RIVERSIDE PUBLIC UTILITIES

UTILITY 2.0

BOARD WORKSHOP - ROADMAPS

JULY 13,2015

WATER | ENERGY | LIFE

CITY OF RIVERSIDE PUBLIC UTILITIES

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RIVERSIDE PUBLIC UTILITIES - PLANNING DATELINE

WORKING THE PLAN

2014

General Manager Assessment

Q1 - 2015

February 12, 2015
Introduction to Utility 2.0

February 27, 2015
Utility 2.0 Feedback

Q2 - 2015

May 7, 2015
Joint Meeting #1
Utility 2.0
& Governance

Q3 - 2015

July 13, 2015
Utility 2.0
Infrastructure &
Workforce
Roadmaps

July 29, 2015
Utility 2.0
Resource Supply
Thriving Financially
Roadmaps

August 11, 2015
City Council
to discuss
Performance Audits
Fiscal and Reserves
Policy

August 28, 2015
Joint Meeting #2
Utility 2.0 - Roadmaps
& Governance

September 1, 2015
Council Workshop
RPU
Finance 101

Q4 - 2015

October 2015
Fiber Optic Plan
Northside Audit
Transactions
to Board and
Council

Oct.-Dec. 2015
Roadmap Feedback
Fiscal Policies Audit
Organizational Review
Thriving Financially
to Board and
Council

Q1 - 2016

Jan.-Mar. 2016
Draft Financial Plan
(5 year forecast)
Performance Audit
(next phase)
Detailed Finance Audit
to Board and
Council

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CITY OF RIVERSIDE
PUBLIC UTILITIES

COMPLETED

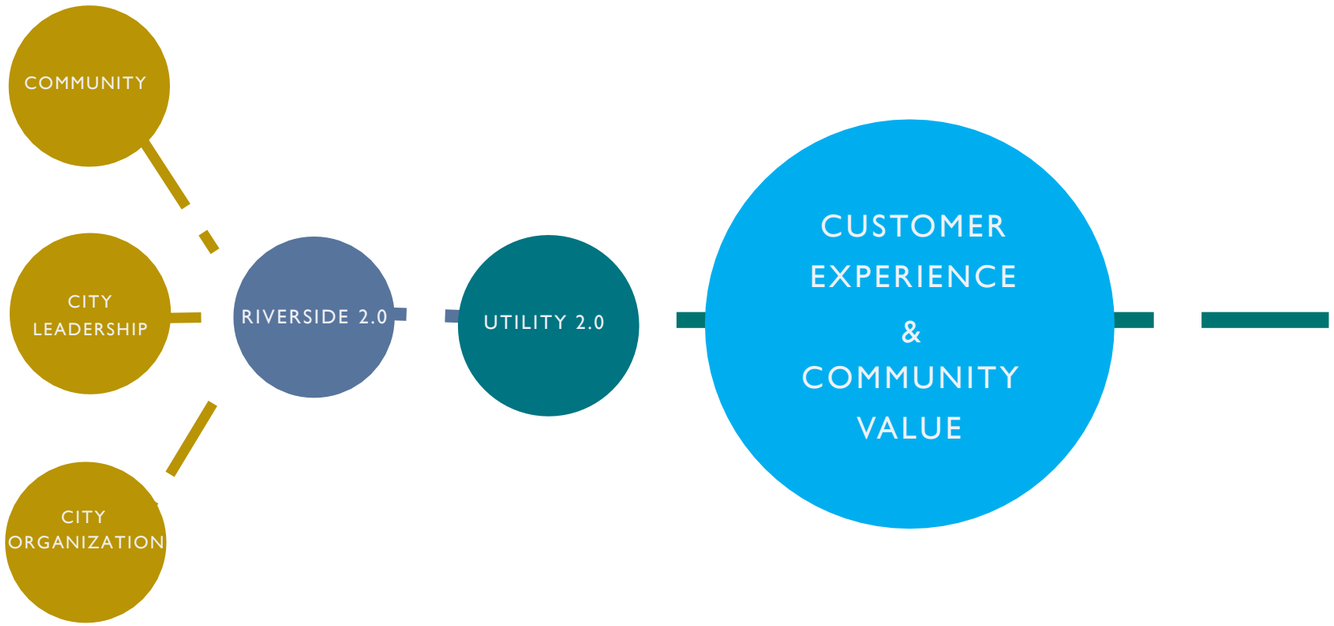
City Council

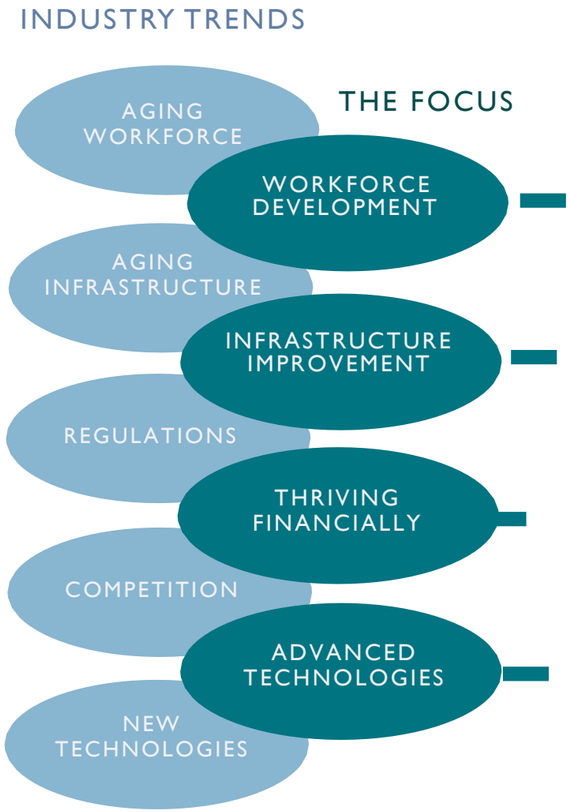
Board of Public Utilities

Joint Meeting Council Board

Reports to Board And Council

THE PLANNING PROCESS





THE PLANS

- RECYCLED WATER
- WATER INFRASTRUCTURE
- INTEGRATED WATER
- WORKFORCE DEVELOPMENT
- FACILITIES PLAN
- RPS POWER IMPLEMENTATION
- INTEGRATED POWER RESOURCES
- ELECTRIC INFRASTRUCTURE
- TRANSMISSION RELIABILITY
- FIBER BUSINESS
- TECHNOLOGY
- CONSERVATION AND EFFICIENCY
- FINANCIAL PRO FORMA - 10 YR

Riverside 2.0 was created after input from the Community through the Seizing Our Destiny process, the City Council's development of seven strategic goals in 2015, and the City Management's governing principles. This graphic illustrates the planning process and specifically outlines how RPU's plans fit within the City's broader plan.

HOW INFRASTRUCTURE ROADMAPS SUPPORT OUR GOALS

CITY GOAL #1
Enhanced Customer Service: Improved quality of life

CITY GOAL #2
Economic Development: Continue to develop an economically vibrant City

CITY GOAL #3
Community Services: Provide appealing, accessible and safe venues

CITY GOAL #4
City Transportation Program: Continue to develop efficient transportation systems and provide affordable options for community mobility

CITY GOAL #5
Improve Housing Diversity and Options

CITY GOAL #6
Improve Teamwork and Communication

CITY GOAL #7
Reduce Taxpayer Liability and Reduce Costs Wherever Possible

RPU GOAL #1
Contribute to the City of Riverside's economic development while preserving RPU's financial strength

RPU GOAL #2
Maximize the use of technology to improve utility operations

RPU GOAL #3
Impact positively legislation and regulations at all levels of government

RPU GOAL #4
Develop and implement electric and water resource plans

RPU GOAL #5
Create and implement a workforce development plan

WORKFORCE DEVELOPMENT

INFRASTRUCTURE IMPROVEMENT

THRIVING FINANCIALLY

ADVANCED TECHNOLOGIES

THE PLANS

- RECYCLED WATER
- WATER INFRASTRUCTURE
- INTEGRATED WATER
- WORKFORCE DEVELOPMENT
- FACILITIES PLAN
- RPS POWER IMPLEMENTATION
- INTEGRATED POWER RESOURCES
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- FINANCIAL PRO FORMA - 10 YR

RIVERSIDE PUBLIC UTILITIES

UTILITY 2.0

ELECTRIC INFRASTRUCTURE ROAD MAP

JULY 13, 2015

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CITY OF RIVERSIDE

PUBLIC UTILITIES

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ROAD MAPS – INFRASTRUCTURE IMPROVEMENT –
ELECTRIC

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ROAD MAPS – INFRASTRUCTURE IMPROVEMENT - ELECTRIC

INFRASTRUCTURE IMPROVEMENT

EXECUTIVE SUMMARY

WORKFORCE DEVELOPMENT

THRIVING FINANCIALLY

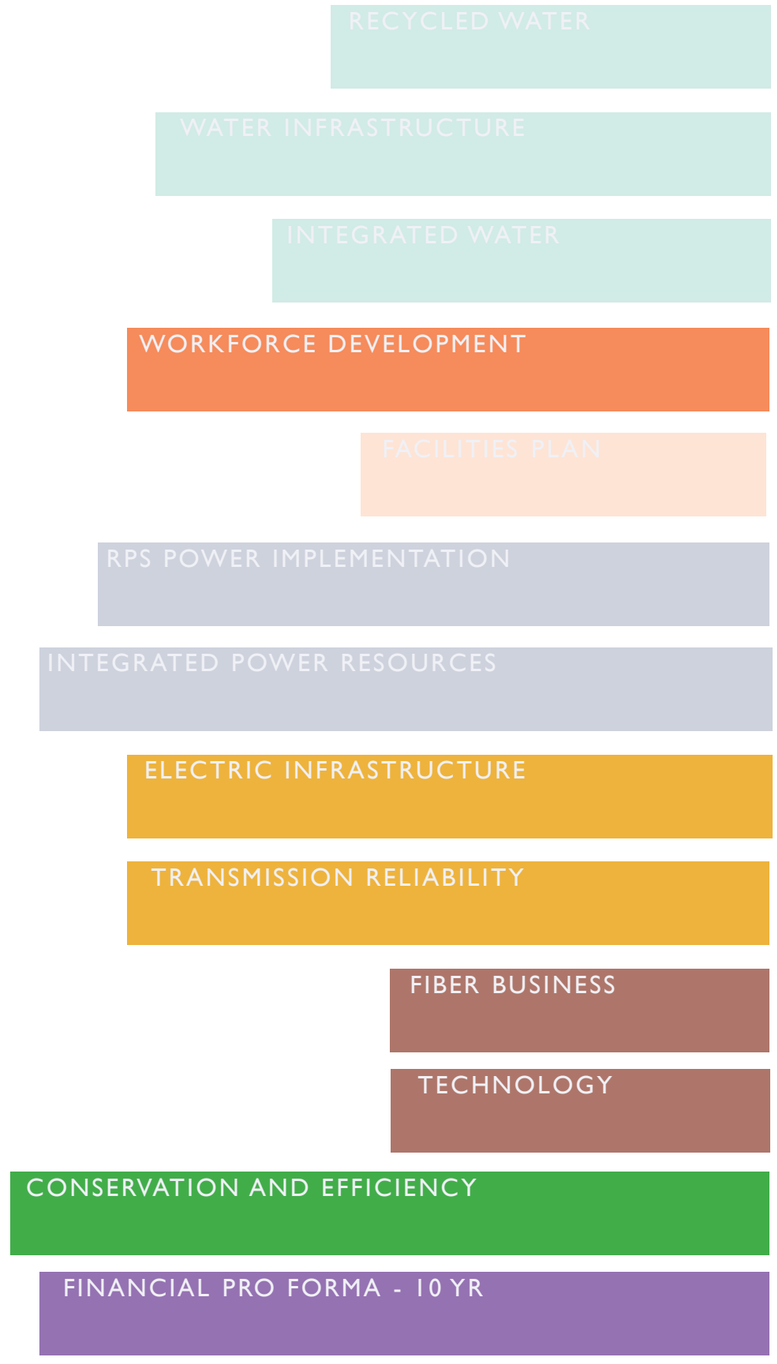
ADVANCED TECHNOLOGIES

ROAD MAPS – INFRASTRUCTURE IMPROVEMENT – ELECTRIC - GOALS

INFRASTRUCTURE IMPROVEMENT

- Address aging infrastructure.
- Improve system safety and reliability.
- Increase the use of technology to inform future planning and increase conservation.
- Use financial pro forma to strike investment balance.

THE PLANS



Diamond Reliability Recognition

- APPA represents community-owned electric utilities in over 2,000 U.S. cities
- RP_3 recognizes utilities with high proficiency in reliability, safety, work force development and system improvement
- RP_3 one of two utilities in California - Diamond level

Replace with newer one?

City of Riverside Electric System Area

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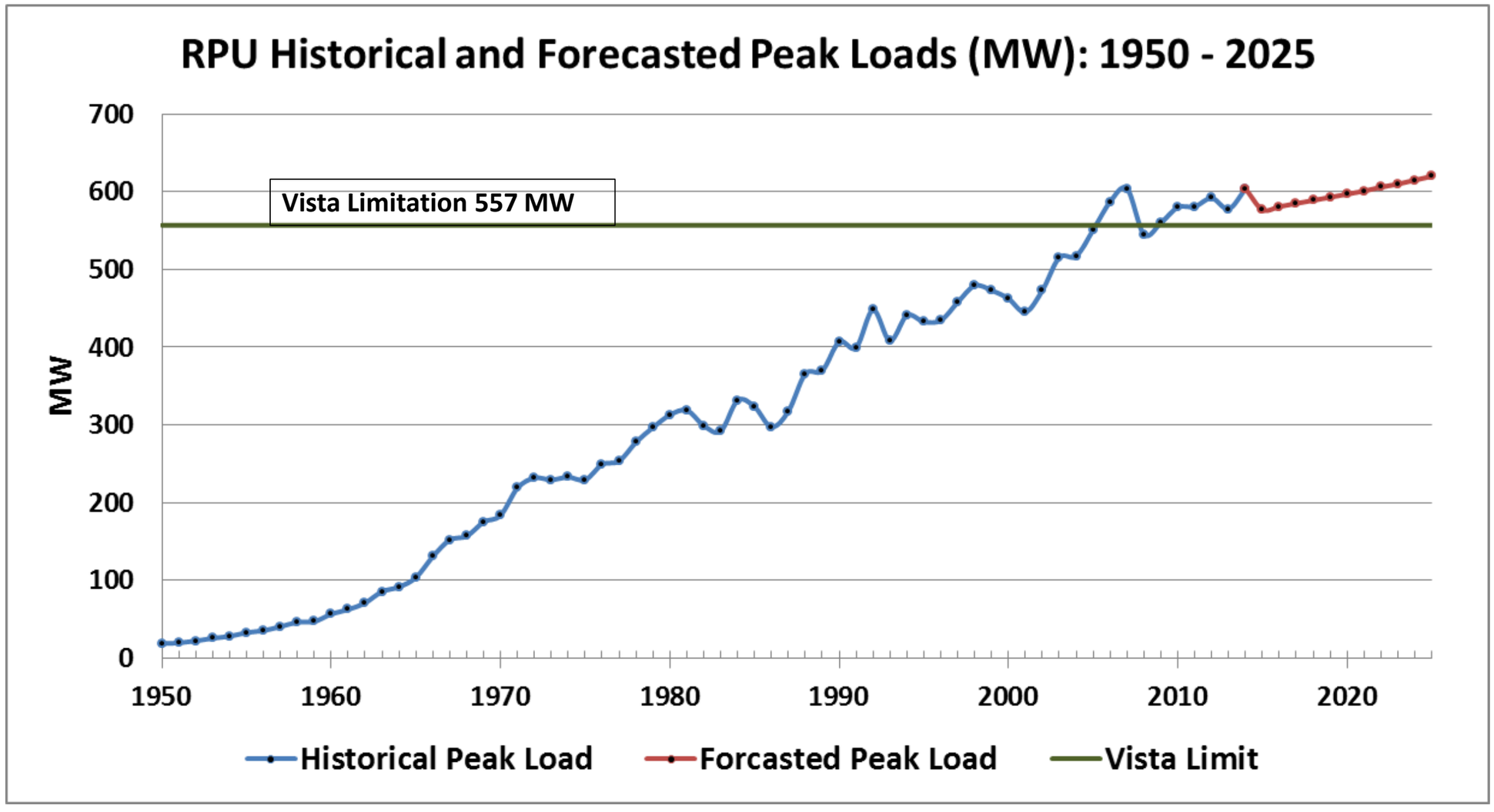
CITY OF RIVERSIDE PUBLIC UTILITIES

- Electric Substations
- Transmission Lines
- SCE Transmission Lines

VISTA
ALUMAX
HUNTER
RIVERSIDE
UNIVERSITY
MTN. VIEW
PLAZA
MAGNOLIA
LA COLINA
CASA BLANCA
SPRINGS
LYNN
FREEMAN
KAISER
ORANGECREST

