2022 Integrated Resource Plan

Building the Long-Term Plan

Seattle City Light

WE POWER SEATTLE

Building the 2022 IRP: Agenda

- Welcome
- Clean Energy Futures Customer Survey
- Revisit Equity Indicators
- Building the 2022 IRP
- Incorporating Climate Change Information
- Next Up

Clean Energy Future Survey Results

Building the 2022 IRP

Seattle City Light

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Objectives, Methodology, and Analysis

- Objectives
  - Gather feedback from customers to inform multiple strategic initiatives (TESIP, CEIP, IRP, Strategic Plan)
  - Comply with CETA requirements for customer input
- Survey questions were informed by Clean Energy Transformation Act (CETA) equity indicators as well as in consideration of other utility initiatives and some questions were reserved for Customer Satisfaction (CSAT) survey conducted in October 2021 (>3,000 responses)
- Residential customers; Email sent 8/6/2021 and reminder 8/13/2021 to ~180,000 customers

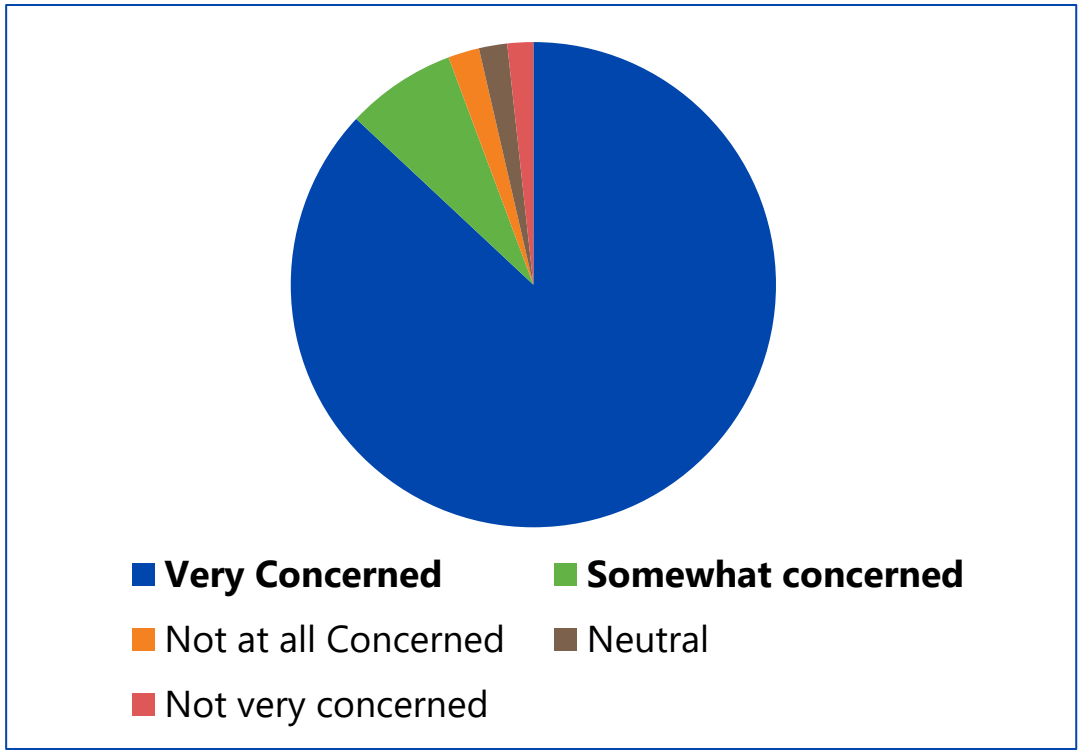
	Total	BIPOC	Hispanic/Latino	Renters	Household income <$50k
Number of responses	4522	633	175	1328	417
Confidence level	95%	95%	95%	95%	95%
Margin of error	+/-1%	+/-4%	+/-7%	+/-3%	+/-5%

Overall Responses

n=4522

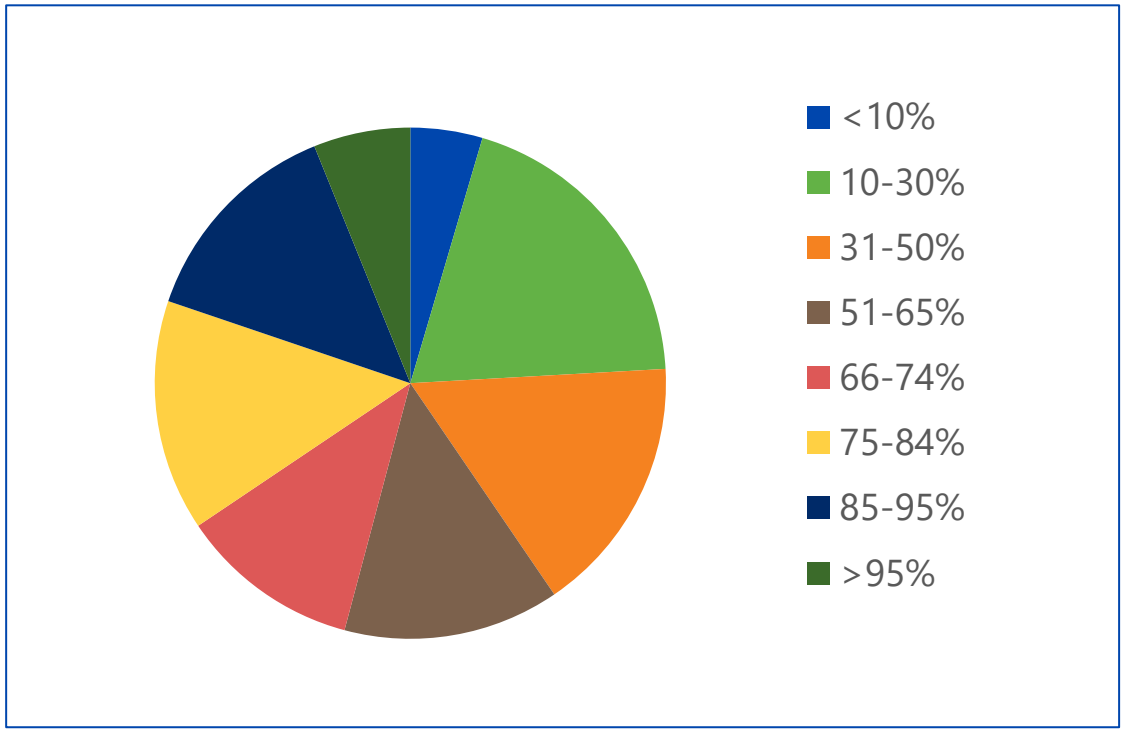
Seattle City Light

Q1: How concerned are you about climate change?



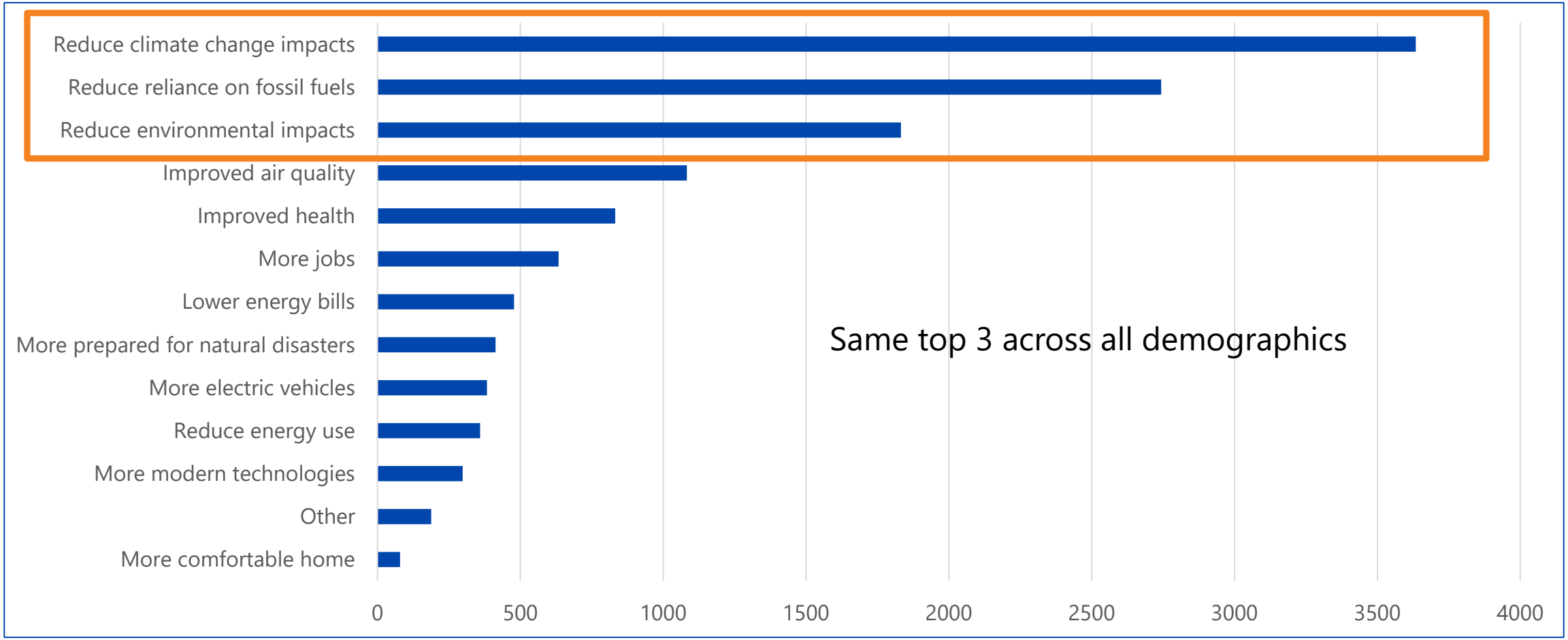
- 94% of all respondents are concerned about climate change
  - Renters are slightly more concerned (+2%)
  - BIPOC (+1)

Q2: What percentage of City Light's power supply do you think comes from renewable energy sources?

