



Seattle City Light

2020 INTEGRATED RESOURCE PLANNING ("THE FUTURE IS NOW")

City Light IRP Kickoff

October 16, 2019

AGENDA

- Welcome & Safety Procedure
- 2020 IRP Kickoff
 - Regional Resource Adequacy
 - Conservation Potential Assessment
- Change Vision
- 2020 Priorities and Timeline
- Discussion about process and deliverables
- Wrap Up and Next Steps



HOW TO CONTRIBUTE TODAY

- Learn about resource adequacy and identify questions for follow up
- Review new conservation potential assessment and discuss next steps for future evaluations
- Discuss and identify your highest priorities for 2020 Integrated Resource Plan
- Review and schedule stakeholder activities



INTEGRATED RESOURCE PLANNING

- Identifies how City Light plans to meet Seattle area's electric power supply needs for the next 20 years (PLAN)
- An evaluation to explain the mix of generation and demand-side resources that we plan to use to meet the Energy Independence Act and ensure adequate power supply (PLANNING)
- Describes clean energy implementation plans with new guidelines from Clean Energy Transformation Act (NEW)
- Requires City Council approval before September 1, 2020 (TIMELINE)



CITY LIGHT MARKET RESEARCH TAKEAWAYS

- Leverage new technologies to improve service, lower costs, and ensure safety
- Invest in alternative clean energy solutions, such as replacing fossil fuels with clean electric power for transportation
- Invest in infrastructure and operations to improve power reliability
- **Customers want City Light to effectively prepare for the future while keeping costs affordable**



2018 INTEGRATED RESOURCE PLAN STAKEHOLDER RECOMMENDATIONS

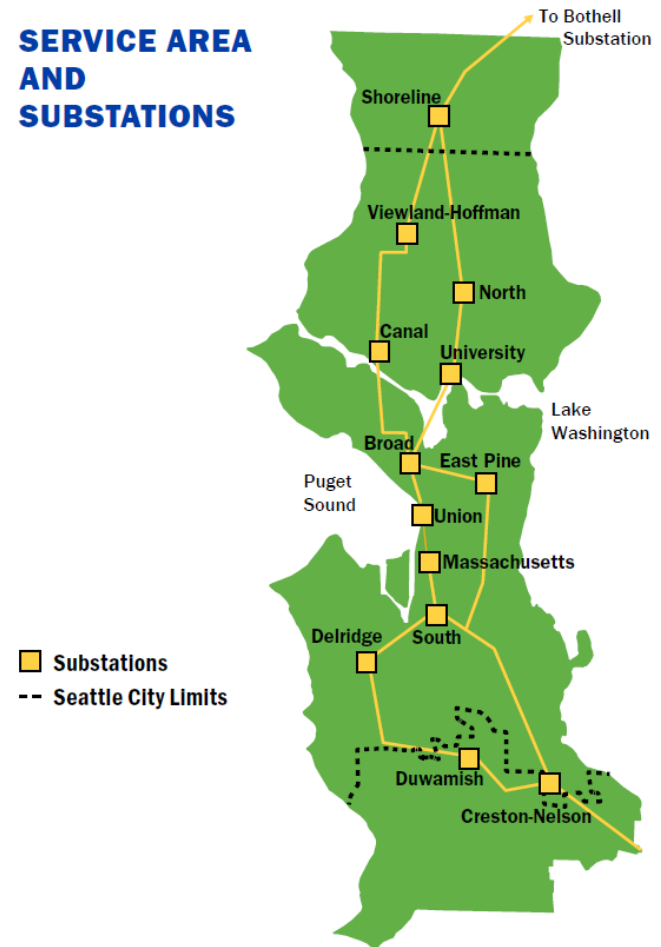
- Evaluate City Light's market reliance to be prepared for a changing resource mix
- Consider renewable power resources over purchasing renewable energy credits
- Look more broadly and strategically at demand side and supply side alternatives to complement City Light's hydropower resources
- Ensure equitable outcomes
- Explore different paths to meet electrification policies and respond to climate change



CITY LIGHT GENERAL INFORMATION

Service Area Population	906,595
Service Area Size	131 sq. mi.
Customers Served	460,609
Employees	1,771
Major Substations	15
Commercial and Industrial Power Transformers	56
Distribution Circuit Miles	2,335
Network Distribution Circuit Miles	309

SERVICE AREA AND SUBSTATIONS





Seattle City Light



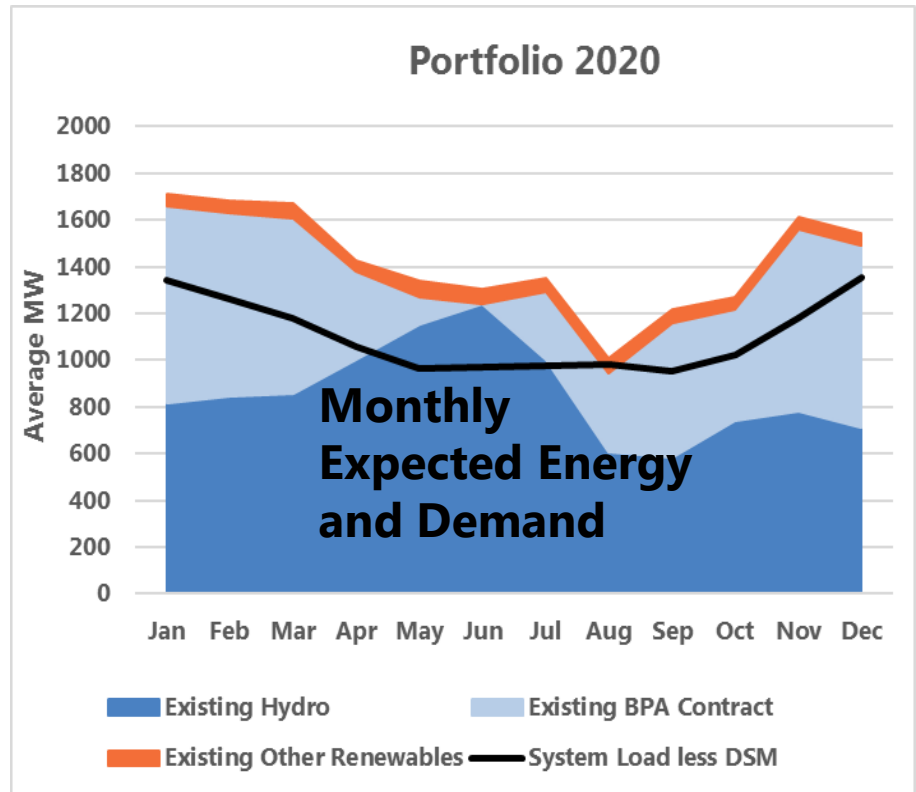
RESOURCE ADEQUACY



CITY LIGHT'S POWER SUPPLY

WHERE DO WE GO FROM HERE?

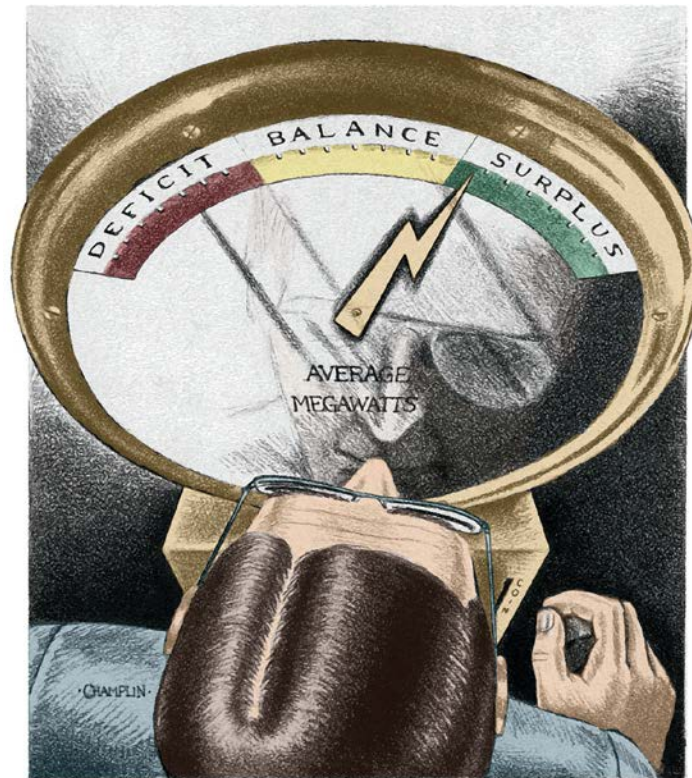
- Can we depend on the regional market for some of our reliability?
- How much of demand can be controlled reliably? (i.e., Demand Response)
- Will energy surpluses provide ample revenue to fund additional investment?
- How much energy efficiency, new renewable energy and storage will be needed?



