The United Illuminating Company

UI Electric T & D Utility Exchange Program
(Pakistan Distribution Companies)

September 17 – 18, 2012

UIL HOLDINGS CORPORATION

UI Electric T & D

Utility Exchange Program

(Pakistan Distribution Companies)

The United Illuminating Company

INTRODUCTION

John Prete, Senior Vice President
Electric Transmission & Distribution

Joseph Thomas, Vice President
Electric System Operations &
Client Fulfillment

UIL HOLDINGS CORPORATION

Welcome

The United Illuminating Company

Program Agenda

09:00	John Prete	Welcome Introduction, Program Overview
		Overview of United Illuminating Company
09:15	Joe Thomas	• History • Assets • Service Territory • Customer Base
09:45	Walt Booker	• Safety *(Safety Rule Book, Industry Standards NESC/OSHA)*
		SYSTEM PLANNING PROCESSES & PRINCIPLES
10:15	Chuck Eves	• Organization and responsibilities of planning unit • Staffing, qualifications, and training programs
10:45	Coffee & Tea Break	
11:00	Bob Manning	• Long-term system planning and power requirements
		ENGINEERING AND DESIGN PROCESS
		Engineering and Design Process Overview
11:30	Paul Kranowski	• Overhead & Underground Distribution Design Process & Criteria
11:50	Robin Lyons	• Infrastructure Planning
12:10	Mike Zaffina	• Equipment Design and Construction Standards & Specifications
12:30		Lunch
		System Planning Tools
13:30	Peter Sampiere	• GIS mapping of distribution network
		Protection & Control
14.00	Bob Peligrini	• Protection & Control
14:30	Bryan LaPerle	• SCADA
		Metering & Telecommunications
15:00	Guy Cattaruzza	• Smart Metering • Electricity Losses / Theft – Control Methods

The United Illuminating Company

Program Agenda

15:30	Coffee & Tea Break	
		Infrastructure Planning
15:45	Vincent Brescia	• Live line projects
16:00	Ed DelMonte	• Load reduction / shedding
16:15	Christian Bilcheck	• Transmission System Asset Planning
16:30		**Roundtable Discussion** to Address Questions & Implementation Issues
17:00		Adjourn & Return to Hotel (Dinner with UIL / UI executives)

DAY 4 - TUESDAY, SEPTEMBER 18, 2012: UNITED ILLUMINATING COMPANY

08:30		Delegation meets Andrew Palmateer in hotel lobby for transportation to site visits
Morning		
	Jim Cole / Joe Flach	**Site Visit** **Tour of New Operation complex** **Tour of ESWC, 801 Bridgeport Avenue, Shelton**
	George Becker Ralph Anderson	**Trumbull Substation** **Singer 345KV GIS Substation**
13:00		Lunch
15:00		**Roundtable Discussion** to Address Questions & Implementation Issues
17:00		Adjourn & Return to Hotel
Evening		Executive Time (Potential tour of Yale University)

UI Electric T & D

Utility Exchange Program

(Pakistan Distribution Companies)

The United Illuminating Company

SAFETY

By: Walt Booker, Manager

Safety & Technical Training

UIL HOLDINGS CORPORATION

The United Illuminating Company

Agenda

- Safety Mission Statement
- Safety Philosophy - Principals
- Best Practices
- Incident Investigation
- Safety Audit
- Questions

UIL HOLDINGS CORPORATION

The United Illuminating Company

Safety Mission Statement

The United Illuminating Company is firmly committed to protecting the public and our employees from injury through safety training and awareness programs.

This commitment is accomplished by constructing and operating our equipment and work facilities in accordance with a comprehensive safety program that is consistence with regulations, current technology and sound safety business practice.

UIL HOLDINGS CORPORATION

The United Illuminating Company

UI Safety Philosophy – Safety Principles

The following six safety principles govern UI's approach toward safety and are used in all decisions regarding safety. To achieve continuous safety improvement, all employees, from management to hourly workers, will need to know, understand and accept these principles as the standard reference for a safe work environment.

UIL HOLDINGS CORPORATION

The United Illuminating Company

All injuries can be prevented

- Belief is cornerstone of our safety approach
- Governs our attitude to unsafe acts and conditions
- Establishes responsibility for reporting unsafe conditions
- Causes us to investigate incidents that could have caused injury

UIL HOLDINGS CORPORATION

The United Illuminating Company

Management is responsible for preventing injuries

* Provide tools, equipment and PPE
* Provide safety training
* Hold employees accountable for working safely

UIL HOLDINGS CORPORATION

The United Illuminating Company

All operating exposures can be safeguarded

- UI Safety Manual
- OSHA Regulations
- Operating procedures
- NESC
- Work practices

UIL HOLDINGS CORPORATION

The United Illuminating Company

Training employees to work safely is essential

* OJT
* Enhanced skills training
* Continuous refresher training

UIL HOLDINGS CORPORATION

The United Illuminating Company

Prevention of personal injuries is good business

* Time away from work
* Costs of injuries to the business
* Morale

UIL HOLDINGS CORPORATION

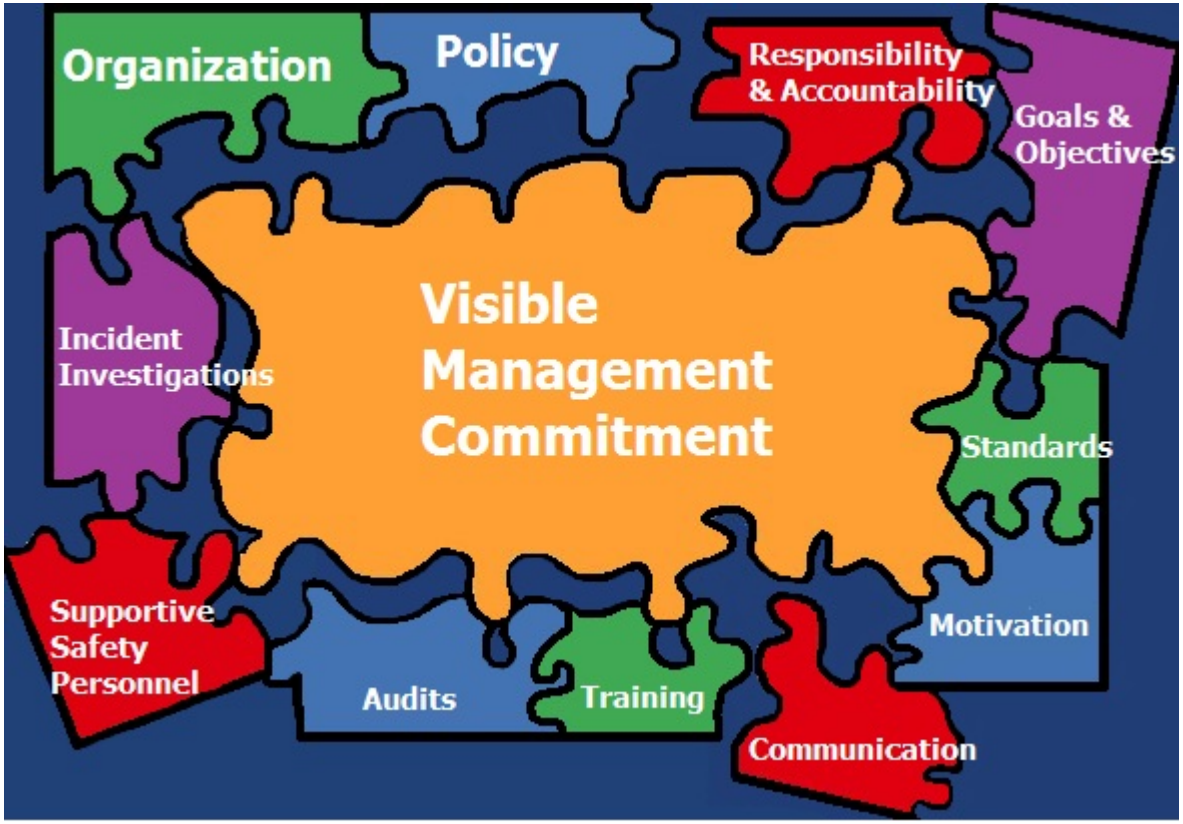
The United Illuminating Company

Working safely is a condition of employment

* Applies to all employees
* Important aspect for assessing employee's work
* Impacts chances for promotions and raises
* Persistent disregard can lead to dismissal

UIL HOLDINGS CORPORATION

Best Practices



The United Illuminating Company

Incident Investigation

* Identifies the root cause of the accident or near miss
* Results are communicated through out the company
* Prevent Recurrence
* Improve Your Management Safety
* Demonstrate Your Commitment to Safety

UIL HOLDINGS CORPORATION

The United Illuminating Company

Safety Audit

- Identifies unsafe acts and conditions before an injury takes place.
- Maintains standards by ensuring that everyone follows the rules and procedures you already have and showing you where your rules and procedures are insufficient.
- Measures the effect of safety education by showing how far it has improved work behavior.
- Reveals weaknesses in the safety program.

UIL HOLDINGS CORPORATION

Safety Audit (cont'd.)

- Motivates supervisors and hourly employees by giving the results of their safety efforts in a clear, measurable form. Supervisors can see where they are going and plot their progress.
- Increases safety awareness.

The United Illuminating Company

UIL HOLDINGS CORPORATION

The United Illuminating Company

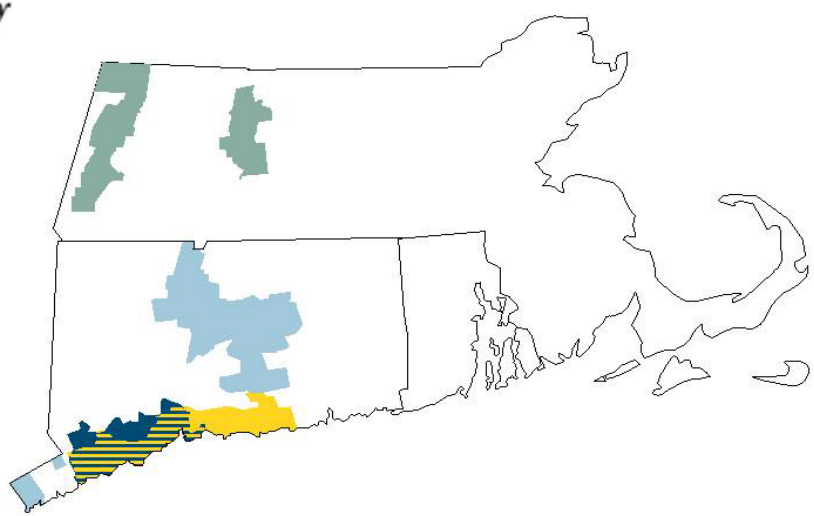
UIL New Headquarters

UIL HOLDINGS CORPORATION

The United Illuminating Company

Assets

UIL Holdings Corporation



The United Illuminating Company

- Territory: 335 sq miles
- ~324,000 customers
- 1,066 employees
- Allowed ’10 Transmission ROE (composite) of 12.52%

Southern Connecticut Gas (SCG)

- Territory: 512 sq miles
- ~173,000 customers
- 324 employees
- 2,269 miles of mains with ~131,000 services

Connecticut Natural Gas (CNG)

- Territory: 716 sq miles
- ~158,000 customers
- 341 employees
- 2,011 miles of mains with ~124,000 services

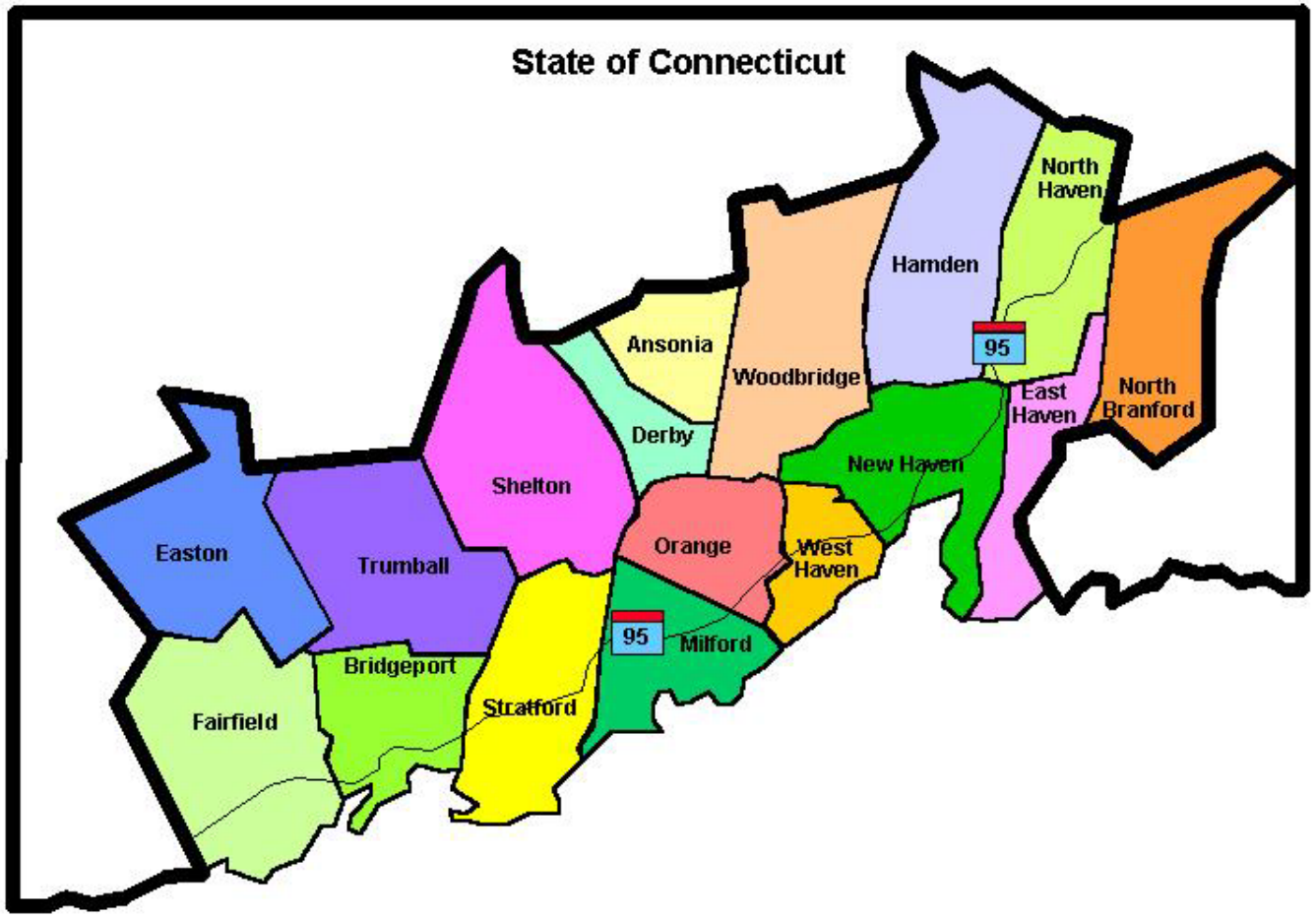
Berkshire Gas Company

- Service territory: 738 sq miles
- ~35,000 customers
- 127 employees
- 738 miles of mains

UIL HOLDINGS CORPORATION

The United Illuminating Company

Service Territory



Service Area Cities

- Bridgeport
- New Haven
- Ansonia
- Derby
- East Haven
- Easton,
- Fairfield
- Hamden
- Milford
- North Branford
- North Haven
- Orange
- Shelton
- Stratford
- Trumbull
- West Haven
- Woodbridge

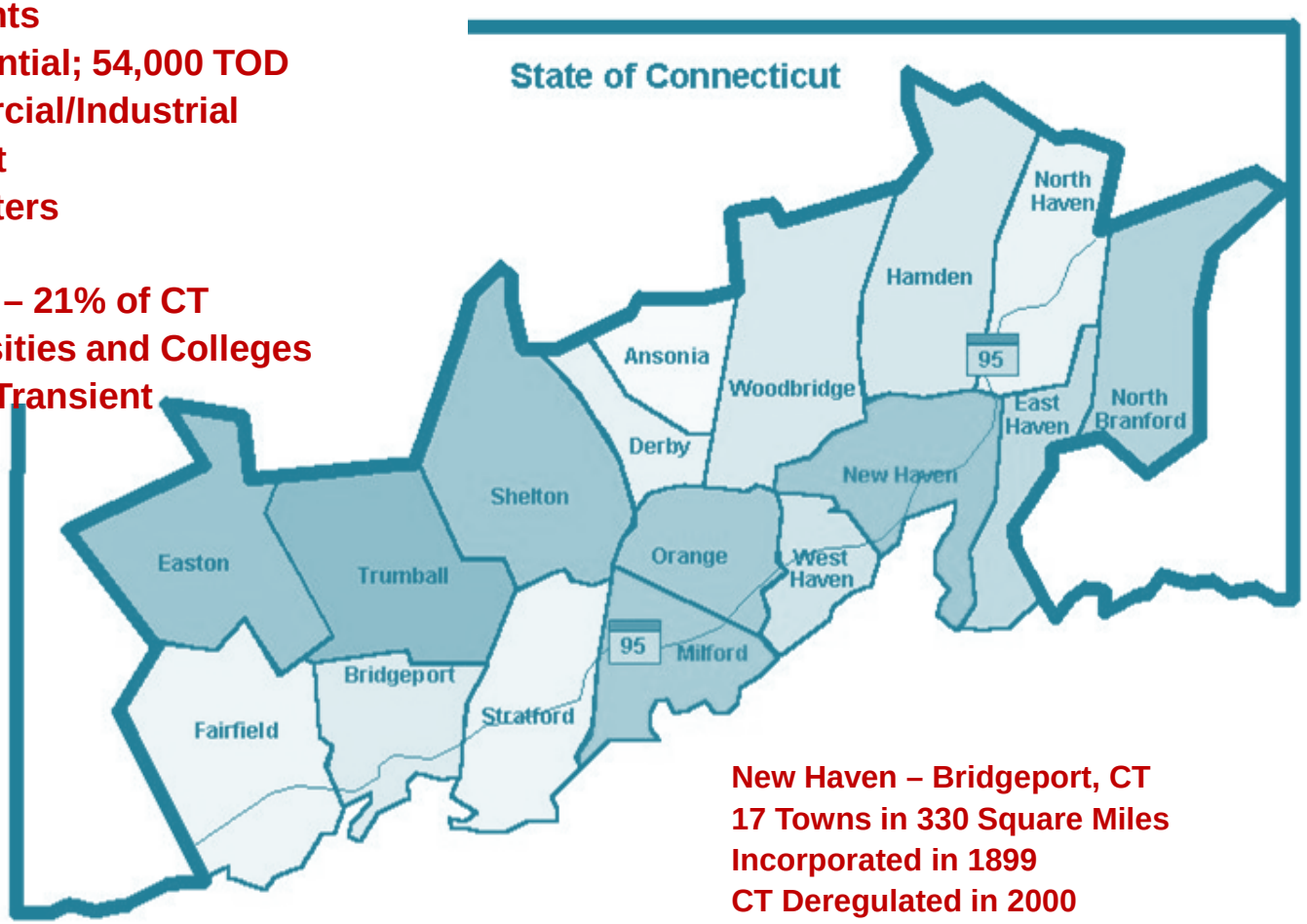
UIL HOLDINGS CORPORATION

The United Illuminating Company

Customer Base

323,000 Accounts
290,000 Residential; 54,000 TOD
31,000 Commercial/Industrial
25% Delinquent
34% Indoor Meters

726,000 People – 21% of CT
7 Major Universities and Colleges
1/3 Population Transient



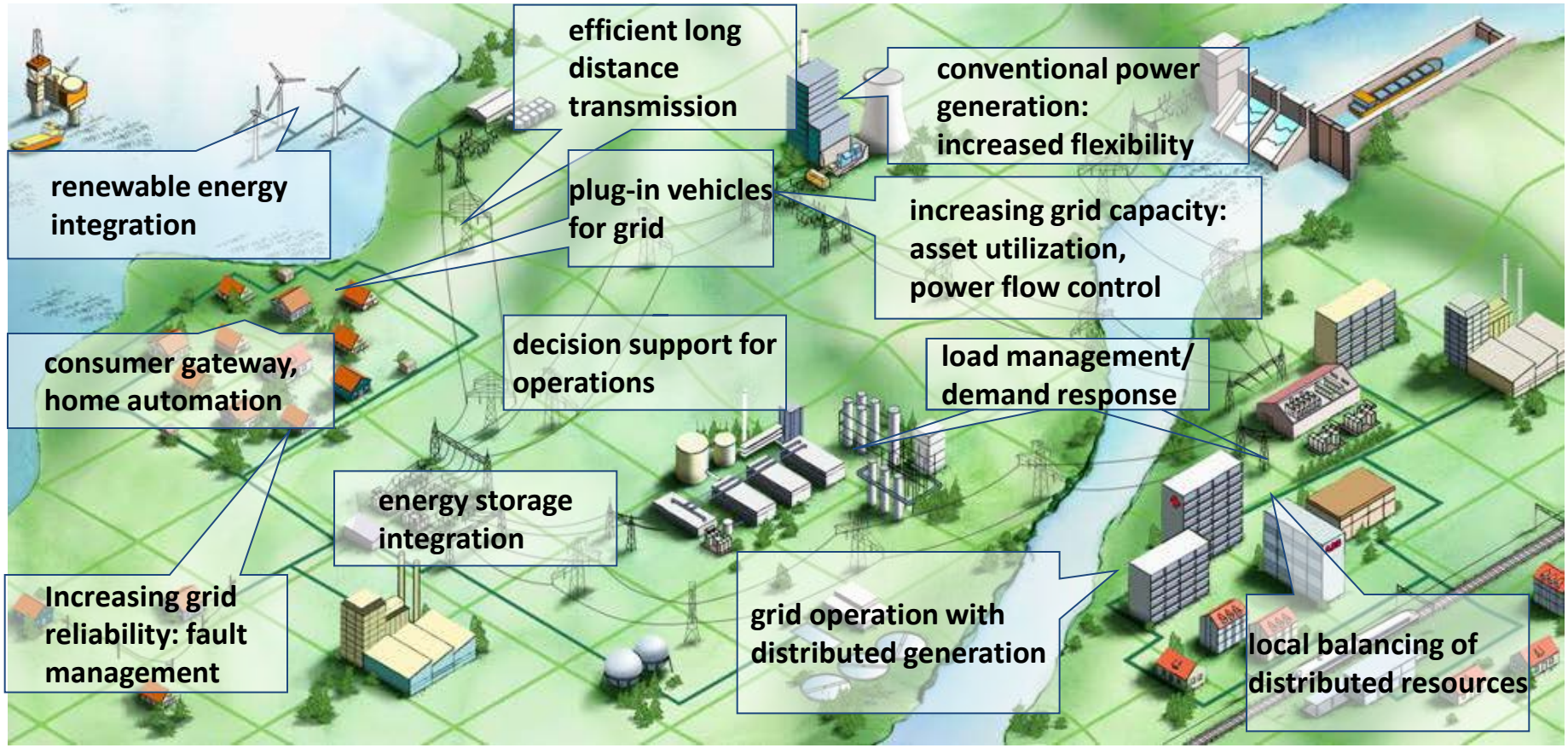
New Haven – Bridgeport, CT
17 Towns in 330 Square Miles
Incorporated in 1899
CT Deregulated in 2000
Wires Only Co. - No Generation

UIL HOLDINGS CORPORATION

The United Illuminating Company

Smart System…

…supports the entire electricity supply chain



UIL HOLDINGS CORPORATION

Multiple Benefits, Various Stakeholders

Smart Grid Benefit	Nature of Benefit		Primary Beneficiary		
	Service	Cost	Customer	Utility	Society
Customer Participation					
Smart meters & home automation	✓	✓	✓	✓	
Accomodation of plug-in hybrid electric vehicles	✓	✓	✓		✓
Facilitation of demand response		✓		✓	✓
System Reliability & Efficiency					
Improved customer service	✓		✓	✓	
Enhanced grid reliability	✓		✓	✓	✓
Optimization of network performance	✓	✓		✓	
Reduce system losses, operating expense		✓	✓	✓	
Asset Utilization					
Equipment monitoring & reduced risk of failure	✓		✓	✓	
Optimization of asset utilization		✓	✓	✓	
Prioritization of system enhancements, repairs	✓	✓	✓	✓	
Environmental Benefits, Renewable Energy, Energy Storage					
Reduced carbon footprint					✓
Wind, solar, biomass integration	✓	✓		✓	✓
Facilitate distributed generation		✓	✓	✓	✓
Enabling micro-grids		✓	✓		

The United Illuminating Company

Our Vision

Partner with: Our Customers and Technology Solution Providers

- Help customers better manage their energy use
- Help to reduce operating cost, Improve Customer service, and meet Energy/Regulatory Market Req’ts

UIL HOLDINGS CORPORATION

The United Illuminating Company

Our Vision

Process Improvement / Technology Integration

Responsive Service

Remote Connect / Disconnect

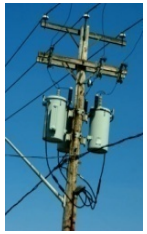
Field Service

SAP

MDMS

Customer

A Commitment to Caring



Outage Restoration

Reliable Service

Customer Presentment

IVR

Payment Options

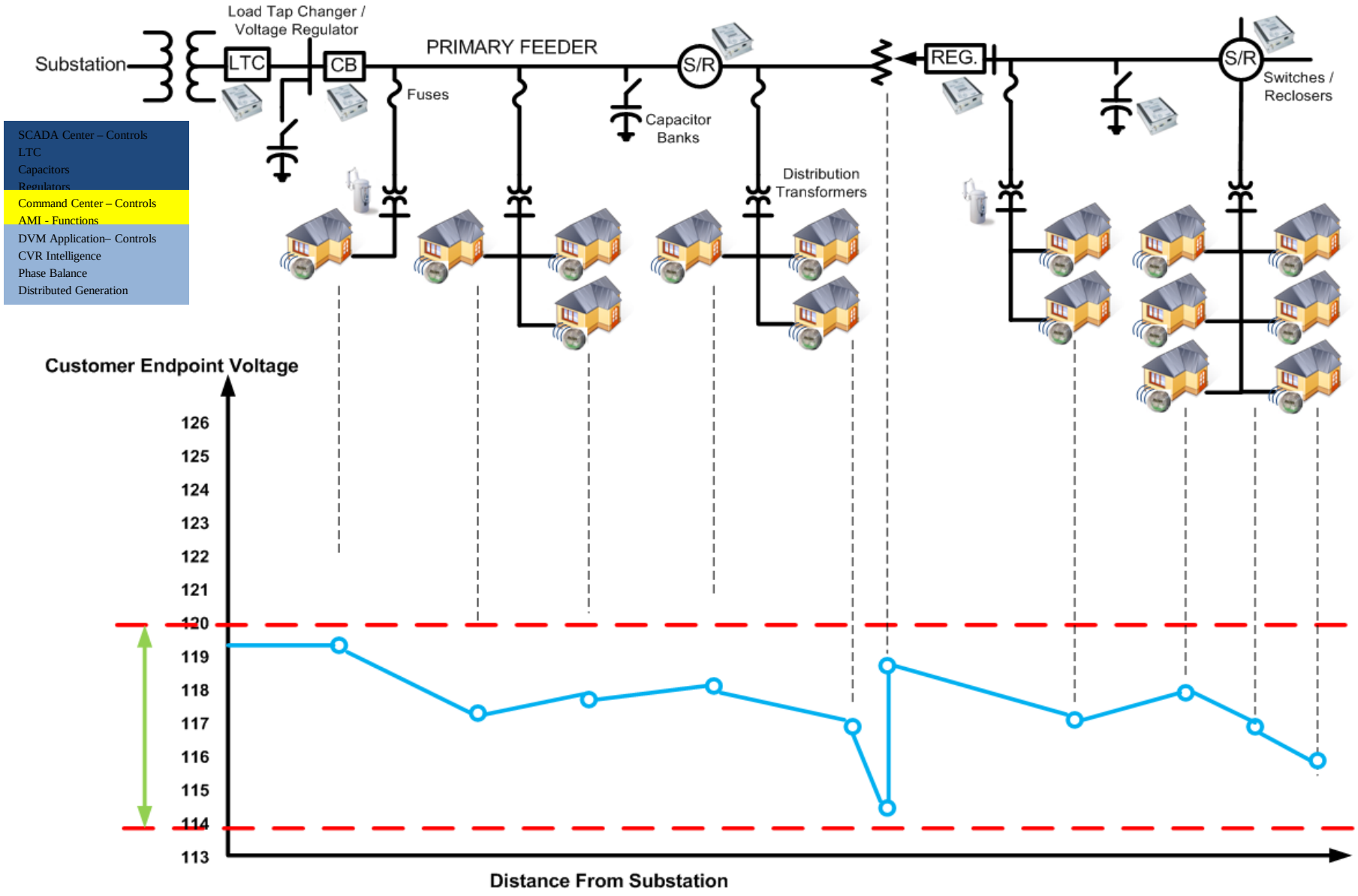
Advanced Mesh Metering

Flexible Service

UIL HOLDINGS CORPORATION

The United Illuminating Company

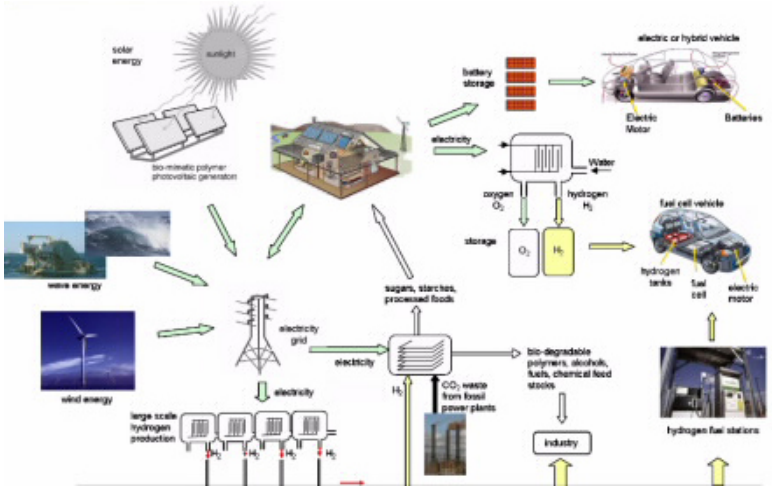
AMI Volt Management



The United Illuminating Company

Load Management

217 Solar Sites



24,000 Water Heater Load Control Devices

1,118 Distributed Generation Sites

75.04 MW Generation

UIL HOLDINGS CORPORATION

Benefits

- Implemented mandatory time-of-use rates
- Remotely Implement Meter Program Changes
- Shifted on-peak time period
- Implemented Net Metering
- Support adaptable and flexible rate and energy management options

Benefits

Avoided 87,000 meter site visits

Avoided over

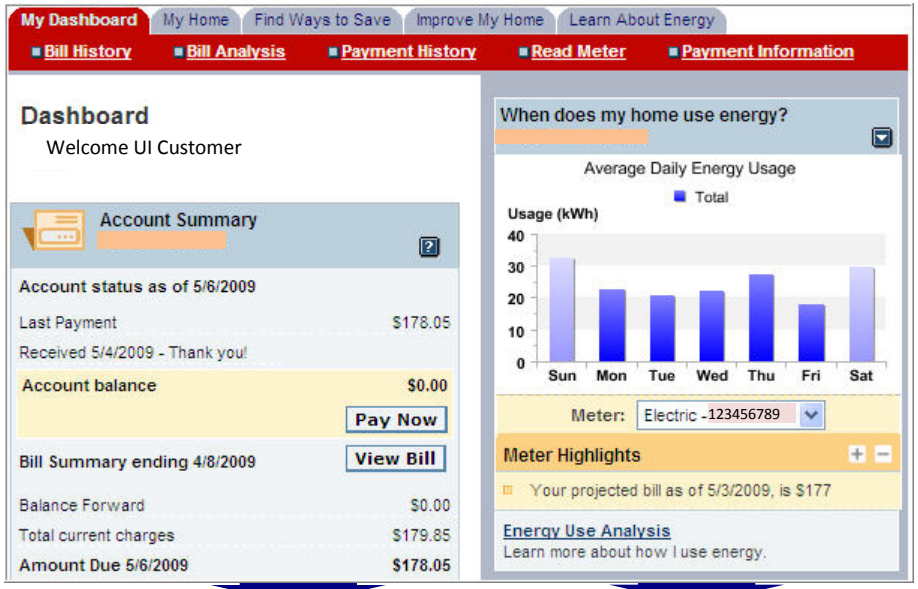
$4 million

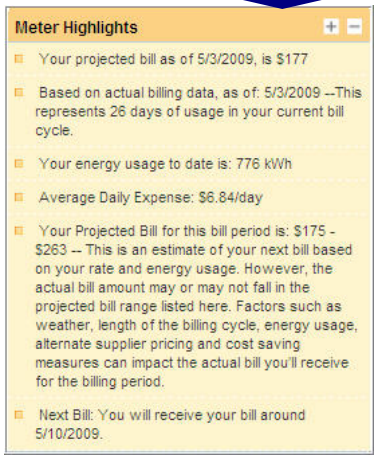
in cost

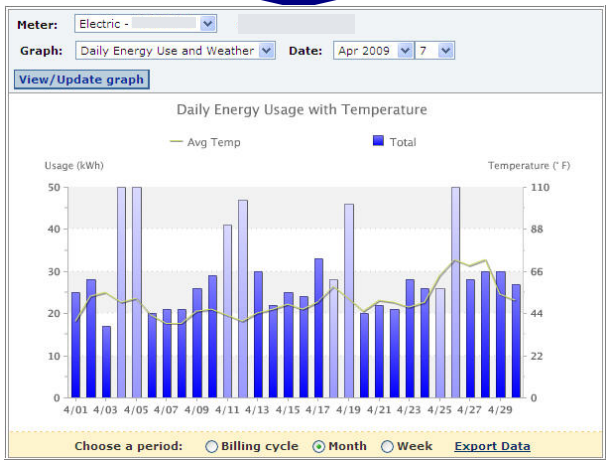
The United Illuminating Company

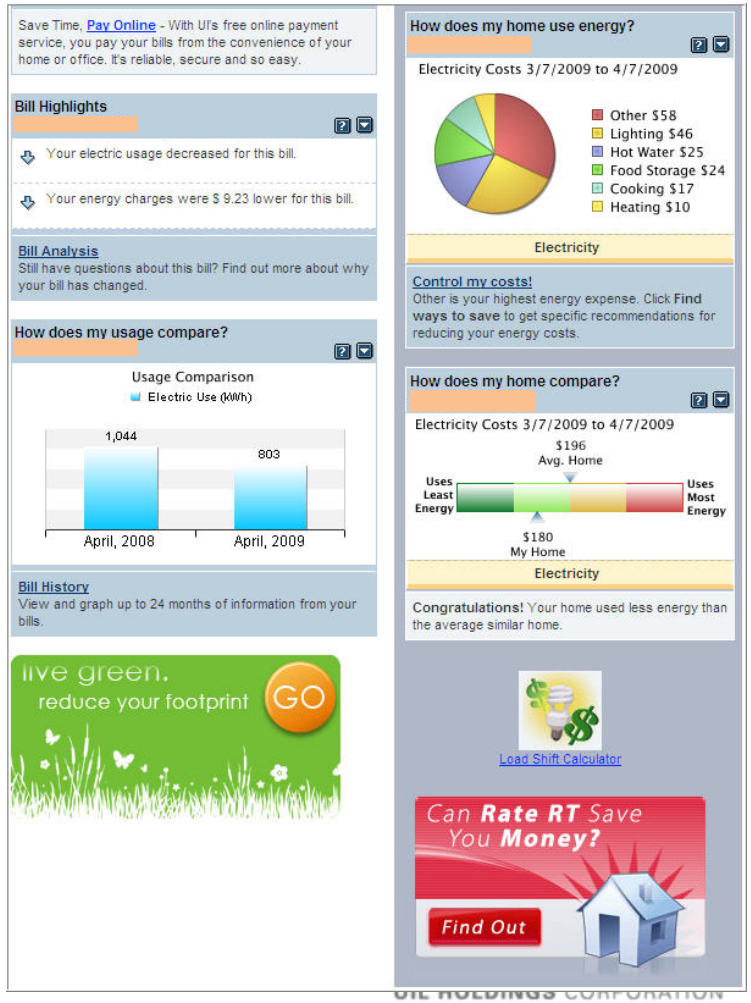
Customer Tools

"My Account" Dashboard





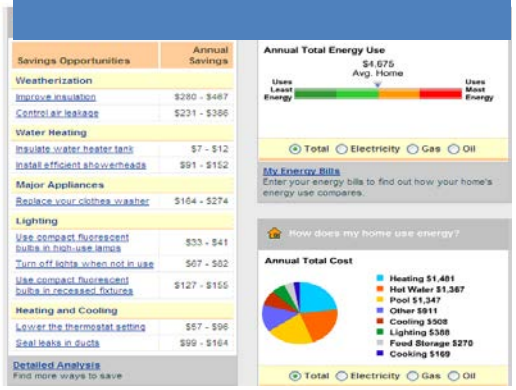




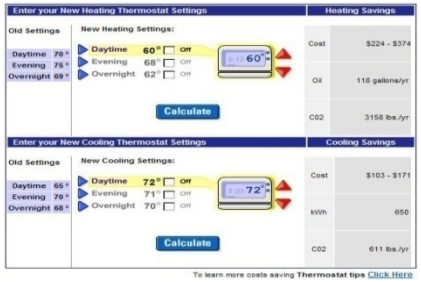
The United Illuminating Company

Customer Tools

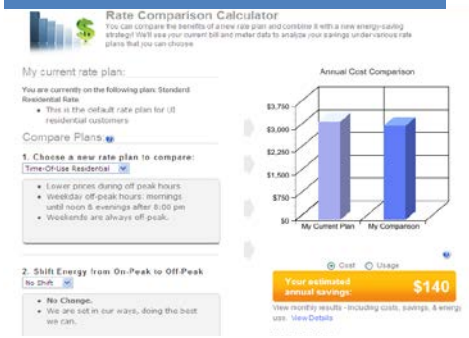
Investment Calculator



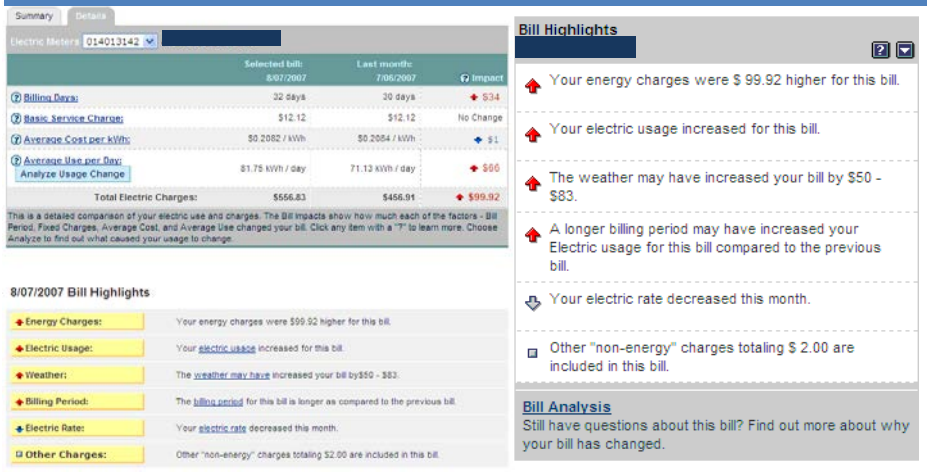
Use Management



Rate Comparison-TOD



Bill Analysis



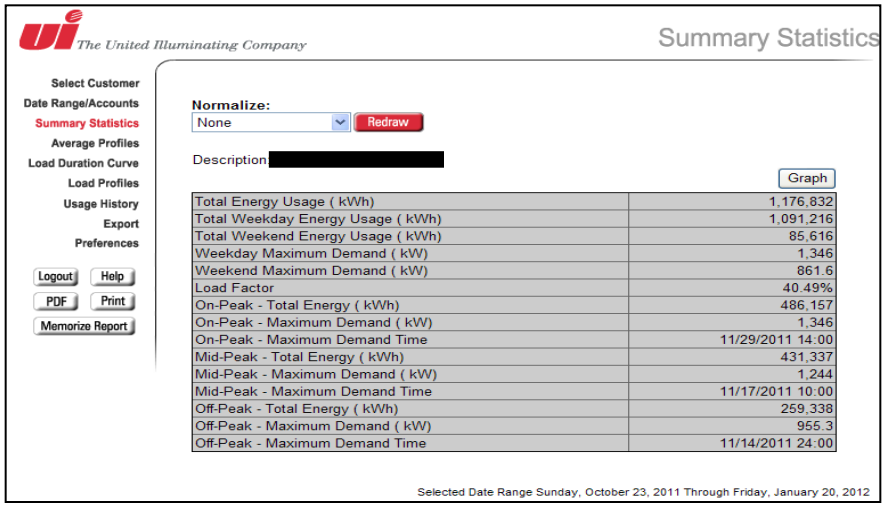
Carbon Calculator

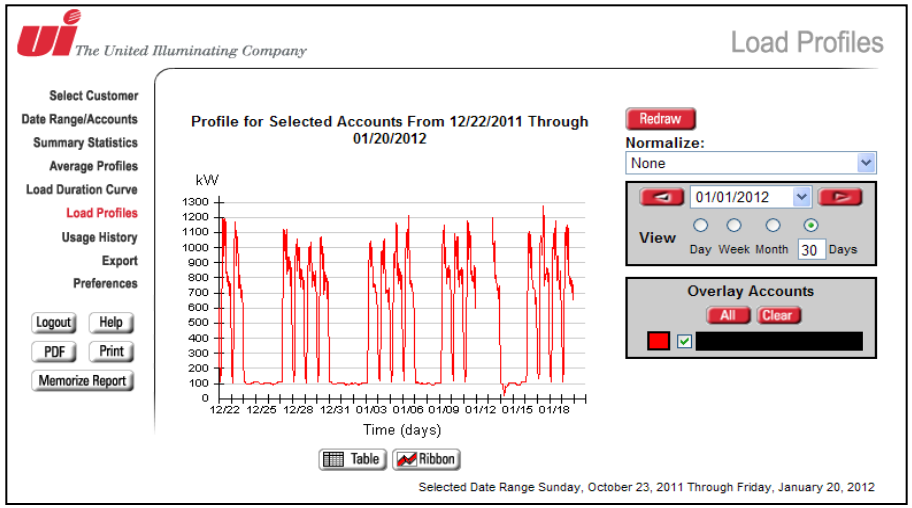
UIL HOLDINGS CORPORATION

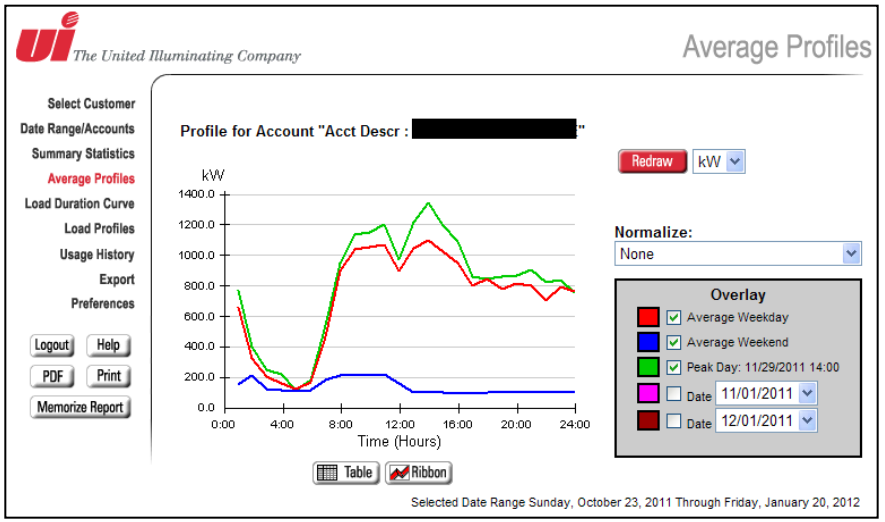
The United Illuminating Company

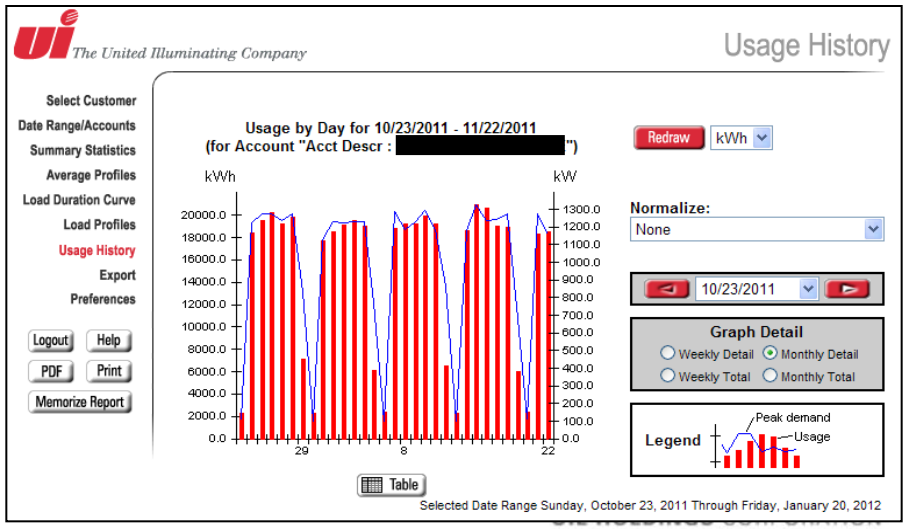
Customer Tools

Energy Profiler Online









Remittance

- EZ Pay Project:
  - Implement bill print, ACH and credit card solution to improve UI's remittance process
  - Mitigate uncollectible risk
  - Provide Smart Technologies to improve customer satisfaction and Reduce Operating Cost
- Business Need:
  - Improve Revenue Cycle Service process
  - Improve Cash Flow
  - Mitigate Uncollectible Risk
  - Improve Customer Satisfaction

