SEATTLE CITY COUNCIL

Transportation and Utilities Committee

Agenda

Wednesday, February 19, 2020

9:30 AM

Council Chamber, City Hall
600 4th Avenue
Seattle, WA 98104

Alex Pedersen, Chair
Dan Strauss, Vice-Chair
M. Lorena González, Member
Lisa Herbold, Member
Tammy J. Morales, Member
Debora Juarez, Alternate

Chair Info: 206-684-8804; Alex.Pedersen@seattle.gov

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February 19, 2020 - 9:30 AM

Meeting Location:
Council Chamber, City Hall, 600 4th Avenue, Seattle, WA 98104

Committee Website:
http://www.seattle.gov/council/committees/transportation-and-utilities

This meeting also constitutes a meeting of the City Council, provided that the meeting shall be conducted as a committee meeting under the Council Rules and Procedures, and Council action shall be limited to committee business.

Please Note: Times listed are estimated

A. Call To Order

B. Approval of the Agenda

C. Public Comment

(10 minutes)

D. Items of Business

1. Res 31932 **A RESOLUTION relating to the City Light Department; acknowledging and approving City Light's adoption of a biennial energy conservation target for 2020-2021 and ten-year conservation potential.**

Supporting Documents:
- Summary and Fiscal Note
- 2020 Conservation Potential Assessment - Volume I
- 2020 Conservation Potential Assessment - Volume II
- Central Staff Memo
- Presentation

Briefing, Discussion, and Possible Vote

Presenters: Debra Smith, General Manager and CEO, Jennifer Finnigan, and Craig Smith, Seattle City Light

2. CB 119741 **AN ORDINANCE relating to the Central Puget Sound Regional Transit Authority ("Sound Transit"); authorizing execution of a Funding and Cooperative Agreement for Northgate Station Area Access Improvements between Sound Transit and The City of Seattle; and ratifying and confirming certain prior acts.**

Attachments:
- Att A - Northgate Funding and Cooperative Agreement

Supporting Documents:
- Summary and Fiscal Note
- Presentation

Briefing, Discussion, and Possible Vote

Presenters: Eric Strauch and Bill LaBorde, Seattle Department of Transportation

3. CB 119743

AN ORDINANCE relating to grant funds from non-City sources; authorizing the Director of Transportation to accept specified grants and execute related agreements for and on behalf of the City; amending Ordinance 126000, which adopted the 2020 Budget, including the 2020-2025 Capital Improvement Program (CIP); changing appropriations for the Seattle Department of Transportation; revising allocations and spending plans for certain projects in the 2020-2025 CIP; and ratifying and confirming certain prior acts.

Attachments: Att A – CIP Project Page - Pedestrian Master Plan – New Sidewalks

Supporting Documents: Summary and Fiscal Note

Presentation

Briefing, Discussion, and Possible Vote

Presenters: Chloe Wilkes and David Burgesser, Seattle Department of Transportation

4. CB 119744

AN ORDINANCE relating to the Department of Transportation's Hazard Mitigation Program; authorizing the Director of the Department of Transportation to acquire, accept, and record on behalf of the City of Seattle, 11 catchment wall easements (From Daniel Bayeh, located in a portion of Lots 10 and 11, Block 3, Sturtevant's Rainier Beach Lake Front Tracts; a catchment wall easement from Blue Bird Rentals, LLC, a Washington limited liability company, located in a portion of Lots 14 through 17, Block 46, Rainier Beach; a catchment wall easement from Margaret Brown, located in a portion of Lots 17 and 18, Block 46, Rainier Beach; a catchment wall easement from Dan J. Del Duca and Mary F. Del Duca, located in a portion of Lots 1 and 2, Block 35, Rainier Beach; a catchment wall easement from Paul J. Farrington and Ronald F. Minter, located in Lots 5 and 6, Block 2, Mayes' Addition to the City of Seattle; a catchment wall easement from Mark Duane Lewis, located in a portion of Lots 2 and 3, Block 2, Mayes' Addition to the City of Seattle; a catchment wall easement from Gene Louie and Lena T. Louie, located in a portion of Lots 3 through 5, Block 2, Mayes' Addition to the City of Seattle; a catchment wall easement from Lincoln A. Louie and Ann Marie D. Louie, located in a portion of Lots 3 through 5, Block 35, Rainier Beach; a catchment wall easement from Robert Miller and Ana Miller, located in a portion of Lots 11 and 12, Block 3, Sturtevant's Rainier Beach Lake Front Tracts; a catchment wall easement from Ngoc Nguyen and My Chau Tran, located in a portion of Lots 9 and 10, Block 3, Sturtevant's Rainier Beach Lake Front Tracts; a catchment wall easement from F. D. Staats, the Trustee of the F. D. Staats Family Trust, located in a portion of Lots 6 and 7, Block 35, Rainier Beach), for the purpose of protecting the adjacent roadway of superficial surface erosion of the adjacent slopes along a portion of Rainier Avenue South; placing the real property rights under the jurisdiction of the Seattle Department of Transportation; and ratifying and confirming certain prior acts.

Attachments:
Att 1 - Bayeh Catchment Wall Easement
Att 2 - Blue Bird Rentals LLC Catchment Wall Easement
Att 3 - Brown Catchment Wall Easement
Att 4 - Del Duca Catchment Wall Easement
Att 5 - Farrington and Minter Catchment Wall Easement
Att 6 - Lewis Catchment Wall Easement
Att 7 - Gene and Lena Louie Catchment Wall Easement
Att 8 - Lincoln and Ann Marie Louie Catchment Wall Easement
Att 9 - Miller Catchment Wall Easement.pdf
Att 10 - Nguyen and Tran Catchment Wall Easement
Att 11 - Staats Catchment Wall Easement

Supporting Documents:
Summary and Fiscal Note
Summary Ex 1 - Vicinity Map
Presentation

Briefing, Discussion, and Possible Vote

Presenter: Gretchen Haydel, Seattle Department of Transportation

E. Adjournment

File #: Res 31932, **Version:** 1

CITY OF SEATTLE

RESOLUTION _____

A RESOLUTION relating to the City Light Department; acknowledging and approving City Light's adoption of a biennial energy conservation target for 2020-2021 and ten-year conservation potential.

WHEREAS, Ballot Initiative 937 (I-937), also known as the Energy Independence Act, was passed by Washington state voters on November 7, 2006, which requires qualifying electric utilities to obtain new renewable resources and undertake cost-effective energy conservation; and

WHEREAS, I-937 was codified in chapter 19.285 of the Revised Code of Washington (RCW); and

WHEREAS, RCW 19.285.040 calls for each qualifying utility to pursue all available conservation that is cost-effective, reliable, and feasible, including requiring of the development of conservation potential and biennial conservation targets; and

WHEREAS, WAC 194-37-070 requires that each qualifying utility must document the methodologies and inputs used in the development of its ten-year potential and biennial target and must document that its ten-year potential and biennial target are consistent with the requirements of RCW 19.285.040; and

WHEREAS, the City Light Department undertook a Conservation Potential Assessment study to develop its ten-year potential and biennial target, which was consistent with the methodologies set forth in RCW 19.285.040 and WAC 194-37-070; and

WHEREAS, the Conservation Potential Assessment identifies a ten-year conservation potential of 82.67 annual megawatts (aMW) starting in 2020, and a biennial energy conservation target of 21.27 aMW for City Light in 2020-2021; and

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WHEREAS, City Light anticipates meeting or exceeding the energy conservation target for 2020 and 2021, and updating its Conservation Potential Assessment by 2021; and

WHEREAS, WAC 194-37-070 requires that each utility must establish its ten-year potential and biennial target by action of the utility's governing board, after public notice and opportunity for comment; NOW, THEREFORE,

BE IT RESOLVED BY THE CITY COUNCIL OF THE CITY OF SEATTLE, THE MAYOR CONCURRING, THAT:

Section 1. Pursuant to chapter 19.285 RCW et. seq. and corresponding WAC 194-37-070 regulations, and after public hearing, the City Council acknowledges and approves the City Light Department's (City Light) adoption of a biennial energy conservation target of 21.27 aMW for 2020-2021 and a ten-year conservation potential of 82.67 aMW starting in 2020. City Light's biennial energy conservation target and ten-year conservation potential are based upon a Conservation Potential Assessment conducted using methodologies consistent with those used by the Pacific Northwest Electric Power and Conservation Planning Council in order for City Light to pursue all available conservation that is cost-effective, reliable, and feasible.

Section 2. The City Council further acknowledges that City Light anticipates meeting or exceeding the biennial energy conservation target with its adopted 2020 budget and the spending plan adopted in the Strategic Plan's rate path for the 2021 budget.

Adopted by the City Council the _____ day of _____, 2020, and signed by me in open session in authentication of its adoption this _____ day of _____, 2020.

_____

President _____ of the City Council

The Mayor concurred the _____ day of _____, 2020.

_____

Jenny A. Durkan, Mayor

Filed by me this _____ day of _____, 2020.

_____

Monica Martinez Simmons, City Clerk

(Seal)

Seattle City Light

2020 Conservation Potential Assessment—Volume I

Project Lead/By: Jennifer Finnigan
Prepared by: Lakin Garth, Cadmus
11/26/2019

Table of Contents

Definition of Terms

aMW	Average Megawatt
AC	Air Conditioning
C&I	Commercial and Industrial
CBSA	Commercial Building Stock Assessment
CFL	Compact Fluorescent Lamp
CPA	Conservation Potential Assessment
Council	Northwest Power and Conservation Council
DOE	Department of Energy
ECM	Energy Conservation Measure
EISA	Energy Independence and Security Act of 2007
EUIs	Energy Use Intensities
EUL	Effective Useful Life
HVAC	Heating Ventilation and Air Conditioning
I-937	Initiative 937
IRP	Integrated Resource Plan
kW	Kilowatt
kWh	Kilowatt-hour
LED	Light-emitting diode
MW	Megawatt
MWh	Megawatt-hour
NEEA	Northwest Energy Efficiency Alliance
O&M	Operations and Maintenance
RBSA	Residential Building Stock Assessment
RCW	Revised Code of Washington
REC	Renewable Energy Credit
RECS	Residential Energy Consumption Survey
RTF	Regional Technical Forum
RUL	Remaining Useful Life
SCL	Seattle City Light

T&D	Transmission and Distribution
TRC	Total Resource Cost
UCT	Utility Cost Test
UEC	Unit Energy Consumption
UES	Unit energy savings
WAC	Washington Administrative Code

Acknowledgements

The authors would like to thank the Seattle City Light staff who provided invaluable guidance and support, especially Jennifer Finnigan, John Rudolph, and Villamor Gamponia. The study required a compilation of a large amount of data from many sources, including several departments at City Light. The authors thank Kali Hollenhorst, Carsten Croff, Aliza Seelig, Mike Hamilton, and Saul Villareal for their guidance on load forecasting, avoided costs and economic assumptions.

1. Executive Summary

1.1. Overview

Seattle City Light (City Light) engaged Cadmus to complete a Conservation Potential Assessment (CPA) to produce rigorous estimates of the magnitude, timing, and costs of conservation resources within City Light's service territory over the next 21 years, beginning in 2020, which aligned with City Light's Integrated Resource Plan (IRP) timeline. This study identifies all cost-effective conservation potential in each of City Light's major customer sectors, including residential, commercial, and industrial. This study did not estimate street lighting potential as these have all been converted to LED.[1]

This study accomplishes the following objectives:

- Fulfills statutory requirements of Chapter 194-37 of the Washington Administrative Code (WAC), Energy Independence Act. This WAC requires City Light to identify all achievable, cost-effective, conservation potential for the upcoming 10 years.[2] City Light's public biennial conservation target should be no less than the *pro rata* share of conservation potential over the first 10 years. The study estimates will inform City Light's targets for the 2020-2021 biennium.
- Provides adjustments to the final load forecasts for customers' energy savings from City Light's programs.
- Provides inputs into City Light's Integrated Resource Plan (IRP). Completed every two years, City Light's IRP determines the mixture of supply-side and conservation resources required over the next 20 years to meet customer demand. The IRP requires a thorough analysis of conservation potential to properly assess the reliability, cost, risk, and environmental impact of different power generation resource portfolios.

This study relies on City Light-specific data, compiled from their oversample of the 2017 Residential Building Stock Assessment (RBSA),[3] the 2014 Commercial Building Stock Assessment (CBSA),[4] and other regional data sources. This study uses a methodology consistent with the Northwest Power and Conservation Council's Seventh Power Plan. It incorporates savings and costs for all energy conservation

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1 City Light's 2018 CPA did estimate streetlighting potential and, therefore, some figures and graphs in this report show those results for comparison to the 2020 CPA results

2 Washington State Legislature. *Energy Independence Act.* Washington Administrative Code Chapter 194-37.

3 Northwest Energy Efficiency Alliance. 2017 Residential Building Stock Assessment.

4 Northwest Energy Efficiency Alliance. 2014. Commercial Building Stock Assessment.

measures (ECMs) in the Council's final Seventh Plan workbooks and the active Regional Technical Forum's (RTF) unit energy savings (UES) workbooks.[5]

This study also anticipates upcoming requirements of Washington State's Clean Energy Transformation Act (CETA) which was passed as Senate Bill 5116 in April 2019 as the conservation potential assessment study analysis was being completed. Several CETA requirements, such as the inclusion of the social cost of carbon in avoided energy costs and estimates of demand response and solar photovoltaic (PV) potential were analyzed by this study.

1.2. Scope of Analysis

This study includes analysis of three sectors. In most of these sectors, Cadmus considered multiple market segments, construction vintages—new and existing—and end uses. Specifically, the analysis addressed the following sectors:

- Residential: Single-family and three types of multifamily homes, including low-rise, mid-rise and high-rise
- Commercial: 19 major commercial segments, including offices, retail and other segments;
- Industrial: Energy-intensive manufacturing and primarily process-driven customers

For each sector, Cadmus developed a baseline end-use load forecast that assumed no new future programmatic conservation. The baseline forecast largely captured savings from building energy codes, equipment standards, and other naturally occurring market forces. Cadmus calculated energy efficiency potential estimates by assessing each ECM's impact on this baseline forecast. Therefore, conservation potential estimates presented in this report represent savings beyond codes and standards, and naturally occurring savings.

Consistent with the Washington Administrative Code (WAC) requirements, this study considers three types of energy efficiency potential, as shown in Figure 1.1.

[5] RCW 19.285.040 requires CPAs to use methodologies consistent with those used by the Council's most recent regional power plan.

Figure 1.1. Incremental Achievable Economic Potential

EPA- National Action Plan for Energy Efficiency

This study defines the three types of potential as follows:

- **Technical potential** includes all technically feasible conservation measures, regardless of costs and market barriers. This is the theoretical upper bound of available conservation potential, estimated after accounting for technical constraints. The Methodology section of this report includes a description of the data sources Cadmus used to estimate these technical constraints for individual measures.
- **Economic potential** represents a subset of technical potential, consisting only of measures meeting cost-effectiveness criteria, based on City Light's avoided supply costs for delivering electricity. Adherent to WAC 194-37-070, Cadmus used the total resource cost (TRC) to identify cost-effective measures using a method consistent with the Council. The report's Economic Potential section includes a detailed description of benefits and costs considered.
- **Achievable economic potential** represents the portion of economic potential that might be reasonably achievable during the 21-year study horizon, given the possibility of market barriers impeding customer adoption such as initial first cost, awareness and understanding of energy efficient technologies, and sufficient contractor base for installing efficient technologies. Ramp rates—defined as the acquisition rates for specific technologies—also determine the amount of economic potential considered achievable on an annual basis, beginning in 2020. The Achievable Economic Potential section discusses Cadmus' approach to estimating achievable potential.

1.3. Summary of Results

Study results indicate a 10-year achievable conservation potential of 82.7 average megawatts (aMW) (cumulative in 2029) within City Light's service territory. Two-year conservation potential equals 21.3 aMW, and the *pro rata* share (20 percent of 10-year conservation potential) which represents City

Light's minimum biennial target equals 16.5 aMW. Table 1.1 summarizes achievable economic conservation potential for each sector; all values include line losses at the generator.

