2026

INTEGRATED RESOURCE PLAN

Seattle City Light

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EXECUTIVE SUMMARY

Seattle City Light (City Light) is a municipal utility serving the electric load of Seattle and surrounding areas totaling approximately 513,504 residential and nonresidential customers.[1] Establishing a pathway for Seattle's energy future and defining criteria to meet the anticipated energy needs of its customers over the next 20 years requires a long-term strategy called an Integrated Resource Plan (IRP). City Light's system load forecast used for the 2026 Integrated Resource Plan ("2026 IRP Report") shows increases in average and peak loads in both winter and summer months, reflecting recent observed system conditions: the utility set a 30-year record for a high load in December 2022 and again in January 2024, and experienced a record high summer load in June 2021. In addition, severe weather and hydrological conditions have both limited generation from City Light's owned hydroelectric facilities and contributed to increased volatility in the regional wholesale energy market.

The 2026 IRP Report provides a full update to the prior full 2022 IRP Report. It reaffirms trends identified in the 2024 IRP Progress Report, addressing changes in customers' power needs as well as the existing power supply, and evolving assumptions on new power resource technologies and costs over the 2026–2045 planning horizon.[2] The findings within this report emphasize a growing need for new resource acquisitions to reliably serve customers' increasing power needs.

As part of its mission to seek new and innovative solutions, City Light deployed a new modeling framework for the 2026 IRP Report. This framework used methodologies similar to those used in previous IRPs, but the new model improved the accuracy and granularity of the IRP's representation of City Light's power supply portfolio.

The IRP provides strategic guidance based on City Light's current assessment of resource adequacy, policy requirements, transmission constraints, and available resource technologies. It recommends a portfolio designed to reliably and cost-effectively meet future energy needs based on the assumptions at the time of the analysis.

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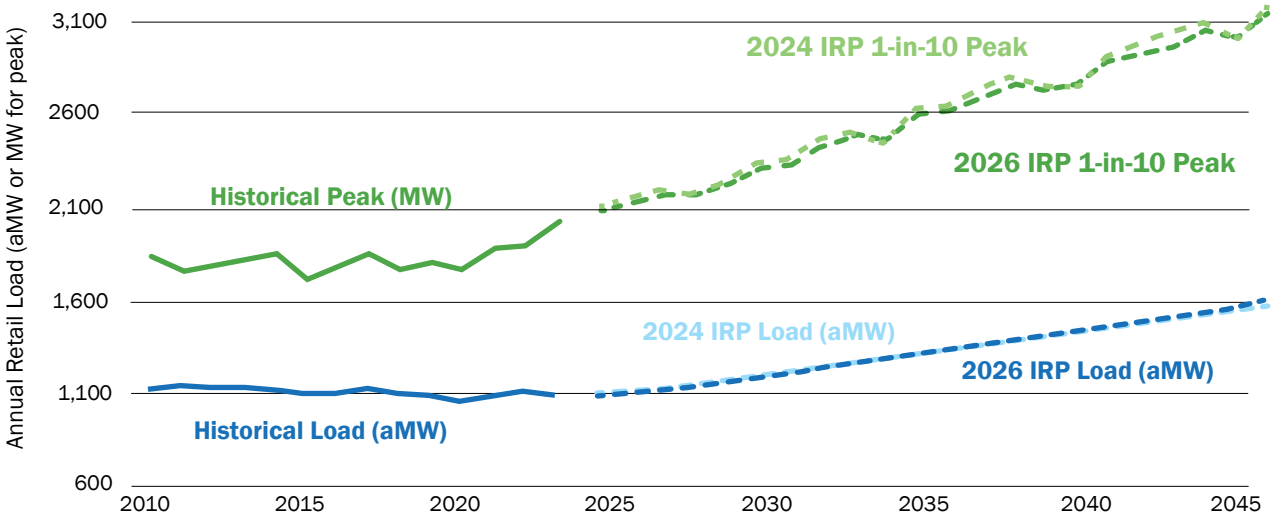
1 *This figure reflects information available through December 31, 2024.*

2 *2022 IRP Report (www.seattle.gov/documents/Departments/CityLight/2022IntegratedResourcePlan.pdf)*
2024 IRP Progress Report (www.seattle.gov/documents/departments/citylight/irp/2024irpprogressreport.pdf)

Figure 1: Load Forecast



The load forecasts used in the most recent resource plan filings (2024 IRP Progress Report and 2026 IRP Report) show increasing load growth, reflecting technology electrification and changes to City Light's customer base from economic and population growth. The 2026 IRP Report used the 2026 Demand-Side Management Potential Assessment (DSMPA)[3] study to inform the amount of conservation and demand response resources available. Figure 1 shows the anticipated change between historical and forecasted loads. The load forecasts in the 2024 IRP Progress Report and the 2026 IRP Report show relatively similar projections of energy and peak needs by 2045.

The load forecasts used in this report reflect the policy landscape as of November 2024, including city, state, and federal initiatives that have accelerated the shift from fossil fuels to electric technologies. Key policy drivers include the Seattle Climate Action Plan and Seattle Office of Sustainability's carbon-based benchmarking requirements as well as initiatives informed by City of Seattle's Building Emissions Performance Standards, Washington's Zero-Emission Vehicle Standard, and federal programs such as the Inflation Reduction Act, which included tax credits for renewable resources and electric vehicles. These policy drivers contribute to increased electrification in transportation and buildings, resulting in load peaks that are growing slightly faster than overall annual energy consumption. Winter load peaks remain the primary factor driving City Light's need for additional resources.

The energy industry is navigating a particularly volatile operating environment. In the time since the inputs for the 2026 IRP were finalized, this environment has shifted dramatically as a result of a variety of factors:

- Tax credits for many renewable energy resources have been repealed, resulting in increased cost.
- Tax credits for electric vehicles have been repealed, potentially slowing the rollout of these vehicles.
- The role of artificial intelligence (AI) has grown, leading to higher demand for data centers and increasing load forecasts.
- Market availability in the Northwest has radically shifted, with multiple studies identifying the possibility of resource shortages across the region during severe weather within the next five years.
- Development of clean, firm resources such as enhanced geothermal systems and small modular nuclear reactors (SMRs) has accelerated.

