



Seattle City Light

2018 INTEGRATED RESOURCE PLAN

Stakeholder Meeting

Seattle City Light | November 13, 2017

AGENDA

- Welcome
- Review key inputs
- Expected future resource needs
 - Resource Adequacy
 - Renewable portfolio standard (RPS) compliance
- Preliminary portfolios
- Draft scenarios
- Wrap up/ next meeting

WHAT WILL WE REASSESS IN THE 2018 IRP?

These are questions we answer in an IRP

- ✓ **What do we have? (resources and contracts)**
- ✓ **How much do we need and when? (to meet demand and renewable portfolio standards)**
- How can we fill that need? (portfolio options)
- Which options are robust? (scenario testing)
- Where's the best value? (cost, risk, and environmentally responsible)

2018 IRP UPDATE- WHAT'S CHANGED

- Existing and future BPA contract modeled as shaped block only
- Future BPA annual energy allotment reduced by expected cost-effective energy efficiency
- Gas and hydro resources will be modeled to reflect resource variability, not as fixed block PPAs
- Inclusion of an option to rely on 70% of next year's RECs for compliance
- Inclusion of 20-year REC contracts



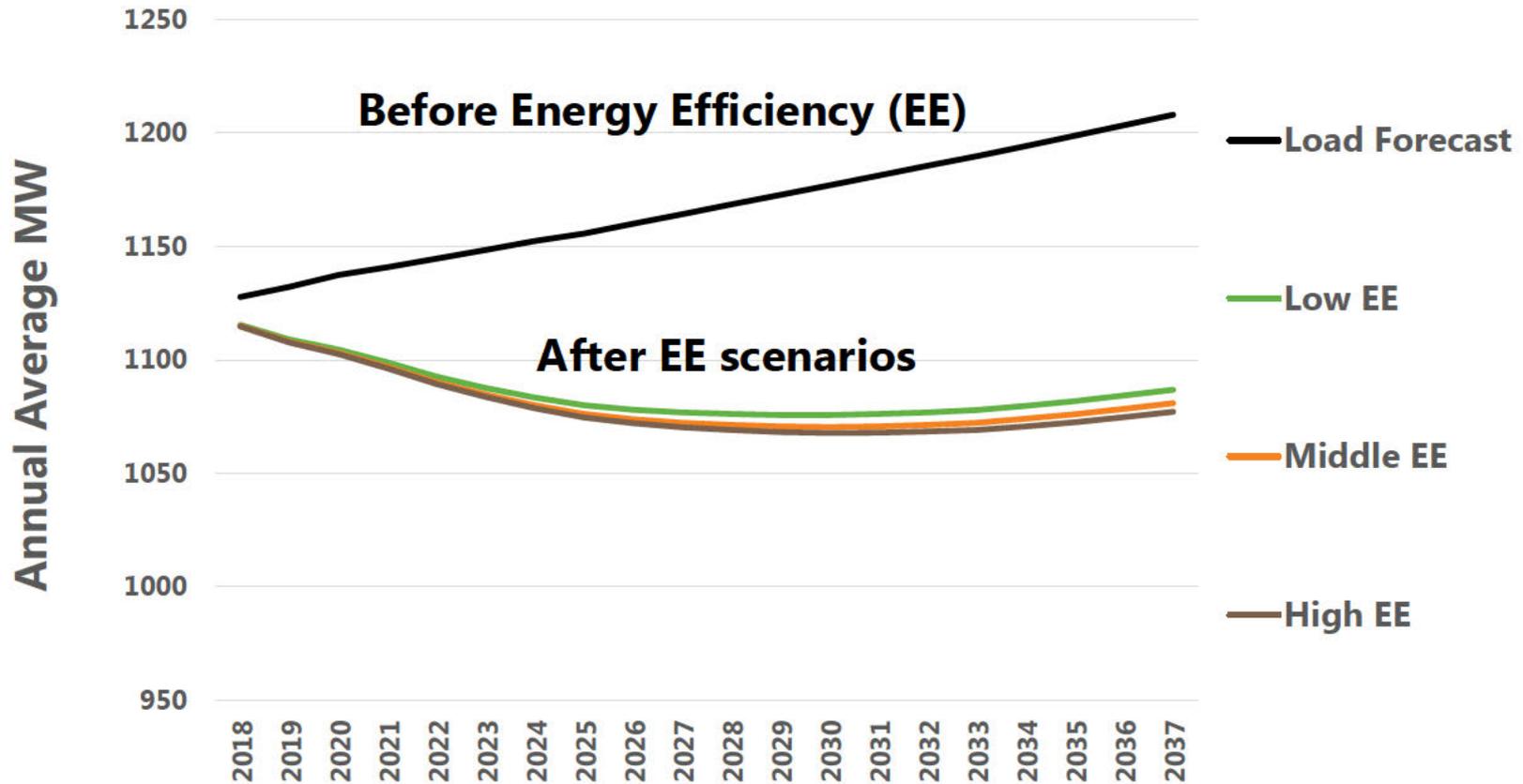
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KEY INPUT REVIEW