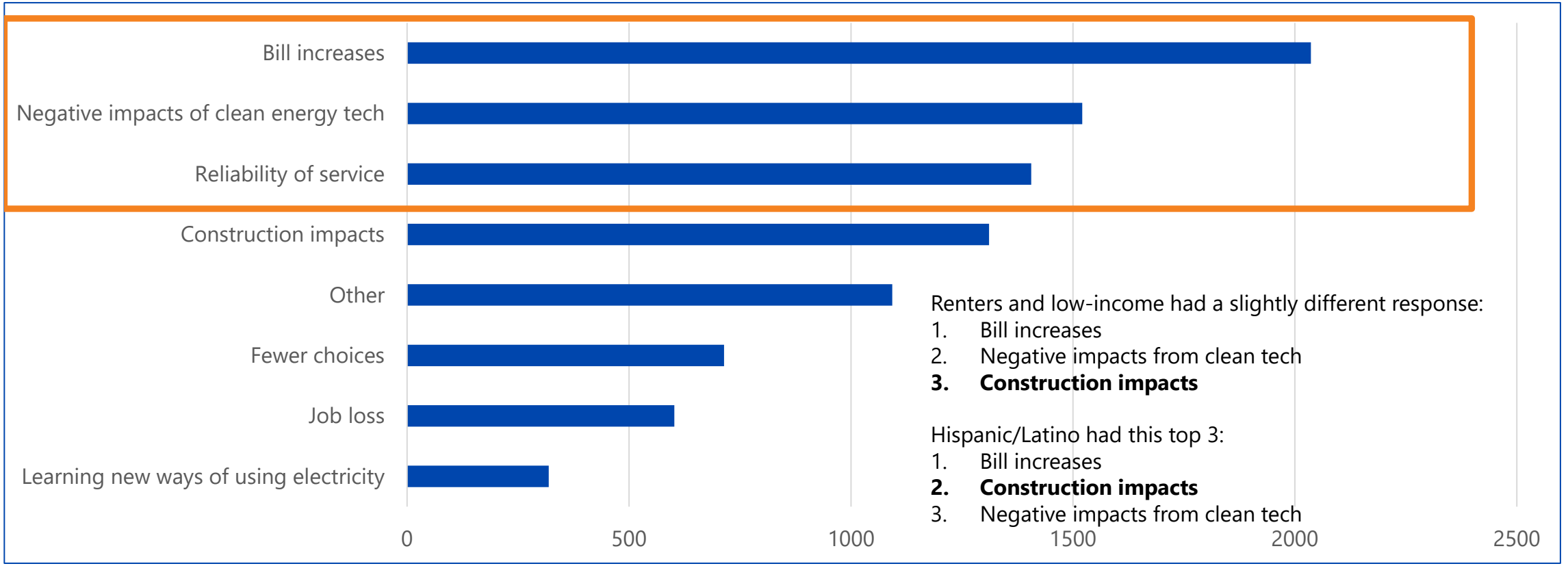


- 80% believe our power supply is less than 90% renewable (41% believe less than 50% renewable)
  - Low-income and Hispanic/Latino respondents are less aware (+5%)
  - BIPOC are less aware (+3)
  - Renters are also less aware (+2%)

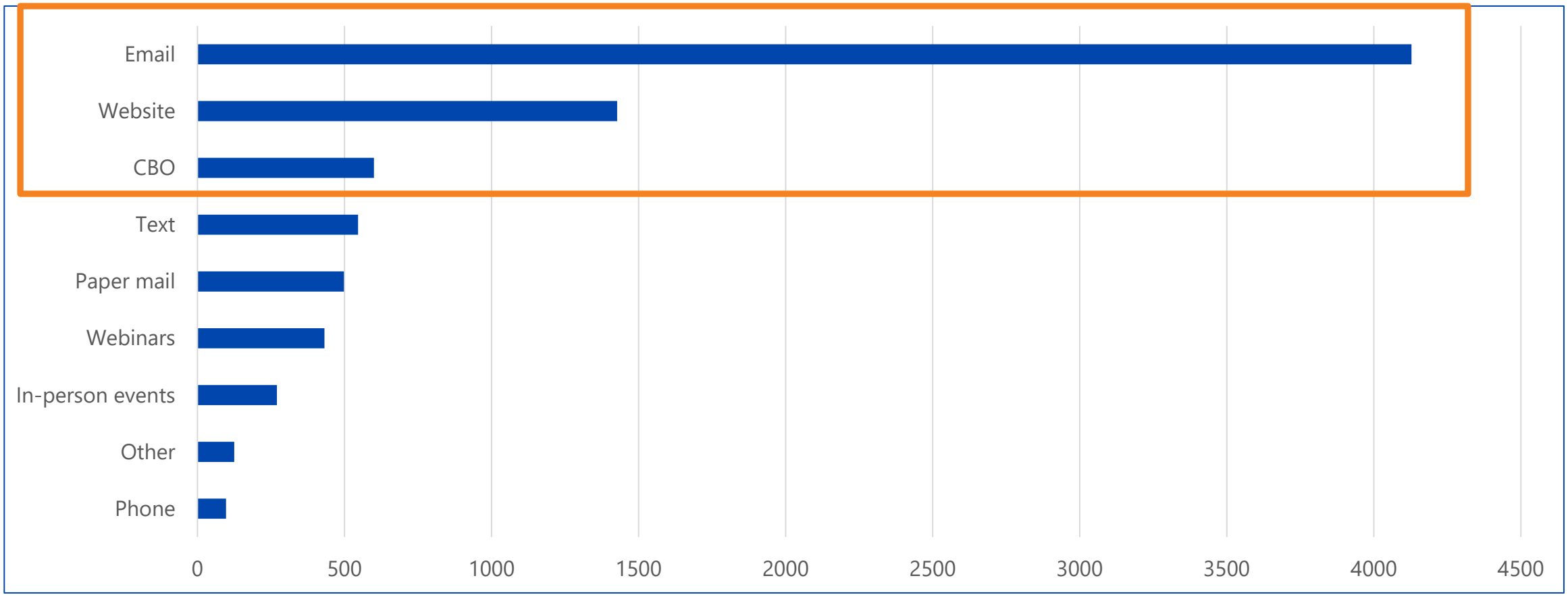
Q3: What 3 benefits of achieving 100% clean energy by 2045 are most important to you?



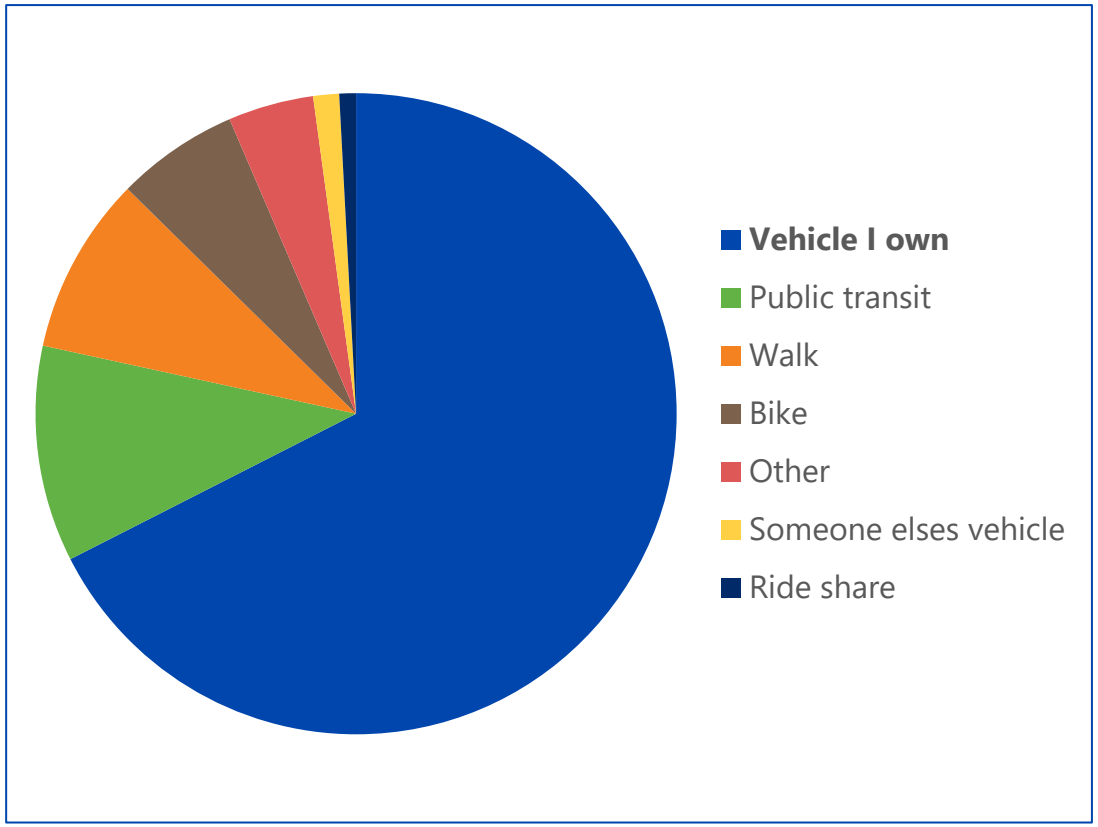
Q4: What 3 things concern you the most about achieving 100% clean energy by 2045?



Q5: What are the best ways for us to gather input and feedback from you?

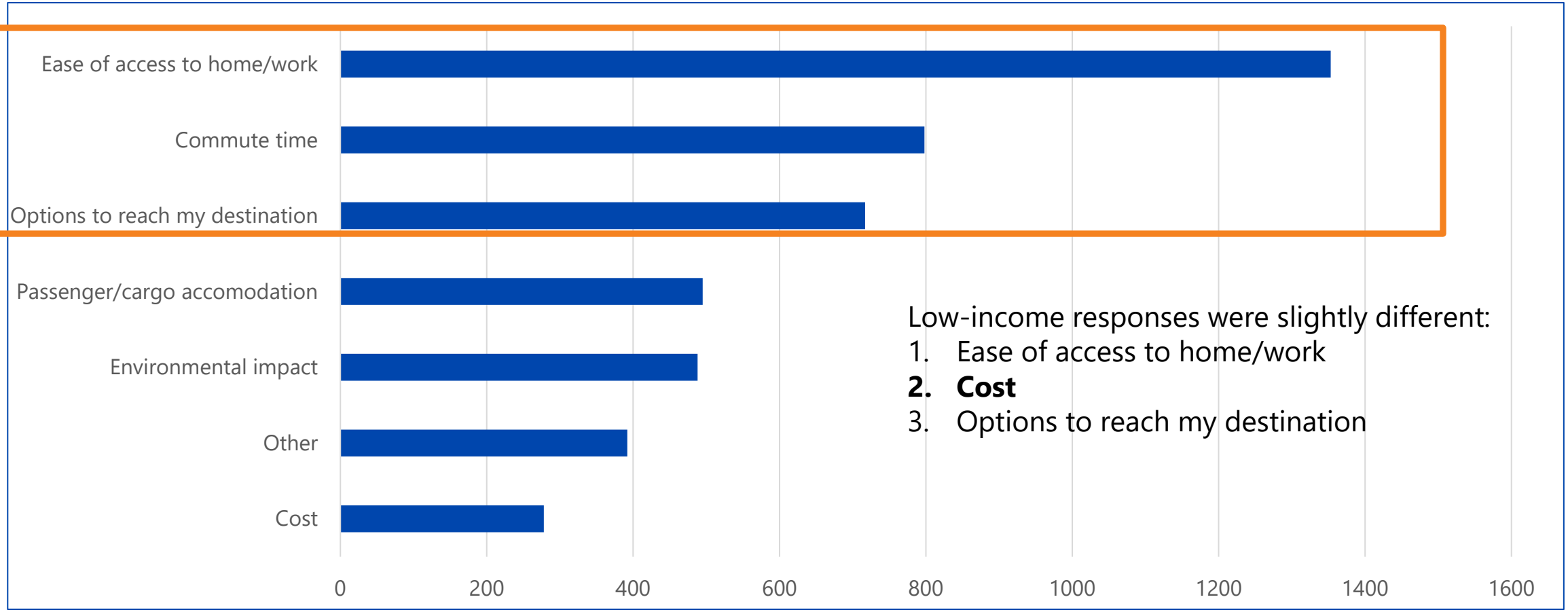


Q8: What is your main way of getting from place to place?