1.3.1. Achievable Economic Potential

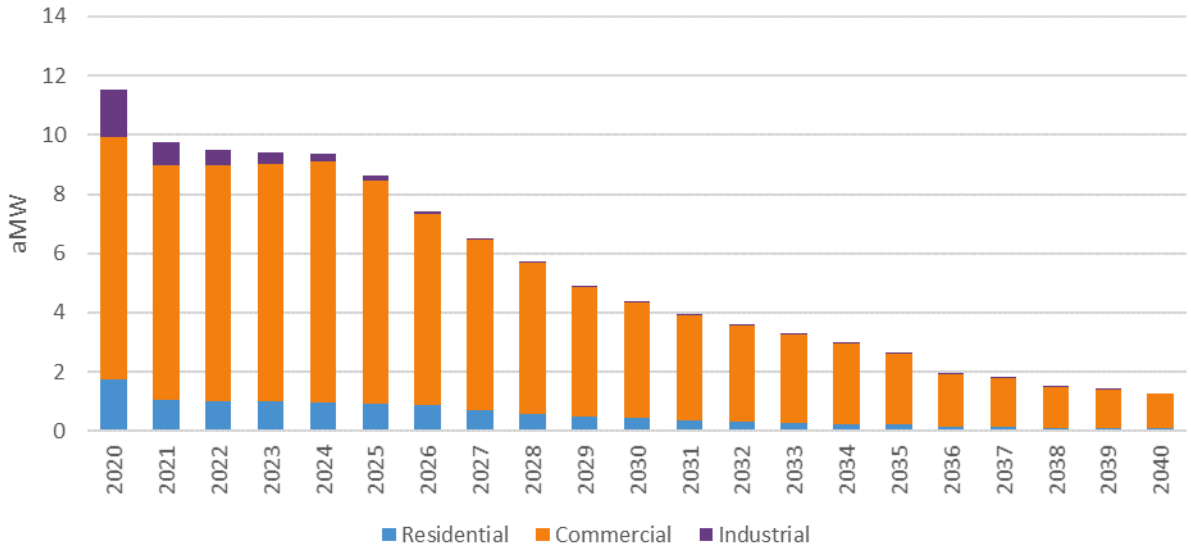
TABLE 1.1. CUMULATIVE ACHIEVABLE POTENTIAL BY SECTOR

Sector	Achievable Economic Potential (aMW)			
	Two Year (2020-2021)	Ten Year (2020-2029)	21 Year (2020-2040)	20% of 10-Year Potential
Residential	2.77	9.27	11.70	1.85
Commercial	16.10	69.43	95.54	13.89
Industrial	2.40	3.96	4.04	0.79
Street Lighting	0	0	0	0
Total	21.27	82.67	111.28	16.53

The commercial sector accounts for approximately 86 percent of cumulative, 21-year achievable potential, while the residential and industrial sectors account for roughly 11 percent and 3 percent of the 21-year potential, respectively. The study did not estimate street lighting potential, unlike the 2018 CPA because all streetlights have been upgraded to LED. This report's Energy Efficiency Potential section provides detailed estimates of achievable economic potential for each sector.

Figure 1.2 shows incremental achievable potential over the study horizon. Approximately 72 percent of the 21 year conservation potential will be achieved within the first 10 years, partly due to the mixture of measures with high conservation potential. This acceleration becomes particularly pronounced in the residential and industrial sectors, where 77 percent and 96 percent, respectively, of potential is acquired within the first 10 years. Cadmus determined the acquisition rate of incremental achievable potential using each measure's ramp rate, applying ramp rates developed by the Council for the Seventh Power Plan, and accelerating the application of ramp rates based on Seattle's historic conservation achievements. Historically, City Light has achieved energy savings greater than both its I-937 targets and its share of the regional savings on a percent of sales basis. Therefore, some ramp rates have been adjusted to reflect the greater pace of achievement, particularly with respect to commercial lighting technologies.

Figure 1.2. Incremental Achievable Economic Potential

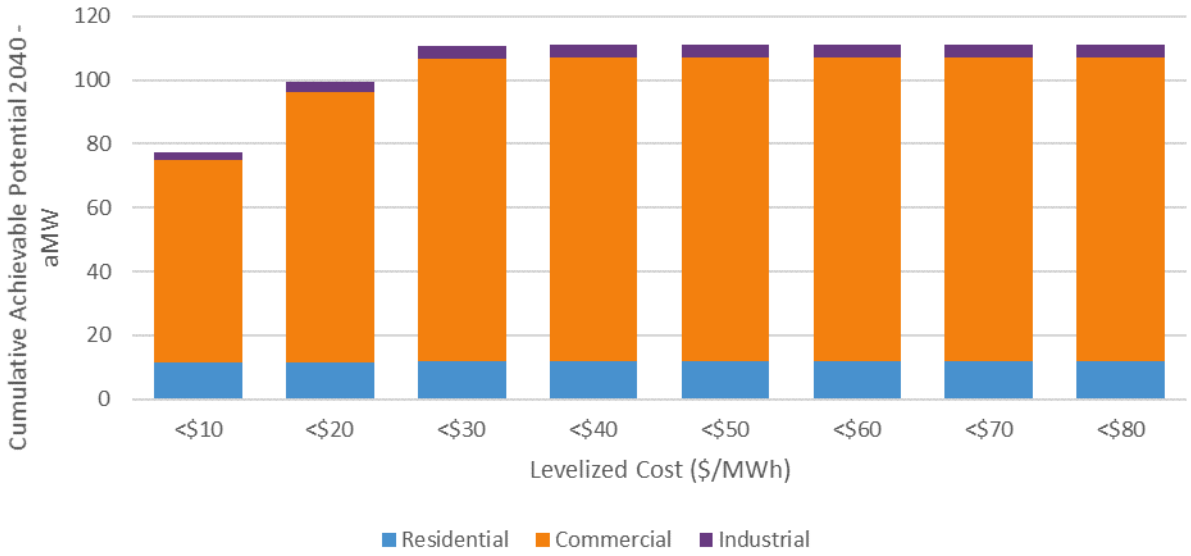


Lighting measures in the commercial sector account for a large portion of savings, and many of these measures have relatively aggressive ramp rates, based on the measures' availability and City Light's' program accomplishments. The Achievable Economic Potential section discusses Cadmus' ramp-rate application rates to determine incremental achievable potential; the Energy Efficiency Potential section includes descriptions of the top-saving measures in each sector.

Figure 1.3 shows the amount of 21-year cumulative achievable potential at different, levelized cost thresholds. Levelized costs (expressed in 2018 dollars) represent the present value of the incremental measure cost, including reinstallations over the course of the study horizon, divided by the net present value of energy savings over the study's horizon.[6] Levelized costs of conserved energy often are used to compare the cost of conservation to supply-side resources.

[6] The report's Economic Potential section includes a detailed discussion of levelized cost calculation, including the methodology and components.

Figure 1.3. Conservation Supply Curves



Potential conservation remains a low-cost resource: study results indicate roughly 78 aMW of conservation is achievable at a cost of less than $10 per megawatt-hour (MWh). This roughly accounts for 70 percent of the 21-year cumulative achievable potential. Approximately 89 percent of the 21-year, cumulative, achievable potential costs less than $20/MWh when levelized.

1.3.2. Technical and Economic Potential

1.3.2.1 Technical Potential

Table 1.2 shows the cumulative technical potential for each sector in 2040. Overall, study results identify 282 aMW of technically feasible conservation potential by 2040—the equivalent of 23 percent of forecasted baseline sales. Study results are presented as a percent of forecasted baseline sales which provides a useful benchmark for comparison against previous CPAs and the Council's 7th Power Plan.

TABLE 1.2. TECHNICAL POTENTIAL

Sector	Baseline Sales– 21 Year (aMW)	Technical Potential– 21 Year (aMW)	Technical Potential as % of Baseline Sales
Residential	440	100	23%
Commercial	693	173	25%
Industrial	88	9	10%
Street Lighting	5	0	0%
Total	1,226	282	23%

The commercial, residential, and industrial sectors account for 61 percent, 36 percent, and 3 percent of the 21-year technical potential, respectively.

1.3.2.2 Economic Potential

According to WAC 194-37-070, City Light must consider conservation potential estimates using avoided costs equal to a forecast of regional market prices. Regional market price forecasts, however, do not necessarily reflect all the costs associated with City Light's preferred portfolio of generation resources. To assess impacts of avoided cost uncertainty, Cadmus prepared estimates of economic and achievable potential, using an avoided energy cost forecast that assumes continued purchases and delivery from Bonneville Power Administration after City Light's 20-year contract ends in 2028, inclusion of the social cost of carbon based on Washington's Clean Energy Transformation Act (ESSSB 5116), additions for renewable energy credits, market purchases during the month of June since the monthly shaping of the BPA contract assumes no BPA purchases in June so energy efficiency displaces market purchases in June, and a 10 percent conservation credit.[7]

The study also accounted for forecasts of deferred transmission and distribution (T&D) costs. The 2020 CPA updated these values to align with the Council's recently updated assumptions for its upcoming 2021 Power Plan.[8] Cadmus used forecast values from the Council's presentation in March of 2019, which reflected values of $3.08/kW-year and $6.85/kW-year for transmission and distribution, respectively, which were converted from 2016 to 2018 dollars.[9] As City Light does not face constrained generation capacity, these scenarios do not include costs associated with adding generation capacity.

In the 2020 CPA, total levelized avoided costs for the 2020 to 2040 period are approximately $38/MWh, compared to $52/MWh in the 2018 CPA, or nearly 27 percent lower, as shown in Figure 1.4.[10] These lower avoided energy and capacity costs contributed to a decrease in economic potential in the residential, commercial, and industrial sectors, in addition to factors contributing to lower technical potential.

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7 The Northwest Power Act requires the Bonneville Power Administration to provide a 10 percent benefit to conservation over other sources of electric generation. Northwest Power Act, Section 3(4)(D), 94 Stat. 2699.

8 https://www.nwcouncil.org/sites/default/files/2019_0312_p3.pdf

9 The Council's values were presented in its March 2019 meeting and reflect weighted average values from several regional utilities and are expressed in $2016, levelized. https://www.nwcouncil.org/sites/default/files/2019_0312_p3.pdf

10 Both the 2018 CPA and 2020 CPA levelized cost values are expressed in 2018 dollars for comparison purposes

Figure 1.4. Economic Potential as a Fraction of Baseline Sales – 2040 Cumulative

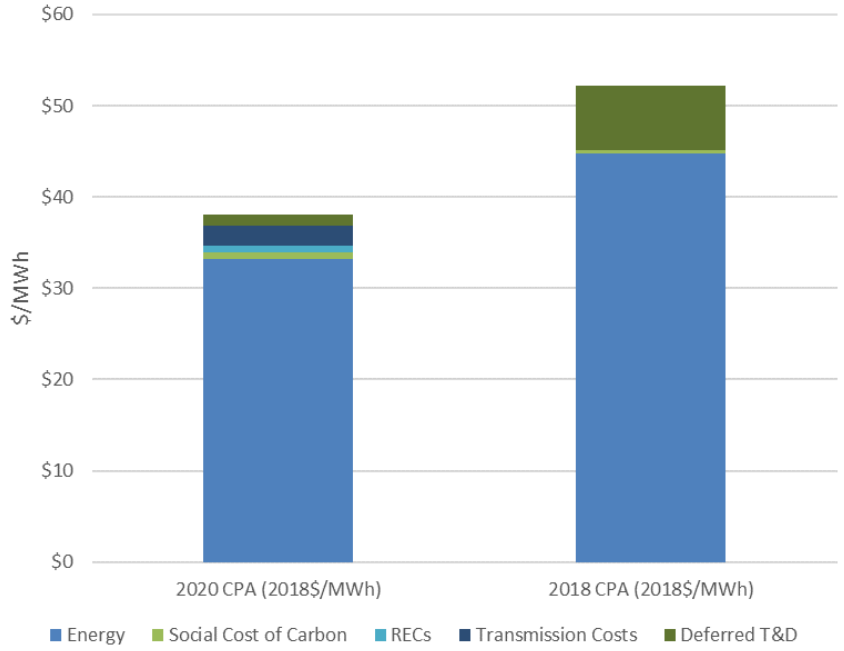


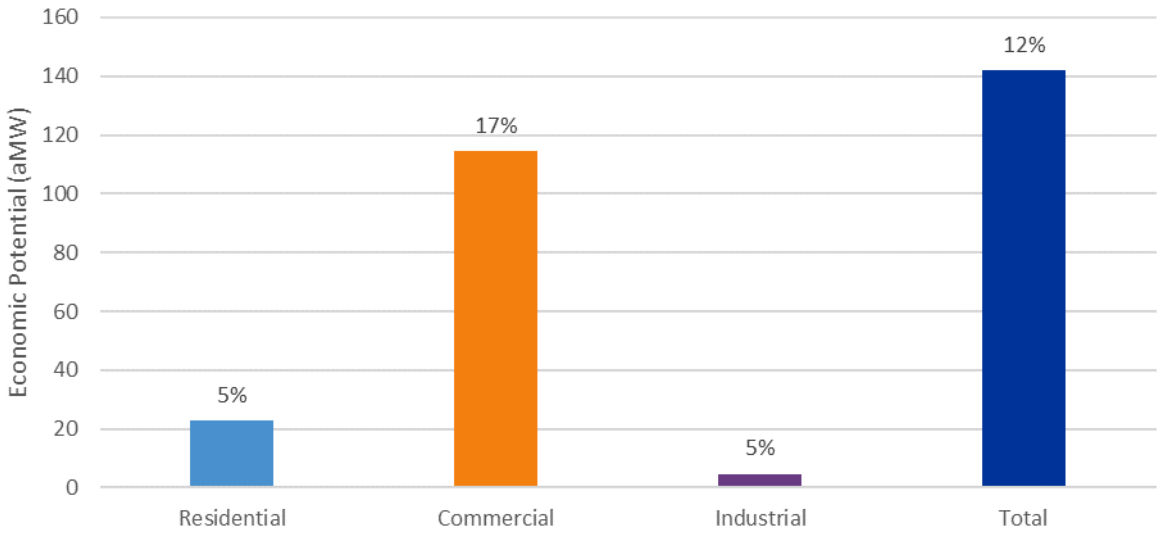
Table 1.3 summarizes cumulative economic potential in 2040 for each avoided-cost scenario. Using updated avoided costs, approximately 23 percent of technical potential proves cost-effective in the residential sector, compared to 66 percent in the commercial sector and 56 percent in the industrial sector. Substantial differences in the percent of technical potential that is economic exist between sectors, particularly for the residential sector, which is much lower than commercial and industrial. The primary reason for this discrepancy is that, relatively speaking, residential measures are typically less cost-effective than commercial and industrial, as unit energy savings are lower due to the relative magnitude of energy consumption between homes, businesses, and industries.

TABLE 1.3. ECONOMIC POTENTIAL

Sector	Economic Potential—21 Year (aMW)	Economic Potential as a % of Baseline Sales	Economic Potential as a % of Technical Potential
Residential	23	5%	23%
Commercial	115	17%	66%
Industrial	5	5%	56%
Total	142	12%	50%

Figure 1.5 shows the cumulative economic potential in 2040, relative to forecasted baseline sales, by sector.

Figure 1.5. Economic Potential as a Fraction of Baseline Sales – 2040 Cumulative



WAC 194-070 requires City Light to test multiple scenarios and incorporate risk into estimates of achievable potential. By using a higher or lower IRP avoided-cost scenario based on the relative change in avoided costs from the last CPA instead of a scenario based on avoided costs that reflect market prices, Cadmus accounted for risk associated with market price forecasts.

1.3.3. Comparison to the 2018 CPA

TABLE 1.4. TECHNICAL POTENTIAL COMPARISON						
	2020 CPA			2018 CPA		
Sector	Baseline Sales—21 Year (aMW)	Technical Potential—21 Year (aMW)	Technical Potential as % of Baseline Sales	Baseline Sales—20 Year (aMW)	Technical Potential—20 Year (aMW)	Technical Potential as % of Baseline Sales
Residential	440	100	23%	336	85	25%
Commercial	693	173	25%	747	180	24%
Industrial	88	9	10%	150	13	9%
Street Lighting	5	0	0%	10	1	12%
Total	1,226	282	23%	1,242	279	22%

The 2020 CPA identified 282 aMW of technical potential, compared to 279 in the 2018 CPA. This very slight increase affects changes in both the economic and achievable potential. Changes contributing to the difference in technical potential include the following:

- Higher residential baseline load forecasts
- New residential measures not previously considered in the 2018 CPA
- Additional commercial measures not previously included in the 2018 CPA
- Lower industrial baseline load forecasts due to the re-classification of some industrial customer premise loads in the commercial sector

This report's Comparison to 2018 CPA section discusses each factor in detail. Table 1.5 compares economic potential for the 2020 and 2018 CPAs.

TABLE 1.5. ECONOMIC POTENTIAL COMPARISON						
Sector	2020 CPA (Market Avoided Costs)			2018 CPA (IRP Avoided Costs)		
	Economic Potential—21 Year (aMW)	Economic Potential as % of Baseline Sales	Economic as a % of Technical Potential	Economic Potential—20 Year (aMW)	Economic Potential as % of Baseline Sales	Economic as a % of Technical Potential
Residential	23	5%	23%	21	6%	25%
Commercial	115	17%	66%	131	17%	72%
Industrial	5	5%	56%	10	7%	77%
Street Lighting	0	0%	0%	1	12%	100%
Total	142	12%	50%	163	13%	58%

The 2020 CPA identified 142 aMW of economic potential, compared to 163 aMW of economic potential in the 2018 CPA. Lower avoided energy and deferred T&D capacity costs contributed to decreases in the residential, commercial, and industrial sectors, in addition to factors contributing to lower technical potential for the commercial and industrial sectors only (see Table 1.4).