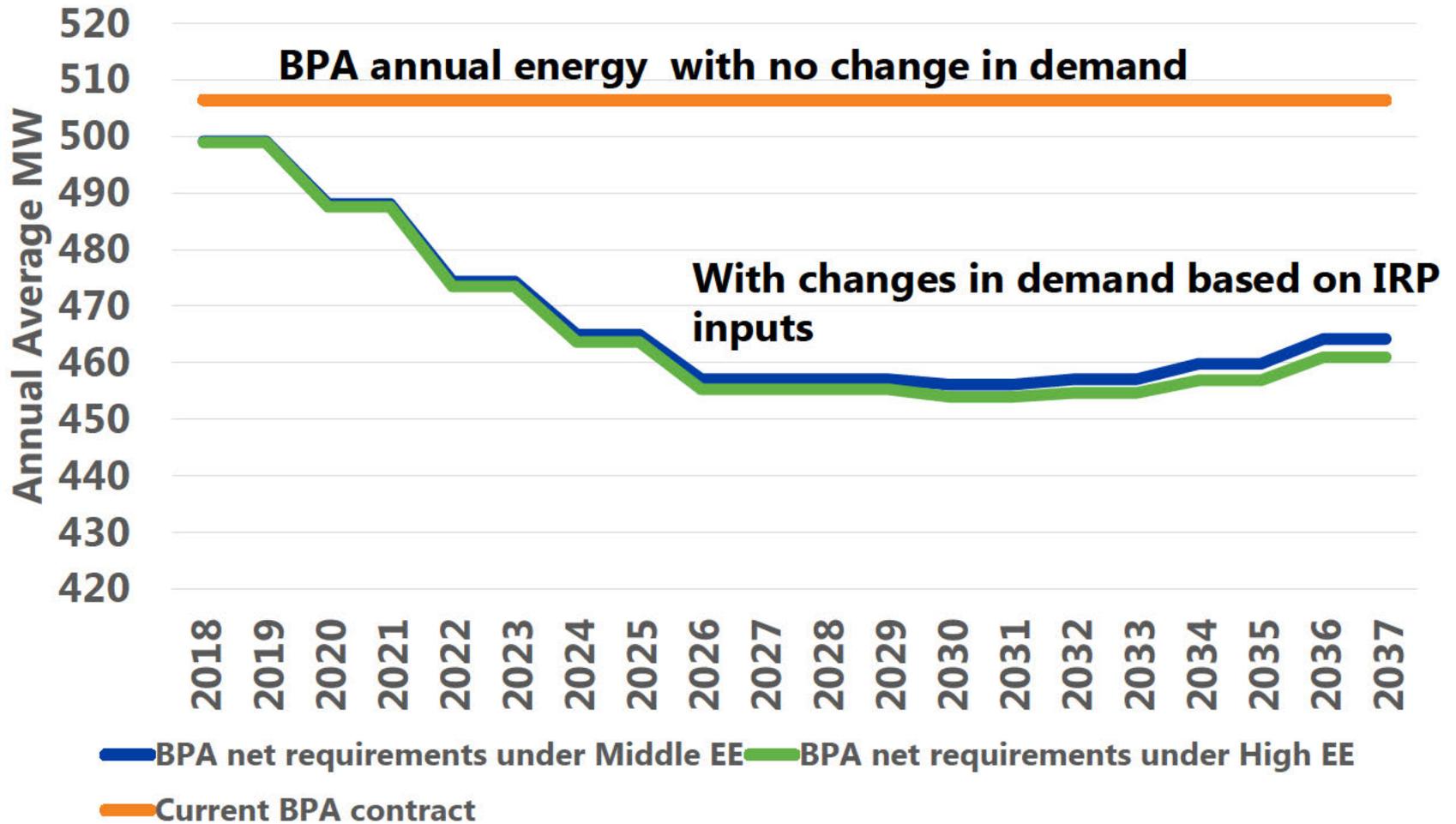


2018 IRP LOAD FORECAST BEFORE AND AFTER UTILITY ENERGY EFFICIENCY

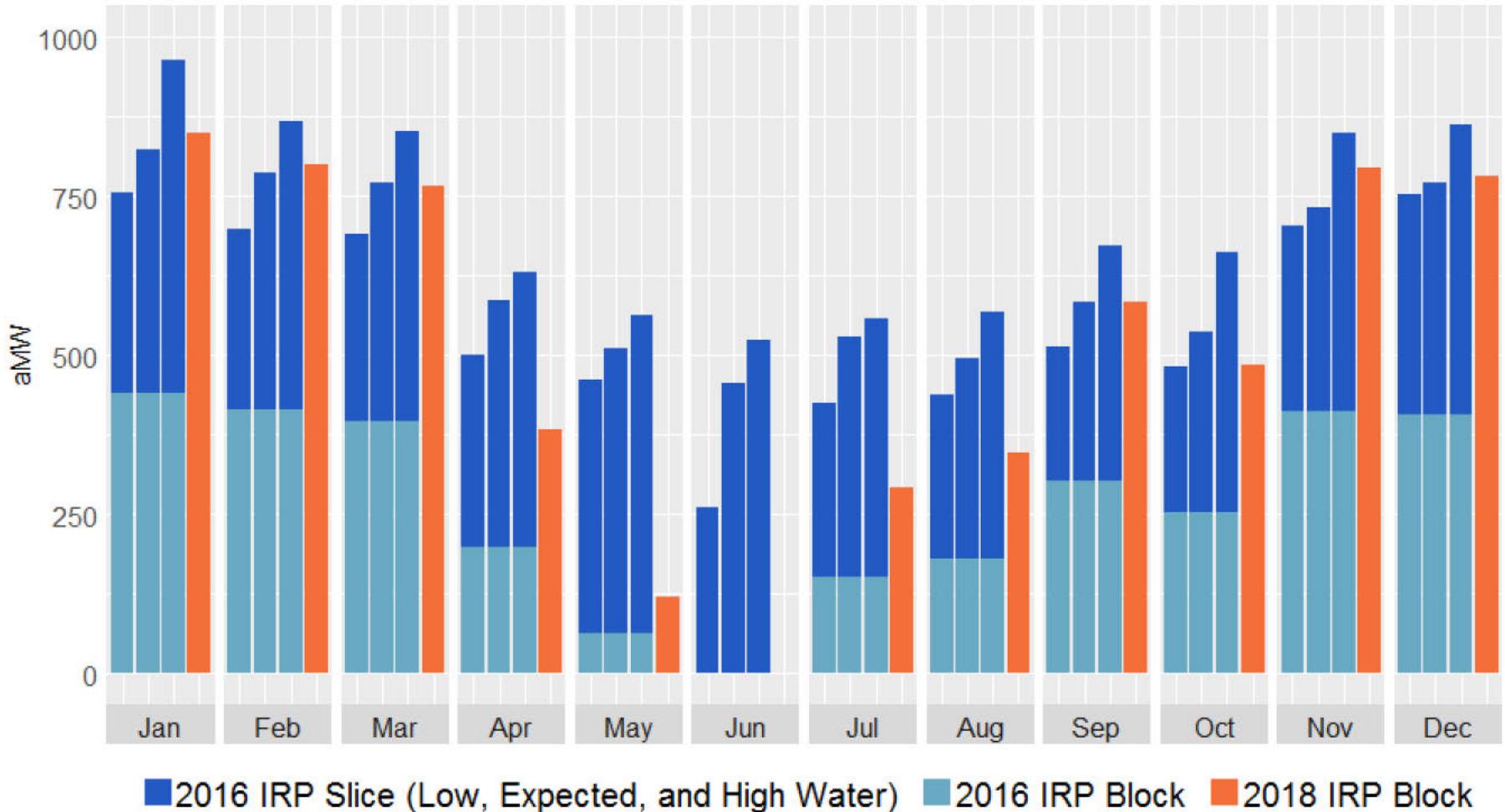


PROJECTED BPA CONTRACT

ENERGY REDUCTIONS FOR REDUCED DEMAND

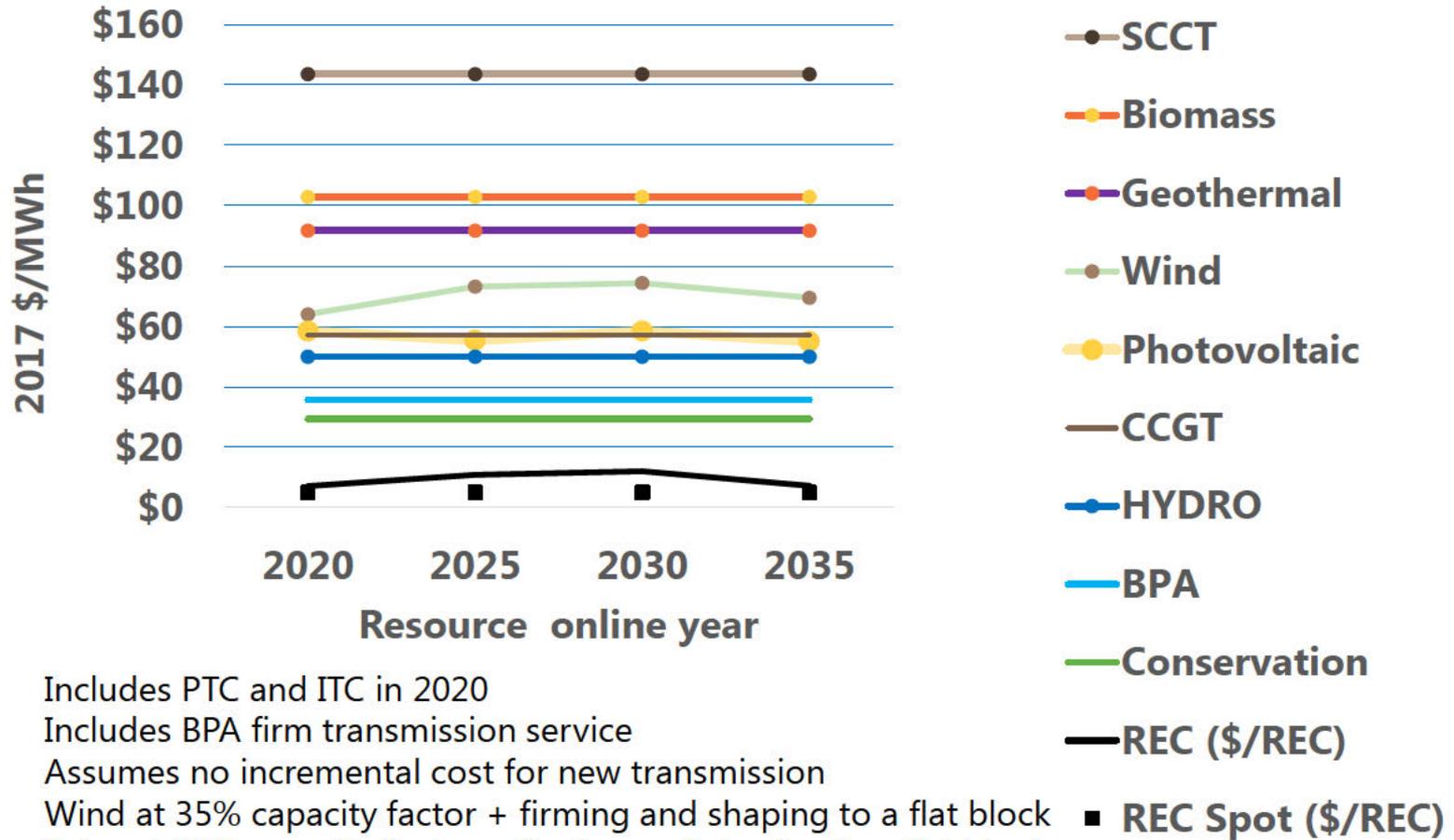


REDUCED VARIABILITY IN BPA CONTRACT



UTILITY SCALE NEW RESOURCE COST INPUTS

PROJECTED LEVELIZED COST – 2017 \$/MWH



- Includes PTC and ITC in 2020
- Includes BPA firm transmission service
- Assumes no incremental cost for new transmission
- Wind at 35% capacity factor + firming and shaping to a flat block
- Solar at 26% capacity factor + firming and shaping to a flat block
- CCGT and SCCT includes fuel cost, excludes City Light GHG offsets

UTILITY SCALE NEW RESOURCE COSTS

DISCUSSION OF ASSUMPTIONS

- Levelized cost not equal to levelized avoided cost