Benefits

- Process Improvement
  - Disconnect / Reconnect process
- Multiple payment options
  - Non-enrolled one-time payments
    - Channels - web, IVR, & live agent
    - Payment Types – ACH, Credit, & Debit
  - Enrolled Web Payment
    - Payment Types – ACH only
    - Integration with My Account (Aclara)
  - Soft Post – Near Real-Time SAP Integration
- Implement Bill Print Solution
  - Bill Management
  - Bill Print, Insertion, and Mailing

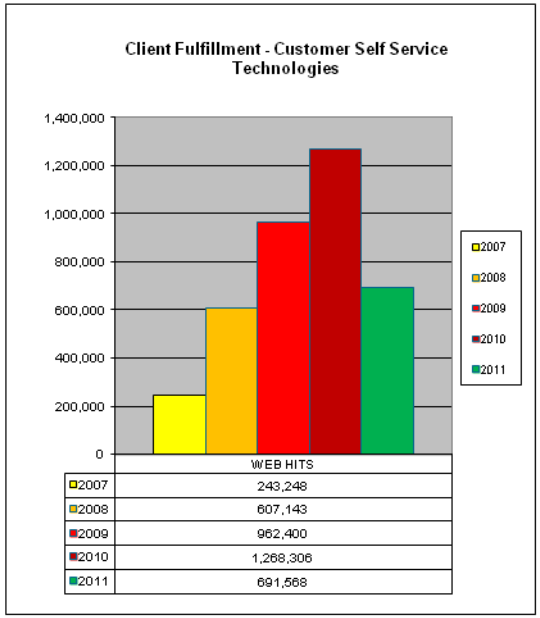
The United Illuminating Company

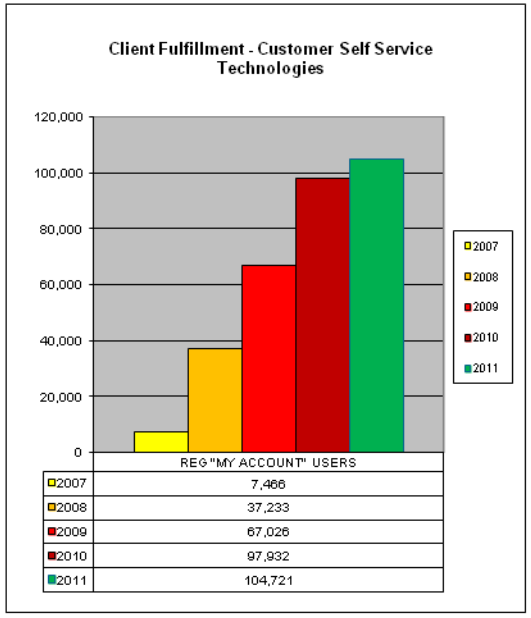
EZ Pay Project

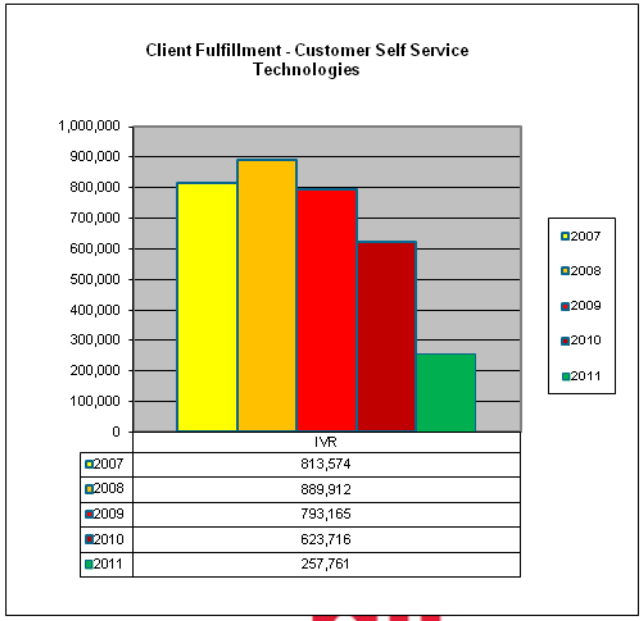
Results

- Utilization of online payment channels
- Increase in registered “My Account” users
- Increase utilization of web/IVR

Online Payments										
Reporting Period: 09/29/2008 - 06/30/2011										
	2008		2009		2010		2011			
Payment Source	Count	Net Amount	Count	Net Amount	Count	Net Amount	Count	Net Amount	Count Total	Dollar Total
IVR	14,948	$4,050,491.51	98,514	$25,567,704.31	135,121	$35,344,180.21	79,517	$19,281,901.92	328,100	$84,244,277.95
Non-Enrolled	4,722	$1,255,491.97	20,992	$5,584,262.81	21,176	$6,964,032.04	8,619	$2,459,799.76	55,509	$16,263,586.58
Enrolled	38,718	$7,113,419.02	283,066	$52,881,569.19	386,114	$71,416,969.56	223,891	$39,201,760.53	931,789	$170,613,718.30
Totals	58,388	$12,419,402.50	402,572	$84,033,536.31	542,411	$113,725,181.81	312,027	$60,943,462.21	1,315,398	$271,121,582.83

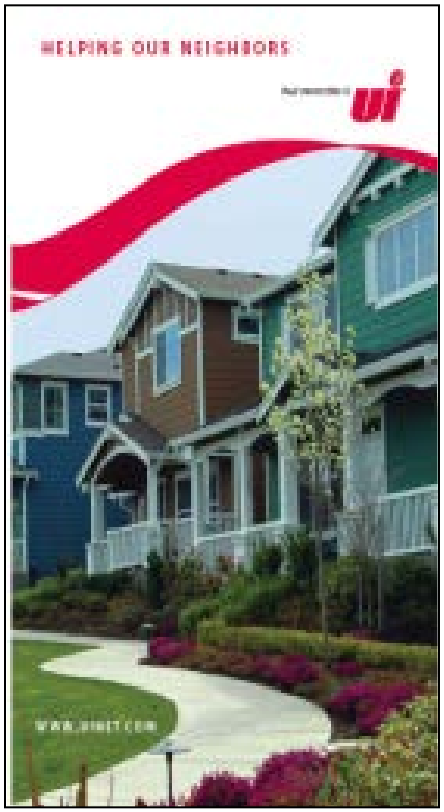






UIL HOLDINGS CORPORATION

2011 Mailing Campaign

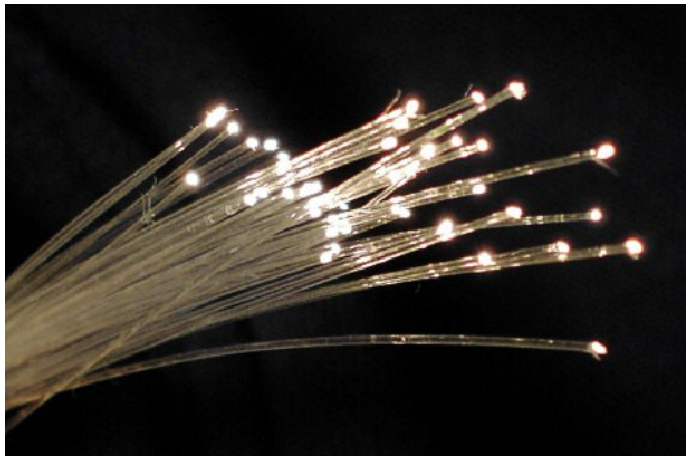


Financial Assistance packages mailed to **20,599** hardship customers

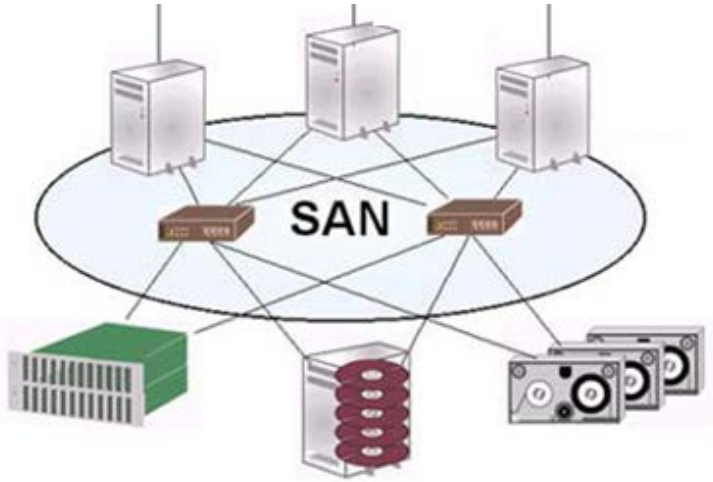
The United Illuminating Company

Technology

Fiber Optics



Storage Area Networks



DataPower Security Appliance

Advanced Mesh Meter Networks

UIL HOLDINGS CORPORATION

The United Illuminating Company

Conservation

Connecticut's Energy Efficiency Programs are funded by a Charge on Customer Energy Bills.

Connecticut Light & Power
The Northeast Utilities System

UIL HOLDINGS CORPORATION

The United Illuminating Company

Residential

- Home Energy Solutions Income Eligible
- Home Energy Solutions Program
- Residential New Construction
- Residential HVAC Incentive Program
- SmartLiving™ Center
- ENERGY STAR® Lighting
- *eesmarts*™

UIL HOLDINGS CORPORATION

Commercial & Industrial Programs

New Construction, Major Renovation & Equipment Replacement

Retrofit Projects & Small Business

Operations & Maintenance Projects

Retro Commissioning

Process Reengineering for Increased Manufacturing Efficiency

Loans & Financing

Load Management

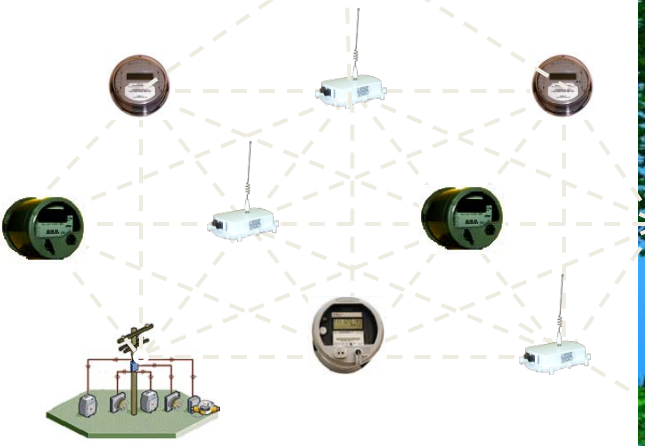
The United Illuminating Company

Energy Management

AMI Host Software

HAN Software

AMI Network



AC Load Control

Direct Load Control

Home Heartbeat ™ Wireless Water Sensor

Home Heartbeat ™ Wireless Contact Switch

InHome ™ Wireless Contact Switch

Partner with Our Customers

helo™
The evolution of power

Help customers better manage their energy use

The United Illuminating Company

Electric Vehicles and Chargers

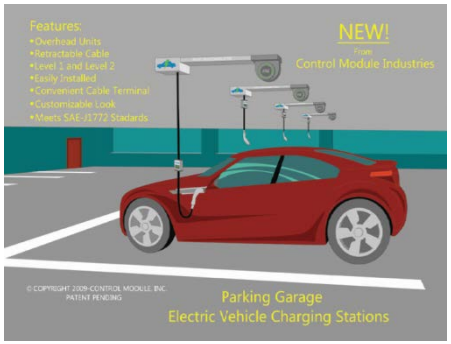
Savings Are Significant
Gas ≈ 11.2 ¢/mi
Electric ≈ 4.3 ¢/mi
Convenience is the key to success

Chevrolet Volt

- Extended Range Electric Vehicle
- 8 kWh battery (usable), 40-mile range
- Charging: 8 hrs at 120V, 12A or 3 hrs at 240V, 15A

- Battery Electric Vehicle
- 24 kWh battery, 100-mile range
- Charging: 20 hrs at 120V, 12A or 8 hrs at 240V, 15A

AeroVironment



CabAire Overhead EVSE

G.E. EVSE

ClipperCreek

The United Illuminating Company

Current Reality

Transformer Load Management

Hourly Meter Reads

Home Energy Management

Customer Notifications

Real Time Pricing

Improved Outage Management

Real Time Energy Cost Presentment

Redesign Billing Statement

Virtual Metering

Integrated Energy Management

Growth in TOU Rates

UIL HOLDINGS CORPORATION

What is SMART

Partnership

Connecticut Department of
ENERGY & ENVIRONMENTAL PROTECTION

UI Electric T & D

Utility Exchange Program

(Pakistan Distribution Companies)

The United Illuminating Company

SYSTEM PLANNING PROCESS & PRINCIPLES

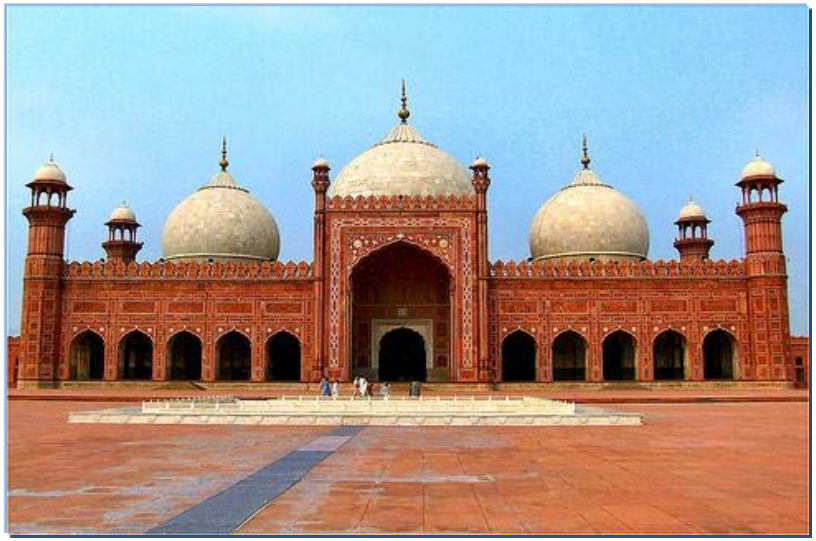
By: Chuck Eves

Sr. Director, Engineering & Strategic Planning

UIL HOLDINGS CORPORATION

The United Illuminating Company

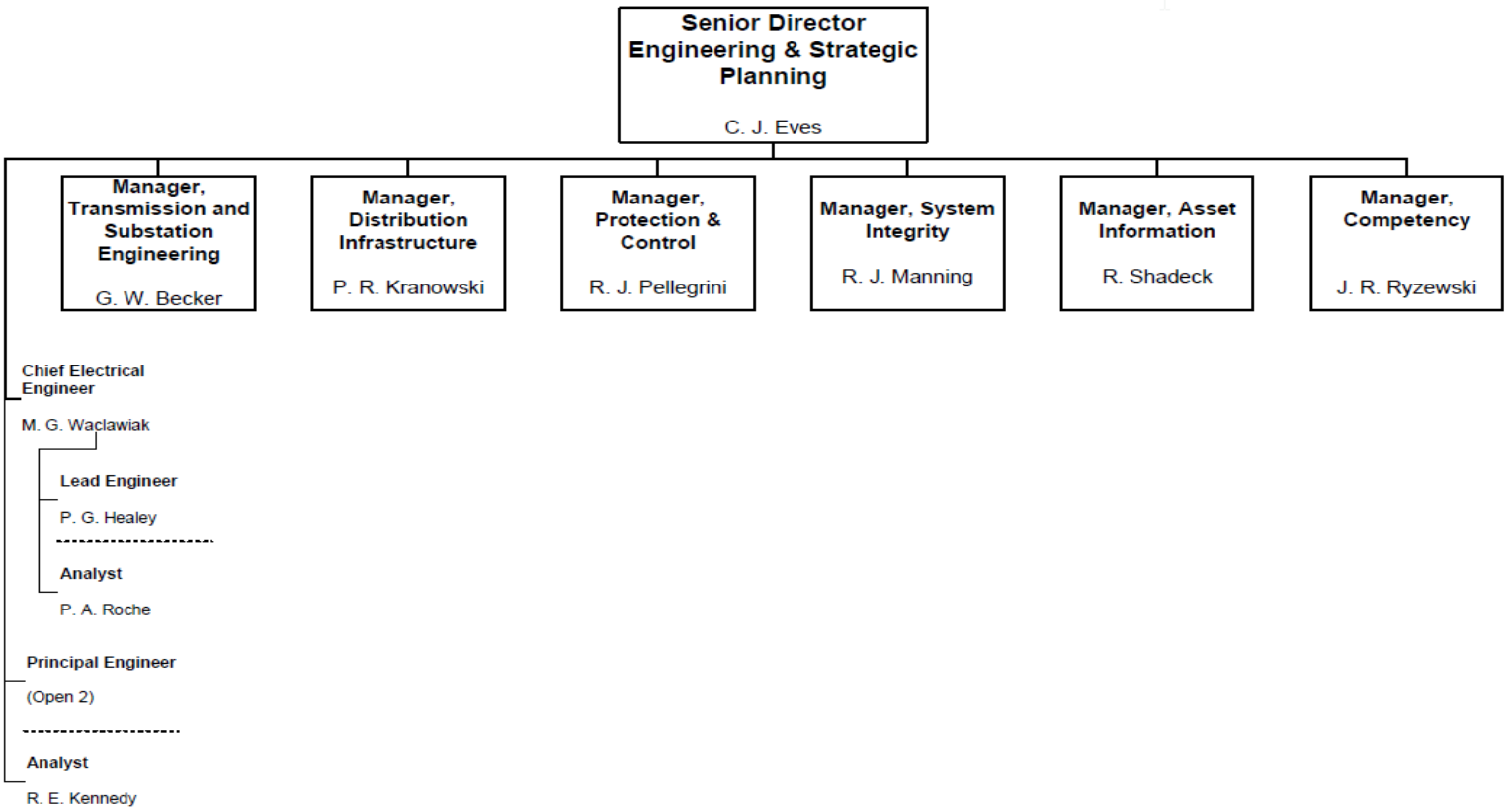
Welcome



UIL HOLDINGS CORPORATION

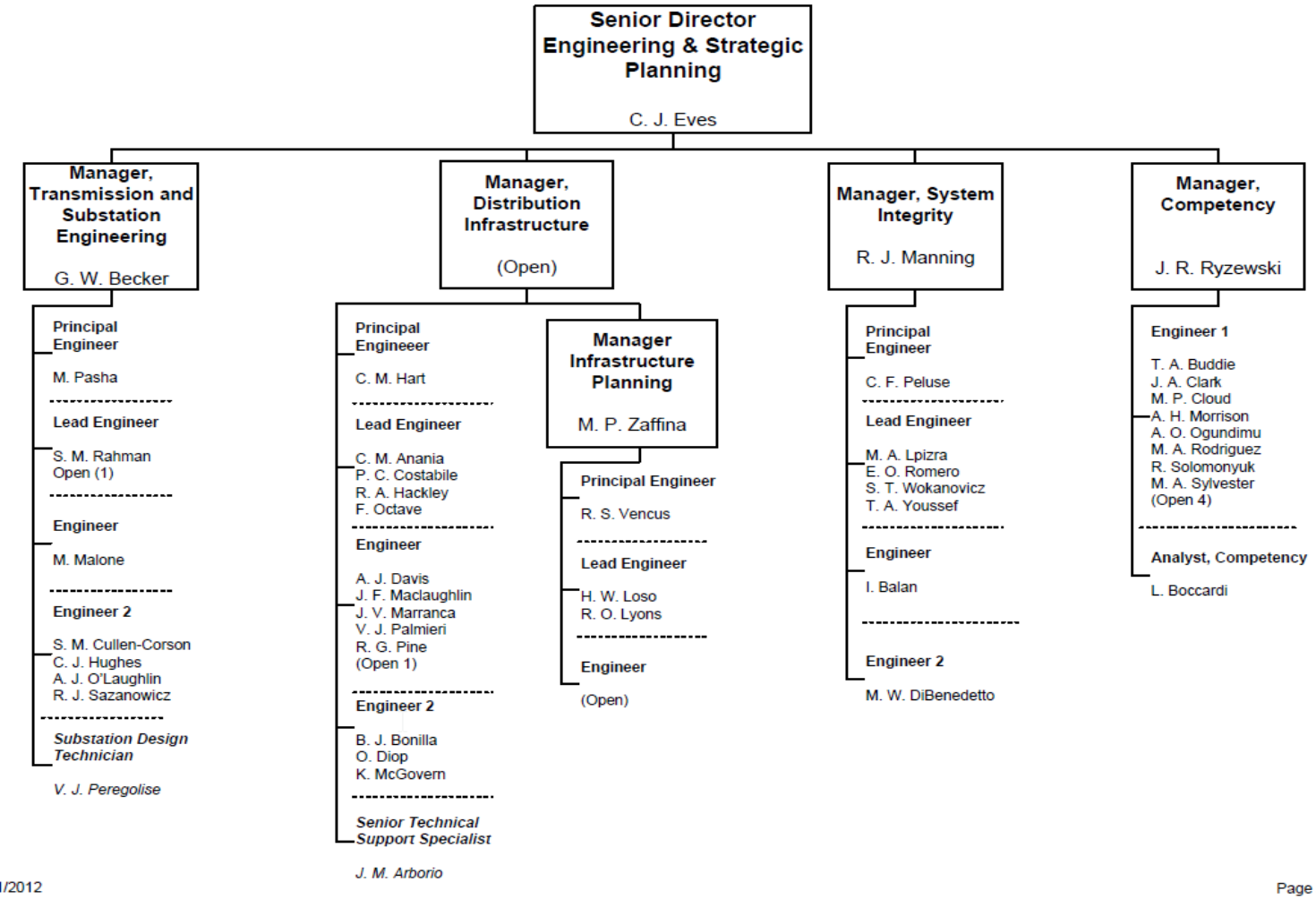
THE UNITED ILLUMINATING COMPANY

ENGINEERING & PROJECT EXCELLENCE – Engineering & Strategic Planning



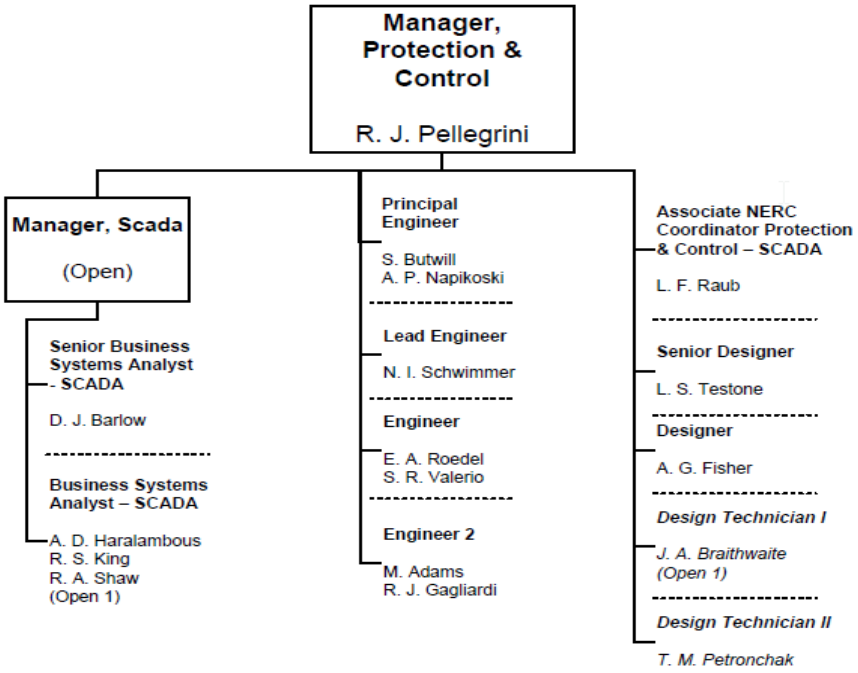
THE UNITED ILLUMINATING COMPANY

ENGINEERING & PROJECT EXCELLENCE – Engineering & Strategic Planning



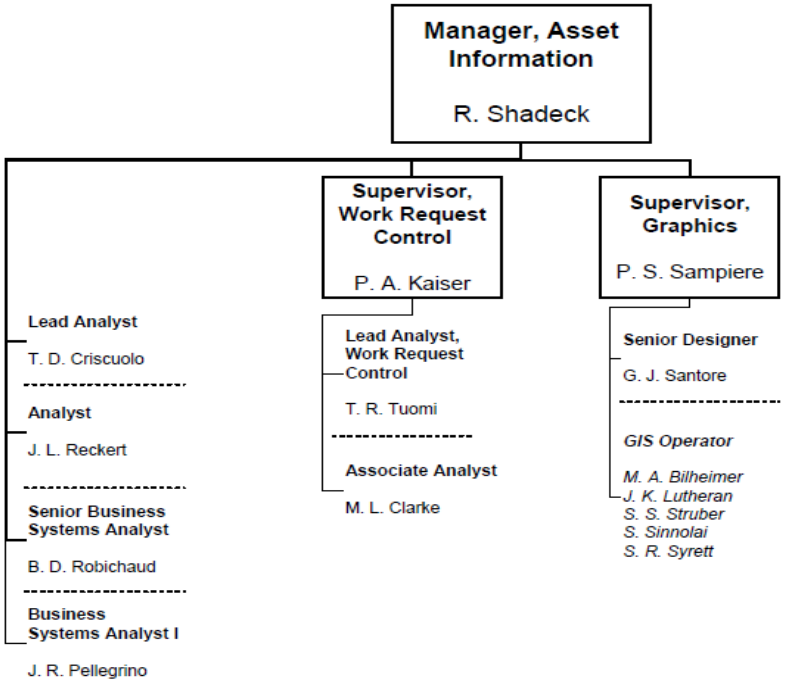
THE UNITED ILLUMINATING COMPANY

***ENGINEERING & PROJECT EXCELLENCE** – Engineering & Strategic Planning – Protection & Control*



THE UNITED ILLUMINATING COMPANY

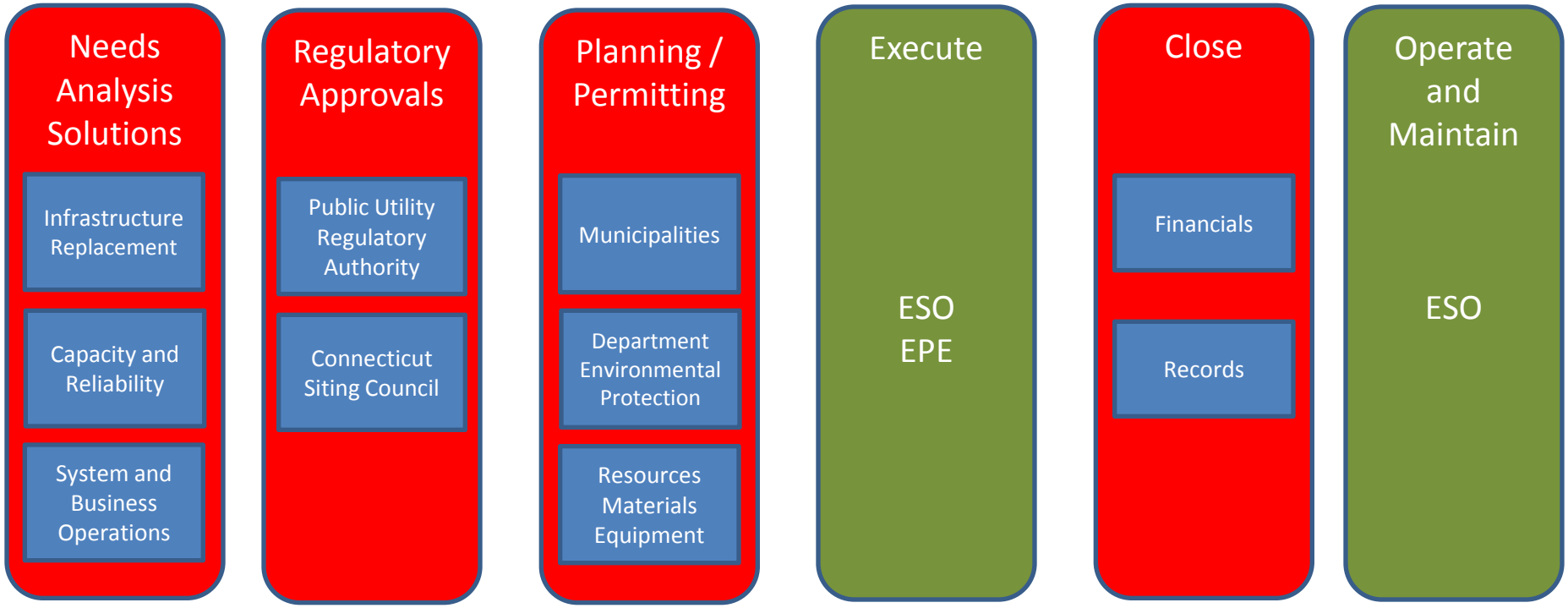
***ENGINEERING & PROJECT EXCELLENCE** – Engineering & Strategic Planning – Asset Information*



The United Illuminating Company

UI's Planning Process

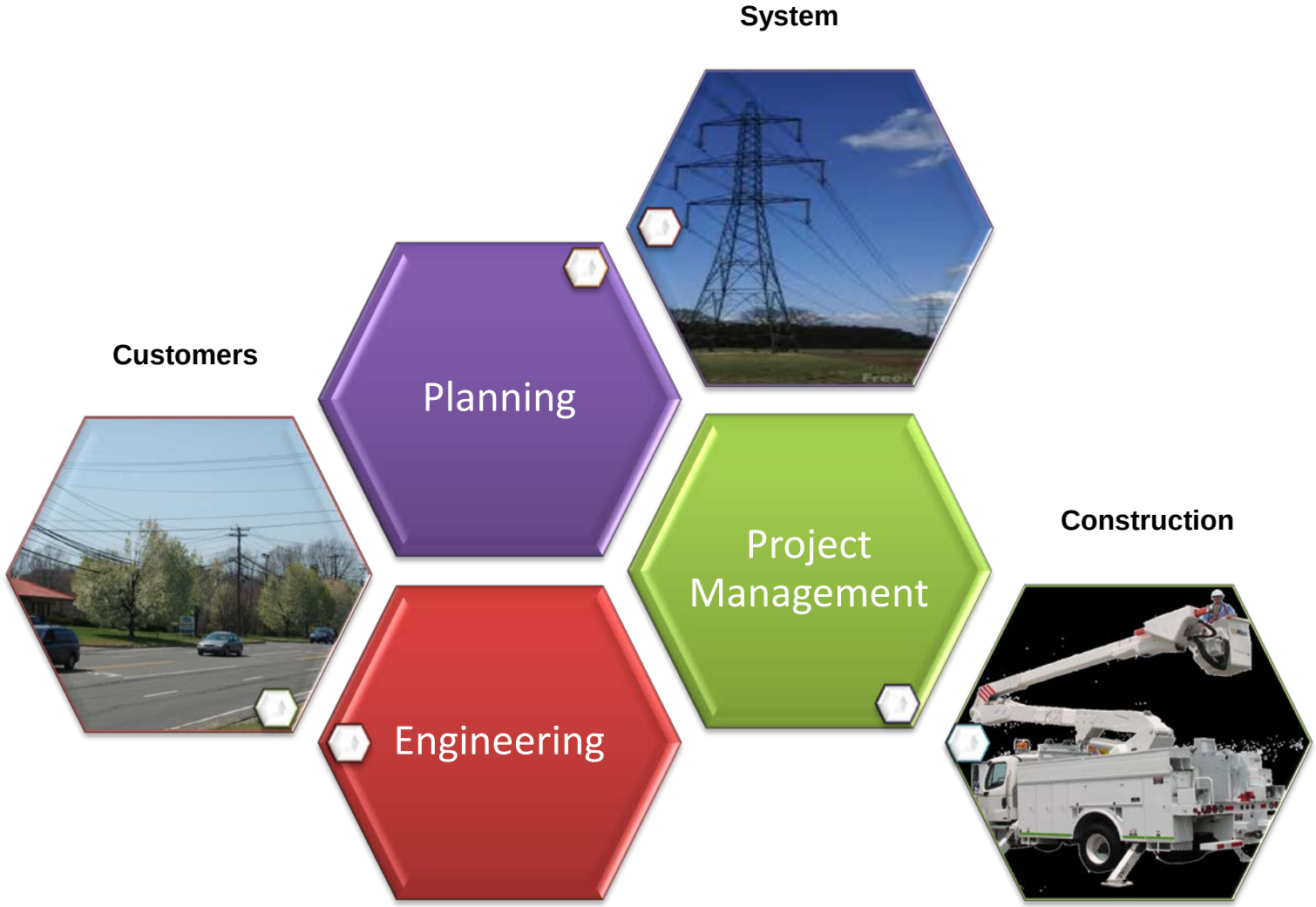
Ten Year
Planning Process



UIL HOLDINGS CORPORATION

The United Illuminating Company

Collaboration



UIL HOLDINGS CORPORATION

The United Illuminating Company

UIL 2012-2021 Capital Expenditure Forecast*

$M

	2011A**	2012P	2013P	2014P	2015P	2016P	2017-2021P	Total 2012-2021P
Electric Distribution	$ 170	$ 150	$ 125	$ 110	$ 113	$ 109	$ 574	$ 1,181
Electric Transmission	$ 60	$ 69	$ 64	$ 55	$ 130	$ 86	$ 169	$ 573
Total UI	$ 230	$ 219	$ 190	$ 165	$ 243	$ 195	$ 743	$ 1,754
Gas Distribution	$ 61	$ 76	$ 85	$ 106	$ 103	$ 97	$ 495	$ 962
UIL Corporate	$ 24	$ 41	$ 30	$ 14	$ 10	$ 12	$ 60	$ 167
Total UIL Capital	$ 315	$ 335	$ 305	$ 285	$ 356	$ 304	$ 1,298	$ 2,883

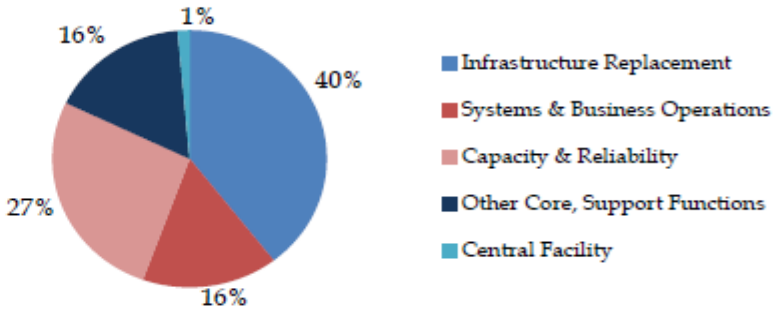
- Identified projects with clear need
- Full 10-yr forecast for Gas Distribution CapEx
- IT-related shared services projects are in UIL Corporate

Total UI = 1,663 M Pak Rupees – Total UIL = 2,738M Pak Rupees

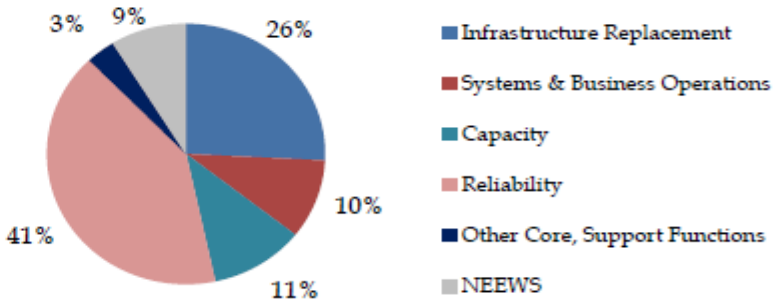
The United Illuminating Company

2012-2021 CapEx by Category

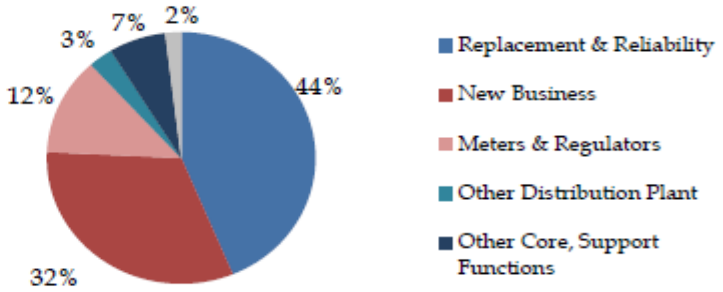
Electric Distribution



Electric Transmission

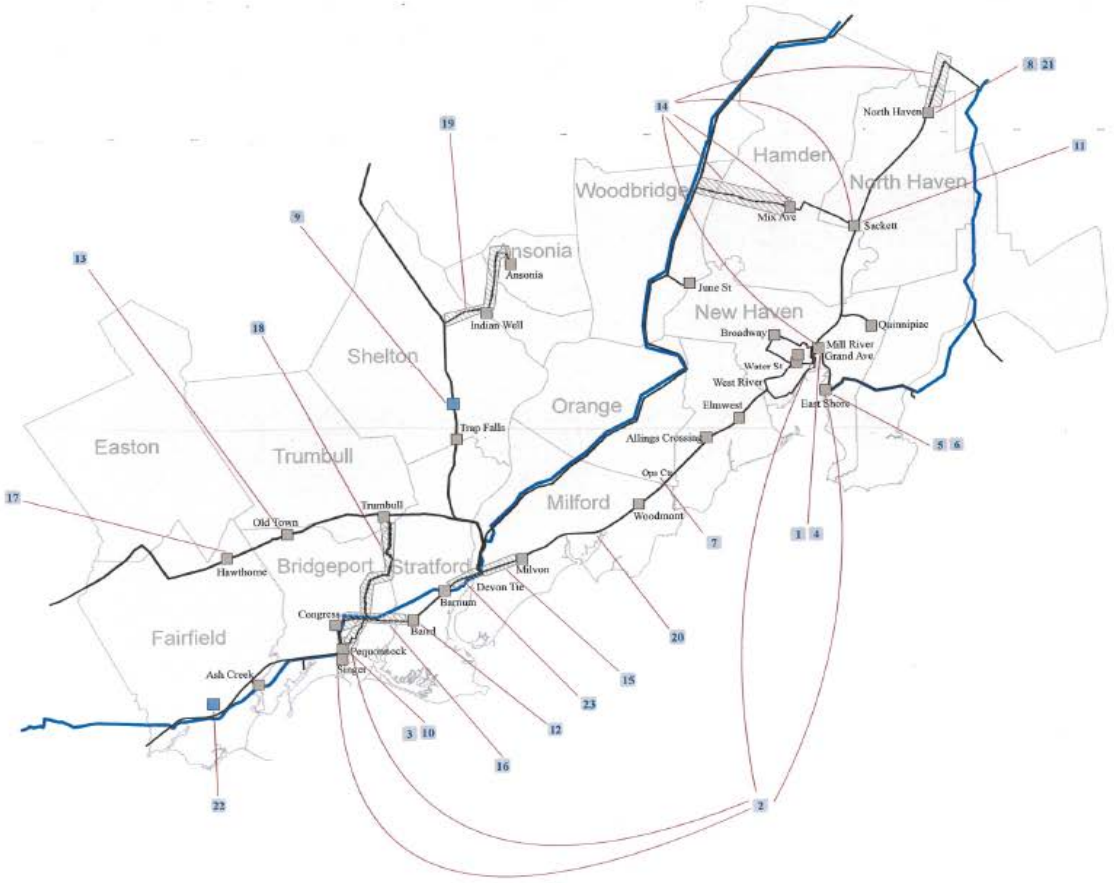


Gas Distribution



The United Illuminating Company

Transmission Projects 2012-2022



2012

1	**Grand Avenue 115 kV Switching Station Modernization**	In-Service
2	**ISO-NE Synchrophasor, Phasor Measurement Unit Installation**	Construction
3	**Pequonnock 115 kV Bus System Upgrades, Bay 1**	Planned
	- Control Room/ Relay Replacement	
	- 115 kV Bus System 63 kA upgrade	
	- Disconnect switch replacements	

2013

4	**8300 Line Reconfiguration Project**	Planned
5	**East Shore 115/13.8 kV Substation, Distribution Capacity Upgrade**	Planned
6	**East Shore Substation, 115 kV Circuit Breaker and Switch Replacement**	Planned
7	**SCADA Master Station Replacement**	Planned
8	**North Haven Substation, Capacitor Bank TRV Mitigation**	Construction

2014

9	**New Pootatuck (Shelton) 115/13.8 kV Substation**	Planned
10	**Pequonnock 115 kV Fault Duty Mitigation, Phase 1**	Proposed

2015

11	**Sackett 115/13.8 kV Substation, Distribution Improvements**	Planned

2016

12	**Baird 115/13.8 kV Substation Upgrade or Replacement**	Concept
13	**Old Town 115/13.8 kV Substation Upgrade or Replacement**	Concept
14	**SWCT, New Haven Area 115 kV Transmission Upgrades**	Concept
	- Glen Lake - Mix Ave 115 kV 1610 Line Reconductoring	
	- Sackett: Phase Shifter Removal, 115 kV Capacitor Bank Replacement, Terminal Upgrades	
	- Mix Ave: 115 kV Capacitor Bank Addition, Terminal Upgrades	
	- North Haven - Wallingford 115 kV 1630 Line Reconductoring	
	- Grand Ave: 115 kV Capacitor Bank Addition	
15	**SWCT, Devon Tie- Milvon 115 kV RR Line Reconductoring/Upgrade**	Concept
16	**SWCT, Congress - Baird 115 kV RR Line Reconductoring/Upgrade**	Concept
17	**SWCT, Hawthorne 115 kV Capacitor Bank (2) addition**	Concept
18	**SWCT, Trumbull - Pequonnock 115 kV Transmission Upgrades**	Concept
19	**SWCT, Naugatuck Valley 115 kV Transmission Upgrades**	Concept
20	**FAC-008 Long Term Remediation Project (2016-2022)**	Concept

2017

21	**North Haven 115/13.8 kV Transformer Replacements (LTC's)**	Concept

2019

22	**New Fairfield 115/13.8 kV Substation**	Concept

2022

23	**SWCT, Barnum - Devon Tie 115 kV RR Line Reconductoring/Upgrade**	Concept

A UIL HOLDINGS COMPANY

The United Illuminating Company

Electric Distribution
Examples of Projects

Central Facility – UI Office & Operations Building

- Consolidate all UI "Work Centers" onto a single site referred to as the Central Facility
- Under construction
- Planned in-service 2012

Splice Chamber Remediation

- Rebuild deteriorated underground splicing chambers
- In progress
- Annual program over 10 years

~ $8M per year

Network Infrastructure Replacement

- Addresses aging network infrastructure to reduce hazards associated with equipment failure
- In progress
- Annual program over 10 years

~ $5M per year

Distribution Transformer Replacement Program

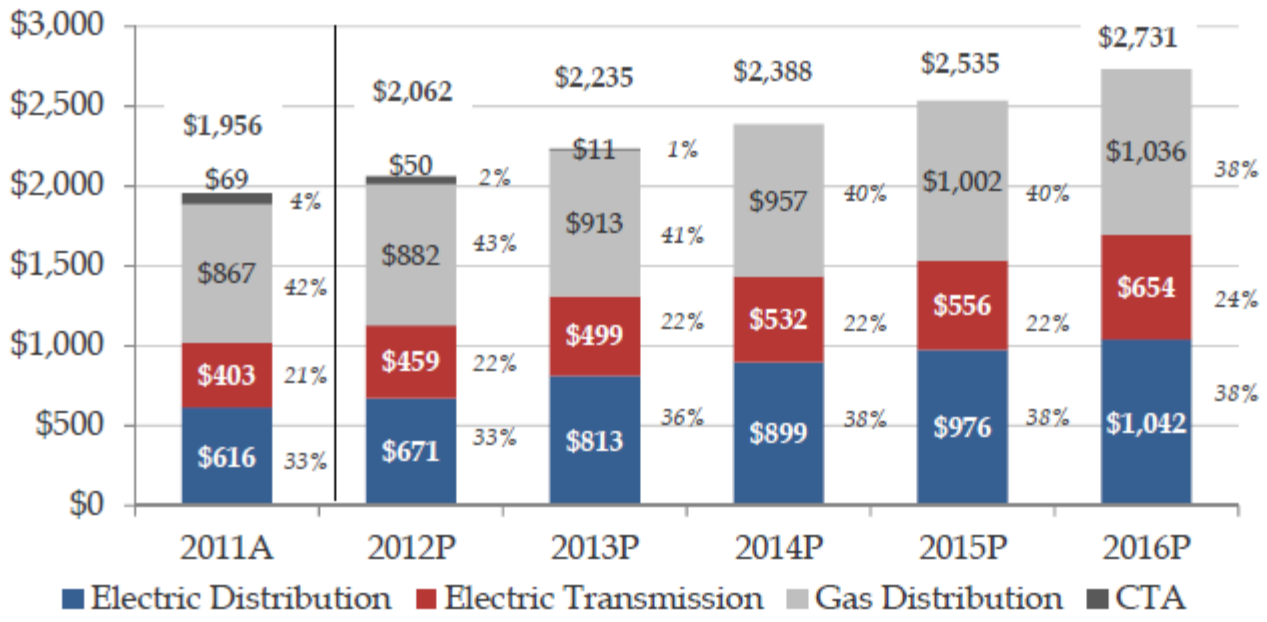
- Infrastructure program to replace transformers due to poor physical condition, inadequate capacity, that could potentially contain levels of PCBs
- In progress
- Annual program over 10 years

~ $7M per year

The United Illuminating Company

2012-2016 Average Rate Base Forecast

Rate Base $M (Excluding GenConn Equity Investments):



2012-2016 CAGR 7.3%
Gas Distribution: 4.1%
Electric Transmission: 9.2%
Electric Distribution: 11.6%

UIL HOLDINGS CORPORATION

The United Illuminating Company

Agenda

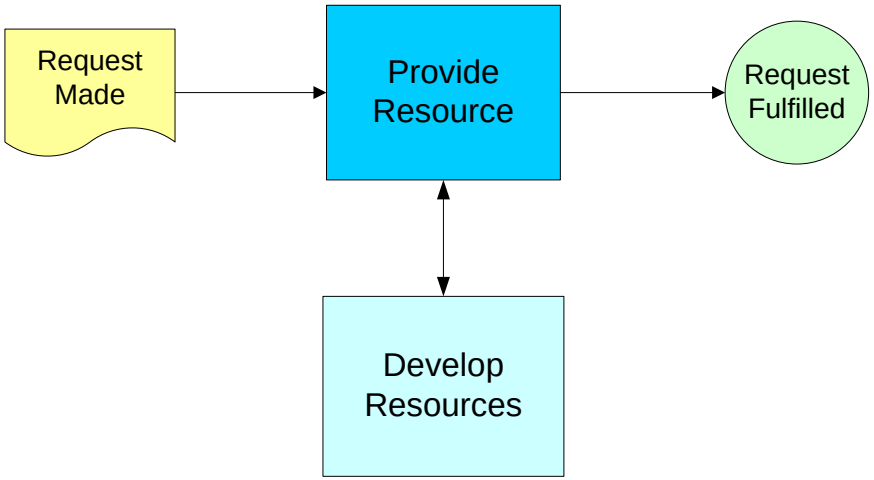
- EPE & ESO Aging Workforce Profile
- Current Programs
  - Internship
  - New Engineer Development
- Recommendations to Close the Gap

UIL HOLDINGS CORPORATION

The United Illuminating Company

EPE Competency - Mission

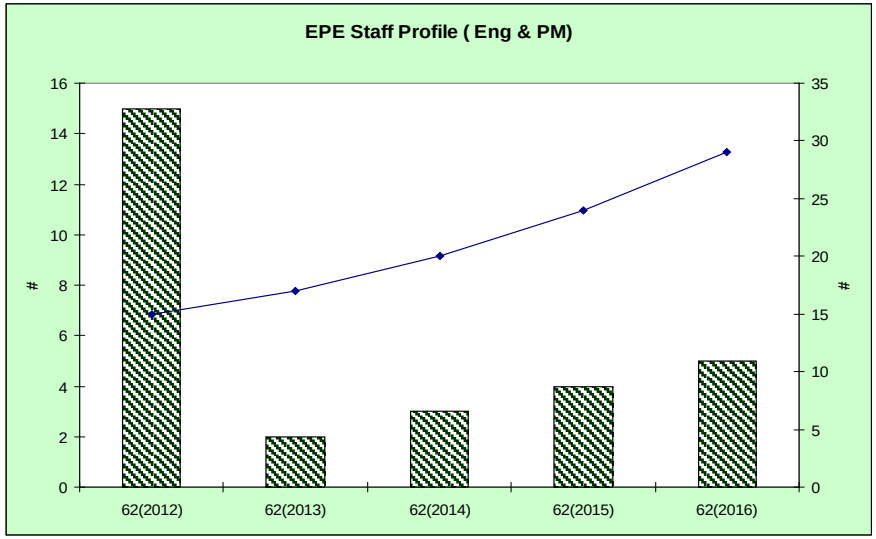
Our processes help provide and develop necessary resources to support the 10 Year Plan and sustain the operational needs of the company.