- Low income and renters most likely to use public transportation (+10%)
- BIPOC (+5)
- Hispanic/Latino (+4%)

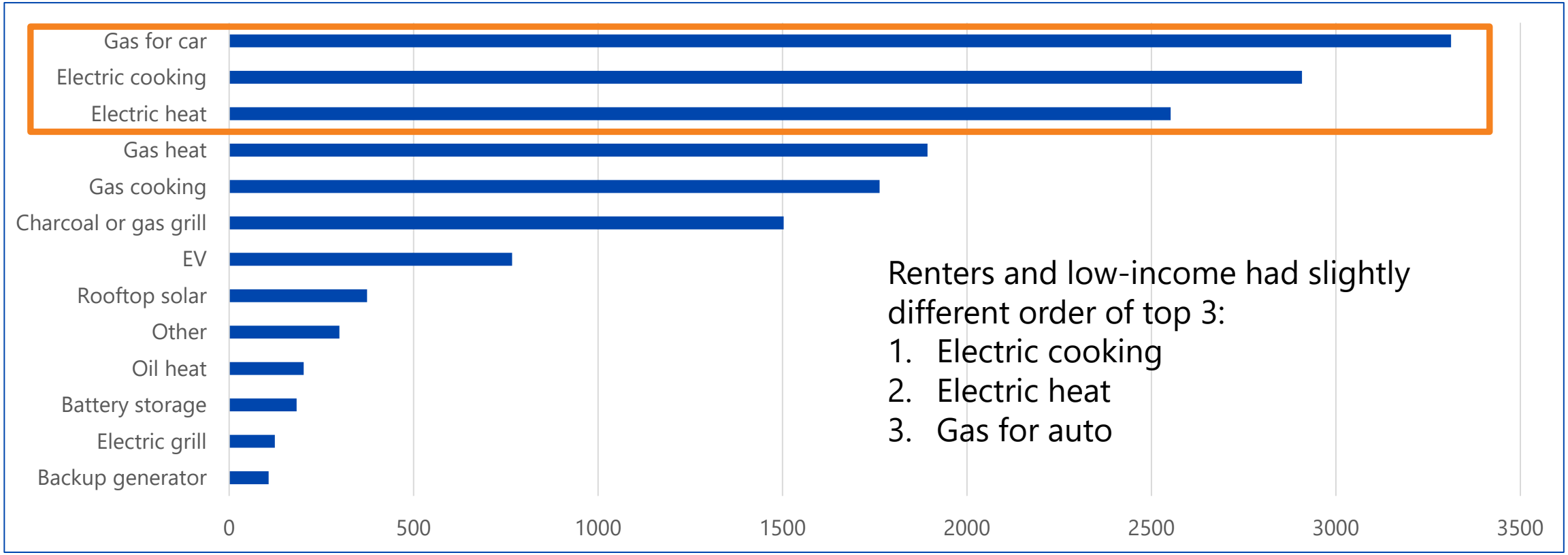
Q9: What is your main concern when choosing transportation?



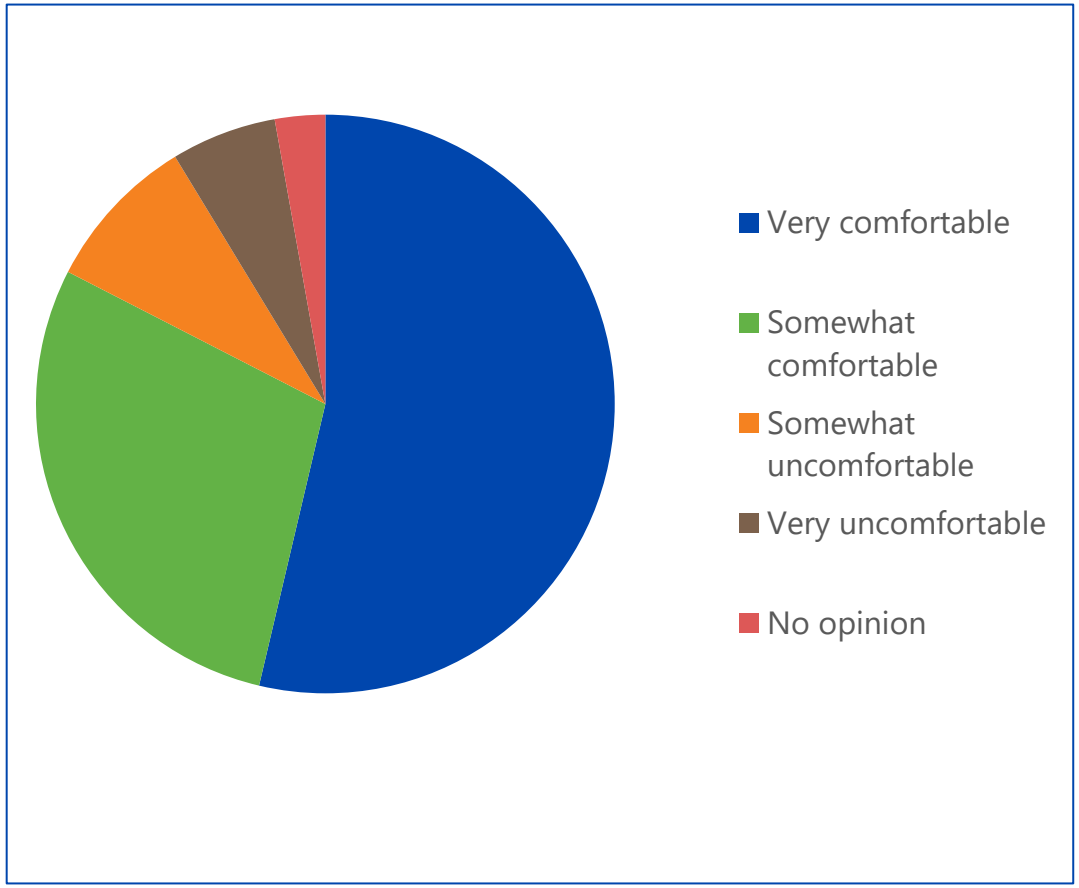
Low-income responses were slightly different:

1. Ease of access to home/work
2. **Cost**
3. Options to reach my destination

Q10: Which energy sources to you use in daily life?

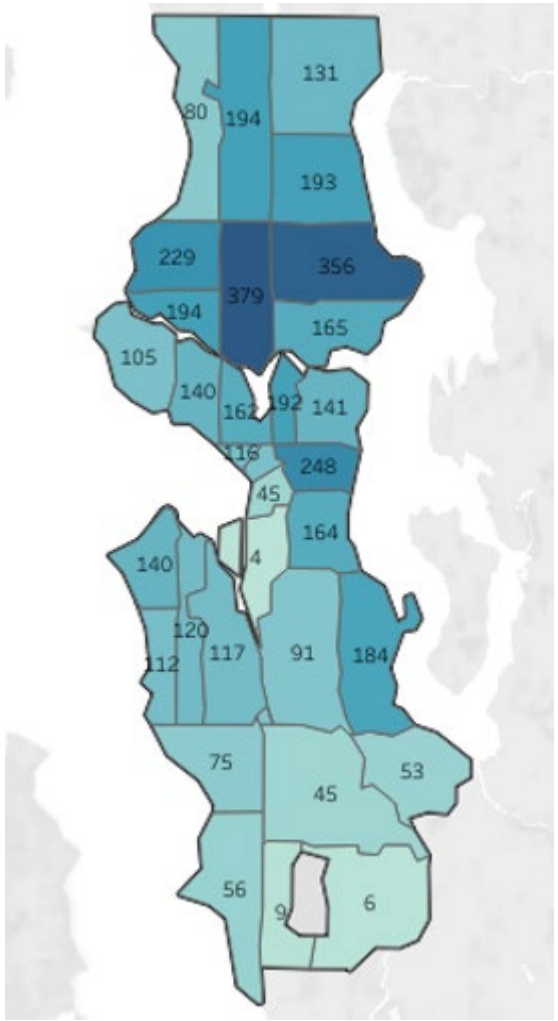


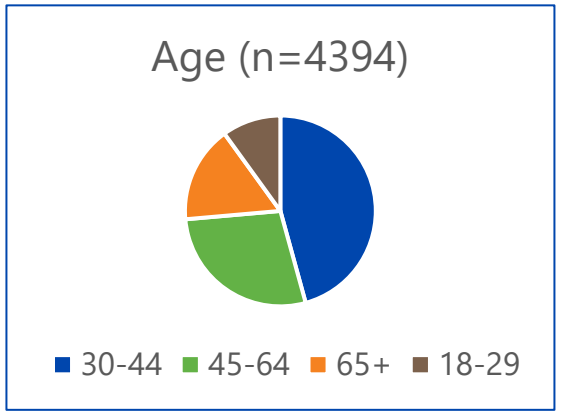
Q11: How comfortable are you transitioning to all electric in your daily life?