- Wind and Solar include a firming cost based on a demand charge equivalent to a new combustion turbine and energy costs to make more equivalent to other resources for comparison
- City Light relies on BPA transmission for remote resource delivery (firmed resources better utilize existing transmission)
- Skagit and Boundary hydroelectric projects essentially operate as a battery for City Light



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RESOURCE ADEQUACY



RESOURCE ADEQUACY VARIABLES

What will City Light need to ensure future electric demands are met?

- Future electric demand may be above or below the forecast
- Hydro capability varies from year to year

City Light's current portfolio was tested against a range of supply and demand scenarios that cover these different possibilities

RESOURCE ADEQUACY MEASURES

250 scenarios

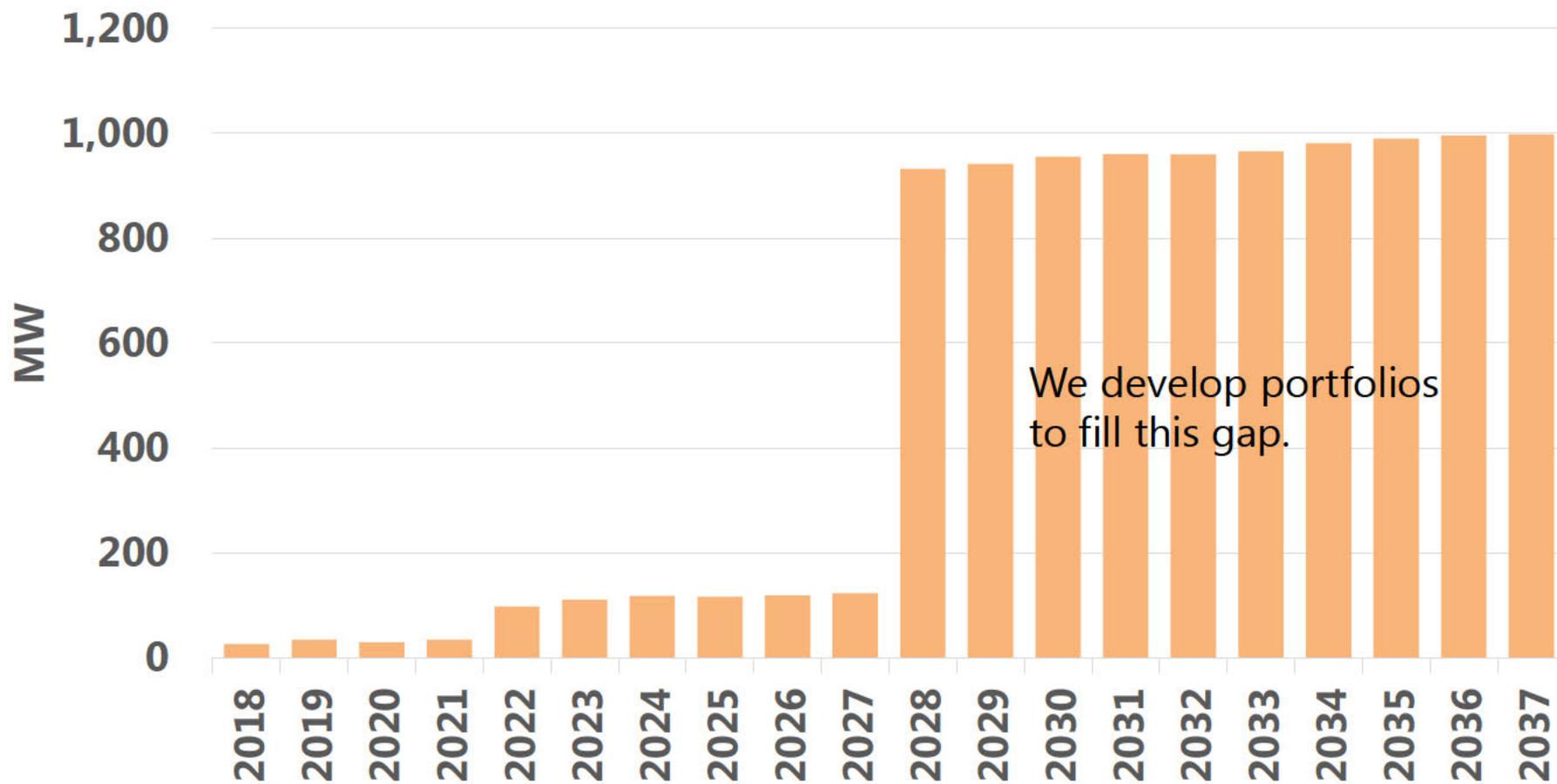
- Capture peak winter loads (December)
- Range of demand conditions
- Range of hydro conditions