Historic Peaks

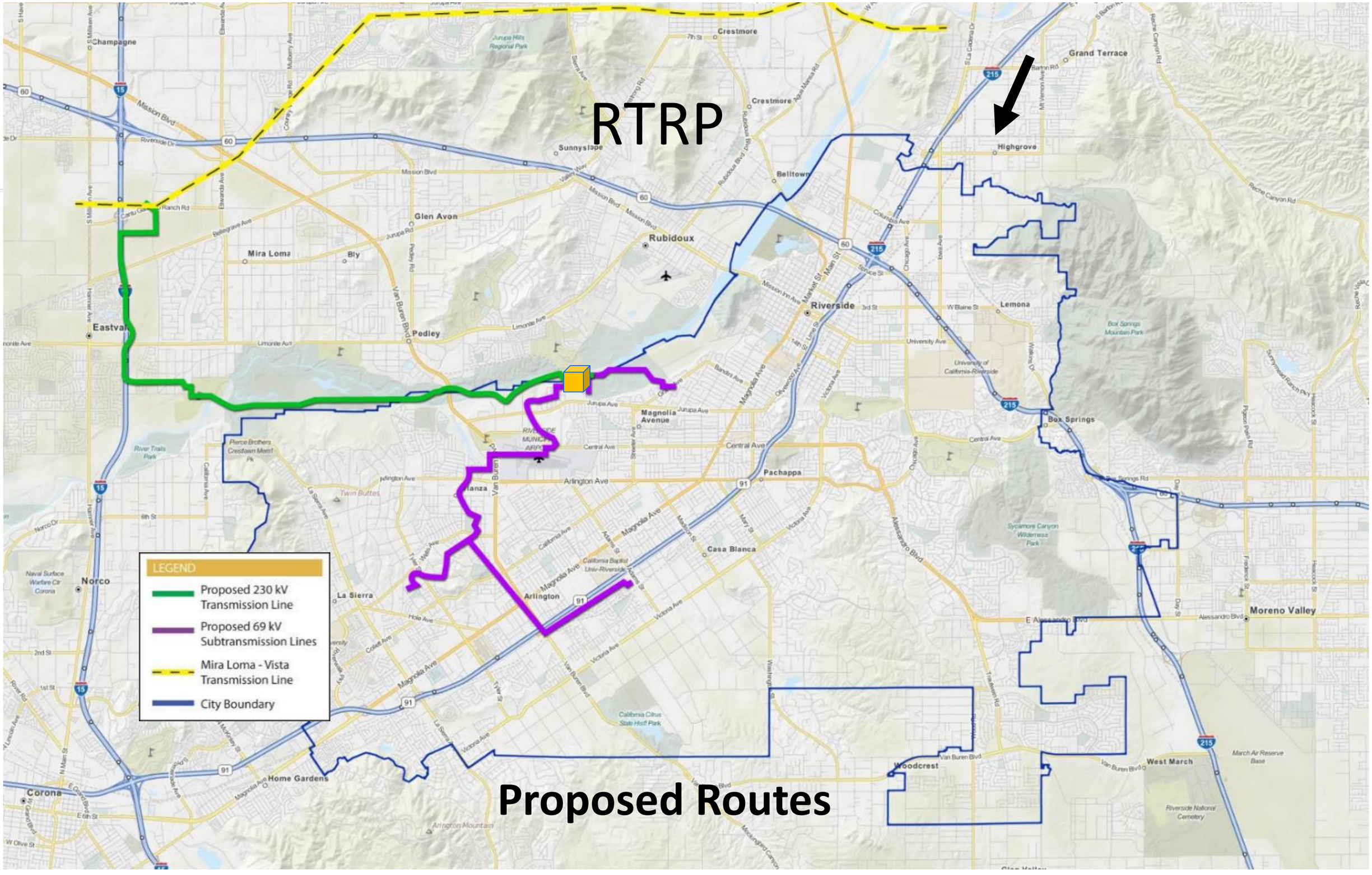


Vista Substation

1 interconnection

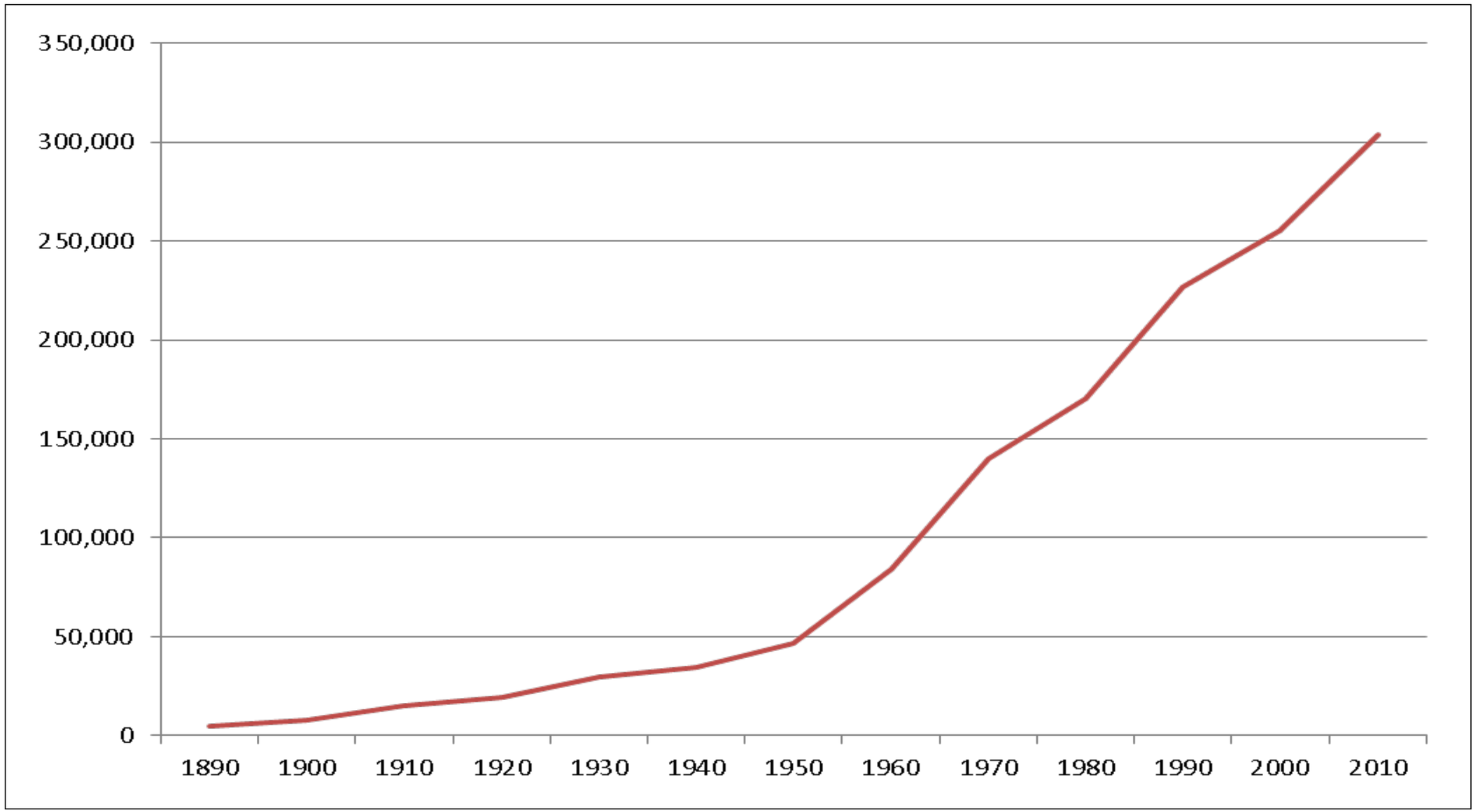
Arizona Public Service

RTRP

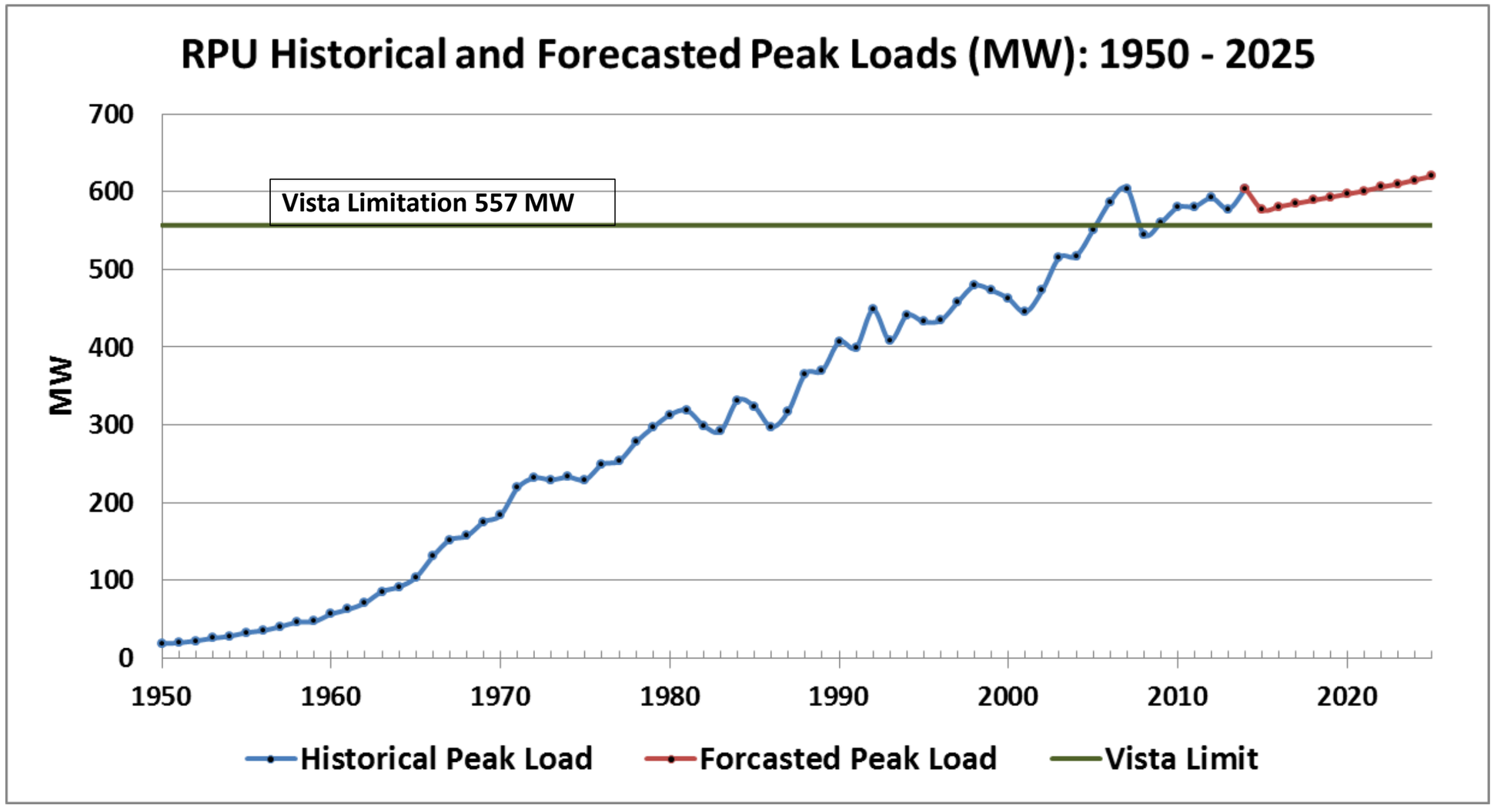


Proposed Routes

Riverside Population & Infrastructure Growth



Historic Peaks



Electric Infrastructure Assessment

Infrastructure:

- Many of our key infrastructure assets are more than 50 years old.
- Electric utility operations are changing.

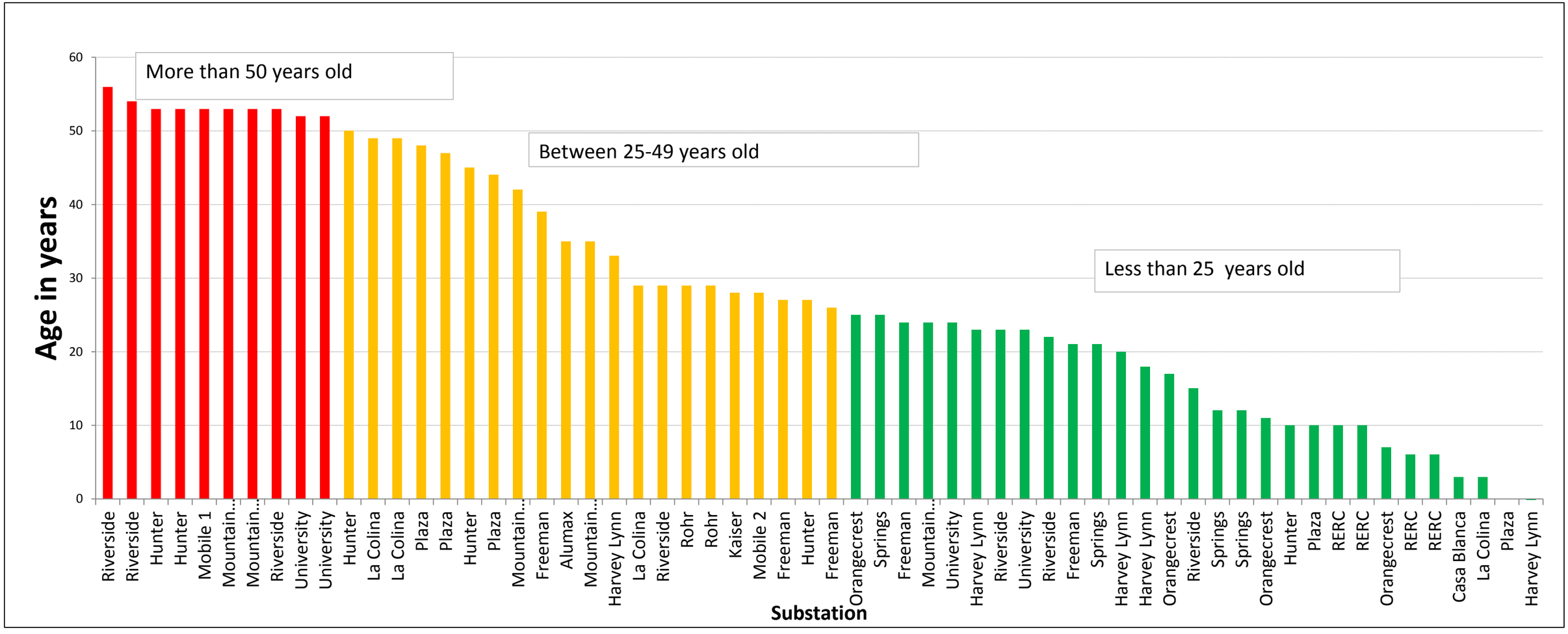
Technology:

- Smart Grid technologies are key to future success and system reliability/management.

Workforce:

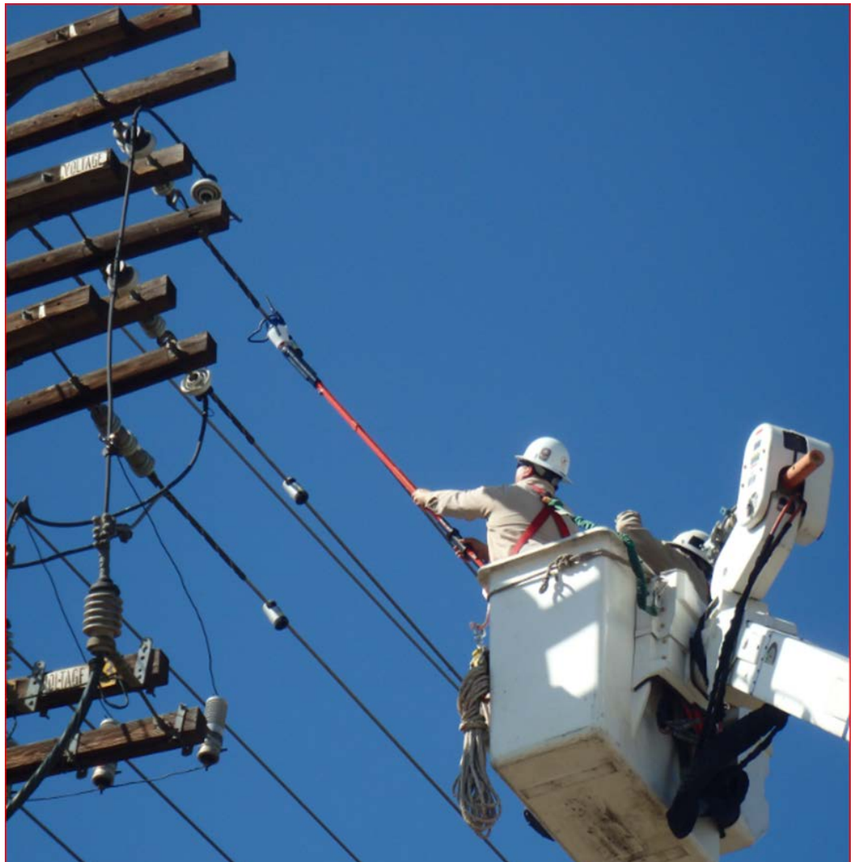
- Workforce needs training to have Utility 2.0 skill sets.
- Knowledge transfer needed for aging workforce.