[3] *The 2026 DSMPA outlines the estimated magnitude, timing, and costs of potential resources in City Light's service territory during the period of 2026–2045. The report identifies the cost-effective potential of energy efficiency, customer-sited solar photovoltaics, and demand response across the residential, commercial, and industrial sectors. (www.seattle.gov/documents/Departments/CityLight/DemandSideManagementPotentialAssessment.pdf)*

Table 1 compares the type and magnitude of resource additions identified through the 2024 IRP Progress Report and the fully updated 2026 IRP Report. For the 2026 IRP Report, the analysis focused on established resource technologies, including solar, wind, and short-duration energy storage. The 2026 IRP Report identifies 1,711 MW-nameplate of wholesale resource additions in the first 10 years of the planning horizon (2026–2035), which is similar to the 1,825 MW-nameplate additions identified for the first 10 years of the 2024 IRP's planning horizon (2024–2033). For the second 10-year period, the 2026 IRP shows an increase of 1,873 MW-nameplate of wholesale resource additions, which is much larger than the 525 MW-nameplate in the 2024 IRP Progress Report.

In the 2026 IRP Report, City Light identified that most of the system's resource adequacy risk comes from multiday weather events. The meteorological conditions that cause City Light's load to increase (multiday heat waves in summer and cold snaps in winter) also tend to cause low wind and low solar irradiance conditions. Thus, if a multiday weather event occurs during an extended period of poor hydrological conditions, the region could experience multiple consecutive days of low hydro, solar, and wind energy, which would present a high risk of insufficient generation for serving loads directly or for recharging short-duration batteries. A candidate portfolio built only on wind, solar, and short-duration batteries requires a high volume of capacity additions to overcome the weather dependency of these resources as modeled. But even if it meets City Light's resource adequacy target (an expectation of one day with lost load in ten years) a candidate portfolio reliant on only wind, solar PV, and short-duration battery additions is still not guaranteed to produce power when it is needed. Clean, firm technologies such as the advanced technology resources evaluated in the 2026 IRP Report will be an integral part of a reliable future portfolio.

Table 1: Comparison of Resource Additions in 2024 IRP Progress Report and 2026 IRP Report

	2024 IRP Progress Report			2026 IRP Report		
New Resource Additions (MW-Nameplate, unless noted)	**2024–2033**	**2034–2043**	**TOTAL**	**2026–2035**	**2036–2045**	**TOTAL[1]**
Battery	200	0	200	109[2]	251	360
Solar	375	0	375	600	0	600
Solar + Battery	50	25	75	0	0	0
Wind	1,100	100	1,200	1,002	1,308	2,310
Enhanced Geothermal	100	300	400	0	0	0
Offshore Wind[3]	0	100	100	0	0	0
Firm Energy Purchases[4]	0	0	0	0	314	314
Wholesale Resource Subtotal	**1,825**	**525**	**2,350**	**1,711**	**1,873**	**3,585**
Conservation (aMW)	80	49	129	78	25	103
Customer Solar Programs (aMW)	12	21	33	14	23	37
Demand Response (MW)	26	25	51	15	-1[5]	14
TOTAL	**1,943**	**620**	**2,563**	**1,818**	**1,920**	**3,738**
2026 IRP Transmission Additions				302	204	505

[1] *Subtotal and totals may vary due to rounding.*
[2] *While modeled separately for the 2026 IRP, 83 MW of battery additions are considered to be co-located with solar for the 2026–2035 period.*
[3] *Enhanced geothermal and offshore wind were not evaluated in the main analysis to prevent the uncertainty of the technology availability and price from affecting the selection of other resources. Enhanced geothermal was evaluated along with other advanced technologies in a break-even analysis discussed later in this report; however, the viability of offshore wind has become more uncertain, so offshore wind was not included in the analysis.*
[4] *City Light did not offer Firm Energy Purchases in the 2024 IRP. For more information see page 12 and Appendix 9: Resource Adequacy.*
[5] *Demand response modeling includes customer attrition resulting in a reduction of resource additions.*

THE FINDINGS ABOVE CULMINATE IN

FOUR

KEY TAKE-AWAYS:

1. Within the 2024 IRP Progress Report, 2026 DSMPA, and 2026 IRP Report, City Light has forecast **sustained load growth** through the studies' 20-year planning horizons. This trend reflects shifts in its customer base due to regional economic and population growth, alongside rising electricity needs from transportation and building electrification. Transportation and building electrification have an outsized impact on **projected winter peaks.**

2. Meeting future electricity needs will require **adding new resources to City Light's portfolio, including wind, solar PV, and batteries, as well as firm capacity and new transmission.**

3. Projected load growth drives both the timing and scale of resource additions, leading to a steadily increasing **need for new resources throughout each decade of the planning horizon.**

4. **Carbon-free, firm resource options that can reliably meet demand without weather-driven intermittency will be essential** to City Light's power supply portfolio. These resources include additional hydropower, enhanced geothermal systems, SMRs, hydrogen, and long-duration energy storage systems. City Light will evaluate these advanced technology resources in depth.

INTRODUCTION

IRP LEGAL REQUIREMENTS

Washington law (RCW 19.280) requires all electric utilities with more than 25,000 customers to develop comprehensive resource plans that identify strategies to meet their customers' electricity needs in the short and long term.

City Light is required to file an IRP, alternating between a progress report or a fully updated IRP every two years. Full IRPs are comprehensive resource plans that outline the mix of generation resources City Light intends to use to meet customer electricity needs over the planning horizon. Progress reports provide updates on forecast conditions and their impacts to the IRP's future preferred portfolio. City Light produced its last full IRP in 2022 and its last progress report in 2024. It will produce its next IRP progress report in 2028 and its next fully updated IRP in 2030.

Since 1910, City Light has delivered reliable, affordable, and environmentally responsible energy to its customers. As the utility plans for the future, it must account for growing power supply demands from its customers while prioritizing emissions reductions to ensure an equitable clean energy transition for all stakeholders. This must be done while maximizing affordability for customers and reducing rate pressure.

City Light remains committed to minimizing environmental impacts of its power supply portfolio. Notably, it has operated as greenhouse gas (GHG) neutral since 2005—and was the first electric utility in the nation to achieve this distinction. City Light's 2026 IRP Report outlines the resources needed to meet customers' anticipated power needs at the lowest cost under changing market dynamics, evolving policies, and future uncertainties over the period of 2026 to 2045.

Long-term power resource planning requires ongoing evaluation of conditions that affect power supply needs, costs, and risks. These considerations include the potential of energy efficiency, demand response, distributed resources, and new supply-side resource additions, as well as the need to ensure reliability, environmental stewardship and compliance with Washington state's carbon-free and renewable energy mandates.