Identified top 10% of largest hourly gaps between demand and supply

This is consistent with 2016 IRP methodology

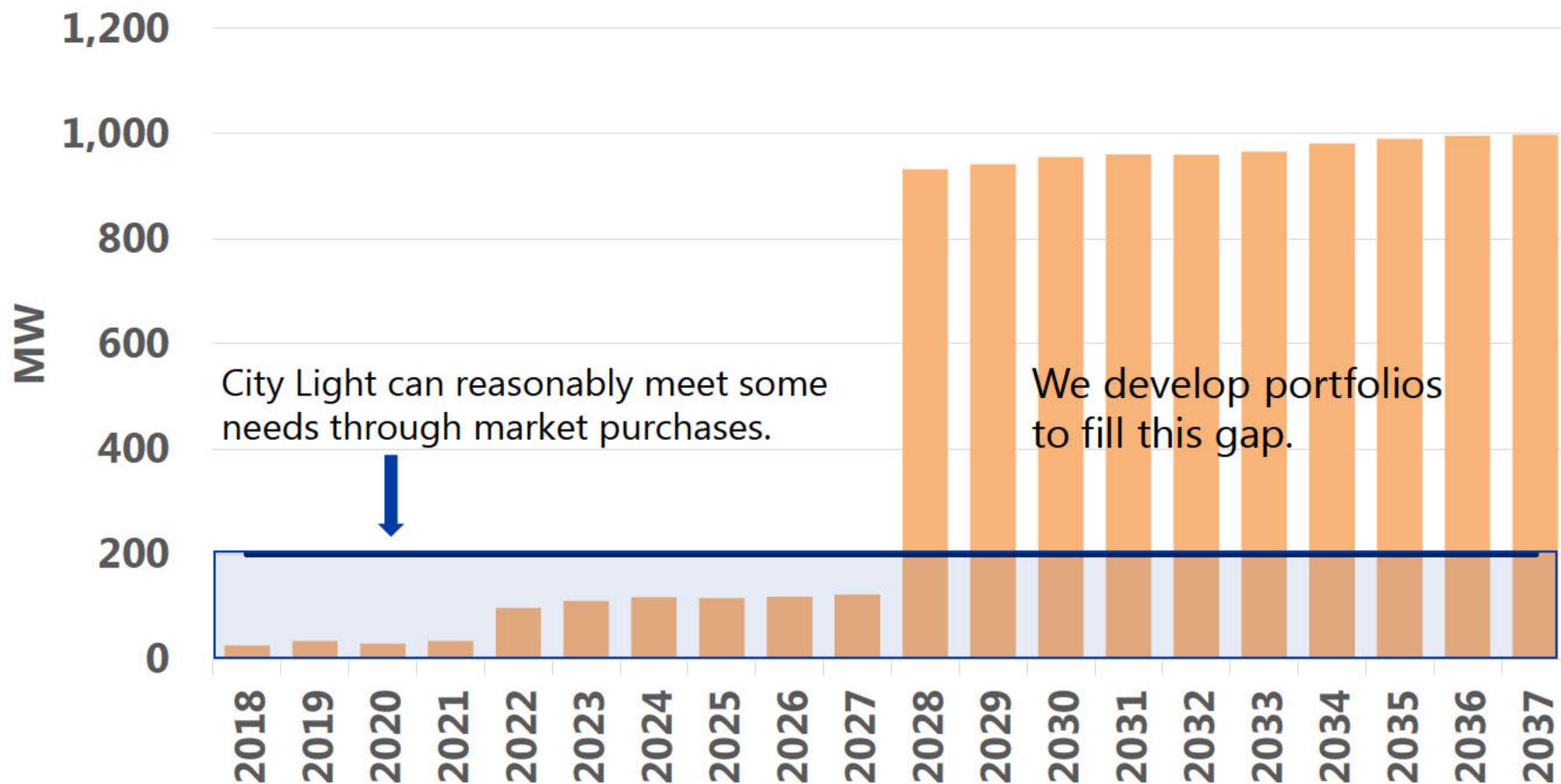
CITY LIGHT'S RESOURCE NEEDS OVER TIME

Resource Need for 2018 IRP



CITY LIGHT'S RESOURCE NEEDS OVER TIME

Resource Need for 2018 IRP





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RECS AND RPS



CITY LIGHT'S RPS-ELIGIBLE PORTFOLIO

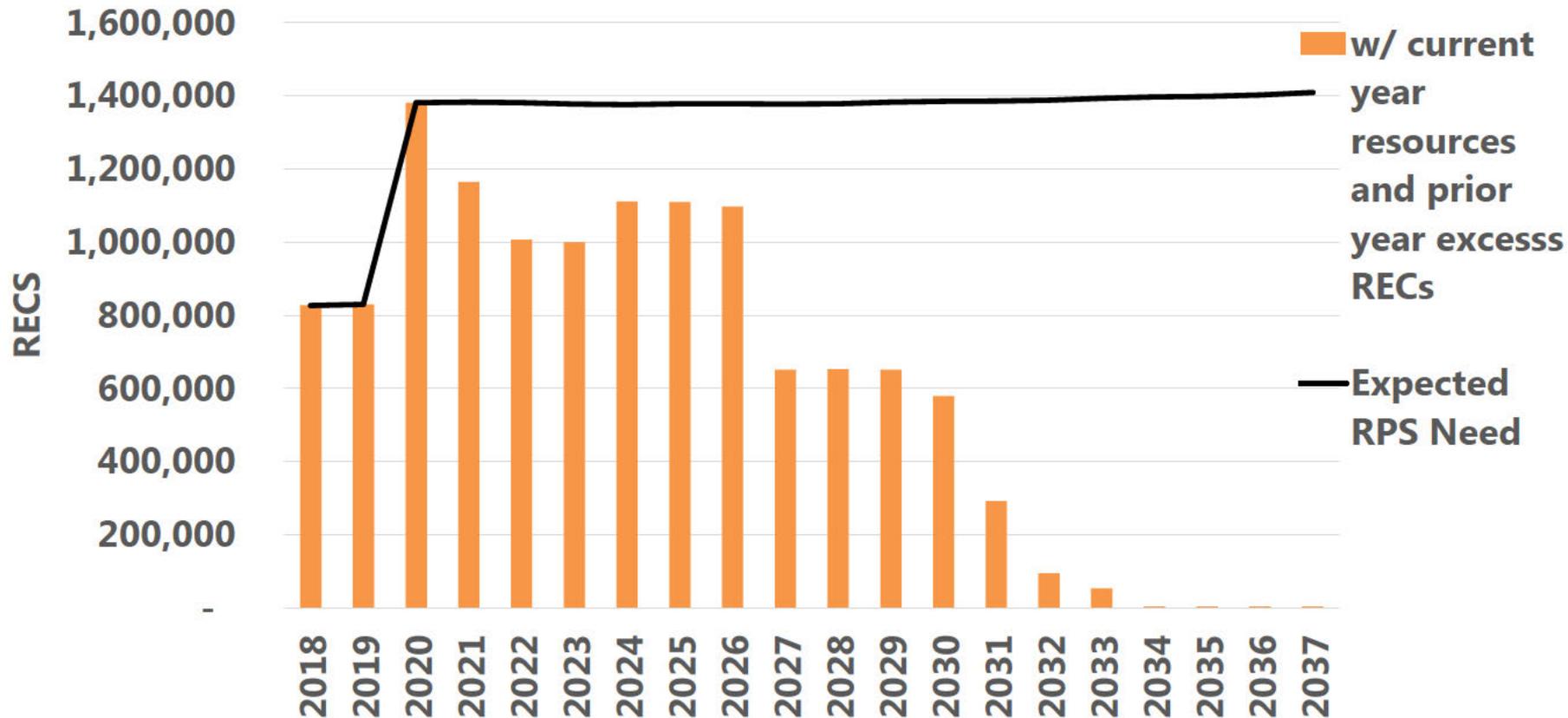
- 15% by 2020
 - Stateline wind purchase expires end of 2021
 - REC purchase continues 2022 to 2026
 - RPS-eligible RECs from BPA expire 2020 to 2027
 - New REC-only purchases begin in 2019 and 2024
 - Need for additional RECs in 2021 - 2022
(dependent on load and REC banking and compliance option)

CITY LIGHT RPS PLANNING

- If retail load declines over a 3 year period, we would be eligible for a different compliance option
 - Spend 1% of retail revenue on eligible resources and/or RECs
 - Use additional RECs to offset non-renewable resource purchases made after 2007
 - 2017 retail sales trending up
 - May be lower cost option compared to 15% target