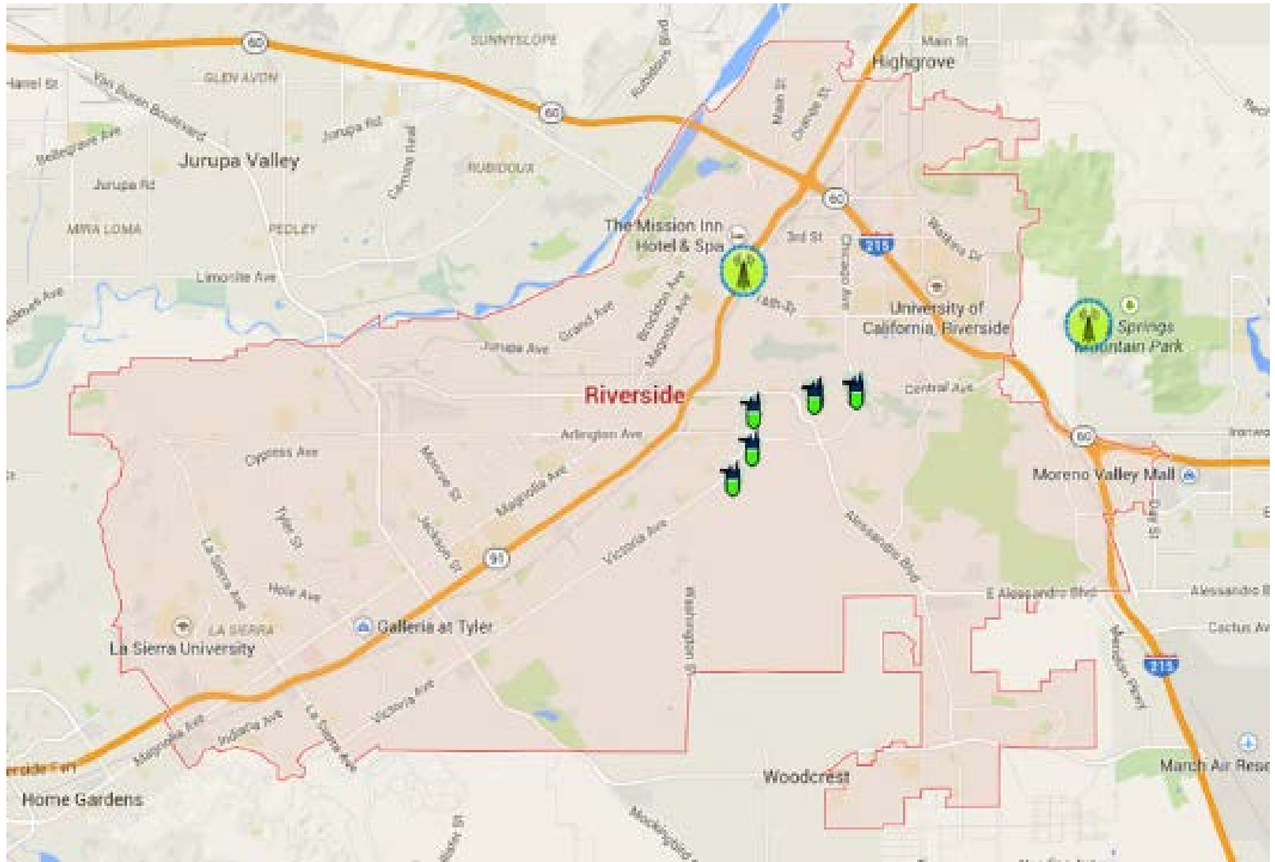
Substation Transformers – Current Condition



Changes To The Network

- Distributed Generation creates 2-way power flows
- Greater visibility of the system
- Future Grid: Sense - Communicate - Control





1950's → 2015

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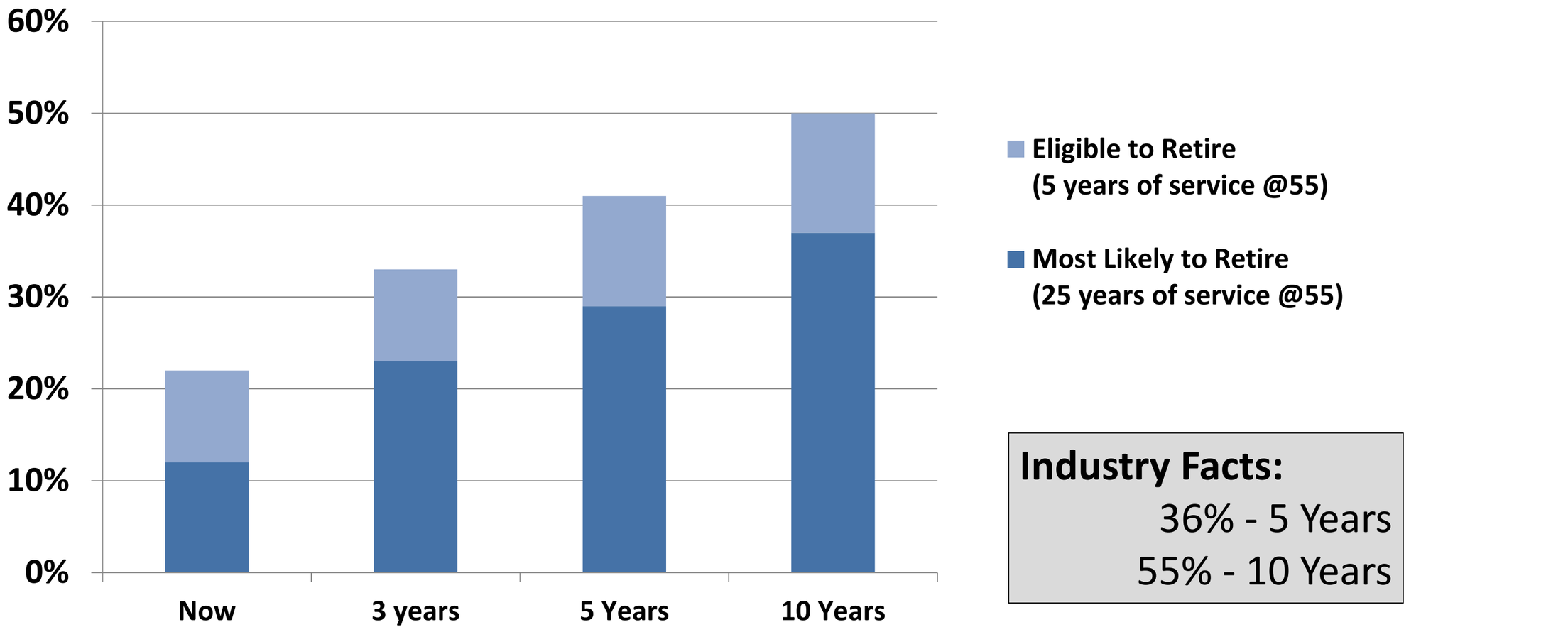
CITY OF RIVERSIDE PUBLIC UTILITIES

RPU Retirement Projections



Employees eligible to retire now and future

Industry Facts:

36% - 5 Years

55% - 10 Years

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CITY OF RIVERSIDE PUBLIC UTILITIES

Assessment

Current State

Run to Failure

Low - up front cost
High - future cost

Negative impact to service

Balance

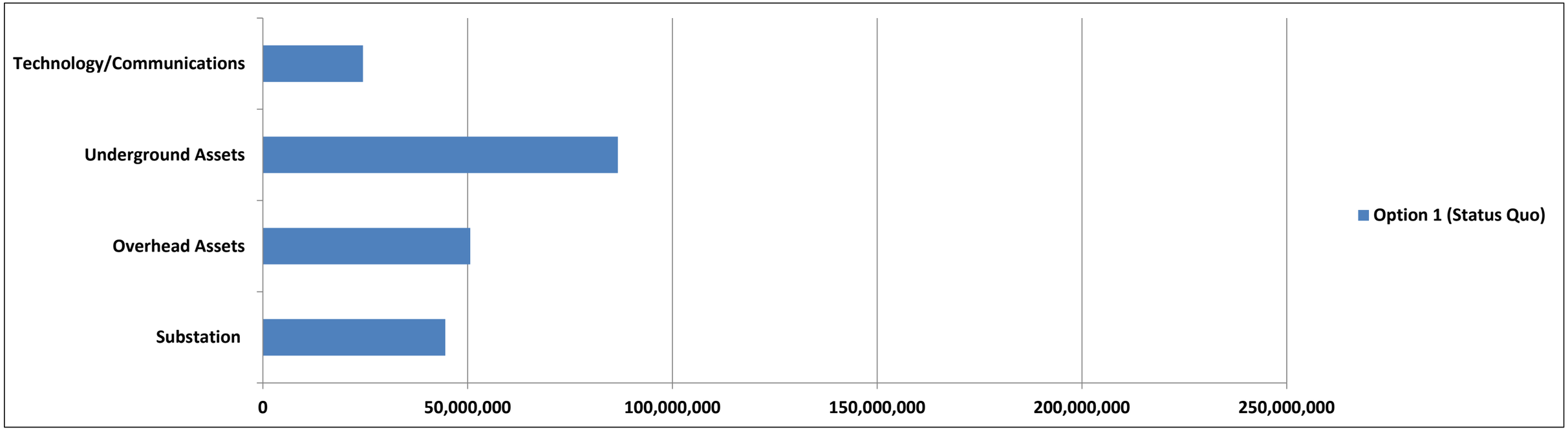
Ideal State

Immediate Replacement

High- up front cost
Lower - future cost

Positive impact to service

Option 1: Stay the Same (reactive mode), but fall behind as costs rise.



Option 1: $171M – $206M

Option 2: $317M – $381M

Option 3: $365M – $439M

Option 4: $519M – $623M

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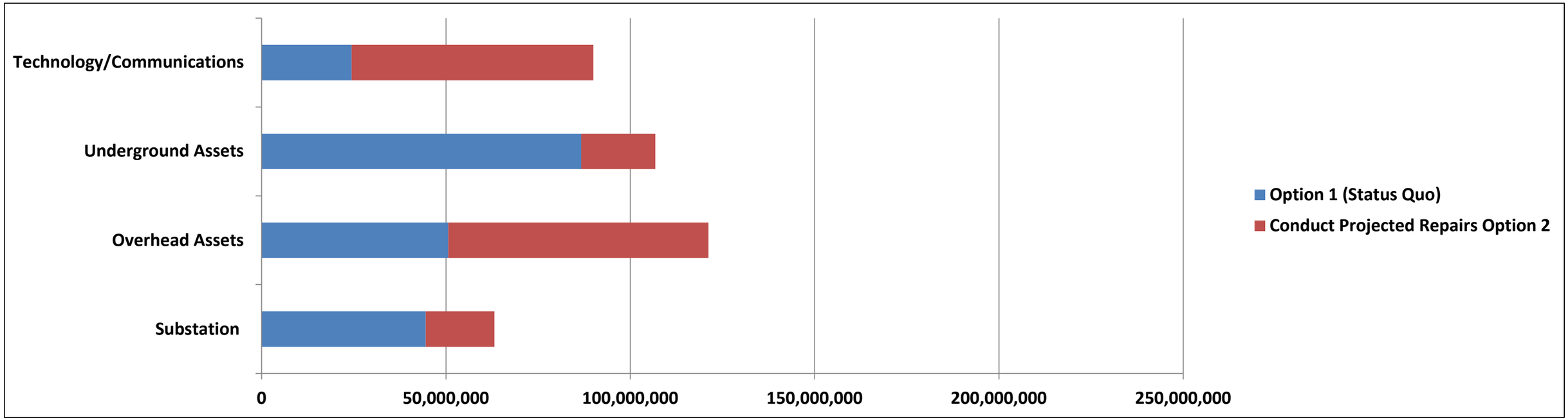
CITY OF RIVERSIDE PUBLIC UTILITIES

Option 2: Add Option 1 plus the costs to actively do projected repairs.



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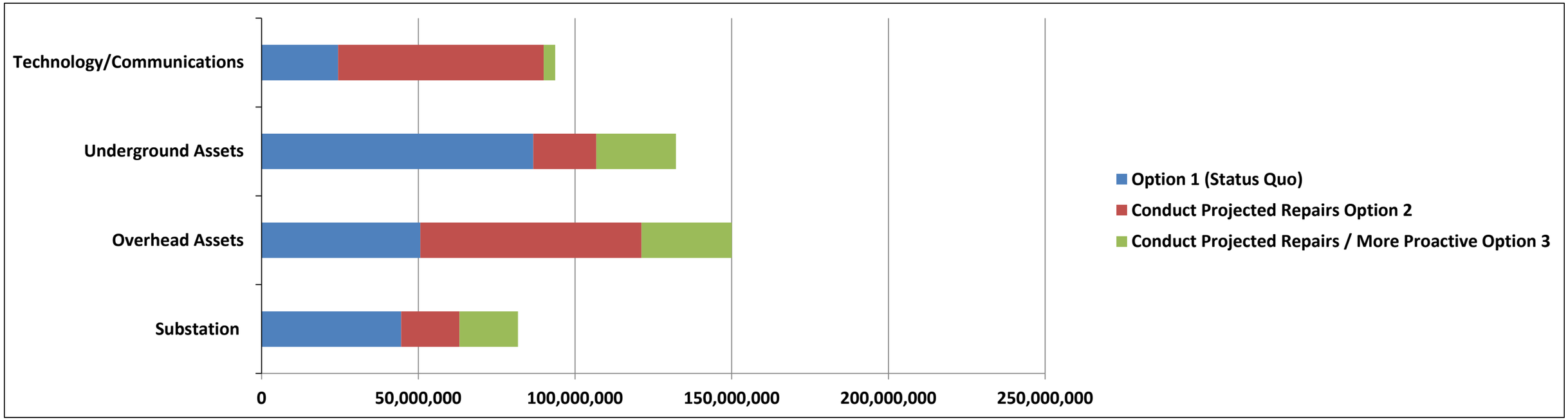
CITY OF RIVERSIDE PUBLIC UTILITIES

Option 3: Options 1 and 2 plus increase condition-based maintenance to be more proactive.



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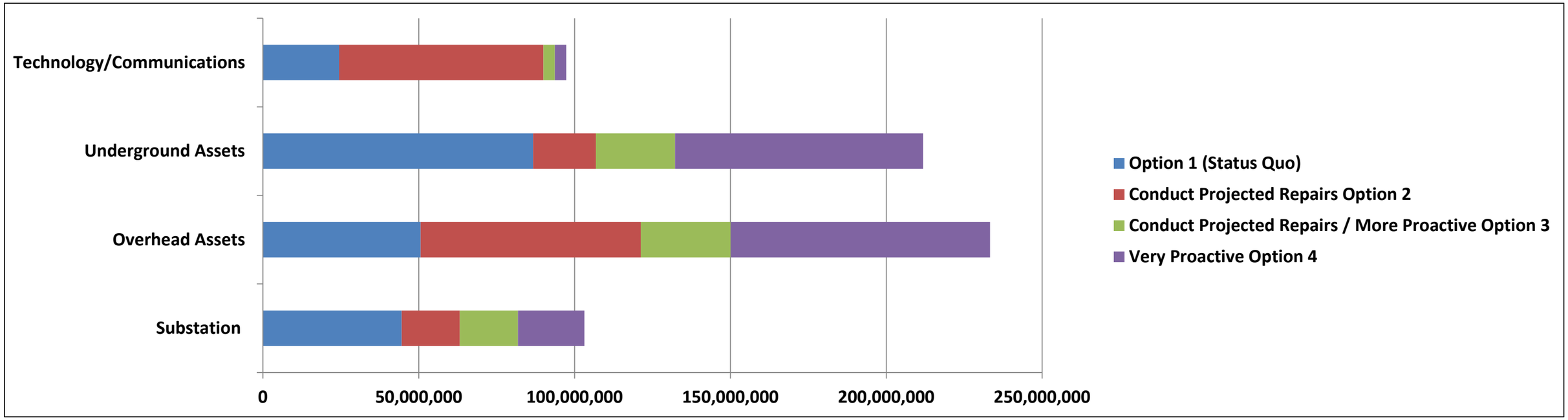
CITY OF RIVERSIDE PUBLIC UTILITIES

Option 4: Cost to be Highly Proactive



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CITY OF RIVERSIDE PUBLIC UTILITIES

Summary of Investment Options

Additional financial investment is required to address current backlog and improve maintenance.

Option 1	Option 2	Option 3	Option 4
Reactive	Reactive plus Projected Repairs	Proactive	Highly Proactive
$171 – 206 million	$317 – 381 million	$365 – 439 million	$519 – 623 million

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CITY OF RIVERSIDE PUBLIC UTILITIES

ROAD MAPS – INFRASTRUCTURE IMPROVEMENT - ELECTRIC

INFRASTRUCTURE IMPROVEMENT

BACKGROUND

WORKFORCE DEVELOPMENT

THRIVING FINANCIALLY

ADVANCED TECHNOLOGIES

Background

- Electric Service began in Riverside in 1895
- Population grew rapidly from 1950-2010
- Infrastructure grew along with population
- Serve population over 300,000
- System replacement cost over $2 Billion
- Annual revenues over $340 Million
- Vital Electric Infrastructure is over 50 years old.

RIVERSIDE, CAL., APR 1 1906

M C. B. Brennand

TO CITY OF RIVERSIDE ELECT. LT. DEPT., D

Balance, Account Rendered, $

Light on Flat Rate from ..... to ..... 190 .....