City Light created the 2026 IRP as part of good utility practice and developed it with guidance from the Mayor of Seattle, Seattle City Council, input City Light collected from customers and the Review Panel, and Washington state law—including the Energy Independence Act (I-937) and the Clean Energy Transformation Act (CETA).

Following are the primary goals for City Light's IRP:

- Forecast the energy and capacity needed to meet customer demand throughout the planning period.
- Determine the utility's capability to supply those needs and ensure flexibility during load fluctuation.
- Define the capability and cost of current and prospective resources.
- Evaluate potential future City Light portfolios based on reliability, cost, risk, and environmental impact.
- Provide guidance for future resource acquisition.

New Model Framework

For the 2026 IRP, City Light used a mathematical optimization modeling framework similar to the methodologies used in previous IRPs to identify the most cost-effective and reliable mix of demand-side resources (including conservation and demand response) and commercially available supply-side resources to meet projected future demand. The supply-side resources comprise utility-scale wind farms, solar PV plants, and short-duration energy storage to supplement City Light's existing power supply portfolio. City Light also considered carbon-free advanced technology resources as part of the 2026 IRP. These were evaluated in separate break-even analyses discussed later in this report and in Appendix 11: Advanced Technology Break-even Analyses. The 2026 IRP model incorporated City Light's system load forecast, projected regional wholesale energy market prices and conditions, transmission constraints, and policy requirements through the 20-year study period from 2026 through 2045.

City Light retained Sylvan Energy Analytics ("Sylvan") for the 2026 IRP and used Sylvan's open source model, GridPath, to identify the most cost-effective and reliable supply-side resource additions to City Light's portfolio to meet expected future loads at a reliability level consistent with its resource adequacy standard. Within GridPath, City Light and Sylvan were able to enhance the representation of the utility's resources and transmission assets by increasing modeled resource flexibility and overall accuracy.

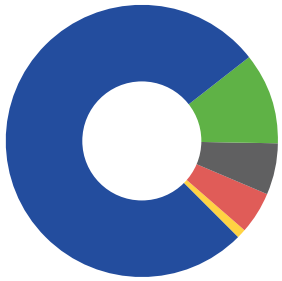
CURRENT RESOURCE PORTFOLIO

City Light has cultivated its existing resource portfolio to be among the cleanest and lowest cost in the nation. Its current portfolio includes many past investments in energy efficiency, City Light–owned hydropower resources, existing hydropower and renewable contracts from regional partners, and wholesale power market purchases. Energy efficiency program participation has helped to reduce City Light customers' energy use. Projecting future program participation, the 2026 DSMPA and 2026 IRP Report anticipate the continued utilization of energy efficiency, customer solar, and demand response programs as resources to meet customer power needs.

Approximately 77% of City Light's total power mix comes from carbon-neutral hydroelectricity. In a typical year, about half of this hydropower comes from City Light's fully owned hydroelectric projects on the Skagit and Pend Oreille Rivers and the remaining half is purchased from the Bonneville Power Administration (BPA), a nonprofit federal power marketing agency. BPA provides approximately 40% of City Light's power. In addition to hydropower, BPA also supplies City Light with nuclear, unspecified, and a share of City Light's wind power mix. Wind power has become a larger component of City Light's resource supply, partly as a result of City Light's power purchase agreement of a 50 MW wind project in Oregon. The remainder of City Light's power mix comes from various renewable energy sources, with the addition of 87 MW of solar in the next few years. In addition to energy generation, City Light's hydroelectric facilities support flood risk mitigation, fish habitat protection, and recreational use of reservoirs. In coordination with City Light, Seattle Public Utilities operates two projects for municipal water supply. City Light's power mix for 2024 is shown in Figure 2.

City Light's generation mix remained roughly the same as reported in the 2024 IRP Progress Report, with the majority of energy coming from hydropower and a relatively even split between owned and contracted generation. Additionally, City Light has continued to participate in regional wholesale power markets and regional planning committees, including the Western Energy Imbalance Market (since 2020), the Western Power Pool, and the Western Resource Adequacy Program (WRAP).

Figure 2: City Light's 2024 Power Mix



HYDRO	77%
WIND	11%
UNSPECIFIED[1]	6%
NUCLEAR[2]	5%
BIOGAS	1%
TOTAL	100%

[1] *Unspecified energy consists of market purchases that are assigned to the utility including purchases made by City Light to balance or match its loads and resources, along with market purchases made by BPA. Unspecified energy may incidentally include coal or natural gas resources. Any emissions associated with unspecified market purchases are offset through City Light's GHG neutrality policy.*

[2] *This fuel represents a portion of the power purchased from BPA.*

The following section lists each resource, its generation in 2024, and for contracted resources, when the contract is set to expire. A full discussion of the current energy resource portfolio can be found in Appendix 1: Current Resource Portfolio.

City Light's largest power purchase contract is with BPA. This contract allows City Light to receive power from 31 federally owned and operated hydroelectric projects and several thermal and renewable projects in the Pacific Northwest. The energy is delivered over BPA's transmission grid. City Light's current BPA contract will expire in 2028. In December 2025, City Light executed a contract to continue purchasing power from BPA for the period from 2028 through 2044. City Light will switch from its current BPA Block product to the BPA Slice/Block product at the start of the new contract in October 2028. The Slice/Block product offers City Light a simulated "slice" of the BPA system's hydroelectric capability, which will provide greater operational flexibility to manage new renewable resources and extreme peak loads. However, this greater flexibility and capability comes with increased operational complexity and variability in energy delivery, as well as a dependence on annual hydro conditions. As shown in Table 2, City Light's resource portfolio in 2024 includes City Light's owned generation and purchase contracts that total over 9,800 GWh.