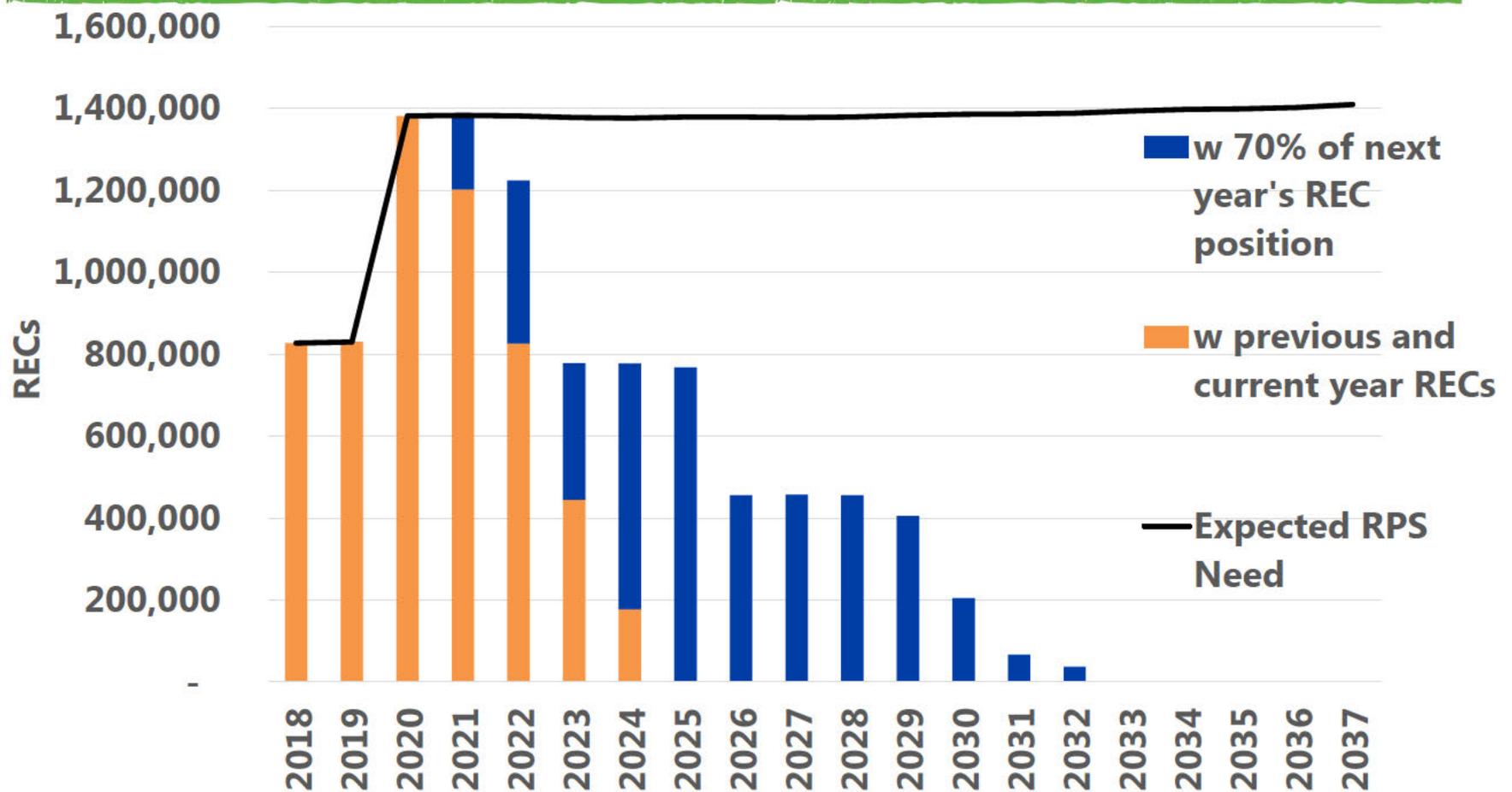
EXPECTED RPS NEED

(AFTER UTILITY EE AND PREVIOUS YEAR EXCESS RECS BANKING)



EXPECTED RPS NEED

(AFTER UTILITY EE AND FUTURE YEAR REC BANKING)





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DRAFT PORTFOLIOS



DRAFT PORTFOLIO DEVELOPMENT

Portfolios are designed to be lowest cost based on resource availability assumptions and must at a minimum:

- Meet resource need based on City Light's resource adequacy planning metric
- Satisfy Washington's renewable portfolio standard requirements

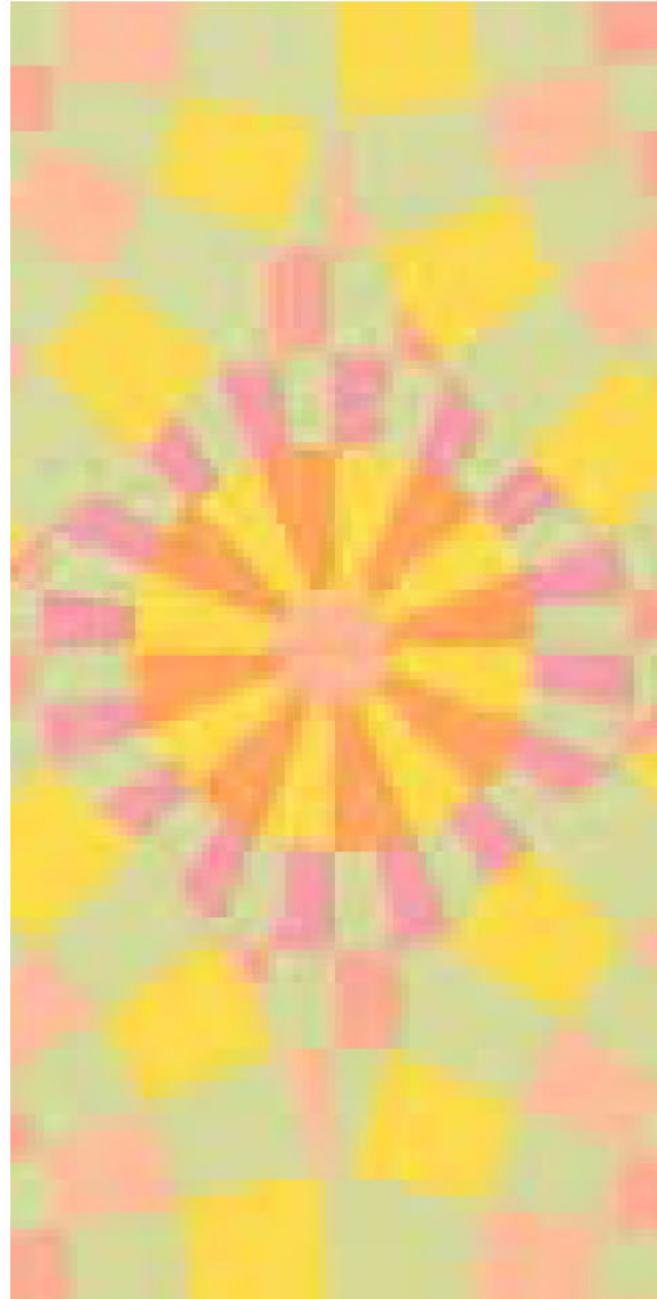
DRAFT PORTFOLIO DEVELOPMENT

Design takes into consideration

- cost
- characteristics of supply resources
- resource availability such as
 - Renewable resources and RPS eligible resources only (consistent with City Council policies)
 - renewable resources instead of REC only contracts
 - non renewable resources available for cost and risk comparison