As with technical and economic potential assessment, Cadmus identified lower 20-year, cumulative achievable economic potential. As 20-year cumulative achievable potential represents a subset of economic potential, factors contributing to lower cumulative achievable potential were the same as those previously discussed for economic potential. Figure 1.5 shows incremental achievable economic potential for the 2020 and 2018 CPAs.

Figure 1.6. Incremental Achievable Economic Potential 2020 and 2018 CPAs

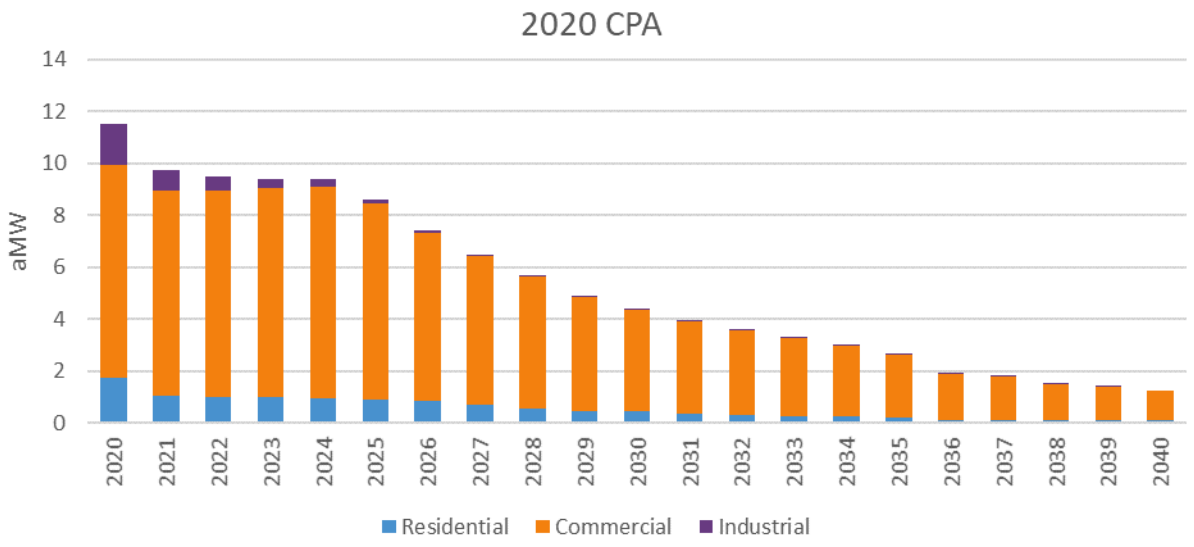


Figure 1.6. Incremental Achievable Economic Potential 2020 and 2018 CPAs

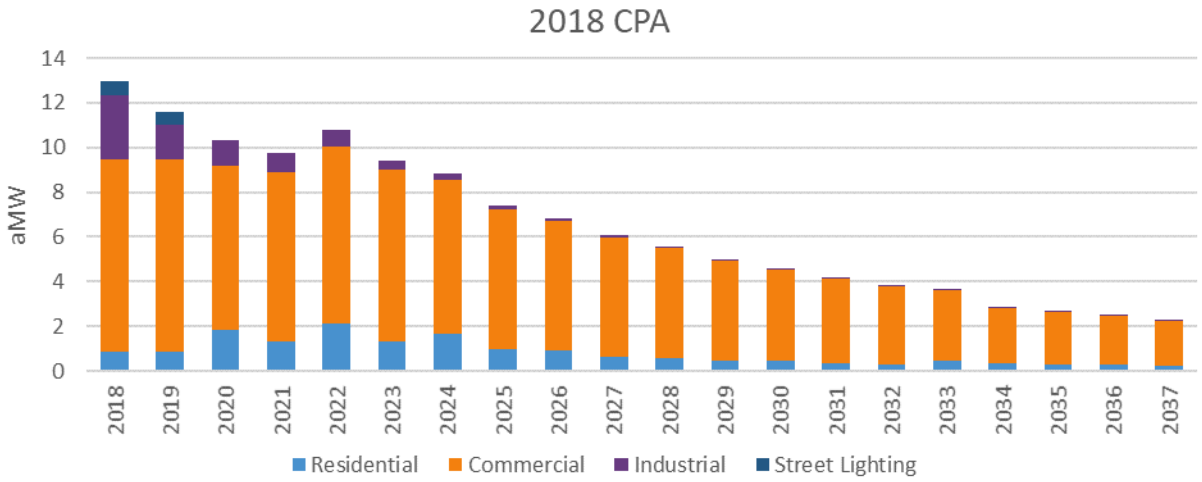


Figure 1.7 illustrates, compared to the 2018 CPA, the 2020 CPA determines a higher proportion of total achievable potential will be realized in the study's early years. This change results from multiple factors:

- The shift in the study horizon (moving from a 2018 start year to 2020)
- The application of faster ramp rates for lost opportunity measures to account for the difference in the 2020 CPA start year (2020) and 7th Plan start year (2016), which is also consistent with the approach taken by BPA's CPA.[11]

As illustrated in Figure 1.7, the cumulative achievable potential as a percent of 21-year achievable potential in the 2020 CPA is comparable to the 2018 CPA.

[11] Bonneville Power Administration. *BPA Conservation Potential Assessment, 2020-2039.* Prepared by The Cadmus Group and EES Consulting, July 2018. Available online: https://www.bpa.gov/EE/Utility/research-archive/Documents/BPA_Conservation_Potential_Assessment_2020-2039.pdf

Figure 1.7. Cumulative Achievable Potential as a Percent of Total Achievable Potential

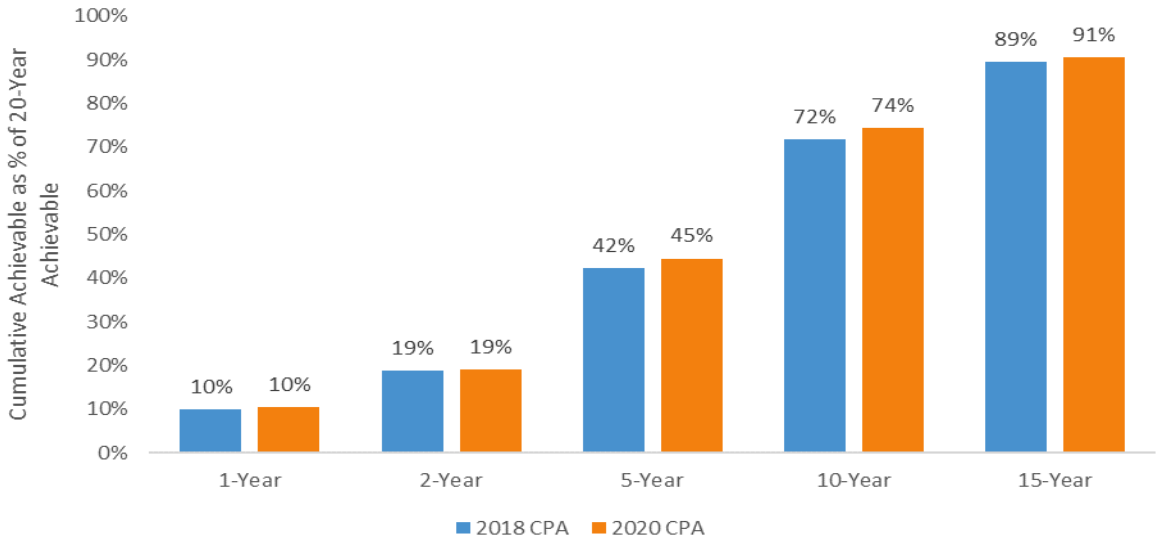


Table 1.6 provides a summary of the technical, economic, and achievable capacity savings from energy efficiency by sector, in 2040. The commercial sector accounts for 87% and 91% of the total, cumulative winter and summer capacity achievable potential, respectively.

TABLE 1.6. CUMULATIVE 21-YEAR WINTER AND SUMMER CAPACITY SAVINGS BY SECTOR, IN 2040

Sector	Technical Potential		Economic Potential		Achievable Potential	
	Winter MW	Summer MW	Winter MW	Summer MW	Winter MW	Summer MW
Residential	189	69	26	23	15	11
Commercial	243	317	162	189	135	158
Industrial	10	11	6	6	5	5
Total	**441**	**398**	**193**	**218**	**155**	**174**

The residential sector accounts for nearly 43% of the winter capacity technical potential but only 17% of the summer capacity technical potential, reflecting the relatively higher saturation of residential electric space heating loads compared with residential cooling loads. The residential sector's share of winter and summer economic and achievable capacity potential declines compared to its share of technical potential, as many of the highest capacity-savings measures are not cost-effective, including efficiency air source and ductless heat pumps and weatherization measures.

1.4. Organization of this Report

This report presents the study's findings in two volumes. Volume I—this document—presents the methodologies and findings. Volume II contains the appendices, and it provides detailed study results, supplemental materials, and summaries of demand response and solar photovoltaic potential.

Volume I includes the following sections:

- The methodology overview provides an overview of the methodology Cadmus used to estimate technical, economic, and achievable economic potential.
- Developing Baseline Forecasts provides an overview of Cadmus' approach to produce baseline end-use forecasts for each sector.
- Measure Characterization describes Cadmus' approach for developing a database of ECMs, deriving from this estimates of conservation potential. This section discusses how Cadmus adapted measure data from the Seventh Power Plan, RTF, and other sources for this study.
- Estimating Conservation Potential discusses assumptions and underlying equations used to calculate technical, economic, and achievable economic potential.
- Baseline Forecasts provides detailed sector-level results for Cadmus' baseline end-use forecasts.
- Energy Efficiency Potential provides detailed sector, segment and end-use specific estimates of conservation potential as well as discussion of top-saving measures in each sector.
- Comparison to 2018 CPA shows how this study's results (the 2020 CPA) compare to City Light's prior CPA.

Volume II includes the following sections:

- Appendix A. Washington Initiative 937 (I-937) Compliance Documentation
- Appendix B. Baseline Data
- Appendix C. Energy Efficiency Measure Descriptions
- Appendix D. Detailed Assumptions and Energy Efficiency Potential
- Appendix E. Measure Details

2. Methodology

2.1. Methodology Overview

Estimating conservation potential draws upon a sequential analysis of various ECMs in terms of technical feasibility (technical potential), cost-effectiveness (economic potential), expected market acceptance, and considered normal barriers possibly impeding measure implementation (achievable economic potential).

Cadmus' assessment took the following primary steps:

- Baseline forecasting, which involved determining 21-year future energy consumption by sector, market segment, and end use. The study calibrated the base year (2019) to City Light's sector-load forecasts produced in 2018. Baseline forecasts in this report include Cadmus' estimated impacts of naturally occurring potential and codes and standards.
- Estimation of technical potential, based on alternative forecasts reflecting the technical impacts of specific energy efficiency measures.
- Estimation of economic potential, based on alternative forecasts reflecting technical impacts of cost-effective ECMs.
- Estimation of achievable economic potential, calculated by applying ramp rates and on the achievability percentage to economic potential, which this section describes in detail.

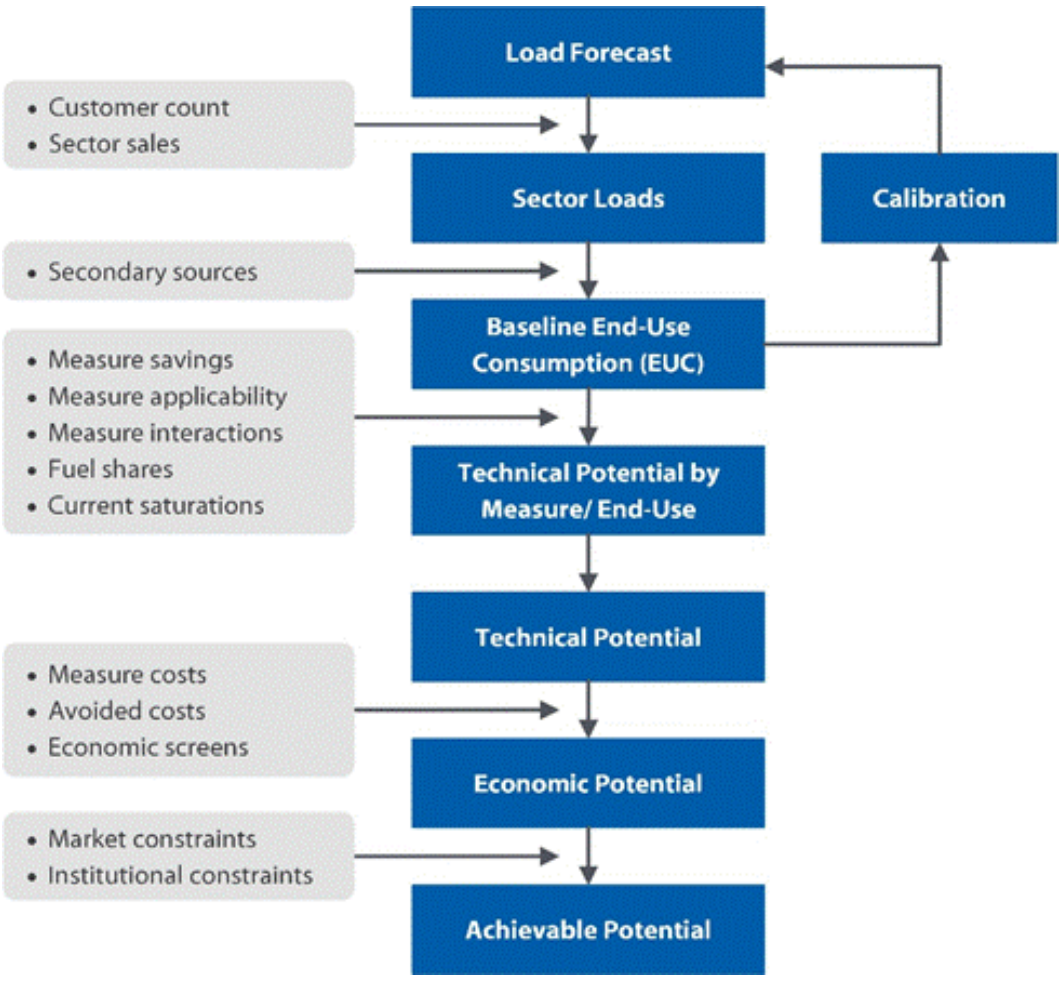
This approach offered two advantages:

- First, savings estimates would be driven by a baseline calibrated to City Light's.
- Second, the approach maintained consistency among all assumptions underlying the baseline and alternative forecasts—technical, economic, and achievable technical. The alternative forecasts changed relevant inputs at the end-use level to reflect ECM impacts. As estimated savings represented the difference between baseline and alternative forecasts, they could be directly attributed to specific changes made to analysis inputs.

Cadmus' general methodology can be best described as a combined top-down/bottom-up approach. As shown in Figure 2.1, the top-down component began with the most current load forecast, adjusting for building codes, equipment efficiency standards, and market trends not accounted for through the forecast. It then disaggregated this load forecast into its constituent customer sectors, customer segments, and end-use components.

The bottom-up component considered potential technical impacts of various ECMs and practices on each end use. Impacts could then be estimated, based on engineering calculations, and accounting for fuel shares, current market saturations, technical feasibility, and costs.

Figure 2.1. General Methodology for Assessment of Conservation Potential



2.2. Developing Baseline Forecasts

City Light's sector-level sales and customer forecasts provided the basis for assessing energy efficiency potential. Prior to estimating potential, the study disaggregated sector-level load forecasts by customer segment (business, dwelling, or facility types), building vintage (existing structures and new construction), and end uses (all applicable end uses in each customer sector and segment).

The first step in developing baseline forecasts determined the appropriate customer segments within each sector. Designations drew upon categories available in the study's key data sources—primarily City Light's nonresidential customer database (for the C&I sectors), and the U.S. Census Bureau's American Community Survey (for the residential sector), followed by mapping appropriate end uses to relevant customer segments.

Upon determining appropriate customer segments and end uses for each sector, the study produced the baseline end-use forecasts, based on integration of current and forecasted customer counts with key market and equipment usage data.

For the commercial and residential sectors, calculating total baseline annual consumption for each end use in each customer segment used the following equation:

$$EUSE_{ij} = \Sigma_e \, ACCTS_i * UPA_i * SAT_{ij} * FSH_{ij} * ESH_{ije} * EUI_{ije}$$

Where:

$EUSE_{ij}$	=	total energy consumption for end use j in customer segment i
$ACCTS_i$	=	the number of accounts/customers in customer segment i
UPA_i	=	units per account in customer segment i (UPAi generally equals the average square feet per customer in commercial segments, and 1.0 in residential dwellings, assessed at the whole-home level)
SAT_{ij}	=	the share of customers in customer segment i with end use j
FSH_{ij}	=	the share of end use j of customer segment i served by electricity
ESH_{ije}	=	the market share of efficiency level in equipment for customer segment and end use ij
EUI_{ije}	=	end-use intensity: energy consumption per unit (per square foot for commercial) for the electric equipment configuration ije

For each sector, total annual consumption could be determined as the sum of $EUSE_{ij}$ across the end uses and customer segments.