Assessing Resource Adequacy in the Pacific Northwest

Seattle City Light
Stakeholders Meeting
October 16, 2019

John Fazio, Senior Systems Analyst
NW Power and Conservation Council

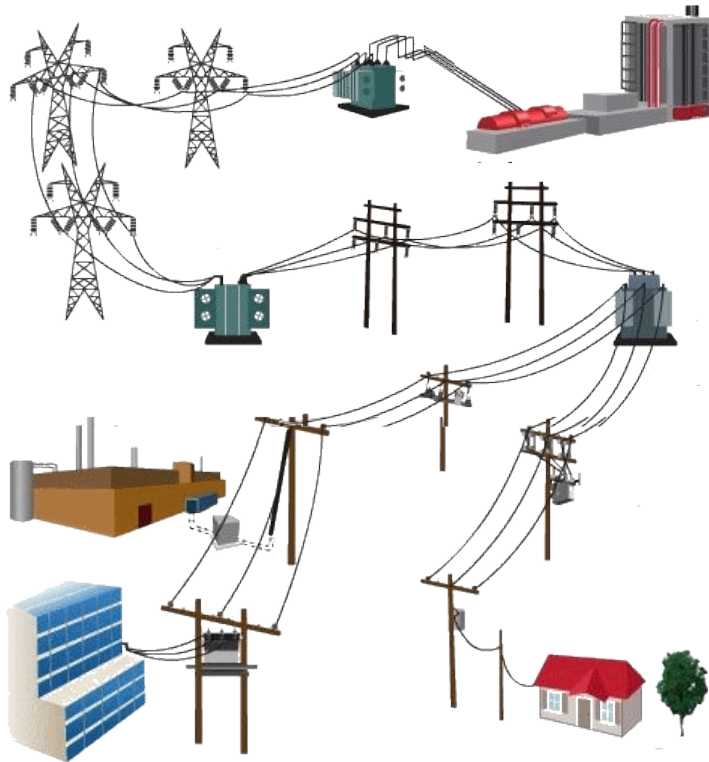


What is Resource Adequacy?

- Adequacy \neq Reliability
- Reliable – a system is reliable if it operates when needed
- Adequate – a system is adequate if produces enough to serve all needs
- A power supply can be 100% reliable (i.e. no component failures) but not adequate
- A power supply can be adequate even if some of its components are unreliable
- A power supply is adequate if it can supply all electrical needs, within an acceptable level of tolerance, accounting for unscheduled component outages and unexpectedly high demand

Three Major Components of a Power System

- Until recently, adequacy for each component was done separately
- With greater computing power, a few are now combining generation and transmission
- Distribution adequacy is always done separately
- Council assesses generation adequacy only

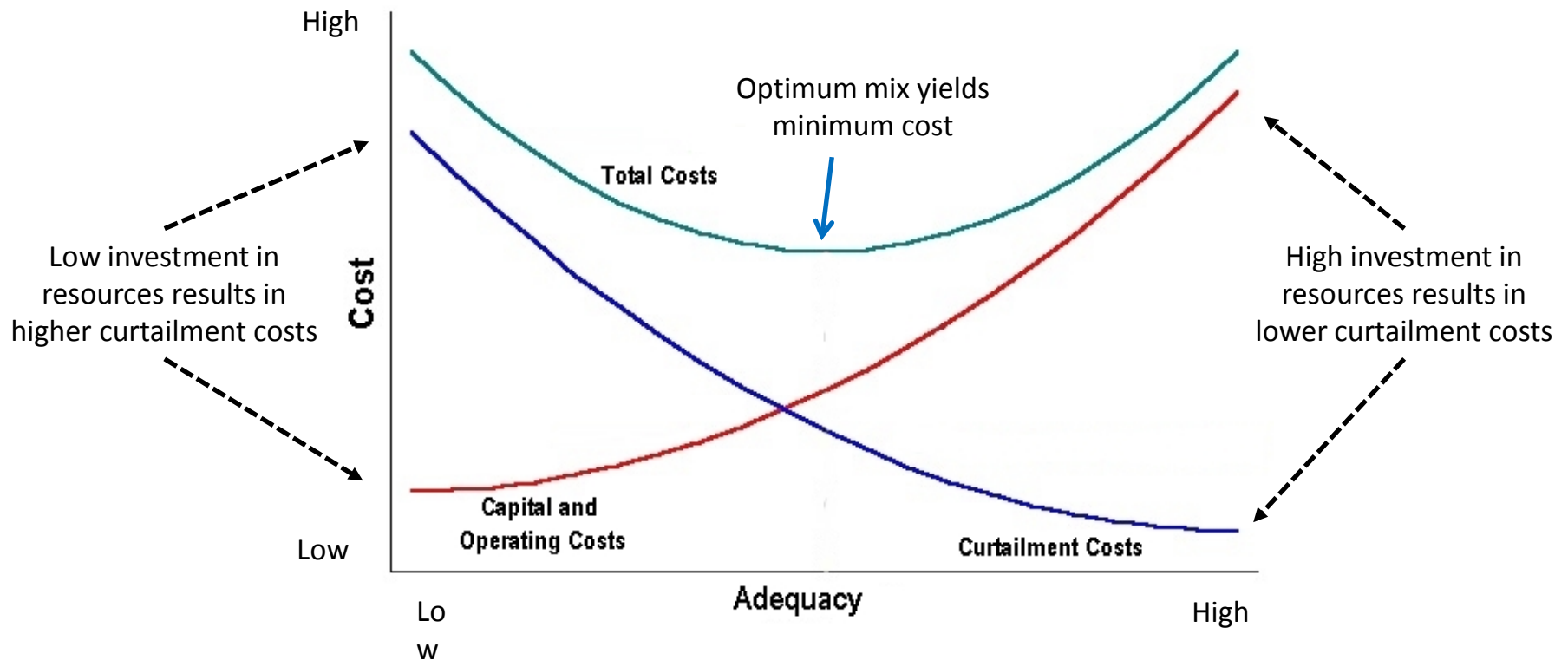


Generation

Transmission

Distribution

Tradeoff: Adequacy vs. Cost



What is an Adequacy Standard?

- Adequacy standard is composed of 2 parts
 - Metric (measure of adequacy)
 - Threshold (limit for the metric)
- Two types of standard
 - Deterministic – e.g. load/resource balance
 - Probabilistic – measure of the frequency, duration and magnitude of potential curtailment events
- Industry is moving toward using probabilistic standards
- But there is no industry-wide standard, most common “measure” is 1-day-in-10-year loss of load expectation

Historical Perspective on Adequacy

- Historically, **Load/Resource Balance** (based on critical hydro) was used to measure adequacy
- During the 1990s, few new resources were built and by 1998 L/R deficit grew to 4,000 aMW
- Was the power supply adequate?
 - Difference between average hydro and critical hydro is about 4,000 aMW
 - So, based on the L/R balance, region had about a 50% chance of being short
 - But no indication of the size, duration, frequency or seasonality of potential shortfalls
 - In other words, L/R balance is a very gross measure of adequacy
- In 1999, Council took a probabilistic approach, built the GENESYS model and set the initial standard to 5% LOLP (see next slide)
- First assessment done in 1999 indicated a 24% chance of a shortfall
- West Coast energy crisis of 2001 validated need for new more accurate adequacy standard

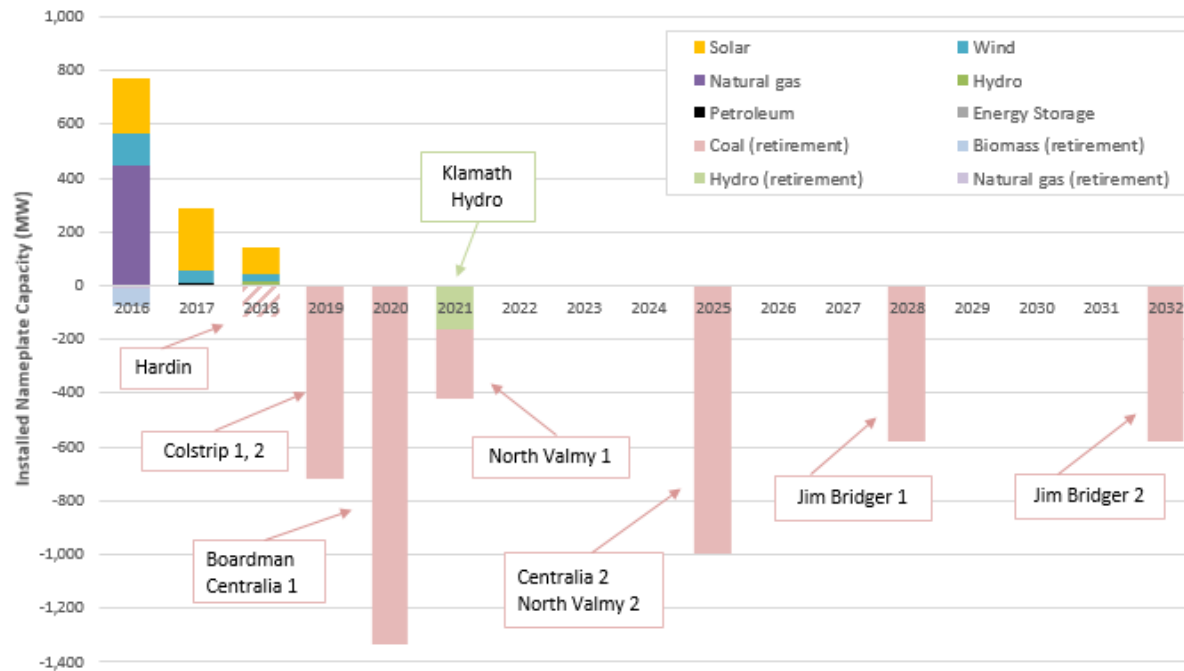
Council's Adequacy Standard¹

- The Council deems the power supply to be adequate if the likelihood of having one or more shortfalls in a future operating year is less than or equal to 5 percent (i.e. annual LOLP \leq 5%)
- LOLP is assessed by simulating the power system's operation thousands of times with different future conditions for each simulation,
 - River flow volume (based on historic record from 1929-2008)
 - Temperature-sensitive load (based on historic hourly temperatures from 1949-2017)
 - Hourly wind and solar generation (based on historic distributions)
 - Thermal resource forced outages
- Only existing resources, planned resources that are sited and licensed and expected EE savings are assumed for the studies because this is just an early warning to give planners time to act

¹Officially adopted by the Council in 2011.