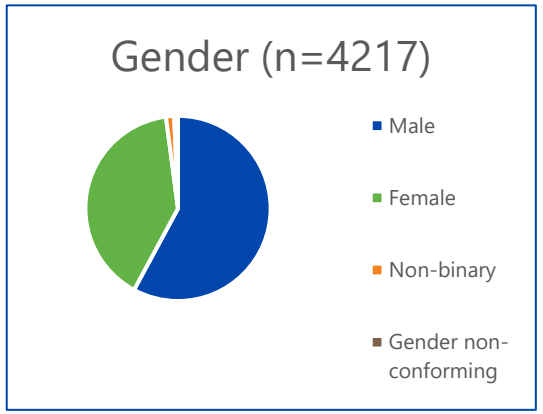


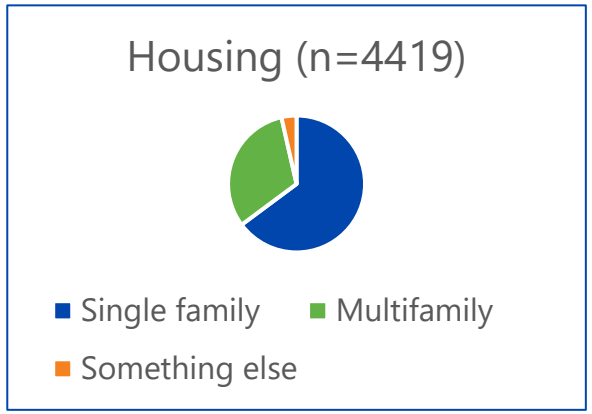
- Renters are the most comfortable (+10%)
- Low-income, BIPOC and Hispanic/Latino (+4%)

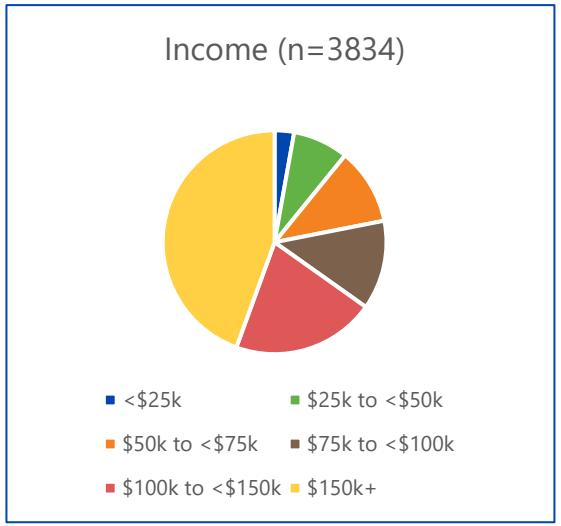
Overall Demographics

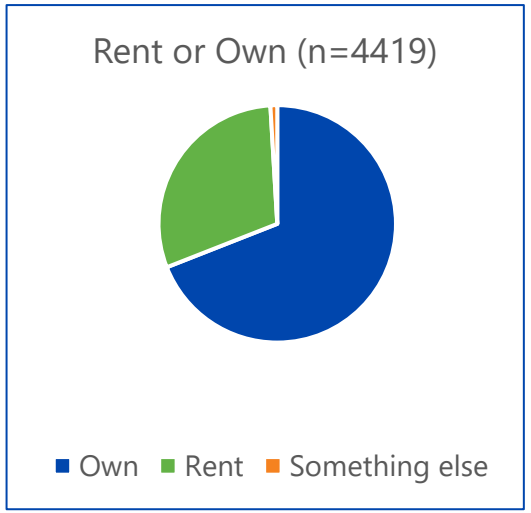


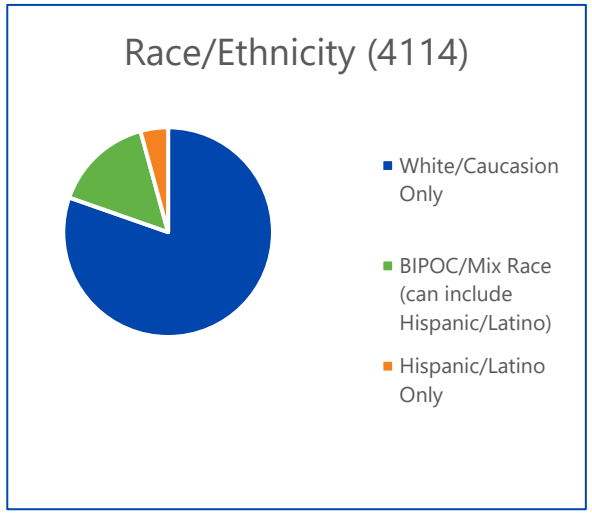






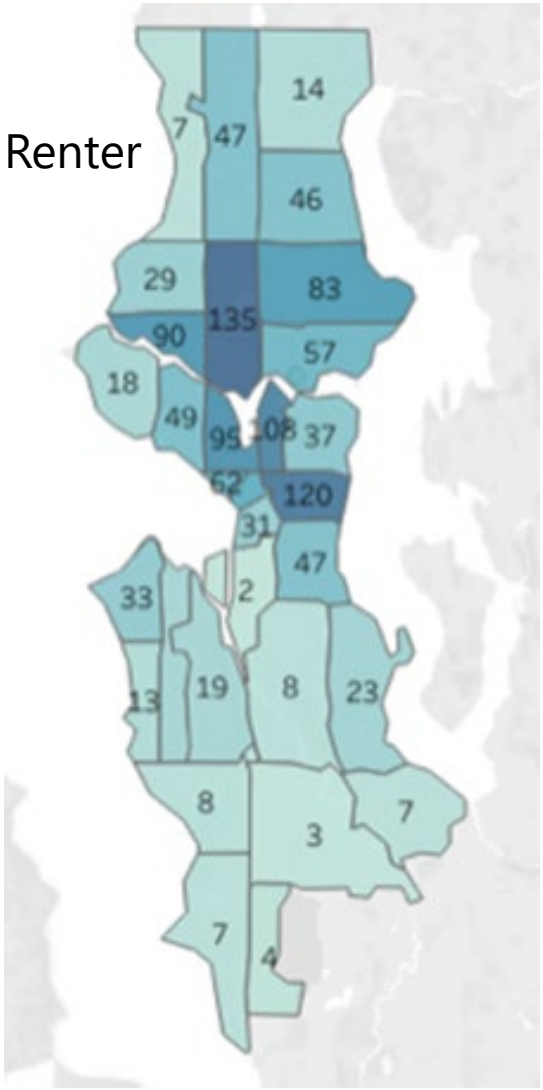




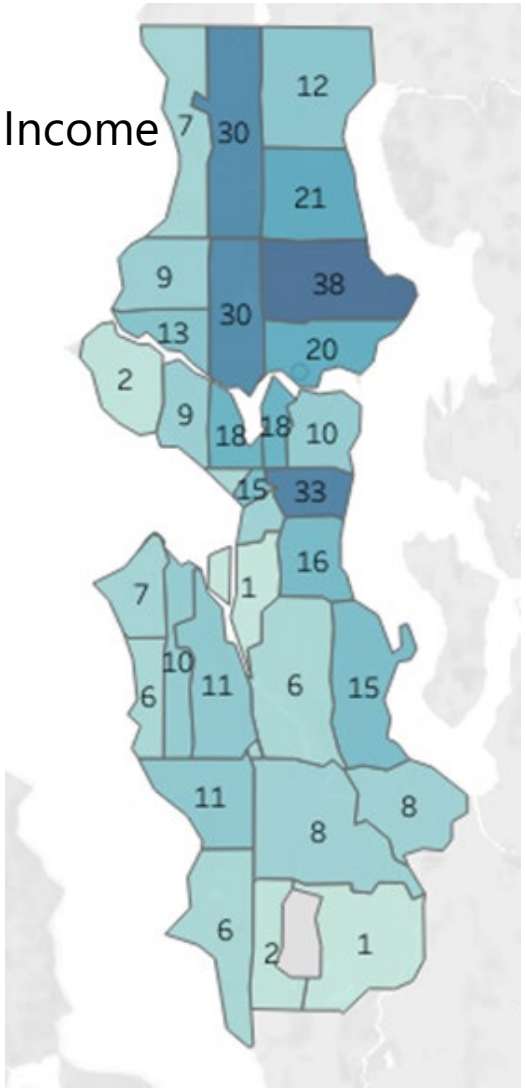


Renter, Low-Income, Hispanic/Latino, BIPOC Location

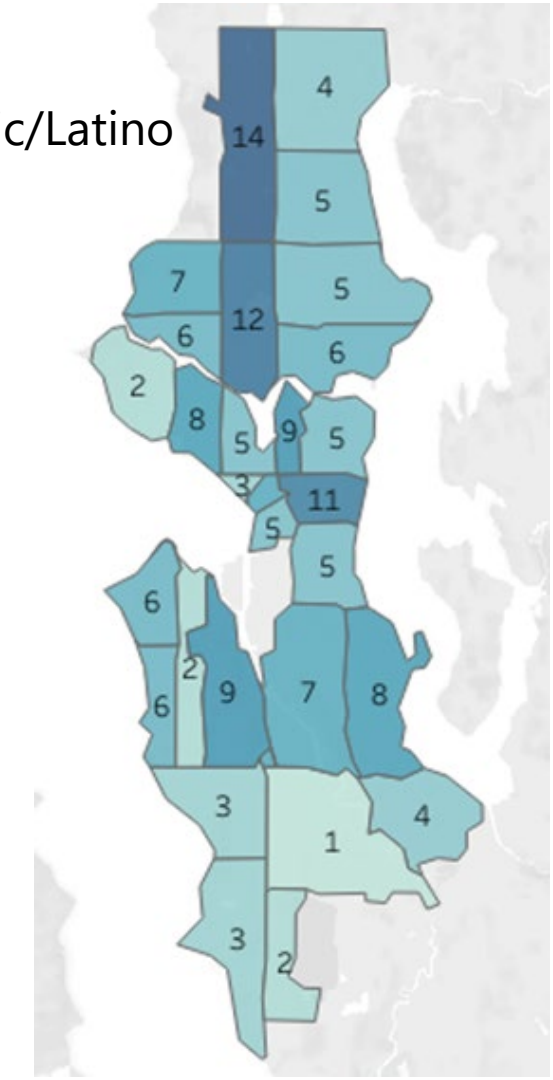
Renter



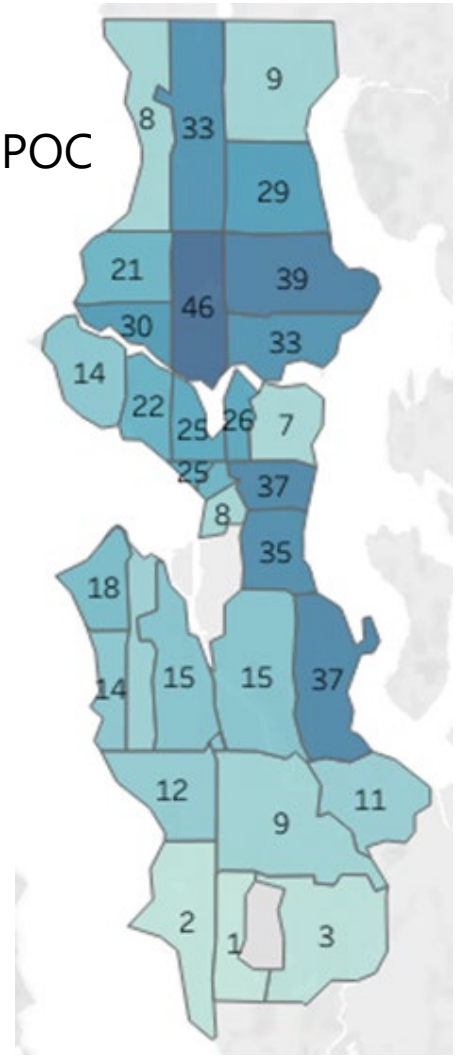
Low-Income



Hispanic/Latino



BIPOC



Other Learnings and Considerations

- About 2% of respondents reported a language other than English as the primary language spoken in the home; representing 34 different languages
- 44% of people who identified as BIPOC reported they were bi-racial /multi-racial
- We have collected a long list of trusted Community Based Organizations (CBOs) and new program suggestions from customers

Clean Energy Indicators

Building the 2022 IRP

Seattle City Light

What does CETA say about equity?