Consistent with other conservation potential studies, and commensurate with industrial end-use consumption data (which varied widely in quality), allocating the industrial sector's loads to end uses in various segments and drawing upon data available from the U.S. Department of Energy (DOE) Energy Information Administration.[12]

2.2.1. Derivation of End-Use Consumption

End-use energy consumption estimates by segment, end use, and efficiency level *(EUI_{ije})* provided one of the most important components in developing a baseline forecast. In the residential sector, the study used estimates on unit energy consumption (UEC), representing annual energy consumption associated with an end use and represented by a specific type of equipment (e.g., a central air conditioner or heat pump).

For the commercial sector, the study treated consumption estimates as end-use intensities, representing annual energy consumption per square foot served. The accuracy of these estimates proved critical. They accounted for weather and other factors (described below) that drove differences among various segments.

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[12] Energy Information Administration. *Manufacturing Energy Consumption Survey.* U.S. Department of Energy. *2010.*

For the industrial sector, end-use energy consumption represented total annual industry consumption by end use, as allocated by the secondary data described above.

2.3. Measure Characterization

As technical potential drew upon an alternative forecast, reflecting installations of all technically feasible measures, selecting appropriate ECMs to include in this study posed a central concern. To alleviate this concern and to arrive at the most robust set of appropriate measures, Cadmus developed a comprehensive database of technical and market data for ECMs; these applied to all end uses in various market segments. The database included the following measures:

- All measures included in the Council's final Seventh Power Plan conservation supply curve workbooks
- Active RTF UES measures
- Particular technologies of interest to City Light, as identified for the study (e.g., residential and commercial central cooling and room cooling measures)

Cadmus only included Council and RTF measures applicable to sectors and market segments within City Light's service territory. For example, the study did not characterize measures for the agriculture sector or the residential manufactured home segment as these represented a small fraction of City Light's customer mix.

Cadmus added measures if the RTF developed UES workbooks not included in the Seventh Power Plan. For the residential sector, these included the following:

- ENERGY STAR room air conditioners
- Residential refrigerator and freezer decommissioning
- Interior fluorescent high-performance T8 lamps

In the commercial sector, additional RTF measures included the following:

- Commercial refrigerator and freezer decommissioning
- Efficient commercial ice makers

After creating a list of electric energy efficiency measures applicable to City Light's service territories, Cadmus classified the measures into two categories:

- **High-efficiency equipment measures** directly affecting end-use equipment (e.g., high-efficiency domestic water heaters), which follow normal replacement patterns based on expected lifetimes.
- **Non-equipment (retrofit) measures** affecting end-use consumption without replacing end-use equipment (e.g., insulation). Such measures do not include timing constraints from equipment turnover—except for new construction—and should be considered discretionary, given that savings can be acquired at any point over the planning horizon.

Each measure type's relevant inputs include the following:

Equipment and non-equipment measures:

- Energy savings: average annual savings attributable to installing the measure, in absolute and/or percentage terms.
- Equipment cost: full or incremental, depending on the nature of the measure and the application.
- Labor cost: the expense of installing the measure, accounting for differences in labor rates by region, urban versus rural areas, and other variables.
- Technical feasibility: the percentage of buildings where customers can install this measure, accounting for physical constraints.
- Measure life: the expected life of the measure equipment.

Non-equipment measures only:

- Technical feasibility: the percentage of buildings where customers can install this measure, accounting for physical constraints.
- Percentage incomplete: the percentage of buildings where customers have not installed the measure, but where its installation is technically feasible. This equals 1.0 minus the measure's current saturation.
- Measure competition: for mutually exclusive measures, accounting for the percentage of each measure likely installed to avoid double-counting savings.
- Measure interaction: accounting for end-use interactions (e.g., a decrease in lighting power density causing heating loads to increase).

Cadmus derived these inputs from various sources, though primarily through the following:

- Northwest Energy Efficiency Alliance's (NEEA) CBSA, including City Light's oversample
- NEEA's RBSA
- The Council's Seventh Power Plan supply curve workbooks
- The RTF's UES measure workbooks

For many equipment and non-equipment inputs, Cadmus reviewed a variety of sources. To determine which source to use for this study, Cadmus developed the following hierarchy for costs and savings:

- The Council's Seventh Power Plan supply curve workbooks
- RTF UES measure workbooks
- Various secondary sources, such as American Council for an Energy-Efficient Economy work papers, Simple Energy and Enthalpy Model building simulations, or various technical reference manuals

Cadmus also developed a hierarchy to determine the source for various applicability factors, such as the technical feasibility and the percentage incomplete. This hierarchy differed slightly for residential and commercial measure lists. Generally, the study sought to achieve 90 percent confidence with a ±10 percent precision for each estimate.

For residential estimates, Cadmus relied on City Light's oversample in NEEA's 2016 RBSA. If City Light's subset included an insufficient sample to achieve 90 percent confidence with a ±10 percent precision for a given estimate, estimates were derived from the sample of Puget Sound-area customers (e.g., City Light, Puget Sound Energy, Snohomish County Public Utility District, Tacoma Power) or for the broader Northwest, as found in the RBSA. If Cadmus could not calculate applicability factors from NEEA's RBSA, the study used applicability factors from the Council's Seventh Power Plan workbooks. The resulting estimates reflected averages for the Northwest region and were not necessarily specific to City Light's service territory.

For the commercial sector, Cadmus first used the subset of City Light's customers, including City Light's and the Bonneville Power Administration's oversample in NEEA's CBSA. If NEEA's CBSA had an insufficient number of customers to achieve estimates with 80 percent confidence with a ± 20 percent precision for a given building type, Cadmus developed estimates from the sample of urban buildings in the regional CBSA data. If NEEA's CBSA did not include sufficient data to estimate an applicability factor for a given measure, Cadmus relied on factors from the Council's Seventh Power Plan supply curve workbooks.

By data input, Table 2.1 lists the primary sources referenced in the study.

TABLE 2.1. KEY MEASURE DATA SOURCES			
Data	**Residential Source**	**Commercial Source**	**Industrial Source**
Energy savings	Seventh Power Plan supply curve workbooks; RTF; Cadmus research	Seventh Power Plan supply curve workbooks; RTF; Cadmus research	Seventh Power Plan supply curve workbooks; RTF; DOE Industrial Assessment Center database; Cadmus research
Equipment and labor costs	Seventh Power Plan supply curve workbooks; RTF; Cadmus research	Seventh Power Plan supply curve workbooks; RTF; Cadmus research	Seventh Power Plan supply curve workbooks; RTF; DOE Industrial Assessment Center database; Cadmus research
Measure life	Seventh Power Plan supply curve workbooks; RTF; Cadmus research	Seventh Power Plan supply curve workbooks; RTF; Cadmus research	Seventh Power Plan supply curve workbooks; RTF; DOE Industrial Assessment Center database; Cadmus research
Technical feasibility	NEEA RBSA; Cadmus research	NEEA CBSA; Cadmus research	Cadmus research; Industrial Council data; NEEA Industrial Facilities Site Assessment (IFSA)
Percentage incomplete	NEEA RBSA; City Lights program accomplishments; Cadmus research	NEEA CBSA; City Lights program accomplishments; Cadmus research	Cadmus research; Industrial Council data; NEEA IFSA
Measure interaction	Seventh Power Plan supply curve workbooks; RTF; Cadmus research	Seventh Power Plan supply curve workbooks; RTF; Cadmus research	Cadmus research

2.3.1. Incorporating Codes and Standards

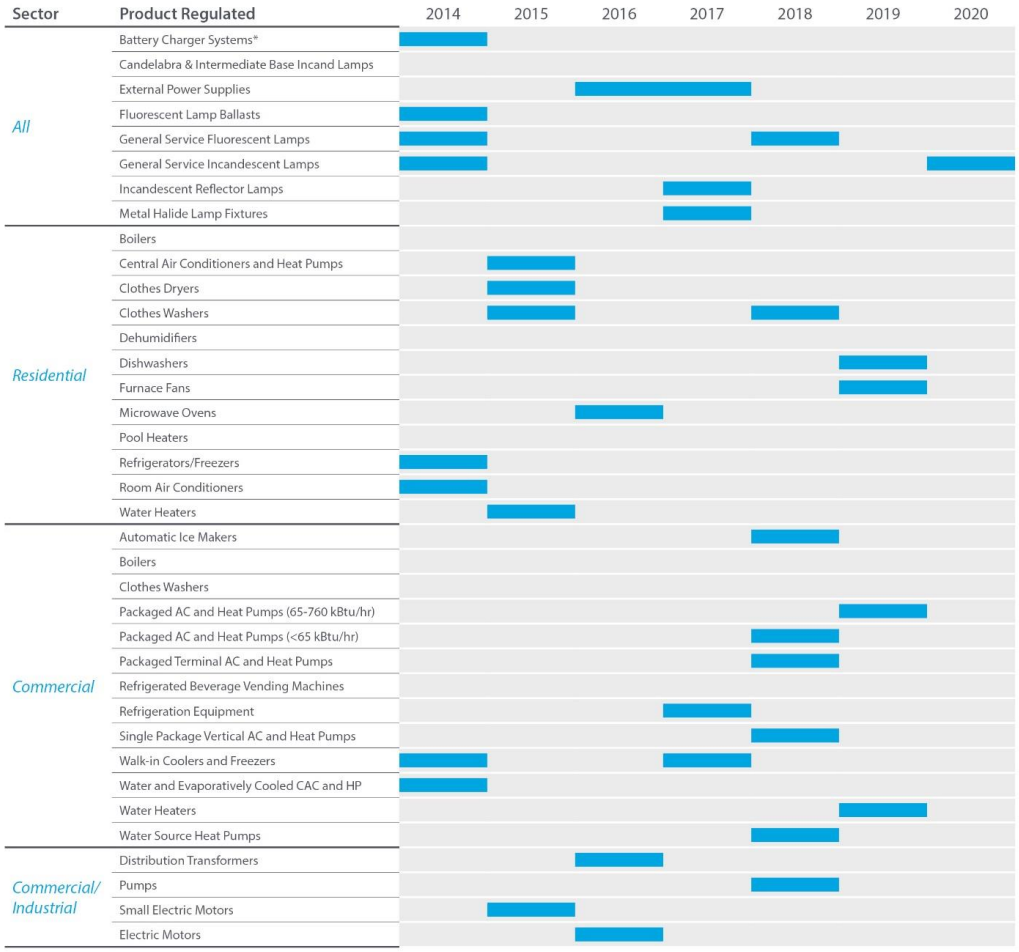
Cadmus' assessment accounted for changes in codes and standards over the planning horizon. These changes not only affected customers' energy-consumption patterns and behaviors; they also determined which energy efficiency measures would continue to produce savings over minimum requirements. Cadmus captured current efficiency requirements, including those enacted but not yet in effect.

Cadmus did not attempt to predict how energy codes and standards might change in the future. Rather, the study only factored in legislation already enacted—notably, the Energy Independence and Security Act of 2007 (EISA) provisions slated to take effect over the course of the analysis. EISA requires that

general service lighting becomes approximately 30 percent more efficient than current incandescent technology, with standards phased in by wattage from 2012 to 2014. In addition, EISA includes a backstop provision that requires even higher-efficiency technologies beginning in 2020.

Cadmus explicitly accounted for several other pending federal codes and standards. For the residential sector, these included appliance, HVAC, and water-heating standards. For the commercial sector, these included appliance, HVAC, lighting, motor, and water-heating standards. Figure 2.2 provides a comprehensive list of equipment standards considered in the study. Bars indicate the year in which a new equipment standard will be enacted. Some products will be subject to multiple standards over the planning horizon.

Figure 2.2. Equipment Standards Considered



** Battery chargers are an Oregon state standard, not a federal standard*

The study considered four codes and standards sources in addition to federal standards:

1. 2015 Washington State Energy Code (WSEC)
2. 2015 City of Seattle Energy Code

3. City of Seattle Office of Sustainability Benchmarking Code
4. Washington State House Bill 1444 Appliance Standards

The study incorporated the WSEC in its baseline development of residential and new construction measures. After reviewing the City of Seattle Energy Code, one small adjustment was made to single family heat pump measures in new construction applications; however, none of these measures passed cost-effectiveness testing. Other measures affected by the City of Seattle Energy Code were either not cost-effective (new construction interior lighting controls) or offered relatively low amounts of technical and economic potential and the code applied to only a portion of measure applications (commercial direct digital control energy management in new construction). Similarly, Cadmus reviewed both the City of Seattle OSE Benchmarking Code and the Washington State HB 1444 appliance standards and concluded the study had either sufficiently considered the standards (in the case of HB 1444) and that, since the effects of the new benchmarking code were still unknown, no additional adjustments were required.

2.3.2. Adapting Measures from the RTF and Seventh Power Plan

To ensure consistency with methodologies employed by the Council and to fulfill requirements of WAC 194-37-070, Cadmus relied on ECM workbooks developed by the RTF and the Council to estimate measure savings, costs, and interactions. In adapting these ECMs for this study, Cadmus adhered to the following principles:

- **Deemed ECM savings in RTF or Council Workbooks must be preserved:** As City Light relies on deemed savings estimates provided by the Bonneville Power Administration that largely remain consistent with savings in RTF workbooks in demonstrating compliance with I-937 targets, Cadmus sought to preserve these deemed savings in the potential study. Doing so avoided possible inconsistencies between estimates of potential, targets, and reported savings.
- **Use inputs specific to City Light's service territory:** Some Council and RTF workbooks relied on regional estimates of saturations, equipment characteristics, and building characteristics derived from RBSA and CBSA. Cadmus updated regional inputs with estimates, calculated either from City Light's oversample of CBSA and RBSA or from estimates affecting the broader Puget Sound area. This approach preserved consistency with Council methodologies while incorporating Seattle-specific data.

Cadmus' approach for adapting Council and Seventh Plan workbooks varied by sector, as described in the following sections.

2.3.2.1 Residential and Commercial

Cadmus reviewed each residential Council workbook and extracted savings, costs, and measure lives for inclusion in this study. Applicability factors (such as the current saturation of an ECM) largely derived from City Light's oversample of RBSA, adjusted for City Lights program accomplishments. If Cadmus could not develop a City Light-specific applicability factor from RBSA, it used the Council's regional value.

In addition to extracting key measure characteristics, Cadmus identified each measure as an equipment replacement measure or a retrofit measure. Key distinctions between these two types of measures included the following:

- Savings for equipment replacement measures were calculated as the difference between the measure consumption and baseline consumption. For instance, concerning the heat pump water heater measure, Cadmus estimated the baseline consumption of an average market water heater and used deemed Council savings to calculate the consumption for a heat pump water heater. This approach preserved deemed savings found in Council workbooks.
- Savings for retrofit measures were calculated in percentage terms relative to the baseline end-use consumption yet reflected deemed Council and RTF values. For instance, if the Council deemed savings of 1,000 kilowatt-hour (kWh) per home for a given retrofit measure and Cadmus estimated the baseline consumption for the end use to which this measure was applicable as 10,000 kWh, relative savings for the measure were 10 percent. Cadmus did not apply relative savings from the Council's workbooks to baseline end-use consumption; doing so would lead to per-unit estimates that differed from Council and RTF values.

Cadmus also accounted for interactive effects included in Council and RTF workbooks. For instance, the Council estimated water heating, heating and cooling savings for residential heat pump water heaters—with the heating and cooling savings as the interactive savings. Because installation of a heat pump water heater represented a single installation, Cadmus employed a stock accounting model, which combined interactive and primary end-use effects into one savings estimate. Though Cadmus recognized this approach could lead to overstating or understating savings in end use, in aggregate—across end uses—savings matched deemed Council values.

Cadmus generally followed the same approach with the commercial sector; however, because of the mixture of measures considered in the Seventh Power Plan, Cadmus chose to model all commercial measures as retrofits and none as equipment replacements. Although many commercial measures represent equipment improvements, commercial building operators often replace these measures before the end of their effective useful life (EUL). Savings and costs for these measures reflected this decision.

2.3.2.2 Industrial

Cadmus adapted measures from the Council's Industrial_tool_7thPlan_v09 workbook for inclusion in this study; the workbook defined values for the following key industrial measure inputs:

- Measure savings (expressed as end-use percentage savings)
- Measure costs (expressed in dollar per kWh saved)
- Measure lifetimes (expressed in years)
- Measure applicability (percentage)

Cadmus mapped each Council industry type to industries found in City Light's service territory. These included foundries, miscellaneous manufacturing, stone and glass, transportation equipment manufacturing, other food, frozen food, water, and wastewater. Cadmus identified applicable end uses

using the Council's assumed distribution of end-use consumption in each industry. Table 2.2 shows the distribution of end-use consumption and the list of industries considered in this study.