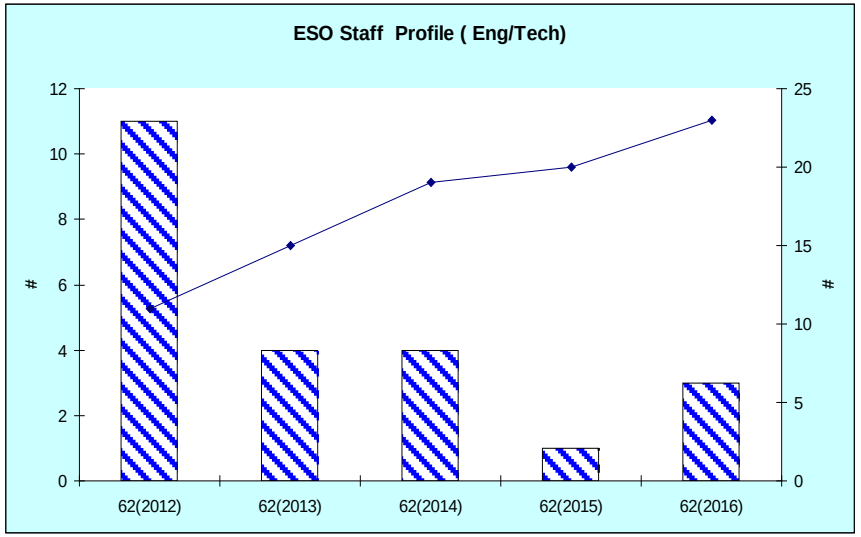


UIL HOLDINGS CORPORATION

The United Illuminating Company

EPE – ESO: Aging Workforce



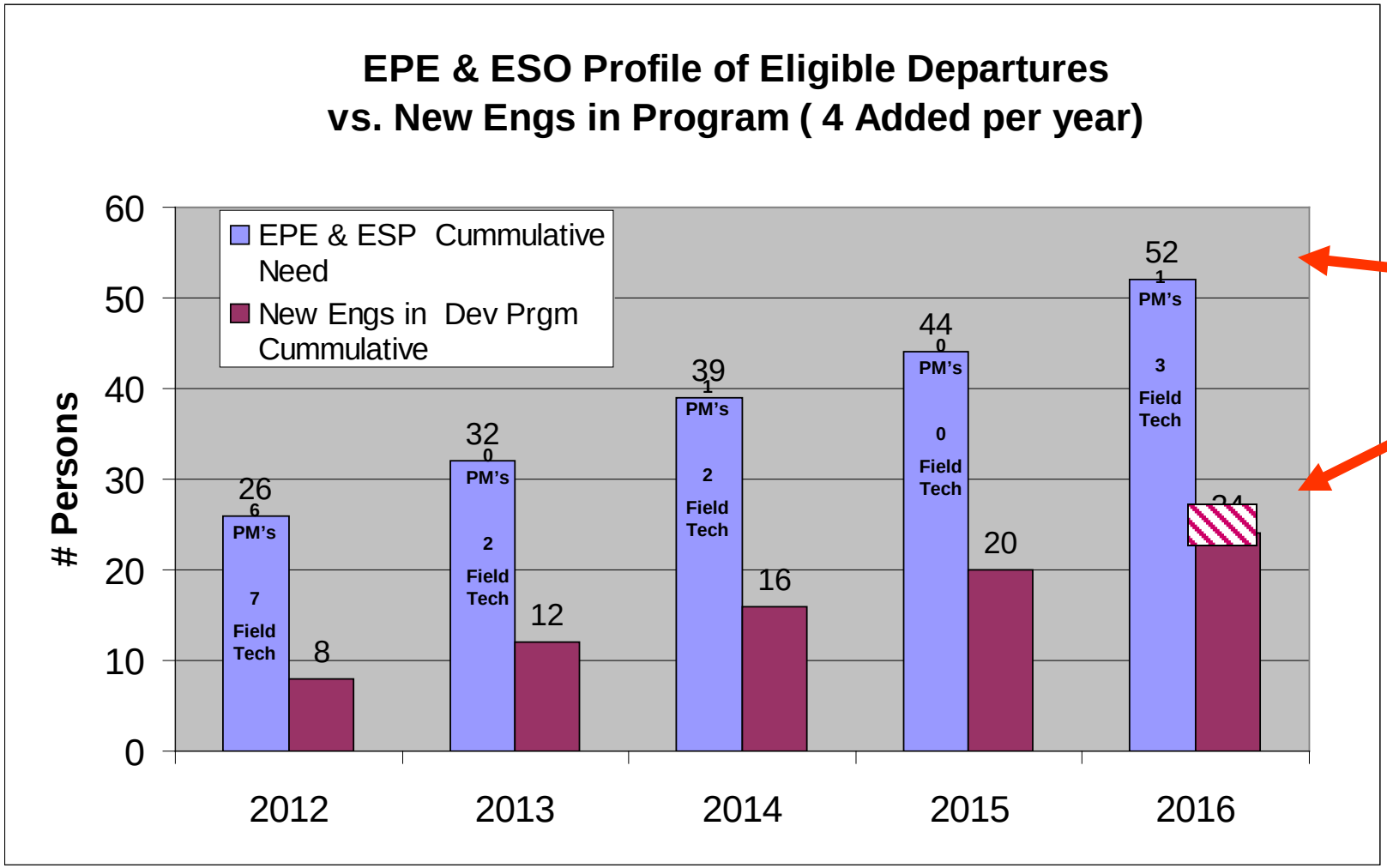


- **The charts portray the number of persons who have reached the age of 62 as of that year. These positions require a degree and are not union.**
- **The line and scale on the right show the cumulative number of persons who have reached the age of 62 over the five year period.**

UIL HOLDINGS CORPORATION

The United Illuminating Company

New Engineer Development Program Resource Projection & Gap



*** Does not include any non-retirement attrition**

The United Illuminating Company

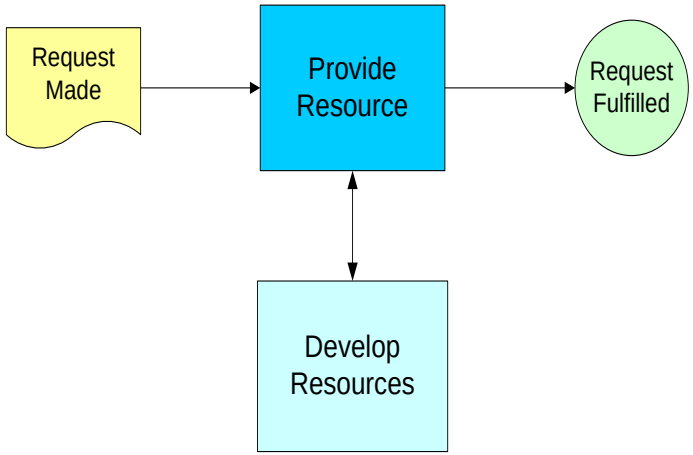
Providing A Trained, Competent Workforce

We have established Programs to attract and develop new talent:

I. External Recruitment
- The Marketplace & Graduating Seniors

II. UI's Internship Program
- 11 out of 17 Engineering positions were

III. Engineering Development Program
- 14 have 'graduated' into the mainstream



UIL HOLDINGS CORPORATION

The United Illuminating Company

Graduates & Interns Have Come From

- Buffalo*
- Clarkson*
- Gateway *
- Fairfield University*
- WPI*
- Villanova
- NYIT
- SUNY
- UNH
- Manhattan College
- Central CT State University
- UConn

Clarkson University

Jaspers

University of New Haven

Gateway Community College

New Haven Chargers

WPI

INROADS

University at Buffalo

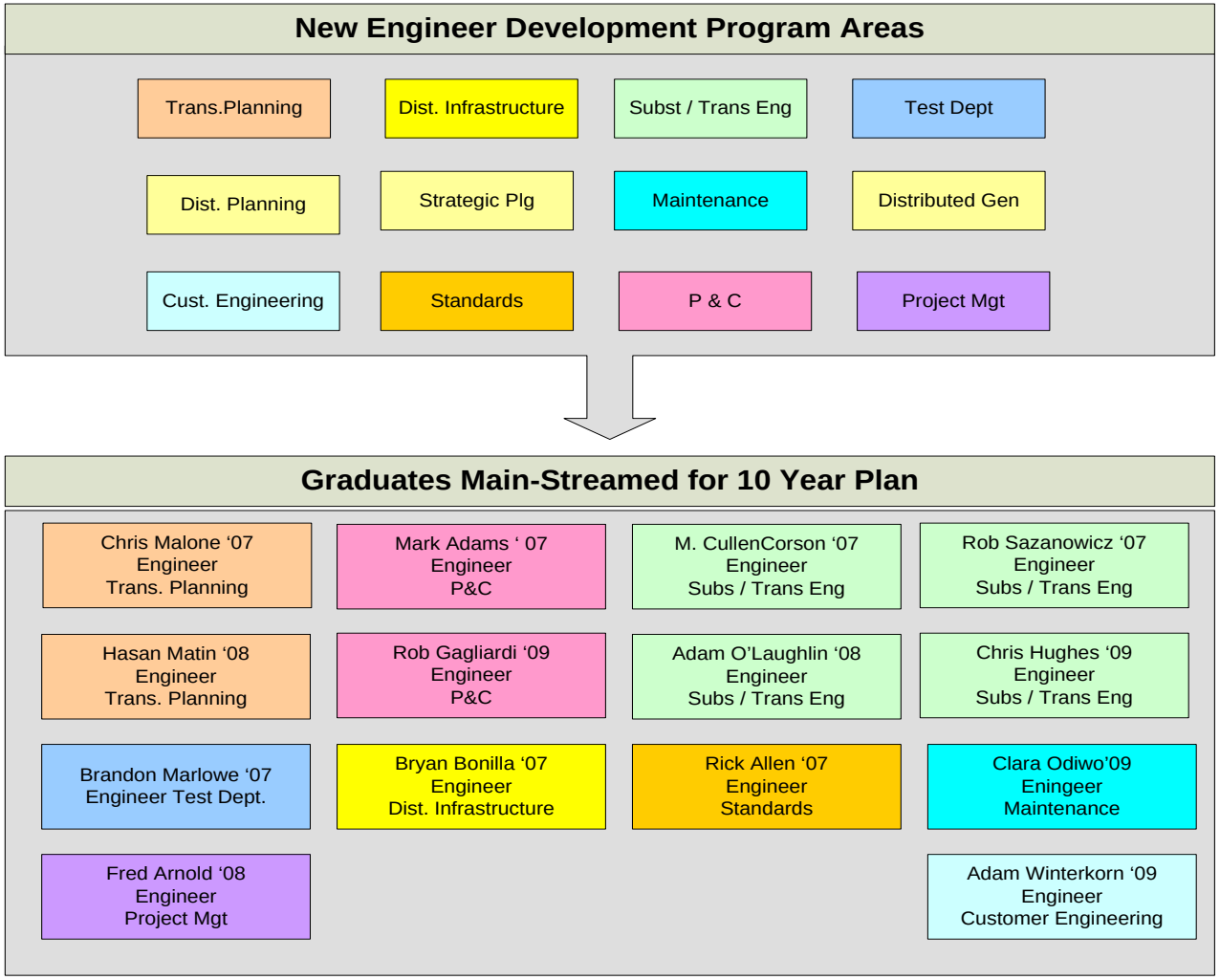
CCSU Central Connecticut State University

University of Connecticut

UIL HOLDINGS CORPORATION

The United Illuminating Company

New Engineer Development Program: Resources for 10 Year Plan



The United Illuminating Company

Our Challenge: Close the Gap

We need to accelerate and expand our:

1. Recruitment
   - Project managers and “second career” engineers
   - Engineers in targeted universities and colleges

2. Internship / Scholarship Program
   - Recruit Local and Regional talent
   - Include UNH

3. New Engineer Development Program
   - Increase from 4 to 6 per year
   - Build upon our success

UIL HOLDINGS CORPORATION

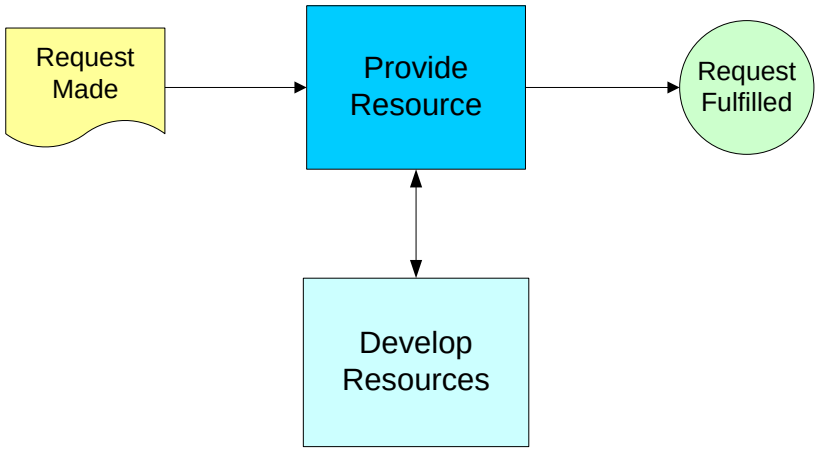
The United Illuminating Company

The Good News!

We have:

1. Proven processes that provide and develop resources to support the 10 Year Plan.

2. Engaged Employees
   - Challenging Work
   - Focused Development
   - Advancement Opportunities



3. Commitment at all levels
   - Engaged Management & Supervisors
   - Implemented 2010 Adjustment Study
   - Aligned to UIL Scorecard, the 10 Year Plan and our core business.

UIL HOLDINGS CORPORATION

The United Illuminating Company

UIL HOLDINGS CORPORATION

UI Electric T & D

Utility Exchange Program

(Pakistan Distribution Companies)

The United Illuminating Company

LONG TERM PLANNING AND POWER REQUIREMENTS

By: Bob Manning, Manager

System Integrity

UIL HOLDINGS CORPORATION

The United Illuminating Company

Why Load Forecasting & Long Term Planning?

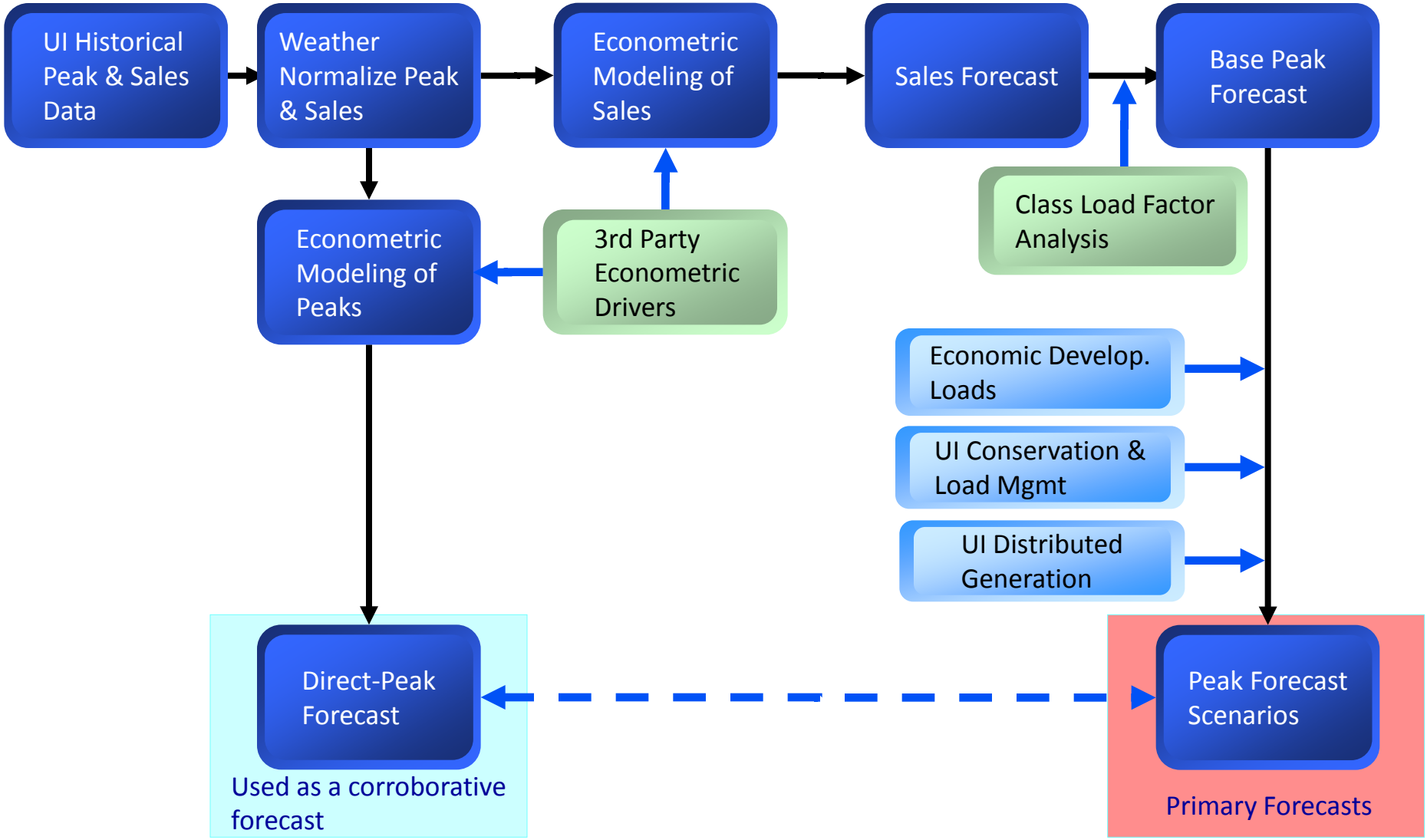
- Analyze Capacity of Existing Substations
- Input into the Ten Year Plan
  - Financial Forecasting
  - Manpower Forecasting
- Meet Required In-Service Dates of Multi-Year Projects
  - New Substations
  - Substation Expansions
- Meet Regulatory Requirements
  - ISO-NE
  - CSC

UIL HOLDINGS CORPORATION

The United Illuminating Company

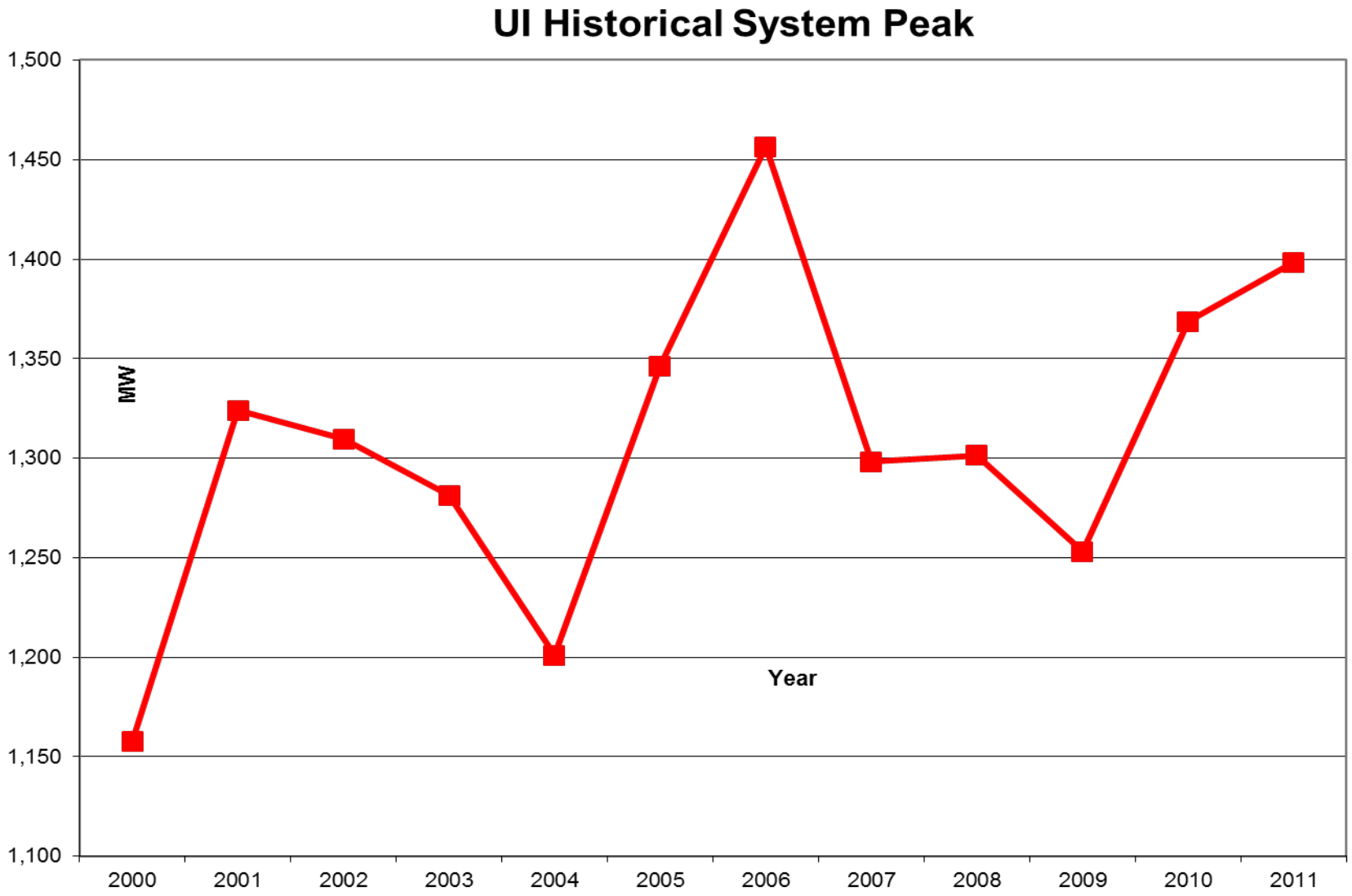
Forecast Methodology

Load Forecast Methodology



The United Illuminating Company

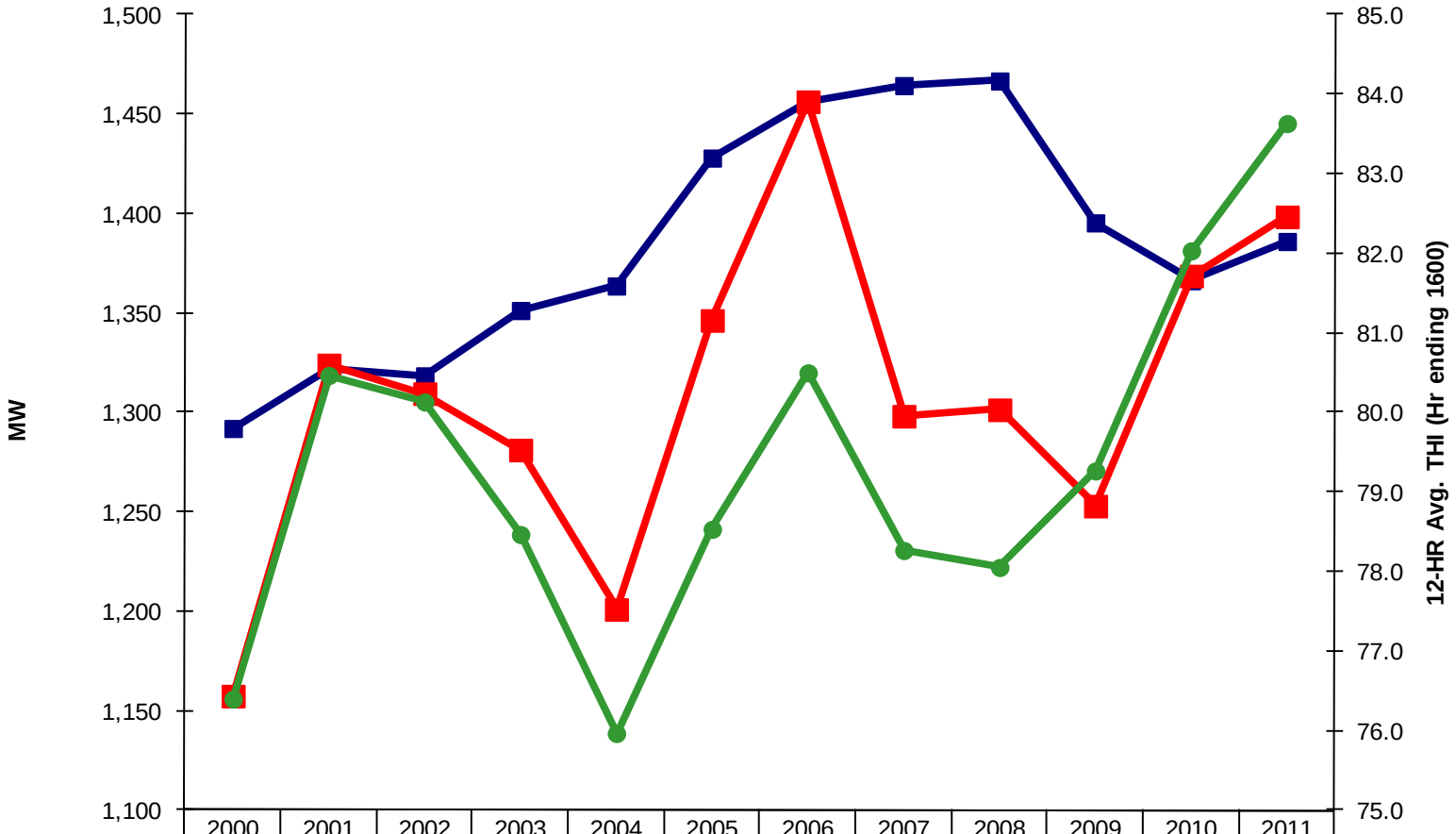
Why Weather Normalize?



The United Illuminating Company

Weather Normalization and THI

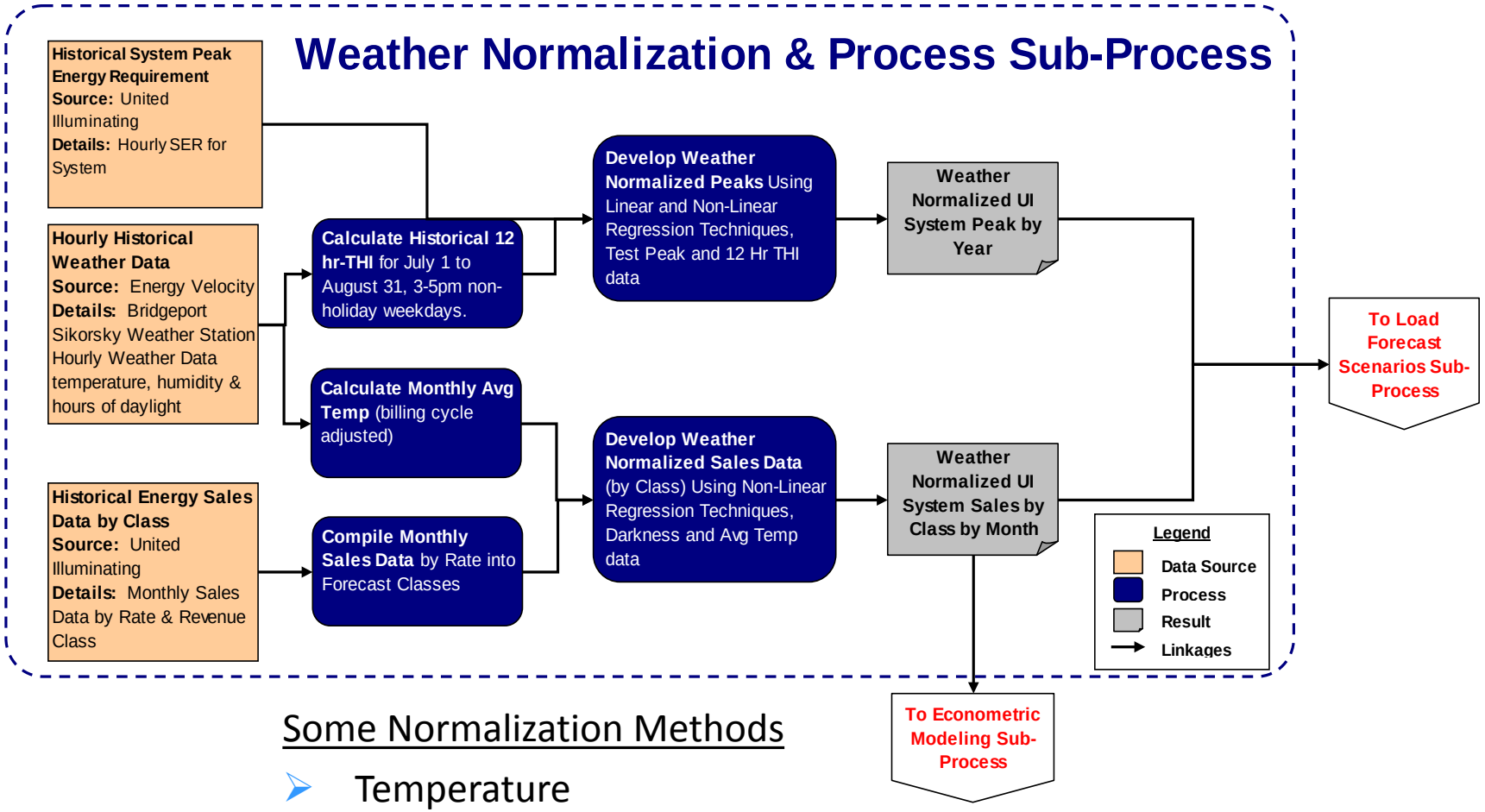
Actual & Normal Peak vs. the 12-HR Average THI



	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
90/10 Normalized Peak	1,292	1,322	1,318	1,351	1,364	1,428	1,456	1,464	1,467	1,395	1,366	1,386
Actual Measured Peak	1,157	1,324	1,310	1,281	1,201	1,346	1,456	1,298	1,301	1,253	1,369	1,398
12-Hr Avg THI	76.4	80.5	80.1	78.5	76.0	78.5	80.5	78.3	78.1	79.3	82.0	83.6

Energy Sales & Peak Weather Normalization

The United Illuminating Company



Some Normalization Methods

- Temperature
- THI
- 3 Day Weighted Average

UIL HOLDINGS CORPORATION

The United Illuminating Company

Forecast Classes

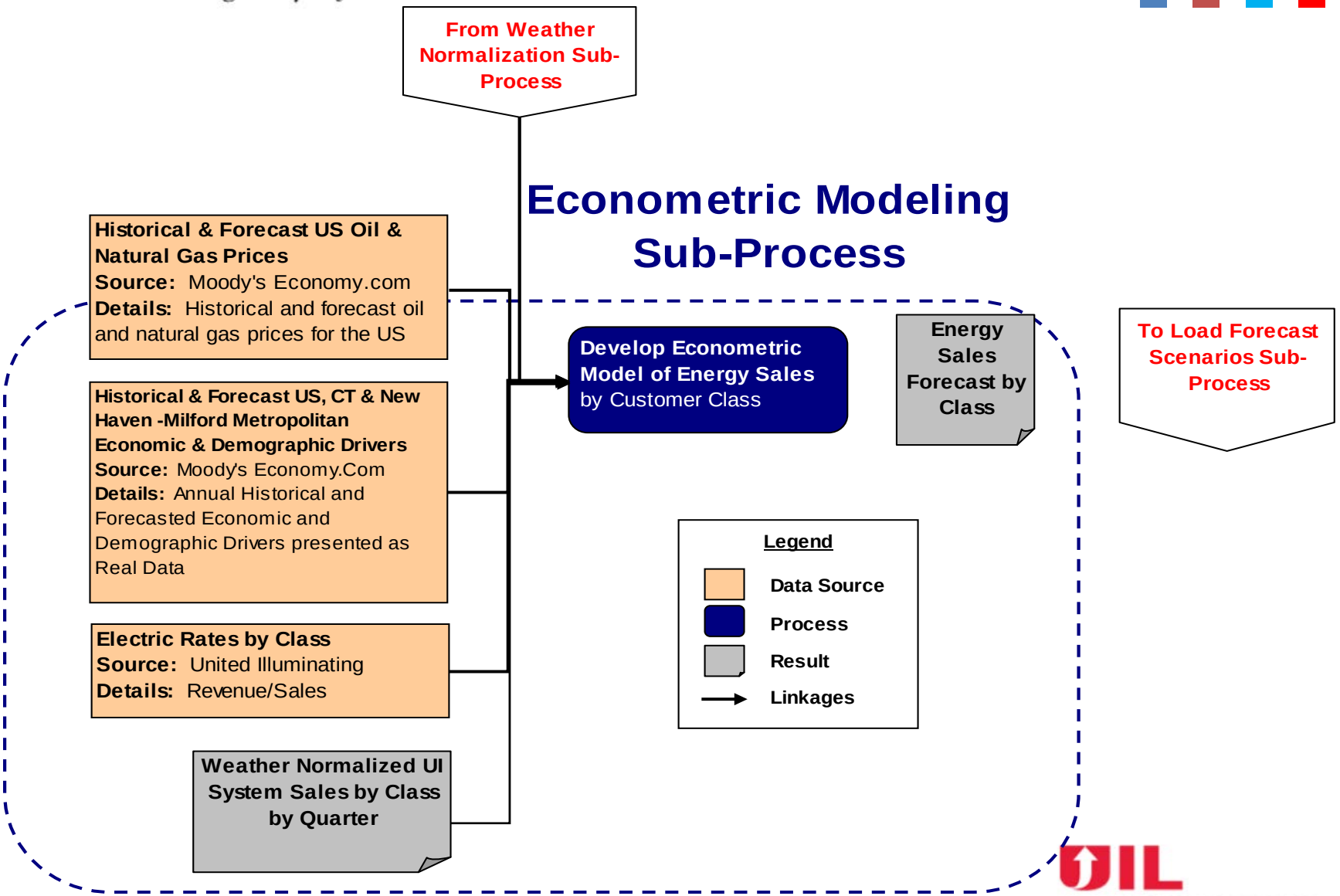
Energy Sales Forecast Classes

- Residential
- Small Commercial
- Mid Commercial
- Large Commercial
- Mid Industrial
- Large Industrial
- Commercial Area Lighting
- Industrial Area Lighting
- Street Lighting

UIL HOLDINGS CORPORATION

The United Illuminating Company

Econometric Modeling



UIL HOLDINGS CORPORATION

The United Illuminating Company

Economic and Demographic Variables

2012 Forecasting Models

Forecast Variables

- NH Civilian Labor Force
- CT Retail Sales
- CT Single Family Housing Starts
- U.S. GDP
- CT Bankruptcies: Bus-Ch-13
- CT Employ: Retail Trade
- NH Population
- U.S. Natural Gas Price

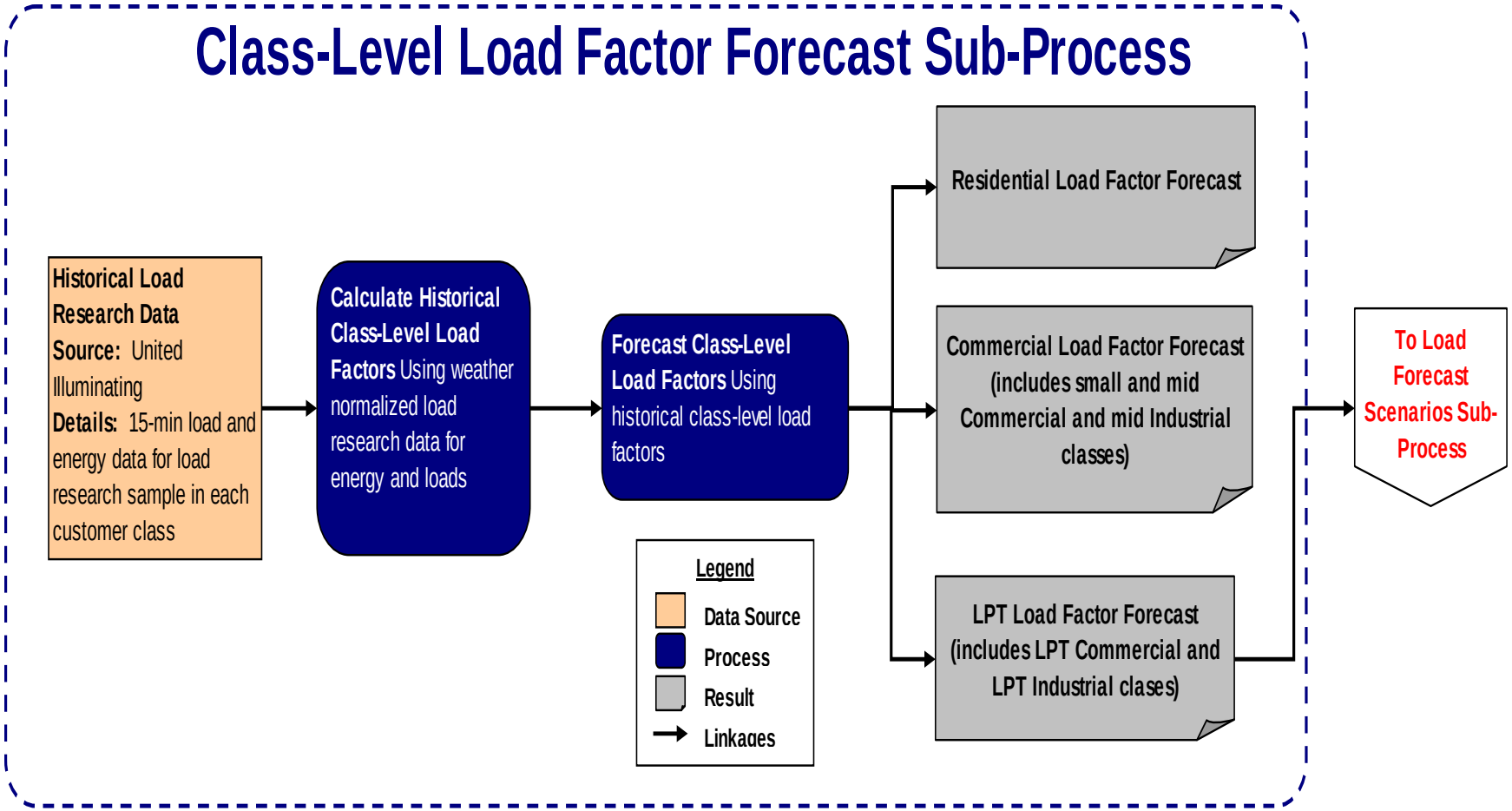
Variables Obtained from 3rd Party Sources

Tested for Lags – Up to 4 Quarters

UIL HOLDINGS CORPORATION

The United Illuminating Company

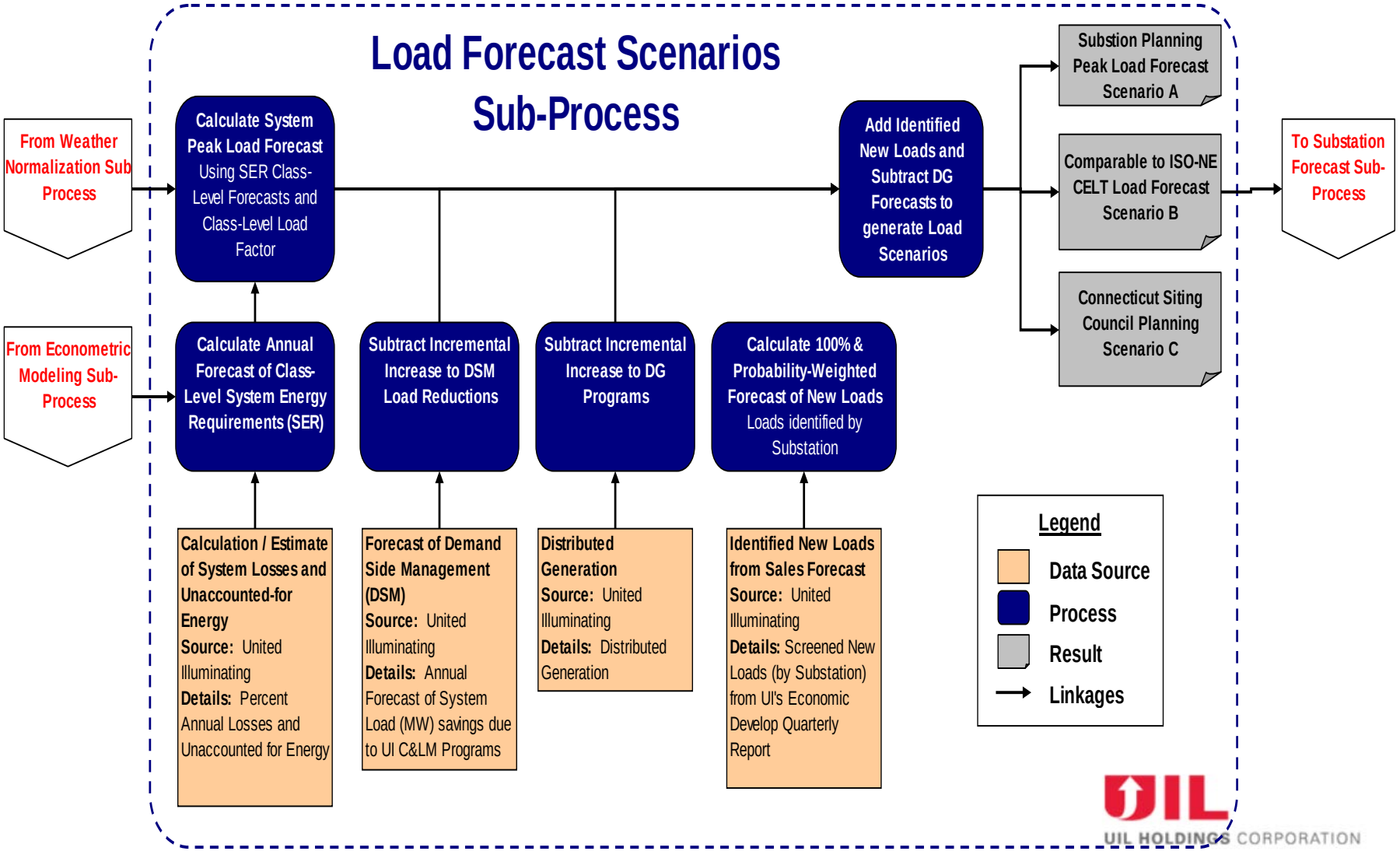
Class-Level Load Factor Forecast



UIL HOLDINGS CORPORATION

The United Illuminating Company

Load Forecast Scenarios



UIL HOLDINGS CORPORATION

The United Illuminating Company

Substation Capacity Analysis

Substation Forecast Sub-Process

From Load Forecast Scenario Sub- Process

System Losses
Source: United Illuminating
Details: Uses data from the 2006 Loss Study.