Table 2: City Light's 2024 Energy Resources

Resource	2024 Energy Produced (MWh)	% of Grand Total	Year Contract Expires
Owned Generation			
Boundary	3,025,434	30.7%	-
Gorge	689,925	7.0%	-
Diablo	363,142	3.7%	-
Ross	411,631	4.2%	-
Cedar Falls	6,841	0.1%	-
South Fork Tolt	44,885	0.5%	-
Total Owned	**4,541,858**	**46.1%**	**-**
Contracts			
BPA Block	4,278,100	43.4%	2028
Priest Rapids	19,184	0.2%	2052
Columbia Basin Hydro	251,860	2.6%	2025–2027
High Ross	315,307	3.2%	2066
Seven Mile	3,263	0.0%	2066
Lucky Peak	290,821	3.0%	2038
Columbia Ridge	69,446	0.7%	2025
King County WW	9,647	0.1%	2033
Condon Wind	73,861	0.7%	2028
Total Contracts	**5,311,489**	**53.9%**	**-**
Grand Total	**9,853,347**	**100.0%**	**-**

Demand-Side Resource Programs

The programs in the selected resource portfolio from the 2026 DSMPA were used as inputs for the 2026 IRP Report. Table 3 shows City Light's economic achievable potential conservation targets by sector from the 2026 DSMPA.

Table 3: Achievable Economic Potential Conservation Targets (aMW)

Sector	2-Year (2026–2027)	4-Year (2026–2029)	10-Year (2026–2035)	20-Year (2026–2045)
Residential	3	5	9	13
Commercial	17	31	62	82
Industrial	1	3	6	8
TOTAL[1]	**21**	**39**	**78**	**103**

[1] *Subtotal and totals may vary due to rounding.*

Table 4 summarizes demand-side resources from the 2026 DSMPA used in the 2026 IRP Report by program category and for the resource plan reporting intervals.

Table 4: Achievable Economic Potential of Demand-Side Resources

New Resource Additions	2-Year (2026–2027)	4-Year (2026–2029)	10-Year (2026–2035)	20-Year (2026–2045)
Conservation (aMW)	21	39	78	103
Customer Solar Programs (aMW)	2	4	14	37
Demand Response (MW)	6	12	15	14[1]
TOTAL[2]	**29**	**55**	**107**	**154**

[1] *Demand response modeling includes customer attrition resulting in a reduction of resource additions.*
[2] *Subtotal and totals may vary due to rounding.*

TRANSMISSION

The majority of City Light's resources are delivered on BPA's transmission system. As the largest regional Transmission Provider, BPA conducts a comprehensive transmission planning process to ensure that it meets its customers' needs. City Light actively participates in these processes and intends to submit formal transmission requests required under RCW 19.280.030(1)(f)(ii) when necessary. Through ongoing engagement, City Light will ensure that its transmission needs are addressed as new resources are added to its portfolio.

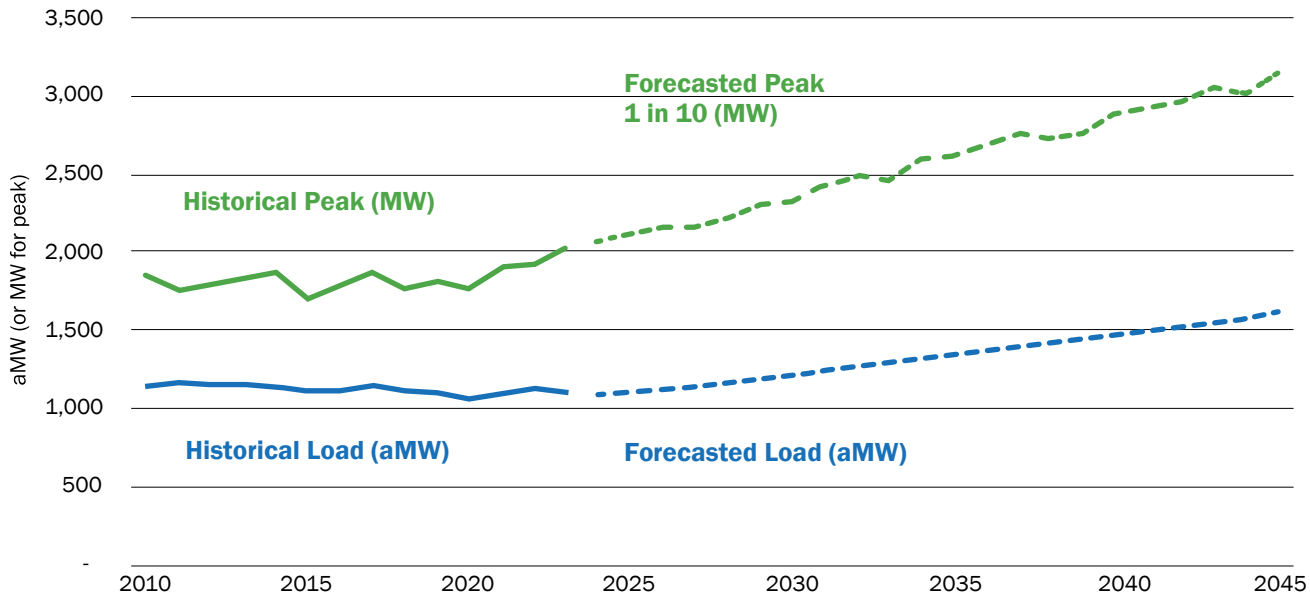
The 2026 IRP modeling evaluated future transmission needs. Full details can be found within the Appendix 7: Transmission.

LOAD FORECAST

An initial step in assessing the need for additional resources is forecasting City Light's future electricity demand. To determine future electricity demand, City Light forecasts how much total energy customers will likely consume over a period of time (load), as well as the maximum amount of energy they will likely consume in a single hour of the year (peak demand).

The system load forecast completed in late 2024 (shown in Figure 3) represents the utility's best estimate for how its retail load will change over time, as of the start of the 2026 IRP study. Consistent with many other utilities' projections, City Light's load forecast is higher than previous versions (pre-2024) primarily due to updated assumptions regarding electrification of the building and transportation sectors. The forecasts used in this report reflect the policy landscape as of November 2024, of city, state, and federal policies that have collectively accelerated the adoption of electric technologies over their fossil fuel–based alternatives. The load forecast also factors in additional elements, including projected population growth over the next two decades, a realistic amount of data center growth, and the impacts of a changing and more volatile climate in City Light's service area. Since the development of this load forecast, there have been some significant changes including the federal roll back of electric vehicle (EV) incentives and data center growth. These changes will be accounted for in subsequent load forecasts and resource planning. For more information on the load forecast, see Appendix 3: Load Forecast.

Figure 3: November 2024 Load Forecast Used in 2026 IRP



Note: Peak values are measured in megawatts (MW). Load is measured in average annual megawatts (aMW). Energy efficiency and customer rooftop solar are not incorporated into this view of the forecast, as they are incorporated later in IRP modeling as a resource that serves load.