TABLE 2.2. DISTRIBUTION OF END USE CONSUMPTION BY SEGMENT

Cadmus Segment	Process Air Comp	Lighting	Fans	Pumps	Motors Other	Process Other	Process Heat	HVAC	Other	Process Electro-Chemical	Process Refrigeration
Foundries	7%	9%	10%	18%	6%	0%	21%	9%	1%	6%	14%
Frozen Food	4%	9%	4%	8%	16%	0%	4%	8%	6%	3%	39%
Other Food	6%	5%	28%	5%	16%	0%	0%	1%	6%	19%	15%
Transportation Equip	6%	15%	6%	8%	14%	0%	11%	19%	12%	4%	5%
Misc. Manufacturing	7%	11%	7%	10%	16%	0%	12%	17%	9%	5%	5%
Water	0%	0%	0%	0%	0%	0%	0%	0%	100%	0%	0%
Wastewater	0%	0%	0%	0%	0%	0%	0%	0%	100%	0%	0%
Stone and Glass	9%	5%	8%	14%	22%	3%	22%	6%	3%	0%	7%

To incorporate broader secondary data, Cadmus aggregated some Council end uses into broader end uses. Table 2.3 shows the mapping of Council end uses to Cadmus end uses.

TABLE 2.3. COUNCIL AND CADMUS END USES	
Council End Use	**Cadmus End Use**
Pumps	Pumps
Fans and Blowers	Fans
Compressed Air	Process Air Compressor
Material Handling	Process Electro Chemical
Material Processing	Motors Other
Low Temp Refer	Process Refrigeration
Pollution Control	Other
Other Motors	Motors Other
Drying and Curing	Process Heat
Heat Treating	Process Heat
Heating	Process Heat
Melting and Casting	Process Heat
HVAC	HVAC
Lighting	Lighting
Other	Other

2.4. Estimating Conservation Potential

As discussed, Cadmus estimated three types of conservation potential, as shown in Figure 2.3.

Figure 2.3. Types of Conservation Potential

EPA- National Action Plan for Energy Efficiency

The following sections describe Cadmus' approach to estimating each type of potential.

2.4.1. Technical Potential

Technical potential includes all technically feasible ECMs, regardless of costs or market barriers. Technical potential divides into two classes: discretionary (retrofit); and lost opportunity (new construction and replacement of equipment on burnout).

Another important aspect in assessing technical potential is, wherever possible, to assume installations of the highest-efficiency equipment that are commercially available. For example, this study examined CFL and LED general-service lighting in residential applications. In assessing technical potential, Cadmus assumed that, as equipment fails or new homes are built, customers will install LED lighting wherever technically feasible, regardless of cost. Where applicable, CFLs would be assumed as installed in sockets ineligible for LEDs. This study treated competing non-equipment measures in the same way, assuming installation of the highest-saving measures where technically feasible.

In estimating technical potential, it is inappropriate to merely sum up savings from individual measure installations. Significant interactive effects can result from installations of complementary measures. For example, upgrading a heat pump in a home where insulation measures have already been installed can produce fewer savings than upgrades in an uninsulated home. Analysis of technical potential accounts for two types of interactions:

- **Interactions between equipment and non-equipment measures:** As equipment burns out, technical potential assumes it will be replaced with higher-efficiency equipment, reducing average consumption across all customers. Reduced consumption causes non-equipment measures to save less than they would if had the equipment remained at a constant average efficiency. Similarly, savings realized by replacing equipment decrease upon installation of non-equipment measures.
- **Interactions between non-equipment measures:** Two non-equipment measures applying to the same end use may not affect each other's savings. For example, installing a low-flow shower head does not affect savings realized from installing a faucet aerator. Insulating hot water pipes, however, causes water heaters to operate more efficiently, thus reducing savings from either measure. This study accounted for such interactions by stacking interactive measures, iteratively reducing baseline consumption as measures were installed, thus lowering savings from subsequent measures.

Although, theoretically, all retrofit opportunities in existing construction—often called discretionary resources—could be acquired in the study's first year, this would skew the potential for equipment measures and provide an inaccurate picture of measure-level potential. Therefore, the study assumed these opportunities would be realized in equal, annual amounts, over the 21-year planning horizon. By applying this assumption, natural equipment turnover rates, and other adjustments described above, annual incremental and cumulative potential could be estimated by sector, segment, construction vintage, end use, and measure.

This study's technical potential estimates drew upon best-practice research methods and standard utility industry analytic techniques. Such techniques remained consistent with the conceptual approaches and

methodologies used by other planning entities (such as the Council in developing regional energy-efficiency potential) and remained consistent with methods used in City Light's previous CPAs.

2.4.2. Economic Potential

Economic potential represents a subset of technical potential, consisting only of measures meeting cost-effectiveness criteria, based on City Light's avoided supply costs for delivering electricity. Adherent to WAC 194-37-070, Cadmus used the TRC to identify cost-effective measures in a manner consistent with the Council. Table 2.4 summarizes benefits and costs considered in calculating benefit-cost ratios.

TABLE 2.4. TRC BENEFITS AND COSTS

Type	Component
Costs	Incremental Measure Equipment and Labor Cost
	Incremental O&M Cost
	Administrative Adder
Benefits	Avoided supply costs ($/kWh)
	Present Value of Non-Energy Benefits
	Present Value of T&D Deferrals ($/kW)
	10% Conservation Credit
	Secondary Energy Benefits

- **Incremental measure cost:** This study considered costs required to sustain savings over a 20-year horizon, including reinstallation costs for measures with useful lives less than 20 years. If a measure's useful life extended beyond the end of the 20-year study, Cadmus incorporated an end effect that treated the measure's cost over its EUL[13] as an annual reinstallation cost for the remainder of the 20-year period.[14]
- **Incremental operations and maintenance (O&M) costs or benefits:** As with incremental measure costs, O&M costs were considered annually over the 20-year horizon. Cadmus used the present value to adjust the levelized cost upward for measures with costs above baseline technologies and downward for measures that decreased O&M costs.
- **Administrative adder:** Cadmus assumed program administrative costs of 20 percent in the residential sector and 23 percent in the C&I sectors, basing these on City Light's actual 2015 program expenditures.

[13] This refers to levelizing over the measure's useful life, equivalent to spreading incremental measure costs in equal payments, assuming a discount rate of City Light's weighted average cost of capital.

[14] This method is applied to measures with a useful life of greater than 20 years and those with a useful life extending beyond the 20th year at the time of reinstallation.

- **Avoided supply costs**: City Light's portfolio from the 2018 IRP includes the continuation of the BPA block contract in the next 20 years using the net requirement product from BPA. This means that reductions in loads due to conservation displaces the amount of energy City Light can rely from BPA. As a result, the forecast of BPA energy and delivery rates is a major component in the avoided energy costs of conservation. However, the monthly shape of BPA block is such that City Light does not take any BPA power in June based on City light's portfolio shaping. Thus, conservation displaces market purchases in June. In addition, City Light reduces its purchase of RECs when loads are reduced due to conservation. Finally, the social cost of carbon based on the recently passed Clean Energy Transformation Act is applied to determine the avoided carbon cost due to conservation.
- **Non-energy benefits** were treated as a reduction in levelized costs for measures that saved resources (such as water or detergent). For example, the value of reduced water consumption from installing a low-flow shower head would reduce that measure's levelized cost.
- **The regional 10 percent conservation credit and T&D deferrals** were similarly treated as reductions in levelized cost for electric measures. The addition of this credit, per the Northwest Power Act, was consistent with the Council methodology and effectively served as an adder to account for unquantified external benefits from conservation when compared to other resources.[15]
- **Secondary energy benefits** were treated as a reduction in levelized costs for measures saving energy on secondary fuels. This treatment was necessitated by Cadmus' end-use approach to estimating technical potential. For example, consider R-60 ceiling insulation costs for a home with a gas furnace and an electric cooling system. For the gas furnace end use, Cadmus classified energy savings that R-60 insulation produced for electric cooling systems, conditioned on the presence of a gas furnace, as a secondary benefit that reduced the measure's levelized cost. This adjustment affected only the measure's levelized costs; the R-60's magnitude of energy savings on the gas supply curve was not affected by considering secondary energy benefits.

2.4.2.1 About Levelized Costs of Conserved Energy

In addition to benefit-cost ratios, the levelized cost of conserved energy had to be determined to characterize each measure-in-conservation supply curves. Where possible, the study aligned its approach for calculating each measure's levelized costs to the Council's levelized-cost methodology; levelized costs include all costs and benefits described above.

The approach adopted in calculating a measure's levelized cost of conserved energy aligned with that of the Council, considering the costs required to sustain savings over a 21-year study horizon (including reinstallation costs for measures with useful lives less than 21 years). If a measure's useful life extended

[15] Northwest Power & Conservation Council. Northwest Power Act. Available online: http://www.nwcouncil.org/library/poweract/default.htm

beyond the end of the 21-year study, Cadmus incorporated an end effect, treating the measure's levelized cost over its useful life as an annual reinstallation cost for the remainder of the 21-year period.

For example, Figure 2.4 shows the timing of initial and reinstallation costs for a measure with an eight-year lifetime, in context with the 21-year study. As a measure's lifetime in this study ends after the study horizon, the final five years (Year 17 through Year 21) were treated differently, levelizing measure costs over the measure's eight-year life and treating these as annual reinstallation costs.

Figure 2.4. Illustration of Capital and Reinstallation Cost Treatment

	Year																				
Component	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**	**16**	**17**	**18**	**19**	**20**	**21**
Initial Capital Cost																					
Reinstallation Cost																	End Effect				

As with incremental measure costs, Cadmus considered O&M costs annually over the 21-year horizon. The present value was used to adjust the levelized cost upward for measures with costs above baseline technologies and downward for measures that decreased O&M costs.

2.4.3. Achievable Economic Potential

Achievable economic potential can be defined as the portion of technical potential expected to be reasonably achievable during a planning horizon. The quantity of energy efficiency potential realistically achievable depends on multiple factors, including the following: the customers' willingness to participate in energy efficiency programs (partially as a function of incentive levels); retail energy rates and various market barriers that historically have impeded adoption of energy efficiency measures and practices by consumers. These barriers tend to vary, depending on a customer's sector, local energy market conditions, and other difficult-to-quantify factors.

However, calculation of achievable economic potential must assume a central tenet—that the amount of achievable technical potential is ultimately a function of customers' willingness and ability to adopt energy efficiency measures. This information can best be ascertained through direct intelligence from potential participants.

Although methods for estimating achievable economic potential vary across potential assessment efforts, two dominant approaches appear to be most widely utilized:

- Option 1. This approach assumes a hypothesized relationship between incentive levels and market penetration of energy efficiency programs. This achievable potential generally can be defined as that achieved solely through utility incentive programs. Often, it is based on an incentive level at 50 percent of the incremental cost.
- Option 2. This approach generally relies on a fixed percentage of technical potential, based on past experiences with similar programs. In the Northwest, for example, the Council has historically assumed that, by the end of a 20-year assessment horizon, 85 percent of the economic potential could be achieved and would include savings from utility programs, evolving market structures, and changes in codes and standards.

Consistent with the Council, this study used option two, assuming that up to 85 percent of economic potential could be acquired over the 21-year planning horizon. In addition to applying a fixed percentage, this study incorporated ramp rates to estimate annual achievable technical potential.

Developing sound utility IRPs requires knowledge of alternative resource options and reliable information on the long-run resource potential of achievable technologies. CPAs principally seek to develop reasonably reliable estimates of the magnitude, costs, and timing of resources likely available over the planning horizon's course; they do not, however, provide guidance regarding how (or by what means) identified resources might be acquired. For example, identified potential for electrical equipment or building shell measures might be attained through utility incentives, legislative action instituting more stringent efficiency codes and standards, or other means.

2.4.3.1 About Measure Ramp Rates

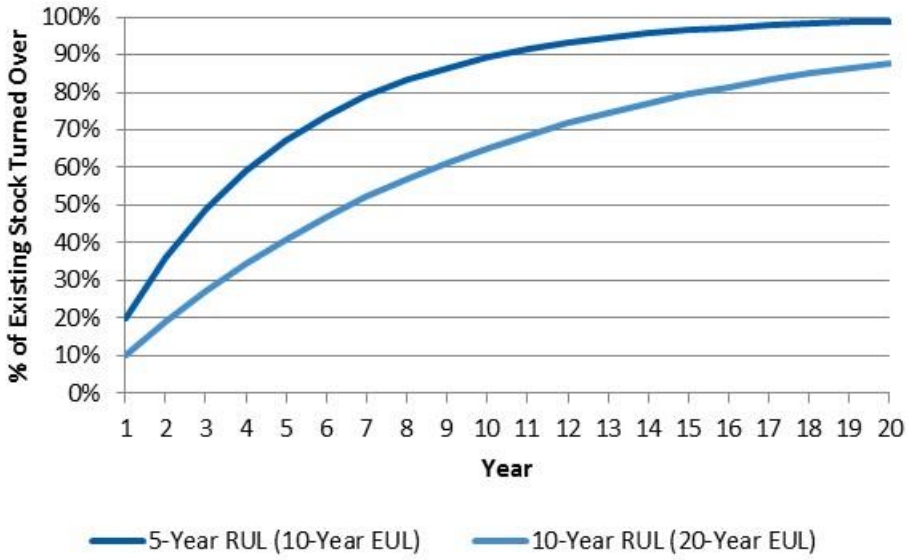
The study applied measure ramp rates to lost opportunity and discretionary resources, although interpretation and application of these rates differed for each class, as described below. Measure ramp rates generally matched those proposed for the Council's Seventh Power Plan. For measures not specified in the Seventh Power Plan, the study assigned a ramp rate considered appropriate for that technology—i.e., the same ramp rate as a similar measure in Sixth Power Plan or Seventh Power Plan.

Lost Opportunity Resources

Quantifying achievable economic potential for lost opportunity resources in each year required determining amounts technically available through new construction and natural equipment turnover. New construction rates drew directly from City Light's customer forecast. The study developed equipment turnover rates by dividing units into each year by the measure life. For example, if 100 units initially had a 10-year life, one-tenth of units (10) would be replaced. The following year, 90 units would remain, and one-tenth of these (9) would be replaced and so on over the study's course.

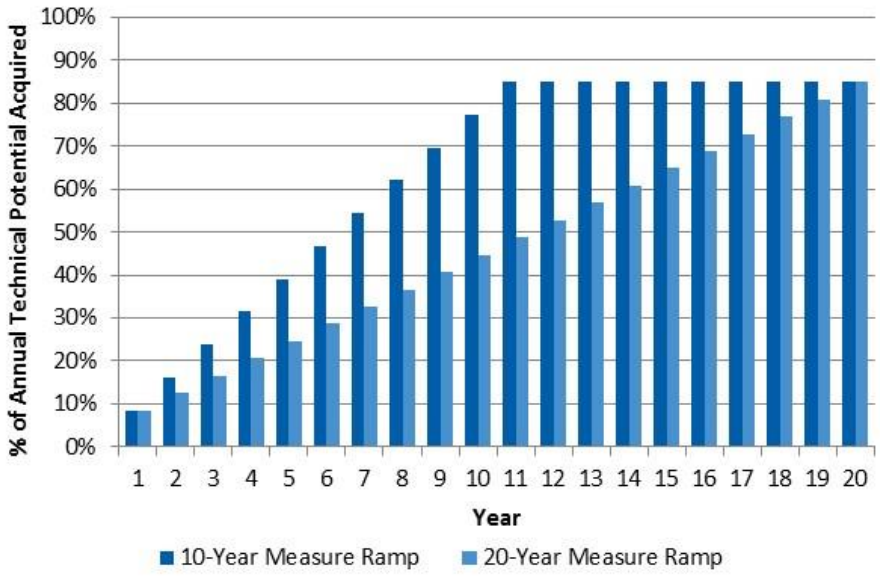
As the mix of existing equipment stock ages, the remaining useful life (RUL) would equal—on average—one-half of the EUL. The fraction of equipment turning over each year would be a function of this RUL; thus, economic potential for lost opportunity measures would have an annual shape before applying ramp rates, as shown in Figure 2.5. The same concept applied to new construction, where resource acquisition opportunities became available only during home or building construction. In addition to showing an annual shape, Figure 2.5 demonstrates that amounts of equipment turning over during the study period were a function of the RUL: the shorter the RUL, the higher the percentage of equipment assumed to turn over.

Figure 2.5. Existing Equipment Turnover for Varying RULs



In addition to natural timing constraints of equipment turnover and new construction rates, Cadmus applied measure ramp rates to reflect other resource acquisition limitations (such as market availability over the study's horizon). These measure ramp rates had a maximum value of 85 percent, reflecting the Council's assumption that, on average across all measures, up to 85 percent of technical potential could be achieved over a 20-year planning horizon. As shown in Figure 2.6, a measure that ramps up over 10 years would reach full market maturity—85 percent of annual technical potential—by the end of that period, while another measure might take 20 years to reach full maturity. Measures that were ramped over 21 years within this CPA included some newer technologies – such as advanced rooftop controllers or variable refrigerant flow – whereas measures that were ramped over a shorter time period included more mature and accepted technologies, such as various LED lighting technologies.