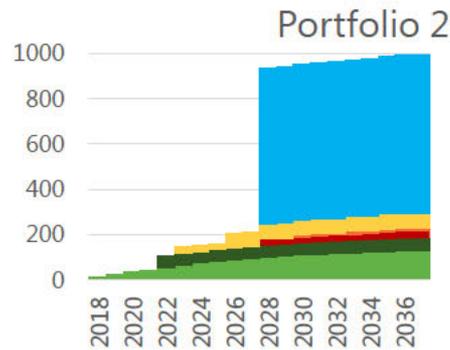
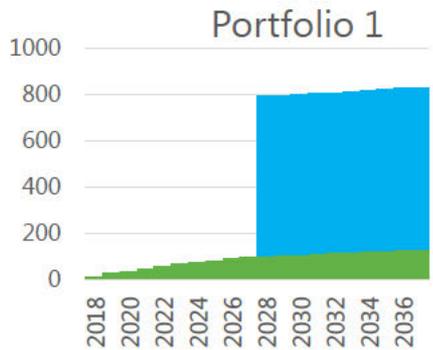
PORTFOLIO DESIGN

- See hand out

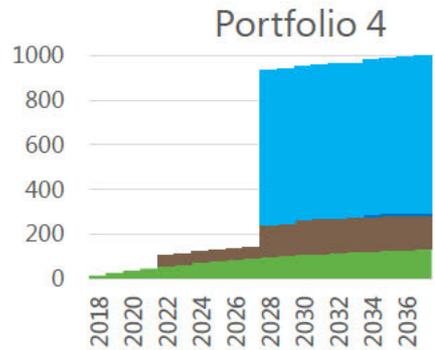
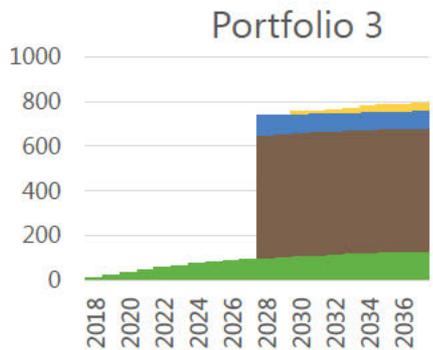


PRELIMINARY PORTFOLIOS (RESOURCE ADEQUACY COMPONENT)

December Capacity MW

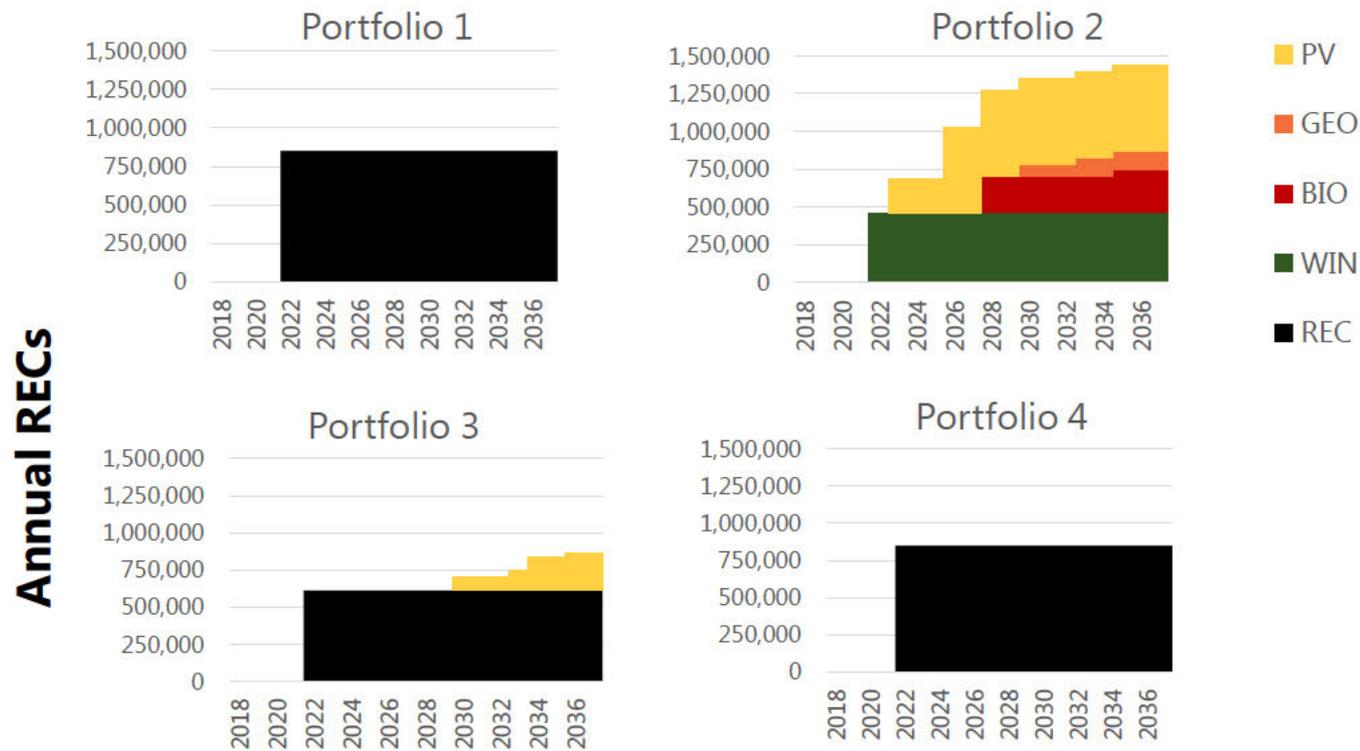


- BPA
- PV
- GEO
- HYD
- CCG
- BIO
- WIN
- Conservation



Note: Wind and solar are firmed to provide RA equal to annual average generation

PRELIMINARY PORTFOLIOS (RPS COMPLIANCE COMPONENT)



1 aMW = 8,760 RECs (non leap year)



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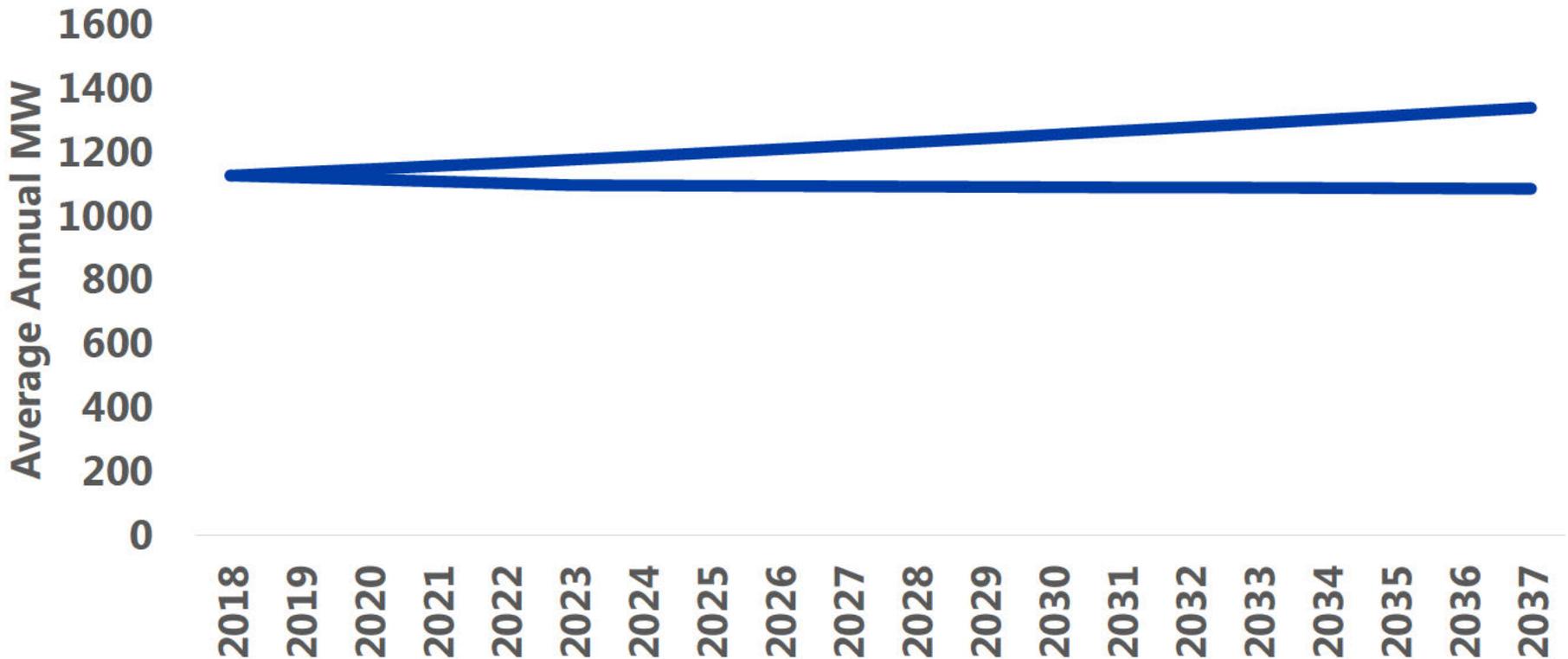