Adjust System Peak Load Forecast for losses to obtain 13.8 kV load
- adjust System Peak Load Forecast for losees from 115 kV lines & 115/13.8 kV transformers

Assign Top 80 LPT Industrial and 162 LPT Commercial Customers to their substation

Allocate Remaining Base Peak Load Forecast to Substations
- allocation based on the number of customers by class at each sub and their average use per customer

Assign Screened New Loads to their substation

Coincident Substation Level Forecast for"As-Is" Condition

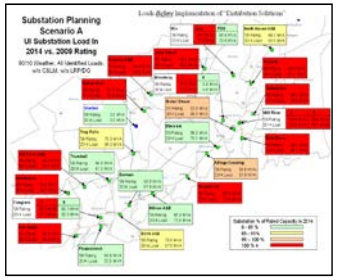
Convert to Non-Coincident Substation Level Forecast for"As-Is" Condition

Substation Level Forecast for"As-Is" Condition

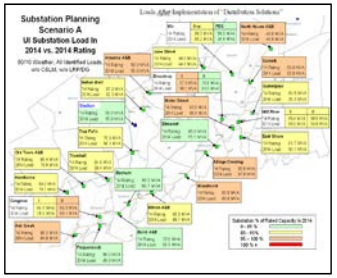
Substation Level Forecast for Distribution Solutions

Distribution Solutions Identified

Map Load by Substation vs. Substation Ratings



Map Load by Substation vs. Substation Ratings

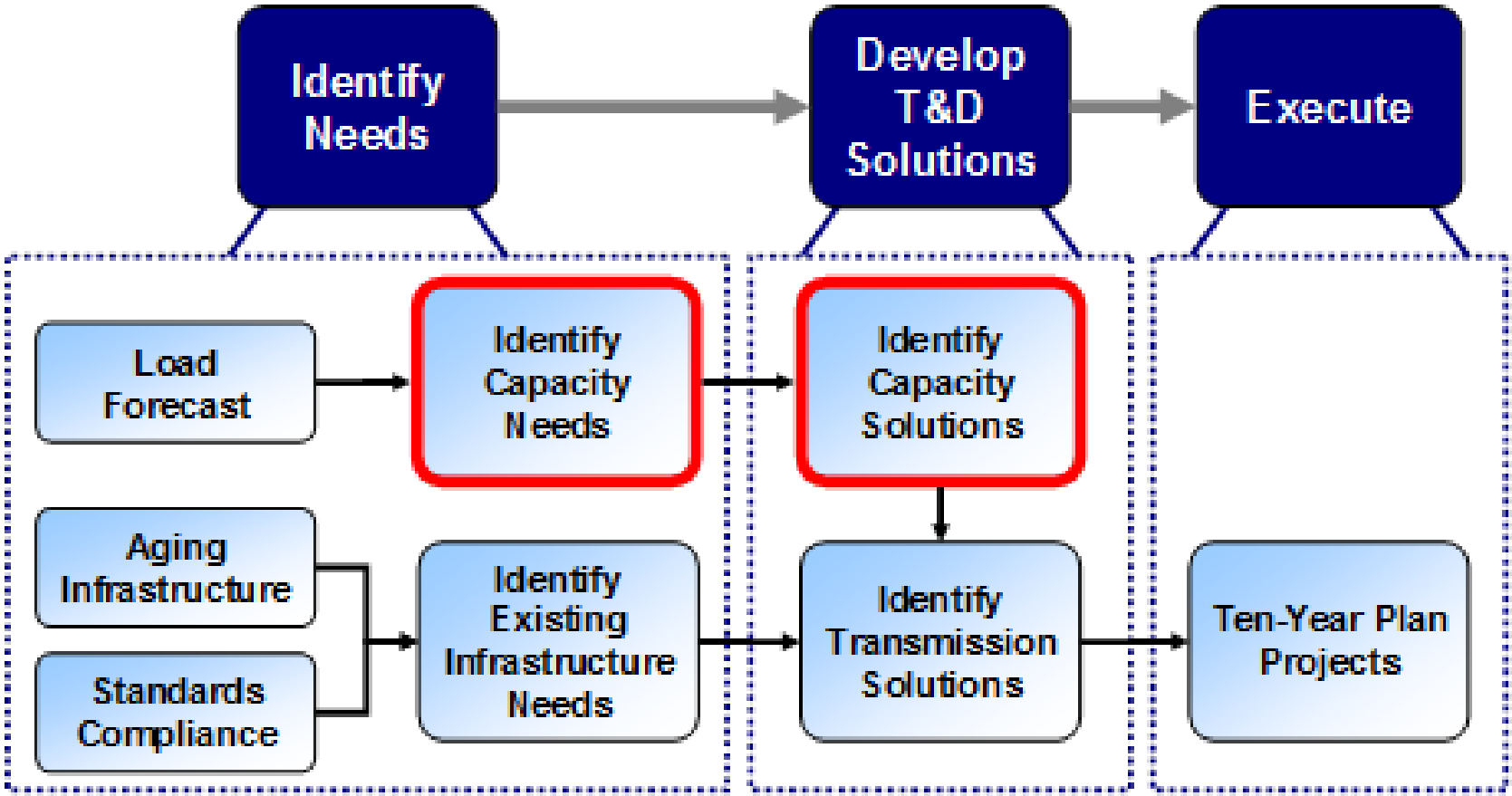


Legend
- Data Source
- Process
- Result
- Linkages

UIL HOLDINGS CORPORATION

The United Illuminating Company

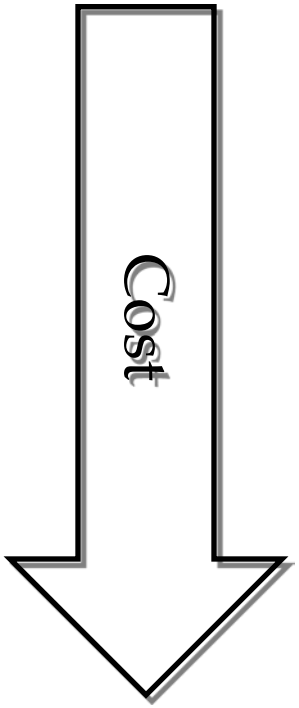
Needs and Solutions



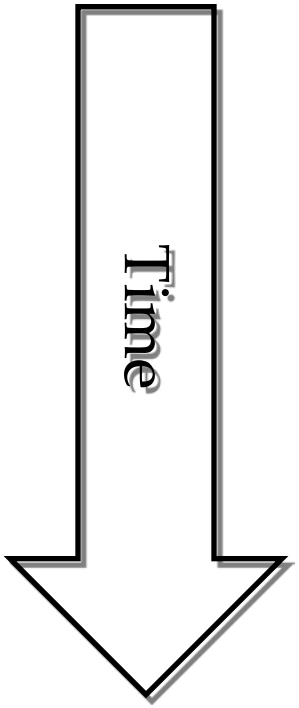
UIL HOLDINGS CORPORATION

The United Illuminating Company

Solutions



- Transferring load from one substation to another
- Increasing the capacity of existing substations
- Adding new substation capacity by constructing a new substation



UIL HOLDINGS CORPORATION

The United Illuminating Company

UIL HOLDINGS CORPORATION

UI Electric T & D

Utility Exchange Program

(Pakistan Distribution Companies)

The United Illuminating Company

OVERHEAD & UNDERGROUND DISTRIBUTION DESIGN PROCESS & CRITERIA

Paul Kranowski, Manager

Distribution Infrastructure

UIL HOLDINGS CORPORATION

Department Management Principals

The United Illuminating Company

Distribution Engineering

Chris Hart
Principal Electrical Engineer

Claudio Anania
Lead Civil Engineer

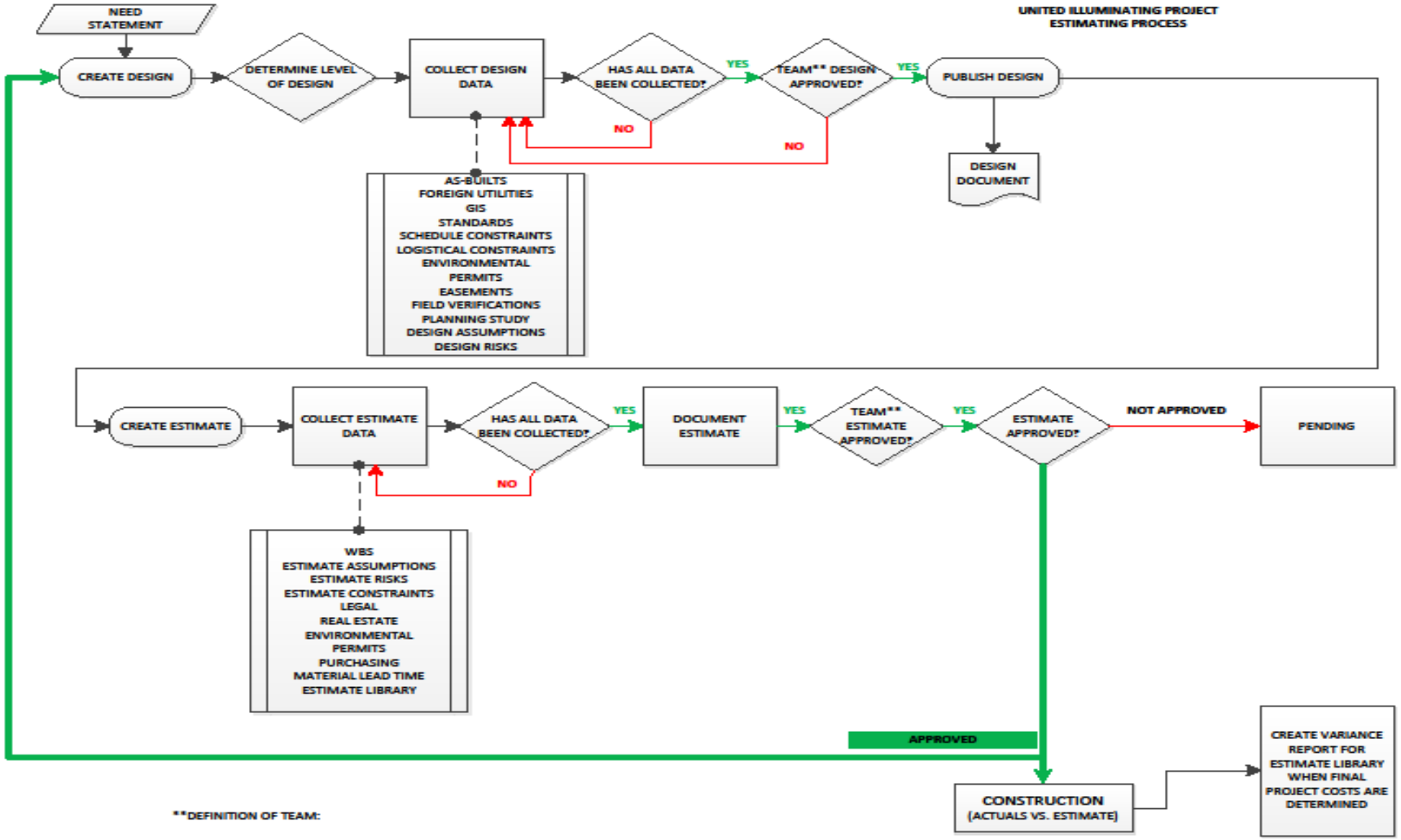
UIL HOLDINGS CORPORATION

OUR MISSION

Operate in a Safe & Efficient Manner To:

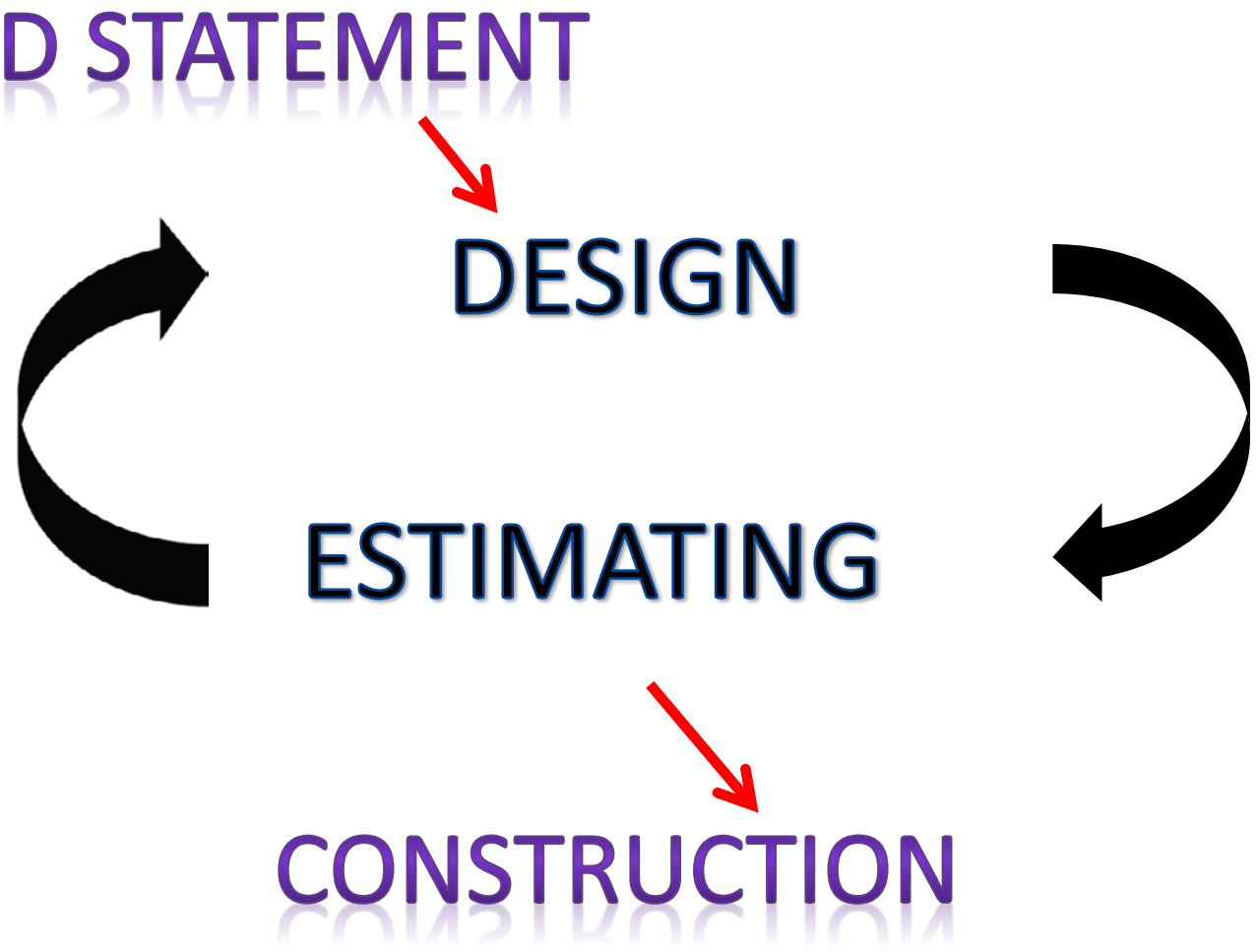
- **Improve Reliability – Maintain System Integrity**
- **Support the Ten Year Plan**
- **Conduct Need Assessments and Solution Studies**
- ***Provide Vetted Estimates***
- ***Engineer Quality Design***
- **Construction Support**
- **Supply Electrical-Civil Expertise when required**

Estimating & Design Process Flow



The United Illuminating Company

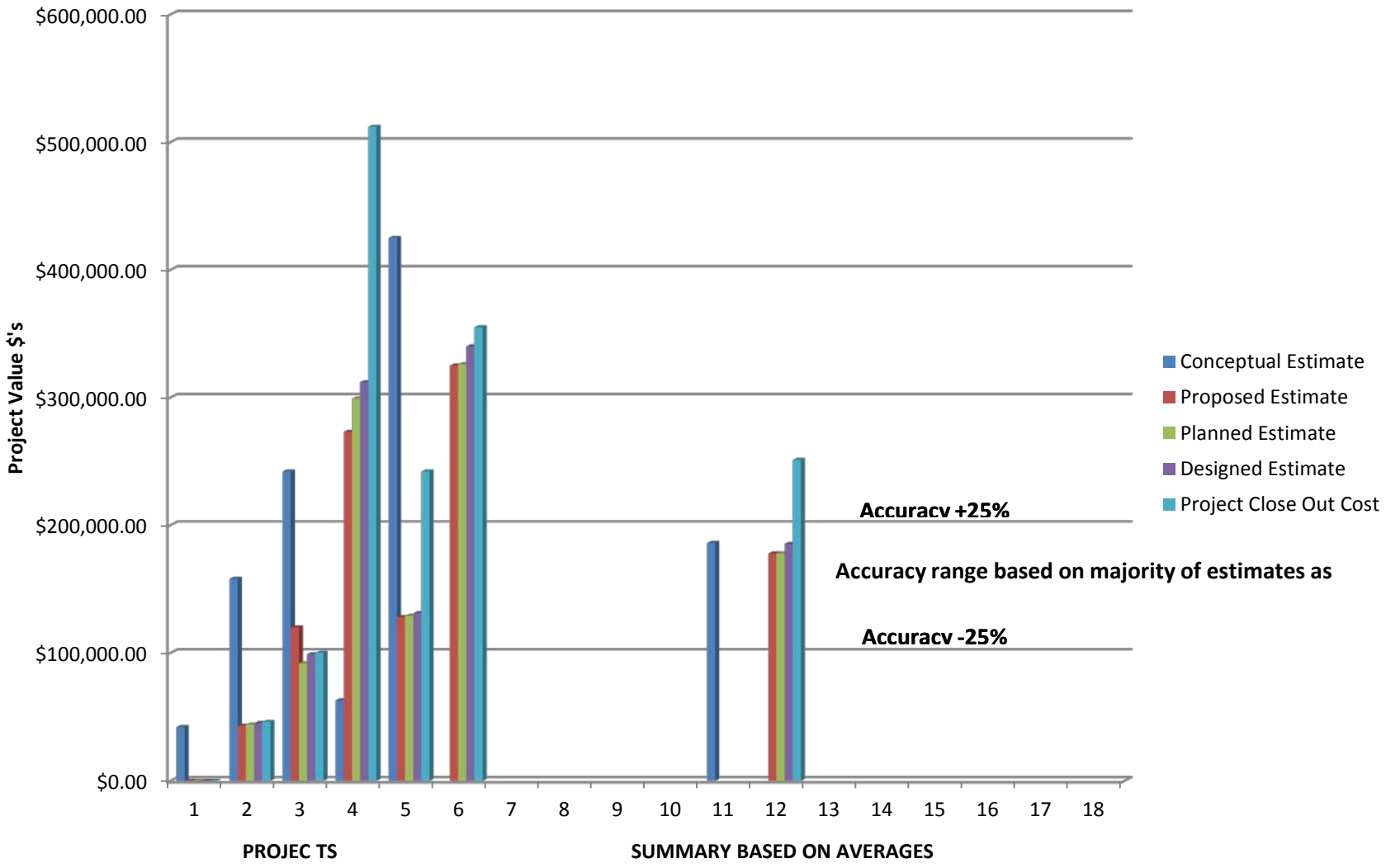
Estimating & Design Process Flow



UIL HOLDINGS CORPORATION

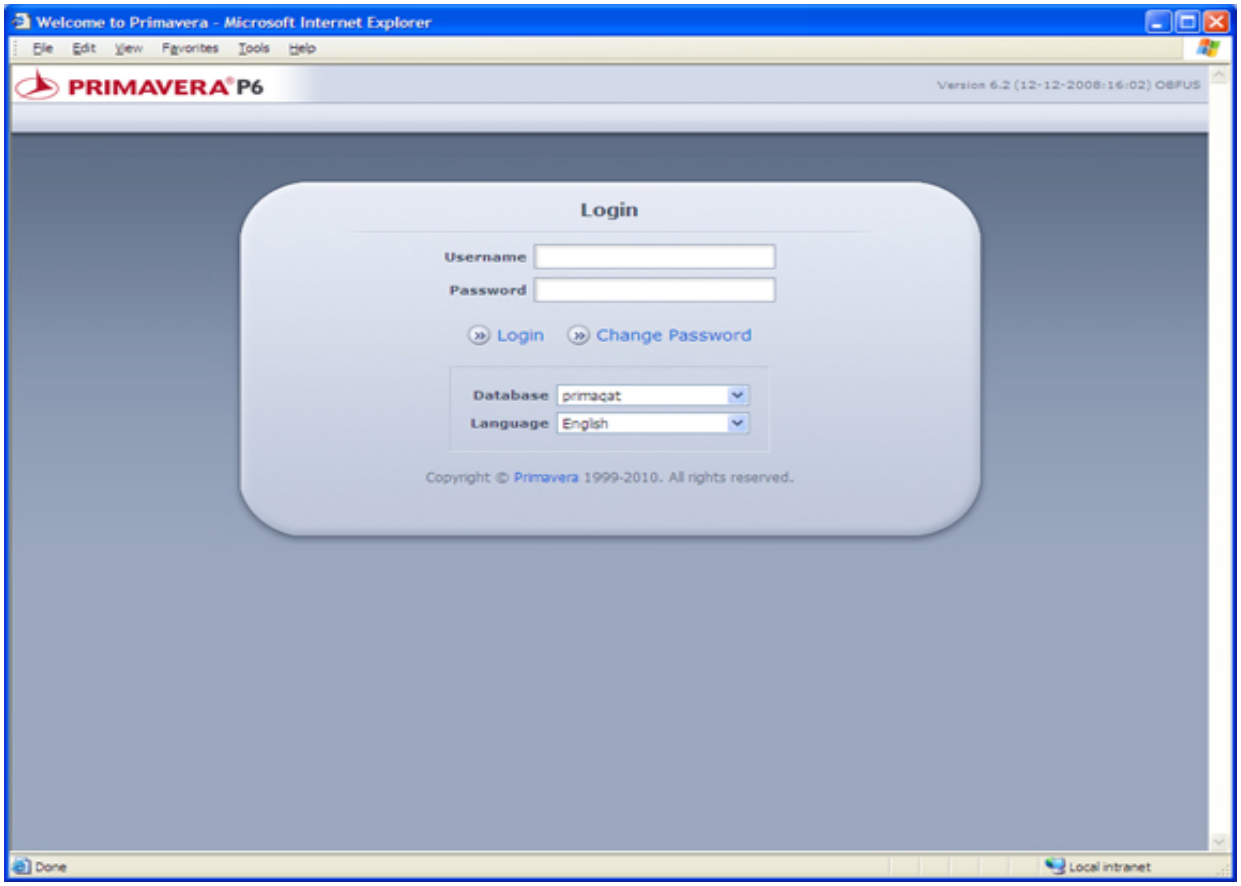
The United Illuminating Company

Estimating to Actual Cost Model



SCHEDULING

PRIMAVERA



The United Illuminating Company

Distribution Engineering

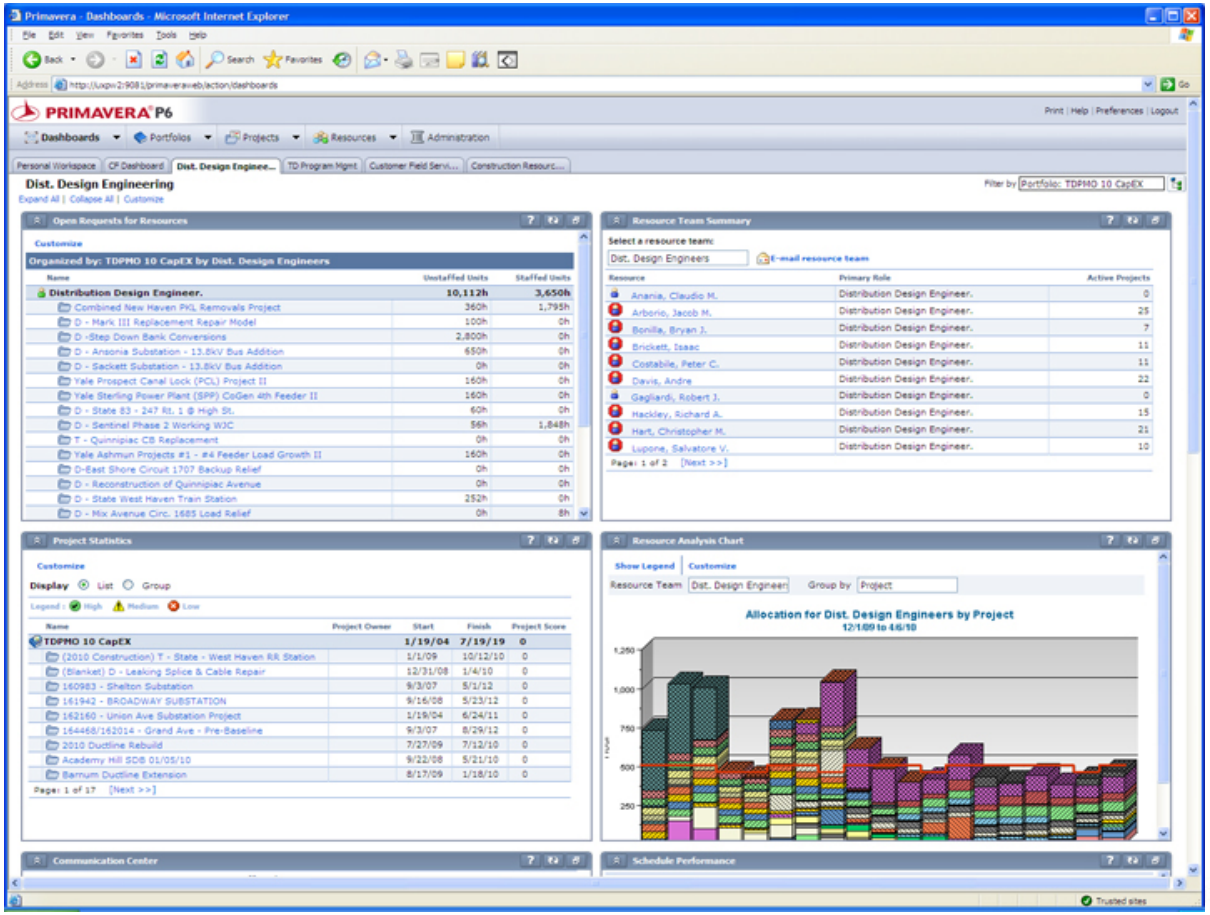
SCHEDULING

PRIMAVERA

Default Dashboard:

Primavera will open to your default dashboard, designed to provide information needed to manage your resources.

- **Open Requests for Resources**
- **Resource Team Summary**
- **Project Schedules**
- **Resource Analysis Chart**

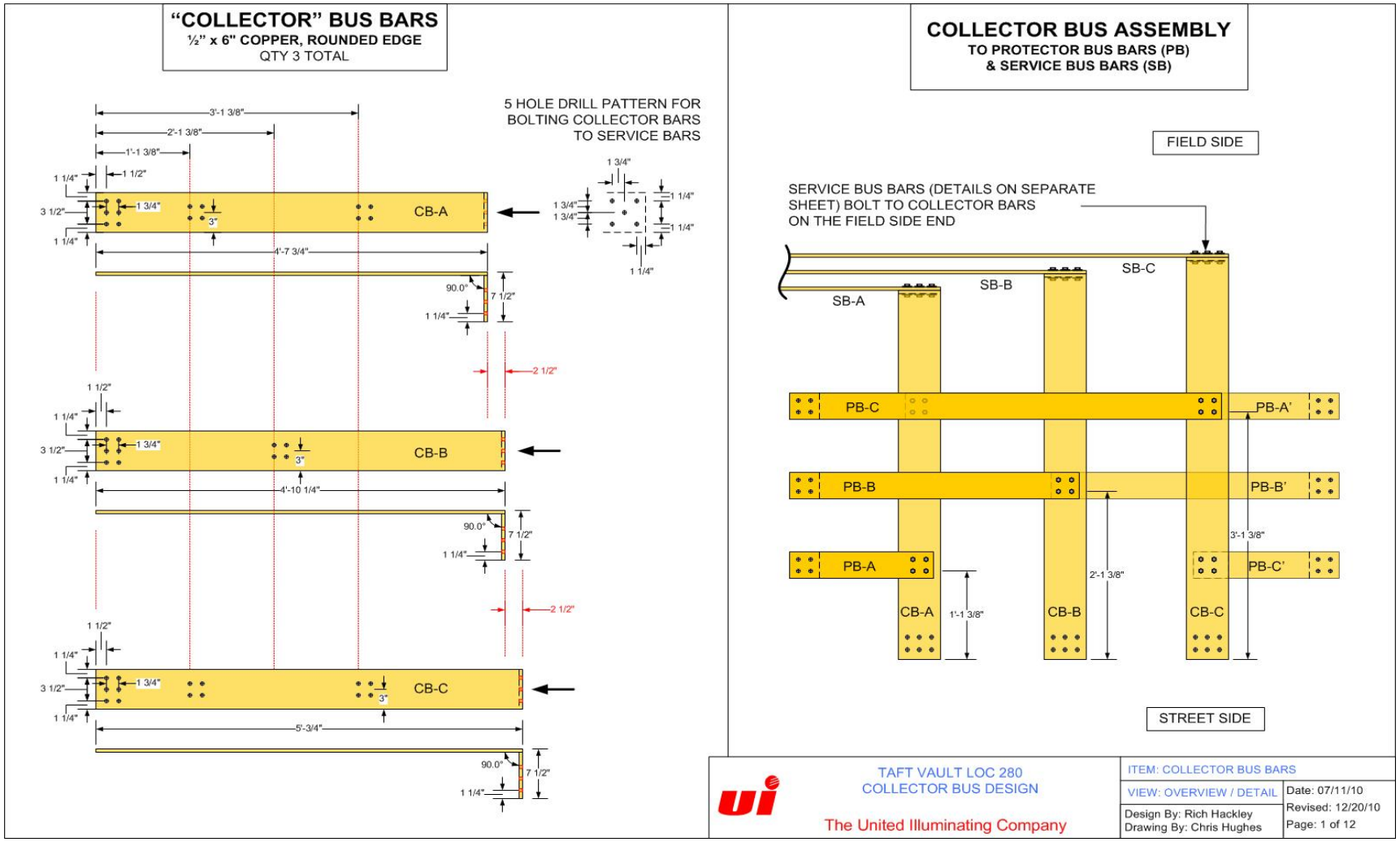


Electric Design Engineering @ UI

Electric Design Engineering @ UI

Electric Design Engineering @ UI

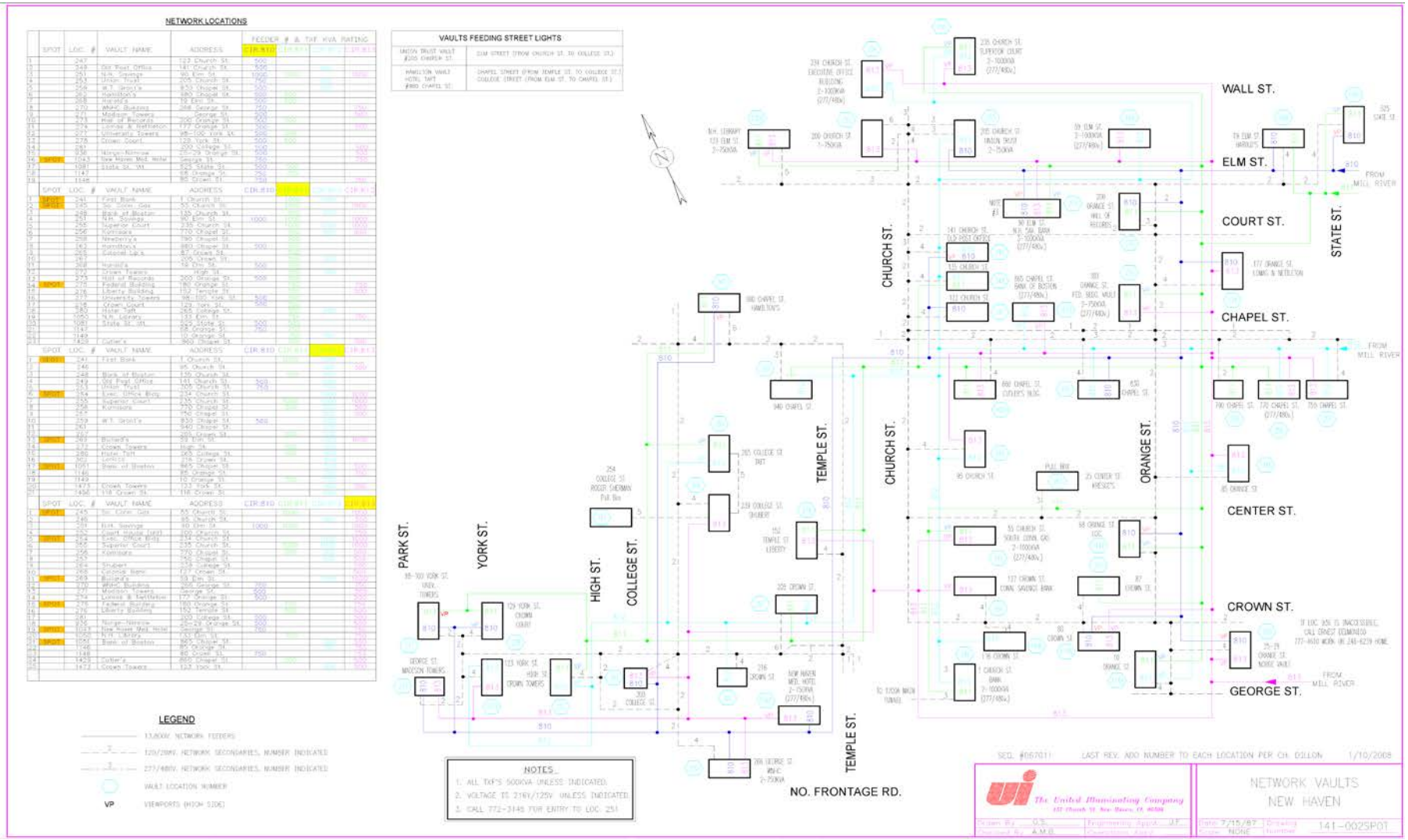
Electric Design Engineering @ UI



The United Illuminating Company

Distribution Engineering

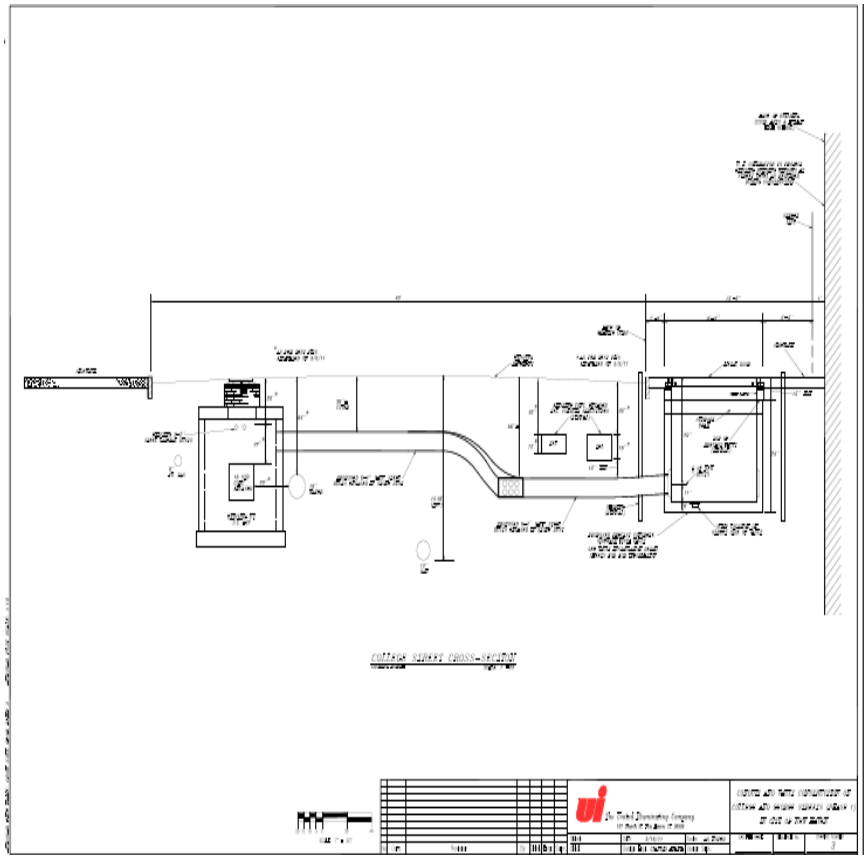
Electric Design Engineering @ UI

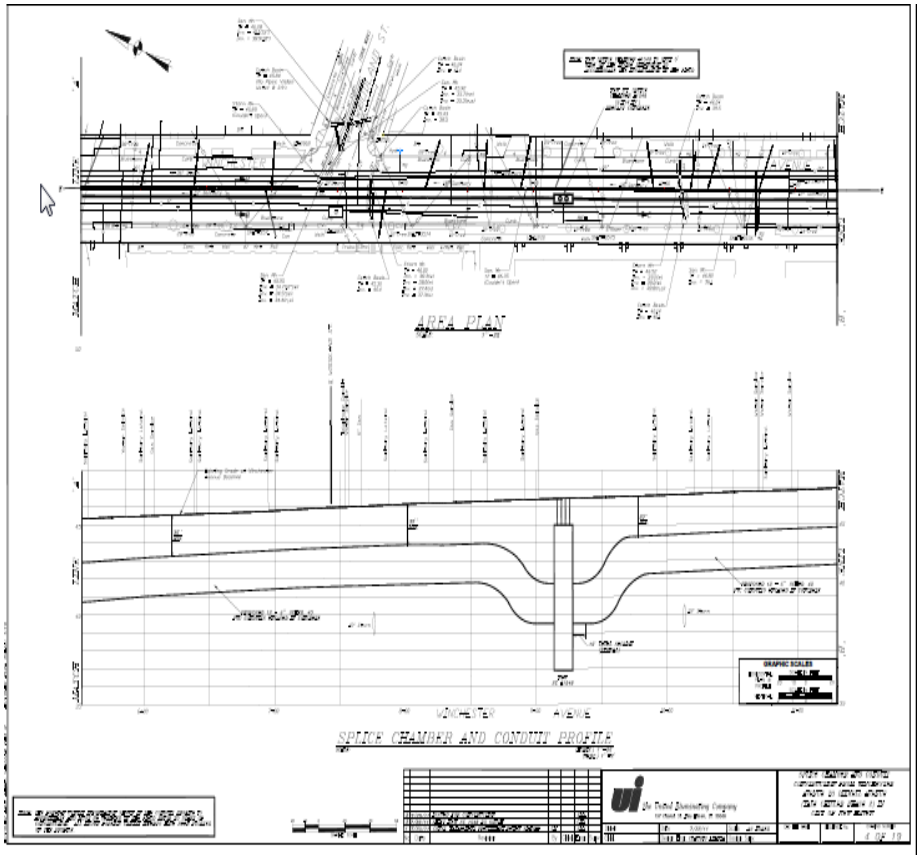


Civil Design Engineering @ UI

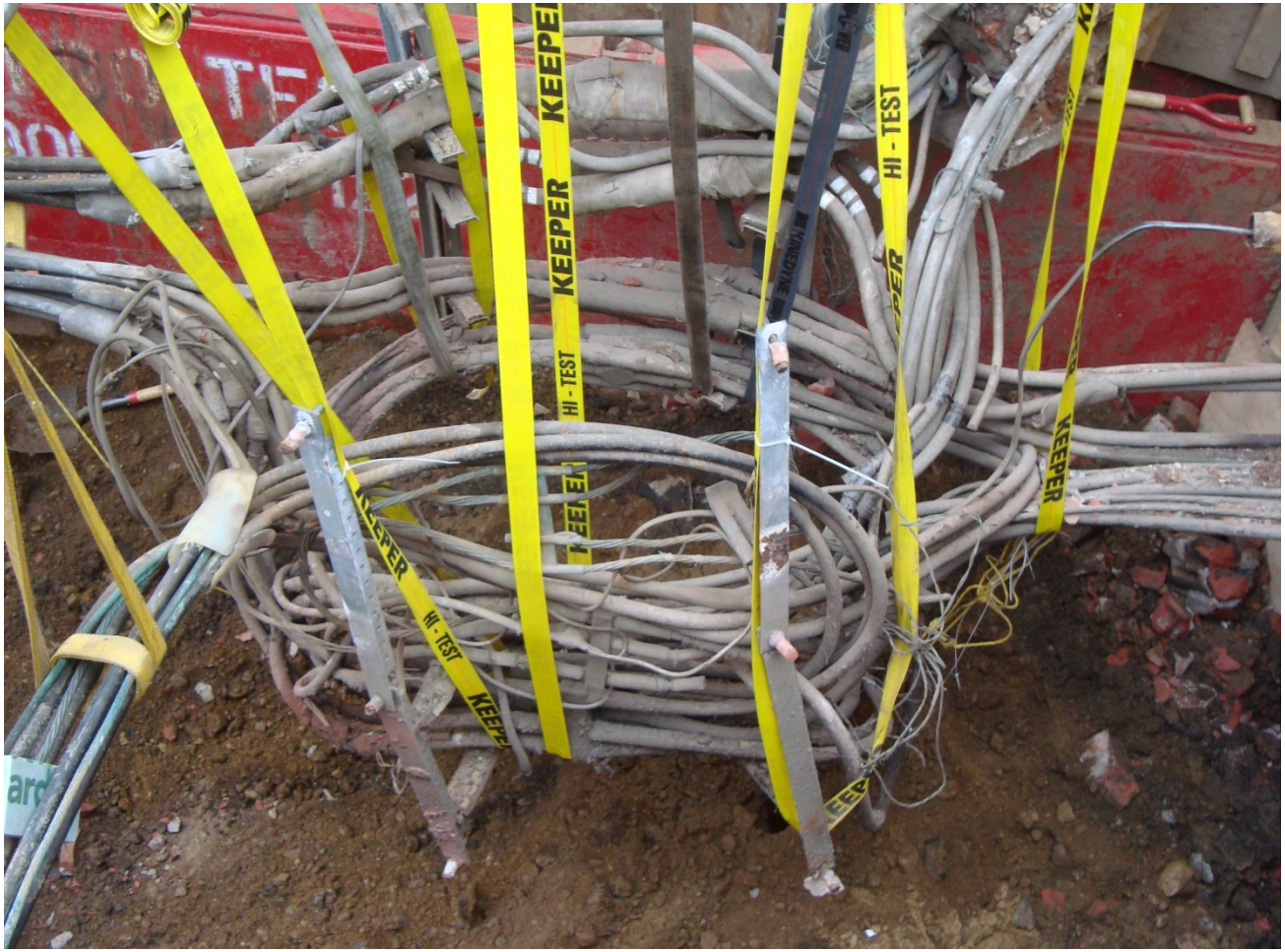
Civil Design Engineering @ UI

Civil Design Engineering @ UI





Electric & Civil Design Engineering @ UI



Part Time Weathermen

Every Day Provides Challenges and Surprises

The United Illuminating Company

UIL HOLDINGS CORPORATION

UI Electric T & D

Utility Exchange Program

(Pakistan Distribution Companies)

The United Illuminating Company

DISTRIBUTION INFRASTRUCTURE PLANNING

Robin Lyons, Lead Engineer

Infrastructure Planning

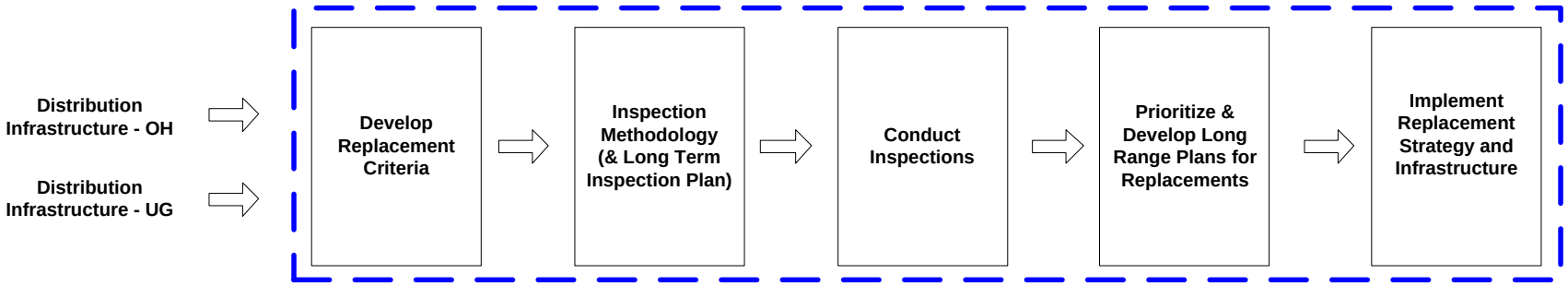
UIL HOLDINGS CORPORATION

Distribution Infrastructure Planning – Overview

- **This area develops short and long range plans to meet the infrastructure replacement requirements of UI's Distribution Ten Year Plan.**
- **The Infrastructure Planning (IP) Engineer has a central role in developing, planning and executing the strategic replacement of UI's aging distribution infrastructure.**
- **The Infrastructure Planning (IP) Engineer works closely with the Distribution Standards, System Integrity Planning, System Maintenance and Project Management areas to develop, plan and coordinate the inspection / replacement criteria, condition assessment methodology and analysis of selected types of electric equipment such as poles, splice chambers, vaults, cable, transformers, switchgear, etc.**

The United Illuminating Company

Distribution Infrastructure Planning Replacement Process



- Specific for Each Asset Class
- Do we have it currently
- What do we need to get it
- Compare proactive program to Individual replacement as needed

- Do we have it documented currently
- What is required to develop
- Develop for each asset class
- Training

- Review current inspection programs
- What is required to develop
- Develop/refine for each asset class
- What are the current results quantified in $$ and work

- Prioritize Strategy for each asset class
- High level understanding, awareness, and analysis
- High level solutions and Alternatives identified

- Review solutions/ alternatives drill down details
- Evaluate solutions
- Select Solution
- Solution Approval
- Implement Solutions

Note: Distribution Asset Classes are at various stages in this process

UIL HOLDINGS CORPORATION

Proactive Distribution Replacement Programs

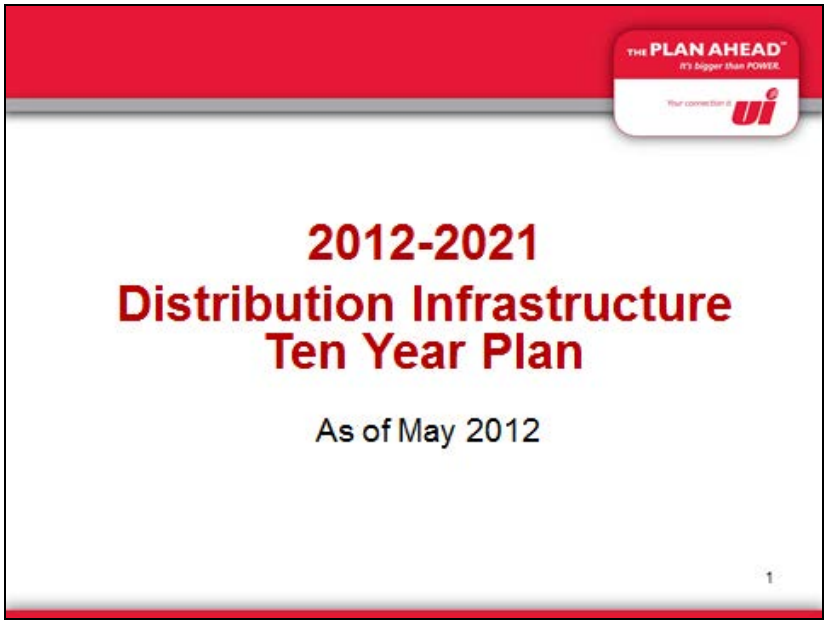
Cage
Distribution Substation
Distribution Transformer
Mark II/III Switch
Network Protector
Network Transformer
Overhead Aerial Cable
PKL Switch
Service Connectors*
Splicing Chamber/Ductline
Streetlight*
Underground Cable
Vault
Wood Pole

** Recently completed programs*

The United Illuminating Company

Distribution Infrastructure Planning

The *Distribution Ten Year Plan* documents and projects capital expenditures associated with the proactive replacement programs over a "rolling" ten year period.