- Clean Energy Transformation Act
- Directs utilities to consider equity implications in utility planning and processes

- Core **equity provision** is in RCW 19.405.040(8)

*"an electric utility must, consistent with the requirements of RCW **19.280.030** and **19.405.140**, ensure that **all customers are benefiting from the transition to clean energy:** Through the equitable distribution of energy and nonenergy benefits and reduction of burdens to vulnerable populations and highly impacted communities; long-term and short-term public health and environmental benefits and reduction of costs and risks; and energy security and resiliency."*

An Update on Equity Indicators & Outcomes

No.	Equity Outcome	Equity Indicator
1	Community Assets	• Expenditures of existing and planned community energy projects
2	Community Collaboration	• Locations of existing and planned community energy projects
3	Economic Opportunities and Youth Pathways	• Career development
4	Equitable Access	• Public Outreach • Public energy education • Accessibility to non-single-family homeowners
5	Healthy Planet, Healthy Lives	• Outdoor air pollution (concentration of diesel particulate matter in air and reduction of greenhouse gas emissions)
6	Affordable & Reliable Electricity	• Burden to program participation • Feeder outages (causes, number, locations, average duration, average response time) by census tract • Response time to outages

- **Thank you** for your feedback!
- Evolving process (4 yrs)
- Equity Outcomes aligned with indicators
- Indicators and target setting to be further refined to through future public input
- Data collection needs a reality check

Building the 2022 IRP

The Starting Point

Seattle City Light

Building the IRP requires adapting to constant change

20-year clean energy resource plan to define and meet resource needs

+ Policy and regulatory drivers
+ Climate change science
+ Proactive customer engagement
+ Equity lens

A Plan centered on our mission, vision and values

Mission

Seattle City Light provides our customers with affordable, reliable and environmentally responsible energy services.

Vision

Create a shared energy future by partnering with our customers to meet their energy needs in whatever way they choose.

Values

- **Customers First**
- **Environmental Stewardship**
- **Equitable Community Connections**
- **Operational and Financial Excellence**
- **Safe and Engaged Employees**

Clean Energy Implementation Plan

Renewable Builds	Year	Capacity (MW)
Gorge Wind	2026	25
SE OR Solar	2026	100
E WA Solar	2026	300
Gorge Wind	2027	50
E WA Solar		
E WA Solar		

400 - 475 MW renewables across scenarios before 2028

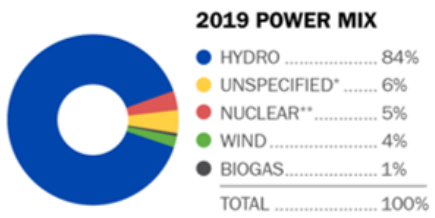
Conservation, BPA & Spot RECs
Cumulative Conservation Savings (2-Year)
BPA_(max energy entitlement is 500 aMW)
Annual I937 RECs
Cumulative Conservation Savings (4-Year)
BPA (max energy entitlement is 500 aMW)
Annual I937 RECs
Cumulative Conservation Savings (20-Year)
BPA (max energy entitlement is 500 aMW)

Proposed Targets – Median Hydro Conditions

Interim target: Percentage of retail load to be served using renewable and nonemitting resources (WAC 194-40-200(2))

Resource	2022	2023	2024	2025	4-year Period Avg
Renewable	93%	93%	93%	93%	93%
Nonemitting	4%	4%	4%	4%	4%
Total	97%	97%	97%	97%	97%

Median hydro: SCL median historical generation, each month, over the operating period 1999 to 2020



Specific targets (WAC 194-40-200(3)):

Resource	Amount
Energy Efficiency 2025 savings	35 aMW
Renewable energy 4-yr sum	32,685,546 MWh
Demand response	Pilot programs planned

Clean Energy Implementation Plan Summary

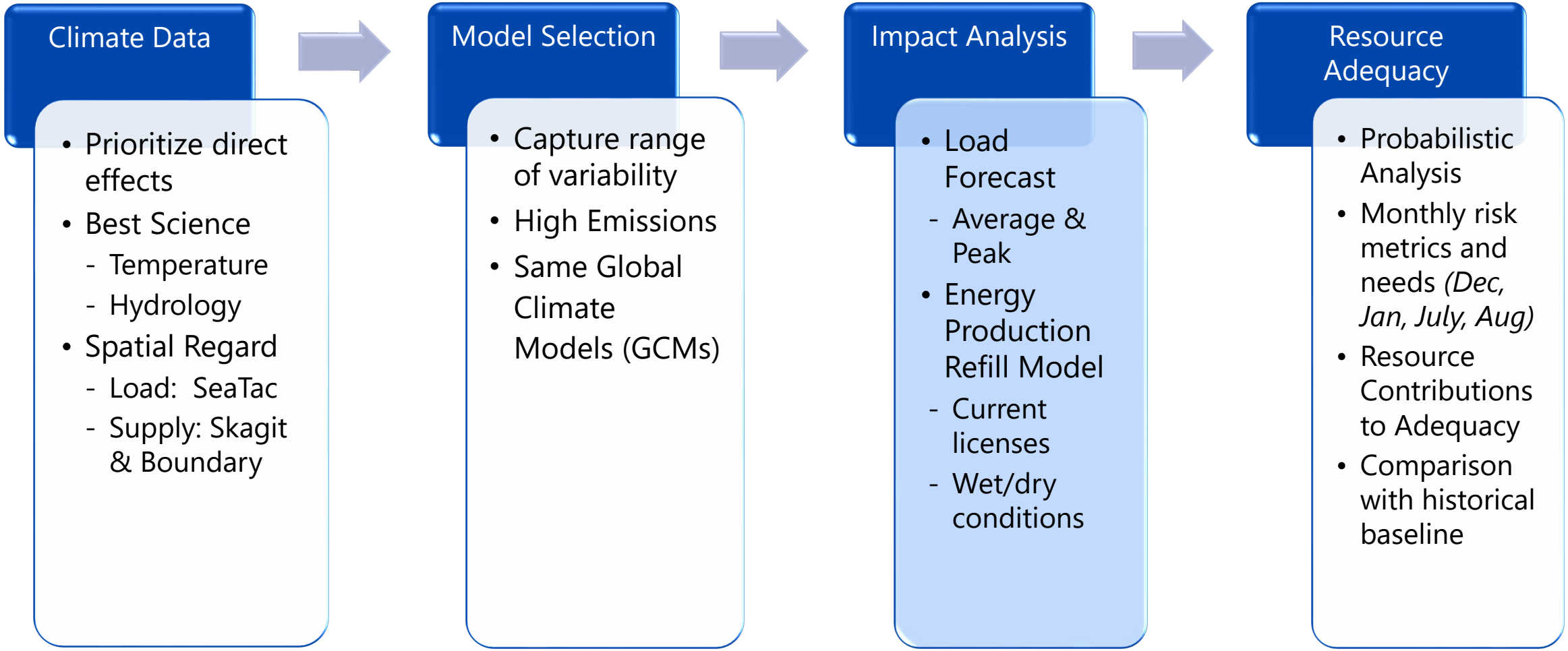
- City Council CEIP summary presentation planned for December
- Resource adequacy needs starting in 2026
  - Between 2026 & 2028, 400-475 MW of planned new utility scale renewables
- Conservation plan of 19 aMW by 2024, 35 aMW by 2026
- Demand Response pilots
- Clean Energy Targets of 97% for 2022-2025 based on historical median hydro conditions

Climate Change Scenario

Building the 2022 IRP

Seattle City Light

Climate Change Scenarios – Approach



The Data – Best Available Climate Change Data

Load

+ **SeaTac** hourly temperatures (2021)
  - Regional Climate Model – 12 GCMs
  - Dynamical downscaled with WRF – bias corrected
  - Simulations for 1970-2099, 12 km

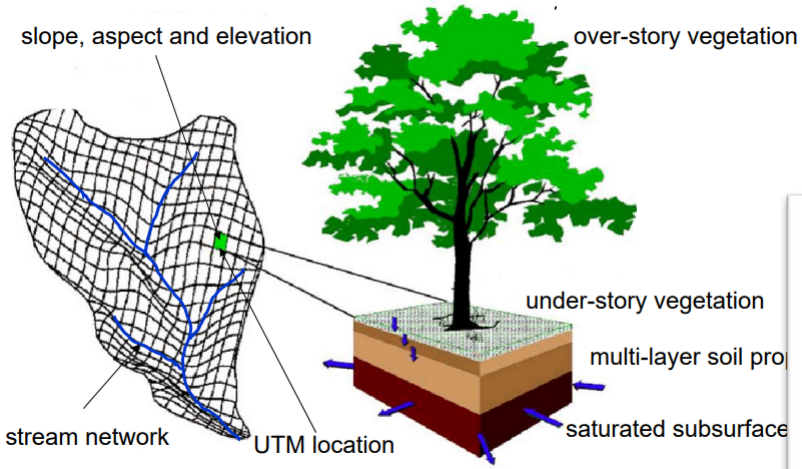
Supply

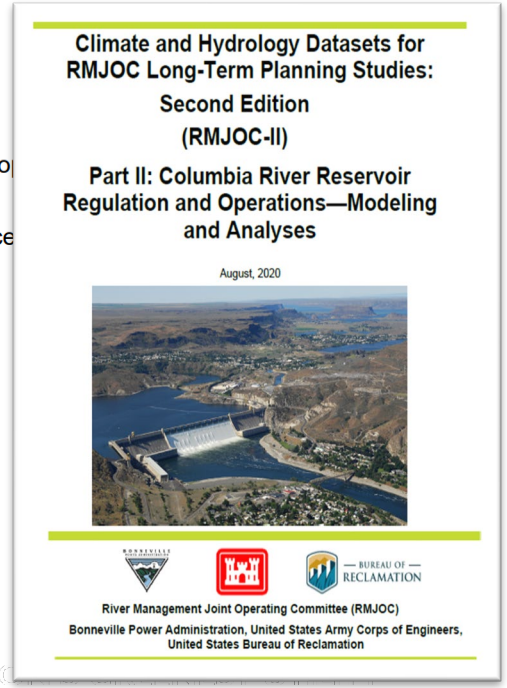
+ **Skagit** daily streamflows (2019)
  - DHSVM* Hydrology model – 10 GCMs
  - Statistically downscaled - bias corrected
  - Simulation for 1962-2099, 150 m

+ **Boundary** daily streamflows (2020)
  - RMJOC-II* Regulated modeled – 10 GCMs (32 futures)
  - Statistically downscaled - bias corrected
  - Simulations for 2019-2049, 1/16th Degree

CIVIL & ENVIRONMENTAL ENGINEERING
UNIVERSITY of WASHINGTON

CLIMATE IMPACTS GROUP




Climate and Hydrology Datasets for RMJOC Long-Term Planning Studies:
Second Edition
(RMJOC-II)
Part II: Columbia River Reservoir Regulation and Operations—Modeling and Analyses
August, 2020
River Management Joint Operating Committee (RMJOC)
Bonneville Power Administration, United States Army Corps of Engineers, United States Bureau of Reclamation