REGULATORY ENVIRONMENT

City Light's approach to modeling the regulatory environment has been relatively consistent since the 2024 IRP Progress Report. The following sections summarize the treatment of compliance obligations in the 2026 IRP. For more detailed summaries of the regulations, please see Appendix 4: Regulatory Requirements.

I-937 Energy Independence Act

The Washington State Energy Independence Act, also known as I-937, requires electric utilities serving at least 25,000 retail customers to use minimum amounts of eligible renewable energy to serve their customers and requires them to fund cost-effective energy conservation. To comply with I-937 requirements, City Light used the Act's "no-load growth" compliance option from 2019 through 2023. However, as load increased due to continued growth in transportation and building electrification in City Light's service territory, City Light switched to the Act's 15% eligible renewable energy target option starting in 2024 and expects to continue using that option through the study period. City Light updates its load forecast annually; reliability and regulatory planning will continue to follow the load forecast and other applicable information.

Clean Energy Transformation Act (CETA)

CETA requires utilities to meet specific GHG targets by 2030 and 2045 and to prepare plans for how they will meet these targets: Clean Energy Implementation Plan (CEIP) and Clean Energy Action Plan (CEAP). City Light submitted its second CEIP to the Washington Department of Commerce under CETA in 2025. Appendix 4: Regulatory Requirements outlines City Light's 10-year CEAP that allows City Light to meet its goals around reliability, affordability, and environmental responsiveness, while also complying with regulatory requirements and ensuring service equity.

CETA also requires utilities to consider the social cost of greenhouse gas (SCGHG)[4] when developing IRPs and CEAPs.[5] The SCGHG affects decisions about whether to fulfill energy shortfalls with new supply- or demand-side energy additions or to purchase electricity from the market. In this evaluation, market purchases were assumed to be unspecified and therefore have a SCGHG penalty added to the price. City Light updated SCGHG values for the 2026 IRP Report.

Climate Commitment Act (CCA) and Clean Fuel Standard (CFS)

Washington's CCA and CFS were passed in 2021. Impacts of the policies were incorporated into the 2024 system load forecast, which contributed to increased building and transportation electrification. Legislation-related updates were also incorporated into City Light's 2026 DSMPA through its engagement with its consultant, Cadmus; otherwise, no updates specific to the IRP modeling were required.

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[4] *www.utc.wa.gov/regulated-industries/utilities/energy/conservation-and-renewable-energy-overview/clean-energy-transformation-act/social-cost-carbon*

[5] *Revised Code of Washington related to IRPs that governs SCGHG methodology is 3a under 19.280.030.*

RESOURCE ADEQUACY

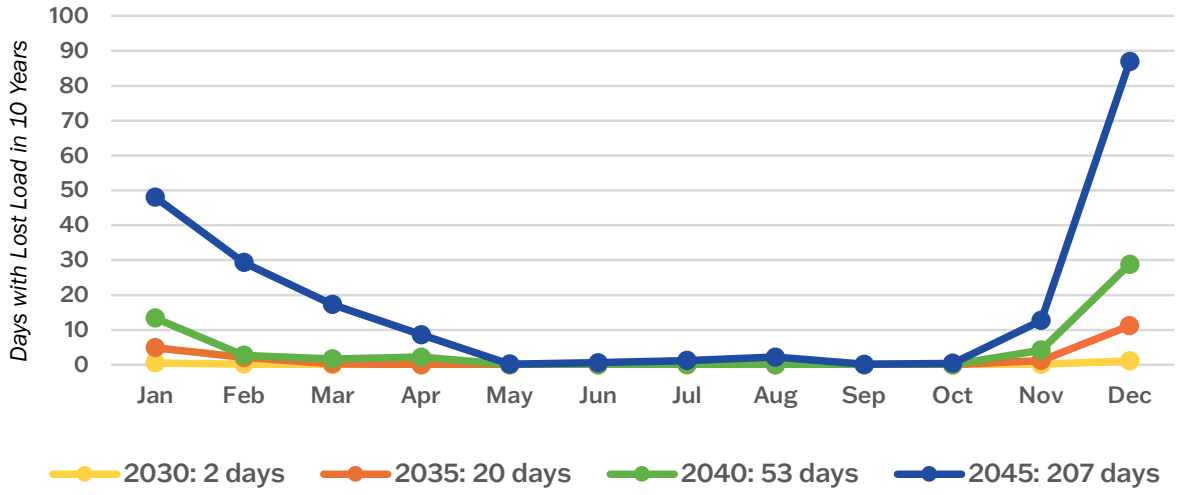
Ensuring adequate generating resources to meet customer power needs is an urgent and immediate challenge. To identify these resource needs, City Light performs resource adequacy assessments as part of its IRP analyses to estimate how much generation will be needed to ensure reliability. Without these assessments, City Light may find itself with insufficient resources to serve customers.

For the 2026 IRP, City Light evaluated resource adequacy using the production cost model within GridPath, focusing on the years 2030 and 2035. This analysis considers 870 possible combinations of 29 distinct weather years and 30 distinct hydro years as modeled by the Northwest Power and Conservation Council. The industry standard is that a portfolio must not exceed a 0.1 Loss of Load Expectation (or one day with lost load in 10 years). To ensure reliability within this threshold, City Light also assesses multiple other resource adequacy metrics. In addition, City Light calculates Western Resource Adequacy Program's Qualified Capacity Contribution requirements separately from the GridPath model runs. This process builds a portfolio that best meets all of City Light's future needs.

Figure 4 shows the expected number of days with lost load in 10 years over the 870 different weather and hydro years, indicating how well City Light's current resource portfolio meets future loads. If simulations show more than one day with lost load on average, the portfolio does not meet City Light's resource adequacy requirements. For more information refer to Appendix 9: Resource Adequacy.