Coal Retirements (2018-2032)

Additions and Retirements since the Seventh Power Plan
(incl. announced planned retirements)



2019-26 Resource Adequacy Assessments

- **2019 LOLP \approx 2.5% (estimate)**
Region has roughly 800 MW of headroom (e.g. loss of 800 MW brings the LOLP to 5%)
- **2021 LOLP = 7.5% (estimate)**
1,619 MW Retired (Hardin, Colstrip 1 and 2, Boardman, Centralia 1)
- **2024 LOLP = 8.2%**
127 MW Retired (N Valmy 1)
Net annual load growth (after EE savings) is 0.3%
- **2026 LOLP = 17%**
804 MW Retired (Centralia 2, N Valmy 2)
Net annual load growth (after EE savings) is 0.3%

Sensitivity¹ to Markets and Load Growth

SW Market Availability (MW)

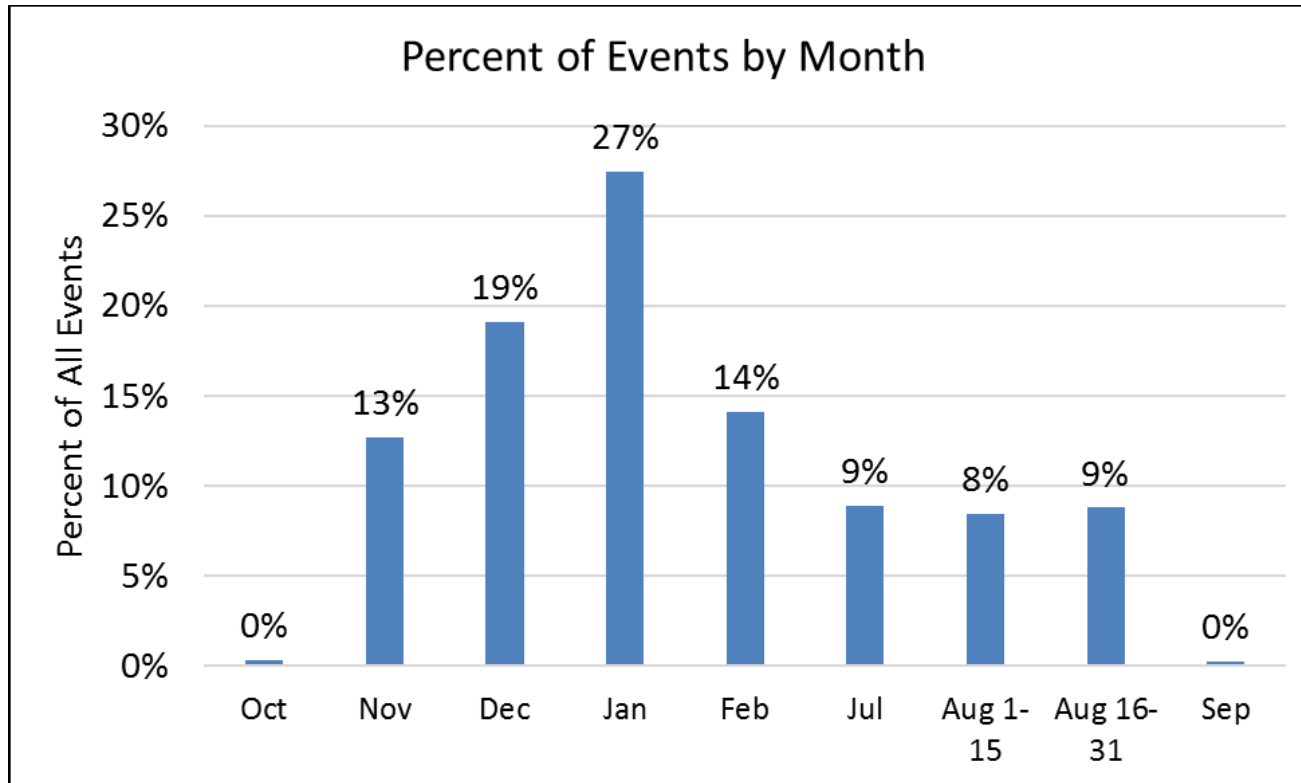
LOLP (%)	1500	2000	2500	3000	3500
High Load (85 th Percentile)	21.1	18.0	16.0	14.4	12.0
Medium Load	12.5	10.2	8.2	6.9	5.2
Low Load (15 th Percentile)	7.0	5.2	4.0	3.1	2.0

¹While the availability of future markets and of rate of future load growth are unknown, the general assumption is that conditions toward the center of the matrix above are more likely than conditions on the edges.

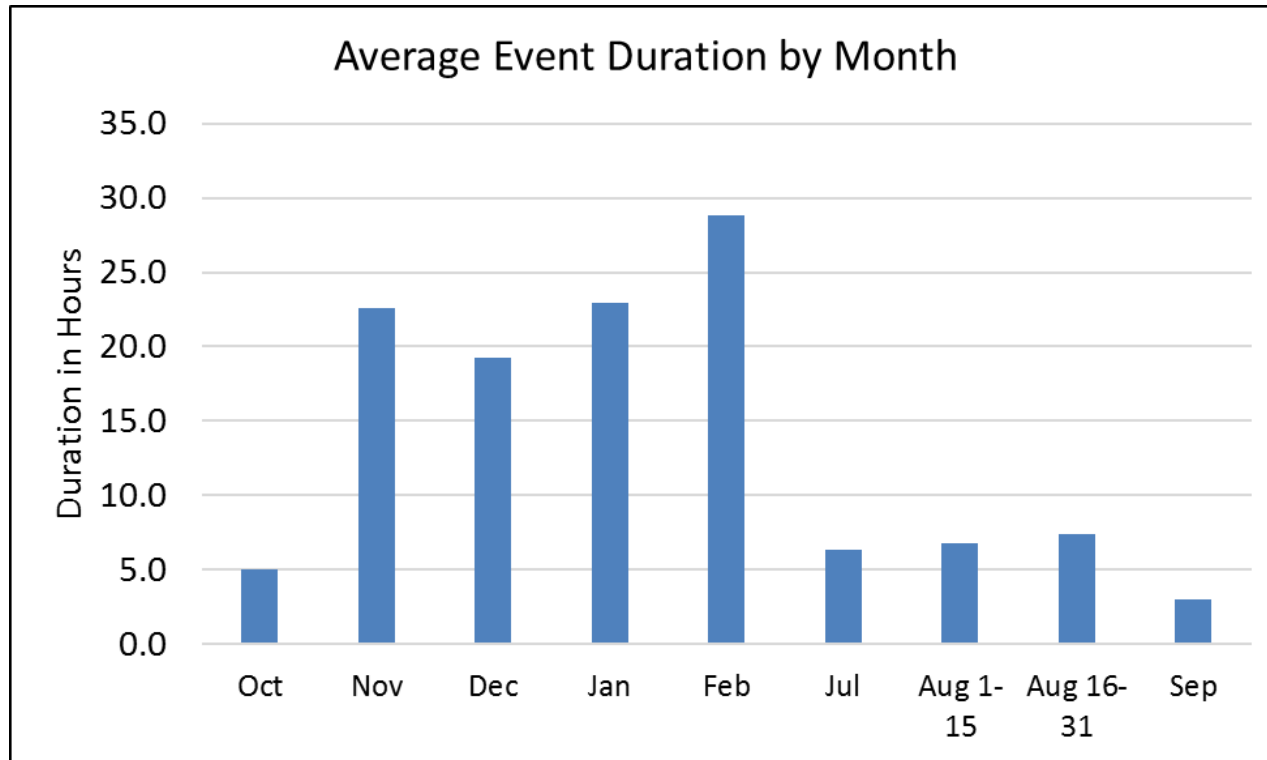
Is Annual LOLP the Right Metric

- **The annual LOLP does not tell us**
 - When a shortfall may occur
 - How big a shortfall may be
 - How long a shortfall may last
 - Or how often it may occur
- **Planners and customers need to decide what they are protecting against and how much they want to spend**