* DHSVM – Distributed Hydrology, Soils, and Vegetation Model
RMJOC-II – River Management Joint Operating Committee (regulated flows)

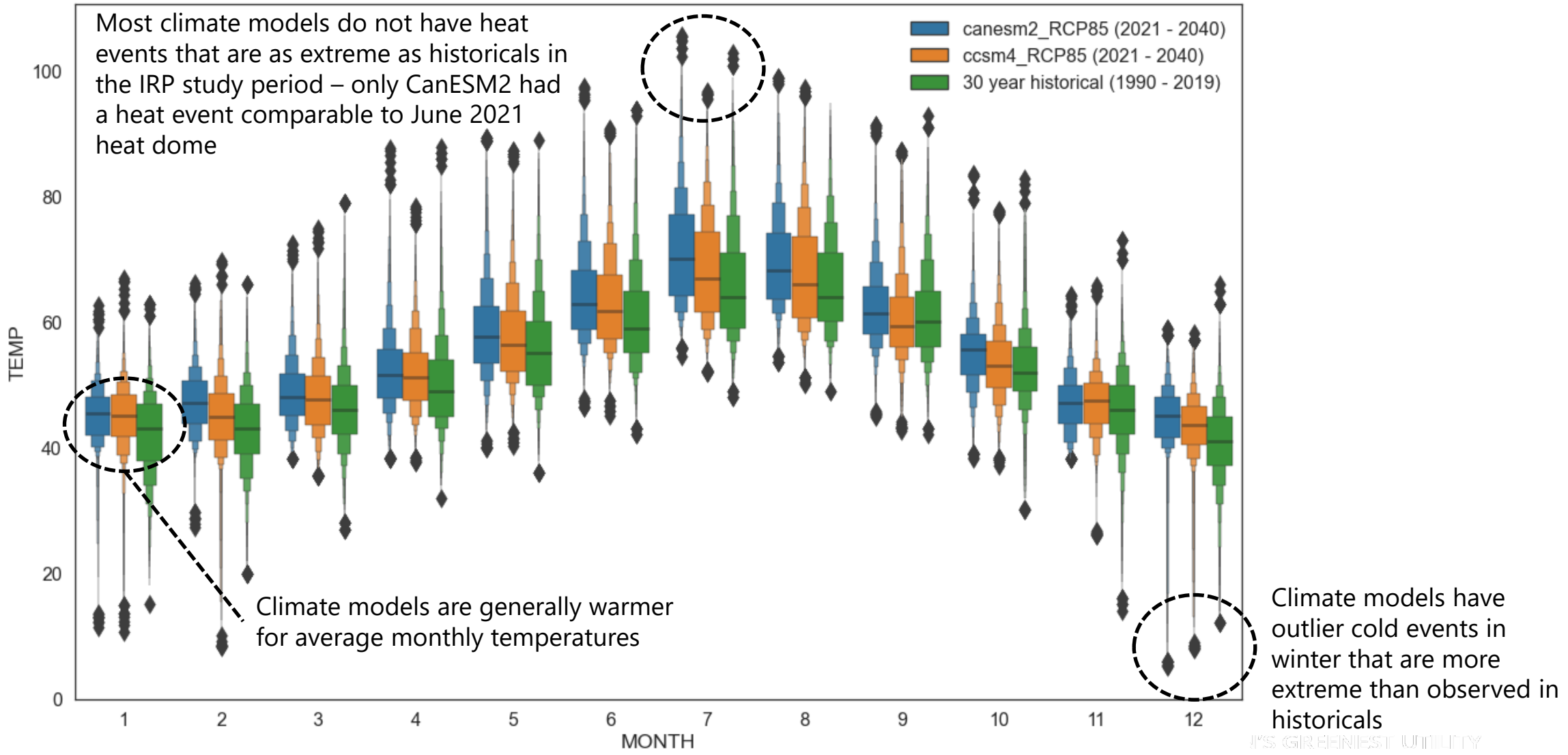
How were climate models selected?

+ **Criteria** for Global Climate Models(GCMs) selection:
  1. **Consistent GCMs** across SeaTac temperature and Skagit and Boundary streamflows
  2. Capture **warming trends** in average temperature/hydro conditions, as well as **extremes** temps/hydro conditions relative to history*

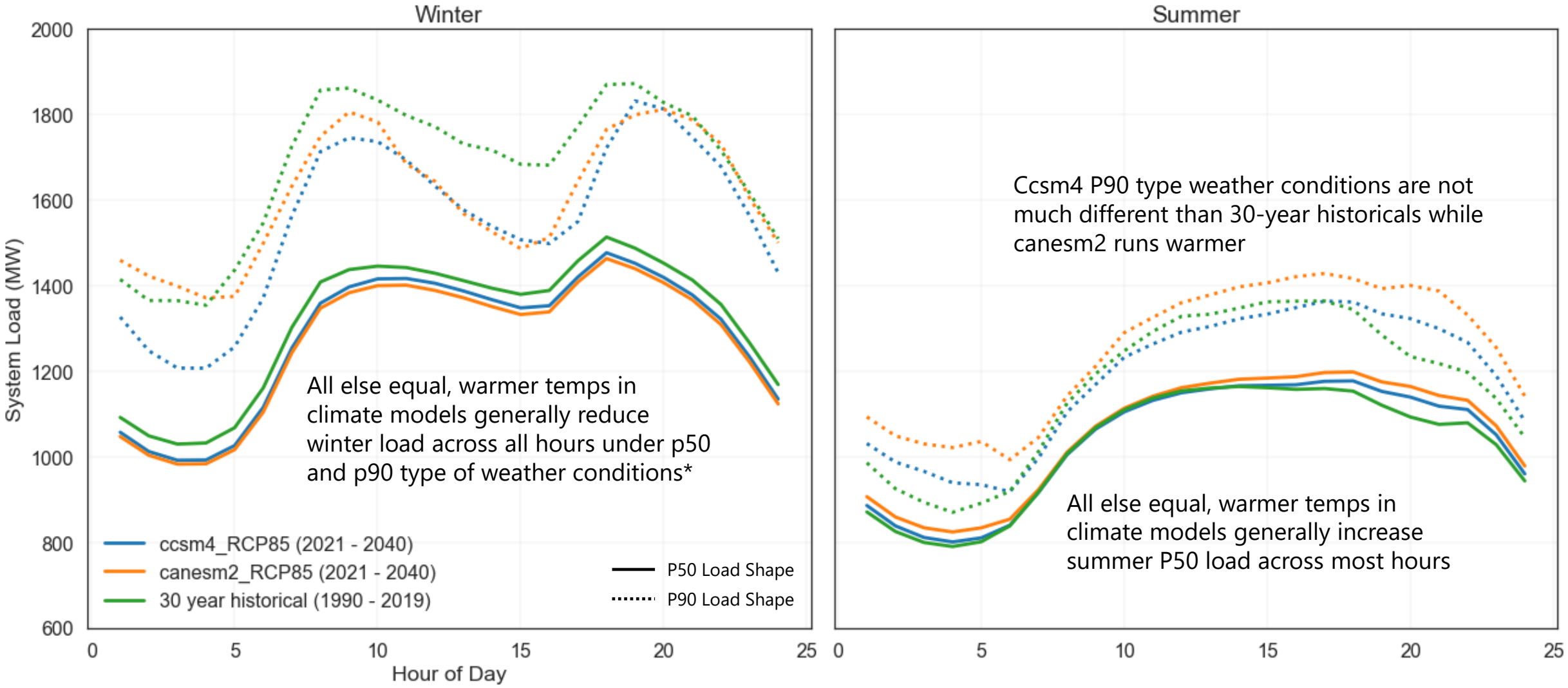
+ **Two GCMs** that meet these criteria:
  1. **CanESM2**: Skagit wetter in Winter/Spring and Drier Summer/Fall, Boundary wetter in 1st half of calendar year, Warmer Winters, Large extreme temps(winter and summer)
  2. **CCSM4**: Skagit drier overall, Boundary wetter in 1st half of calendar year, more February cold events

*Implemented a scoring method to capture variations. Other GCMS were considered but did not meet criteria.

Historical vs Climate Change Hourly Temps (2030)