DRAFT SCENARIOS



PORTFOLIOS WILL BE TESTED AGAINST HIGH AND LOW LEVELS OF ELECTRIC DEMAND

High and Low System Load Forecast Scenarios



Scenarios use outcomes of NWPCC's 7th Power Plan.

MAJOR FACTORS IN DEMAND SCENARIOS

The base case uses our internal load forecast

High and low scenarios are primarily based on:

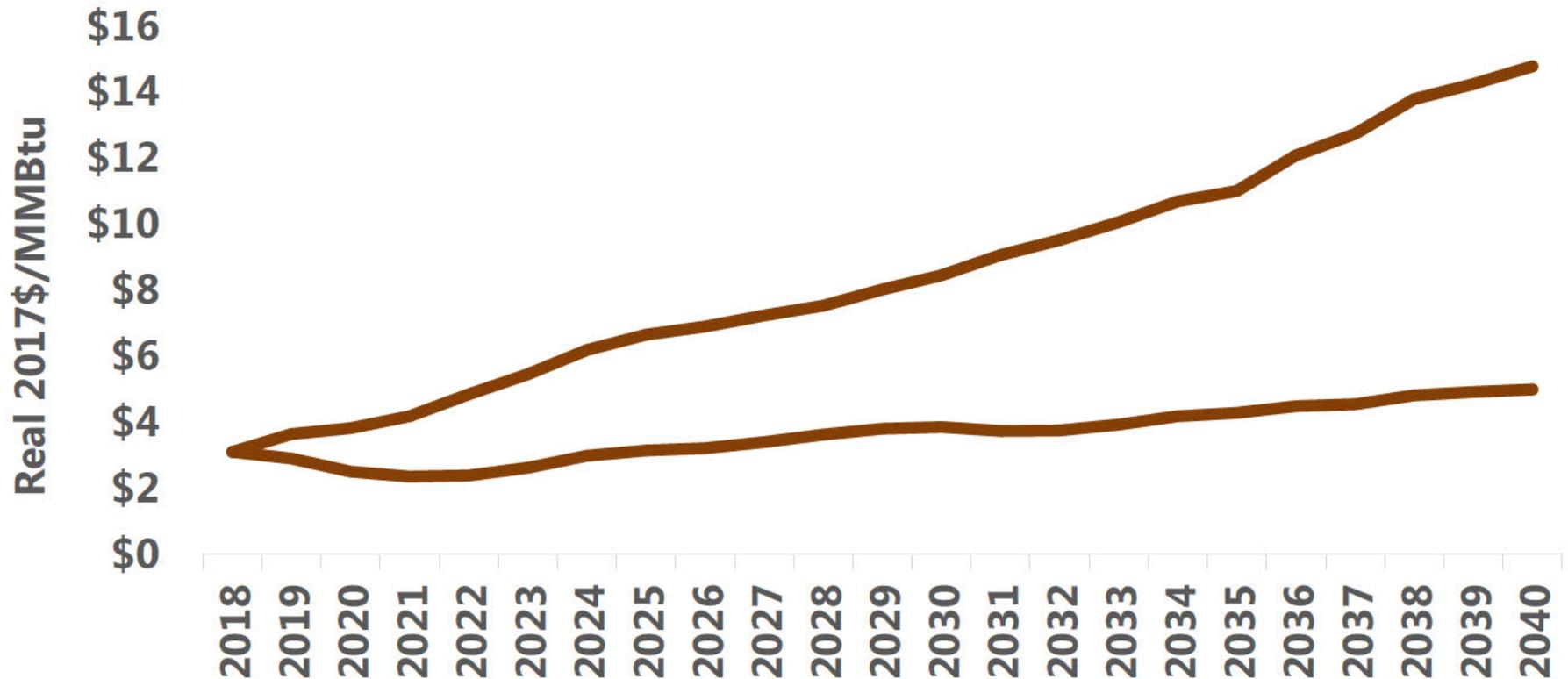
- Future residential units in the region
- Future commercial floor space in the region
- Future industrial output in the region

These affects are scaled to fit City Light's sector mix

***City Light's load forecast methodology is changing.
Future scenarios will be developed in-house***

PORTFOLIOS WILL BE TESTED AGAINST HIGH AND LOW NATURAL GAS PRICES

Natural Gas High and Low Scenarios



Scenarios use outcome of EIA Annual Energy Outlook 2017

MAJOR FACTORS IN NATURAL GAS SCENARIOS

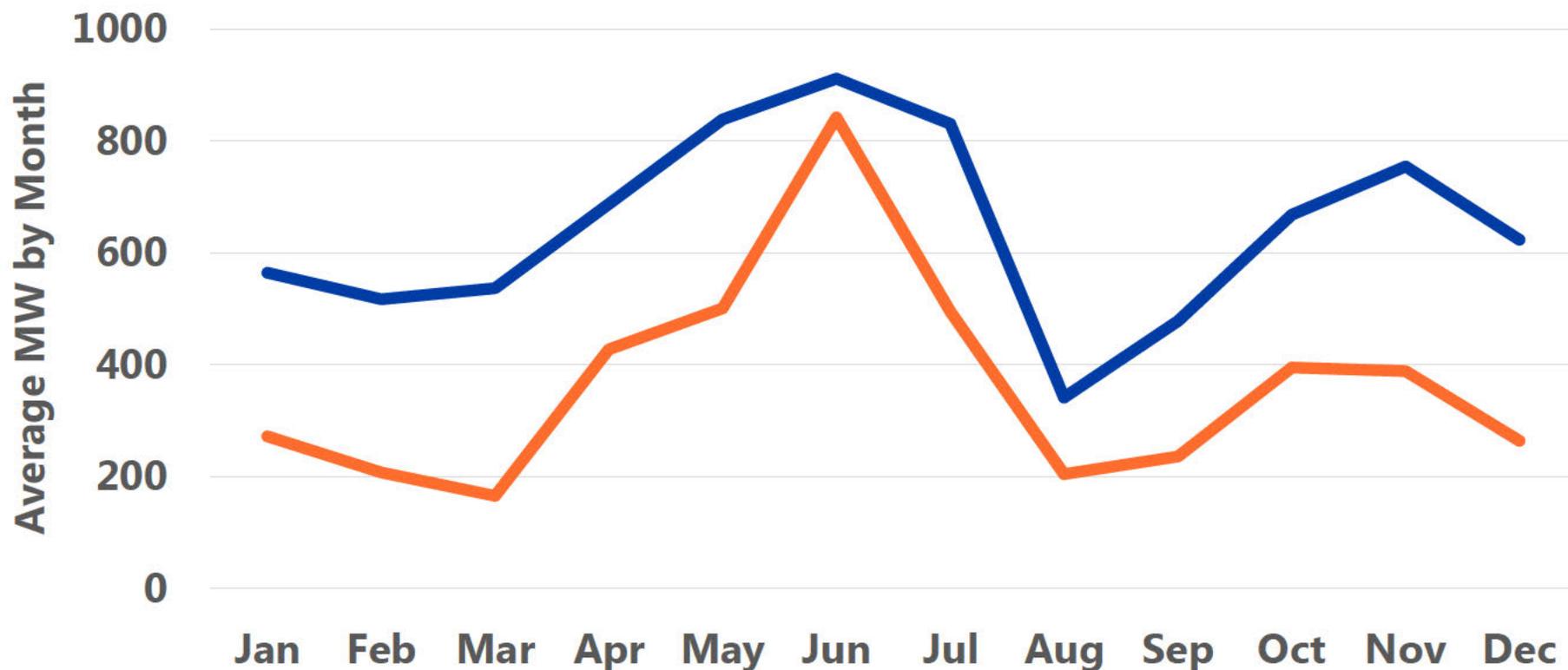
The base case uses IHS natural gas forecast