Figure 2.6. Examples of Lost Opportunity Ramp Rates



To calculate annual achievable economic potential for each lost opportunity measure, Cadmus multiplied technical resource availability and measure ramping effects together, consistent with the Council's methodology. In the early years of the study horizon, a gap occurs between assumed acquisition and 85 percent maximum achievability. These lost resources can be considered unavailable until the measure's EUL elapses. Therefore, depending on EUL and measure ramp rate assumptions, some potential may be pushed beyond the 20th year, and the total lost opportunity, achievable economic potential may be less than 85 percent of economic potential.

Figure 2.7 shows a case for a measure with a five-year RUL/10-year EUL. The spike in achievable economic potential, starting in year 11—after the measure's EUL—results from acquisition of opportunities missed at the beginning of the study period.

Figure 2.7. Example of Combined Effects of Resource Availability and Measure Ramping Based on 10-Year EUL

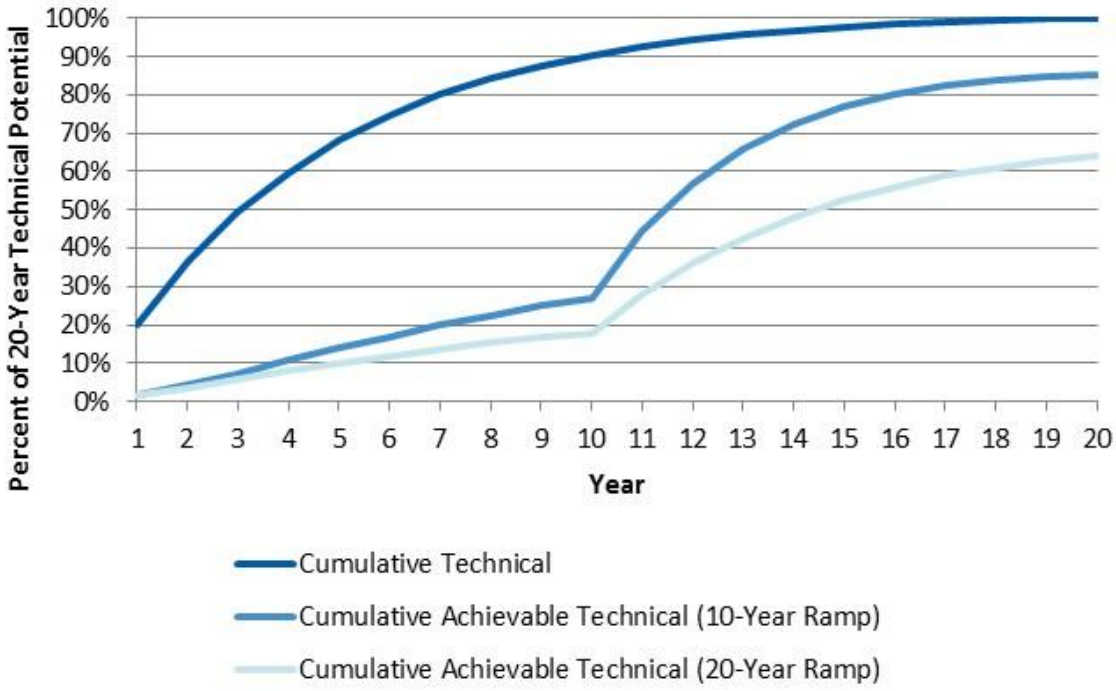


Table 2.5 illustrates this method, based on the same five-year RUL/10-year EUL measures on a 10-year ramp rate (the light blue line in Figure 2.7), assuming 1,000 inefficient units would be in place by Year One. In the first 10 years, lost opportunities would accumulate as the measure ramp-up rate caps availability of high-efficiency equipment. Starting in the 11th year, the opportunities lost 10 years previously become available again. Table 2.5 also shows this EUL and measure ramp rate combination results in 85 percent of technical potential achieved by the close of the study period.

As described, amounts of achievable potential are a function of the EUL and measure ramp rate. The same 10-yearyar EUL measure, on a slower 20-year ramp rate, would achieve less of its 20-year technical potential—also shown in Figure 2.7. Across all lost opportunity measures in this study, approximately 80 percent of technical potential appears achievable over the 20-year study period, a finding consistent with the Council's assumption that less than 85 percent of lost opportunity resources can be achieved.

TABLE 2.5. EXAMPLE OF LOST OPPORTUNITY TREATMENT: 10-YEAR EUL MEASURE ON A 10-YEAR RAMP								
Year	Incremental Stock Equipment Turnover (Units)	Cumulative Stock Equipment Turnover (Units)	Measure Ramp Rate	Installed High-Efficiency Units	Missed Opportunities for Acquisition in Later Years (Units)	Missed Opportunities Acquired (Units)	Cumulative Units Installed	Cumulative Percent of Technical Achieved
1	200	200	9%	17	180	0	17	9%
2	160	360	16%	26	130	0	43	12%
3	128	488	24%	30	92	0	73	15%
4	102	590	31%	32	65	0	106	18%
5	82	672	39%	32	44	0	138	20%
6	66	738	47%	31	29	0	168	23%
7	52	790	54%	29	19	0	197	25%
8	42	832	62%	26	11	0	223	27%
9	34	866	70%	23	6	0	246	28%
10	27	893	77%	21	2	0	267	30%
11	21	914	85%	18	0	153	438	48%
12	17	931	85%	15	0	110	563	60%
13	14	945	85%	12	0	78	653	69%
14	11	956	85%	9	0	55	717	75%
15	9	965	85%	7	0	38	762	79%
16	7	972	85%	6	0	25	793	82%
17	6	977	85%	5	0	16	814	83%
18	5	982	85%	4	0	10	828	84%
19	4	986	85%	3	0	5	836	85%
20	3	988	85%	2	0	2	840	85%

Discretionary Resources

Discretionary resources differ from lost opportunity resources due to their acquisition availability at any point within the study horizon. From a theoretical perspective, this suggests that all achievable economic potential for discretionary resources could be acquired in the study's first year. From a practical perspective, however, this outcome is realistically impossible due to infrastructure and budgetary constraints and customer considerations.

Furthermore, due to interactive effects between discretionary and lost opportunity resources, immediate acquisition distorts the potential for lost opportunity resources. For example, if one assumes that all homes would be weatherized in the program's first year, potentially available high-efficiency HVAC equipment would decrease significantly (i.e., a high-efficiency heat pump would save less energy in a fully weatherized home).

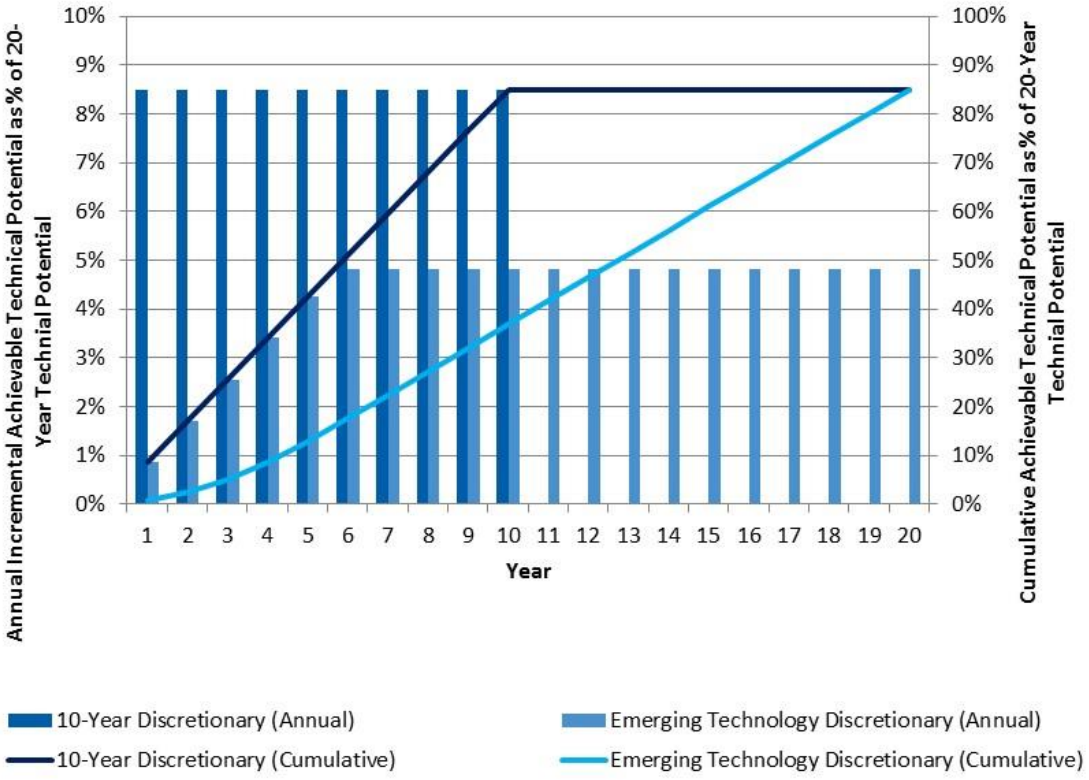
Consequently, the study addressed discretionary resources in two steps:

1. Developing a 20-year estimate of discretionary resource economic potential, assuming technically feasible and cost-effective measure installations would occur equally (at 5 percent of the total available) for each year of the study, avoiding the distortion of interactions between discretionary and lost opportunity resources previously described.
2. Overlaying a measure ramp rate to specify the timing of achievable discretionary resource potential, thus transforming a 20-year cumulative technical value into annual, incremental, achievable values.

The discretionary measure ramp rates only specify the timing of resource acquisition and do not affect the portion of the 20-year economic potential achievable over the study period.

Figure 2.8 shows incremental (bars) and cumulative (lines) acquisitions for two different discretionary ramp rates. A measure on the 10-year discretionary ramp rate reaches full maturity—85 percent of its total economic potential—in 10 years, with market penetration increasing in equal increments each year. A measure on the emerging technology discretionary ramp rate would take longer to reach full maturity, though also gaining 85 percent of the total economic potential. Ultimately, it would arrive at the same cumulative savings as the measure on the 10-year ramp rate.

Figure 2.8. Examples of Discretionary Measure Ramp Rates



3. Baseline Forecast

3.1. Scope of Analysis

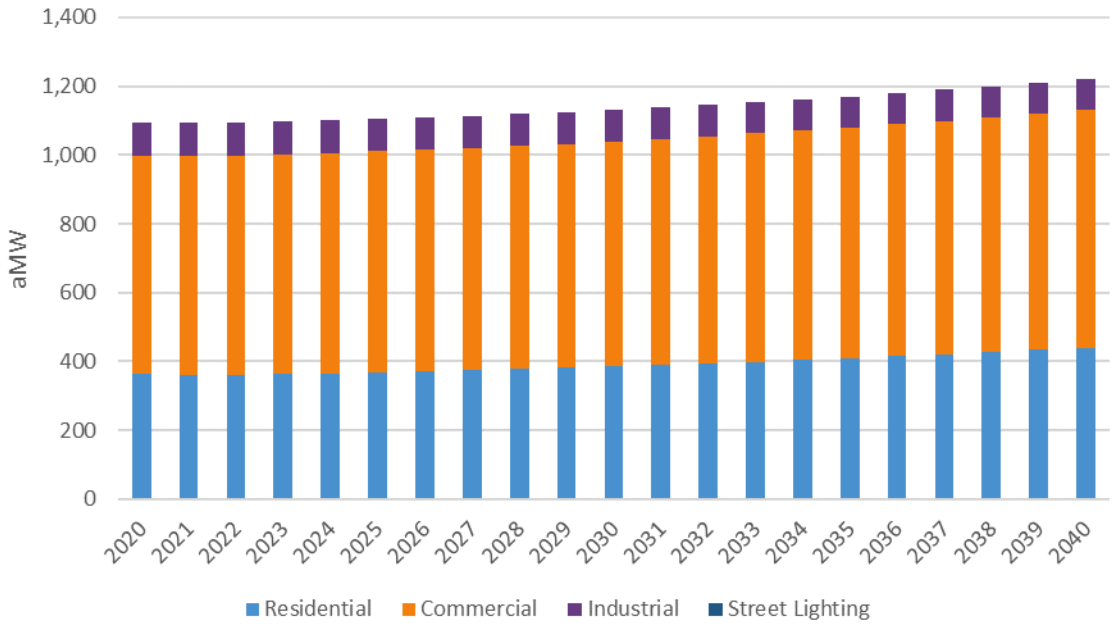
Assessing conservation potential starts with development of baseline end-use load forecasts over a 21-year (2020 to 2040) planning horizon. These forecasts are calibrated to City Light's load forecast in the base year (2019); they are not adjusted for future programmatic conservation, but they do account for enacted equipment standards and building energy codes. The study separately considers residential, commercial, industrial, and street lighting sectors.

Within each sector-level assessment, the study further distinguished customer segments, facility types, and their respective, applicable end uses. The analysis addressed the following:

- Eight residential segments of existing and new construction for single-family, multifamily low-rise, multifamily mid-rise, and multifamily high-rise. Multifamily low-rise is defined as multifamily buildings with one to three floors; mid-rise is defined as buildings with four to six floors; and high-rise is defined as buildings with more than six floors.
- Thirty-eight commercial segments. These include new and existing construction for 19 standard commercial segments.
- Eight industrial segments (existing construction only).
- Street lighting. Although the study included estimates of street lighting in the overall baseline sales forecast, Cadmus did not estimate street lighting potential.

Figure 3.1 shows the distribution of 2040's projected sales by sector. The commercial sector will account for roughly 56 percent of projected sales, while the residential and industrial sectors account for 36 percent, 7 percent respectively.

Figure 3.1. Baseline Sales by Sector



3.2. Residential

Cadmus considered four residential segments and 34 end uses within these segments. Table 3.1 lists each residential segment and end uses considered as well as broad end-use groups used in this study. Overall, the residential sector accounted for approximately 36 percent of total baseline sales.

TABLE 3.1. RESIDENTIAL SEGMENT AND END USES

Segments	End Uses	
	End-Use Group	End Use
Single-Family Multifamily – High-Rise Multifamily – Mid-Rise Multifamily – Low-Rise	Appliances	Cooking Oven Cooking Range Dryer Freezer Refrigerator
	Electric Vehicles	Electric Vehicles
	Cooling	Cool Central Cool Room
	Electronics	Computer – Desktop Computer – Laptop Copier

TABLE 3.1. RESIDENTIAL SEGMENT AND END USES		
		DVD Player Home Audio System Microwave Monitor Multifunction Device Plug Load Other Printer Set Top Box Television Television – Big Screen
	Exterior Lighting	Lighting Exterior Standard
	Heating	Heat Central Heat Pump Heat Room Ventilation and Circulation
	Interior Lighting	Lighting Interior Linear Fluorescent Lighting Interior Specialty Lighting Interior Standard
	Miscellaneous	Air Purifier Other Waste Water Pool Pump
	Water Heating	Water Heat GT 55 Gal Water Heat LE 55 Gal

City Light produces separate forecasts of single-family and multifamily households. Cadmus' directly used City Light's single-family household forecast in the baseline forecast. Cadmus disaggregated multifamily household forecasts based on the distribution of the estimated number of households for the following multifamily segments:

- Multifamily low-rise: up to three floors
- Multifamily mid-rise: four to six floors
- Multifamily high-rise: more than six floors

Cadmus relied on three-year American Community Survey (ACS) estimates of the number of households for each multifamily segment to determine the distribution used to disaggregate City Light's multifamily forecast. Using the approach described in the Developing Baseline Forecasts section, Cadmus combined

residential household forecasts, estimates of end-use saturations, fuel shares, efficiency shares, and end-use consumption to produce a sales forecast through 2040.

Figure 3.2 shows residential sales by segment for each year of the study. City Light projects to add 98,000 new housing units by 2040. New multi-family units account for about 90 percent of new residential construction. As a result multi-family sector baseline sales are expected to increase at a faster rate than single family as shown in Table 3.2.