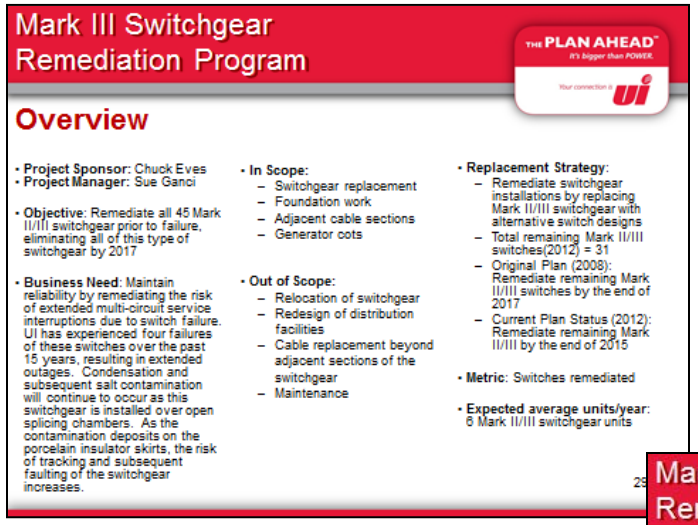
UIL HOLDINGS CORPORATION

Distribution Infrastructure Planning

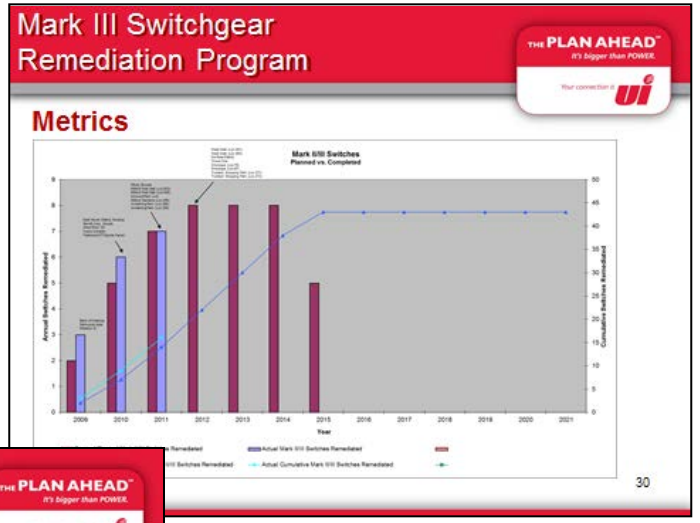
The United Illuminating Company

Each program is documented in three parts:

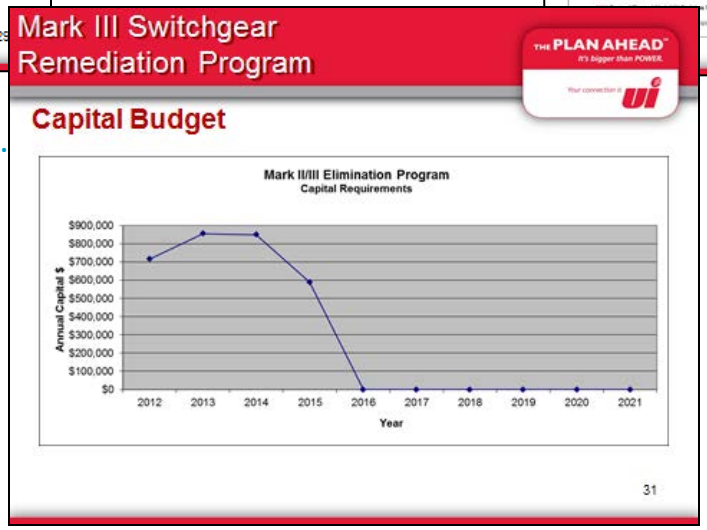
1. Program Overview



2. Metrics



3. Capital Budget



UIL HOLDINGS CORPORATION

The United Illuminating Company

UIL HOLDINGS CORPORATION

UI Electric T & D

Utility Exchange Program

(Pakistan Distribution Companies)

The United Illuminating Company

UI DISTRIBUTION STANDARDS

Mike Zaffina, Manager

Infrastructure Planning

UIL HOLDINGS CORPORATION

What we do:

I. Develop distribution construction and design standards for UI's electrical overhead and underground lines operating to 15,000 volts for use by the engineering and construction workforce.

II. Write engineering specifications for electrical equipment.

III. Create material specifications for various items; such as concrete products, poles, transformers, cable, etc.

IV. Serve as technical advisors (SME) for the application of electric equipment such as cable, transformers, switchgear, etc. to the engineering and construction workforce.

V. Follow updates in research and developments taking place in the power industry (Smart Grid, etc).

VI. Conduct root cause analysis on distribution equipment failures.

VII. Participate and represent UI on Industry associations (IEEE, ANSI, etc).

Why do we need Standards?

- Safety of personnel and public
- Lower cost
- Uniform practices enhance productivity
- Conform to state & federal mandates

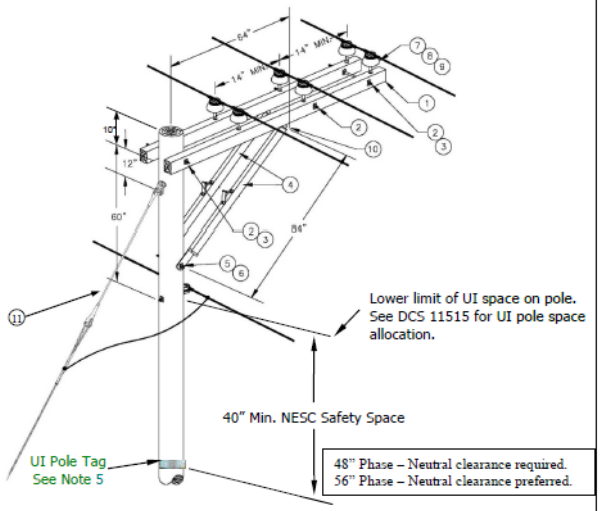
Construction Standards

- Tells you how to build and/or design it.
- Adherence to the National Electrical Safety Code (NESC) provides minimum safe clearances for the public and safe working clearances for the workers.
- Determines the most suitable means to provide a safe and reliable means to serve electrical loads.
- Considers required voltage, current and fault duty ratings.

UI Distribution Standards

- Example Construction Standard – Pole Top

12540 – Double Outrigger Arm	Std: 12540 Pg 1 of 2



Notes:
1. Use eight foot or ten foot crossarms as required to obtain adequate clearance from buildings, structures or to minimize the angle in the line.
2. Not for use with six foot crossarms.
3. See DCS-120 to determine guying requirements.
4. See DCS 12010 for corner feet calculations.
5. See DCS 11516 for UI pole space tag installation.

DOUBLE OUTRIGGER CROSSARMS DOUBLE PINS							
CONDUCTOR SIZE & TYPE	AVERAGE SPAN LENGTH (FT)						
	100	125	150	175	200	225	250
	MAXIMUM ALLOWABLE CORNER FEET						
#4 CU	50	50	50	50	50	50	50
#2 CU	47	46	45	45	44	43	42
#2/0 CU	33	33	32	32	31	30	30
#4/0 CU	25	24	24	24	23	23	22
#1/0 AL	47	46	45	44	43	42	41
#4/0 AL	41	40	39	38	37	37	36
397.5 AL	19	19	19	19	18	18	18

Important: See DCS 12545 for corners exceeding these limits.

Distribution Standard Construction/Design		Original	Revised	Revised	Revised
	Designed By		HL		
	Approved By		MZ		
	Date		8/25/11		

Cad File # Section – 125 Drawing # DS-12540-01 SEQ #: 040971 Revision 3/20/97 MEC

07/30/12 Page 36 of 39

UIL HOLDINGS CORPORATION

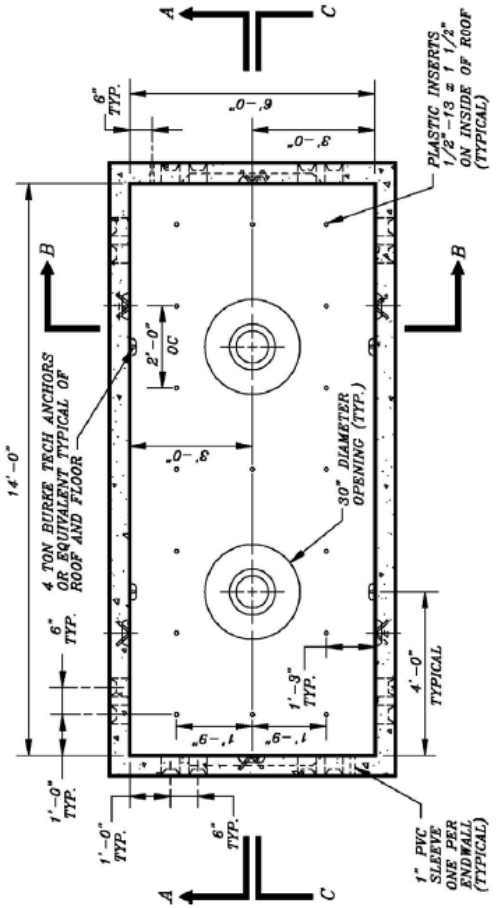
Material Specifications

- Only required when an item isn't readily available via a catalog number
- Explains in detail the physical dimensions, type of material and strength requirements
- References to National Standards may be added (ASTM, ANSI, AASHTO, UL)
- Usually used for structures and hardware

UI Distribution Standards

- Example Specification – Splice Chamber

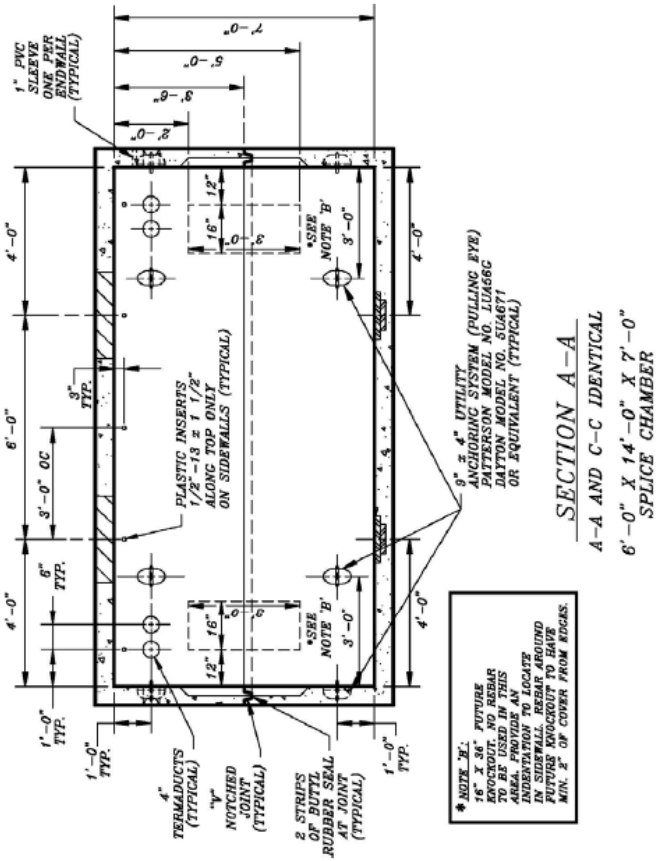
SPLICE CHAMBER, PRECAST – 6′ x 14′ x 7′, Straight	SPC-M02S Page 2 of 6



PLAN VIEW
6′–0″ X 14′–0″ X 7′–0″ SPLICE CHAMBER

Distribution Standards Material Specification		Original	Revised	Revised	Revised
	Drawn By	PF	RSV		
	Approved By	MZ	MZ		
	Date	1/30/2008	1/19/12		

SPLICE CHAMBER, PRECAST – 6′ x 14′ x 7′, Straight	SPC-M02S Page 3 of 6



SECTION A–A
A–A AND C–C IDENTICAL
6′–0″ X 14′–0″ X 7′–0″ SPLICE CHAMBER

Distribution Standards Material Specification		Original	Revised	Revised	Revised
	Drawn By	PF	RSV		
	Approved By	MZ	MZ		
	Date	1/30/2008	1/19/12		

Distribution Equipment Specifications

- Similar to Material Specifications but are far more encompassing
- Covers transformers, cables, switchgear, radios, capacitors, oil etc.
- Items purchased to national standards; ANSI, IEEE, AEIC, ICEA

Distribution Engineering Guides

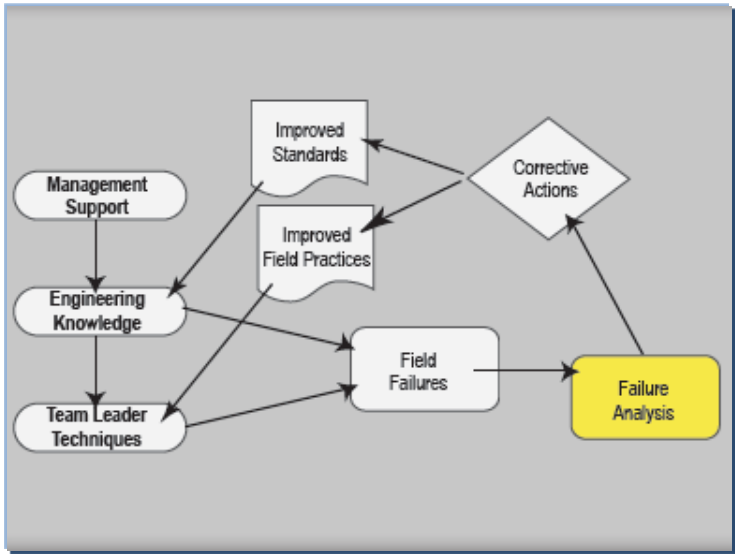
These documents are intended to provide guidelines for the orderly development of overhead and underground systems design and construction, to meet the needs of our customers with an acceptable level of safety, reliability, flexibility, and economics.

Example Topics Covered:

- Overhead Distribution Design
- Underground Design
- Grounding and Bonding
- Voltage Regulation

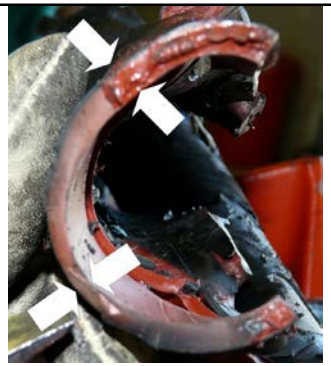
Failure Analysis of Distribution Equipment

- Critical step toward maintaining and improving reliability.
- Provides a thorough understanding of what is failing and how to improve:
  - Standards, specifications and product selection
  - Field Practices
- Failure Analysis reports - central repository (UI - UER)

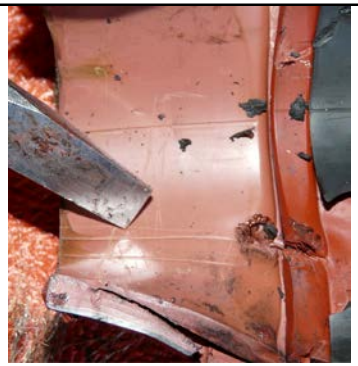


UI Distribution Standards

Example Investigation – Heat Applied Splice Failure



Layers not evenly shrunk.



Wrinkled layers.

Oil found between splice layers in heat shrink transition joints.

Improper connector used
CU connector on aluminum conductor.
(Found on wye and straight splices)

Arc proofing tape installed under splice jacket.

Water intrusion.

Other Document Types – References

- National Standards Library: ANSI, IEEE, AEIC, ICEA (current and historical)
- Equipment Catalogs and instructions docs (current and historical)
- Old UI Standards and Specs (historical)
- UI and Industry Engineering and research studies (current and historical)

The United Illuminating Company

UIL HOLDINGS CORPORATION

UI Electric T & D

Utility Exchange Program

(Pakistan Distribution Companies)

The United Illuminating Company

SYSTEM TOOLS – GIS MAPPING OF DISTRIBUTION NETWORK

Peter Sampiere, Supervisor

GIS

UIL HOLDINGS CORPORATION

The United Illuminating Company

Agenda

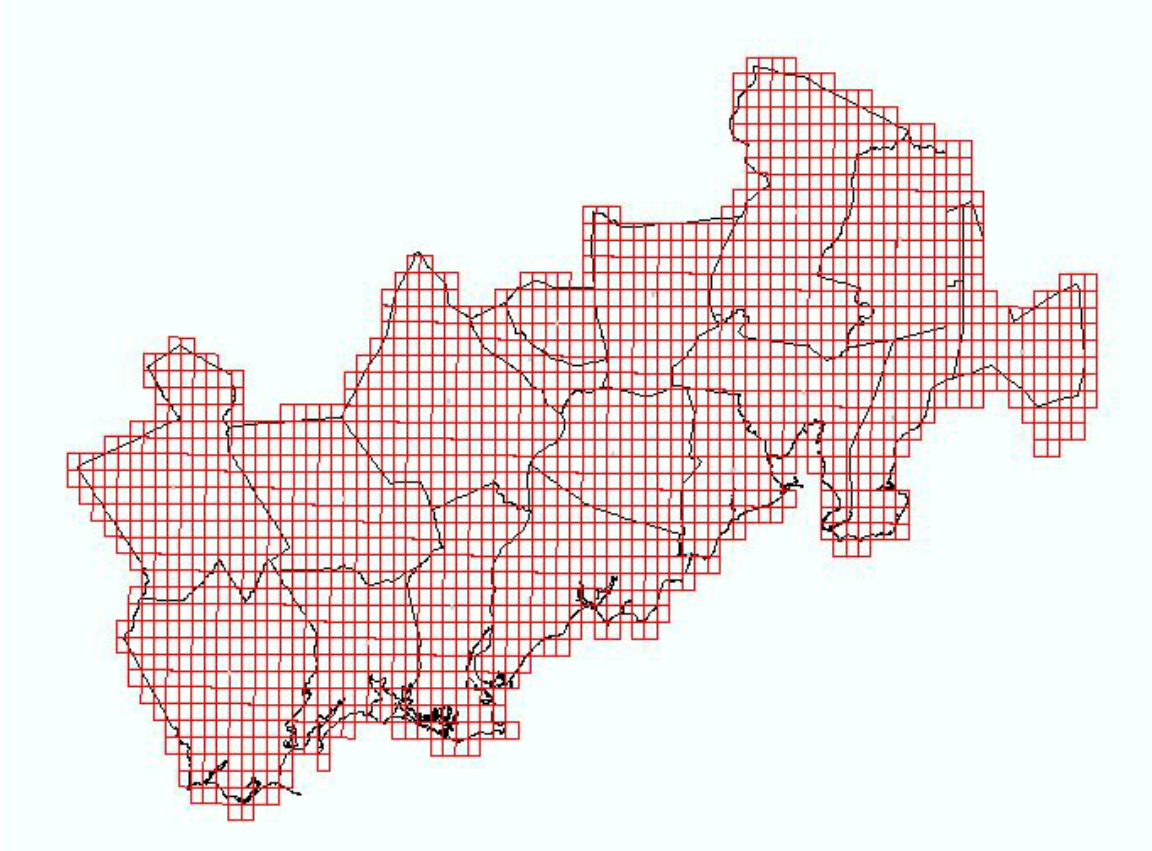
- Background
- Technical Details
- User Community
- Work Examples

UIL HOLDINGS CORPORATION

The United Illuminating Company

UI - GIS

UI's GIS started as a mandate from the DPUC in 1985; the regulatory body wanted all of our assets stored in an electronic database.



IL HOLDINGS CORPORATION

Current GIS

- ESRI ArcGIS/ArcMap
- Telvent's ArcFM 9.3.1*
- Oracle 10G
- Citrix
- ArcView 3.3 (GIS Lite)

* - ArcFM is a GIS add-on that is tooled specifically for use by utilities. It allows users to trace circuits using connectivity, and uses a tool called feeder manager which makes certain changes to the data programmatically. It also comes with a feature called "Map Books," which allows us to better organize and print our standard map products.

The United Illuminating Company

- UI's GIS System is an As-Built, Normal Operating Condition, database. It is updated on a continuous basis. Extracts from our GIS are used in other applications, such as OMS, GIS Lite, and CYME.
  - OMS is our Outage Management System
  - GIS Lite is our GIS viewing tool, used primarily by our engineers
  - CYME is a circuit analysis tool used by our planning area

Every night, Customer data is fed to our GIS from SAP, this information is then linked to our service points.

UIL HOLDINGS CORPORATION

Current Users

- 5 Full Time Editors
- 22 Concurrent ArcView Licenses

Our GIS is used by:

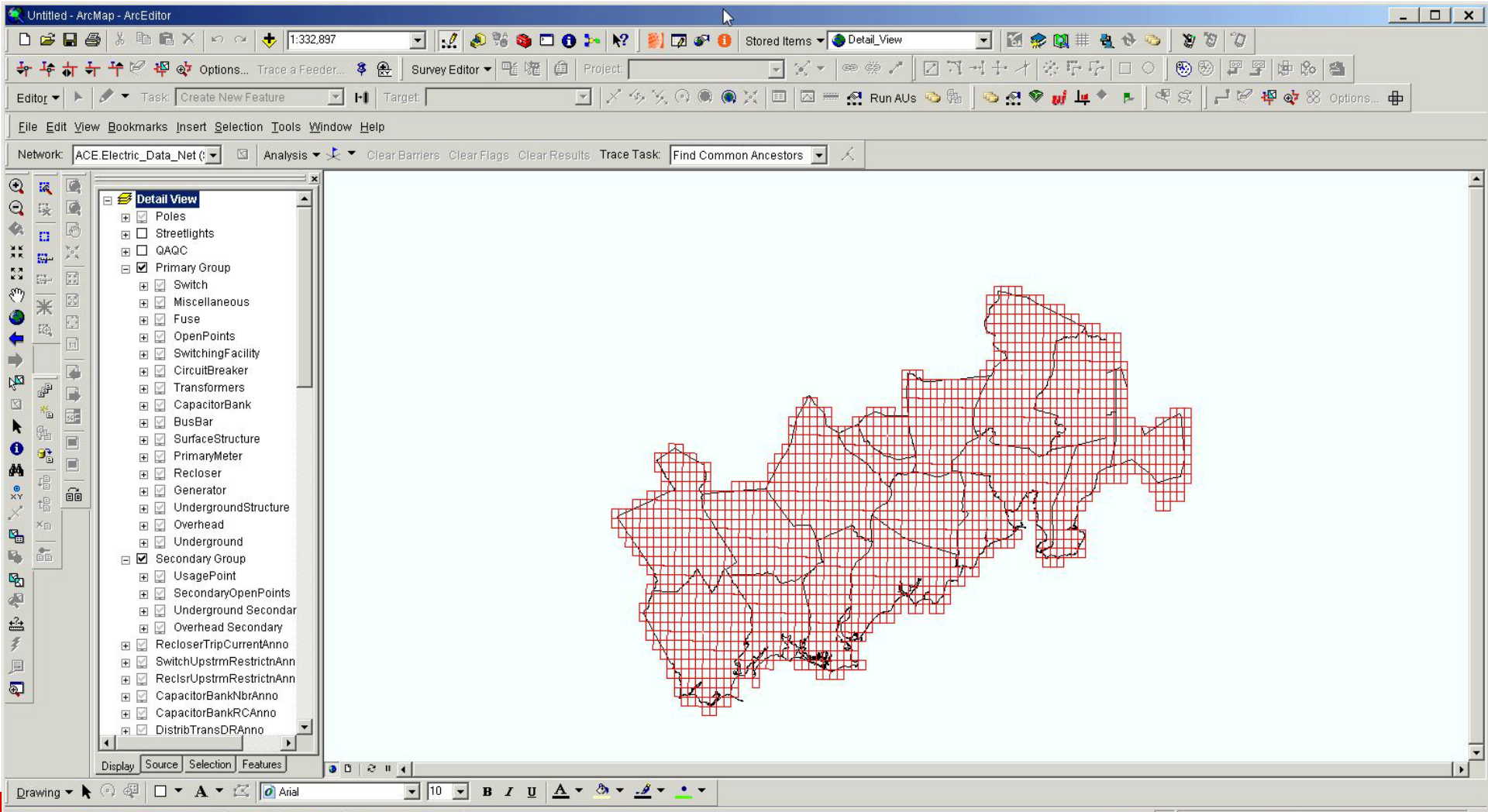
- Engineering Groups
- System Operations
- Maintenance
- Planning
- Construction
- Storm Restoration
- Lighting.

The United Illuminating Company

- Our various Engineering groups use GIS to reconfigure or design electrical circuits, using data extracts as well as maps.
- System Operations uses GIS extracts to populate the data in their OMS (Outage Management System), as well as paper maps as a backup system. The extracts for OMS are updated nightly.
- UI's Maintenance Department uses GIS for – Vegetation Management, Transmission Line Inspections, and Splicing Chamber Inspections. They also use data extracts, such as a cable miles report, and custom tree-trimming maps.
- The Planning Area uses GIS to map out and plan improvements to select circuits in our system. They take circuits extracted from GIS, and import them into our CYME circuit analysis application.
- The Construction area uses GIS maps for Work Requests and Field Inspections.
- Storm Restoration uses GIS extracts through the OMS system, as well as Storm Patrol Maps for our Damage Assessment Crews to take into the field to identify damaged equipment for our repair crews.
- Our Lighting Group can now use GIS to find Streetlights and Private Area Lights that we are billing, since all of our Lights are now in GIS.

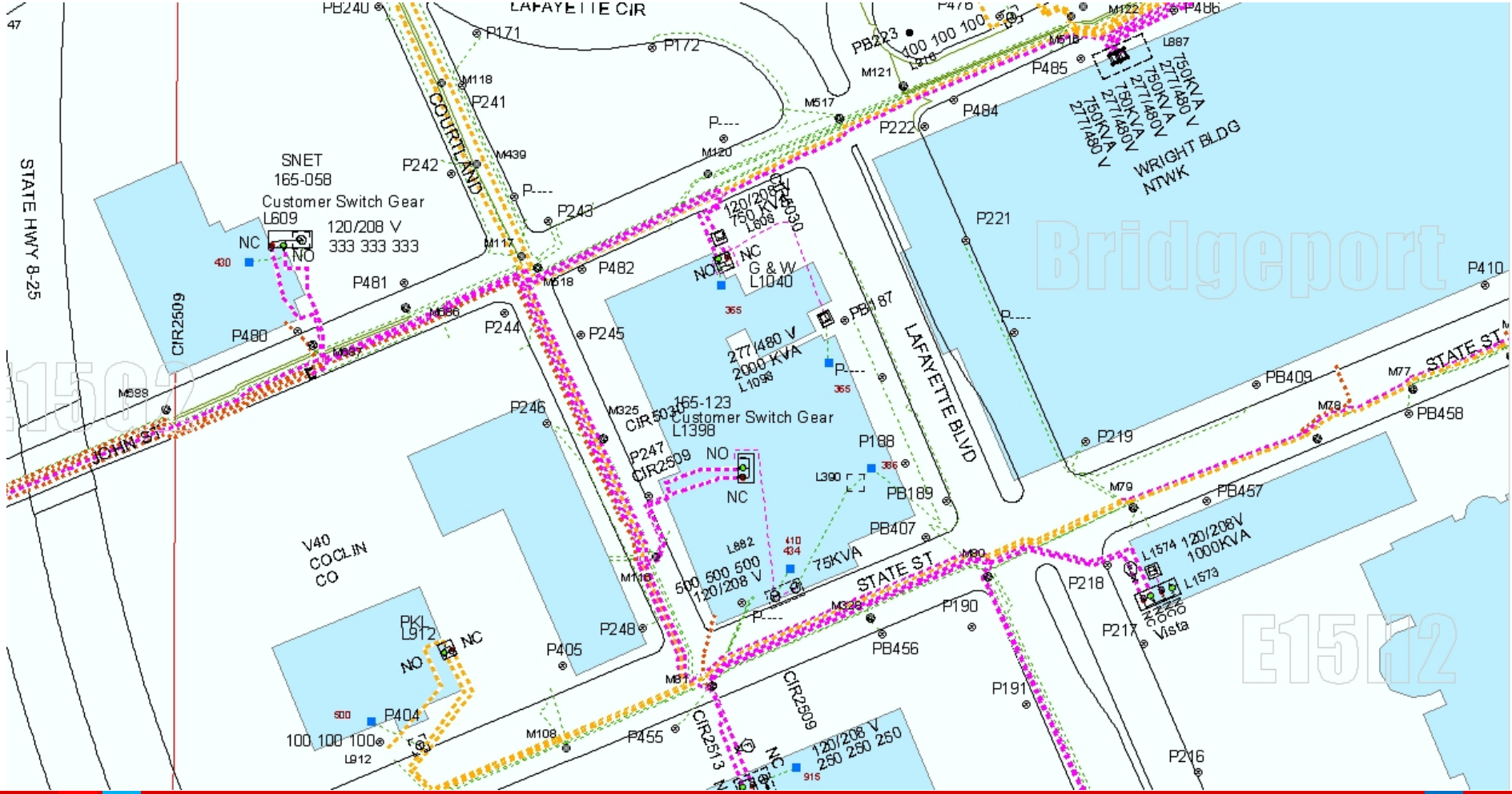
The United Illuminating Company

UI uses Telvent's ArcFM, which is ESRI's ArcGIS customized for utilities.



The United Illuminating Company

Detail View



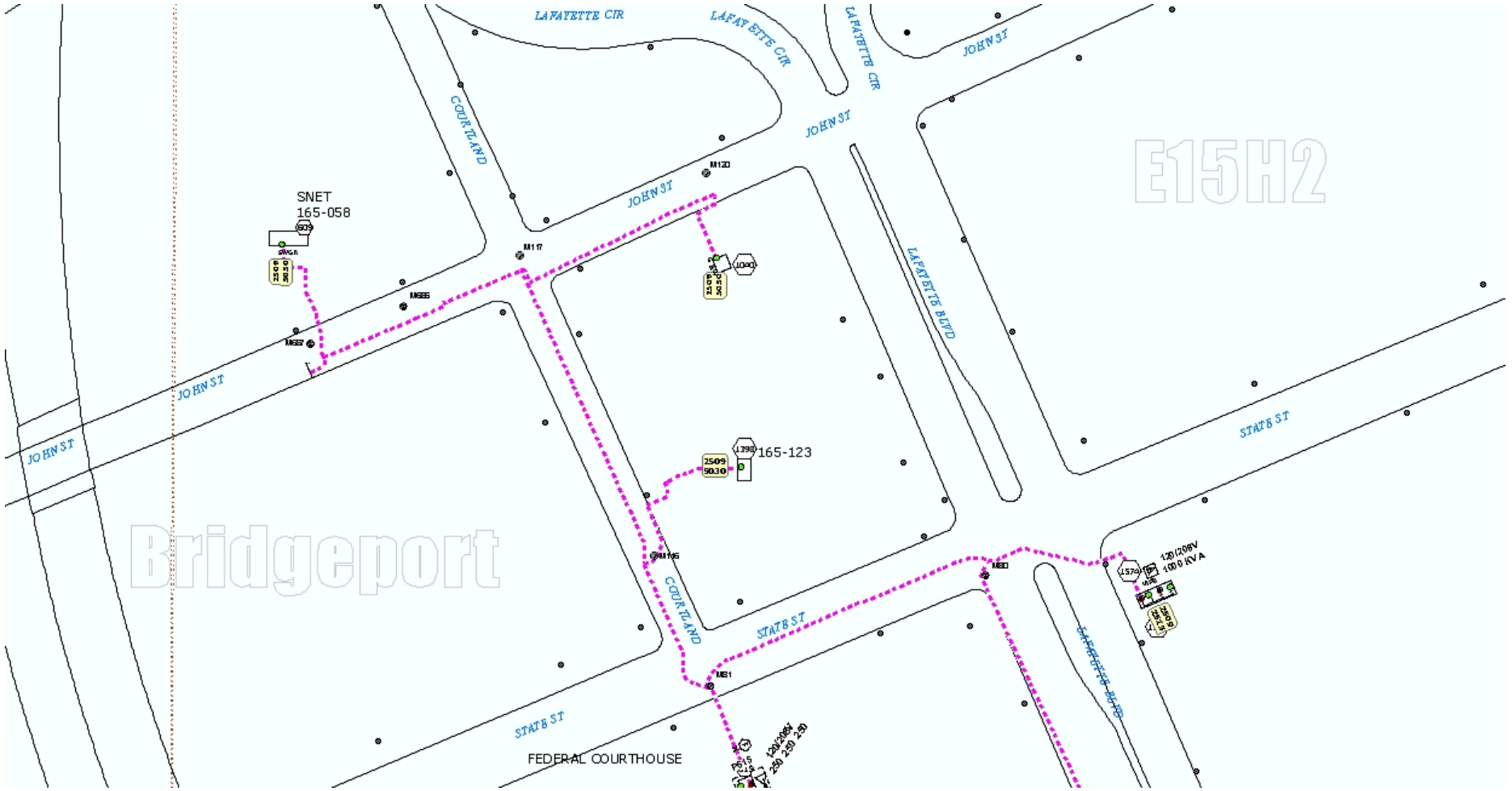
The United Illuminating Company

- The Detail View shows UI's assets from the Circuit Breaker, right down to the Meter.
- There are approximately 1700 Detail Maps that make up UI's Territory.
- Paper Detail Maps are still maintained as a back up system
- Detail Maps are 100' Scale

UIL HOLDINGS CORPORATION

The United Illuminating Company

Primary Circuit (PCM) View



UIL HOLDINGS CORPORATION

- The Primary Circuit View shows a filtered view of UI's Assets; from the Circuit Breaker, down to the Transformer/Switch Level, No Secondary Features.
- There are approximately 400 PCM's, one map(s) per circuit.
- PCM's vary from one sheet to as many as eleven sheets.
- The Scale Factor of PCM's varies by circuit.
- There are also paper PCM maps hanging in the System Operations Center.

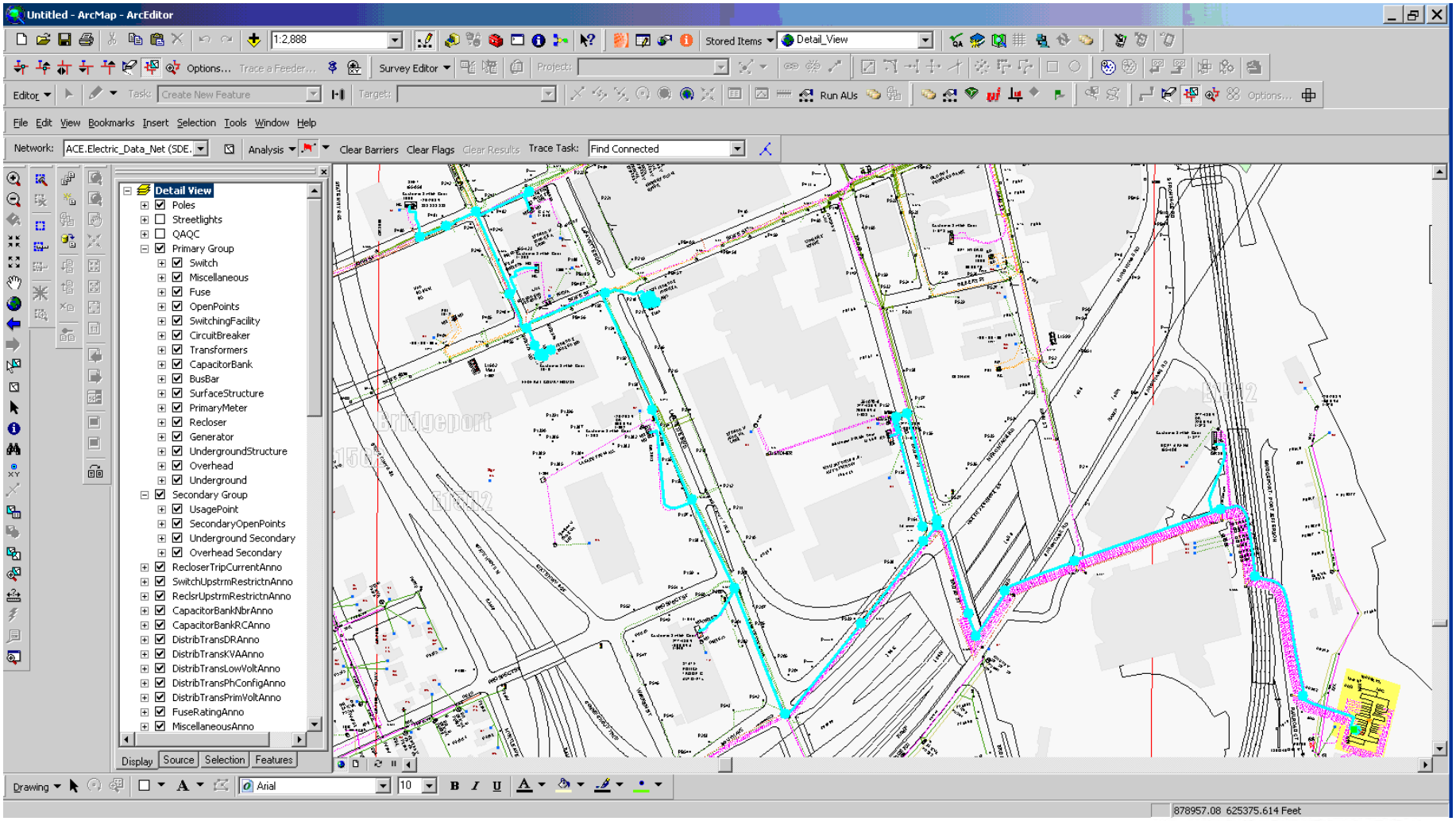
FMM

- The Feeder Mainline Map (FMM) shows UI's assets from the Circuit Breaker to major tie-points (i.e. Air-break Switch, Recloser, Vista Switch, Etc.)
- There is No Secondary on a FMM
- The original goal of the FMM was to fit the extent the circuit's Feeder on one sheet, but for readability reasons, a small amount have two sheets.
- UI's definition of Feeder is 3 Phase, un-fused open wire or cable.

The United Illuminating Company

GIS - Trace

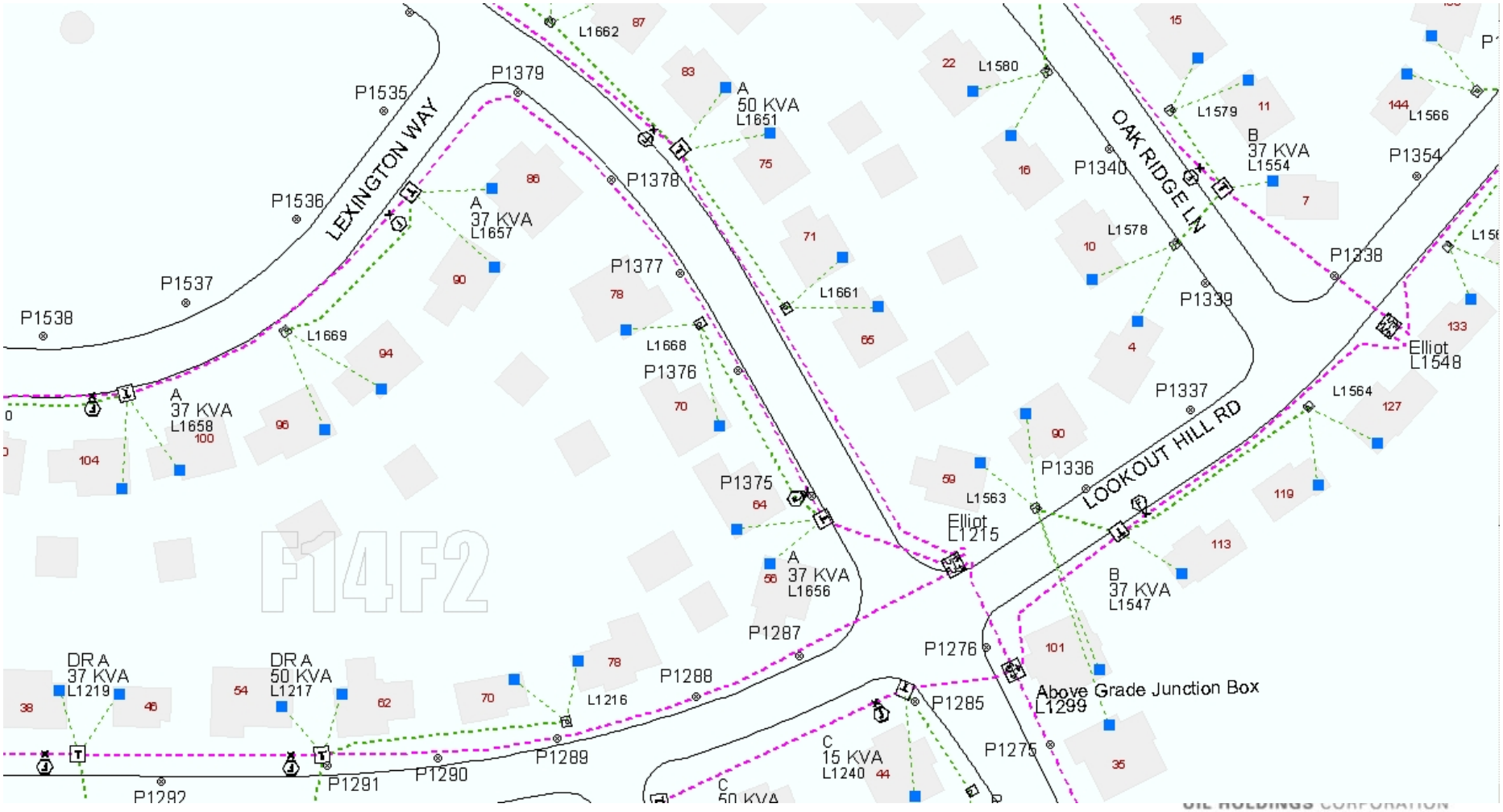
The “Find Connected” trace finds all features connected to the selected circuit



The United Illuminating Company

UI - URD

URD – Underground Residential Distribution



The United Illuminating Company

UIL HOLDINGS CORPORATION

UI Electric T & D

Utility Exchange Program

(Pakistan Distribution Companies)

The United Illuminating Company

UI PROTECTION & CONTROL

Bob Pellegrini, Manager

Protection & Control

UIL HOLDINGS CORPORATION

The United Illuminating Company

Protection and Control

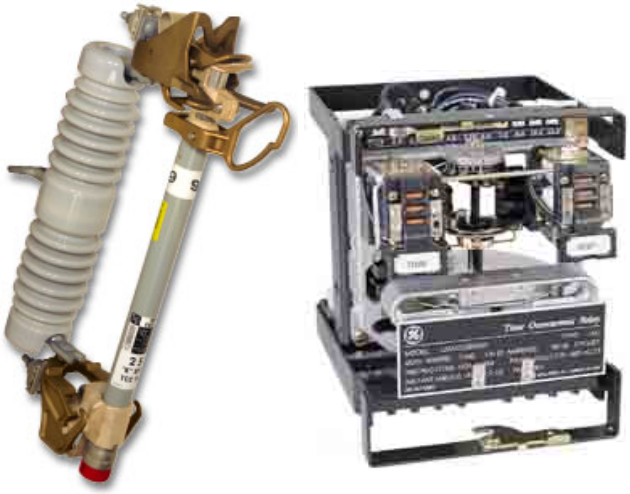
- System P&C Engineer

- What do we do?
- Design systems to “PROTECT” people and equipment from harm during times of electrical faults or when electrical devices and or equipment fails or is damaged.