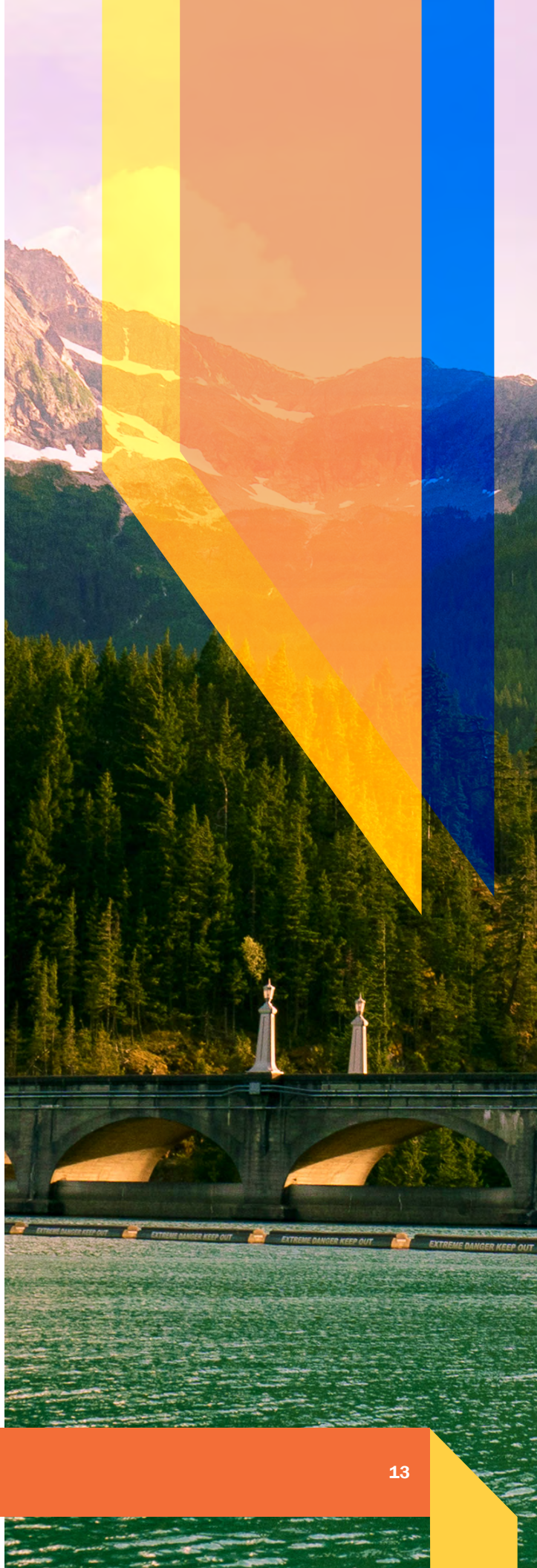
This graph shows that by 2030, City Light's current resources would not be adequate to meet load, with 1.1 days in the month of December alone expected to exceed the resource adequacy maximum. City Light's largest resource need continues to occur in the winter, when poor hydro years combined with multiday cold snaps create the largest risk for energy shortfalls. In later years, this risk increases as load and peaks continue to rise. By relying on weather-dependent resources, City Light risks not meeting load during critical months. As such, City Light needs to consider acquiring firm resources so it can reliably meet load.

Figure 4: Yearly Lost Load with Current Portfolio



For the 2026 IRP, City Light's IRP team used Sylvan's GridPath model to build candidate portfolios that would help City Light continue to reliably serve load over the 20-year study period. The IRP team modeled 32 representative days for key study years (2026–2030, 2035, 2040, and 2045). Twenty-four of the 32 representative days of each modeled year comprised two typical days per month (one weekday and one Sunday or holiday) under typical weather conditions. For the other eight days, the model used the day with the most unserved energy out of all 870 possible futures for each of eight months when only City Light's current resource portfolio could be used to serve load. April, May, September, and October did not have any days with resource needs, so they did not contribute any days in this category to the portfolio expansion model. Over the total 32 representative days per modeled year, no unserved energy was allowed when building the portfolio.

To ensure that the 2026 IRP's candidate portfolios met City Light's resource adequacy requirement without relying on an unrealistic amount of intermittent wind and solar power, the IRP team added firm capacity products to the portfolios. To determine the quantity of firm capacity required for each candidate portfolio, City Light evaluated the resource adequacy of each portfolio across all days of key modeled study years covering the 20-year planning horizon, under all 870 weather and hydro combinations. This comprehensive assessment revealed whether the number of days with lost load exceeded the resource adequacy standard—defined as no more than one day in 10 years with lost load. To close this gap, City Light added firm capacity resources until the portfolio achieved that standard. These firm capacity resource additions, as modeled in the IRP, are equivalent to resource options such as baseload resources like SMRs and enhanced geothermal, forward wholesale energy market purchases such as those that City Light's power marketers already routinely transact, and power contracts with firm energy provisions that can be negotiated by the utility's power contracts team. City Light limited wholesale energy market purchases to 200 MW in regionally constrained hours. For more information on power marketing, market prices, and modeling framework and see Appendix 1: Current Resource Portfolio, Appendix 6: Market Prices, and Appendix 8: Model Framework, respectively.



RESOURCE ADDITIONS

Meeting the electric needs during the study period requires the addition of new resources during the 20-year planning horizon. Table 5 presents the recommended supply-side resource additions identified through the analysis. Resource additions are grouped by resource type and reporting interval, consistent with the 2026 IRP regulatory filing templates.

Table 5: Resource Additions Selected Using GridPath

New Resource Additions	2026–2030	2031–2035	2036–2045	TOTAL
Short-Duration Energy Storage	109	0	*251*	360
Solar PV	600	0	0	600
Wind	424	578	1,308	2,310
Firm Capacity Products	0	0	314	314
Supply-Side Resource Total[1]	**1,133**	**578**	**1,873**	**3,585**
2026 IRP Transmission Additions	0	302	204	505

[1] *Subtotal and totals may vary due to rounding.*

Supply-Side Resource Options

As part of the 2026 IRP, City Light considered several candidate supply-side resources to supplement both the planned demand-side resource additions identified in the 2026 DSMPA and the utility's current owned and contracted portfolio including the Slice/ Block product choice under the BPA Provider of Choice contract, effective 2028. The study considered only carbon-free generation resources for addition to City Light's power supply portfolio. Candidate resources were split into two categories: established technologies and advanced technologies.

Established technologies are technologies that are currently available for development and operation on a utility scale. The established resource technologies considered were wind, solar PV, short-duration energy storage, and co-located solar PV and short-duration energy storage. Cost assumptions for established technologies were finalized in 2024; shortly after, the federal administration rolled back several renewable incentives. As such, the cost assumptions for established resources in the 2026 IRP do not necessarily reflect the price changes under the current federal administration. City Light's model included its existing transmission capacity for importing power into its service territory in times of need and at other times for exporting excess power from its generation resources to the wholesale energy market. When developing the optimal power supply portfolio, the model considered the cost of a new generation resource plus the cost of any transmission additions required to reliably meet City Light customers' power requirements.