Figure 3.2. Residential Baseline Sales by Segment

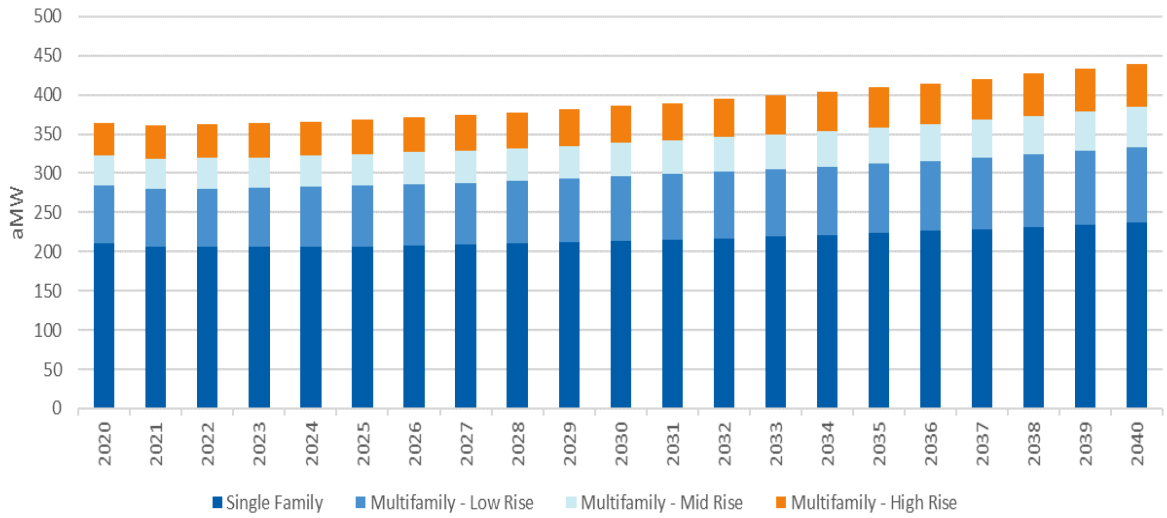


TABLE 3.2. RESIDENTIAL BASELINE SALES AND HOUSING UNITS BY SEGMENT

Sector	Sales (aMW)		Housing Units	
	2020 Sales (aMW)	2040 Sales (aMW)	2020 Housing Units	2040 Housing Units
Single Family	211	238	195,057	206,208
Multifamily	73	96	91,286	128,111
Multifamily	38	51	59,476	83,469
Multifamily	42	56	64,585	90,639
Total	364	440	410,403	508,428

In the base year (2019), Cadmus calibrated baseline forecasts to City Light's load forecast, ensuring that the study's starting point aligned with City Light's starting point forecasts. Cadmus then produced a residential forecast that explicitly accounted for federal lighting standards enacted under EISA, as this standard had little impact on City Light's sales history and was not explicitly accounted for in City Light's forecast.

Figure 3.3 shows the residential baseline forecast by end use. Overall, City Light's residential forecast increases by approximately 21 percent over the 21-year horizon. This primarily due to an increased customer forecast and the addition of new load from electric vehicles.

Figure 3.3 also shows that heating and electronics are the top two consuming end uses, accounting for over one-half (54 percent) of residential consumption, combined. The next three highest forecasted end uses were water heating (14 percent), appliances (15 percent), and electric vehicles (9 percent).

Figure 3.3. Residential Baseline Forecast by End Use

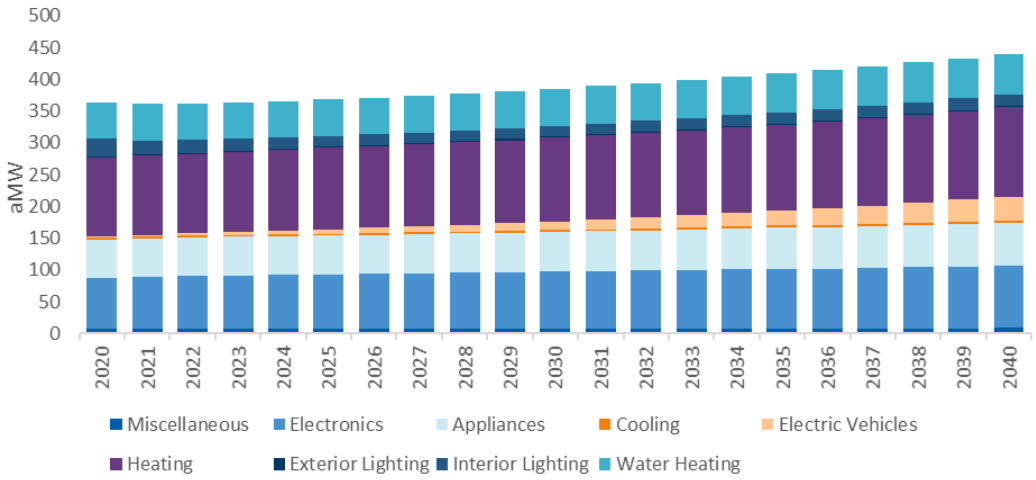


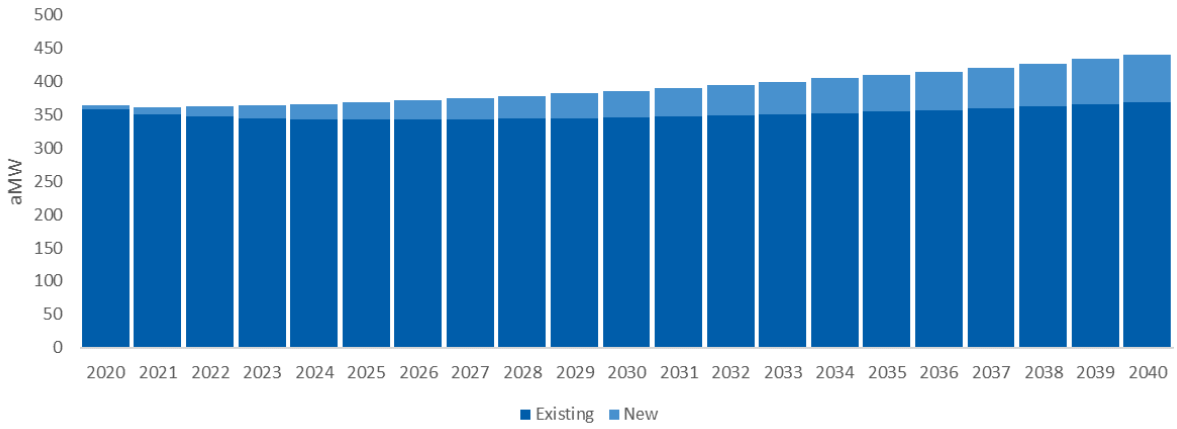
Table 3.3 shows the assumed average consumption per household for each residential segment in 2040. Differences in average consumption for each segment drive either differences in end-use consumption, saturations, fuel shares,[16] or any combination of differences. Appendix C includes detailed baseline data for the residential sector.

[16] Fuel shares refer to the percentage of end use equipment that is electric for end uses where customers have at least the option of electricity or another fuel. Residential end uses where multiple fuels are an option include central furnace space heat, water heating, cooking, and dryers.

TABLE 3.3. PER HOUSEHOLD BASELINE SALES (KWH/HOME) - 2040				
End Use	**Single-Family**	**Multifamily – Low-Rise**	**Multifamily – Mid-Rise**	**Multifamily – High-Rise**
Heating	2,120	2,744	2,113	2,165
Electronics	2,455	1,022	976	976
Water Heating	1,667	951	346	346
Appliances	1,631	670	788	788
Interior Lighting	535	140	137	137
Miscellaneous	209	100	83	83
Exterior Lighting	82	1	1	1
Cooling	111	29	24	24
Total	**9,540**	**6,207**	**5,018**	**5,070**

Figure 3.4 shows forecasted residential sales by construction vintage over the study horizon. Study results indicate approximately 16 percent of sales will derive from homes constructed after 2019 (new construction). Use per customer for existing homes will decrease over the 20-year study timeframe, partly due to equipment standards and other naturally occurring efficiency.

Figure 3.4. Residential Baseline Sales by Construction Vintage



3.3. Commercial

Cadmus considered 19 commercial segments and up to 15 segments within these end uses. Table 3.4 shows each commercial segment and end use considered in this study as well as the broad segment and end-use groups presented in this report. Segments are largely based on those included in the Council's Seventh Power Plan. Overall, the commercial sector accounts for 693 aMW, or 57 percent of total baseline sales in 2040.

TABLE 3.4. COMMERCIAL SEGMENTS AND END USES			
Segments		**End Uses**	
Segment Group	**Segment**	**End Use Group**	**End Use**
Assembly	Assembly	Cooking	Cooking
Hospital	Hospital	Cooling	Cool Central
Large Grocery	Supermarket	Data Center	Data Center
Large Office	Large Office Medium Office	Heat Pump	Heat Pump
Lodging	Lodging	Heating	Heat Central
MF Common Area	Multifamily Common Area	Lighting	Exterior Lighting Interior Lighting
Miscellaneous	Other	Miscellaneous	Compressed Air Other Plug Load Other Waste Water
Other Health	Residential Care	Refrigeration	Refrigeration
Restaurant	Restaurant	Ventilation	Ventilation
Retail	Large Retail Medium Retail Small Retail Extra Large Retail	Water Heat	Water Heat GT 55 Gal Water Heat LE 55 Gal
School	School K-12		
Small Grocery	Mini Mart		
Small Office	Small Office		
University	University		
Warehouse	Warehouse		

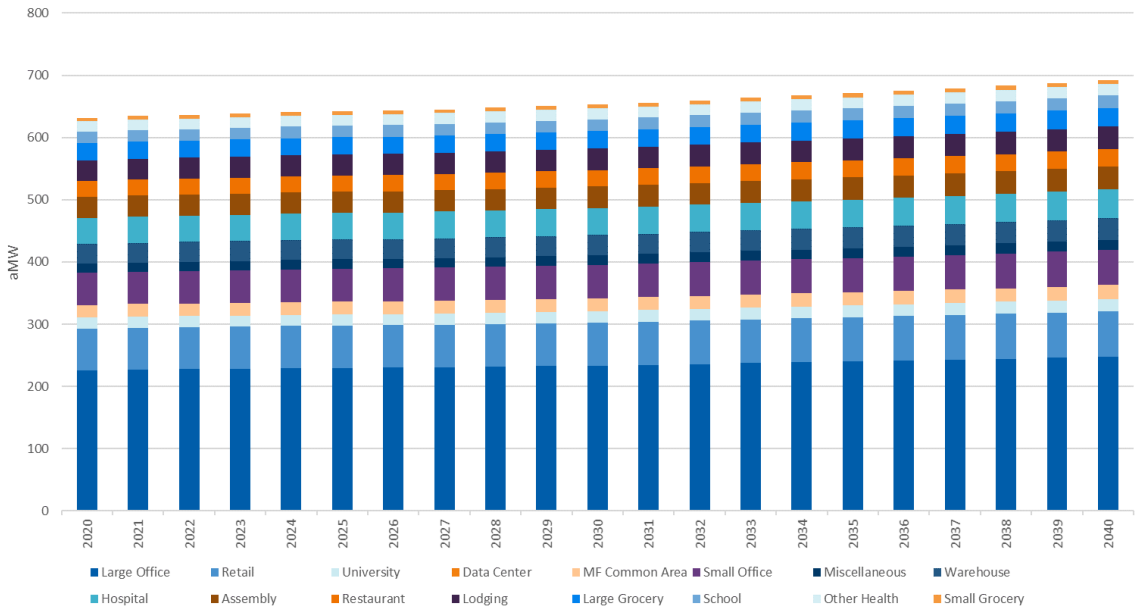
TABLE 3.4. COMMERCIAL SEGMENTS AND END USES			
University	University		
Warehouse	Warehouse		

Cadmus used City Light's nonresidential database to identify sales and the number of customers for each commercial market segment. The database combined City Light's billing data with the King County assessor, as well as other secondary data source, to identify the customer segment and consumption for each nonresidential customer. These data served as the basis for Cadmus' commercial sector segmentation.

In addition, Cadmus classified customers as commercial or industrial based on City Light's premise-level nonresidential customer database. Commercial customers included those identified in a segment listed in Table 3.4, while industrial customers mapped to segments listed in Table 3.5, following in the industrial section.

Cadmus chose commercial segments for consistency with the Seventh Power Plan, except for multifamily common area, which was not a standalone segment in the Seventh Power Plan. Figure 3.5 shows the distribution of baseline commercial energy consumption by segment for each year of the study.

Figure 3.5. Commercial Baseline Sales by Segment



Large offices accounted for over one-third (36 percent) of commercial baseline sales. Retail, small offices, and hospitals accounted for 11 percent, 8 percent, and 7 percent, respectively, of baseline sales. Collectively, these segments represent over one-half (61 percent) of all commercial sector sales.

Cadmus developed whole-building energy intensities using consumption and floor space estimates from City Light's nonresidential customer database. We further disaggregated these energy intensities into end-use intensities, based on end-use saturations and fuel shares derived from City Light's CBSA oversample and building simulations. Specifically, Cadmus determined the expected distribution of end-use consumption for each building type, based on City Light-specific saturations and building simulations and on disaggregated energy intensities—derived from City Light's customer data—using these distributions. Figure 3.6 shows energy intensities for each building type and end use.

Figure 3.6. Commercial EUIs by Building Type

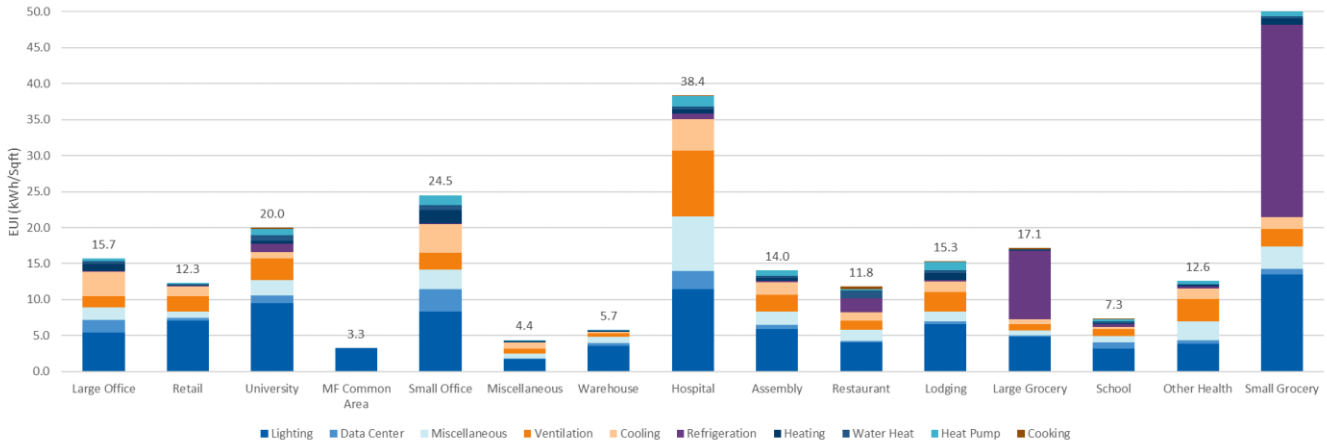
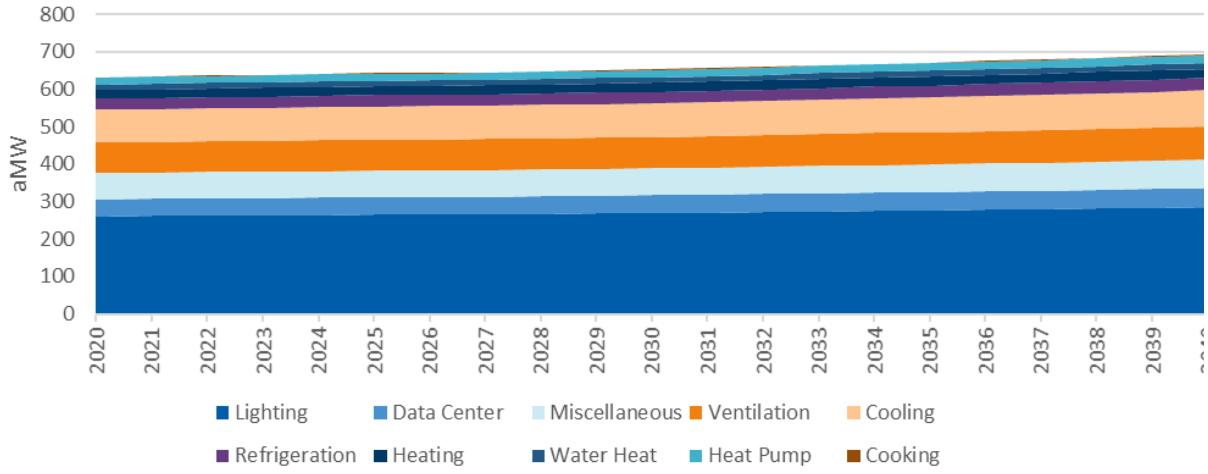


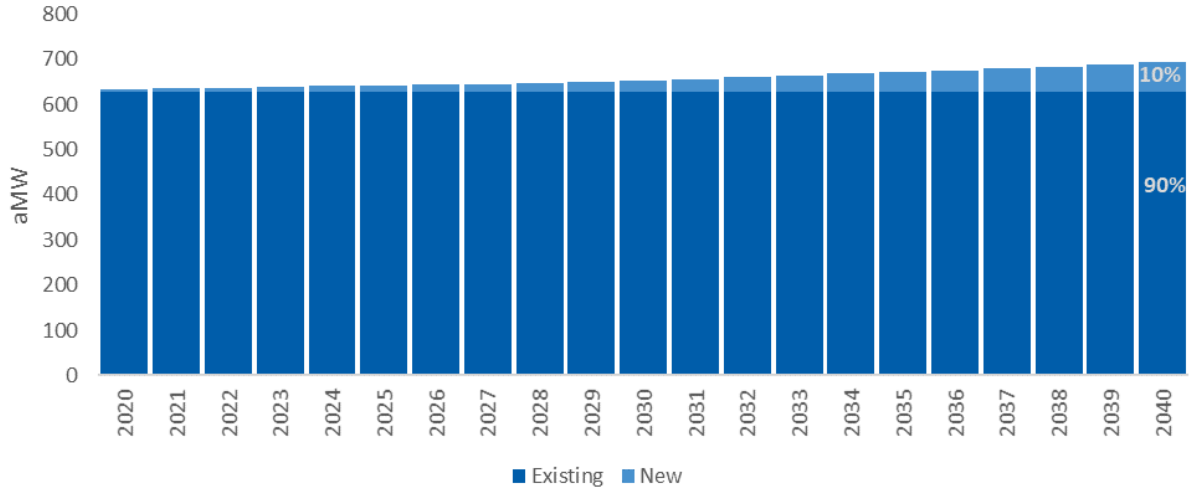
Figure 3.7 shows the commercial baseline forecast by end use. Cadmus' commercial baseline forecast includes moderate load growth; commercial sales increase by roughly 0.5 percent per year over the study's horizon. The highest-consuming end use was lighting, accounting for 41 percent of projected commercial consumption in 2040. The miscellaneous, ventilation, and cooling end uses also account for a large share of consumption, representing 11 percent, 13 percent, and 14 percent of projected commercial sales, respectively.