The United Illuminating Company

Protection and Control

- Protection Systems
- Fuses and/or Protective Relays constantly monitor the power lines to check for problems.
- There Job is to instantly disconnect power lines during times of unplanned system events to protect equipment and personnel
  - Lightning
  - Pole Hit
  - Hurricane or other weather events
  - Equipment Failure
  - Human error



UIL HOLDINGS CORPORATION

The United Illuminating Company

Protection and Control

Substations

- Protection & Control Equipment.
- Electronics to Protect Equipment and Personnel
- Controls to operate system equipment.
- Circuit Breakers
- Switches
- Transformers
- Telecommunications Equipment
- Fiber optic Nodes and equipment.
- SCADA Equipment

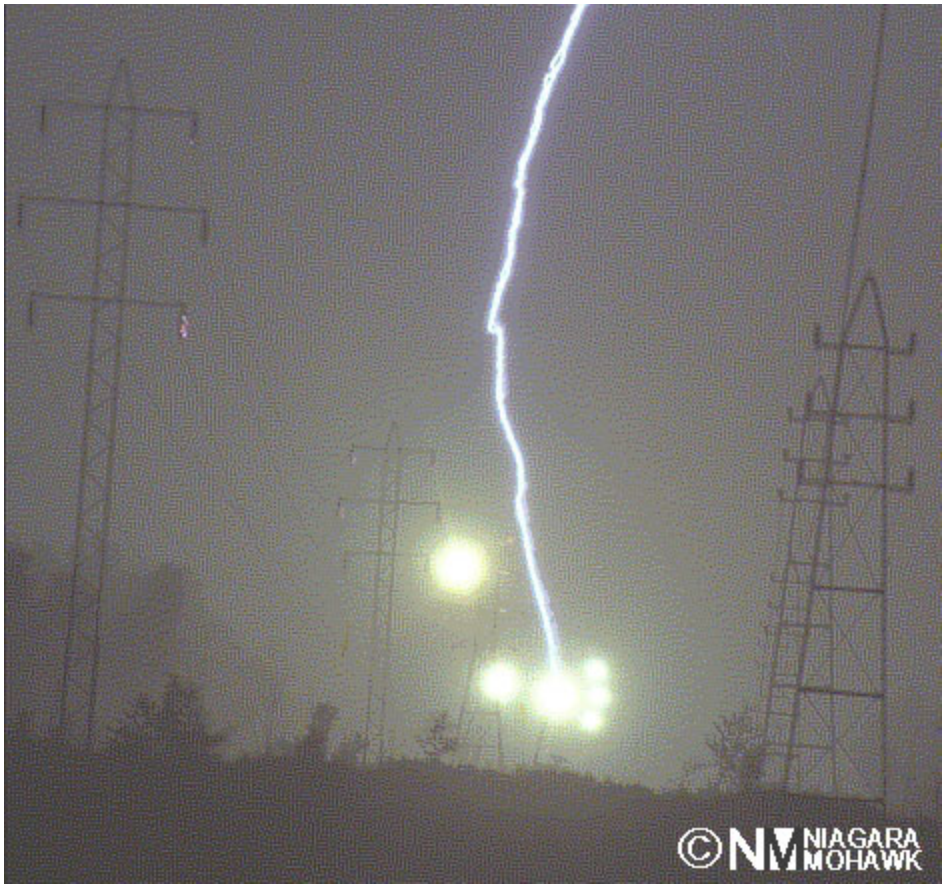
UIL HOLDINGS CORPORATION

Typical Substation Control Room

Typical Substation Yard

The United Illuminating Company

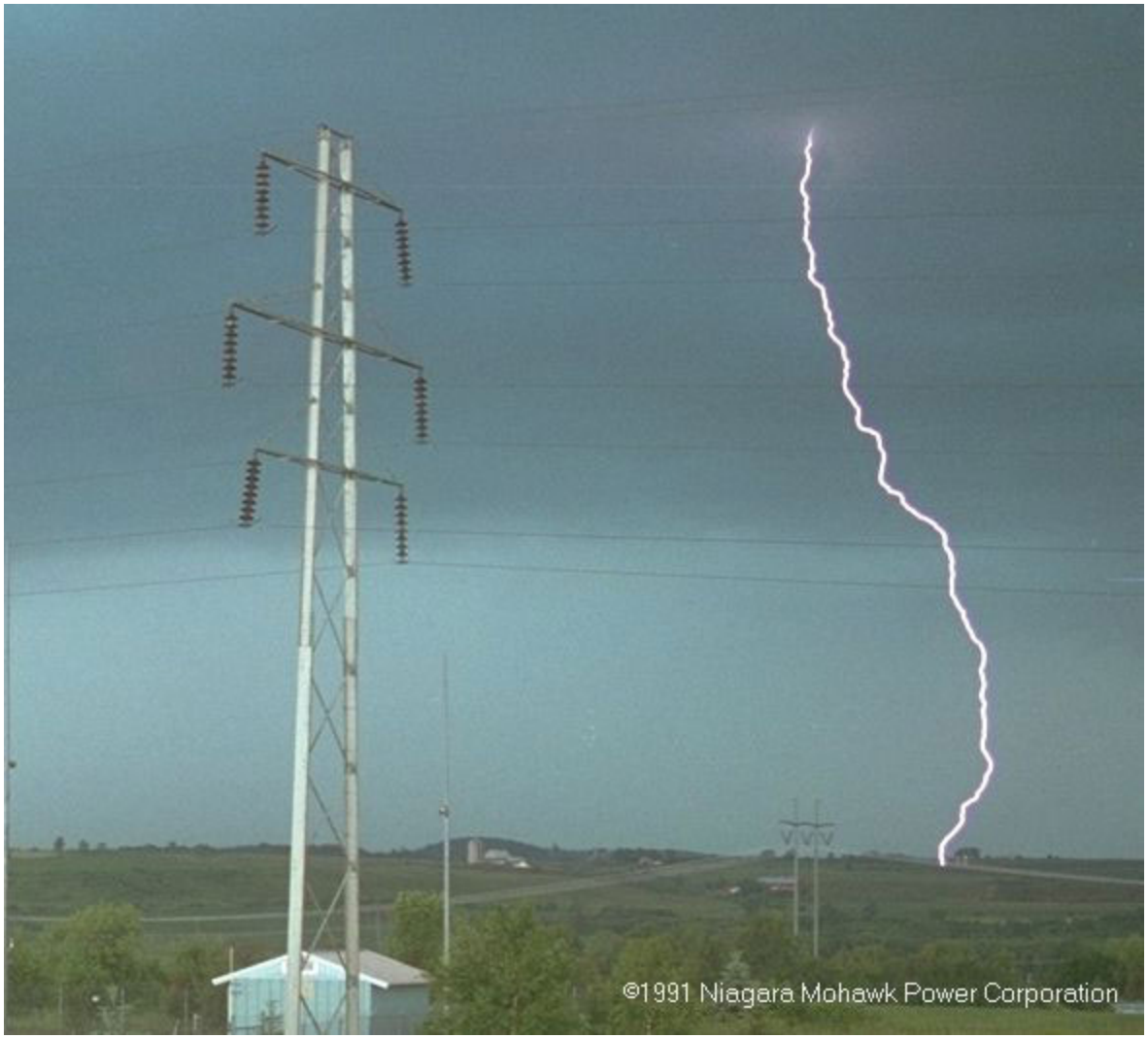
Protection and Control



UIL HOLDINGS CORPORATION

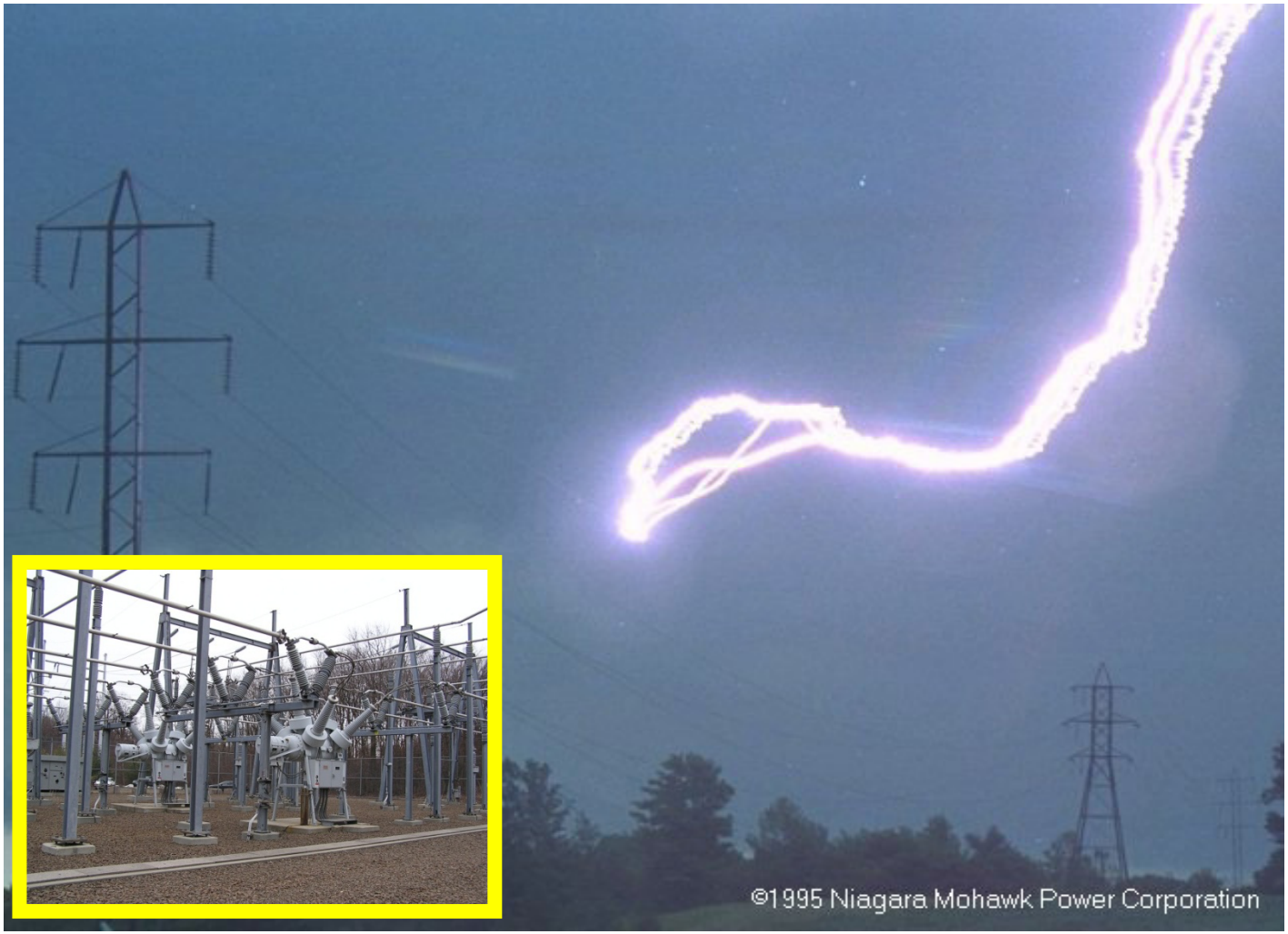
The United Illuminating Company

Protection and Control



UIL HOLDINGS CORPORATION

The United Illuminating Company



UIL HOLDINGS CORPORATION

The United Illuminating Company

Protection and Control

Transmission Protection Characteristics:

- Interconnected Transmission Grid as opposed to Distribution
- High Energy requires fast detection (1/4 cycle) sectionalizing and elimination of system disturbances
- Higher level of transmission complexity requires more sophisticated protection designs
  - Microprocessor based relays for speed, SOE , and recording capability
  - Independent primary and backup relay protection schemes
  - Physically Independent communication channels
  - Separated Physical control panels (Primary and backup separated in control room)
  - Separated and independent control cables
  - Digital Fault Recorders (DFR's) required to record relay events due to speed of operation
  - Reclosing employed; 90% faults lightning and temporary

Protection and Control

Distribution Protection Characteristics:

- Radial circuit designs; not as complex as Transmission
- Circuits connected together only during switiching
- High fault currents; Open bus ties; Arc Flash
- Reclosers used for fast restoration on mainlines
- Communication to pole top devices through hybrid Fiber RF Solution
- Side tap fuses
- Relays coordinate with all field devices; Customer switchgear, pole top reclosers,
- Distributed Generation permitted
    - Fault Current analysis
    - Interconnection Agreement
    - Impact analysis
    - Relay design and coordination study

The United Illuminating Company

UIL HOLDINGS CORPORATION

UI Electric T & D

Utility Exchange Program

(Pakistan Distribution Companies)

The United Illuminating Company

SCADA

Bryan LaPerle, Manager

SCADA

UIL HOLDINGS CORPORATION

What is SCADA?

Supervisory

Control

And

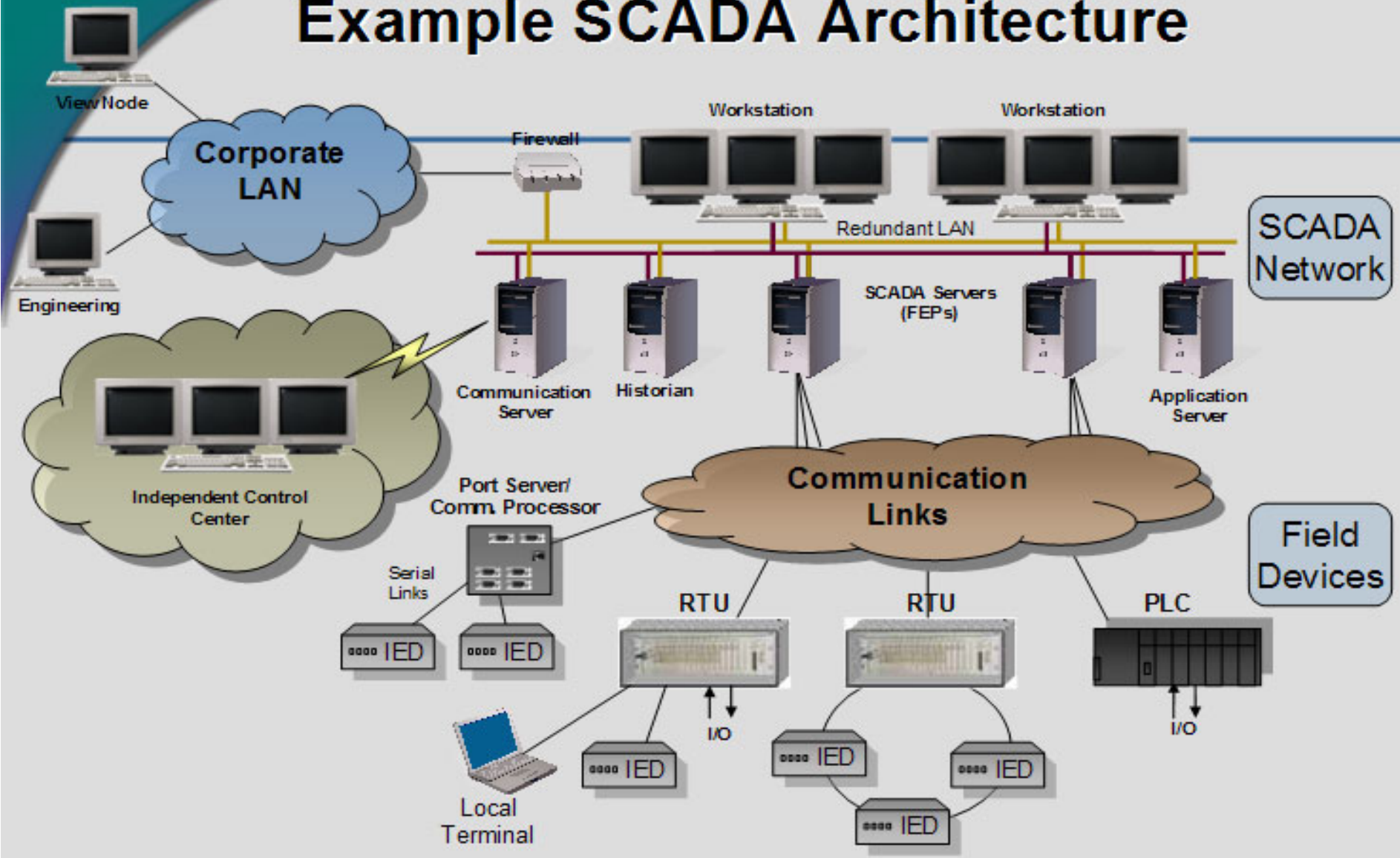
Data

Acquisition

Any application that gets data about a system in order to control that system is a SCADA application and a SCADA application will contain two elements.

- The process or system that you want to monitor and control.
- A network of intelligent devices that with the monitor and control the system through sensors and control outputs.

Example SCADA Architecture



How SCADA Systems Works….

- **Data Acquisition – Refers to information received from sensors or transmitting devices.**
- **Networked data communication - The protocol means required to communicate between devices. This communication may be made up of several protocols.**
- **Data presentation - The SCADA system continuously monitors all sensors and alerts, with a comprehensive view of the entire managed system. (This can then be viewed by an operator through the SCADA operational interface)**
- **Control – A system that responds to inputs from your system or inputs initiated by and individual.**

Keys to a successful SCADA system

- Robust Network Communications and Infrastructure
- Network Security
- Database Configuration
  - Proper alarm configurations
  - Standardizing normal and emergency operation modes
  - Set up a standard for database tagging
  - Configure for possible future expansion of your system needs
- Integration of field devices
  - Communications strategy to the field devices
  - Flexibility to accommodate all the open protocols
- Historical Data information access to business users.
- Maintaining a development and Quality Assurance platform

- Disclaimer

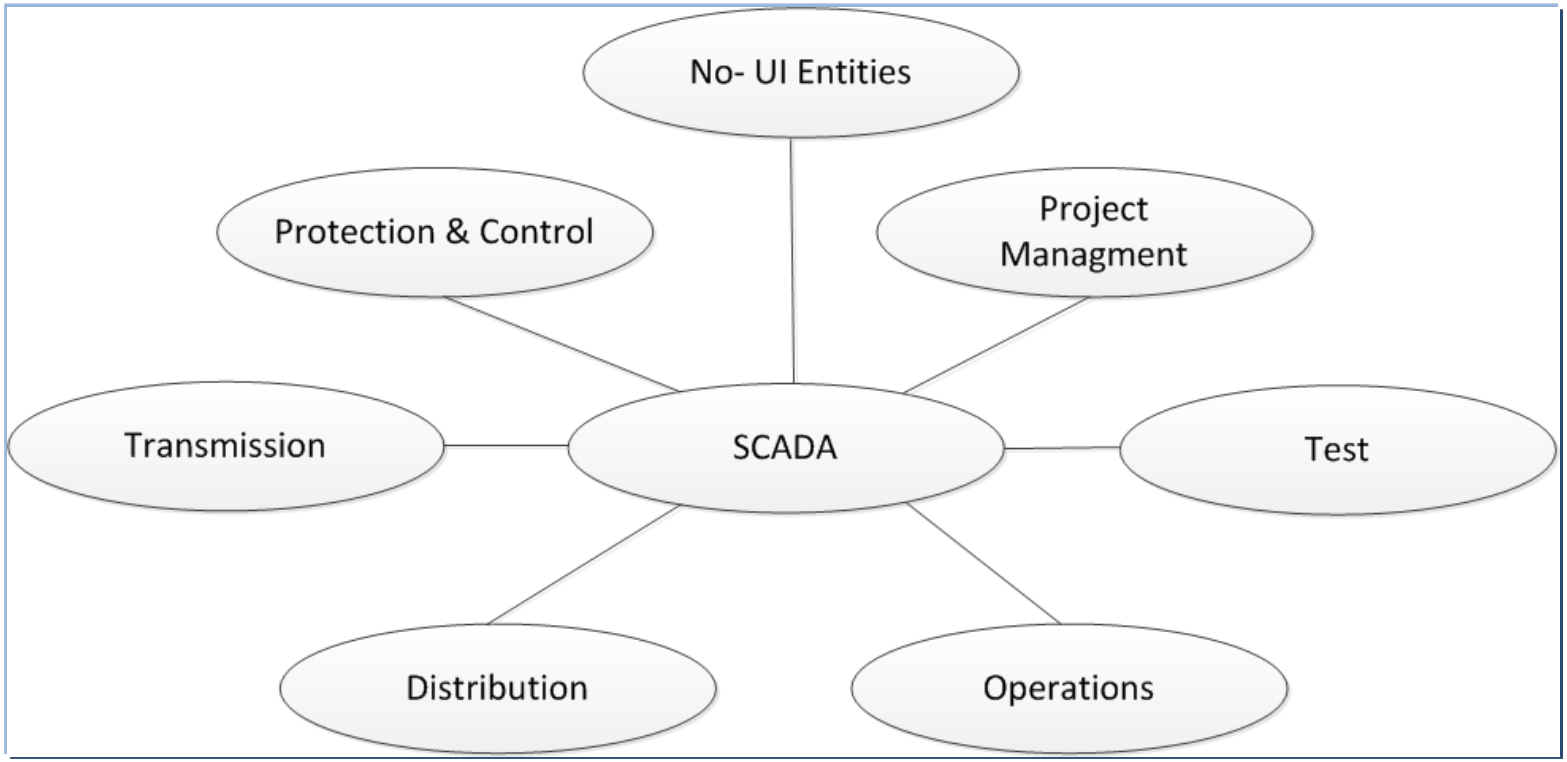
- Due to Regulatory requirements,

United Illuminating is unable to share detailed information about our SCADA system.

The United Illuminating Company

SCADA

SCADA supports multiple groups within the United Illuminating company.



UIL HOLDINGS CORPORATION

Protection & Control

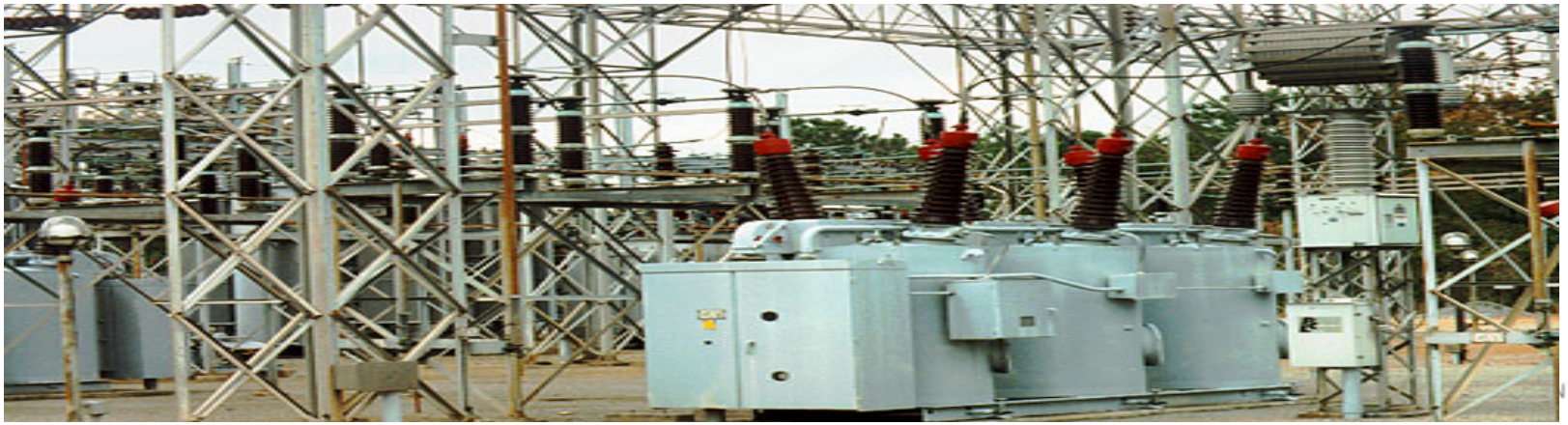
- **Used for Fault Analysis**
- **Used for coordination Analysis of Equipment**

➢ **Primary Data used by this group is for information about.**
  - o **Relay operations**
  - o **Breaker operations**
  - o **Disconnect Switches**
  - o **Etc…**

Transmission

- Used for Transmission Planning Analysis
  - Line ratings calculation verifications
  - Historical data collected to perform cable and transformer degradation analysis (loss of life).
  - Historical data that support existing project schedules as well as verify future projects and prioritize appropriately.

➢ Primary Data used by this group is for information about.
  - Analog data reports various time intervals which may include values of the minimum and maximum values of the data.

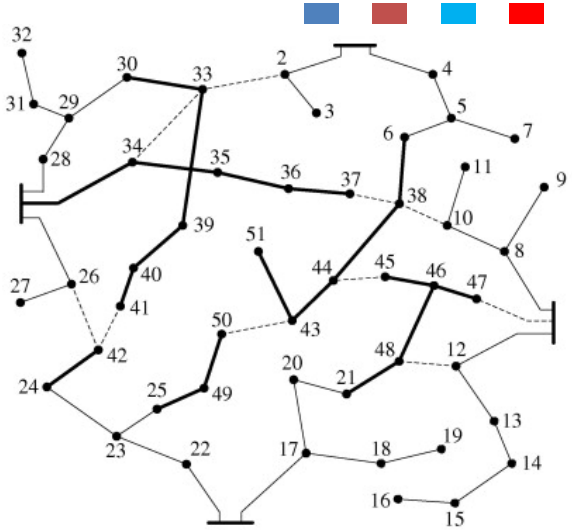


The United Illuminating Company

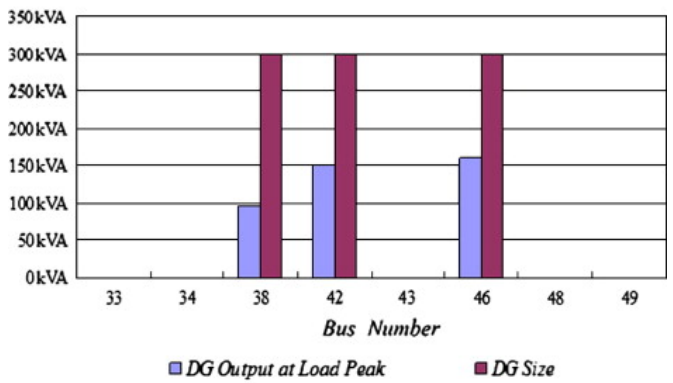
SCADA

Distribution

- **Used for Distribution Planning Analysis**
  - **Historical data collected to Correct overloaded feeder ratings**
  - **Historical data collected to Correct unbalanced load problems on feeders**
  - **Historical data collected to perform cable and transformer degradation analysis (loss of life).**
  - **Historical data that support existing project schedules as well as verify future projects and prioritize appropriately.**
  - **Historical data to maximize the operation of the Power Factor Correction Program.**



(a) Feeder network



(b) DG arrangement

- **Primary Data used by this group is for information about.**
  - **Analog data reports various time intervals which may include values of the minimum and maximum values of the data.**

UIL HOLDINGS CORPORATION

Operations

- **Primary use is the Real Time Operator Interface to SCADA**
  - **Perform all switching and tagging functions**
  - **Monitoring the loading of lines and feeders during switching and abnormal circumstances.**
  - **24/7 monitoring of the system**
  - **Responding to generated SCADA alarms and conditions, that may require dispatch of the proper work force to respond to the alarms.**

- **Primary Data used by this group is Real Time Data**
  - **Attribute reports shows the abnormal alarms on the system**
  - **Analog data reports various time intervals which may include values of the minimum and maximum values of the data.**
  - **Event data in order to respond to an alarm or system condition occurrence.**

TEST

- Primary use is the Real Time Operator Interface to SCADA and Event data
- Respond to Alarm conditions
- Validate real time load flows on relay schemes

➢ Primary Data used by this group is:

- Real Time Database reporting for what is actually happening on the system as it happens.
- Attribute reports shows the abnormal alarms on the system
- Analog data reports various time intervals which may include values of the minimum and maximum values of the data is used by the Test department for historical data trending .
- Event data in order to respond to an alarm or system condition occurrence.

Project Management

- Supporting them in identifying the SCADA tasks and estimated time along with the order the activities take place. Also identifying if other groups are needed in order for our activities to be completed.
- Specification review
- Definition of SCADA related activities associated with a project
- Time estimates for SCADA activities
- Identifying additional resources required to support SCADA activities.
- Providing direction to the Project Management team around regulatory compliance requirements.

The United Illuminating Company

UIL HOLDINGS CORPORATION

UI Electric T & D

Utility Exchange Program

(Pakistan Distribution Companies)

The United Illuminating Company

SMART METERING / ELECTRICITY LOSS & CONTROL METHODS

Guy Cattaruzza

Sr. Director, Standard Field Operation

UIL HOLDINGS CORPORATION

Agenda

- Benefits of AMI and “Smart” Systems
- AMI System and Operation
- Data Analysis and Theft Identification

By Guy Cattaruzza

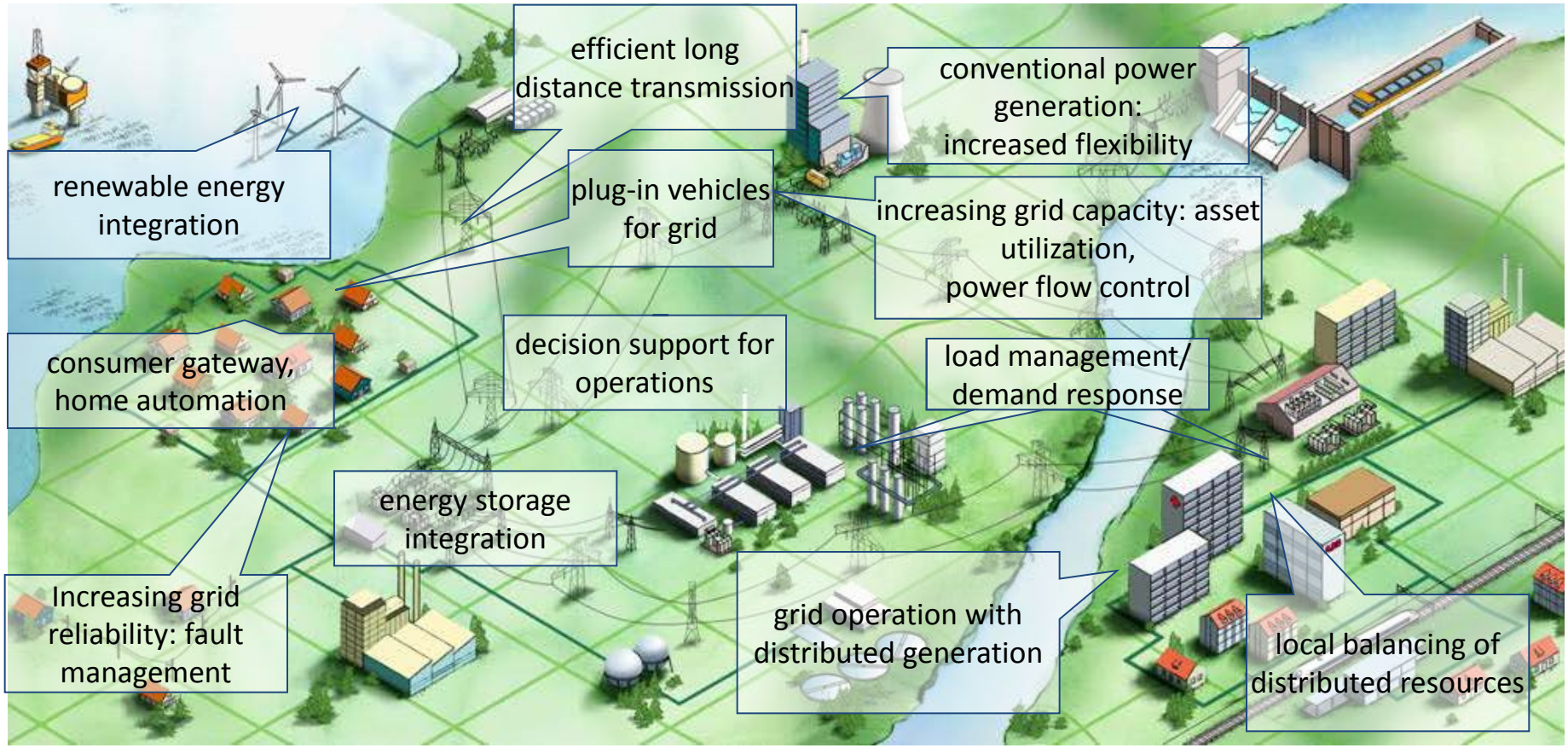
Senior Director, Standard Field

and Revenue Meter Systems

The United Illuminating Company

AMI and "Smart" Systems

…supports the entire electricity supply chain



UIL HOLDINGS CORPORATION

The United Illuminating Company

Benefits of AMI and "Smart" Systems

Smart Grid Benefit	Nature of Benefit		Primary Beneficiary		
	Service	Cost	Customer	Utility	Society
Customer Participation					
Smart meters & home automation	✓	✓	✓	✓	
Accomodation of plug-in hybrid electric vehicles	✓	✓	✓		✓
Facilitation of demand response		✓		✓	✓
System Reliability & Efficiency					
Improved customer service	✓		✓	✓	
Enhanced grid reliability	✓		✓	✓	✓
Optimization of network performance	✓	✓		✓	
Reduce system losses, operating expense		✓	✓	✓	
Asset Utilization					
Equipment monitoring & reduced risk of failure	✓		✓	✓	
Optimization of asset utilization		✓	✓	✓	
Prioritization of system enhancements, repairs	✓	✓	✓	✓	
Environmental Benefits, Renewable Energy, Energy Storage					
Reduced carbon footprint					✓
Wind, solar, biomass integration	✓	✓		✓	✓
Facilitate distributed generation		✓	✓	✓	✓
Enabling micro-grids		✓	✓		

UIL HOLDINGS CORPORATION

Stakeholder Benefits and Value Proposition

The United Illuminating Company

Regulators

- Time of Day and Daylight Savings
- Net Metering
- Flexible Rate Options
- Demand Response
- Conservation and Load Management

Customers

- Customer Empowerment
- Self Service Options
- Billing and Payment Preferences
- Real Time Energy Management

Company Efficiencies

- Outage Management
- Theft Detection / Low Use
- Remote Turn On – Turn Off
- Meter Accuracy
- Improved Asset Utilization (Txfs)
- Operations - DR & ISO

Savings

- Collections
- Field Visits
- Labor Efficiencies

New Opportunities

- Notification / Monitoring Services
- Residential Interruptible Rates
- Threshold Alerts
- Consolidated Billing
- Advanced Distribution Automation, Outage & Work
- Prepayment

UIL HOLDINGS CORPORATION

AMI Network – Hybrid One & Two Way

The United Illuminating Company

L+G Host System

Other Applicatio

- Distribution Automation
- Home Automation
- Load Management

Take Out Point

Gridstream Two-way Meshs Netw

Nth Take ut Point

Transmit-Only
- Gas
- Water

- High-Rise Solution
- Sub-Metering

- Water/Wastewater Applications
- Reservoir Management

- Reclosers
- Switches
- Sectionalizers
- Capacitor Bank

Residential Products:
- Remote Disconnect
- Smart Thermostat
- Load Management

UIL HOLDINGS CORPORATION

The United Illuminating Company

System Architecture

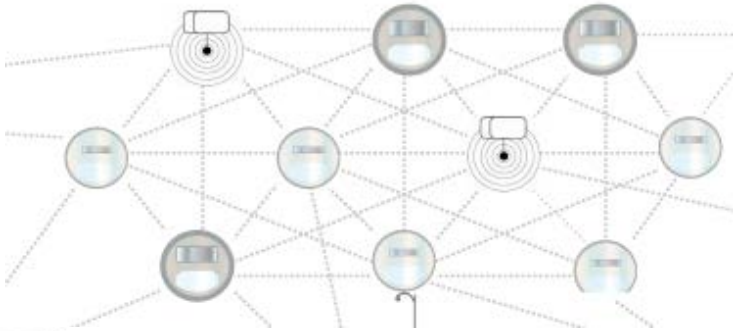
- Over 337,000 total UI meters –
  - **100,000 two-way**
  - **Meters have** ZigBee Smart Energy
  - **Meters read every day w/15Min interval data available**

- 4100 Concentrators [2-way meters act like repeaters as well]
- 30 Collectors
- Mesh Network - RF, Fiber and…
- Master Data is stored in MDM - interface with SAP
- Robust billing process - electronic presentment to payment
- *Outage Management System* uses meter intelligence for restoration and communication
- Over 33% of our customers have Time-of-Day option

UIL HOLDINGS CORPORATION

The United Illuminating Company

Data Collection



COMMAND CENTER

MDMS

Enhanced Outage Management integrating MDMS
Real time notification and reporting of outages
Predict Transformer Outages based on meter reporting
Recognize Planned Work vs. Unplanned Outage (Future)
Voltage Monitoring

UIL HOLDINGS CORPORATION

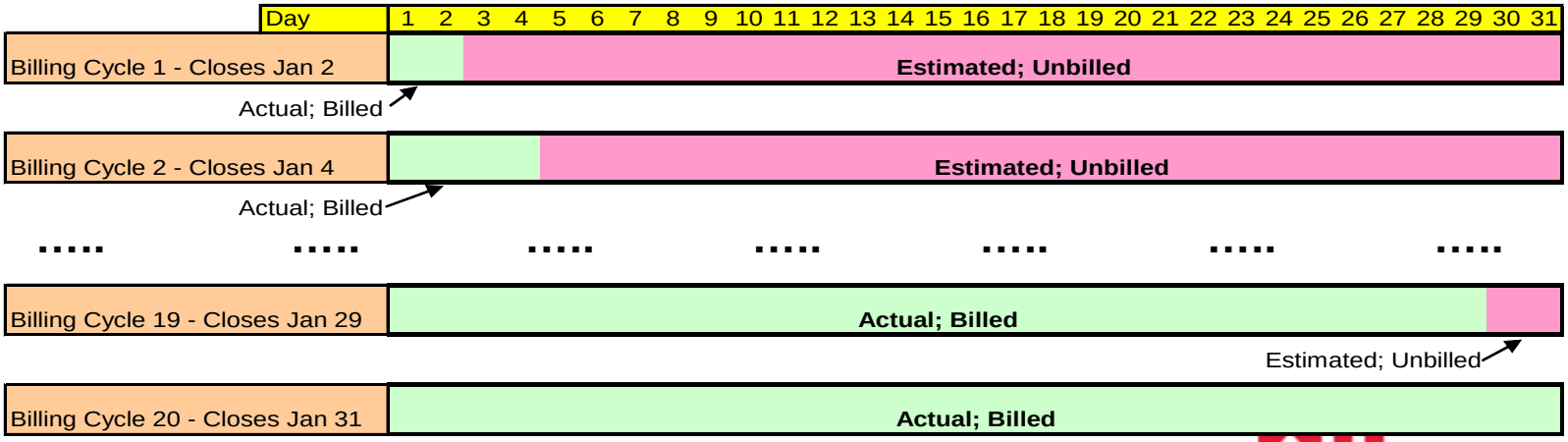
The United Illuminating Company

Revenue Assurance and Billing

Using the information from AMI meters:

- **Improve Billing Accuracy**
- **Identify and reduce illegal usage**
- **Eliminate unbilled estimates by receiving actual reads at end of month for every meter.**