Because City Light cannot use weather-dependent resources such as wind and solar during periods without wind or sun, City Light continues to explore the possibility of acquiring carbon-free firm resources, which it classifies as "advanced technologies." These resources will be critical to building a reliable and clean portfolio. The advanced technology resources City Light has considered are long-duration (multiday) energy storage, enhanced geothermal systems, SMRs, and green hydrogen peaker plants. City Light chose to model advanced technologies in an alternative analysis to prevent the substantial uncertainty around costs and timing of commercial availability of these resource technologies from influencing model guidance on less uncertain (established technology) portfolio resource options. As such, the IRP team performed break-even analyses separately for each advanced technology resource type.

The break-even prices include the capital cost of the resource, operations and fuel costs when required, and any additional transmission costs to deliver the power to the wholesale energy market hub nearest to City Light's service territory. The break-even analysis results showed that baseload resources were estimated to be worth two to four times the cost of the equivalent nameplate capacity of solar resources, when added to the portfolio in 2035. Baseload resources would provide energy that could consistently serve City Light's load day or night, regardless of weather conditions, which provides increased value over the intermittent, daytime-only power provided by a typical solar PV plant, even east of the Cascade Mountains. However, baseload resources cannot easily be turned off when energy is not needed, which means sometimes excess energy must be sold on the wholesale energy market at a net loss.

Green hydrogen peaker plants and long-duration energy storage were found to be worth approximately 17 times the cost of the equivalent amount of short-duration energy storage in 2035, as shown in Table 6. In contrast to baseload resources, both of these resource types can easily be cycled on and off and are therefore operated to provide additional energy only when economically advantageous. This leads to these two resource types offering significantly more value relative to baseload and other resources present in the break-even analysis portfolio by 2035. Additionally, recent resource adequacy studies in the Pacific Northwest have shown that multiday extreme weather events, such as the cold-snap in January 2024, pose the greatest reliability risk to the region, which further contributes to the value offered by both green hydrogen peaker plants and long-duration energy storage to City Light's power supply portfolio.

As shown in Table 6, the break-even analysis results for each of these advanced technologies show significant value to City Light beyond the value offered by established technology resources. While the 2024 IRP Progress Report offered some advanced technology resources to the portfolio expansion model a few years earlier than 2035, the break-even analysis results from the present 2026 IRP are consistent with the conclusion that clean, firm advanced technologies, such as enhanced geothermal or SMRs will be a critical component of City Light's portfolio as soon as they become commercially available on a utility scale.

If City Light could access firm resources, those firm additions could offset the volume of resources City Light would need to acquire by 2035 (Table 6), therefore potentially saving the utility money. As IRPs are repeated every two years, for the 2028 IRP, City Light will perform an in-depth analysis on clean, firm technologies to determine the best fit for these technology types within its portfolio. City Light will also be able to evaluate the potential value-add of specific bids for advanced technologies at the time the utility receives these bids in response to new resource acquisition requests for proposals.

Table 6: Advanced Resource Price Breakdown

Advanced Resource Type[1]	Relative Break-even Value (% of established)
Baseload Resources (SMRs and enhanced geothermal)	261% to 375% of solar PV cost
Green Hydrogen Peaker Plants	1,663% to 1,732% of short-duration energy storage
Long-duration energy storage	1,732% to 1,857% of short-duration energy storage

[1] *City Light did not evaluate Offshore Wind in the 2026 IRP. For more information see Appendix 11: Advanced Technology Break-even Analyses.*

PUBLIC INVOLVEMENT

City Light convened an external advisory panel to provide feedback on the development of its IRPs. The panel comprises individuals representing customers, environmental organizations, regional energy-related governmental organizations, and academics. While conducting the modeling and analyses for the 2026 IRP Report, City Light hosted five meetings with the external IRP advisory panel covering topics such as energy conservation, climate policies, load forecasts, resource adequacy, IRP modeling assumptions, and many other energy-related issues. The timeline for the advisory panel feedback, which helped to shape the IRP process, findings, and recommendations is shown in Figure 5. For more information on public outreach see Appendix 12: Community Outreach and Public Involvement Process.

Member	Organization
Steve Gelb, Roz Jenkins	Emerald Cities Collaborative
Dr. Angela Griffin	Byrd Barr
Paul Munz	Former Bonneville Power Administration
Jeremy Park	University of Washington
Yuri Rodrigues	Seattle Pacific University
Mike Ruby	Envirometrics, Inc.
Elizabeth Osborne	Northwest Power and Conservation Council
Austin Scharff	WA Department of Commerce
Kevin Schneider	Pacific Northwest National Laboratory
Terry Sullivan	King County
John Ollis	Northwest Power and Conservation Council
Charlee Thompson	Northwest Energy Coalition

Figure 5: Timeline of External IRP Advisory Panel Meetings

November 6, 2024

Introductions, Content and Framing, 2026 IRP Overview, Timeline, New IRP Approach, 2026 DSMPA Plan

January 15, 2025

2026 IRP Report Overview, 2026 Load Forecast, IRP Input Assumptions (Transmission, BPA Product Choice, Resource Options, Wholesale Process)

April 2, 2025

2026 IRP & DSMPA Staggered Approach, 2026 DSMPA Preliminary Results (EE and DR), Existing Resources

July 17, 2025

DSMPA Background and Context, 2026 IRP/DSMPA Model, Capacity Expansion Model, Resource Adequacy, Setting Targets

September 24, 2025

IRP Recap, 2026 IRP Results, Monthly Resources Need, Firm Energy Additions, Advanced Resources