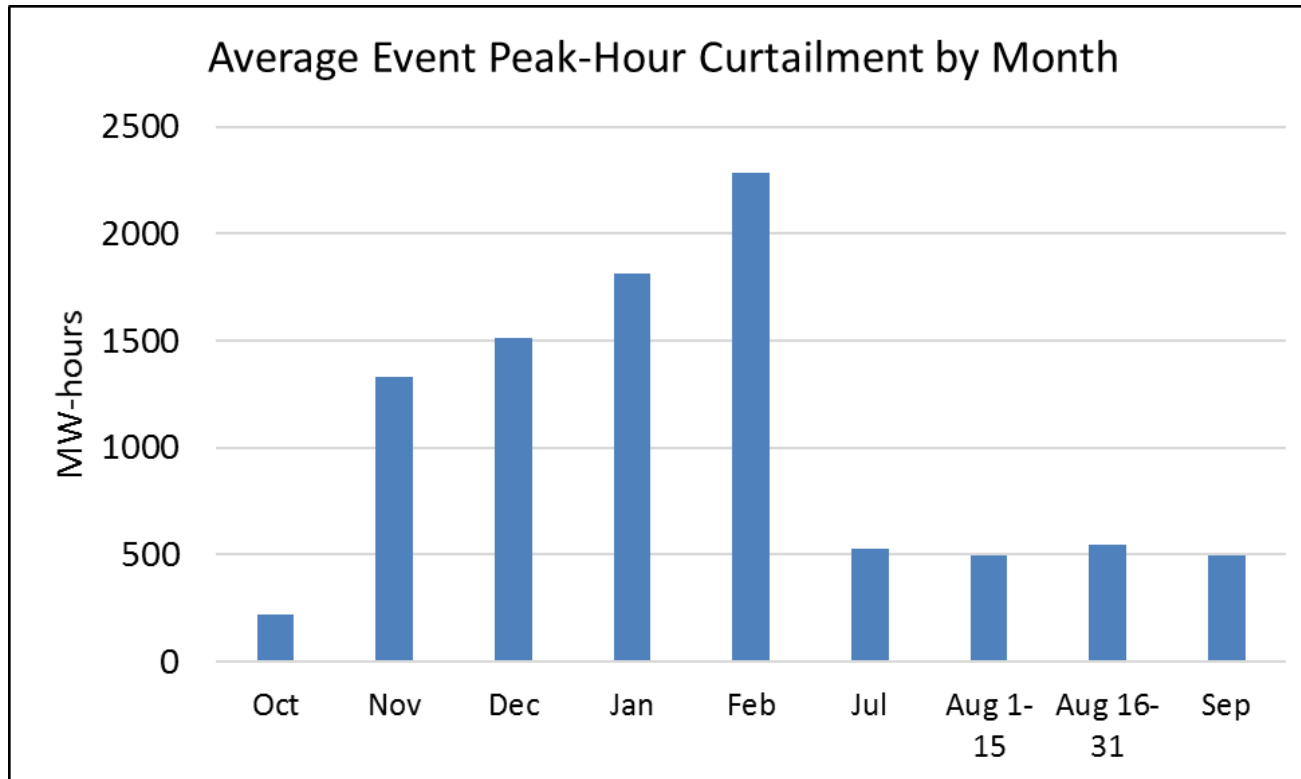
2024 Percent Events by Month



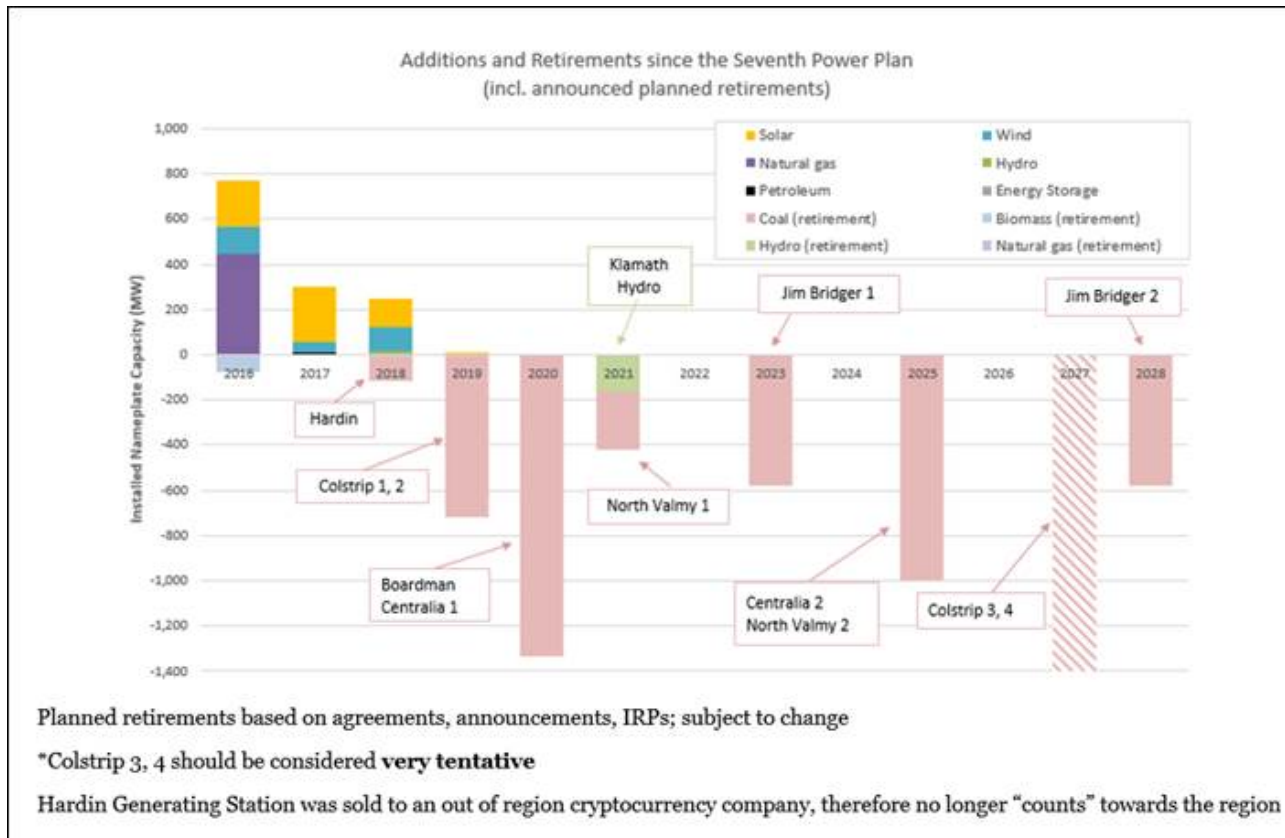
2024 Average Event Duration by Month



2024 Average Peak-hour Curtailment



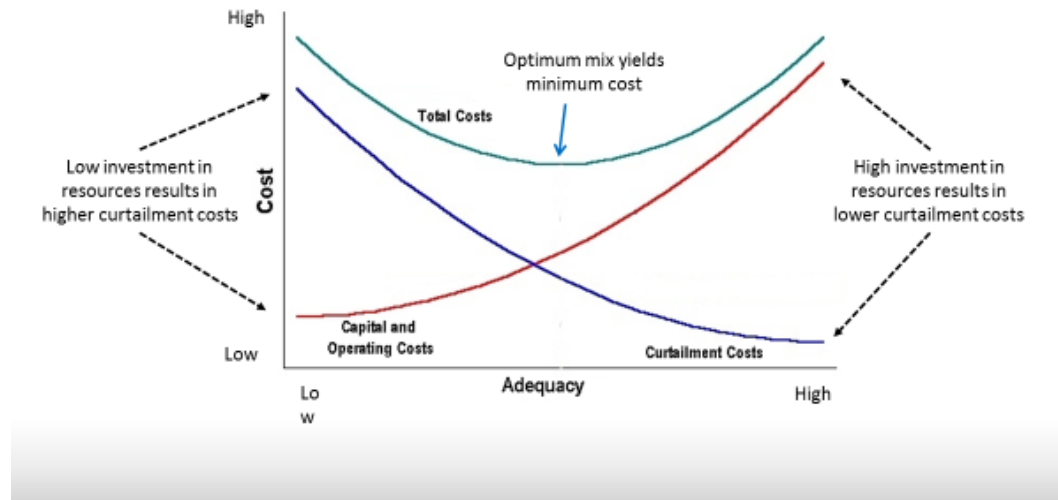
Updated Coal Retirements (2018-2028)



THOUGHTS?

- Utilities and customers need to decide what they are protecting against and how much they want to spend

Tradeoff: Adequacy vs. Cost





Seattle City Light



CONSERVATION POTENTIAL ASSESSMENT







ESTABLISHING BASELINE SALES

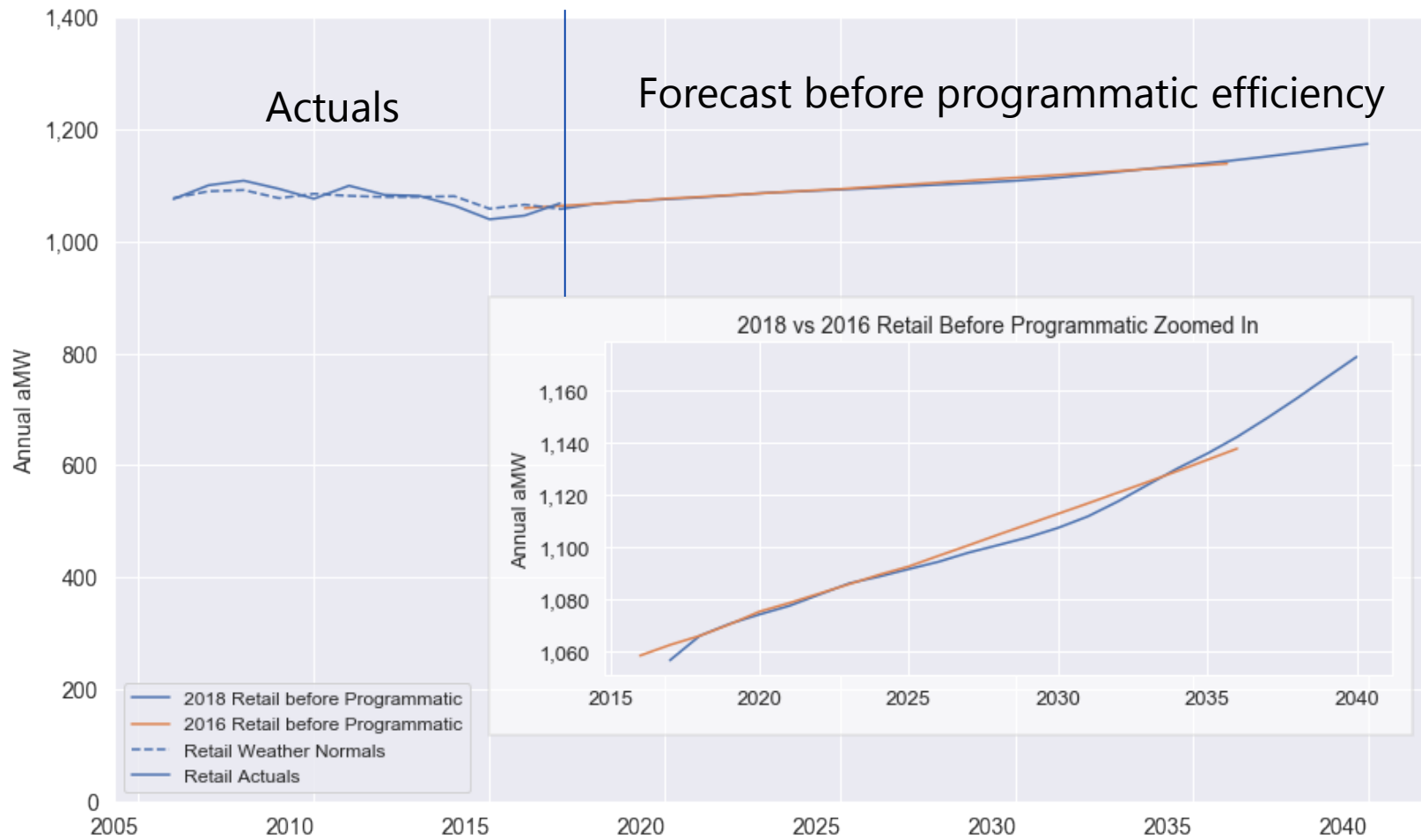
2018 VS 2016 RETAIL FORECAST METHODOLOGY

