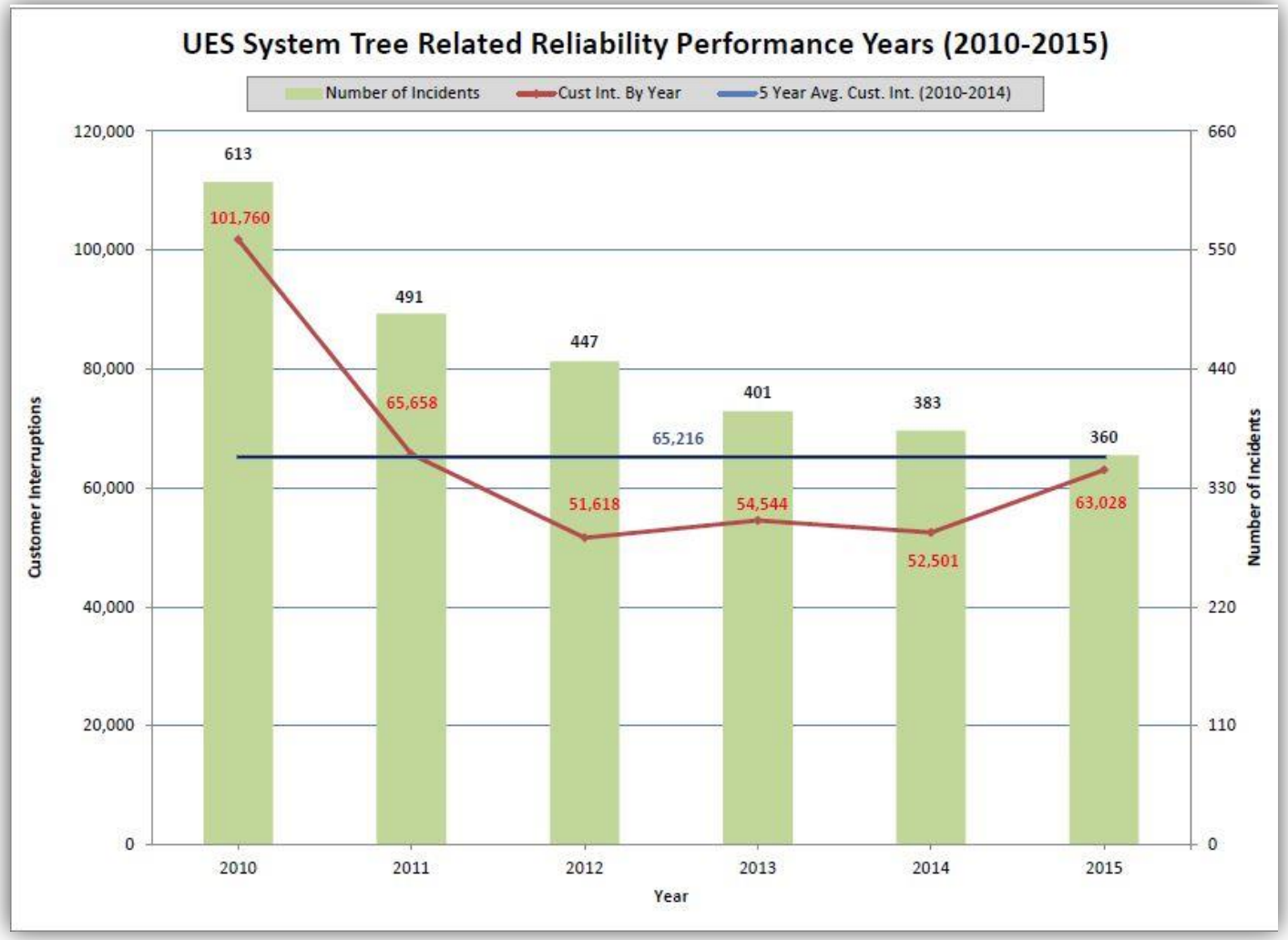
Reliability Results

- System Level