High and low scenarios are primarily based on:

- Future oil and gas resource availability
- Future oil and gas production costs

PORTFOLIOS WILL BE TESTED AGAINST HIGH AND LOW WATER CONDITIONS

Example Dam Under High and Low Water Scenarios



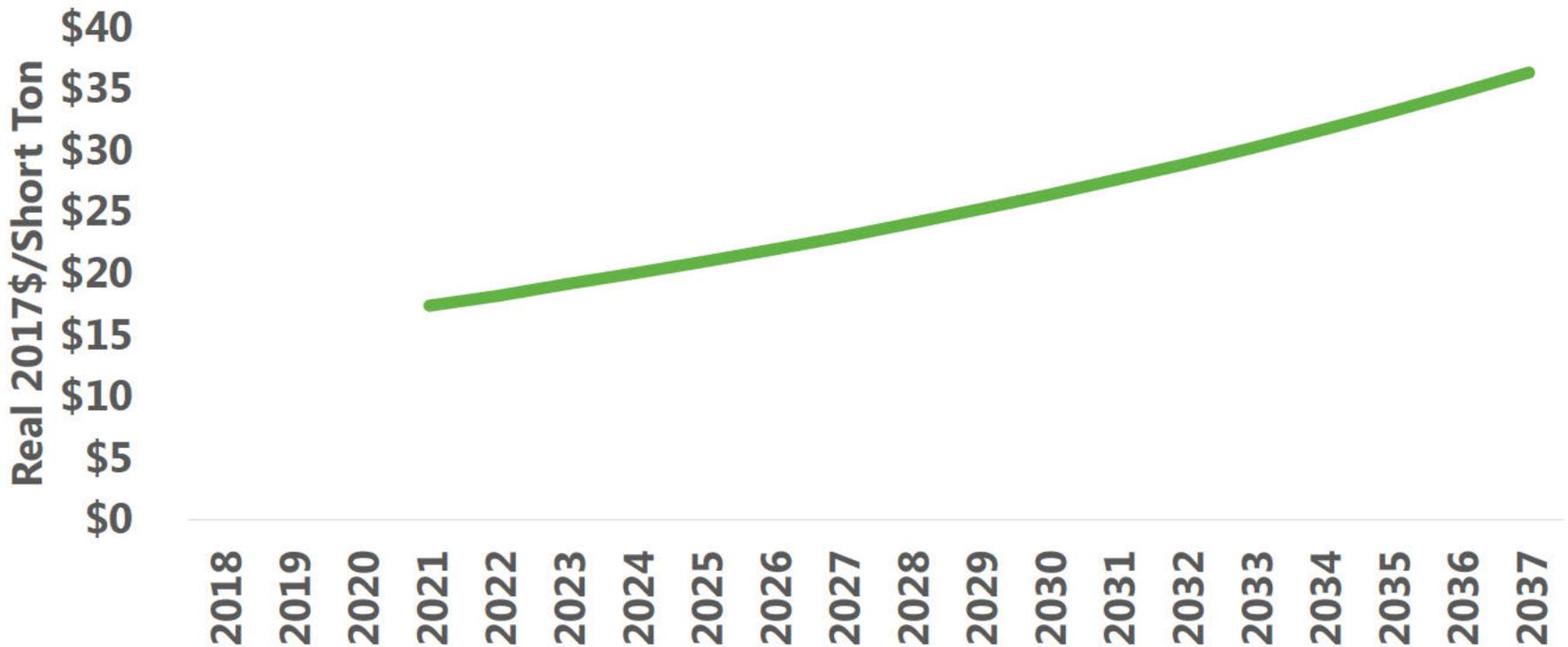
Scenarios use outcome of regional headwater benefits study 2016

HYDRO SCENARIOS

Scenario	
Base case	Expected conditions
Abundant hydro availability	1944 conditions
Scarce hydro availability	1959 conditions

PORTFOLIOS WILL BE TESTED AGAINST A POSSIBLE FUTURE CARBON MARKET

Regional Carbon Market Scenario



Forecast created by E3 for City Light in 2015 based on California cap and trade market

POSSIBLE OTHER SCENARIOS NOW OR FUTURE IRPS

- Early runoff at Skagit and Boundary dams representing a changing climate scenario
- Other

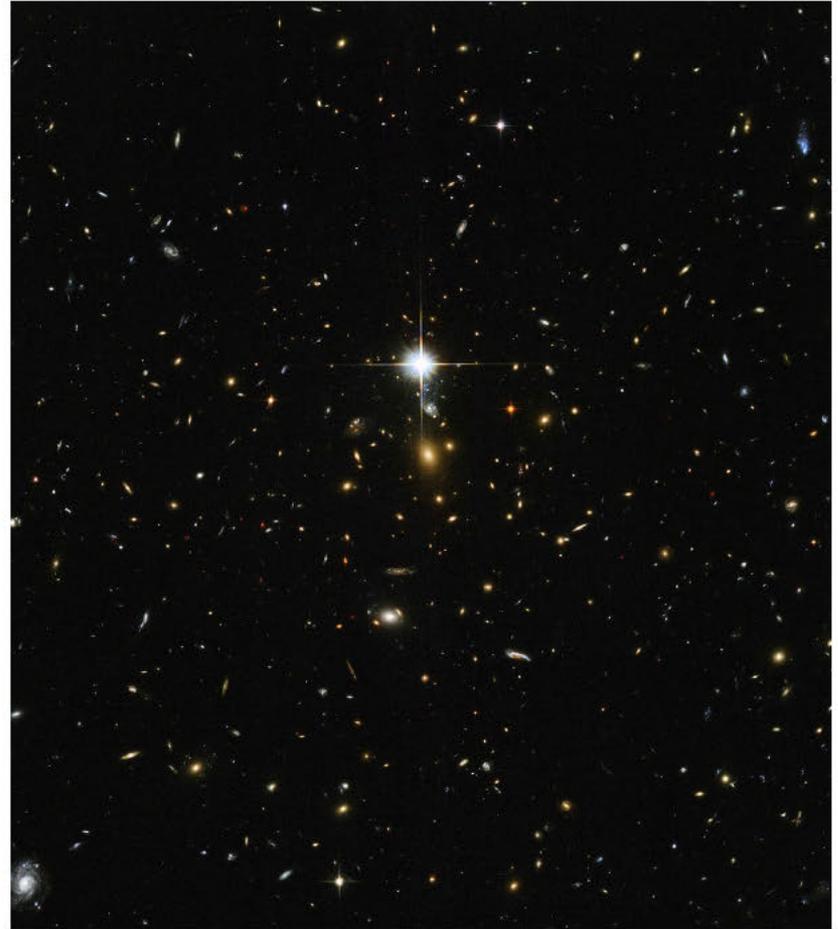
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WRAP UP

- What do we want to further explore?
- Review Stakeholder meeting schedule and topics



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