Econometric to End-Use based forecast

Inclusion of emerging trends in base case:

- Electric Vehicles 
- Distributed generation 
- Increased saturation of cooling equipment 
- Large transit electrification 

2018 VS 2016 RETAIL FORECAST BEFORE PROGRAMMATIC EFFICIENCY



KEY DIFFERENCES IMPACTING THE 2020 CONSERVATION POTENTIAL ASSESSMENT



Stronger long-term growth in residential housing but more heavily weighted towards multi-family



Industrial energy sales are expected to decline



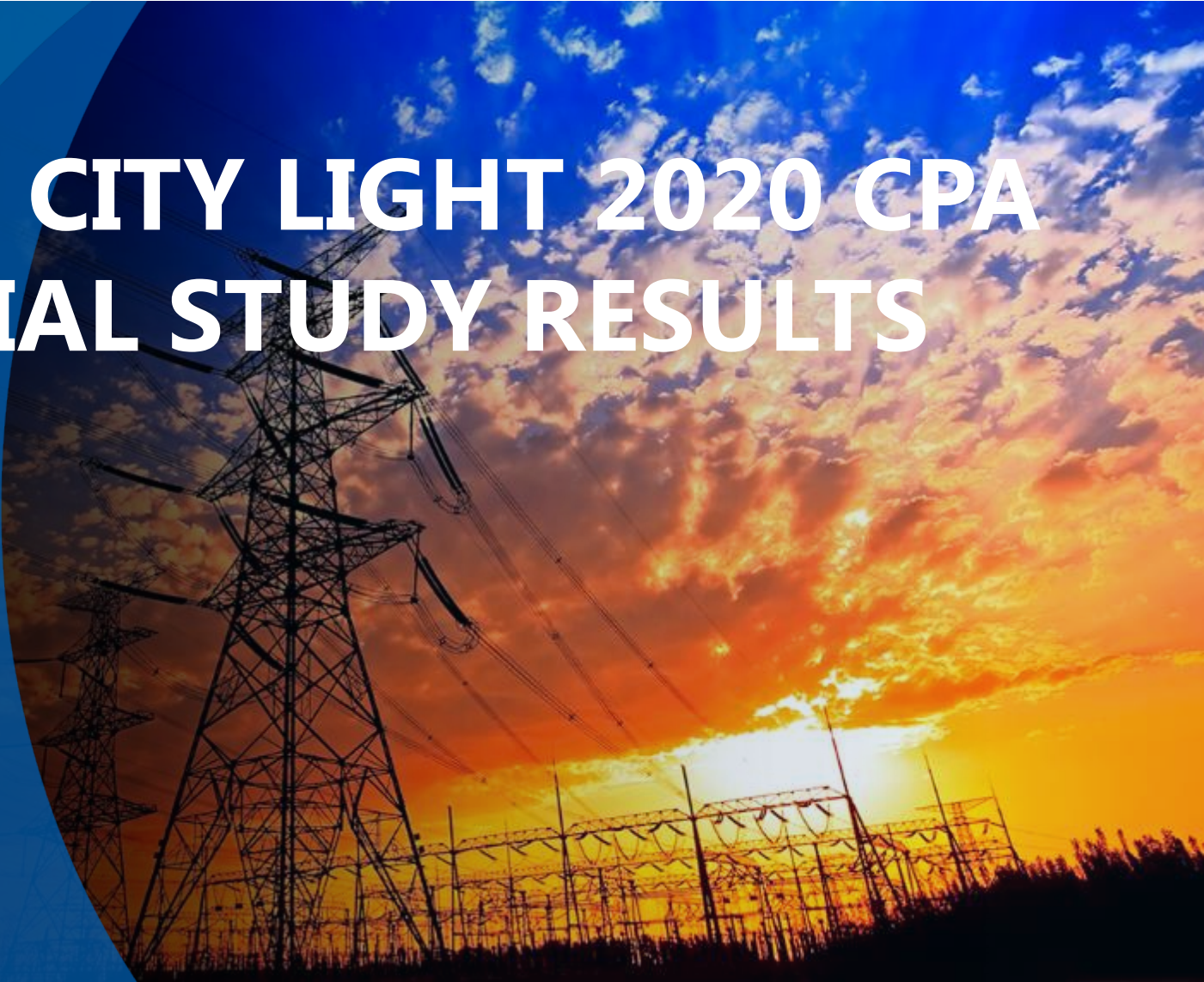
Over 200k light duty electric vehicles will be added in City Light's service territory



CADMUS

SEATTLE CITY LIGHT 2020 CPA POTENTIAL STUDY RESULTS

October 16, 2019



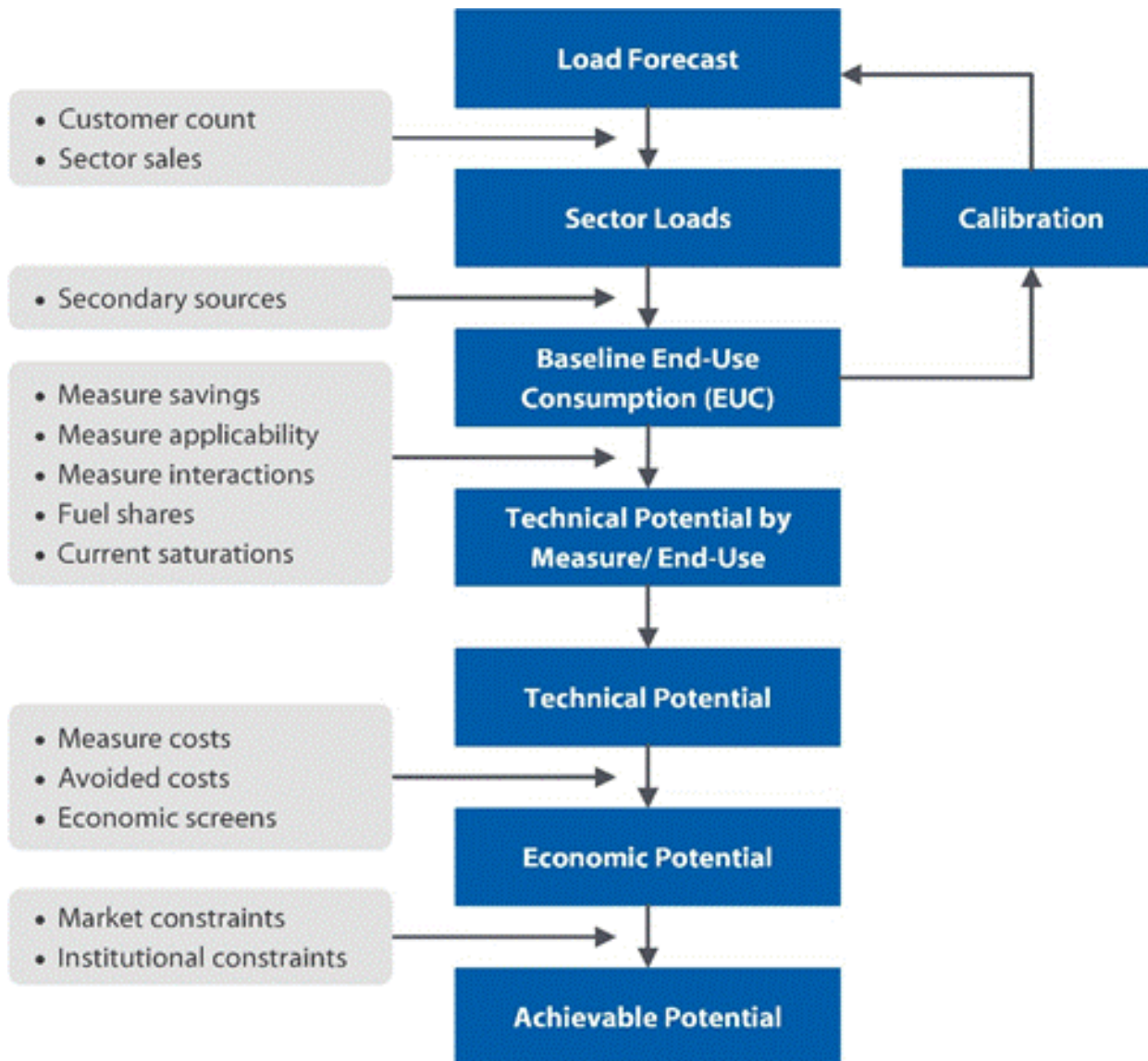
A large, thick blue curved shape, resembling a stylized 'C' or a partial circle, is positioned on the left side of the slide, extending from the top to the bottom.

OBJECTIVES, METHODOLOGY, AND CHANGES.