Power on Flat Rate from ..... to ..... 190 .....

or	Date of Readings	Location	Present Meter Reading	Previous Meter Reading	Difference	Factor	Watts Supplied	
LIGHT	2/17 to 3/17		321800	304600	17200	1	17200	
	to							
	to							
	to							
POWER	to							
	to							
	to							

TOTAL,

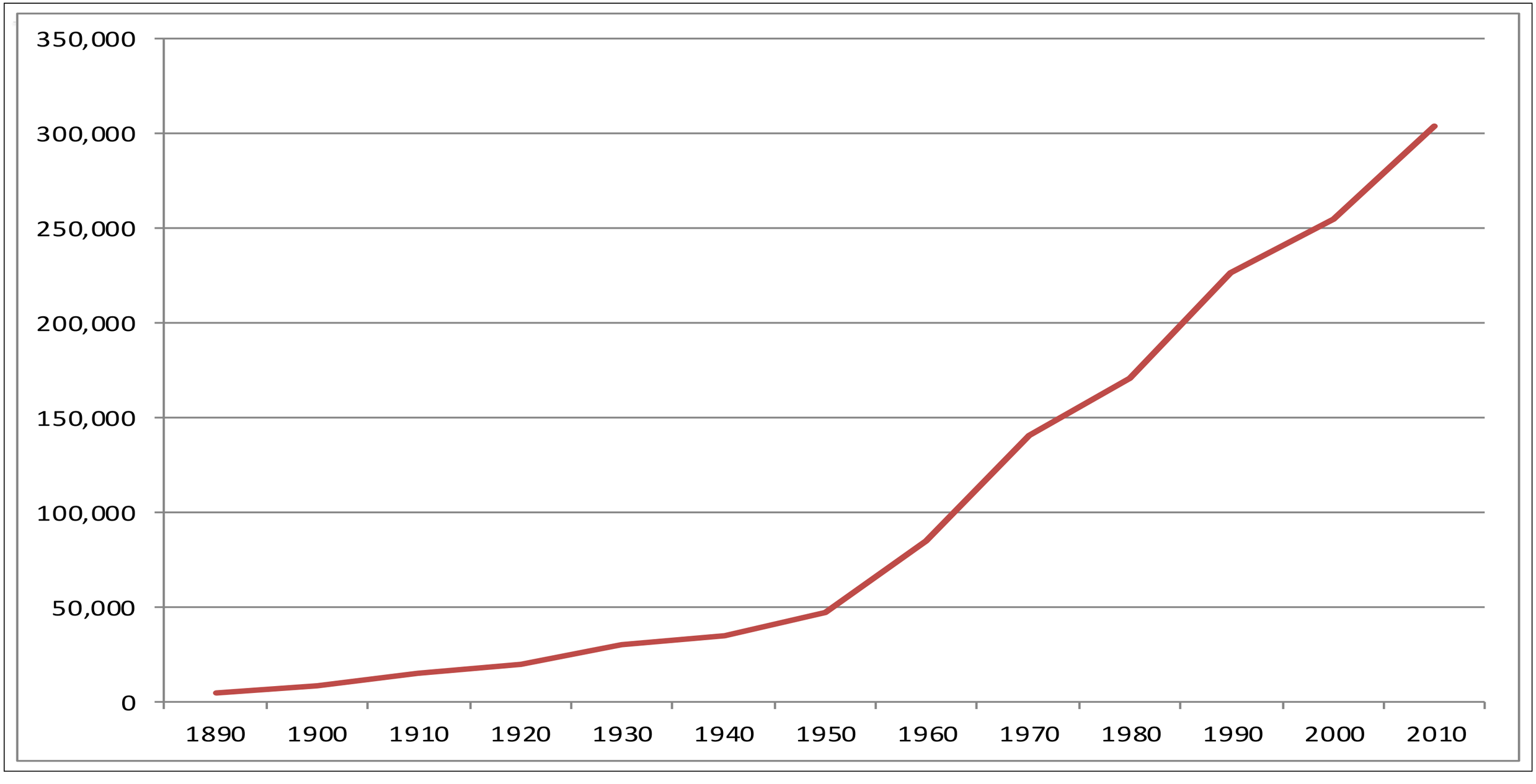
OFFICE AND POWER HOUSE
COrNER NINTH AND MULBERRY STREETS
SUNSET MAIN 7; HOME 1007

Received payment for City, 4/4/06 J. Lindeck

MUNICIPAL
LIGHT-WATER

MUNICIPAL-13

Riverside Population Growth



Electric Utility System Information

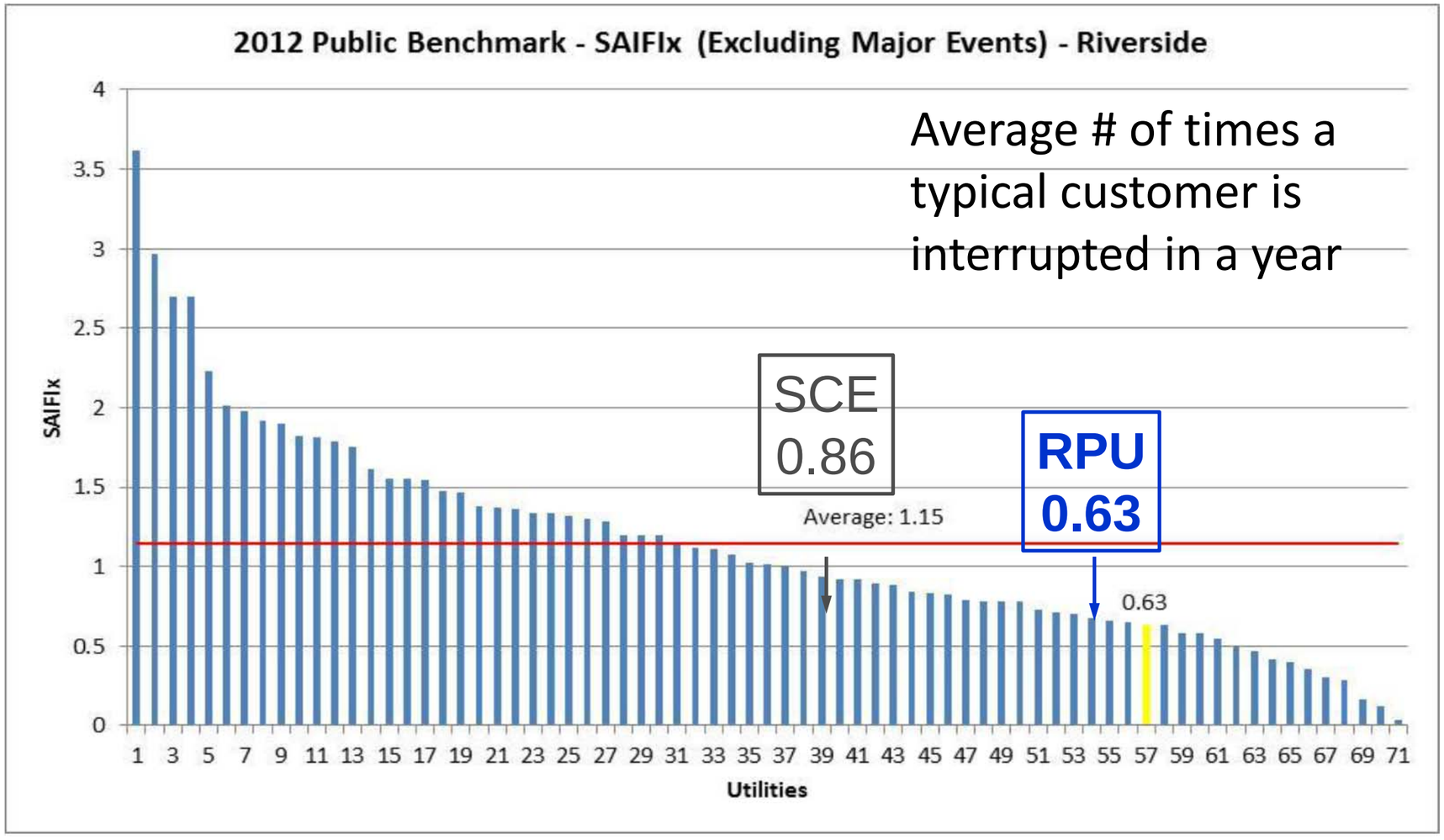
- Budget: $391,977,000
- 108,358 Electric meters
- 463 Employees
- 2,279 Million kWh produced
- Peak demand: 612 MW
- 14 Substations
- 1,327 miles of Distribution Lines

Diamond Reliability Recognition

- APPA represents community-owned electric utilities in over 2,000 U.S. cities
- RP_3 recognizes utilities with high proficiency in reliability, safety, work force development and system improvement
- RP_3 one of two utilities in California - Diamond level

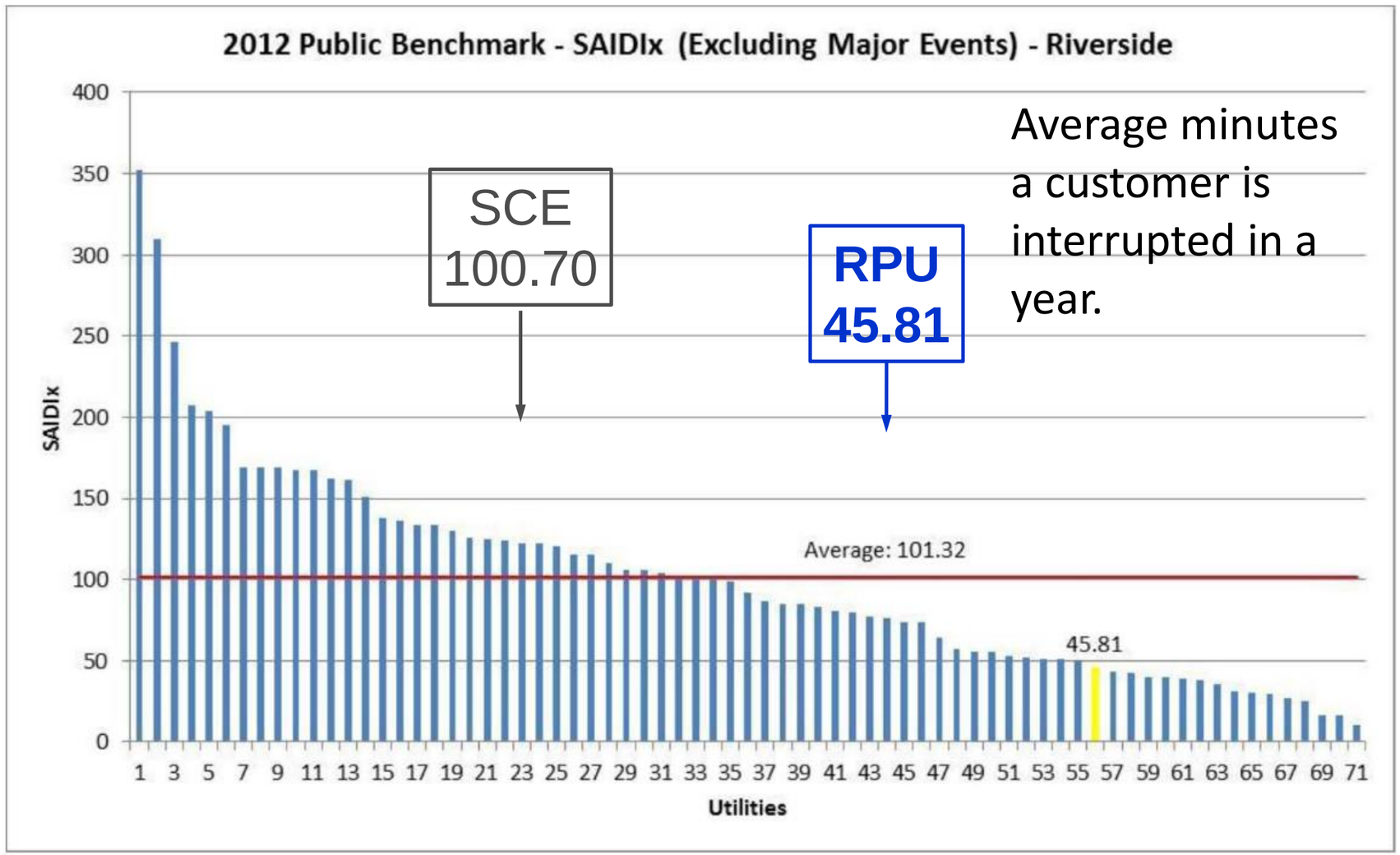
Electric System Reliability

System Average Interruption Frequency Index (SAIFIx)

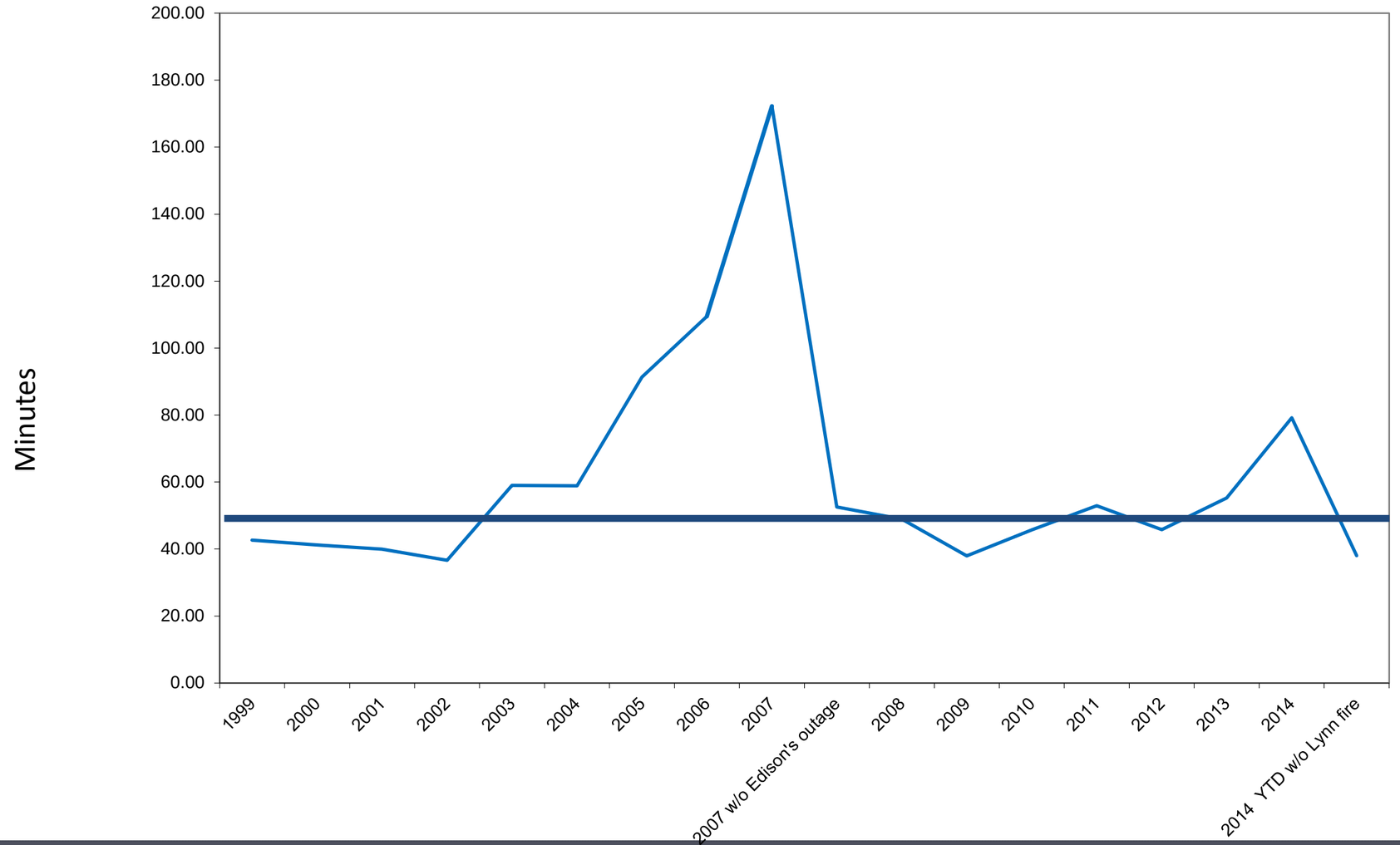


Electric System Reliability

System Average Interruption Duration Index (SAIDIx)