CONCLUSION

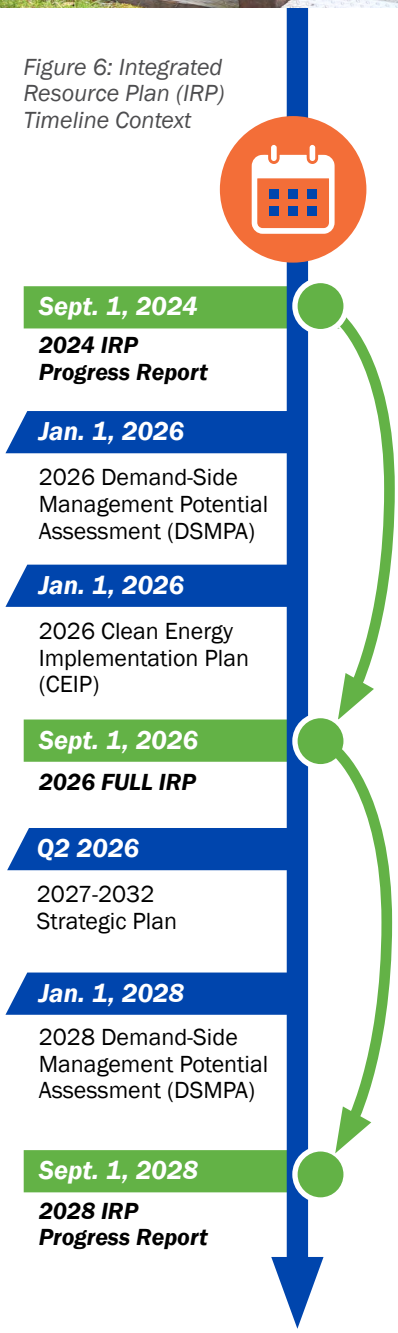


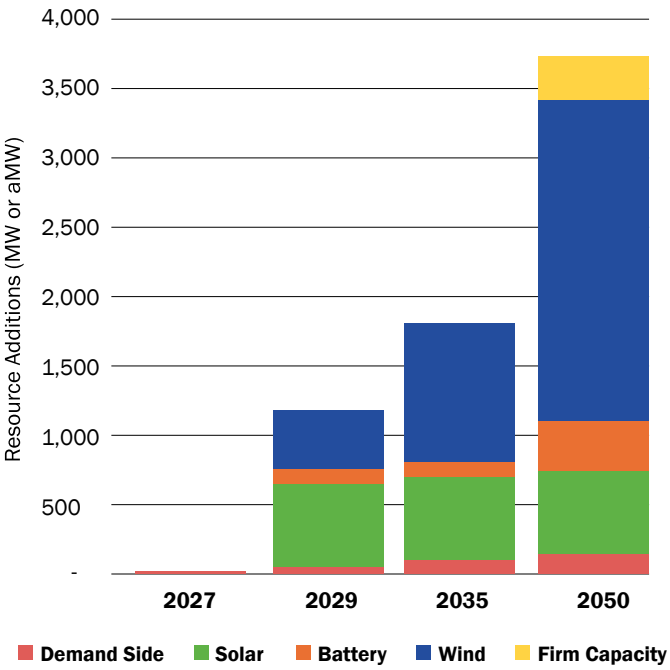
Figure 6: Integrated Resource Plan (IRP) Timeline Context

As the IRP timeline in Figure 6 indicates, the 2026 IRP Report findings build on the results and trends from the 2024 IRP Progress Report and show the actions City Light is taking to plan for its customers' future power supply needs. For the 2026 IRP, City Light selected a portfolio consisting of a diverse set of commercially available utility-scale generation resources comprising wind farms, solar PV projects, short-duration energy storage, and solar PV projects co-located with short-duration energy storage. There is a risk associated with being fully reliant on weather-dependent resources that cannot be used during times with minimal wind or minimal sun. This has made City Light interested in the possibility of acquiring additional firm power supplies. This portfolio was developed under the most conservative of the assumptions around short-term energy market reliance during times of regionally energy-constrained conditions. Because the effect of responding to extreme events on regional market conditions is both difficult to forecast on a long-term basis and requires computationally expensive modeling to explore, the utility selected the more conservative scenario as the most prudent choice.

City Light observed the following key changes from the 2024 IRP Progress Report:

- City Light's load forecast shows a small increase in expected loads over the 20-year study period. However, the forecasted peak loads over the study period show a greater rate of growth than for both the annual average load and the previous peak load forecast. This underscores the value of flexible generation resources, reliable baseload resources, and demand-side management solutions in City Light's future power supply portfolio. Again, this load forecast was developed in November 2024 prior to shifting policies on EV adoption and increases in data center requests.
- Considering only established, carbon-free resource technologies, City Light will need to add a very large and diversified mix of these resources (wind, solar PV, and short-duration energy storage) to its portfolio to provide reliable services, which will come at a great cost to the utility. The size of the portfolio needed is significantly affected by City Light's assumptions about its ability to rely on firm power from wholesale marketing opportunities, and City Light should reevaluate these assumptions in the next IRP cycle. Besides market assumptions, new resource technologies could potentially provide alternative sources of firm power to greatly reduce City Light's portfolio size to ensure that City Light can continue to deliver electricity to its customer-owners reliably, sustainably, and at the least cost.

Figure 7: Selected Resource Additions by Category



The final 2026 IRP selected resource additions in Figure 7 show wind power to be the predominant resource by 2050. The amount of new resource additions is largely due to wind power's intermittency. City Light is interested in further evaluating clean, firm resources in the next IRP, as the lack of intermittency of firm resources could greatly reduce the portfolio size needed to deliver reliable power. The present study has produced estimates of break-even costs of advanced clean, firm resource technologies for internal guidance. City Light will monitor and perform deeper analyses of the development and commercial availability of these technologies to determine when these technologies could benefit City Light's power supply portfolio.

Future Work

As the electric power system evolves and transitions to renewable and carbon-free energy resources, the tools, processes, inputs, and assumptions in long-term resource planning must evolve with it. In addition to iterating on its IRP model, City Light has identified several areas of future work to continue to improve analysis in the next full IRP in 2030.

TRANSMISSION

Consistent with conclusions in both City Light's 2022 IRP Report and 2024 IRP Progress Report, improvements to the transmission system will be critical to meet clean energy targets and electrification goals established by city and state legislation. City Light will continue to develop and refine its transmission modeling, as transmission is one of the largest unknowns in modeling system reliability and a critical component in valuation of non-wires resources to City Light's power supply portfolio.

ADEQUACY PLANNING

City Light is working to include additional resource adequacy metrics in its planning models to obtain a detailed, multidimensional method of quantifying and assessing total system reliability.

CLEAN-FIRM RESOURCES

Clean, firm resources will be an essential component of a reliable portfolio. City Light will continue to evaluate carbon-free, firm resource options that can reliably respond to changes in demand, including enhanced geothermal systems, SMRs, green hydrogen generation, multiday-duration energy storage, and other advanced technologies.

MARKET ASSUMPTIONS

City Light will continue to refine and update marketing assumptions and scenarios as it considers day-ahead markets in the West.

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