OBJECTIVES

- Estimate 20-year technical, economic, and achievable potential
 - Build ECM data sets consistent with Council's most recent Power Plan and Regional Technical Forum (RTF) unit energy savings (UES) measures
- Satisfy Requirements of WAC 194-37
- Provide reports and presentations that document methodology, data sources, and results
- Develop Conservation Supply Curves for 2020 IRP
 - Provide supply curves that demonstrate savings at various levelized costs

OVERVIEW OF METHODOLOGY



CHANGES FROM 2018 CPA

Update	Description	Technical Potential Impact	Economic Potential Impact
Updated Avoided Cost Forecasts	Updated Avoided Energy Cost Forecast	N/A	Decrease
	Updated Deferred T&D Forecast		
New Load Forecasts	Forecasted residential baseline sales are 31% higher*	Res Increase Com/Ind Decrease	Res Increase Com/Ind Decrease
	Forecasted commercial baseline sales are 7% lower		
	Forecasted industrial baseline sales are 41% lower**		
Measure Updates	New/Updated Residential Measures	Res Mostly Increase Com Increase	Res Mostly Increase Com Increase
	New/Updated Commercial Measures		

*Res forecast includes higher customer growth and EVs

**Ind forecast is lower because some customers were re-classified Com

ADDITIONAL CONSIDERATIONS

2020 Conservation Potential Assessment

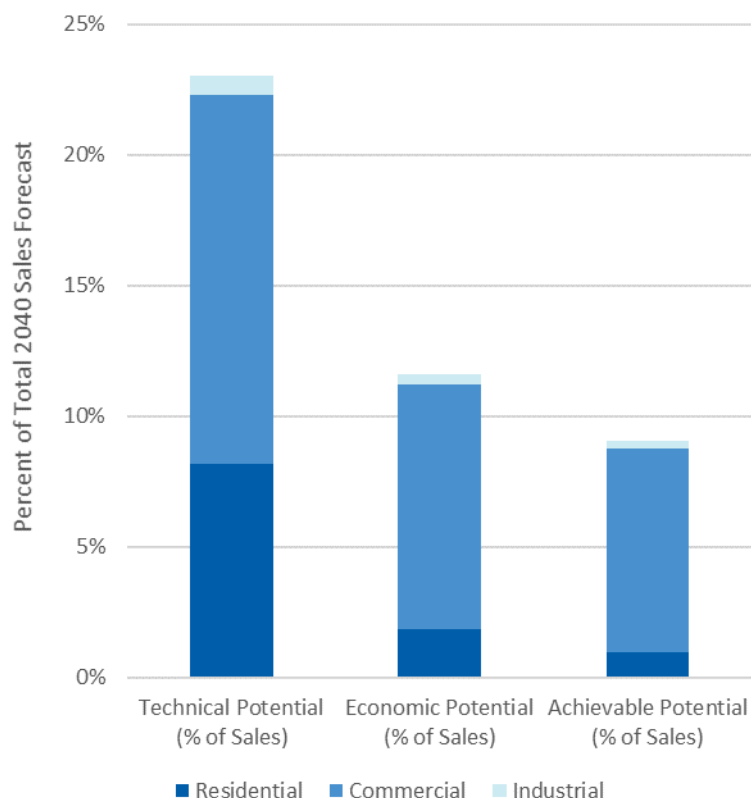
- Clean Energy Transformation Act
- Federal Standards
- WA State Appliance Standards (RCW 19.260, WAC 194-24)
- City of Seattle Energy Code and Benchmarking Ordinance
- Commercial Lighting Updates