System Average Interruption Duration Index (SAIDIx) History



Goal 50 minutes

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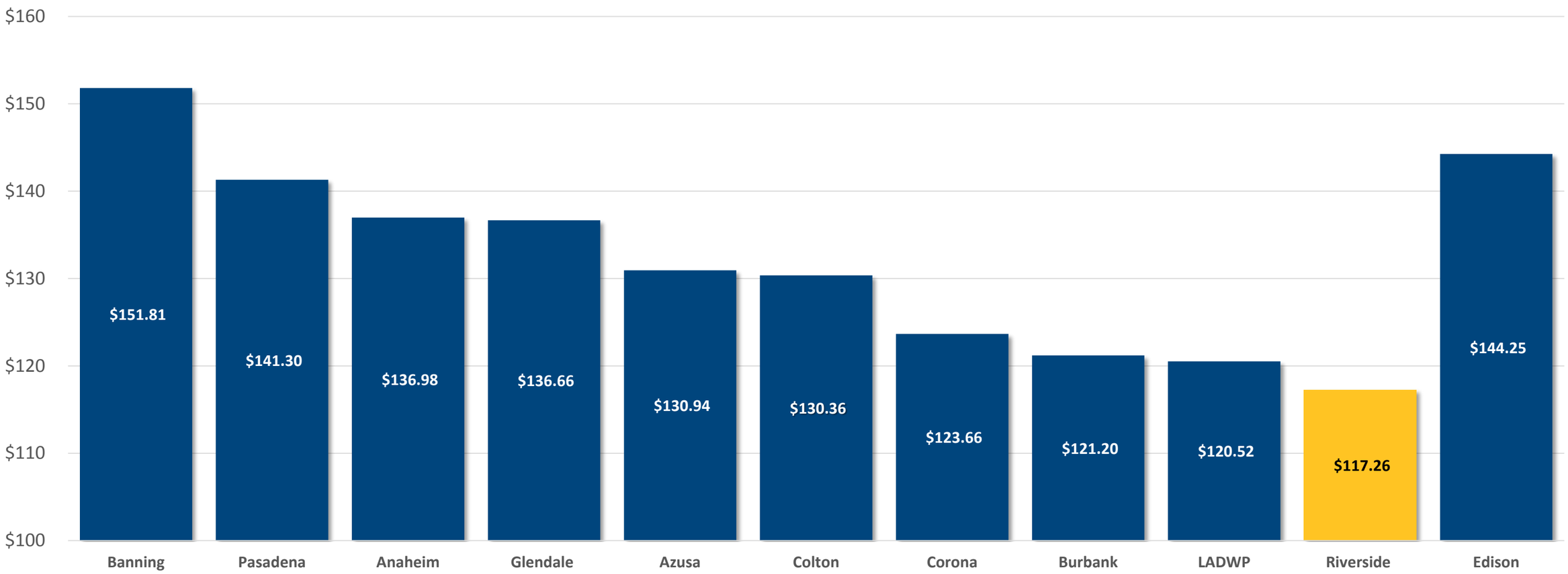
Electric – Rate Comparison



AVERAGE RESIDENTIAL RATE FOR 750 KWH PER MONTH

(AS OF AUG. 31, 2014)

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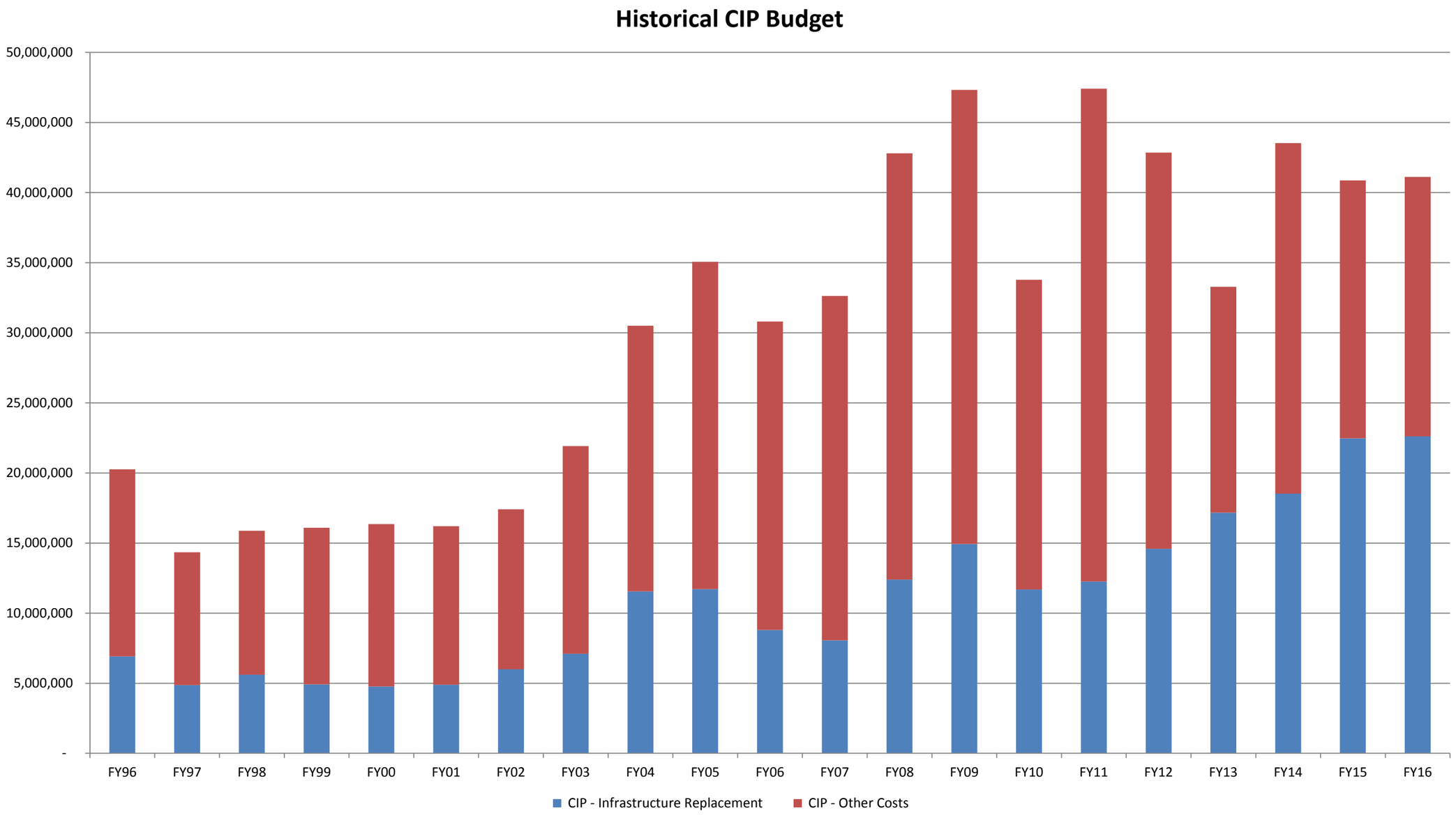
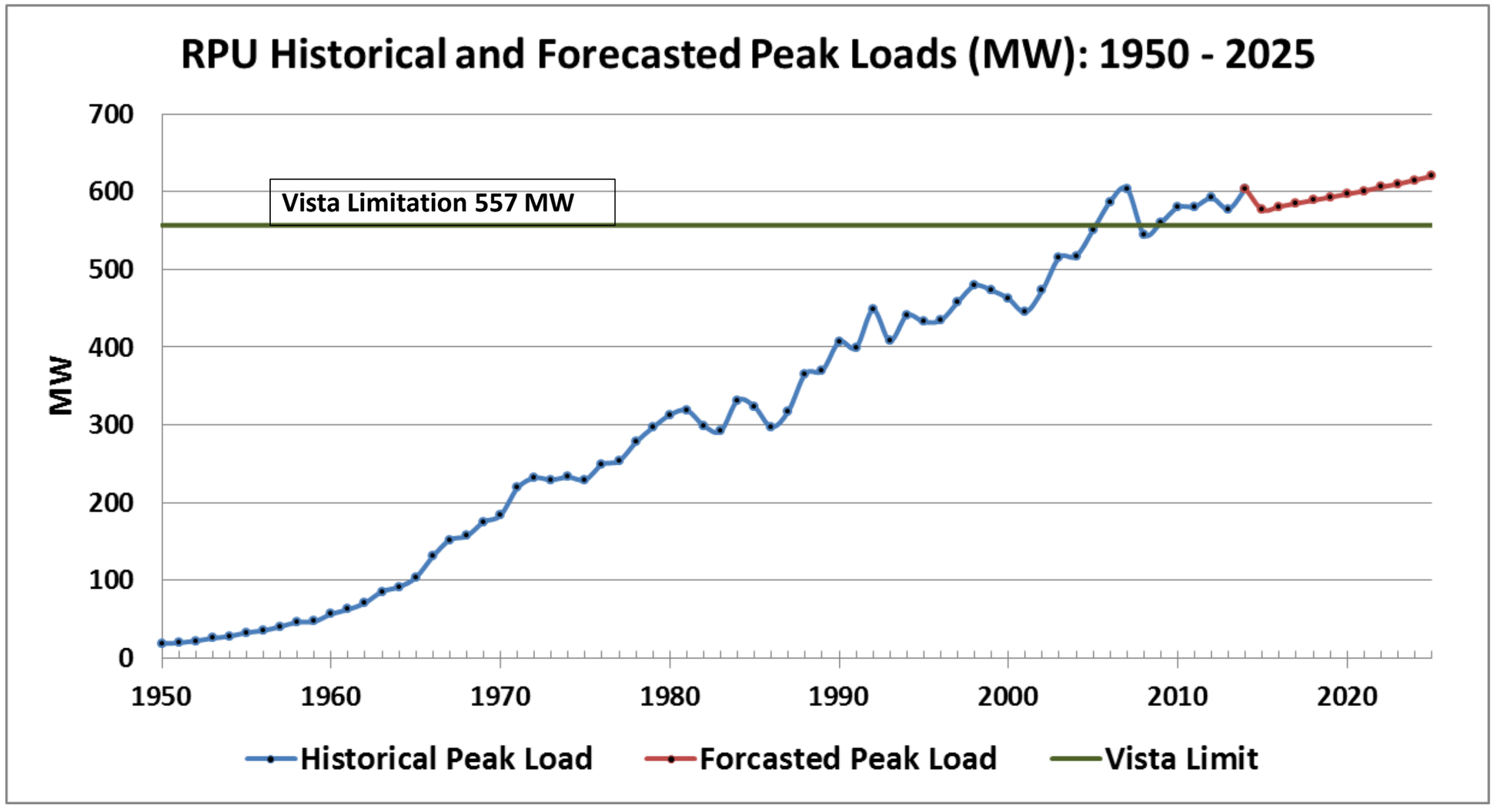
Historical CIP Budget



Current/Recently Completed Electric Infrastructure Efforts

- LED Street Light Pilot
- Harvey Lynn Substation Rehabilitation (La Sierra)
- Magnolia Plaza Reliability Project (MPRP)
- Riverside Transmission Reliability Project (RTRP)

Historic Peaks



Riverside Transmission Reliability Project

Proposed Routes

LEGEND

- Proposed 230 kV Transmission Line
- Proposed 69 kV Subtransmission Lines
- Mira Loma - Vista Transmission Line
- City Boundary

ROAD MAPS – INFRASTRUCTURE IMPROVEMENT - ELECTRIC

WORKFORCE DEVELOPMENT

INFRASTRUCTURE IMPROVEMENT

ASSESSMENT

THRIVING FINANCIALLY

ADVANCED TECHNOLOGIES

Electric Infrastructure Assessment

Infrastructure:

- Many of our key infrastructure assets are more than 50 years old.
- Electric utility operations are changing.

Technology:

- Smart Grid technologies are key to future success and system reliability/management.

Workforce:

- Workforce needs training to have Utility 2.0 skill sets.
- Knowledge transfer needed for aging workforce.

Substation Infrastructure

Transformer & Switchgear

Substation Yard

Overhead Infrastructure

(40% of electric system miles)

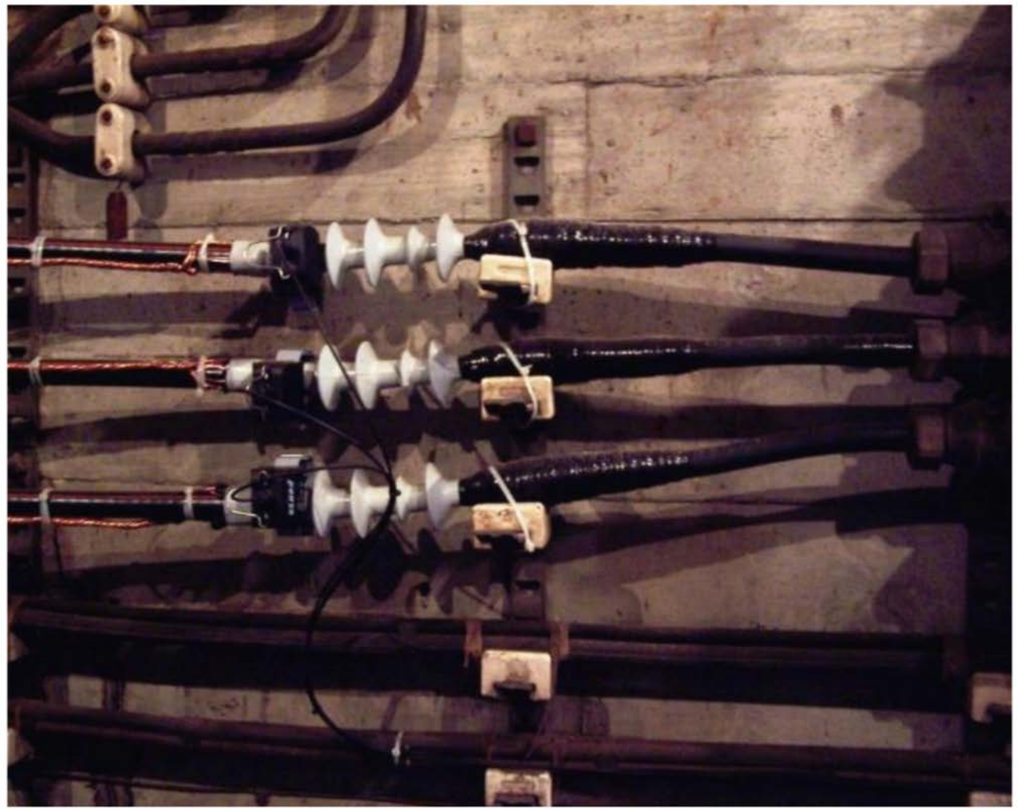
Overhead Transformer on Pole

Capacitor Bank & Streetlight

Underground Infrastructure

(60% of electric system miles)

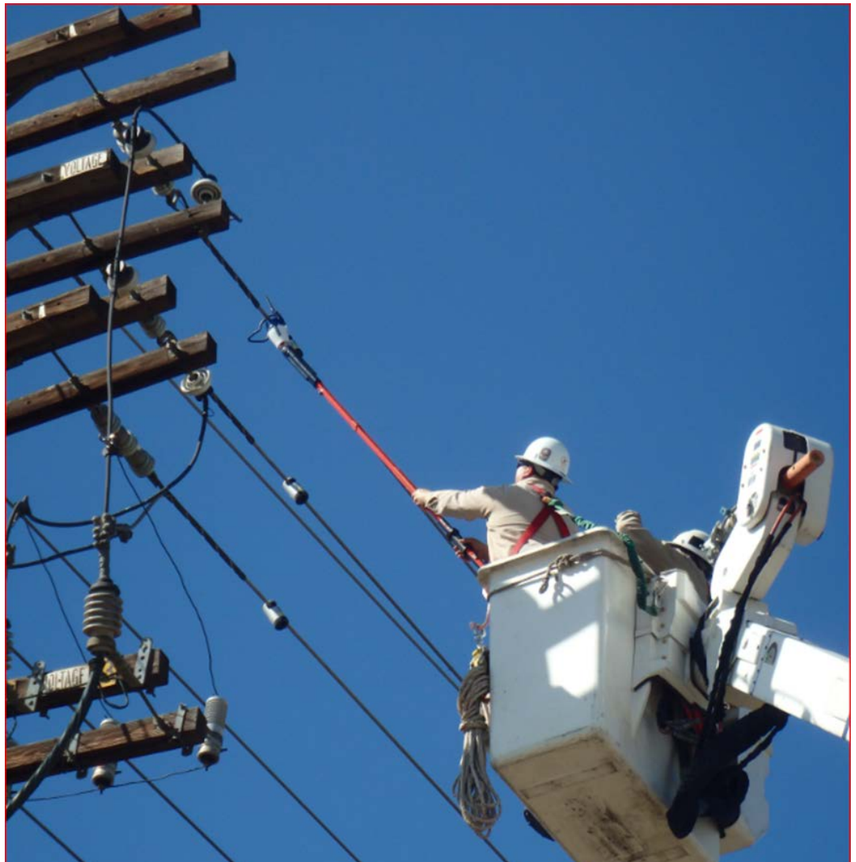
Aluminum Cable

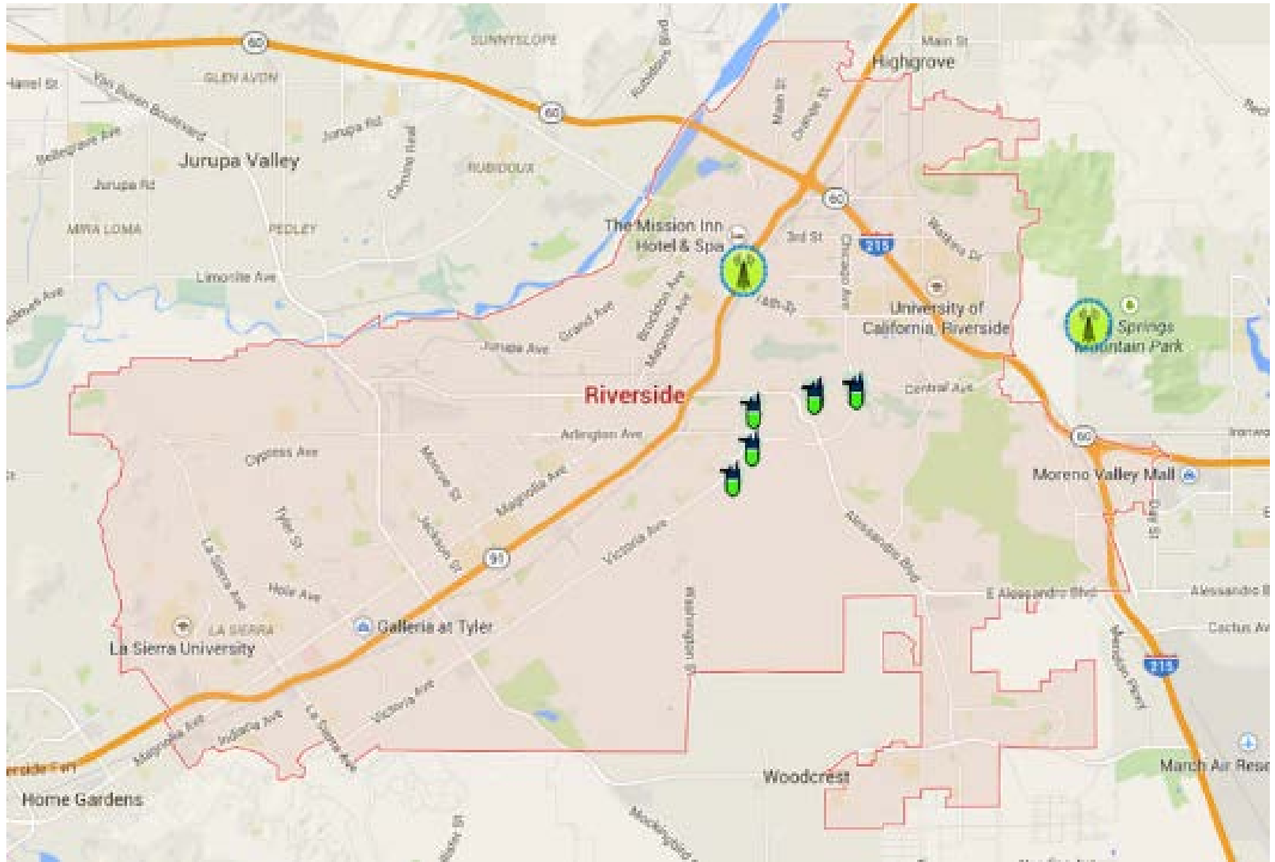


Various Cable in Vault

Changes To The Network

- Distributed Generation creates 2-way power flows
- Greater visibility of the system
- Future Grid: Sense - Communicate - Control