- 5.6 % of system worked through 2014



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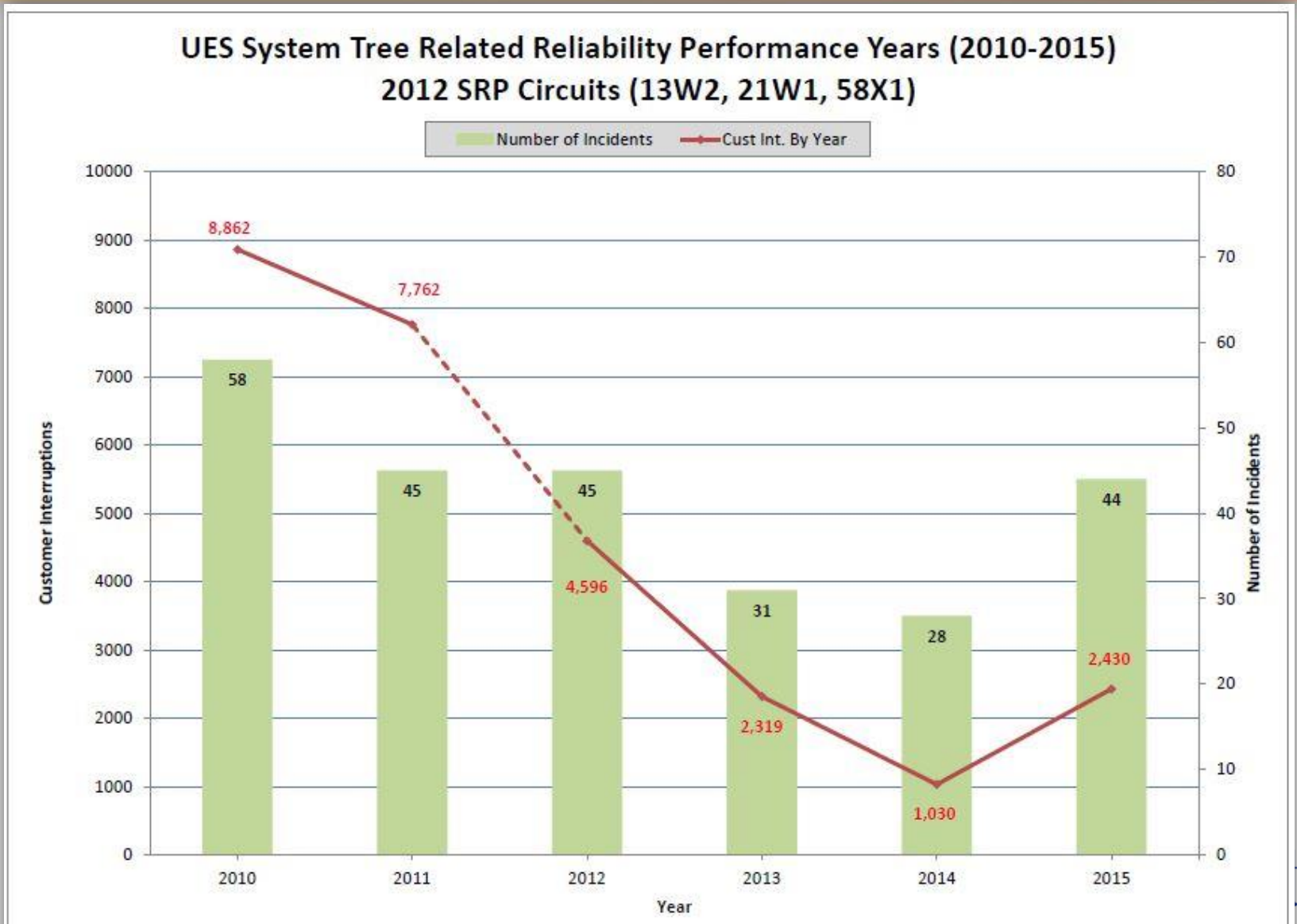
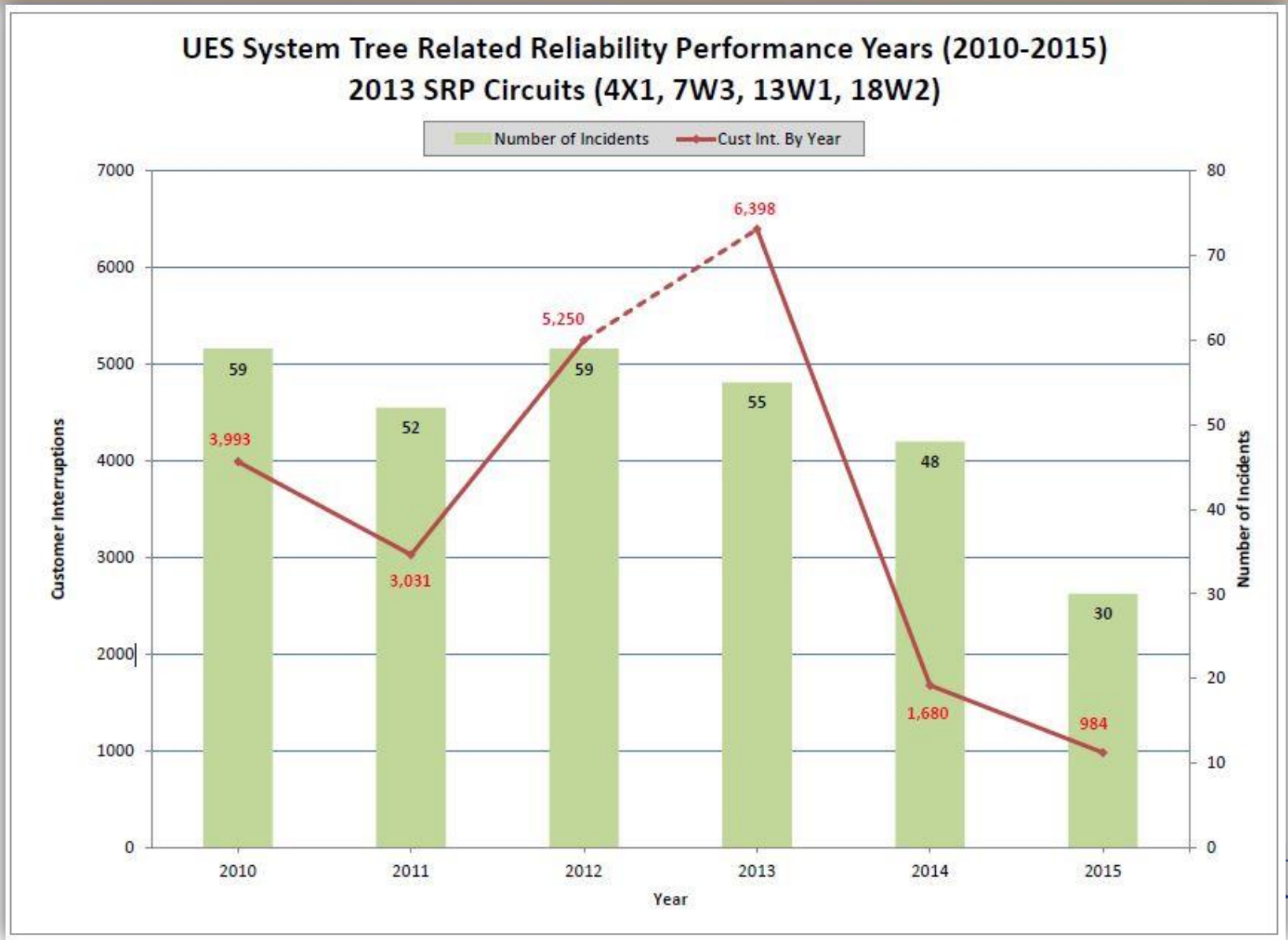
Reliability Results