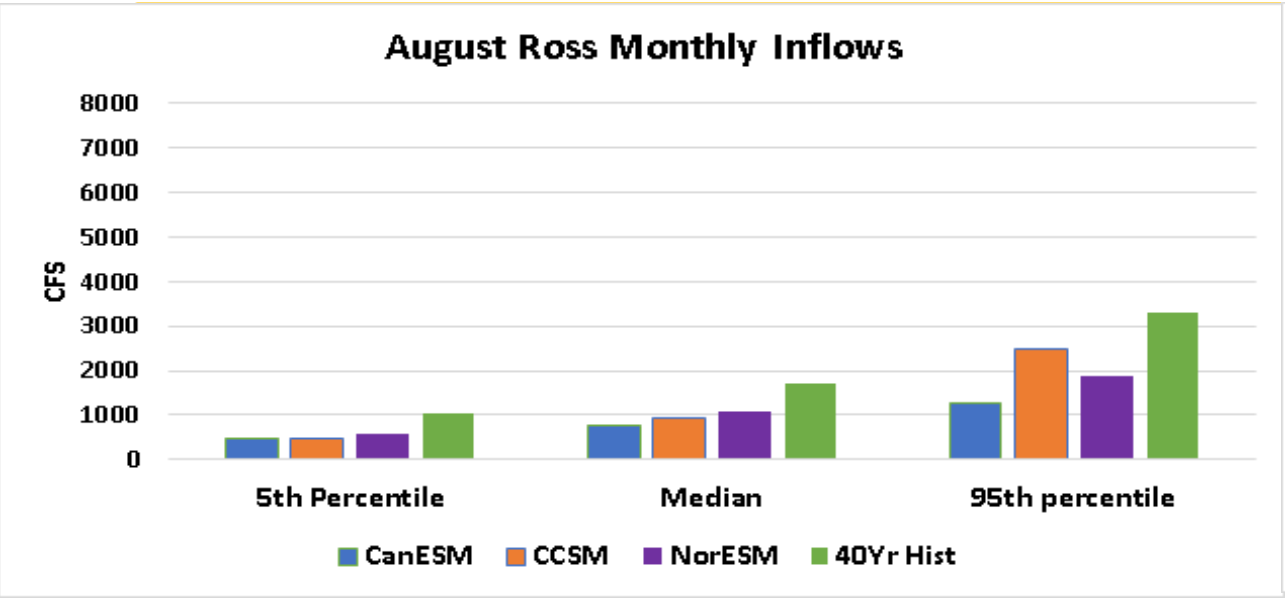


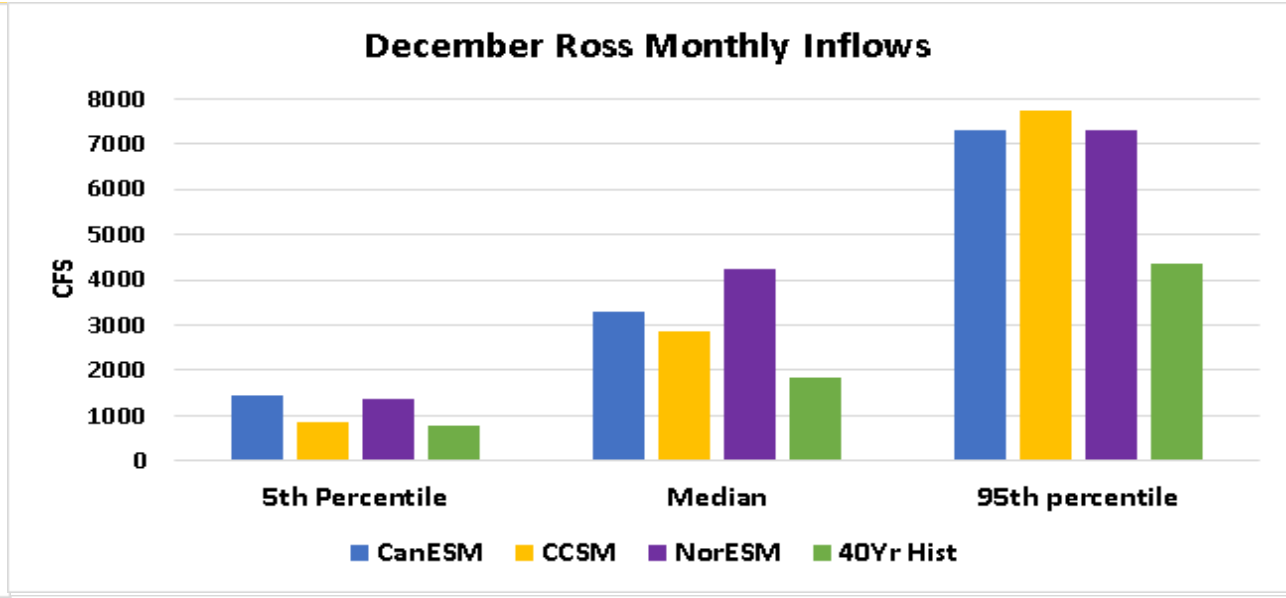
Climate Change Impacts on Normalized System Load

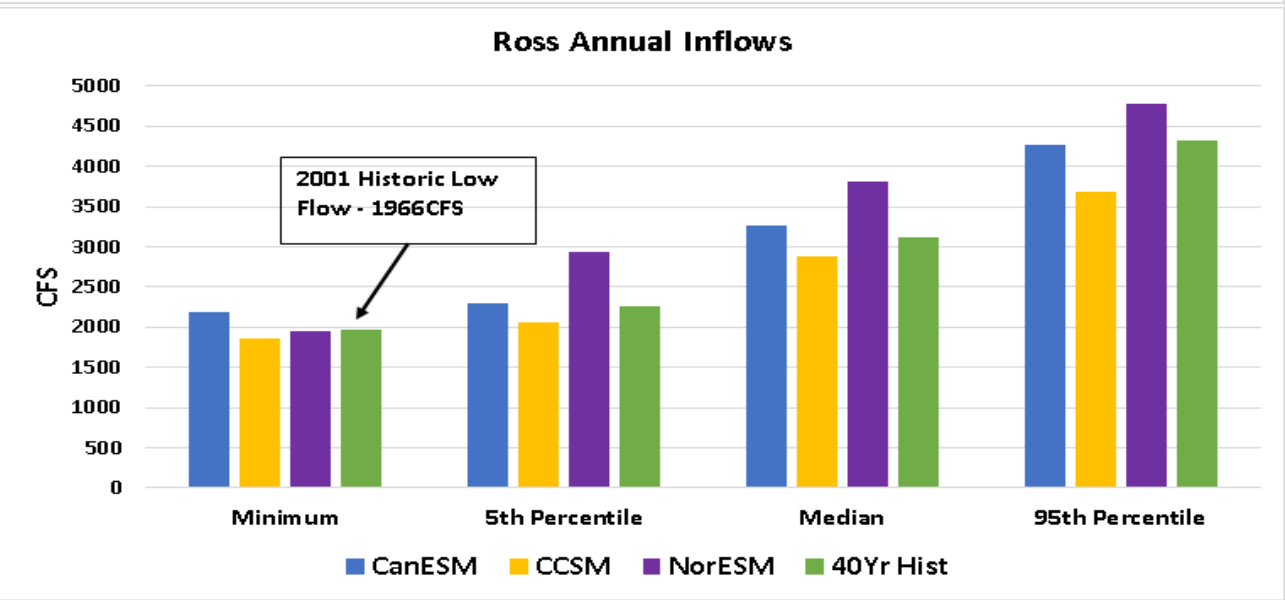


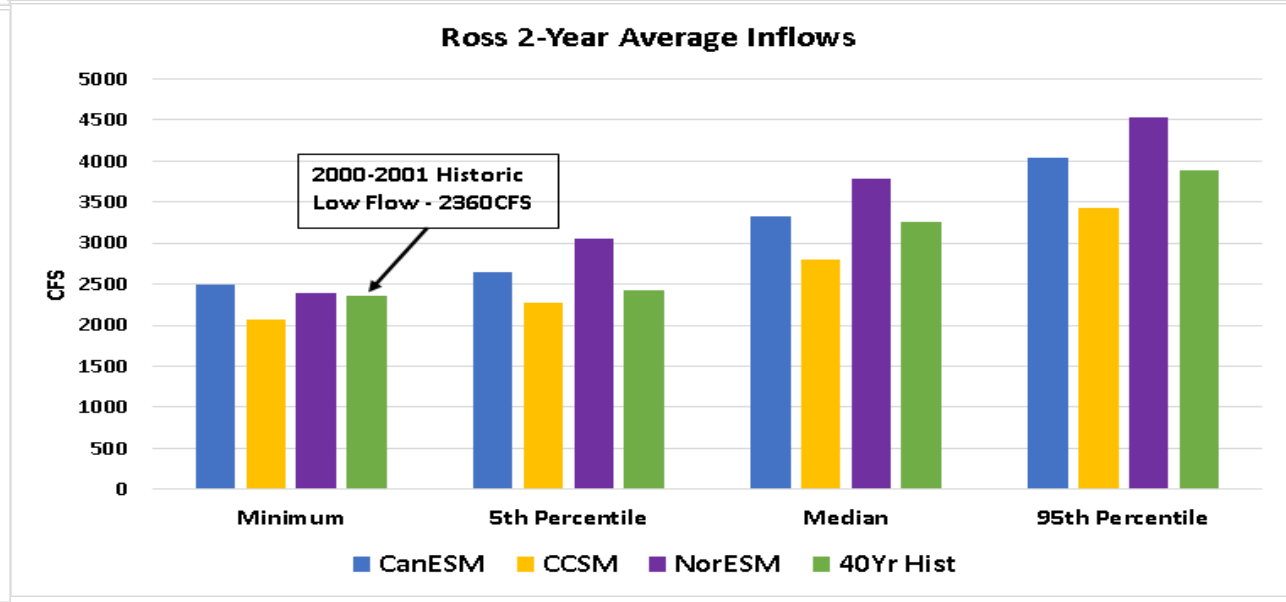
*Outlier cold events in climate models can lead to 2,500 MW winter peak