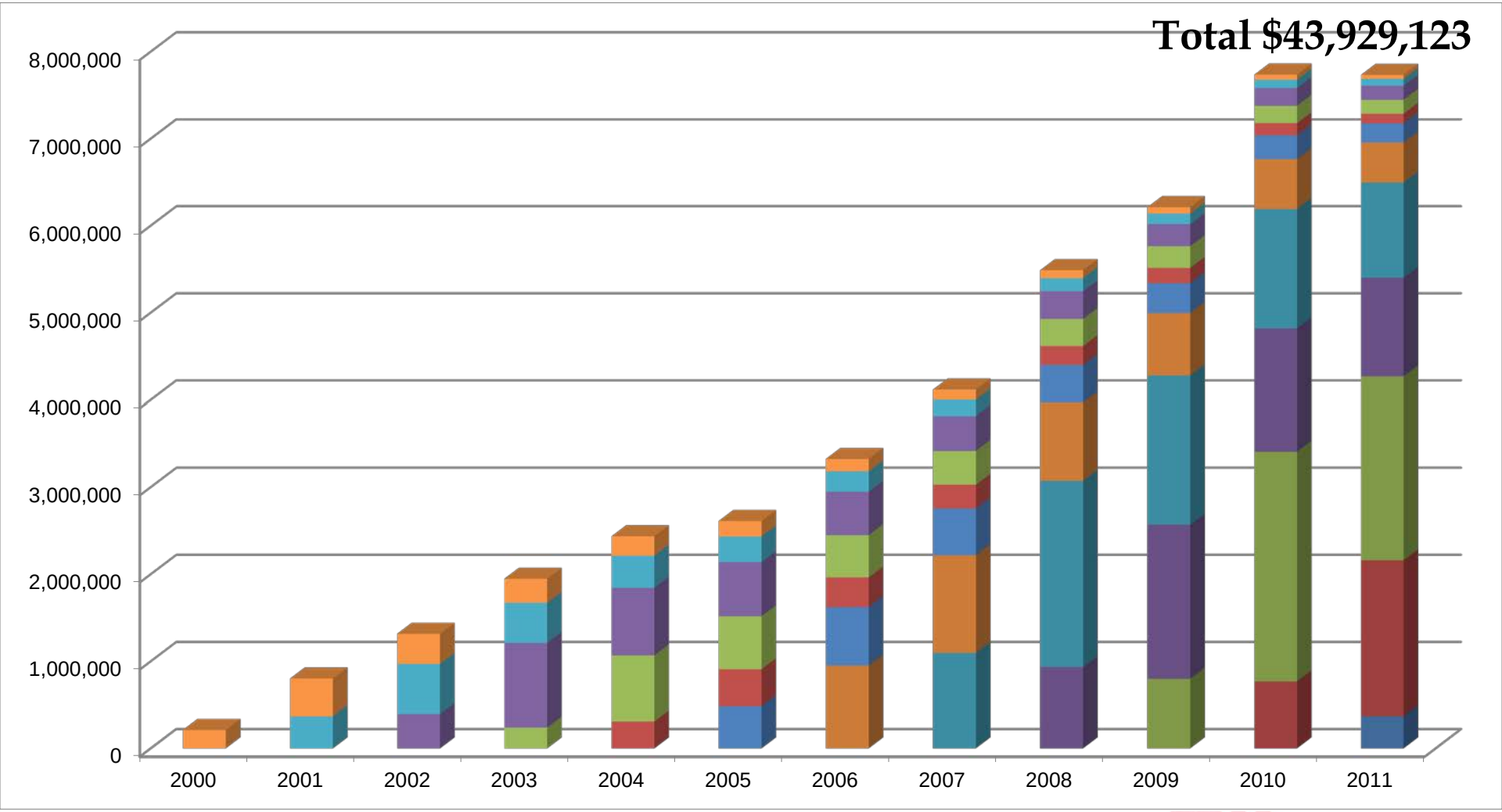
Unbilled Revenue



UIL HOLDINGS CORPORATION

The United Illuminating Company

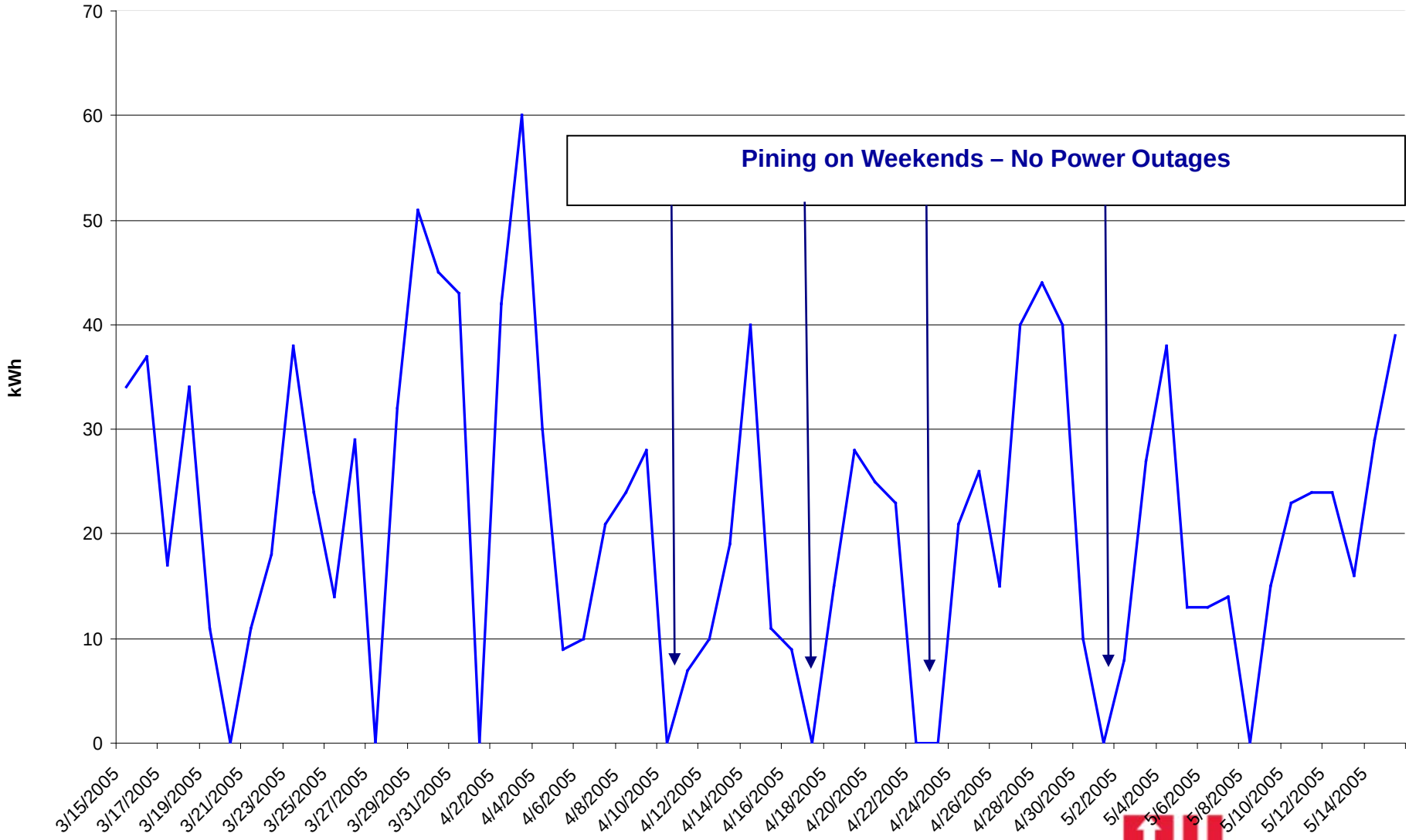
Revenue Assurance – Revenue Protection



UIL HOLDINGS CORPORATION

The United Illuminating Company

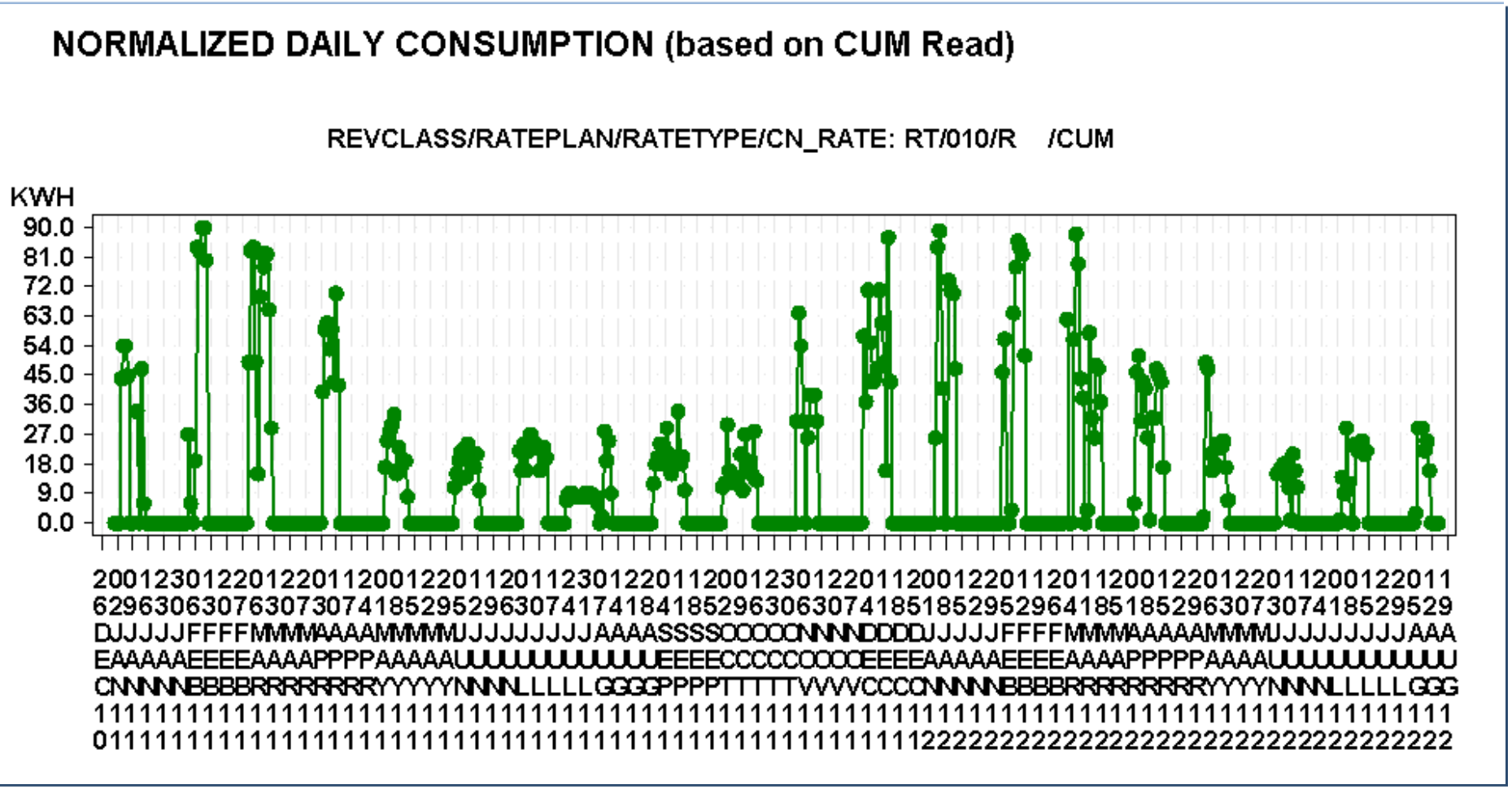
Theft of Service – Pinned Disk



UIL HOLDINGS CORPORATION

Theft of Service – Pinned Disk

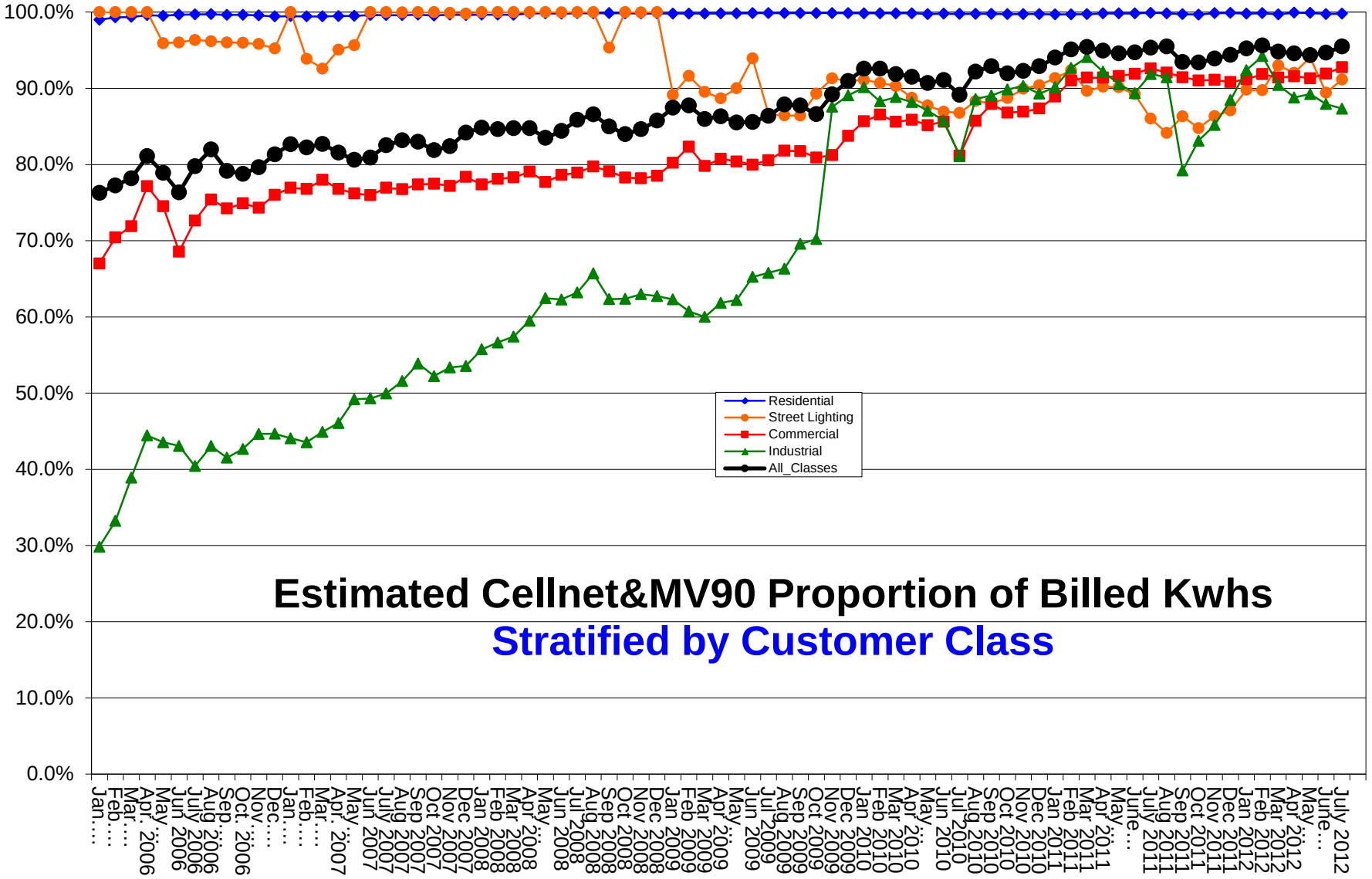
The United Illuminating Company



UIL HOLDINGS CORPORATION

The United Illuminating Company

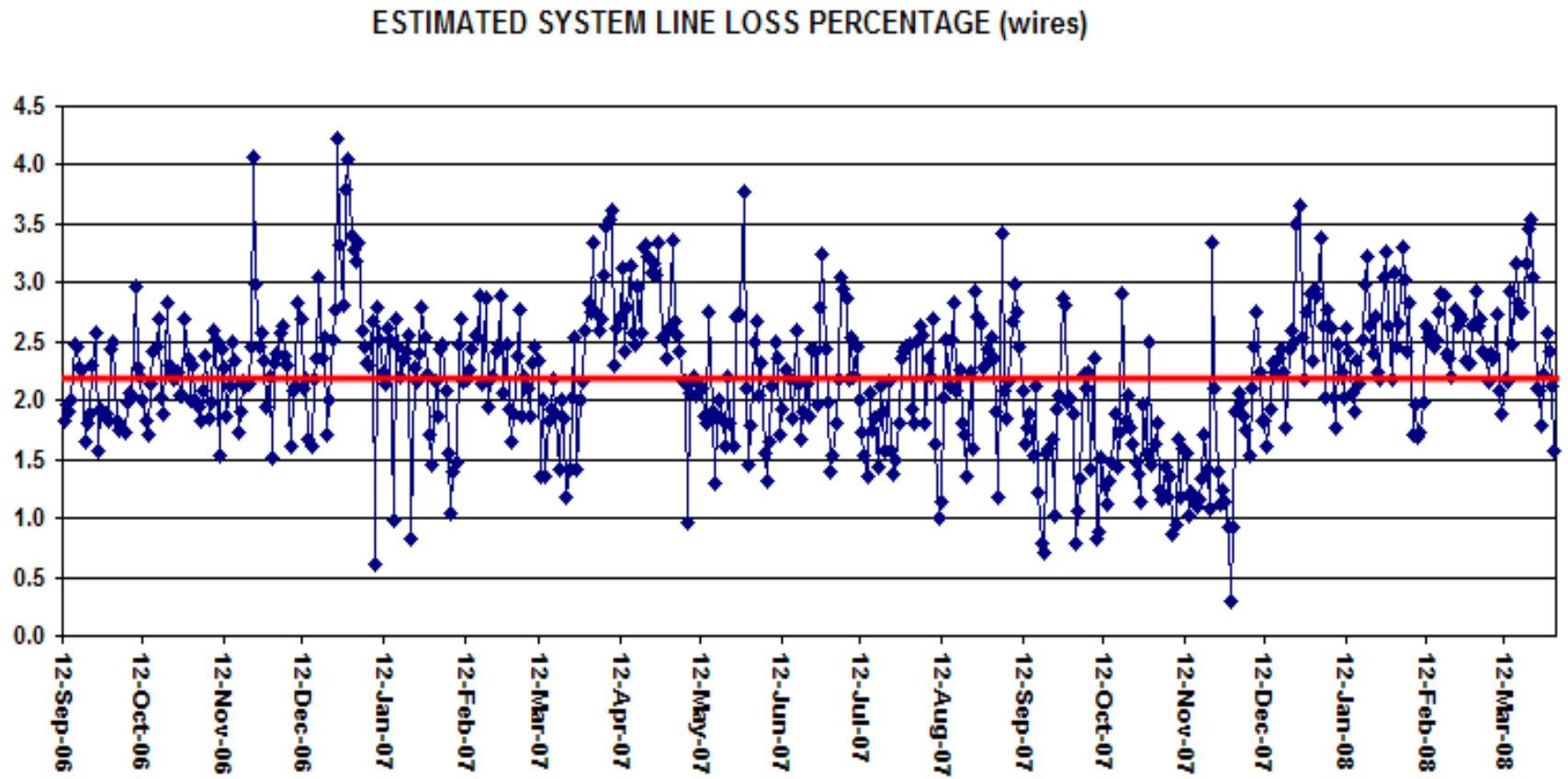
Data Analysis



Data Analysis – Distribution Line Losses

The United Illuminating Company

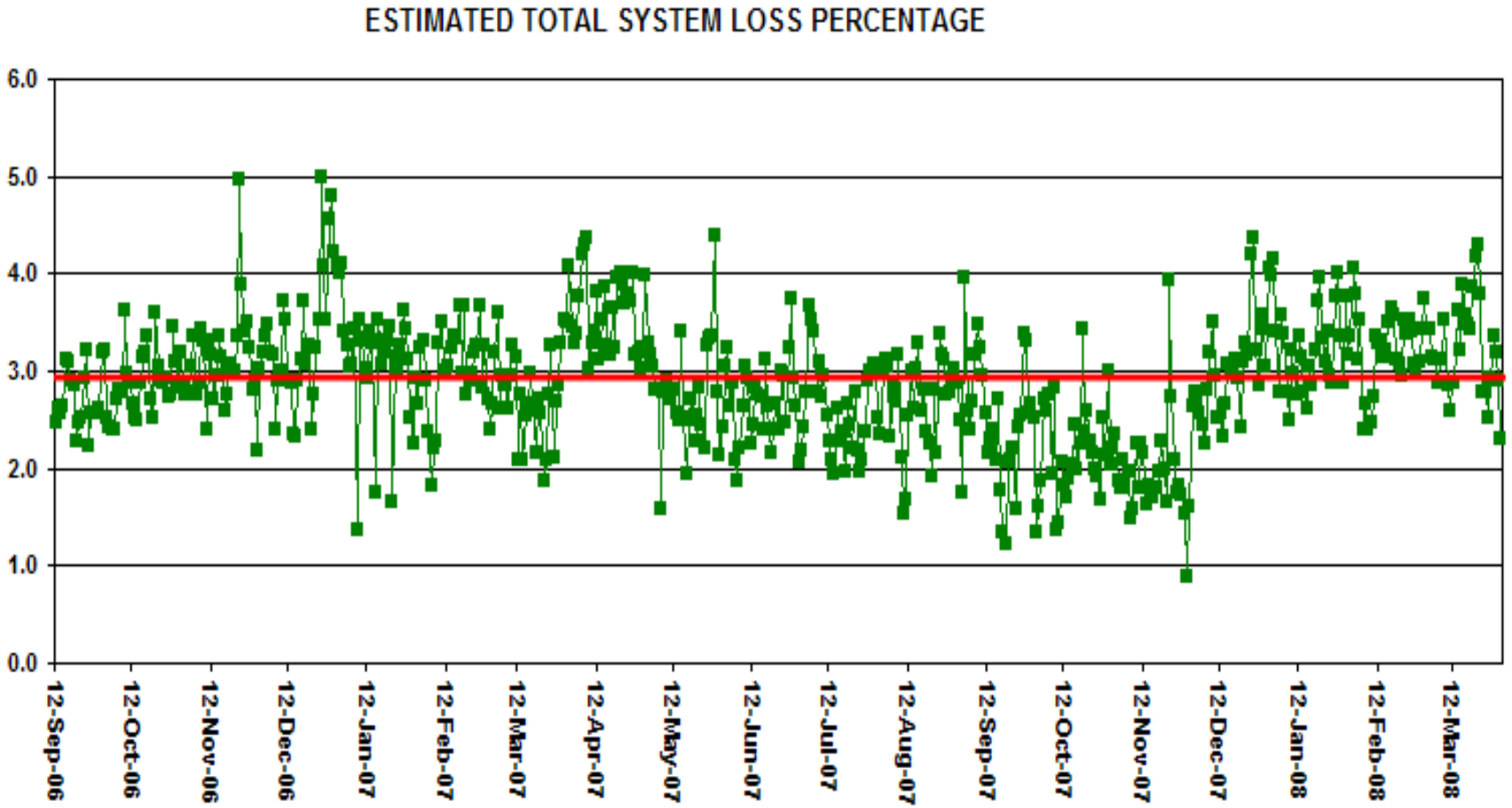
Estimates of distribution line loss
Average = 2.2 %



The United Illuminating Company

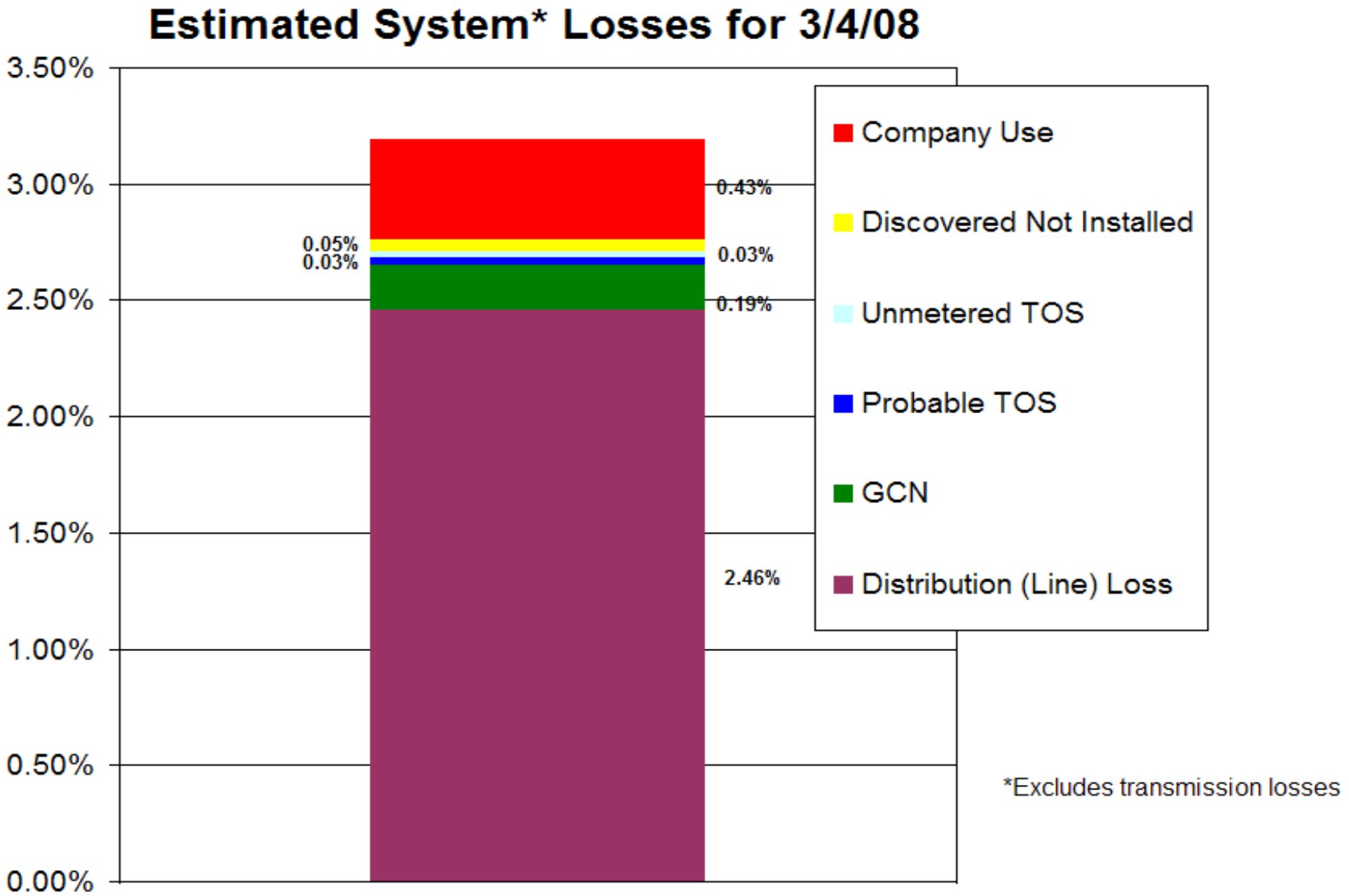
Data Analysis – System Losses

Estimates of total system loss have averaged 2.9% (excluding transmission losses)



The United Illuminating Company

Data Analysis – System Losses



The United Illuminating Company

Meter Errors and Reporting

Meter Events, Reporting and Detection

Error Type	Display
Unprogrammed	Scroll
Unconfigured	Scroll
RAM Failure	Scroll
Non Vol Mem Failure	Scroll
Clock Error	Scroll
Measurement Error	Scroll
Low Battery Error	No Display
Demand Overload	No Display
Tamper Detect	Scroll
Reverse Rotation	Scroll
SD Switch Error (LS Voltage)	Scroll
Time Adjust	Scroll
Phase Error	Scroll
SD Switch Sensor Error	Scroll
Stuck Switch Error	Scroll
Temperature Error	No Display
Phase A Out	Scroll
Phase B Out	Scroll
Phase C Out	Scroll
Invalid Service	Scroll
Standby Accumulation Error	No Display
Excessive Leading Current on Phase A	No Display
Excessive Leading Current on Phase B	No Display
Excessive Leading Current on Phase C	No Display

The United Illuminating Company

UIL HOLDINGS CORPORATION

UI Electric T & D

Utility Exchange Program

(Pakistan Distribution Companies)

The United Illuminating Company

LIVE LINE CONSTRUCTION PROJECTS

Vinny Brescia

Manager, Overhead Power Delivery

UIL HOLDINGS CORPORATION

The United Illuminating Company

Presentation Topics and Tips

- SAFETY FIRST – FR CLOTHING
- INSULATE AND ISOLATE
- RUBBER GLOVING
- RUBBER GOODS
- LINK STICK REQUIREMENTS
- LIVE LINE TOOL REQUIREMENTS
- EPZ GROUNDING
- FIELD PHOTOS

UIL HOLDINGS CORPORATION

The United Illuminating Company

SAFETY FIRST – BEGINS WITH THE PROPER UTILIZATION OF ALL PPE – Personal Protective Equipment/FR Clothing

- Flame resistant clothing shall be worn when an employee may be exposed
- to an electrical hazard.

- FR Clothing enhances employees' personal safety and is considered a
- component of personal protective equipment (PPE), but is not considered a
- replacement for any additional PPE that is required for specific tasks and
- operations, as specified in UI's Safety Manual.

- Frequent Users are those employees who have been determined to have the
- greatest exposure to electrical hazards and, as such, are required to wear
- approved FR garment at all times during the course of performing their
- regular job duties.

- Introduction: Line Worker First Class and Union Safety Officer Chris Jensen
- *Chris is modeling "some" of the FR Clothing items that may be used in an average workday.*

UIL HOLDINGS CORPORATION

The United Illuminating Company

INSULATE AND ISOLATE

BRIEF DEFINITON

- The worker is **“INSULATED”** by using approved and properly tested protective equipment, specifically rubber gloves, rubber sleeves, and insulating cover-up equipment.
- The worker is **“ISOLATED”** by using an approved insulating aerial device, which is also an additional layer of insulation.

RUBBER GLOVING ABOVE 5kv

- Rubber glove work performed at voltages above 5Kv shall be done utilizing the principles of **“Insulate and Isolate.”**

UIL HOLDINGS CORPORATION

Rubber glove and sleeve requirements

When rubber glove work methods are employed for primary work, approved and properly tested rubber gloves and sleeves shall be worn.

The United Illuminating Company

Direct Handling (Rubber Gloving) Procedures above 600 volts cont.

Inspections required before rubber gloving (applicable to ALL primary voltages)

a. Rubber gloves – should be visually inspected AND air tested before beginning work.

b. Rubber sleeves - should be visually inspected before work.

c. Rubber insulation (blankets, line hose, hoods, etc.) should be visually inspected before use.

d. Fiberglass boom(s) of insulated aerial device should be visually inspected and cleaned as necessary.

UIL HOLDINGS CORPORATION

The United Illuminating Company

Direct Handling (Rubber Gloving) Procedures

Cover-up practices (applicable to ALL primary voltages)

a. When working on energized conductors and equipment using rubber glove work methods, all energized conductors and equipment within maximum reaching distance of any part of the employee's body shall be covered with approved protective equipment, except that portion which is actually being worked on.

b. When working on energized conductors and equipment, all other items, including conductors, equipment, guy wires, neutrals, telephone and/or CATV cables, grounds, possible grounds, and portions of poles and cross arms within maximum reaching distance of any part of the employee's body shall be covered with approved protective equipment.

UIL HOLDINGS CORPORATION

The United Illuminating Company

Direct Handling (Rubber Gloving) Procedures

Cover-up practices (applicable to ALL primary voltages) cont.

c. When an energized primary conductor is placed on a cross arm, bracket, or against the pole, the conductor shall first be covered with line hose, and in addition, the cross arm, bracket, or pole shall be covered with a rubber blanket or other approved insulation.

d. Intentional contact with energized lines or rubber protective equipment shall be with rubber gloves only. Other parts of the body should be kept clear of energized lines or rubber protective equipment.

e. Rubber protective cover-up equipment is to be used to provide protection against incidental contact with sources of potential, and is not intended for use as support, balance, leverage, or handholds.

UIL HOLDINGS CORPORATION

Direct Handling (Rubber Gloving) Procedures

Cover-up practices (applicable to ALL primary voltages) cont.

f. The insulated boom and/or bucket of an aerial device should not come in contact with unprotected conductors or grounded objects when rubber gloving work methods are being used.

g. Work limited to one phase at a time - Work being performed on energized conductors and/or equipment in the same work area shall be confined to one phase of the circuit at a time. Simultaneous contact with multiple phases or a phase and any part of the structure is not permitted.

The United Illuminating Company

Link Stick Requirements

- When using approved hot line hoists (web jacks, blocks, rope, winch line or similar devices) an approved insulating link stick shall be installed between the hot line hoist and an attachment point with a different potential. Care should be exercised to maintain link sticks in good mechanical and electrical condition.

- Defective link sticks shall be turned in for testing, repair and/or replacement.

- Link sticks are required for 2.4 kV and 4 kV under similar conditions.

UIL HOLDINGS CORPORATION

The United Illuminating Company

Live Line Tool Requirements

Specific operations requiring continued use of approved live line tools include, but are not limited to, the following:

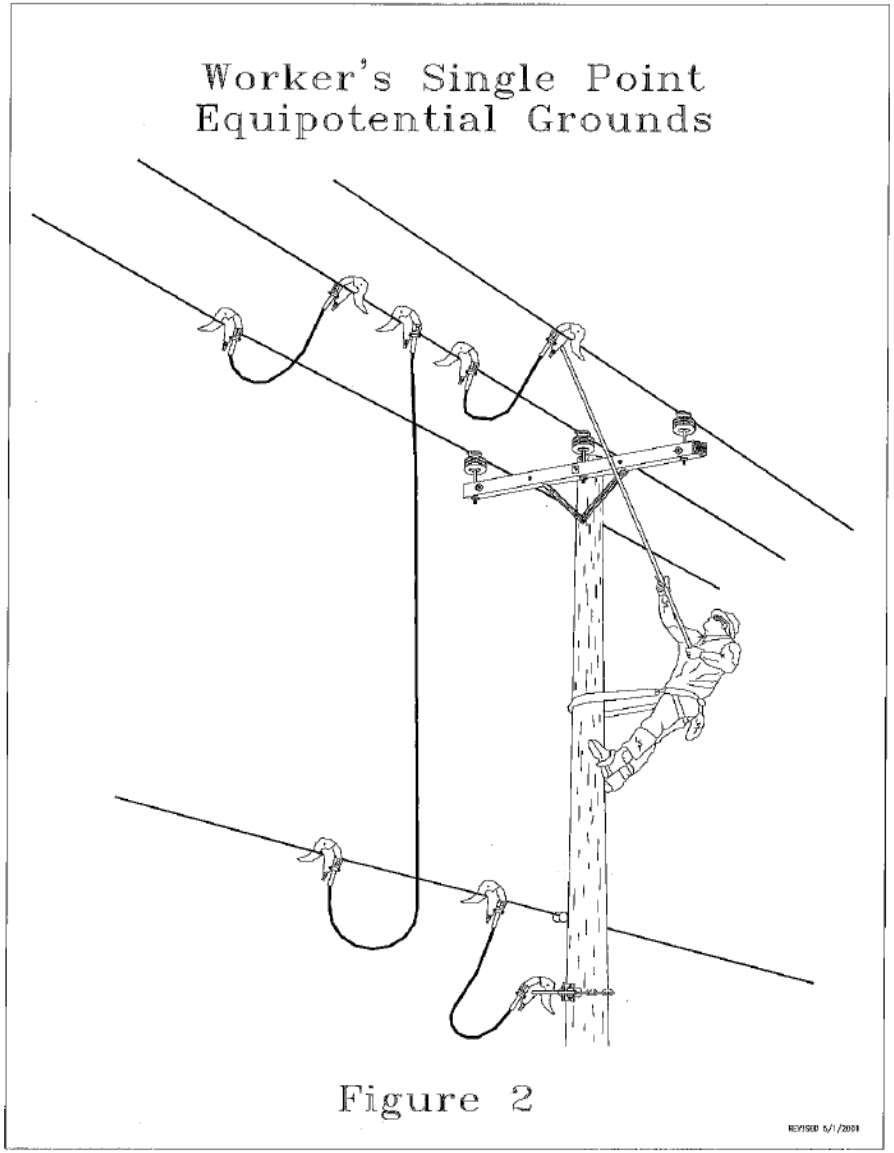
1. Cutout/disconnect opening and closing.
2. Energizing of transformer primary connections.
3. Primary connection of lightning arresters.
4. Use of “load buster” tool.
5. Operating regulator bypass devices.
6. Whenever energizing equipment and/or conductors.
7. Attaching portable grounds.

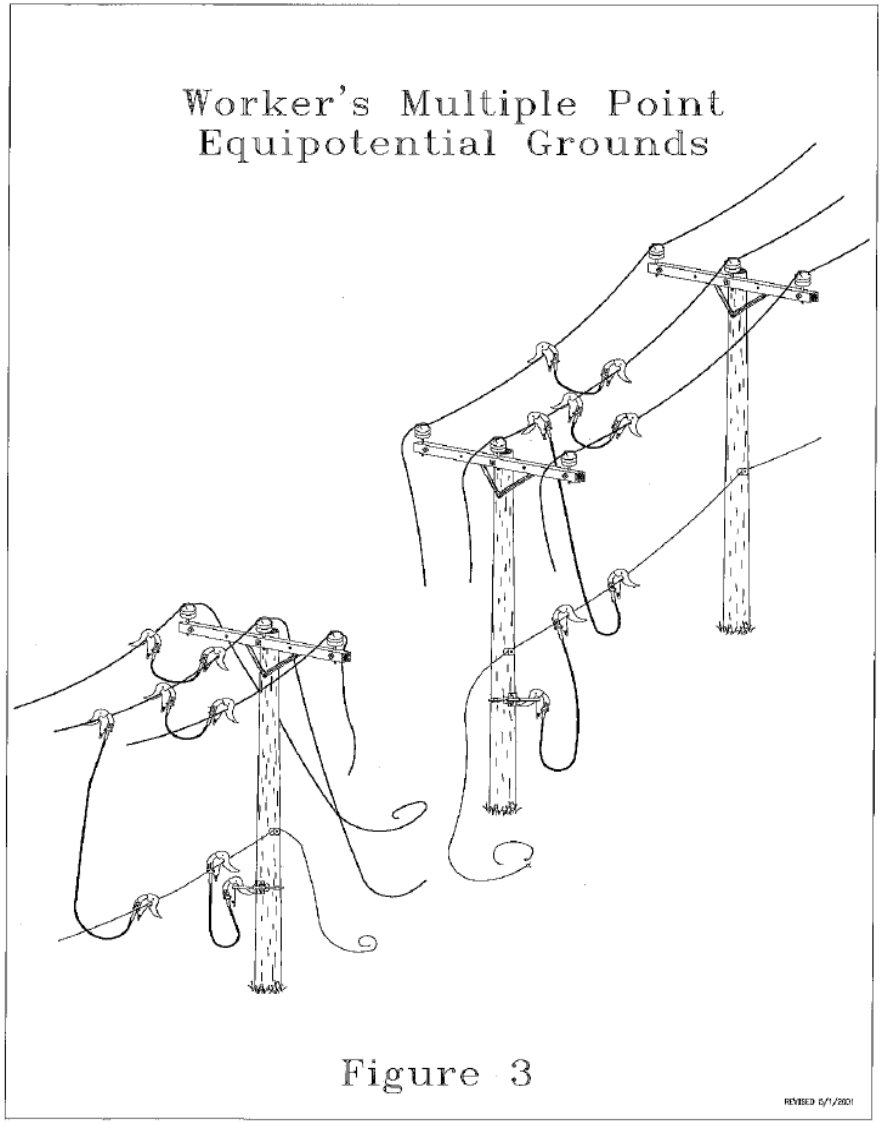
GROUNDS AND EPZ

An Equal Potential Zone (EPZ) must be established around any and all workers before any conductor or line can be treated as dead and grounded. This equal potential zone must be set up in accordance with UI Company Procedure (OP-D72).

- **Under no conditions should anyone ever assume that a line or a piece of equipment is de-energized, unless it is properly tested, grounded, and tagged.**

Note: The diagrams on the following pages are reference copies from UI Procedure: Grounding For Personal Protection On Overhead Distribution Lines – OP-D72