- SRP Circuit Level



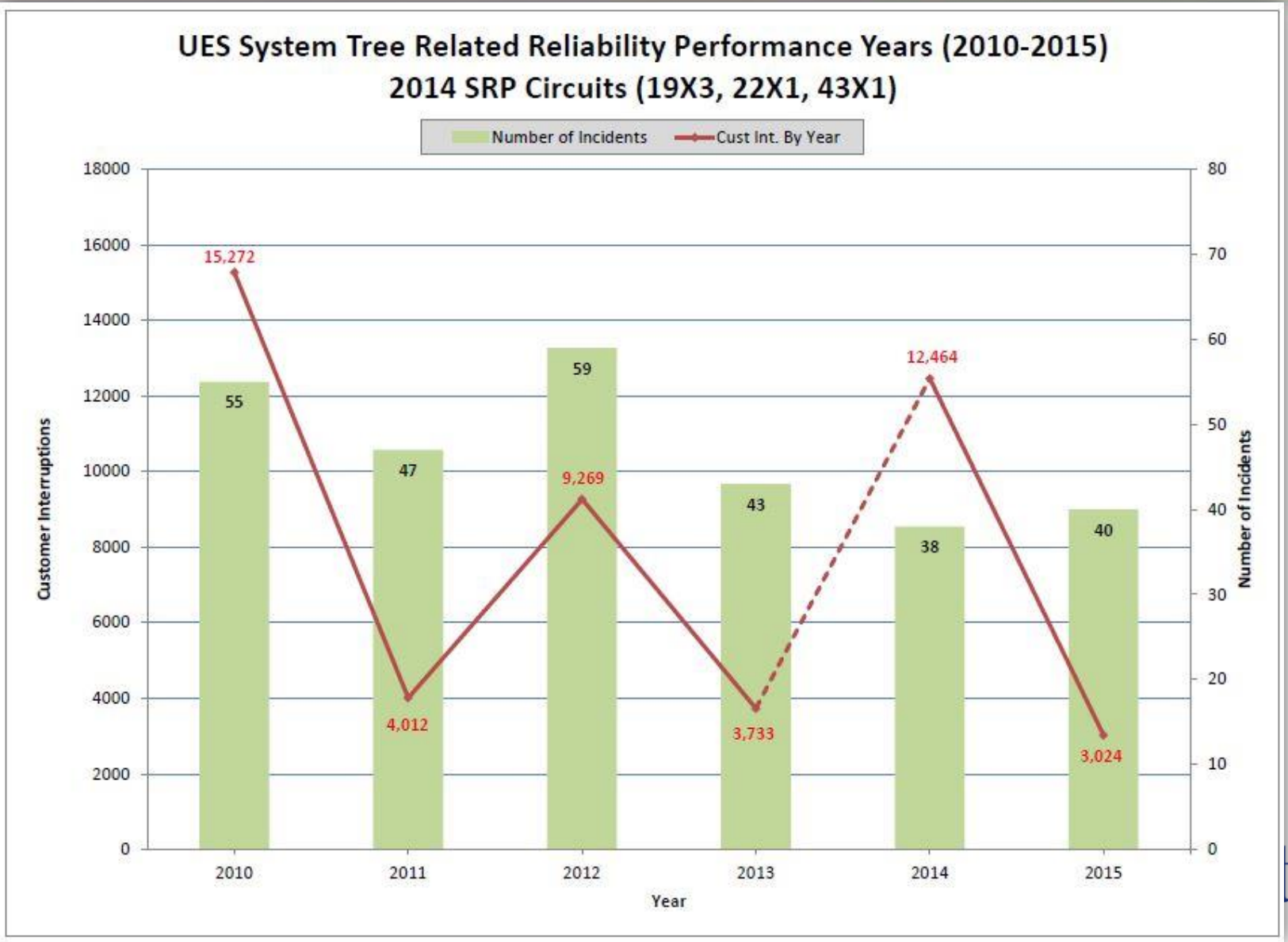
Reliability Results

- SRP Circuit Level



Reliability Results

- SRP Circuit Level



Reliability Results

- Number of Tree Troubles??

- 2012 SRP Circuit Reliability Comparison

(all tree related outage data including major storms 1/1/2013 thru 12/31/2013)

	OH Miles	Outages per OH Mile	Cust-Int per OH Mile
SRP Circuits *	88.41	0.29	20.31
All Other Circuits	1,059.50	0.40	56.49

*E58X1, E21W1, E13W2

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Reliability Results

- Number of Tree Troubles??

- 2012 & 2013 SRP Circuit Reliability Comparison

(all tree related outage data including major storms 1/1/2014 thru 6/30/2015)

	OH Miles	Outages per OH Mile	Cust-Int per OH Mile
SRP Circuits*	213.09	0.75	93.12
All Other Circuits	953.21	0.79	143.51

*E58X1, E21W1, E13W2, C13W1, C18W2, C4X1, C7W3

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SRP Results

Conclusion – Success!!!

How we measured success…

- Customer acceptance of work
- Positive Results in a storm event
- Expected continuation of positive results

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Questions?

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