LED Street Lights

- LED pilot completed in 2014
  - 782 light pilot of 31,000
  - Auto Center, Market St, University Ave, Galleria, Plaza
- Estimated $15M to convert all lights to LED
- Continue to support City of Riverside sustainability goals

Electric Vehicles (EV's) - Impacts

- Today - 300 EV's , 13 public charging stations
- Estimate 5,000 EV's in 10 years
- Future electric network must support EVs and V2G
- Continue to take advantage of grant funding opportunities
- Closely monitor vehicle adoption rates and City of Riverside sustainability goals

Infrastructure Asset Value

Asset Class	Asset Count	Cost/Unit	System Value
Substation Transformers	65	1,660,000	107,900,000
Substation Switch Gears	54	900,000	48,600,000
Cable	1,329	420,487	558,828,292
69 kV Breakers	92	160,000	14,720,000
SCADA/SAS Panels	85	106,667	9,066,695
Civil Substation Work (Structures)	206	100,000	20,600,000
Underground Structures & Equip.	12,709	Varies	994,845,000
Communications	900	31,171	28,053,900
Poles & Overhead Equip.	22,637	15,078	341,320,686
Distribution Transformers	13,912	6,000	83,472,000
Streetlights	30,346	2,500	75,865,000
TOTAL			**$2,283,271,574**

Impact of Asset Failure

Asset Class	Impact of Failure
Substation Transformers & Switchgears	
Substation Civil	
Cable	
SCADA	
Underground Structures & Equip.	
Communications	
Poles & Overhead Equip.	
Distribution Transformers	
Streetlights	

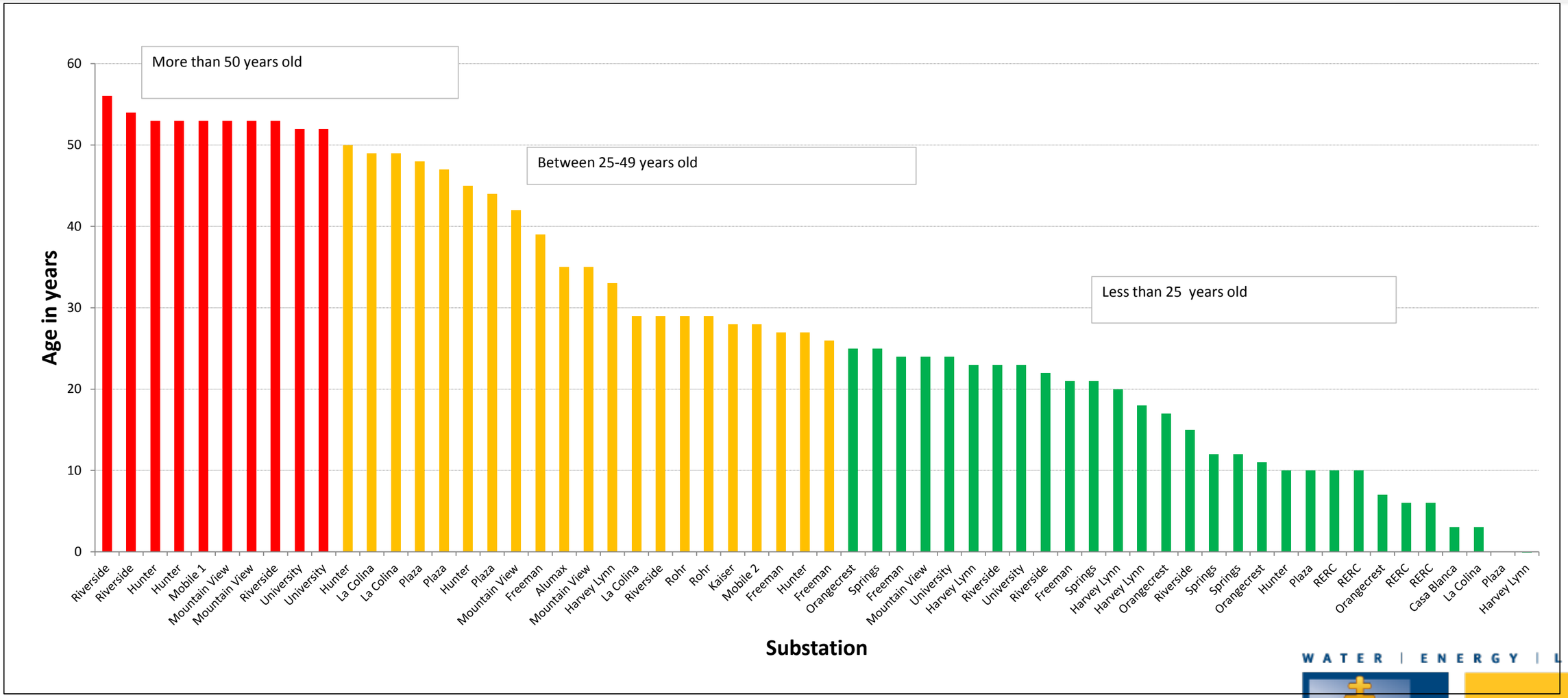
High **Medium** **Low**

Service Life

Asset Class	Impact of Failure	Service Life
Substation Transformers & Switchgears		60
Substation Civil		50
Cable		40
SCADA		8
Underground Structures & Equip.		60
Communications		20
Poles & Overhead Equip.		60
Distribution Transformers		60
Streetlights		70

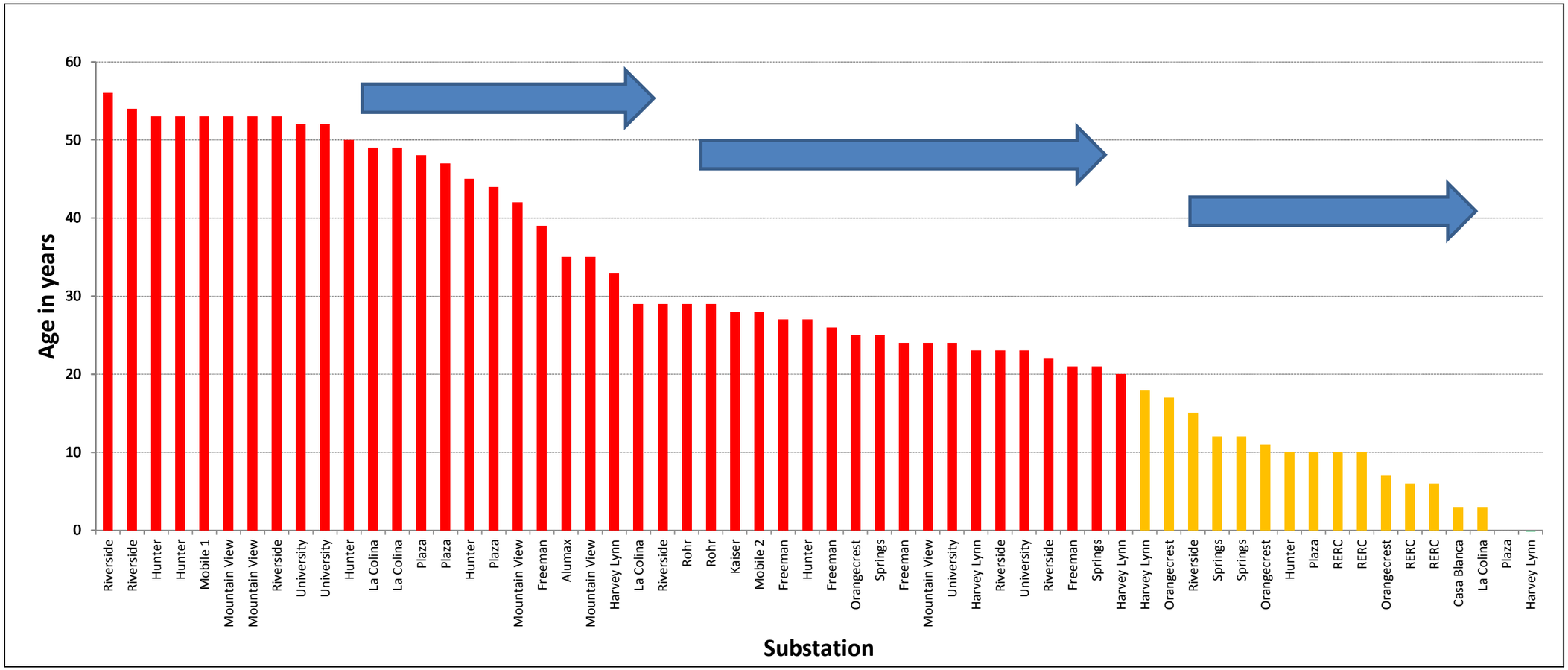
High | Medium | Low

Substation Transformers – Current Condition



Add arrows with 10 year chunk animation

Substation Transformers – Potential Progression



Substation Transformer Replacements

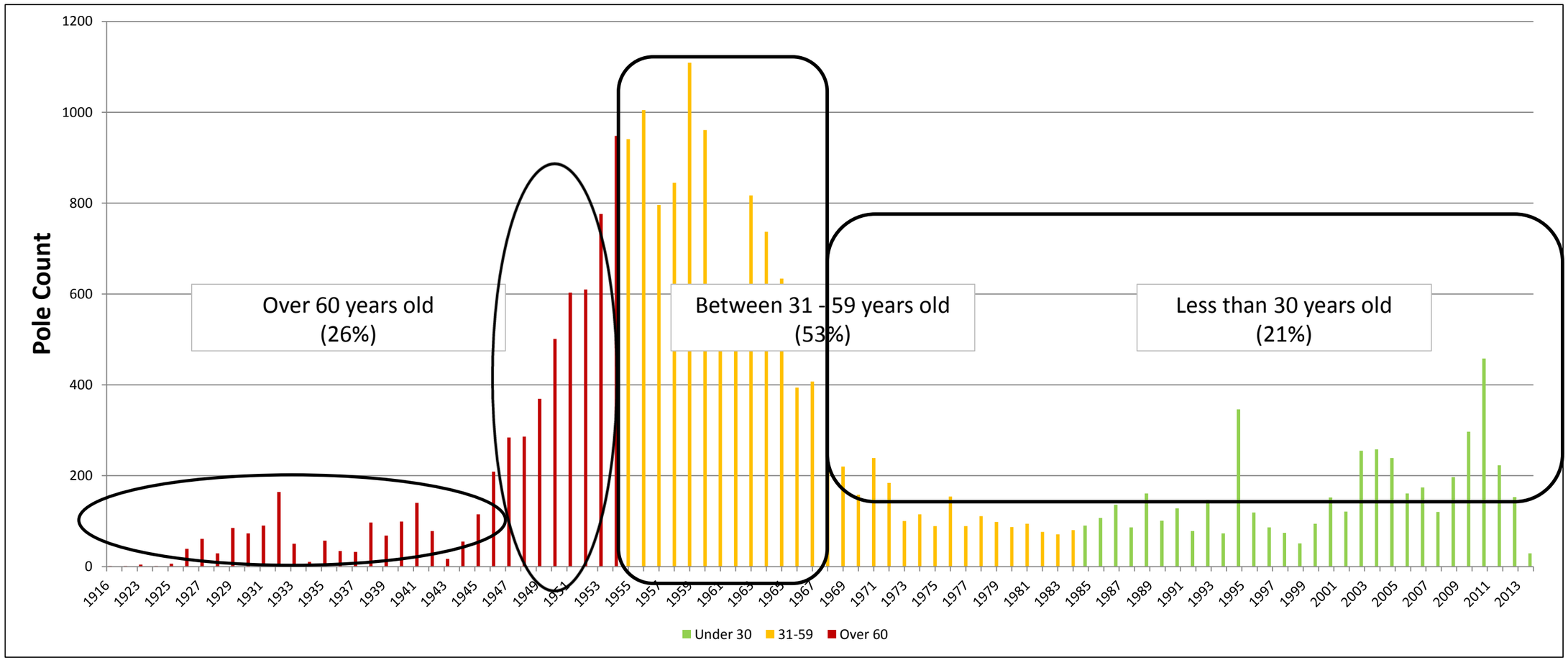
- Very complex and interconnected with other key infrastructure
- Long lead times for engineering and procurement
- Must be serviced in winter due to system loads

Wooden Poles

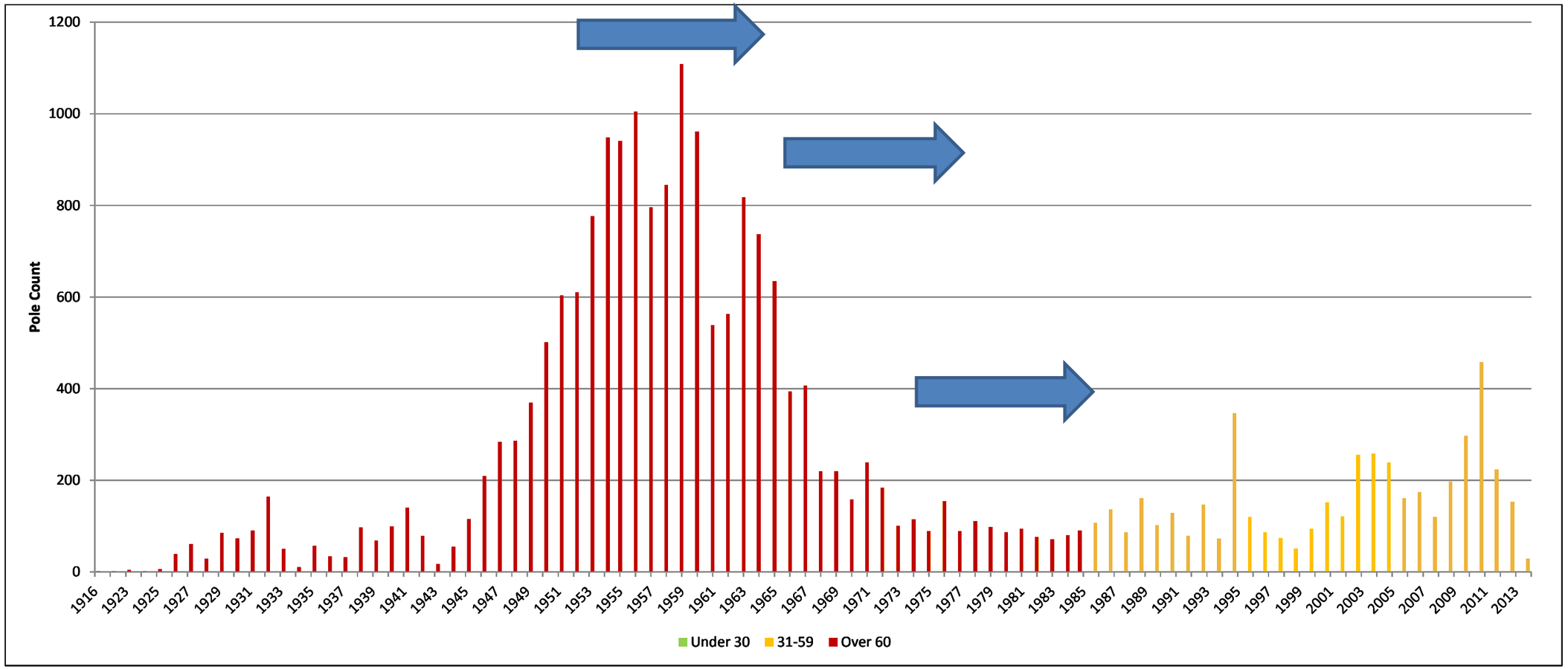
Replacement rates

Replacement Rate:		Assumed Service Life
Current:	200 / year	300 years
Goal:	800 / year	60 years