Historical vs. Climate Change Inflow Distributions

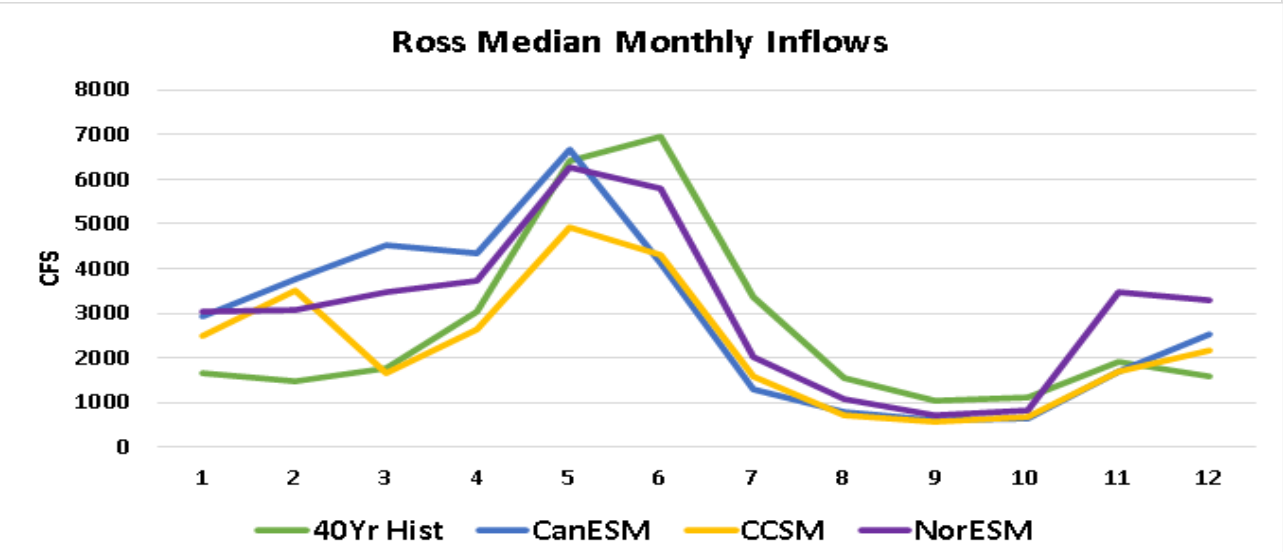


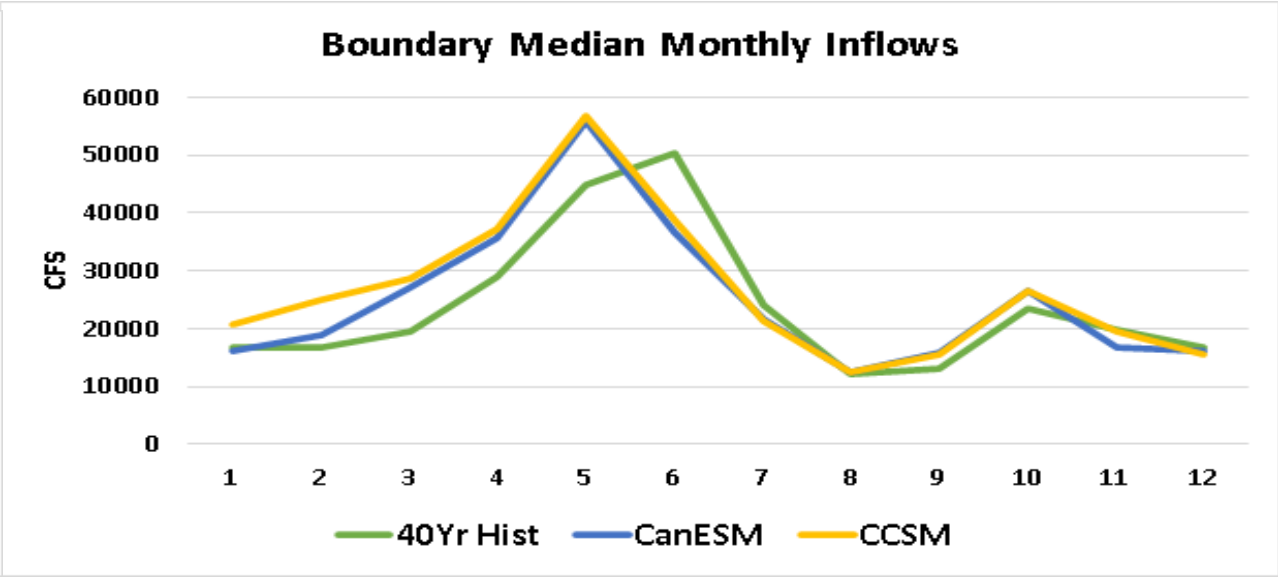


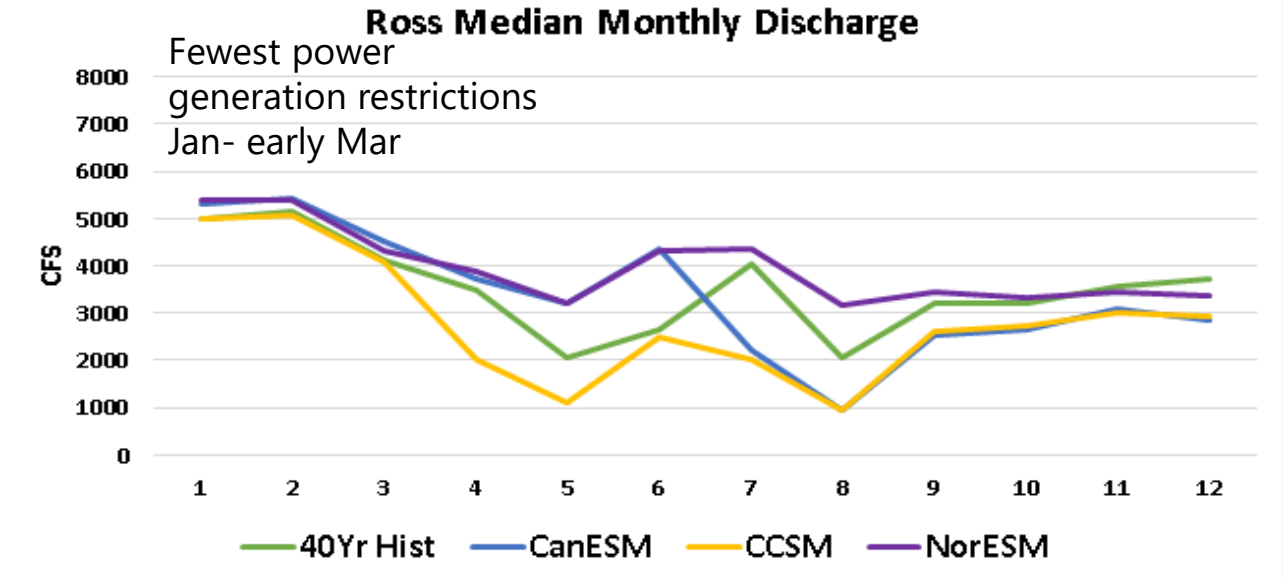


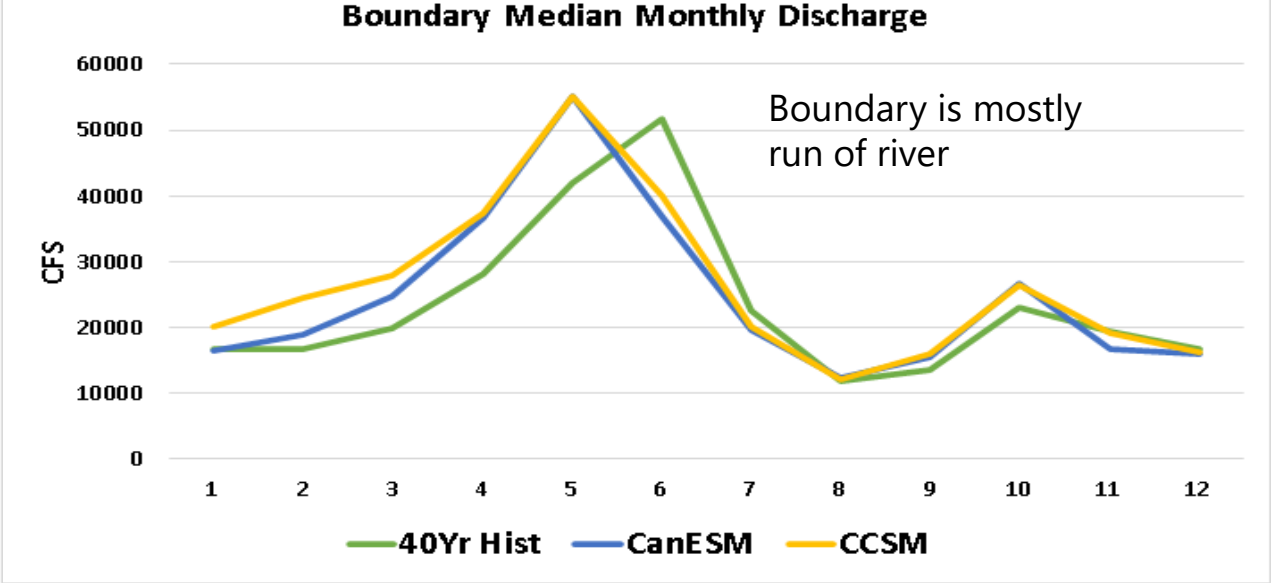


Median Inflows and Regulated Discharges (2030)



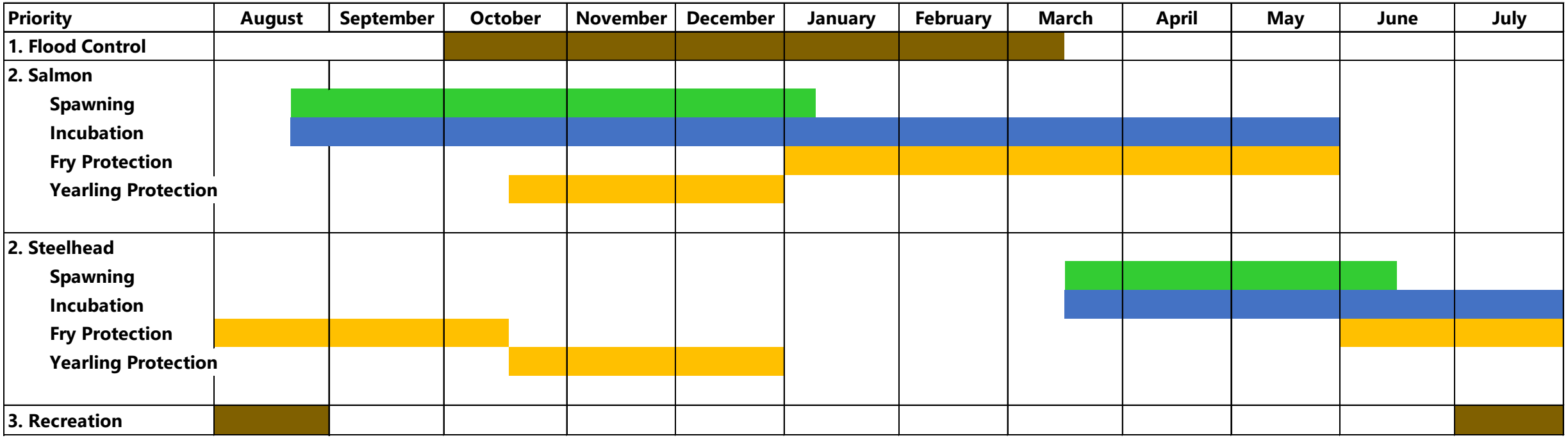






Skagit operations has many requirements

SKAGIT LICENSE REQUIREMENTS



Flood Control/ Recreation = Elevation targets

Spawning flows = Maximum flows

Incubation flows = Minimum Flows

Fry/ Yearling Protection = Down-ramping restrictions

Review of Regional Climate Change Studies
No blueprint

+ 2021 NW Power Plan from the Council
  - Regional impacts as baseline assumptions
    - Direct impacts (e.g. temperatures & precipitation)
    - Indirect impacts (e.g. population migration)

Scenario Index	Scenario
A	*CanESM2_RCP85_BCSD_VIC_P1*
C	*CCSM4_RCP85_BCSD_VIC_P1*
G	*CNRM-CM5_RCP85_MACA_VIC_P3*

+ Northwest Utilities
  - Avista 2021 Electric IRP introduced climate change as a scenario
  - Other utilities following as regionally accepted climate change information becomes available

Looking Ahead

Building the 2022 IRP

Seattle City Light

Resource Adequacy Impact Analysis
Climate Change

- 3 forecast years: 2026, 2030, and 2040 using +/-10 years sampling window from the climate change data
- Use hourly temperatures in load forecasting model
- Simulate hourly generation with reservoir model with license constraints
- For each forecast year, total demand/supply simulations = 400 (20 years of hourly load forecast and 20 years of daily streamflow data)
- Resource adequacy needs by month for key climate change model(s)

2022 IRP Scenarios and Modeling

Scenario	**Load**	**Hydro**	**Regional Power Prices**
IRP Baseline (2022 CPA)	Base (2020 SCL forecast)	History	Base
Climate Change	CCSM4 or CanESM2	CCSM4 or CanESM2	NW Council
Electrification	Rapid Market	History	NW Council Decarbonization Load

Modeling (**New for 3 scenarios**)

- Resource Adequacy Needs
- Effective Load Carrying Capability of Resources
- Clean Policy Obligations
- Net Wholesale Marketing Position

Framing 2022 IRP Portfolio Selection Process
"Optimal" Result or something else?

Lowest Cost "Optimal" Result	**Faster 100% Clean Goals**	**Market Reliance**
Transmission Availability	**Balanced Resource Options**	**Early Seattle BTM Solar**
Defer Resource Adequacy Strategy	**High EE & DR Residential Programs**	**Other Strategies?**

2022 IRP Resource Options

+ 1 wind location
+ 2 solar locations
+ Seattle behind the meter solar (BTM solar)
+ 4 Demand Response Options
+ 616 Energy Efficiency Options
+ 2 solar locations + battery
+ Current contract extensions

THANK YOU

Seattle City Light