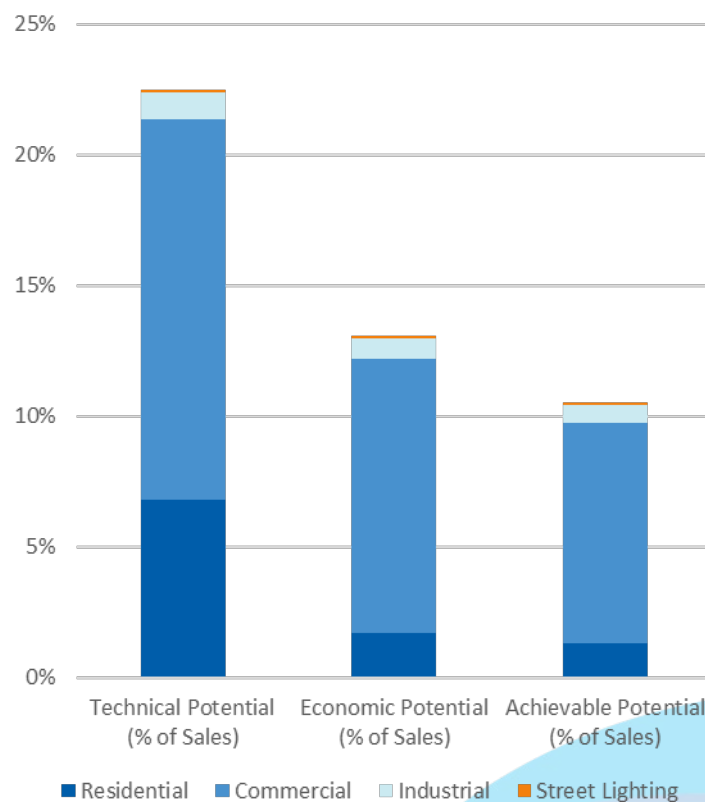
SUMMARY OF RESULTS

COMPARISON TO THE 2018 CPA

2020 CPA Percent of Sales

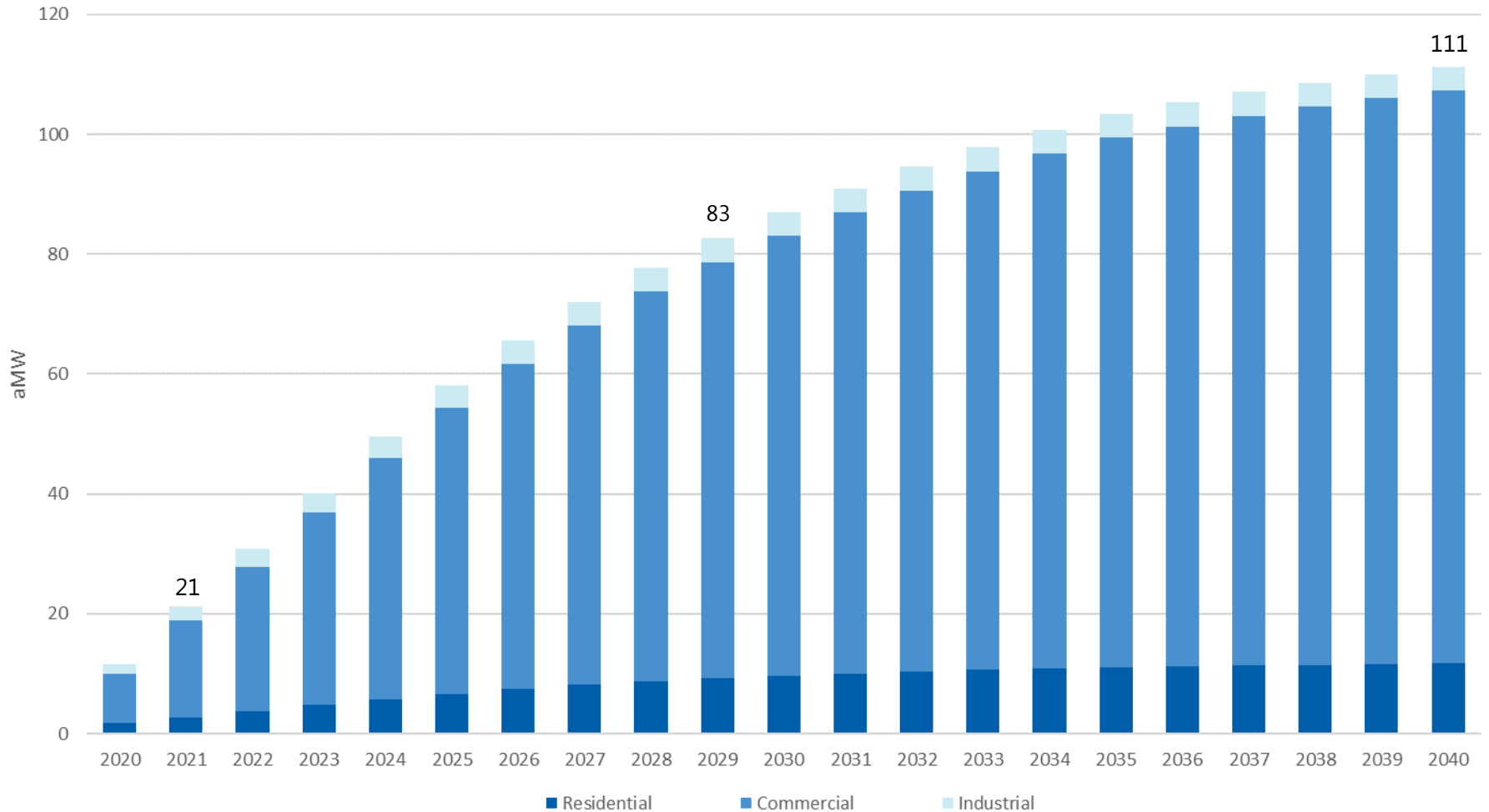


2018 CPA Percent of Sales



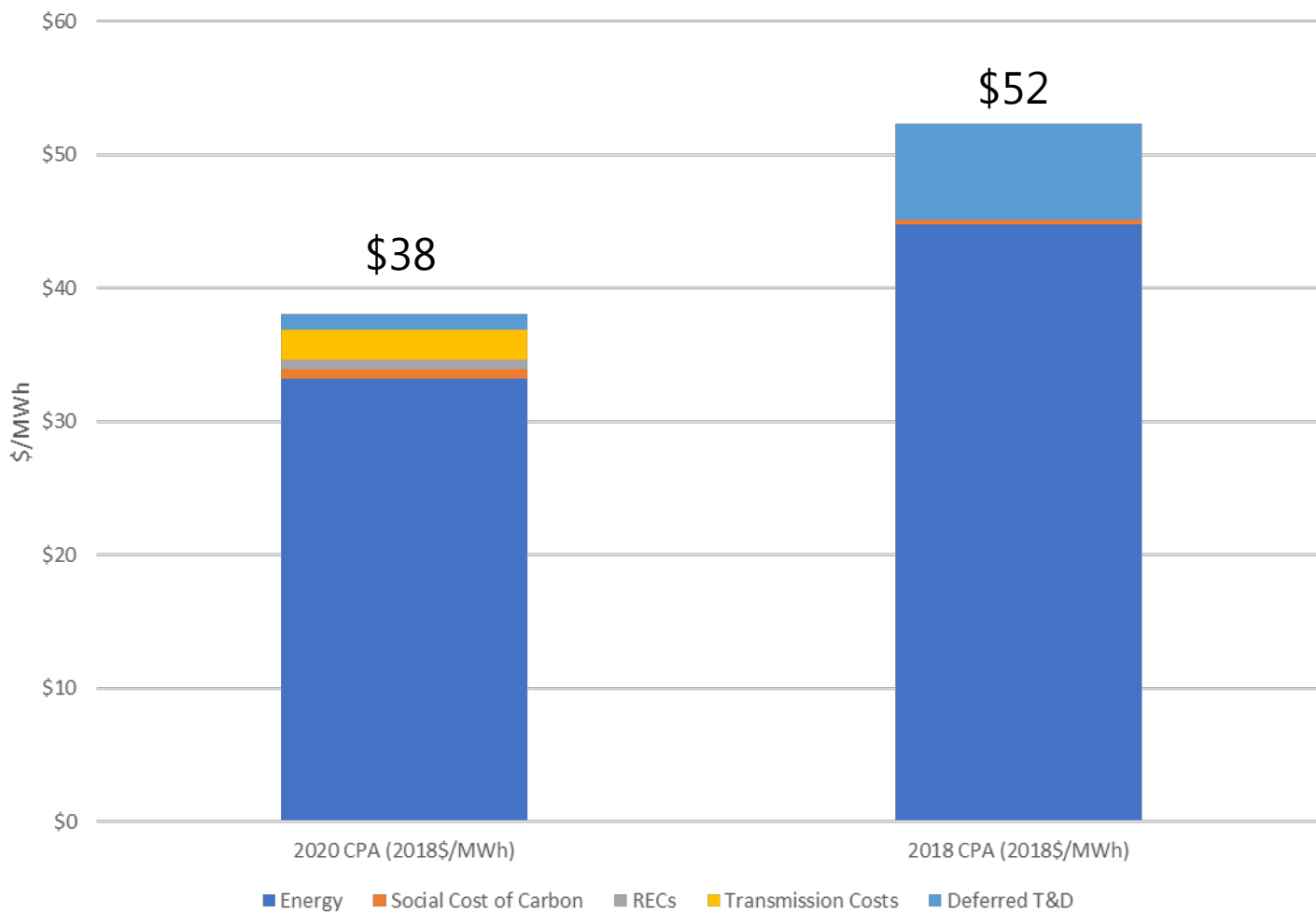
ACHIEVABLE POTENTIAL

2020 Conservation Potential Assessment



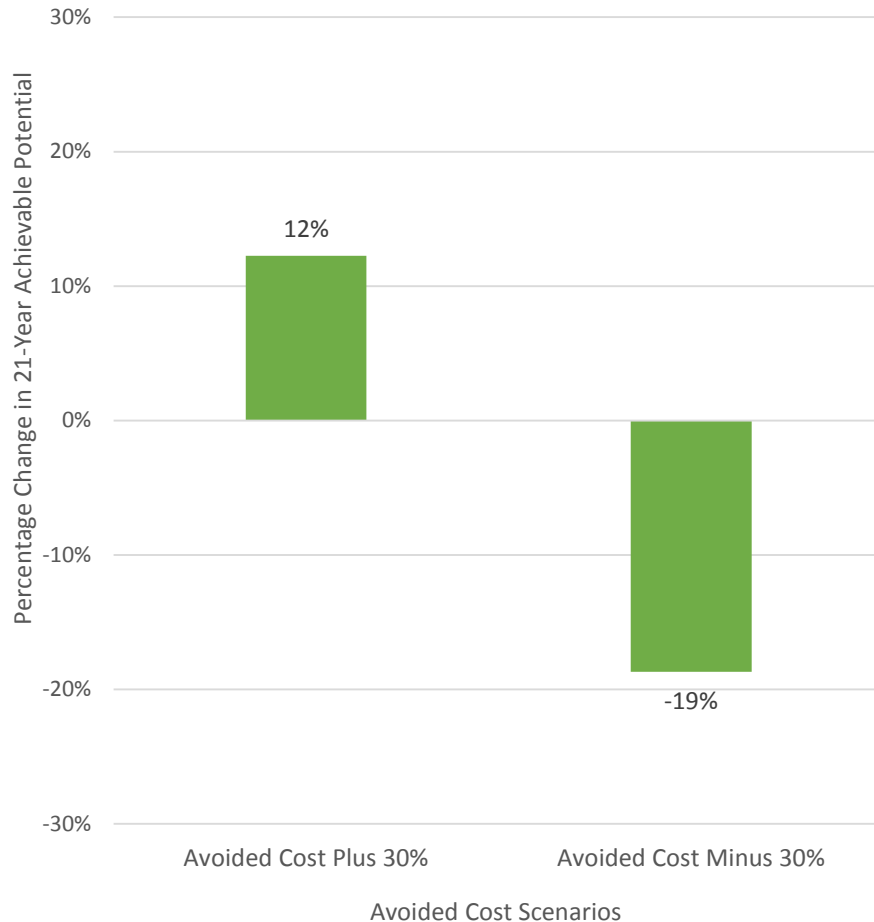
AVOIDED COSTS

2020 CPA Avoided Energy and Deferred T&D Costs



AVOIDED COSTS

2020 CPA Avoided Cost Scenario Analysis



- Achievable potential increases by 12% if avoided costs + 30%
- Achievable potential decreases by 19% of avoided costs – 30%
- The downside risk is higher because a greater proportion of achievable potential is marginally cost-effective than is marginally not cost-effective

CONCLUSIONS

2020 Conservation Potential Assessment

1. Substantial short-term potential (~ 21 aMW through 2021) exists
2. Commercial potential is still really strong
3. Achievable potential is lower in the 2020 CPA compared to 2018 CPA
4. Potential is lower, primarily due to lower avoided costs
5. Potential is more sensitive to lower, rather than higher avoided costs

CADMUS

The background of the slide features a photograph of a business meeting in a modern office. Several people are silhouetted against large windows, some sitting at a table and others standing. A large, semi-transparent blue circular graphic is overlaid on the left side of the image.

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NEXT STEPS

- Report cost-effective targets to City Council (I-937 requirements)
- Conduct new integrated analysis to decide if additional energy efficiency provides strategic value (include in the Integrated Resource Plan)





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CHANGE VISION



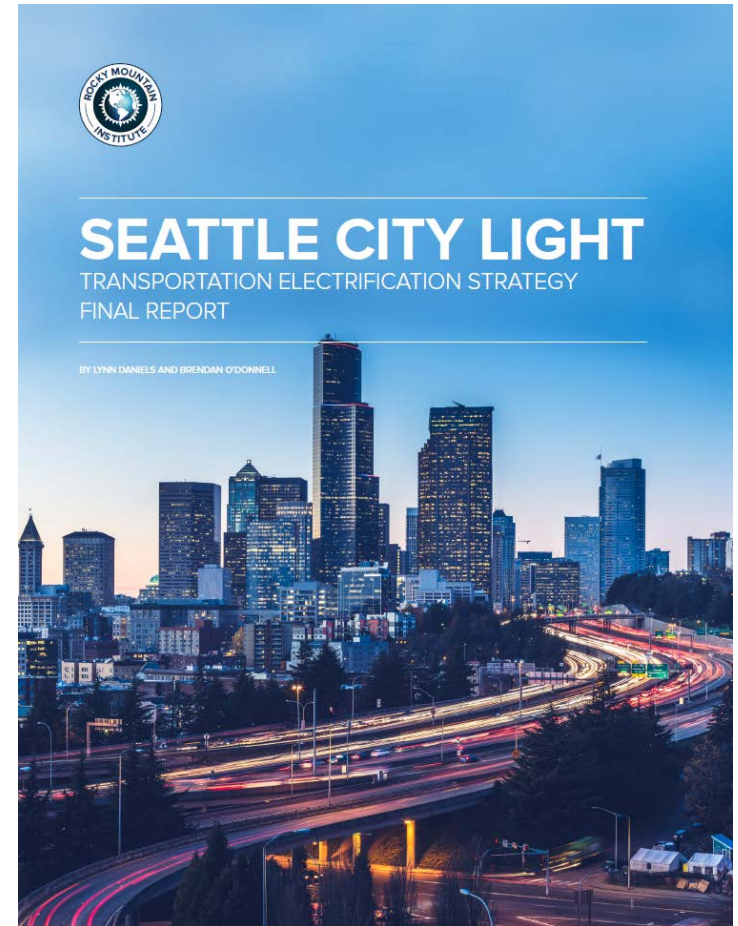
CHANGE VISION

- New City Light Division-- Electrification and Strategic Technology



TRANSPORTATION ELECTRIFICATION PLAN

- Program plan organized around these values:
 - Equity
 - Environment
 - The grid
- Stakeholder outreach
- Budget is capped