Poles– Current Condition



Poles– Potential Progression



ROAD MAPS – INFRASTRUCTURE IMPROVEMENT - ELECTRIC

WORKFORCE DEVELOPMENT

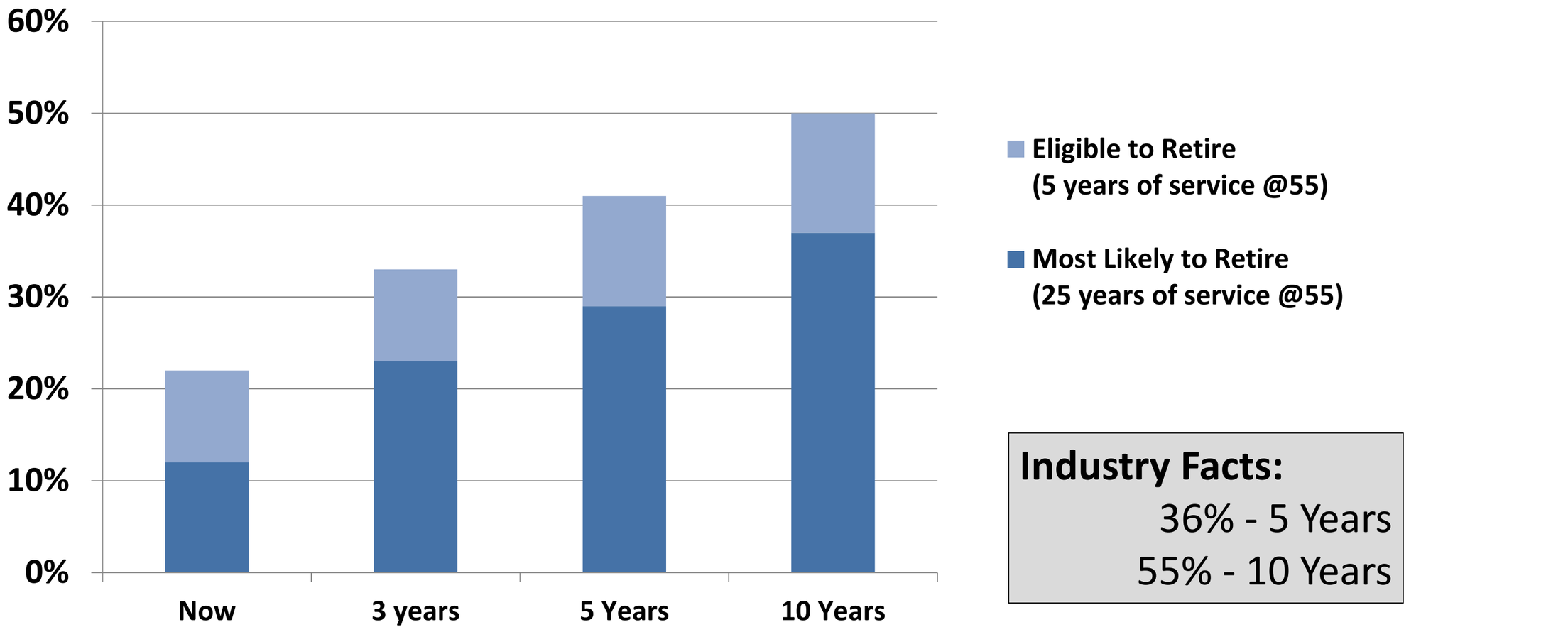
INFRASTRUCTURE IMPROVEMENT

WORKFORCE ASSESSMENT –

THRIVING FINANCIALLY

ADVANCED TECHNOLOGIES

RPU Retirement Projections



Employees eligible to retire now and future

Industry Facts:

36% - 5 Years

55% - 10 Years

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ROAD MAPS – INFRASTRUCTURE IMPROVEMENT - ELECTRIC

WORKFORCE DEVELOPMENT

INFRASTRUCTURE IMPROVEMENT

TECHNOLOGY ASSESSMENT

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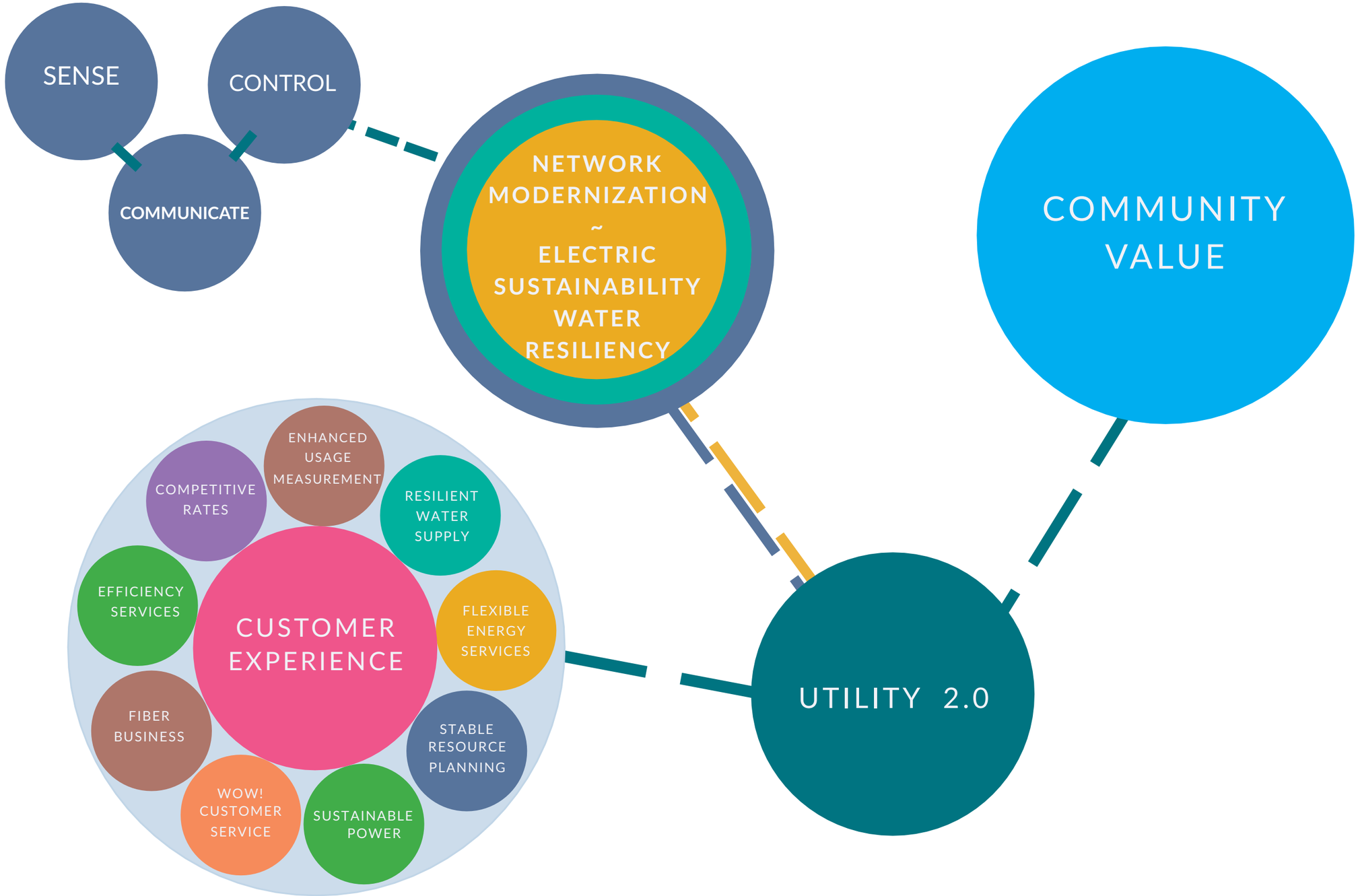
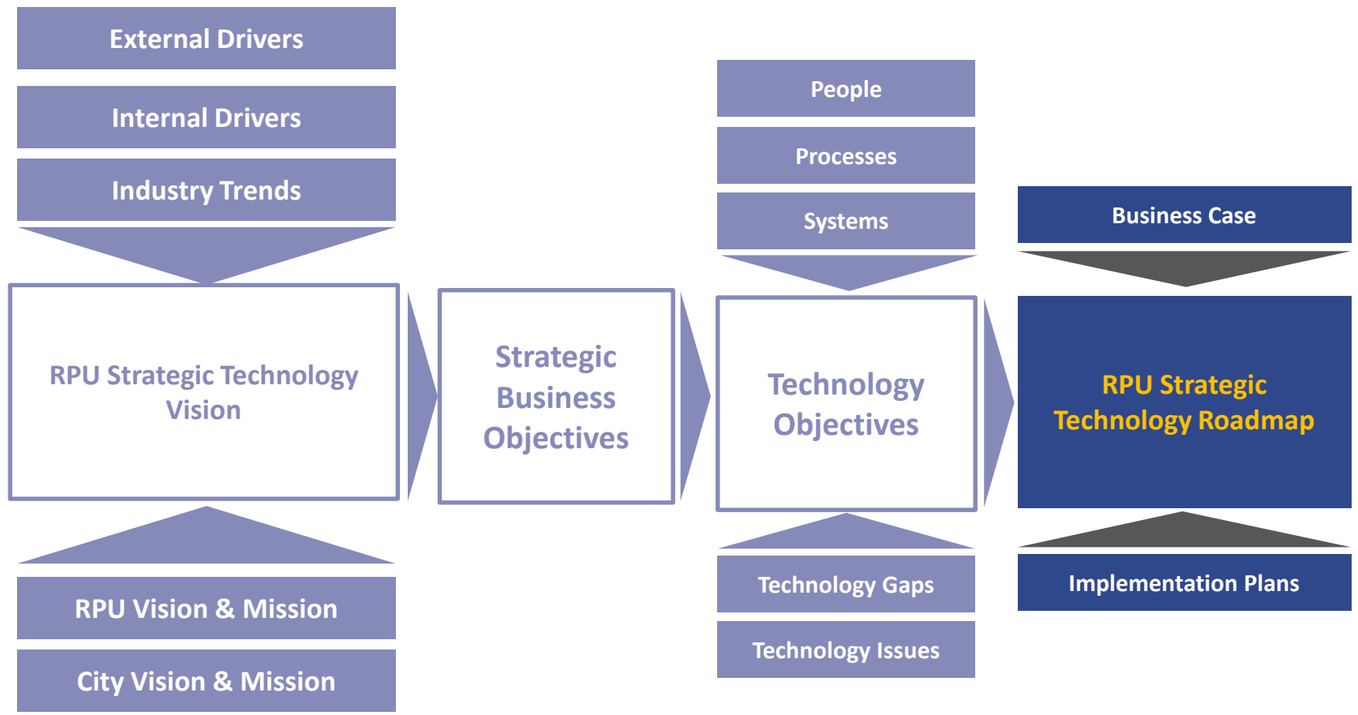
ADVANCED TECHNOLOGIES


SENSE
CONTROL
COMMUNICATE
NETWORK MODERNIZATION ~ ELECTRIC SUSTAINABILITY WATER RESILIENCY
COMMUNITY VALUE
UTILITY 2.0
CUSTOMER EXPERIENCE
ENHANCED USAGE MEASUREMENT
RESILIENT WATER SUPPLY
FLEXIBLE ENERGY SERVICES
STABLE RESOURCE PLANNING
SUSTAINABLE POWER
WOW! CUSTOMER SERVICE
FIBER BUSINESS
EFFICIENCY SERVICES
COMPETITIVE RATES

Technology Assessment

Strategic Technology Roadmap completed by Leidos Engineering, LLC assessed the current state of RPU's technology and made recommendations based on desired future state, industry standards and best practices.



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Technology Master Plan

CUSTOMER FOCUSED

Directly influence customer experience and provide customer interaction

- Customer Information System (CIS)
- Customer Relationship Management (CRM)
- Customer Web Portal (CWP)
- Interactive Voice Recognition (IVR)

INFORMATION BASED

Decision and analysis, data management and process implementation based primarily on large databases

- Meter Data Management (MDM)
- Geographic Information Systems (GIS)
- Operational Data Management System (ODMS)
- Work Management System (WMS)
- Asset Management System (AMS)
- Warehouse Inventory System (WIS)

REAL-TIME OPERATIONAL

Used in real-time operations and control of water and energy delivery systems

- Advanced Metering (AMI)
- Automated Vehicle Loading (AVL)
- Network Communications System (NCS)
- Land Mobile Radio (LMR)
- Distribution Automation (DA)
- Substation Automation (SA)
- Outage Management System (OMS)
- Distribution Management System (DMS)
- Supervisory Control and Data Acquisition System (SCADA)

Base Technology Requirements

- Technology Governance
- Asset and Work Management
- Warehouse Inventory Control
- GIS
- Network Communications
- Land Mobile Radio, Vehicle Locating

Grid Technology Requirements

- Mobile Apps
- Operation Data Management System
- Automated Meter Reading and Data Management
- Distribution and Substation Automation
- Outage Management
- SCADA, Advanced Distribution Management

ROAD MAPS – INFRASTRUCTURE IMPROVEMENT - ELECTRIC

INFRASTRUCTURE IMPROVEMENT

FINDINGS

WORKFORCE DEVELOPMENT

THRIVING FINANCIALLY

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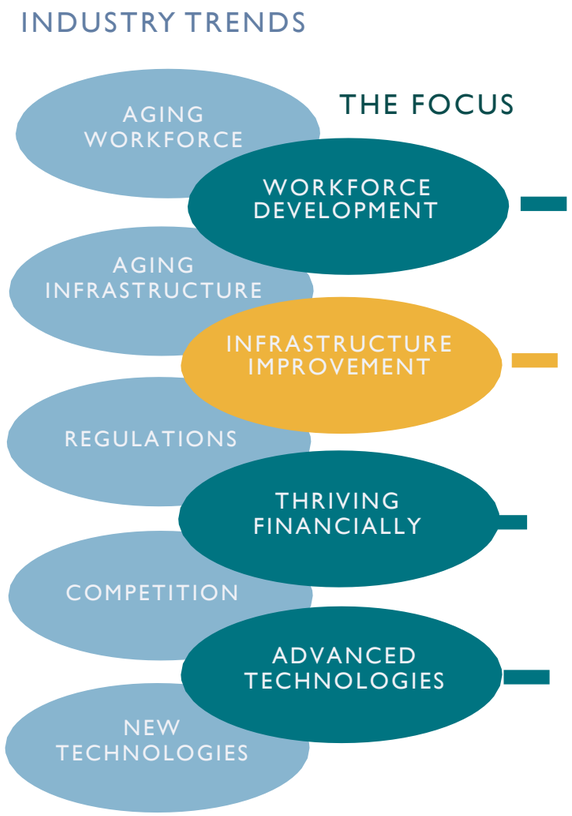
Infrastructure Findings

- Given the asset condition information that is currently available, additional investment is needed to address to maintain safety, reliability, and changing system demands:
- Key efforts include:
  - Replace assets in poor condition
  - Replace those that will move to poor condition in the next 10 years
  - Increase condition-based maintenance, particularly of critical assets
- Preserve system resiliency and sustainability
- Network Modernization

Workforce Development Findings

- Technical training needed on software, systems, & programs.
- Significant training gaps exist in advanced technology job classifications.
- Electric has approximately 32 vacancies (15%) and 18 staff likely to retire.
- No current process for knowledge transfer.