Worker's Single Point
Equipotential Grounds
Figure 2


Worker's Multiple Point
Equipotential Grounds
Figure 3
REVISED 6/1/2001

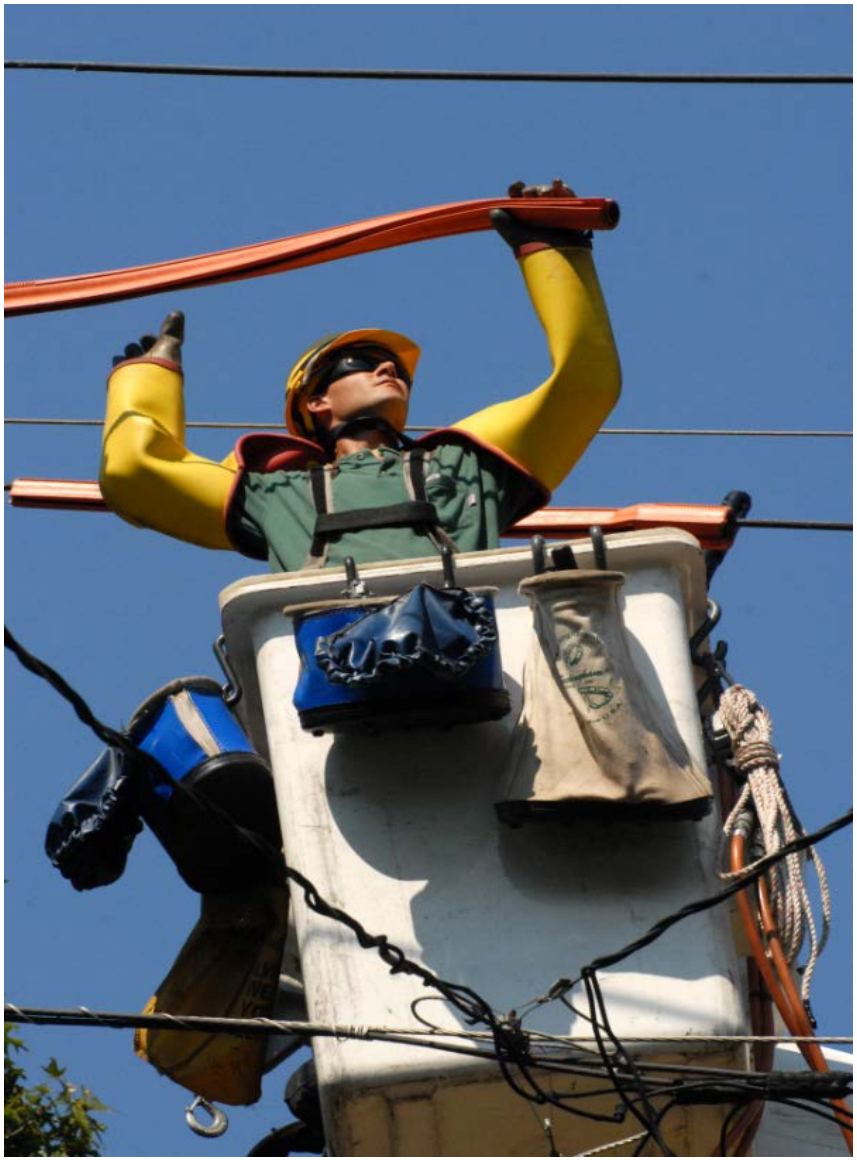
The United Illuminating Company

FIELD PHOTOS

UIL HOLDINGS CORPORATION

The United Illuminating Company

The United Illuminating Company



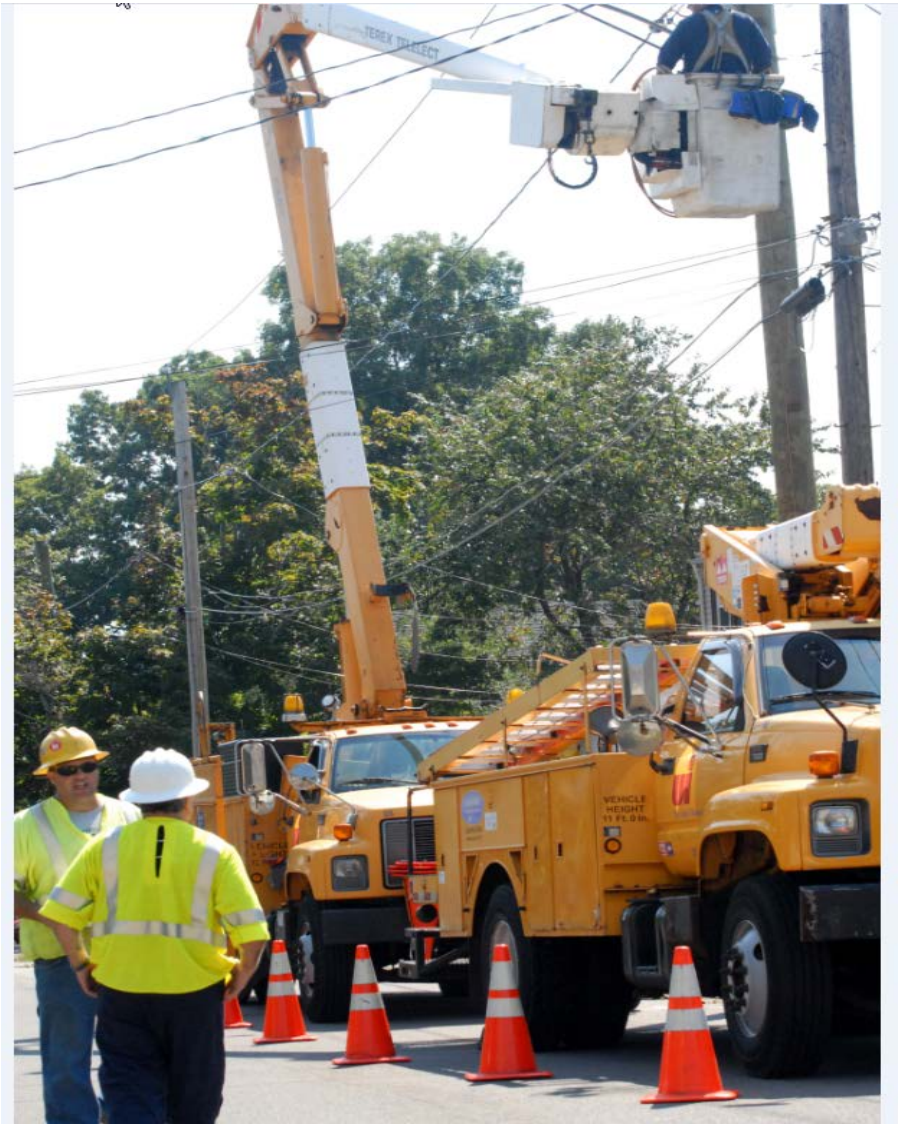
The United Illuminating Company

The United Illuminating Company

The United Illuminating Company

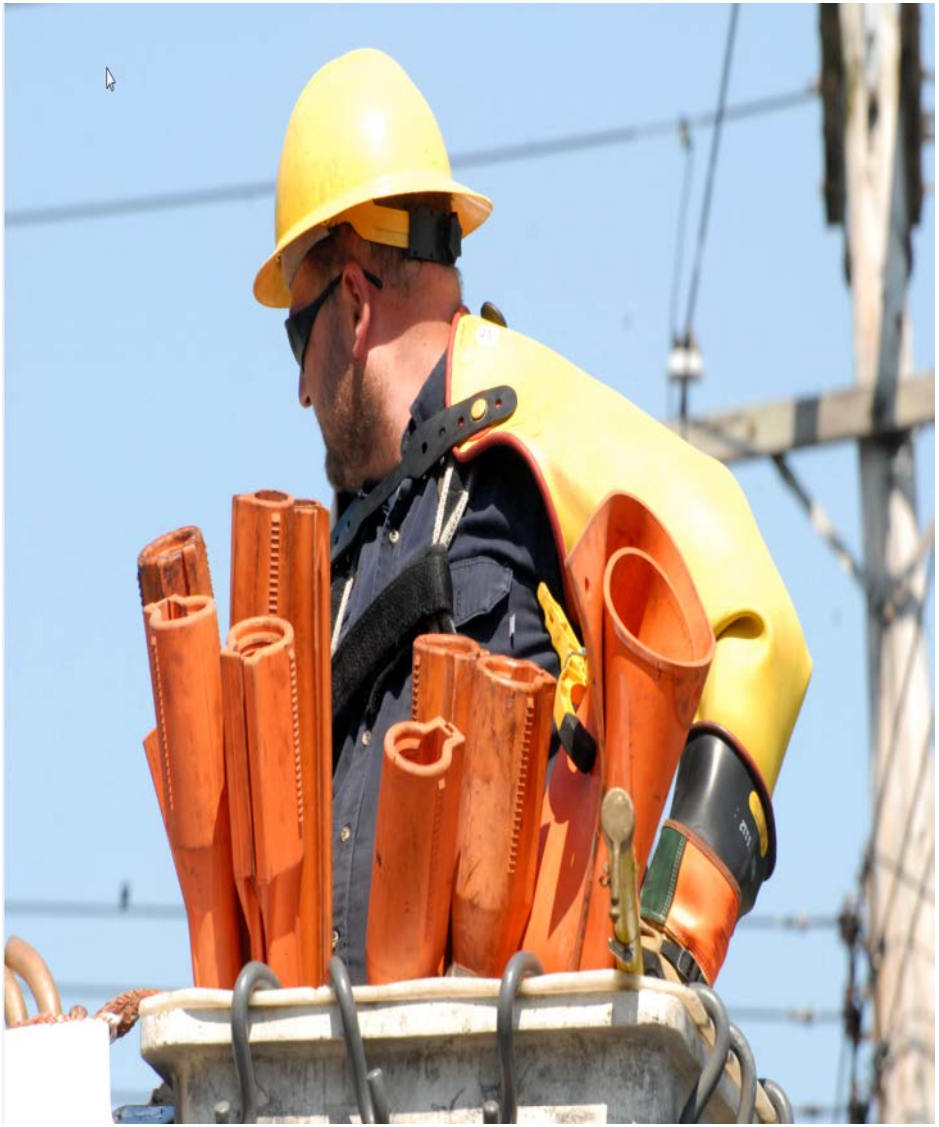
The United Illuminating Company

The United Illuminating Company

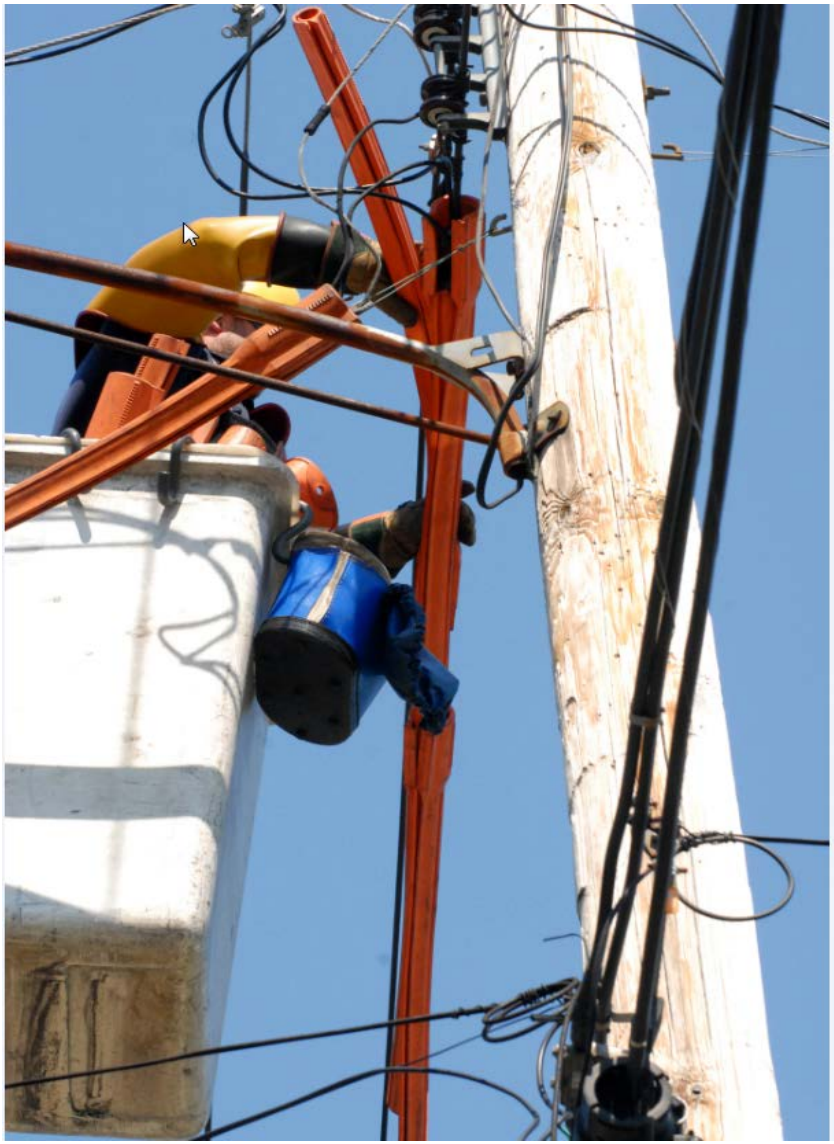


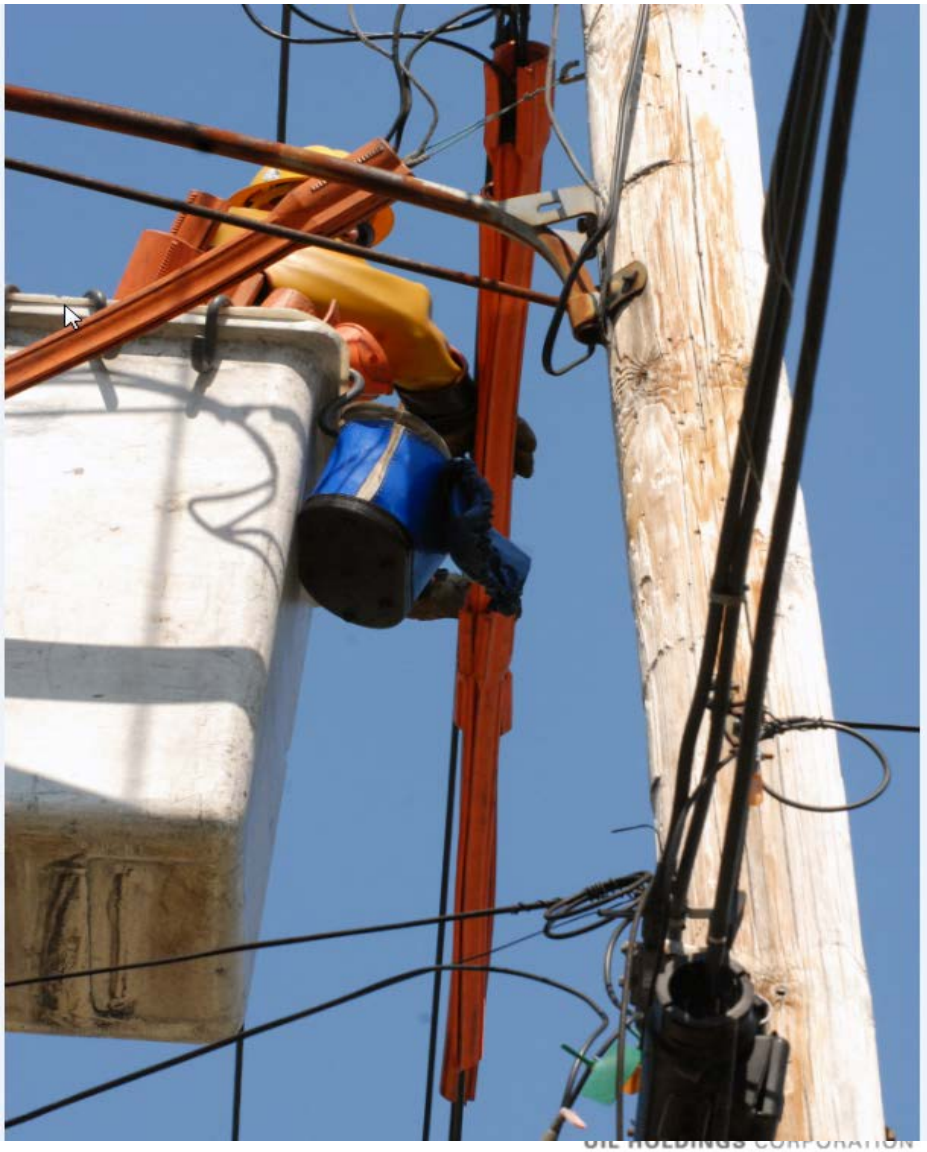
UIL HOLDINGS CORPORATION

The United Illuminating Company

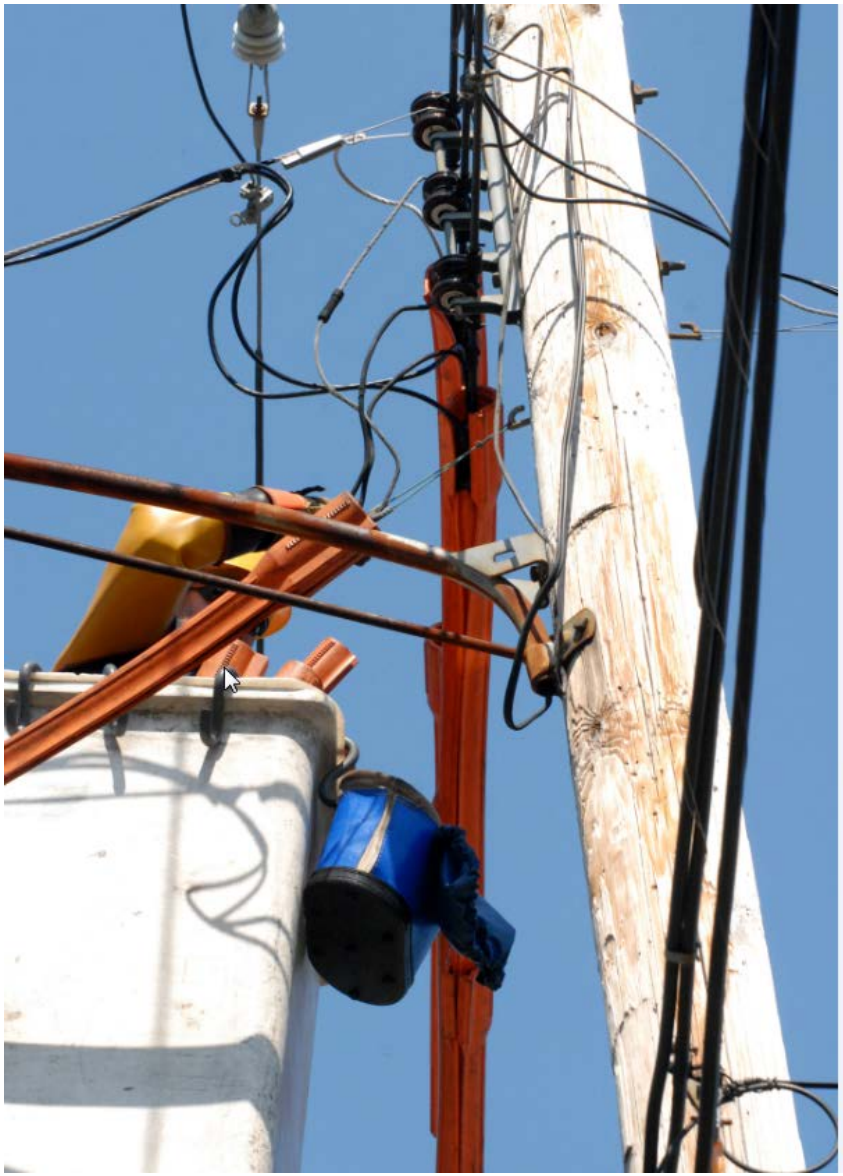


The United Illuminating Company

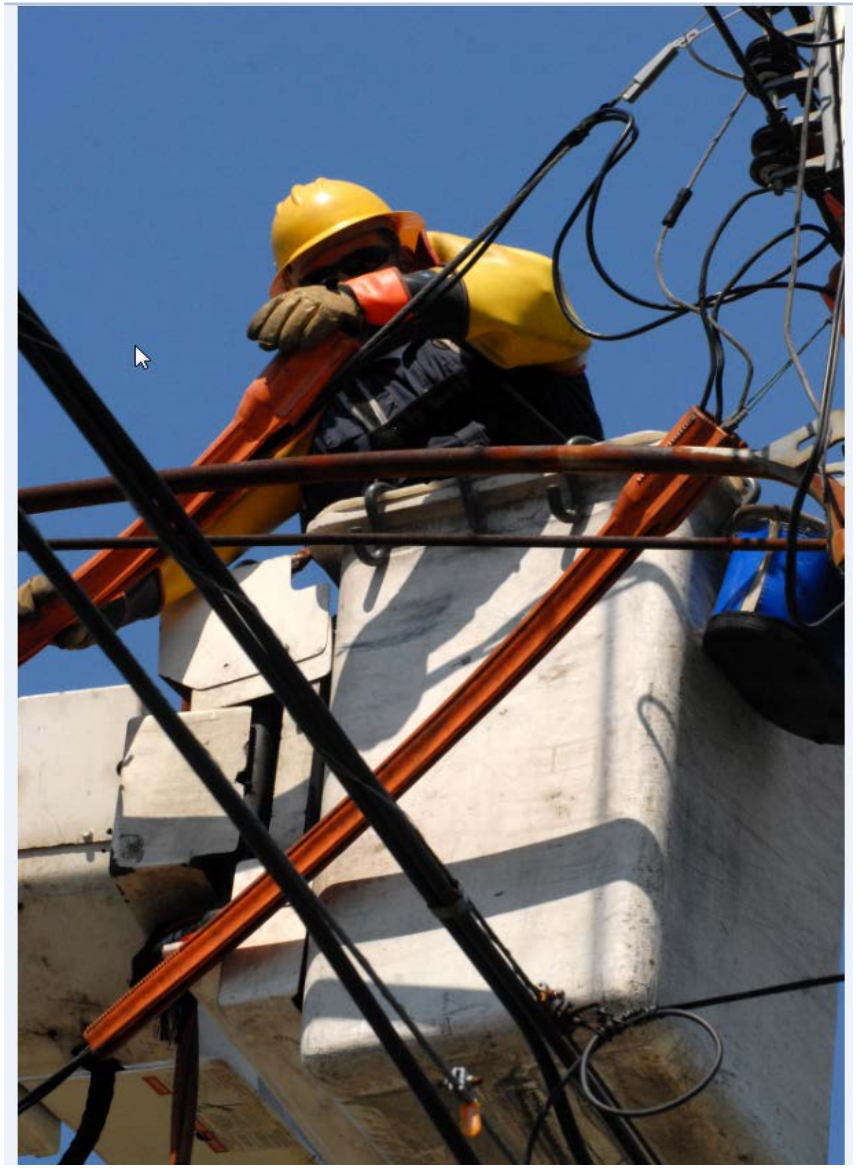




The United Illuminating Company



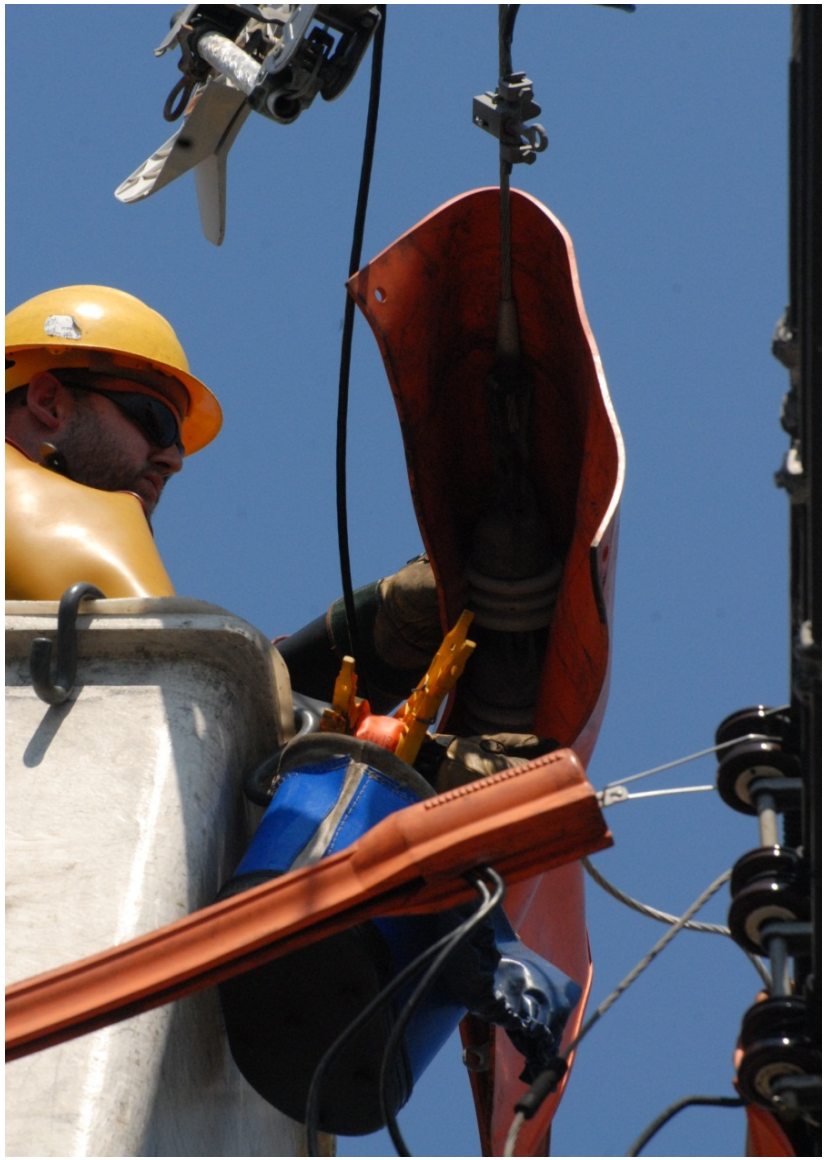
The United Illuminating Company



The United Illuminating Company

The United Illuminating Company

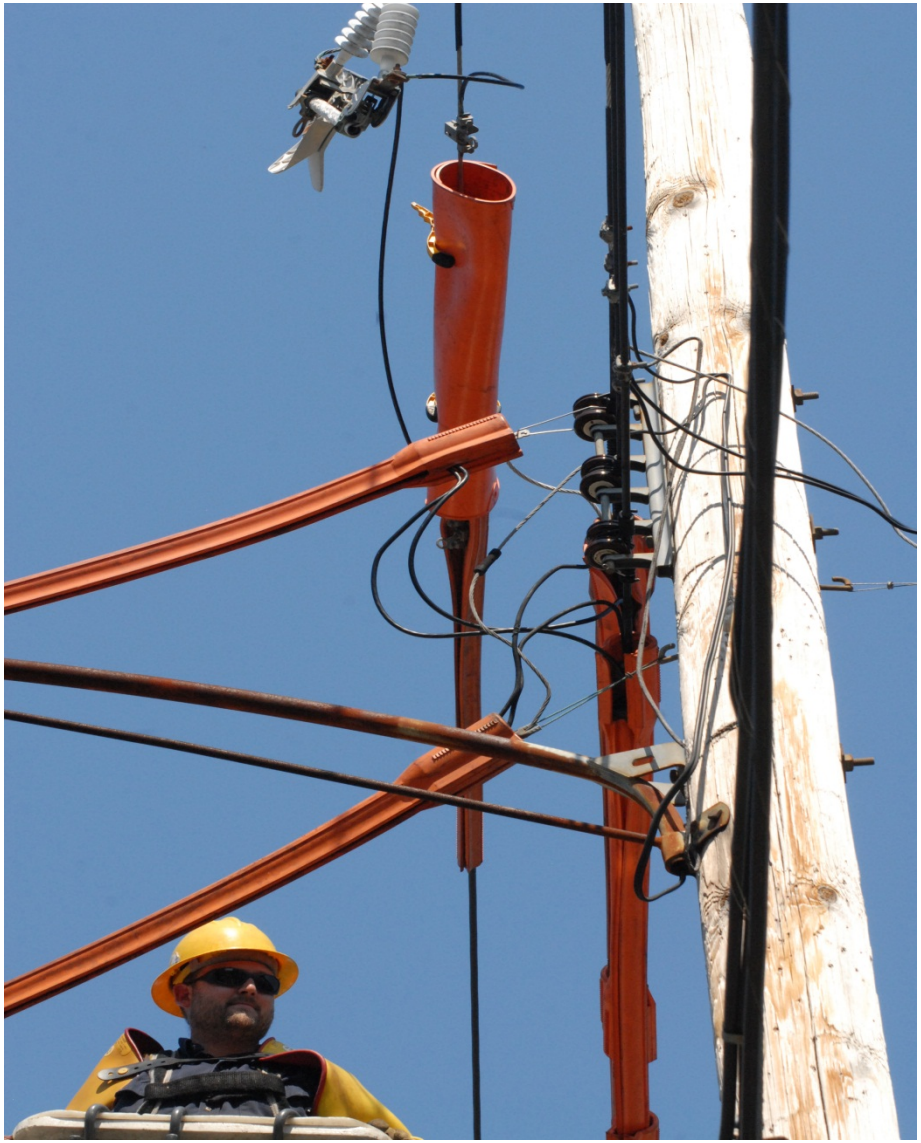
The United Illuminating Company



The United Illuminating Company

The United Illuminating Company

The United Illuminating Company



The United Illuminating Company

The United Illuminating Company

The United Illuminating Company

The United Illuminating Company

The United Illuminating Company

The United Illuminating Company

The United Illuminating Company

The United Illuminating Company

The United Illuminating Company

The United Illuminating Company

The United Illuminating Company

The United Illuminating Company

The United Illuminating Company

The United Illuminating Company

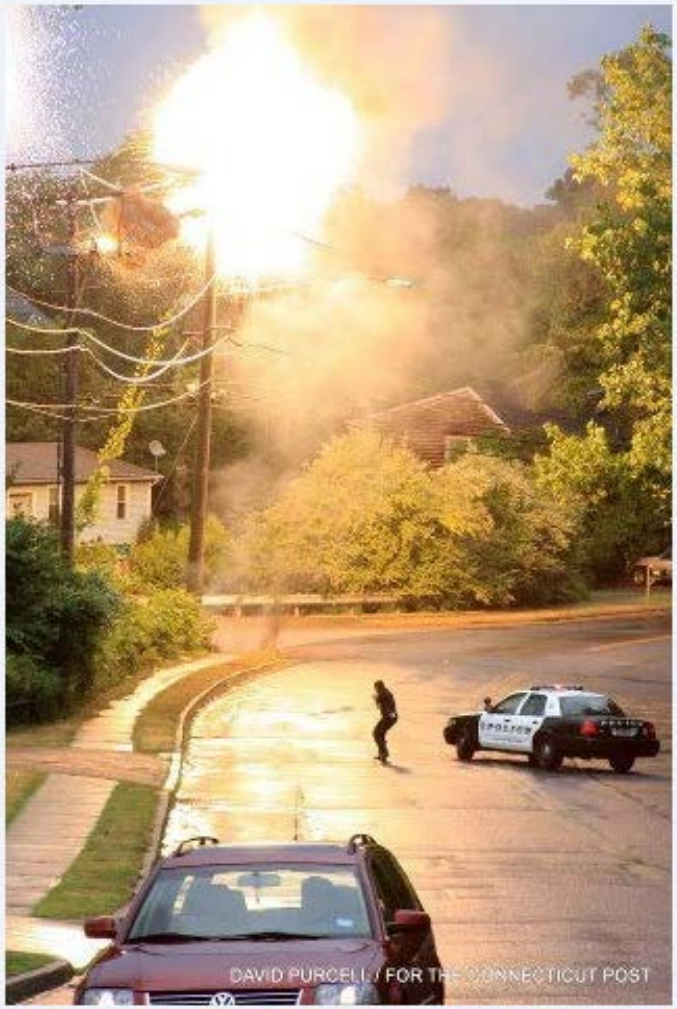
The United Illuminating Company

The United Illuminating Company

The United Illuminating Company

The United Illuminating Company

The United Illuminating Company



UIL HOLDINGS CORPORATION

The United Illuminating Company

Safety First, Always!

UIL HOLDINGS CORPORATION

UI Electric T & D

Utility Exchange Program

(Pakistan Distribution Companies)

The United Illuminating Company

LOAD REDUCTION / SHEDDING

Ed Delmonte

Transmission Operations Lead Engineer

UIL HOLDINGS CORPORATION

The United Illuminating Company

Transmission & Distribution Operations and Maintenance Department

Transmission System Abnormal Conditions and/or Capacity Deficiency Plan
and how it relates to UI's distribution system

UIL HOLDINGS CORPORATION

The United Illuminating Company

High Level Description

- Who are FERC, NERC , NPCC , ISO and CONVEX
- ISO Master/Local Control Center Procedure No. 2
- ISO OP 2,4,6, 7

UIL HOLDINGS CORPORATION

The United Illuminating Company

Who are they and what do they do?

FERC- Federal Energy Regulatory Commission

- They define ISO's authority and the services it provides
- Approves and mandates rules that guide ISO responsibilities
- NERC-North American Electric Reliability Corporation
  - *Develops and ensures compliance with mandatory planning and operating power system standards*
  - *Can Levy fines of $1,000.00 to 1 Million per day per violation*

UIL HOLDINGS CORPORATION

The United Illuminating Company

Who are they and what do they do?

NPCC- Northeast Power Coordinating Council Inc.

- Develops , implements and enforces criteria for the design and operation of interconnected power system

- ISO New England- Independent System Operator
  - *Ensure that the regional Transmission system can reliably deliver power to consumers under a wide range of present and future system conditions*
  - *Develop and follow procedures to meet numerous stringent long term/ short term reliability standards*

UIL HOLDINGS CORPORATION

Definition of Abnormal Conditions

Judgment made by ISO or CONVEX when abnormal conditions exist (or anticipated) that will degrade the reliability of the bulk power supply such as:

- Forecast or actual shortage of Operating Reserves requiring implementation of ISO OP-4 or OP-7, CONVEX OI-4 , OI-7, UI OPE-04, OPE-07

The United Illuminating Company

Definition of Abnormal Conditions

- Low transmission voltages and/or low reactive reserves (OP-12 Appendix A)
- Inability to provide first contingency protection when undesirable post-contingency conditions might result (i.e., load shedding required post-contingency)
- Cold Weather Event declared
- Credible threats to power system security such as: SMD, sabotage or approaching storms
- Other conditions at ISO-NE or LCC discretion

UIL HOLDINGS CORPORATION

The United Illuminating Company

What is M/LCC 2 ?

- Master Local Control Center Procedure No. 2 (M/LCC 2) - Abnormal Conditions Alert, is used to alert applicable power system operations, maintenance, construction and test personnel as well as each applicable Market Participant (MP) when an abnormal condition affecting the reliability of the power system exists or is anticipated.

- Once notified of an M/LCC 2 Abnormal Condition Alert, these entities are expected to take precautions so that routine maintenance, construction or test activities associated with any generating station, Dispatchable Asset Related Demand (DARD), Real-Time Demand Response, Real-Time Emergency Generation, transmission line, substation, dispatch computer, and communications equipment do not further jeopardize the reliability of the power system.

- If a maintenance, construction or test activity could jeopardize the reliability of the power system such activity shall be stopped and/or postponed during the M/LCC 2 Abnormal Condition Alert.

UIL HOLDINGS CORPORATION

The United Illuminating Company

M/LCC 2 may be implemented by:

- ISO-NE for abnormal conditions affecting New England-wide reliability.

- Individual LCCs for abnormal conditions that affect a single LCC's reliability. If UI has a significant event, CONVEX will declare M/LCC2

UIL HOLDINGS CORPORATION

OP-4- Action During A Capacity Deficiency

The United Illuminating Company

This procedure establishes criteria and guides for actions during capacity deficiencies, as directed by ISO New England (ISO) and as implemented by ISO and the Local Control Centers (LCCs). This procedure may be implemented any time one or more of the following events, or other similar events, occur or are expected to occur:

Examples of actions during OP-4 are:

- Voluntary load curtailment (UI OP-E08)
- ISO Load response program
- 5% system wide voltage reduction(UI OP-E02)

UIL HOLDINGS CORPORATION

The United Illuminating Company

OP-07 - Action in an Emergency

This Operating Procedure (OP) establishes criteria to be followed in the event of an operating emergency involving unusually low frequency, equipment overload, capacity or energy deficiency, unacceptable voltage levels, or any other emergency that ISO New England (ISO) deems appropriate in an isolated or widespread area of New England. The objectives in establishing these emergency actions are:

1. *To protect reliable operation of the Eastern Interconnection.*
2. *To restore balance between customers' load and available generation in the shortest practicable time.*
3. *To minimize risk of damage to equipment.*
4. *To minimize interruption of customer service*

UIL HOLDINGS CORPORATION

The United Illuminating Company

OP-07 - Action in an Emergency

If we are experiencing a Transmission Line over load condition , UI will Manually shed load by supervisory . This is a special SCADA display that will shed load based on what is needed. The display shows the operator “blocks” of load that can be shed. The customer circuits for this procedure are reviewed each January based on previous year’s load.

UIL HOLDINGS CORPORATION

The United Illuminating Company

NPCC Requirements for OP-07

- Automatic Under frequency Shedding for low frequency condition
- Goal is to return frequency to 58.5 Hz in 10 seconds and 59.5 Hz in 30 seconds for generator loss of up to 25% of load.

Stage 1	59.5 Hz	7%	300 ms
Stage 2	59.3 Hz	7%	300 ms
Stage 3	59.1 Hz	7%	300 ms
Stage 4	58.9 Hz	7%	300 ms
Stage 5 (anti-stall)	59.5 Hz	2%	10 s

The United Illuminating Company

OP-6- System Restoration

- This procedure addresses restoration of the Bulk Electric System (115 kV and above) after a partial or complete system blackout. Expeditious restoration of the Bulk Electric System depends on independent actions and interactions by Market Participants, Local Control Centers (LCCs) and ISO New England (ISO). Depending on the expanse of the blackout (local area or widespread) numerous Market Participant and LCC restoration procedures, and this procedure, may need to be implemented simultaneously. NPCC Regional Reliability Directory #8 System Restoration provides more detailed information on how system operators should establish and maintain Inter-Area tie lines.

- During system restoration, a high priority must be given to the restoration and reliability of the Interconnection as well as restoration of off-site AC power sources to nuclear Generators. Also, technical aspects of system restoration (i.e. Generator startups, load pickups, switching surges, voltages, frequency, synchronization of islands, etc.) will be crucial. Recognizing these concerns, this procedure and all LCC restoration procedures have been developed in a coordinated fashion.

How are we notified when we have a problem

The United Illuminating Company

- Phone Calls
  - ISO to CONVEX to UI Operations center to UI folks listed in OP's

- Text Messaging
  - ISO
  - CONVEX

- Email alerts
  - ISO
  - CONVEX

UIL HOLDINGS CORPORATION

UI Electric T & D

Utility Exchange Program

(Pakistan Distribution Companies)

The United Illuminating Company

TRANSMISSION & ASSET PLANNING

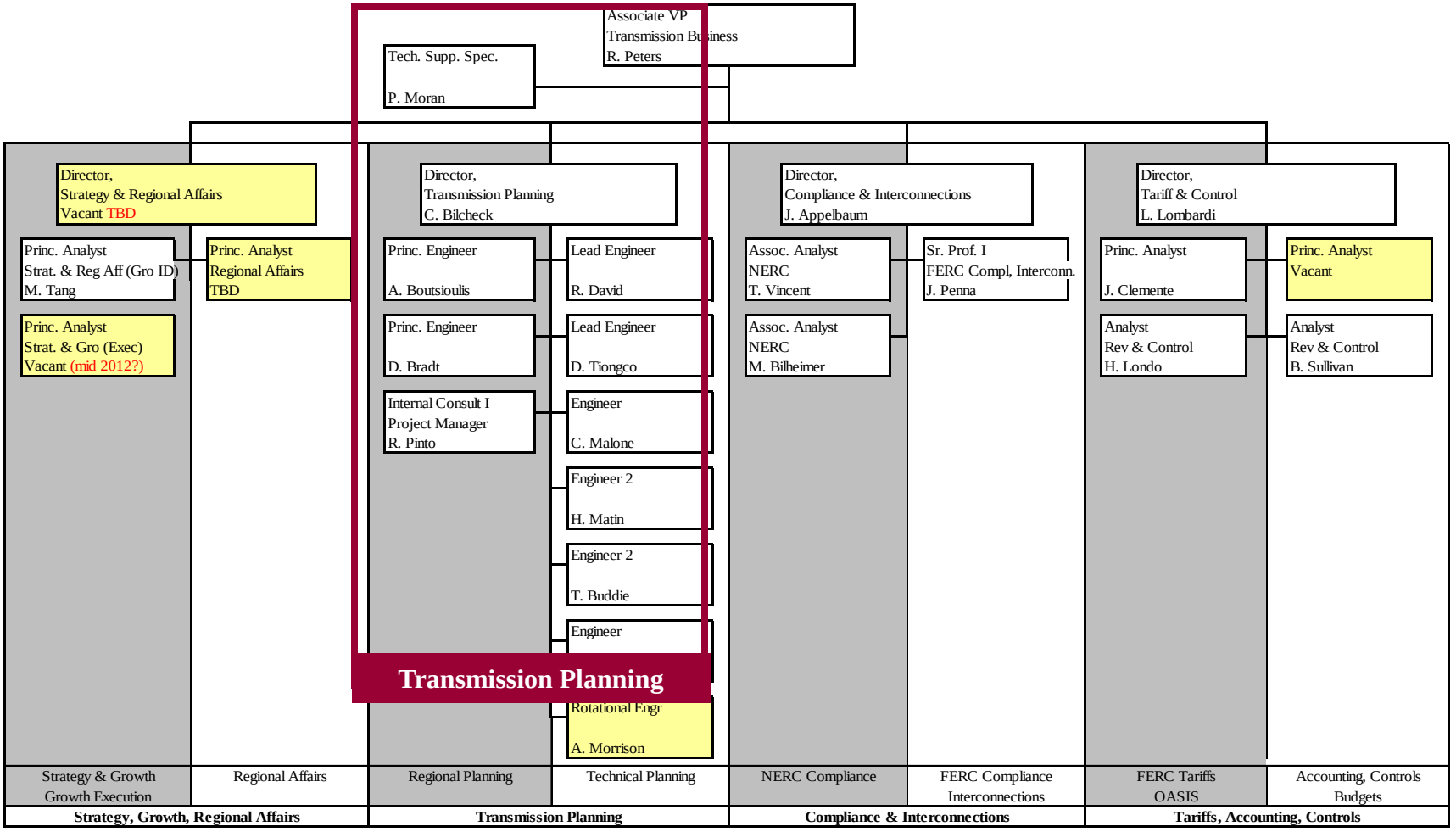
Christian Bicheck

Director, Asset Planning Transmissions

UIL HOLDINGS CORPORATION

The United Illuminating Company

The Transmission Business Organization



The United Illuminating Company

The Planning Team

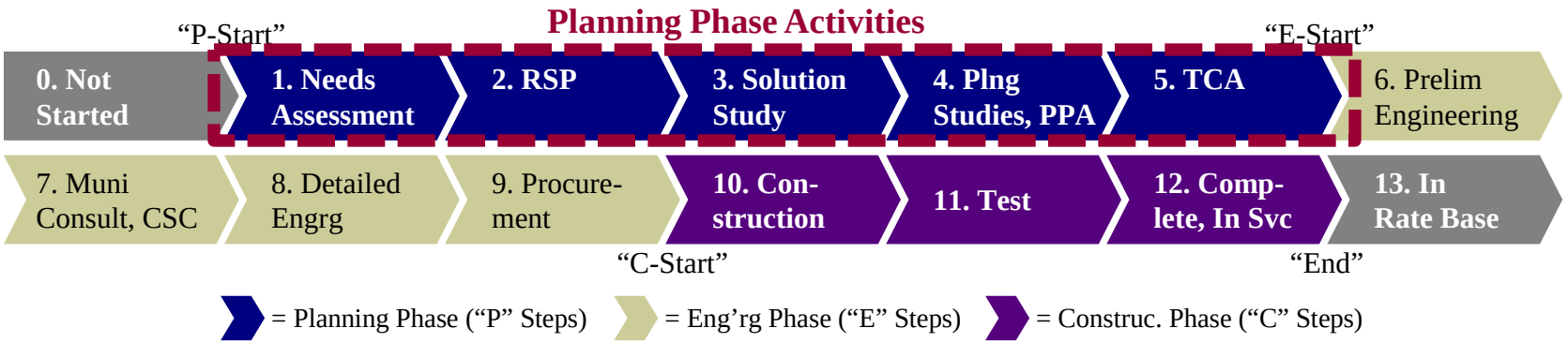
UI's Transmission Asset Planning Department is responsible for effectively planning the electric transmission system to assure its customers receive safe, reliable and cost-effective transmission service, in support and in compliance with NERC, NPCC, ISO-NE and UI reliability criteria, standards and procedures.

Front row left to right: Dave Bradt, Tonya Buddie, Hasan Matin
Back row left to right: Richard David, Dindo Tiongco, Chris Malone, Chris Bilcheck,
Rich Pinto, Alex Boutsioulis

UIL HOLDINGS CORPORATION

The United Illuminating Company

UI must follow NE's Planning Process



(1) Needs Assessment: System needs must be studied and well-documented. Study scope, assumptions, procedures and findings are presented to ISO and the New England Stakeholder group (i.e., "PAC")

(2) RSP ("Regional System Plan"): A transmission project that is being considered as a potential solution to meet the identified need, but for which there is little or no analysis available to support. As projects become more real/ defined, regular updates are made to the RSP (e.g., cost estimates, projected in-service dates) and to PAC.

(3) Solution Study: Strive to identify the most cost-effective and reliable solutions for the region that meet the identified need. Findings and recommendations of this evaluation of alternatives is vetted through ISO and the PAC.

(4) Planning Studies, PPA: System impact studies have been performed to show the transmission project has "no adverse impact" on the reliability or operability of the transmission system.

(5) TCA ("Transmission Cost Allocation"): Formal process to seek New England-wide recovery of the costs for transmission projects that are part of the "pool" (i.e., "PTF")

The United Illuminating Company

Needs Assessments are Initiated to Comply with Mandatory Reliability Standards

Federal Power Act (1935), Energy Policy Acts of 1992/2005:

- **Federal oversight of Transmission**
- **Authorized FERC to ensure Transmission System reliability**
- **FERC authorized NERC to establish and implement standards**

Reliability is defined by resource adequacy and security

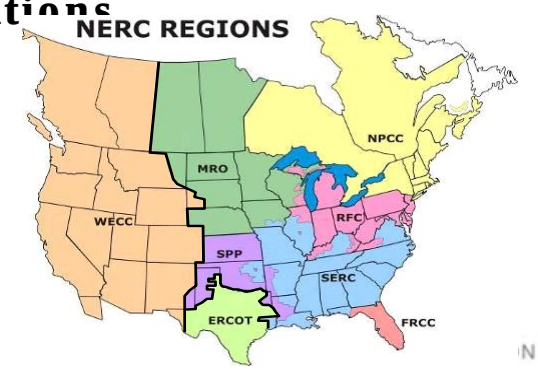
- **Resource adequacy is to ensure sufficient supply**
- **Security is the ability of the power system to withstand contingencies and events**

NERC reliability standards are mandatory

- **NERC has defined over 800 mandatory requirements**
- **Penalties for non compliance - reliability violations can result in fines up to $1 million/day**

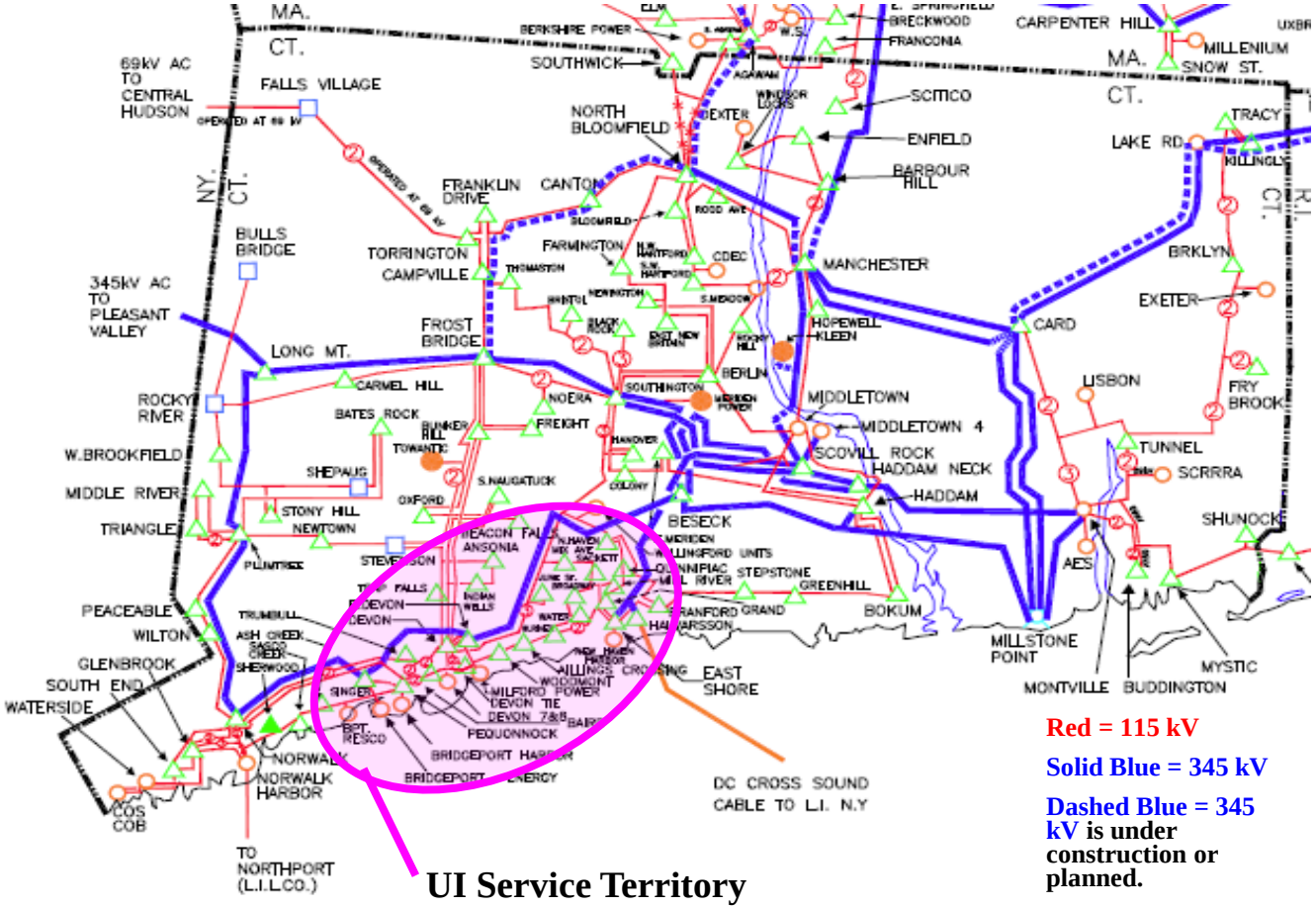
NPCC and ISO-NE

- **Regional focus**
- **Includes NERC requirements**
- **Ensure adequate resources and transmission to meet electricity demand**



The United Illuminating Company

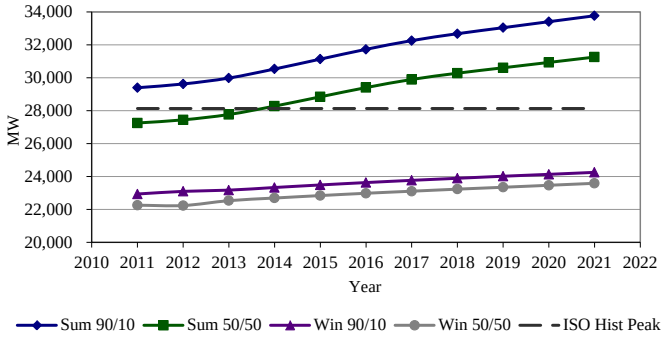
Connecticut is Integrated as Part of the NE System; Coordinated studies with ISO-NE/NU are needed



The United Illuminating Company

Needs Assessments also initiated from other concerns; Close coordination with D-Planning and T&S Engineering

Customer Load Growth



Aging Infrastructure

System Additions/ Retirements

Adequacy of Design

The United Illuminating Company

Many Solution Studies are currently in progress

- SWCT II Coordinated Study; solutions are being developed for:
  - New Haven Area line overloads and voltage collapse concerns
  - Railroad line overloads
  - Bridgeport cable overloads
  - Old Town/ Hawthorne weak transmission voltage
  - Naugatuck Valley overloads and voltage collapse concerns
- Pequonnock Fault Duty Mitigation
  - Many years in development to get to preferred solution
  - Storm surge exposure/ risk impact
- Old Town and Baird Substation Upgrades or Replacement
  - Many upgrades (T&D) required at each substation
  - Evaluation of a complete station replacement vs. component upgrades

UIL HOLDINGS CORPORATION

The United Illuminating Company

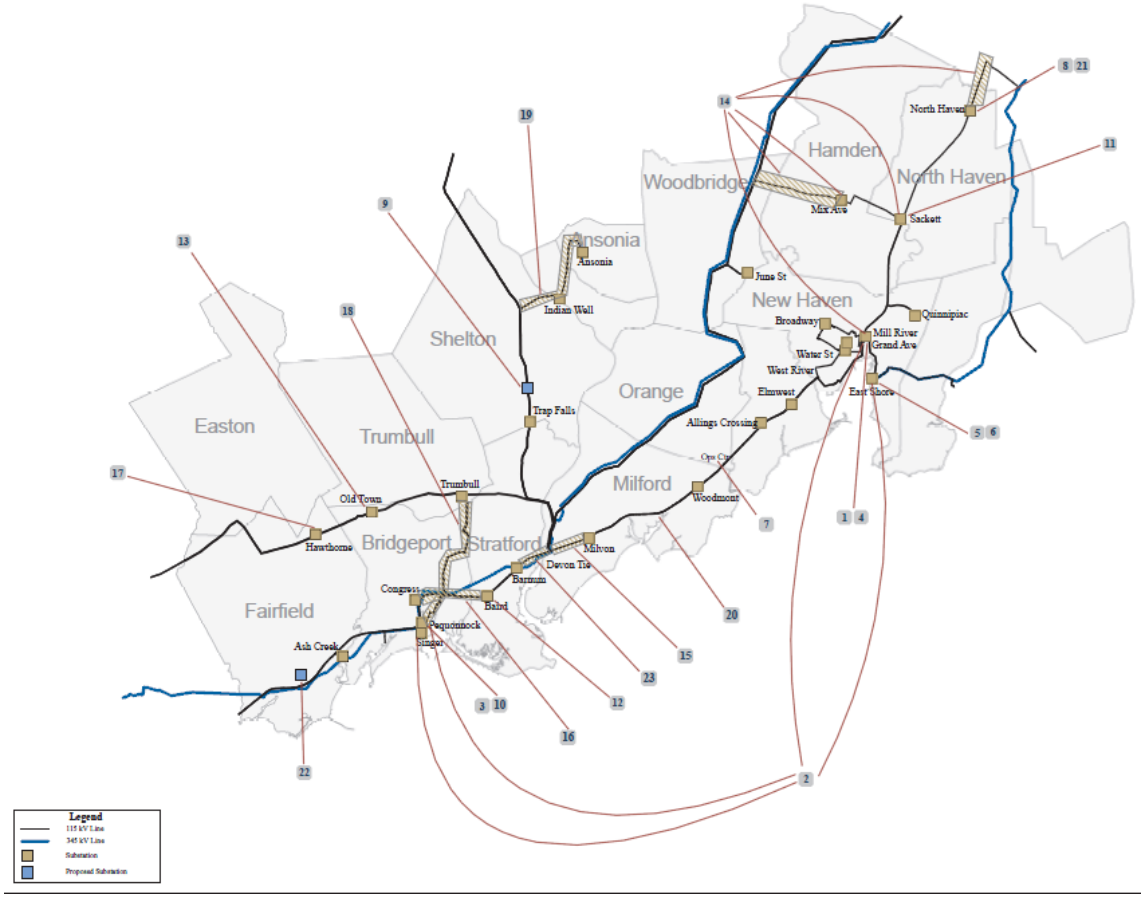
Examples of Projects that have recently moved through the Planning Process

- **Water Street and West River Fault Duty Mitigation: Bus system and ground grid upgrades completed in 2011**
- **Capacitor Bank TRV Mitigation: East Shore completed in 2011, North Haven to be completed in 2012**
- **Devon Tie BPS Compliance: Completed in 2011, met UI's implementation plan schedule to NPCC to comply with BPS design requirements**
- **East Shore OCB/Switch Replacements: Phase 1 completed in 2011, Phase 2 ISD summer 2014. Received approval for 100% regional cost allocation.**
- **8300 Line Reconfiguration Project: Construction to start this fall with summer 2014 ISD. Need identified from SWCT study. Currently in cost allocation approval process.**
- **Shelton Substation: Has received technical approval at ISO, currently in preparation for siting approval, planned 2014 ISD. Need driven by area load growth and voltage collapse concerns**

UIL HOLDINGS CORPORATION

The United Illuminating Company

Transmission and Substation Ten Year Plan Projects



2012		
1	**Grand Avenue 115 kV Switching Station Modernization**	In-Service
2	**ISO-NE Synchrophasor, Phasor Measurement Unit Installation**	Construction
3	**Pequonnock 115 kV Bus System Upgrades, Bay 1**	Planned
2013		
4	**8300 Line Reconfiguration Project**	Planned
5	**East Shore 115/13.8 kV Substation, Distribution Capacity Upgrade**	Planned
6	**East Shore Substation, 115 kV Circuit Breaker and Switch Replacement**	Planned
7	**SCADA Master Station Replacement**	Planned
8	**North Haven Substation, Capacitor Bank TRV Mitigation**	Construction
2014		
9	**New Pootatuck (Shelton) 115/13.8 kV Substation**	Planned
10	**Pequonnock 115 kV Fault Duty Mitigation, Phase 1**	Proposed
	- Control Room/ Relay Replacement	
	- 115 kV Bus System 63 kA upgrade	
	- Disconnect switch replacements	
2015		
11	**Sackett 115/13.8 kV Substation, Distribution Improvements**	Planned
2016		
12	**Baird 115/13.8 kV Substation Upgrade or Replacement**	Concept
13	**Old Town 115/13.8 kV Substation Upgrade or Replacement**	Concept
14	**SWCT, New Haven Area 115 kV Transmission Upgrades**	Concept
	- Glen Lake - Mix Ave 115 kV 1610 Line Reconductoring	
	- Sackett: Phase Shifter Removal, 115 kV Capacitor Bank Replacement, Terminal Upgrades	
	- Mix Ave: 115 kV Capacitor Bank Addition, Terminal Upgrades	
	- North Haven - Wallingford 115 kV 1630 Line Reconductoring	
	- Grand Ave: 115 kV Capacitor Bank Addition	
15	**SWCT, Devon Tie- Milvon 115 kV RR Line Reconductoring/Upgrade**	Concept
16	**SWCT, Congress - Baird 115 kV RR Line Reconductoring/Upgrade**	Concept
17	**SWCT, Hawthorne 115 kV Capacitor Bank (2) addition**	Concept
18	**SWCT, Trumbull - Pequonnock 115 kV Transmission Upgrades**	Concept
19	**SWCT, Naugatuck Valley 115 kV Transmission Upgrades**	Concept
20	**FAC-008 Long Term Remediation Project (2016-2022)**	Concept
2017		
21	**North Haven 115/13.8 kV Transformer Replacements (LTC's)**	Concept
2019		
22	**New Fairfield 115/13.8 kV Substation**	Concept
2022		
23	**SWCT, Barnum - Devon Tie 115 kV RR Line Reconductoring/Upgrade**	Concept

UIL HOLDINGS CORPORATION

The United Illuminating Company

RESOURCES

- **Lineman's and Cableman's Handbook 12th Edition**
  ISBN 0071742581 / 9780071742580

- **Electric Power Distribution Handbook**
  ISBN 0849317916 / 978-0849317910

- **Standard Handbook for Electrical Engineers, 5th Edition**
  ISBN 9780071441469

UIL HOLDINGS CORPORATION