CITY LIGHT PLANNING PROCESSES EVOLVING

Integrated
Resource
Plan

Conservation
Potential
Assessment

Transmission
&
Distribution
Plans

Strategic
Plan

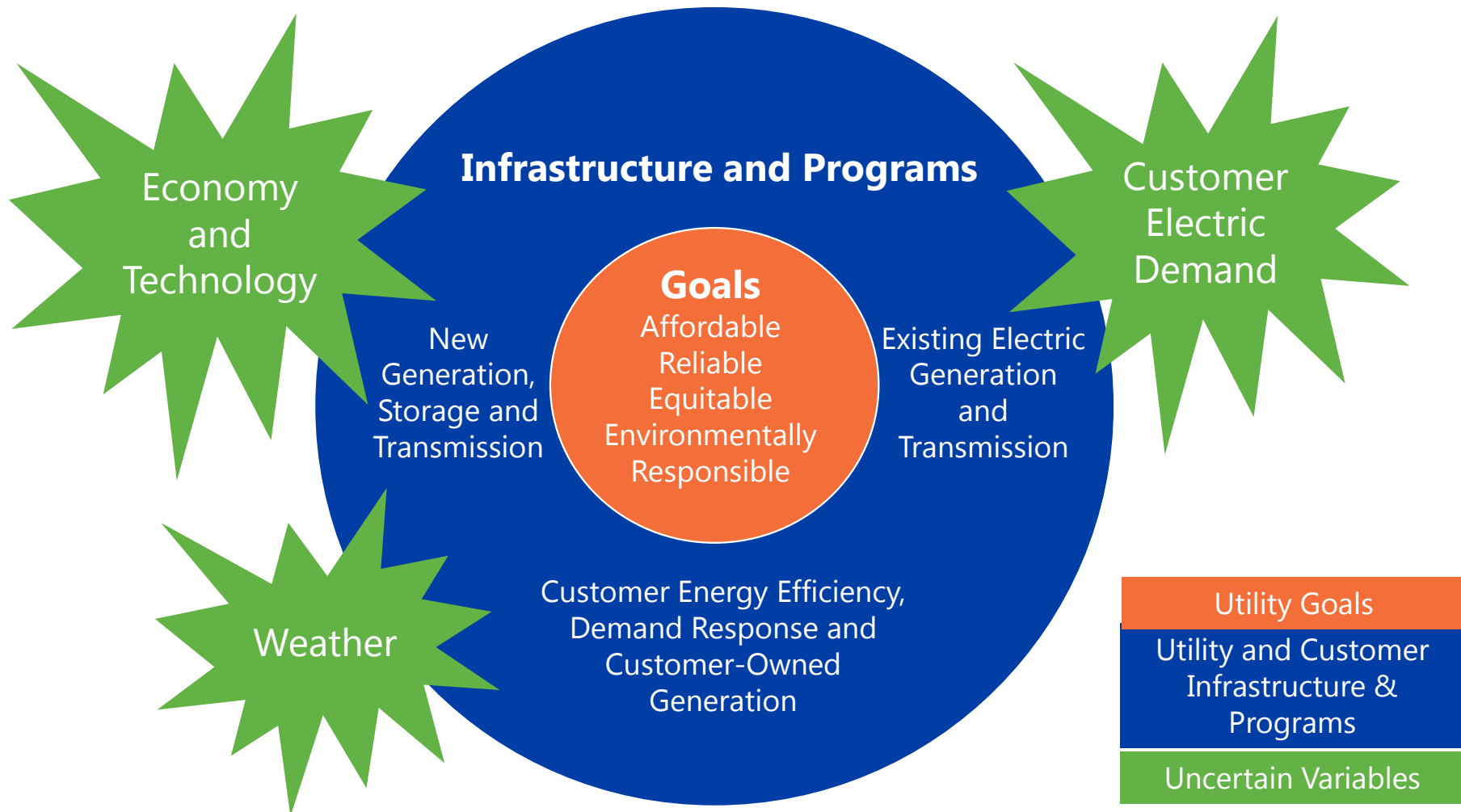
Climate
Vulnerability
And
Adaptation
Plan

Electrification
Plan

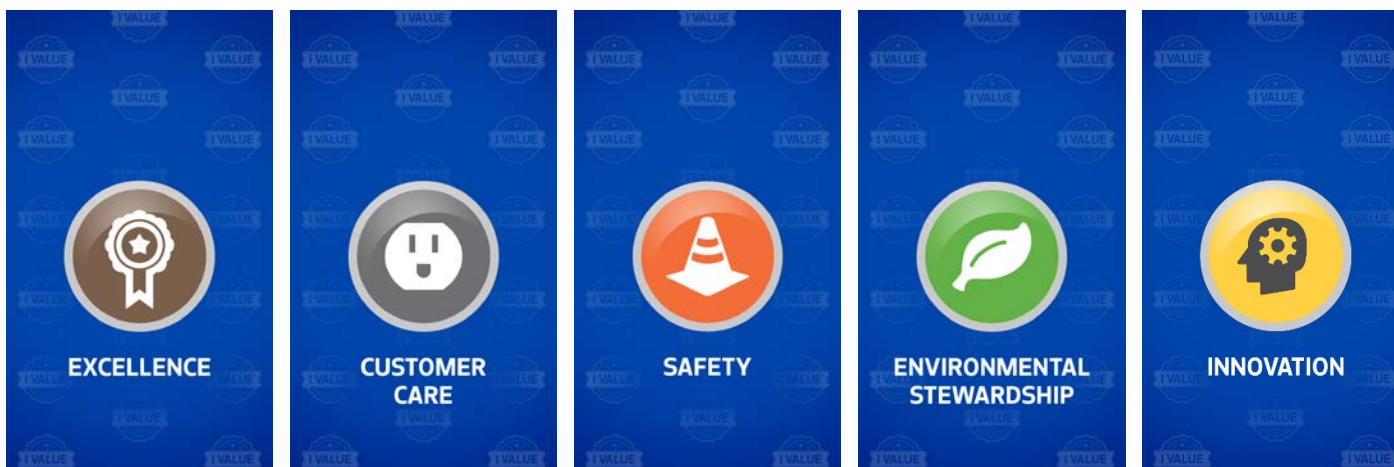
New Long-term
Strategic Planning



INTEGRATED RESOURCE PLANNING PROCESS



2020 INTEGRATED RESOURCE PLAN VALUES

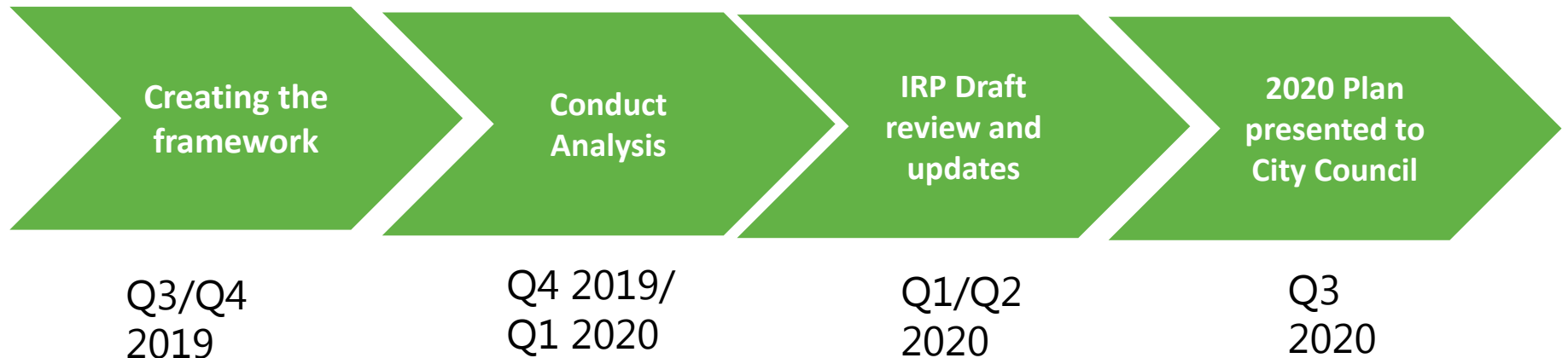


FOCUS AREAS- THREATS OR OPPORTUNITIES?

- Clean Energy Transformation Act and Energy Independence Act action plans
- Climate Change
- Environmental Justice
- Evolving regional energy markets benefits
- Resource Adequacy
- Strategic Opportunities for Demand-Side and New Renewable Resources
- Transmission and Distribution planning harmonization



HIGH-LEVEL INTEGRATED RESOURCE PLAN TIMELINE



Suggested Future Stakeholder meetings

★ Demand
Forecast &
Scenario
planning

★ Review
Draft

★ Review
updates &
finalize





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DISCUSSION



2018 INTEGRATED RESOURCE PLAN STAKEHOLDER RECOMMENDATIONS

- Evaluate City Light's market reliance to be prepared for a changing resource mix
- Look more broadly and strategically at demand side and supply side alternatives to complement City Light's hydropower resources
- Ensure equitable outcomes
- Explore different paths to meet electrification policies and respond to climate change



IN PERSON VS WEBINAR

In person meetings



Review
Draft
(March)



Final review
and draft
letter
(April)

One-hour informational webinars



Demand
Forecast &
Scenarios
(?)



Clean Energy
Transformation
Act /Other
Topics (?)



Seattle City Light
thanks you



CITY LIGHT

OUR MISSION

Seattle City Light is dedicated to delivering customers affordable, reliable and environmentally responsible electricity services.

OUR VISION

We resolve to provide a positive, fulfilling and engaging experience for our employees. We will expect and reinforce leadership behaviors that contribute to that culture. Our workforce is the foundation upon which we achieve our public service goals and will reflect the diversity of the community we serve.

We strive to improve quality of life by understanding and answering the needs of our customers. We aim to provide more opportunities to those with fewer resources and will protect the well-being and safety of the public.

We aspire to be the nation's greenest utility by fulfilling our mission in an environmentally and socially responsible manner.

OUR VALUES

Safety, Environmental Stewardship, Innovation, Excellence, Customer Care



Seattle City Light