Technology Findings

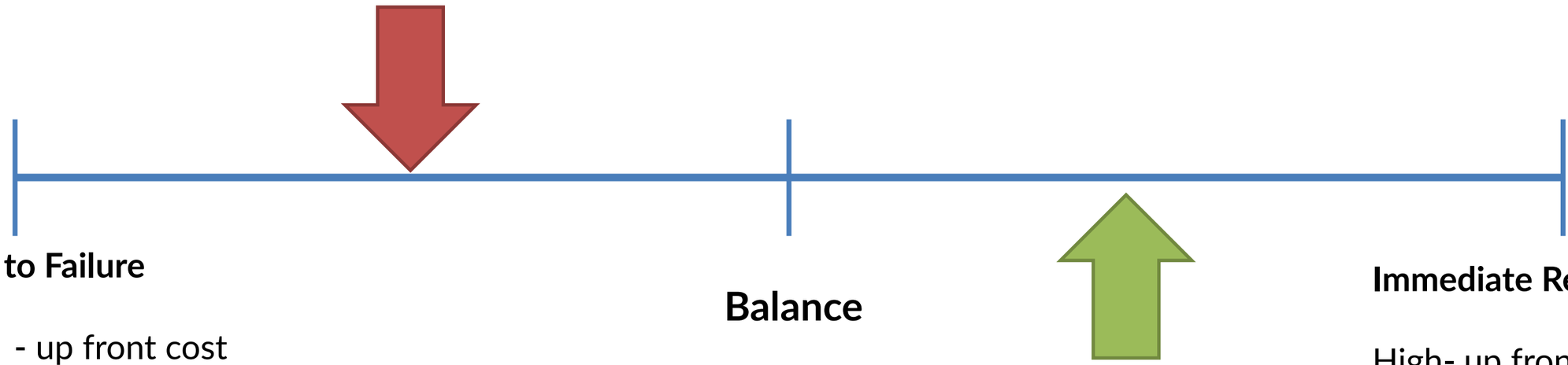


- Excellent fiber system
- AMR Meters – residential nearly complete
- Behind in GIS and automation

Additional investment in technology infrastructure is required to support tomorrow's electric system and customer demands

Assessment

Current State



Run to Failure

Low - up front cost
High - future cost

Negative impact to service

Balance

Ideal State

Immediate Replacement

High- up front cost
Lower - future cost

Positive impact to service

Impact of Asset Failure

Asset Class	Impact of Failure
Substation Transformers & Switchgears	
Substation Civil	
Cable	
SCADA	
Underground Structures & Equip.	
Communications	
Poles & Overhead Equip.	
Distribution Transformers	
Streetlights	

High | Medium | Low

ROAD MAPS – INFRASTRUCTURE IMPROVEMENT - ELECTRIC

INFRASTRUCTURE IMPROVEMENT

OPTIONS

–

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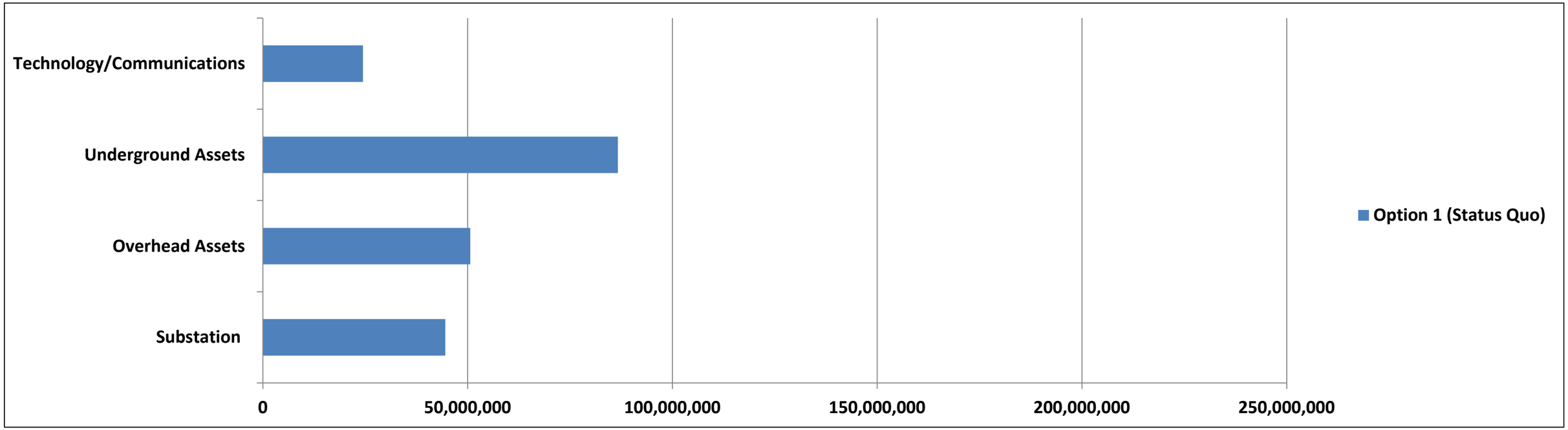
Option 1: Stay the Same (reactive mode), but fall behind as costs rise.



Option 1: $171M – $206M

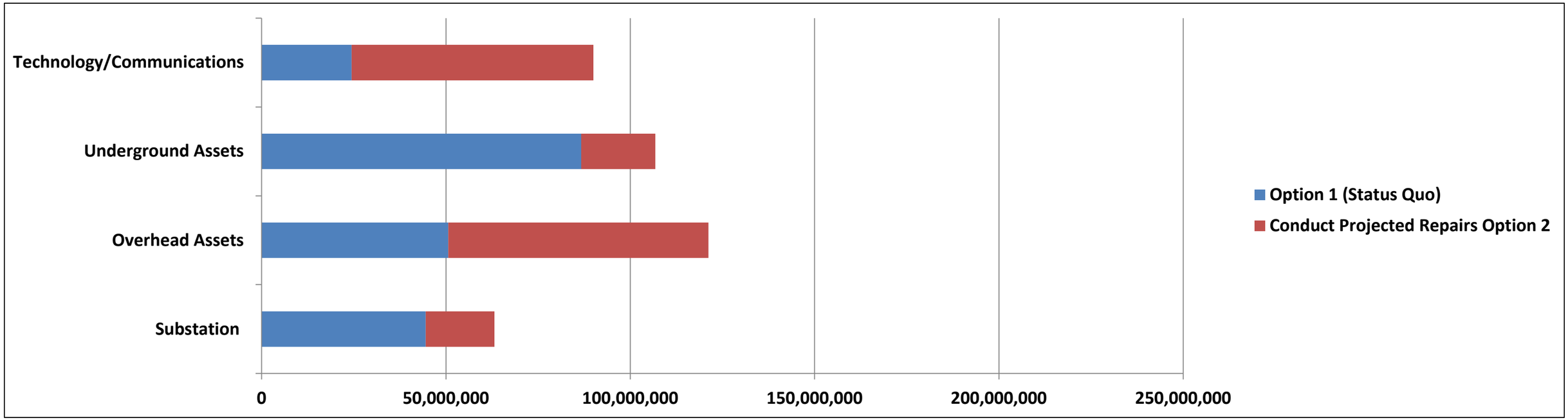
Option 2: $317M – $381M

Option 3: $365M – $439M

Option 4: $519M – $623M

Option 1 continues the past CIP budget pattern for the next 10 years. Based on current data, equipment condition will decline over time.

Option 2: Add Option 1 plus the costs to actively do projected repairs.



Option 1: $171M – $206M

Option 2: $317M – $381M

Option 3: $365M – $439M

Option 4: $519M – $623M

Based on current data, Option 2 halts the decline budgets for all repairs and replacements expected in the next 10 years, all technology recommendations, LED Streetlights, some EV infrastructure, maintains the system.

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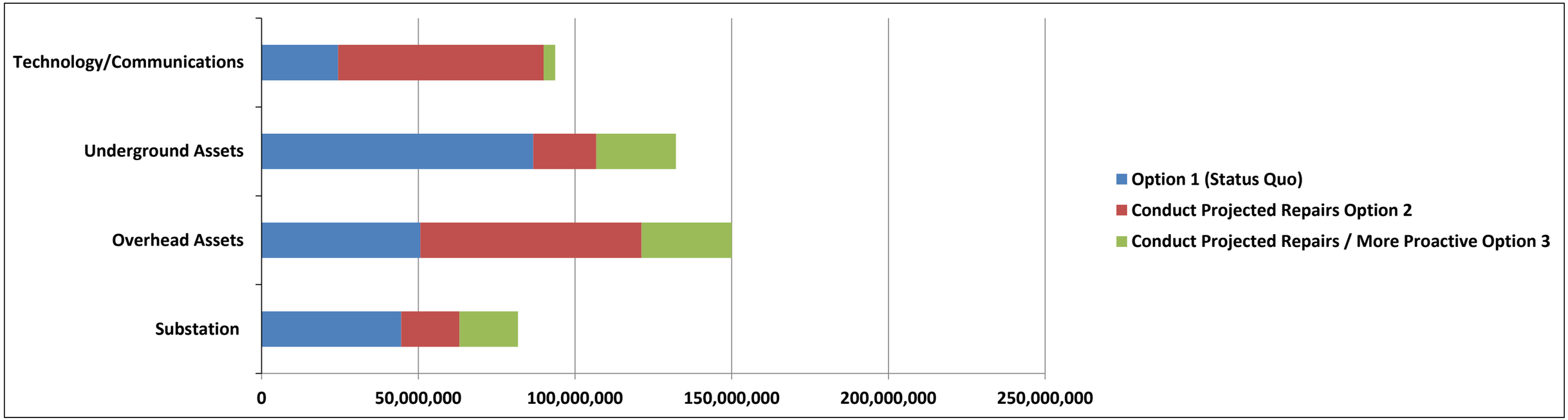
Option 3: Options 1 and 2 plus increase condition-based maintenance to be more proactive.



Option 1: $171M – $206M

Option 2: $317M – $381M

Option 3: $365M – $439M

Option 4: $519M – $623M

Includes Option 2 plus allows for significant additional condition-based maintenance to improve system performance, reliability and safety.

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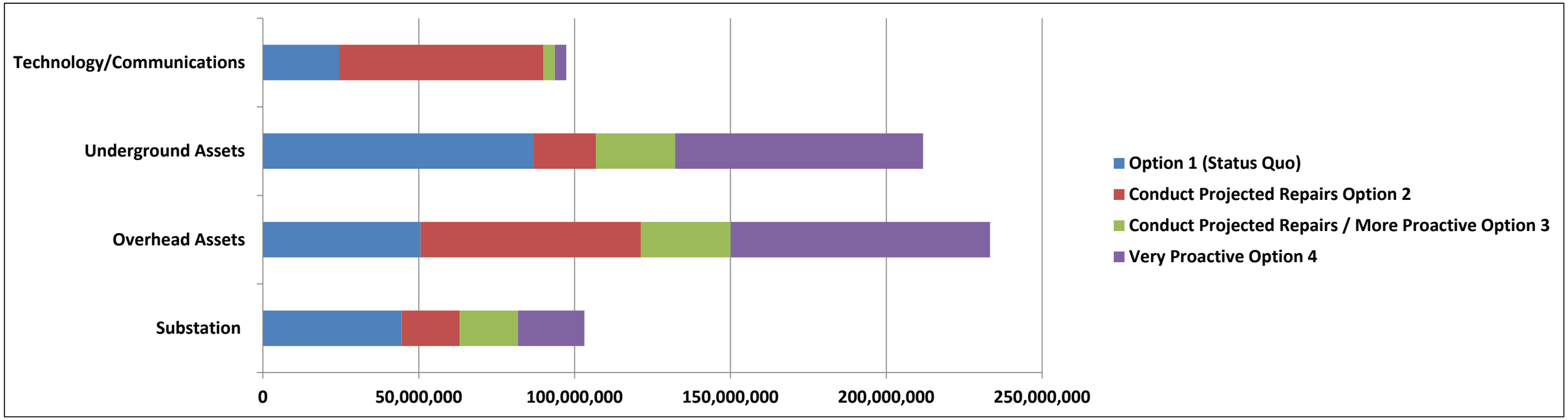
Option 4: Cost to be Highly Proactive



Option 1: $171M – $206M

Option 2: $317M – $381M

Option 3: $365M – $439M

Option 4: $519M – $623M

Includes Option 3 plus allows for aggressive replacement to virtually eliminate equipment failures to dramatically reduce interruptions. Uncommon in the industry.

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Summary of Investment Options

Additional financial investment is required to address current backlog and improve maintenance.

Option 1	Option 2	Option 3	Option 4
Reactive	Reactive plus Projected Repairs	Proactive	Highly Proactive
↓ ↑	↓ ↑	↓ ↑	↓ ↑
$171 – 206 million	**$317 – 381 million**	**$365 – 439 million**	**$519 – 623 million**

Summary

Infrastructure:

- Many of our key infrastructure assets are more than 50 years old.
- Electric utility operations are changing.

Technology:

- Smart Grid technologies are key to future success and system reliability/management.

Workforce:

- Workforce needs training to have Utility 2.0 skill sets.
- Knowledge transfer needed for aging workforce.

ROAD MAPS – INFRASTRUCTURE IMPROVEMENT - ELECTRIC

WORKFORCE DEVELOPMENT

INFRASTRUCTURE IMPROVEMENT

RECOMMENDATIONS

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Sample Short-Term Recommendations – Year 1

Electric Infrastructure	• Replace assets in order of criticality with available resources: 250 poles, 9 Load Tap Changers, 5 sets Sub. transformer bushings, 40 Relays, 15 Breakers, install FCI's on 11 circuits, pilot underground FCI's • Review Asset Management Standards and Policies
Technology Infrastructure	• Work with the Operations Technology Office to assess needs and develop implementation plan. • Expand Asset Management Program and plan integration with key systems • Complete in-flight projects: GIS, prototype reliability tracking in ODMS
Workforce	• Work with HR to fill vacancies and establish a knowledge transfer process • Hire resources needed to support asset management (Asset Manager & Project Manager)

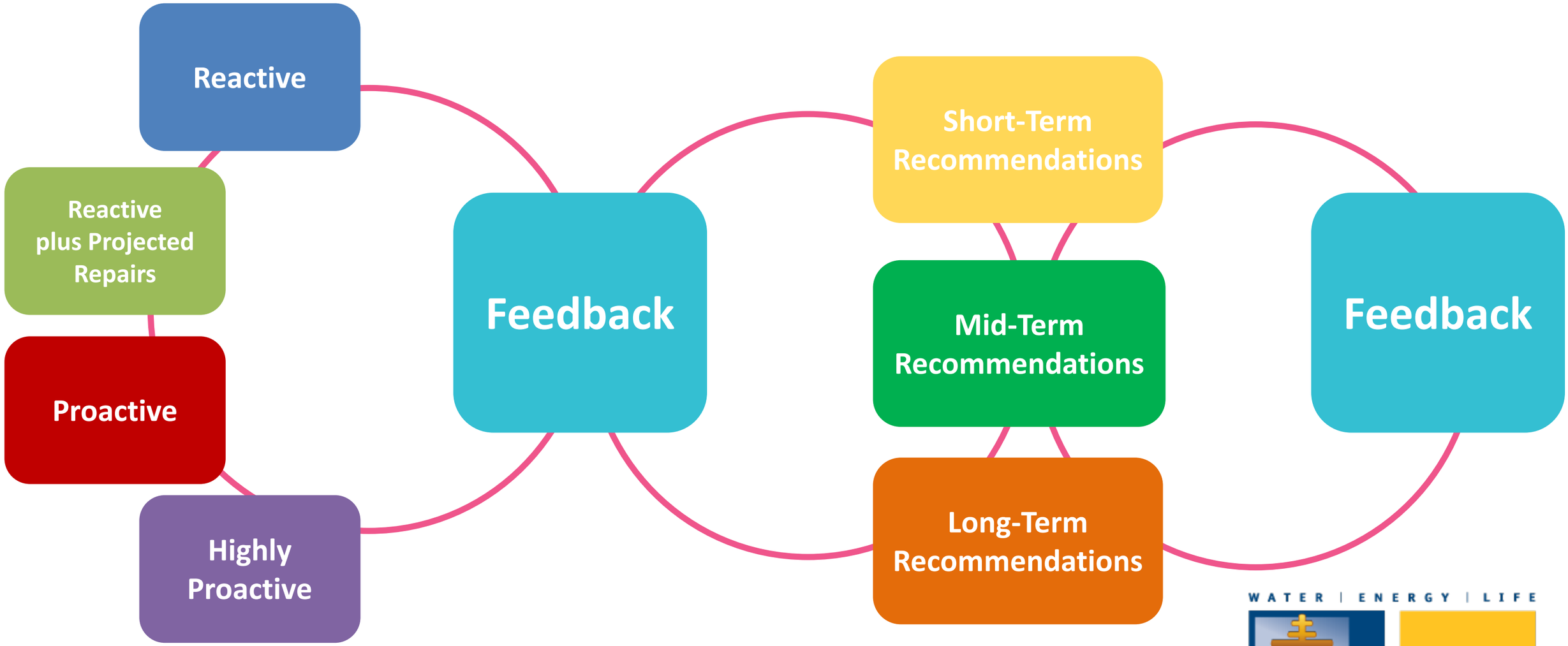
Sample Mid-Term Recommendations – Years 2-5

Electric Infrastructure	• Replace assets in order of criticality with available resources: 3,200 poles, 3 Sub. Transformers, 2 Switchgears, 250 Relays, 65 Breakers, 9 Vaults. Install FCI's on 27 circuits. Automated distribution devices on 5+ circuits. • Capture inspections in routine work with mobile technology.
Technology Infrastructure	• Implement priority projects: GIS, AMI/AMR, ODMS, DA, & OMS, mobile, NCS, LMR, AVL, replace SCADA hardware
Workforce	• Hire additional resources needed to support asset management and advanced technology efforts • Utilize Talent & Learning Management System to capture training data. • Provide technical training to staff on advanced technology equipment and software

Sample Long-Term Recommendations – Years 6-10

Electric Infrastructure	• Replace assets in order of criticality with available resources: 4,000 poles, 4 Sub. Transformers, 2 switchgears, 250 Relays, 20 Breakers, 12 Vaults. Install FCI's on 15 circuits, automated distribution devices on 5 circuits. • Re-evaluate the asset management program, and revise processes based on industry standards and best practices. • Continue to address physical and cyber security needs for utility sites and infrastructure.
Technology Infrastructure	• Implement remaining technology projects: AVL and expanded Substation Automation
Workforce	Expand training provided to staff on advanced technology equipment and software
Financial	Complete infrastructure projects needed to support advanced technology efforts

Options & Recommendations Decided from Feedback



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Next Steps

- Incorporate Comments
- Formulate Detailed recommendations
- Review
- Report Back