Figure 3.7. Commercial Forecast by End Use



New Commercial floorspace is a significant contributor to load growth in the commercial sector. By 2040, 10 percent of the forecasted load will come from buildings constructed after 2019. Figure 3.8 shows the commercial baseline forecast by construction vintage.

Figure 3.8. Commercial Forecast by Construction Vintage



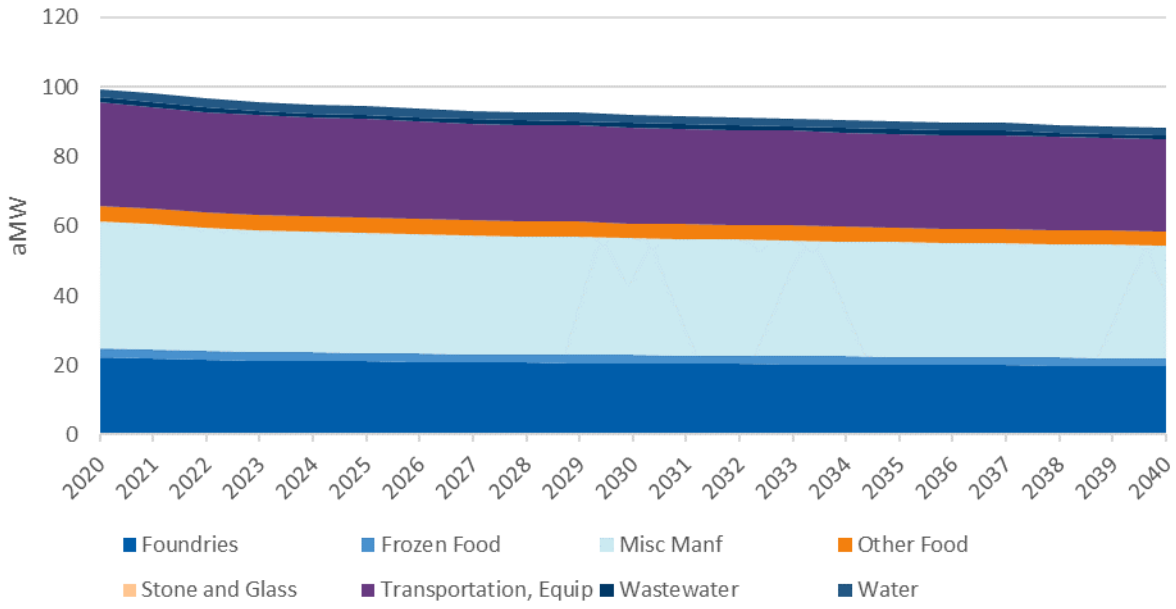
3.4. Industrial

Cadmus disaggregated City Light's forecasted industrial sales into eight facility types/segments and 10 end uses, as shown in Table 3.4. Overall, the industrial sector accounted for 88 aMW, or 7 percent of City Light's overall forecasted baseline sales in 2040. The industrial sector included about ten of City Light's largest customers with known Industrial processes in addition to wastewater and water treatment loads.

TABLE 3.2. INDUSTRIAL SEGMENTS AND END USES	
Segments	**End Uses**
Foundries	Fans
Frozen Food	HVAC
Miscellaneous Manufacturing	Lighting
Other Food	Other Motors
Stone and Glass	Other
Transportation, Equipment	Process Air Compressors
Wastewater	Process Electro Chemical
Water	Process Heat
	Process Other
	Process Refrigeration
	Pumps

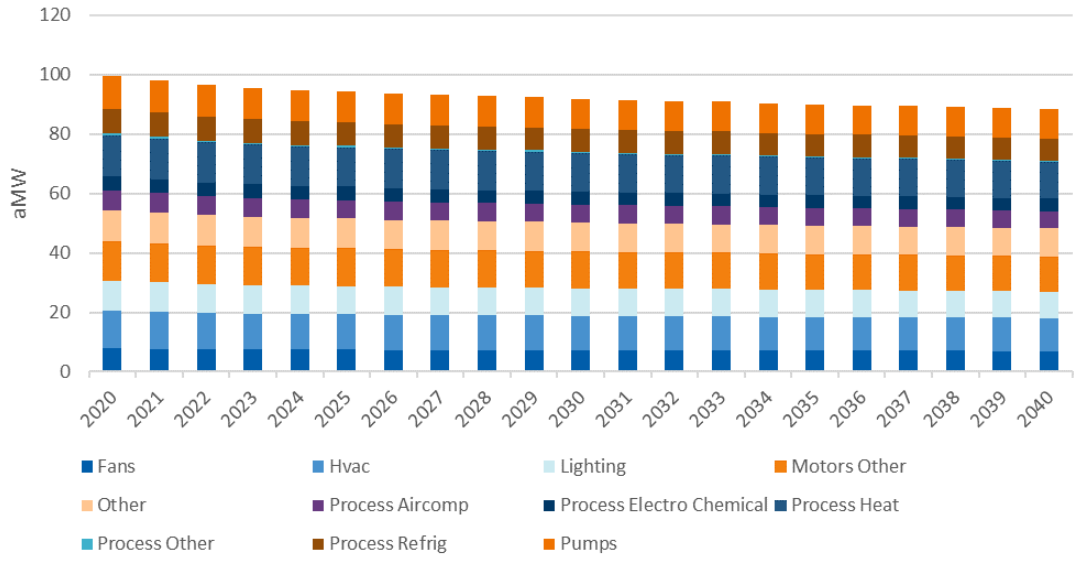
Like the commercial sector, Cadmus relied on City Light's nonresidential customer database to determine the distribution of baseline sales by segment. Figure 3.9 shows the distribution of industrial sales by segment in 2040. Miscellaneous manufacturing accounts for 37 percent of industrial baseline sales; the next largest segments are foundries (22 percent) and transportation equipment (30 percent).

Figure 3.9. Industrial Baseline Sales by Segment



Cadmus relied on end-use distributions provided in the Seventh Plan's industrial tool to disaggregate segment-specific consumption into end uses. Figure 3.10 shows industrial baseline sales forecast by end use.

Figure 3.10. Industrial Baseline Sales by End Use



4. Energy Efficiency Potential

4.1. Overview

4.1.1. Scope of the Analysis

This study included a comprehensive set of conservation measures, incorporating measures assessed by the Council in the 7th Power Plan and the RTF. Analysis began by assessing the technical potential of hundreds of unique conservation measures, considering these measures for each applicable sector, segment, and construction vintage discussed in the Baseline Forecast section. In total, Cadmus considered over 6399 permutations of conservation measures including, for example, a total of 969 lighting measures across 19 segments representing a wide range of technologies and applications within the commercial sector. Table 4.1 lists counts and numbers of permutations of conservation measures considered in this study.

TABLE 4.1. MEASURE AND PERMUTATIONS

Sector	Measures	Permutations
Residential	249	1050
Commercial	2109	4944
Industrial	38	405
Total	2396	6399

4.1.2. Summary of Results

Table 4.2 shows baseline sales and cumulative potential by sector.[17] Study results indicate 282 aMW of technically feasible conservation potential—23 percent of baseline sales—will be available by 2040, the end of the 21-year study horizon, with an estimated 142 aMW—12 percent of baseline sales—both cost-effective and technically feasible; this is economic potential. Cumulative achievable economic potential equals 111 aMW in 2040—9 percent of baseline sales. These results account for line losses and represent cumulative energy savings at generator.

These savings draw upon future sales forecasts, absent future City Light conservation program activities. Although these consumption forecasts accounted for past City Light-funded conservation, the estimated potential identified is inclusive of—not in addition to—forecasted program savings. In other words, the forecast excludes future, planned energy efficiency program efforts but the savings estimates include energy efficiency program savings.

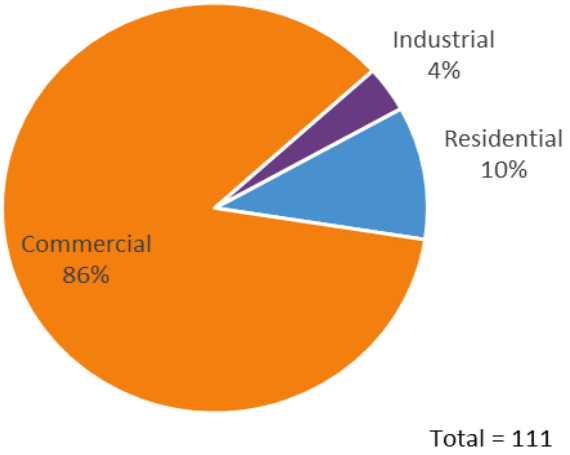
[17] Economic potential and achievable economics potential reflect the IRP avoided-cost scenario.

TABLE 4.2. TECHNICAL, ECONOMIC, AND ACHIEVABLE POTENTIAL BY SECTOR - 2040							
Sector	**Baseline Sales**	**Technical Potential**		**Economic Potential—IRP**		**Achievable Potential**	
		aMW	**Percent of Baseline**	**aMW**	**Percent of Baseline**	**aMW**	**Percent of Baseline**
Residential	440	100	23%	23	5%	12	3%
Commercial	693	173	25%	115	17%	96	14%
Industrial	88	9	10%	5	5%	4	5%
Street Lighting	5	0	0%	0	0%	0	0%
Total	**1,226**	**282**	**23%**	**142**	**12%**	**111**	**9%**

The commercial sector, representing 57 percent of baseline energy use, accounts for approximately 86 percent of achievable economic conservation potential. The commercial sector represents a much higher proportion of total achievable economic potential relative to its baseline sales because, compared with the residential sector, commercial measures are more cost effective and the percent of total commercial technical potential that is cost effective is also a lot higher.

The residential and industrial sectors account for 10 percent and 4 percent, respectively, as shown in Figure 4.1. Although the residential sector's share of baseline energy consumption is higher than its share of achievable economic potential, the industrial sector's share of total achievable economic potential (4 percent) is much lower than its share of baseline energy consumption (7 percent). The 2020 CPA did not estimate potential for streetlighting.

Figure 4.1. Achievable Economic Potential by Sector—2040



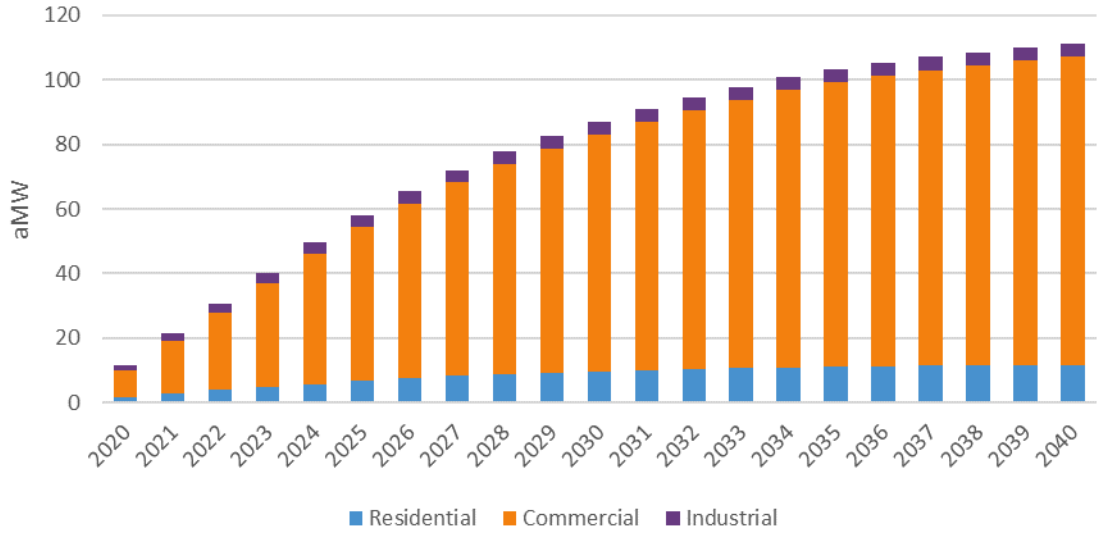
Cadmus determined incremental achievable potential in each year of the study horizon, using the rate at which equipment naturally turns over and measure-specific ramp rates (as discussed in the About Measure Ramp Rates section of this report). Table 4.3 shows cumulative 2-year, 10-year, and 21-year achievable potential by sector, as well as 20 percent of the 10-year achievable potential—the equivalent of City Light's *pro rata* share of 10-year potential for the 2020-2021 biennium.

TABLE 4.3. ACHIEVABLE POTENTIAL BY SECTOR

Sector	Achievable Economic Potential - aMW			
	2 Year (2020-2021)	10 Year (2020-2029)	21 Year (2020-2040)	20% of 10-Year Potential
Residential	2.77	9.27	11.70	1.85
Commercial	16.10	69.43	95.54	13.89
Industrial	2.40	3.96	4.04	0.79
Street Lighting	0	0	0	0
Total	**21.27**	**82.67**	**111.28**	**16.53**

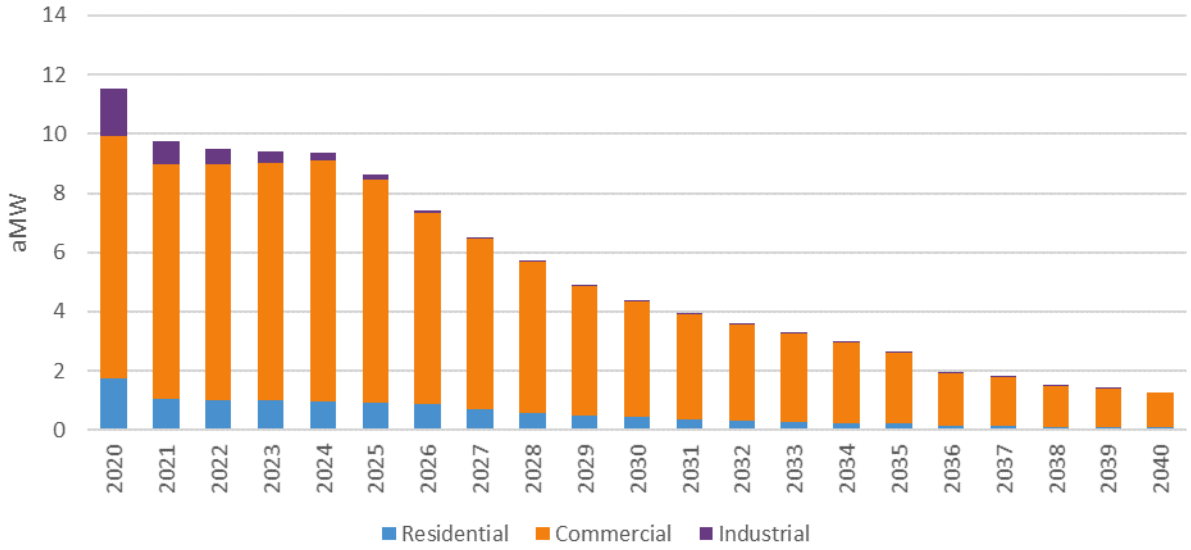
Figure 4.2 presents the cumulative achievable economic potential across the study horizon.

Figure 4.2. Cumulative Achievable Economic Potential



Approximately 45 percent of 21-year achievable potential is acquired in the first five years, and 74 percent of 21-year achievable potential is acquired in the first 10 years. This acquisition rate reflects the measure mixture offering high savings potential and aligning with City Light's prior program accomplishments. The About Measure Ramp Rates section of this report provides more information on how Cadmus performed this calculation.

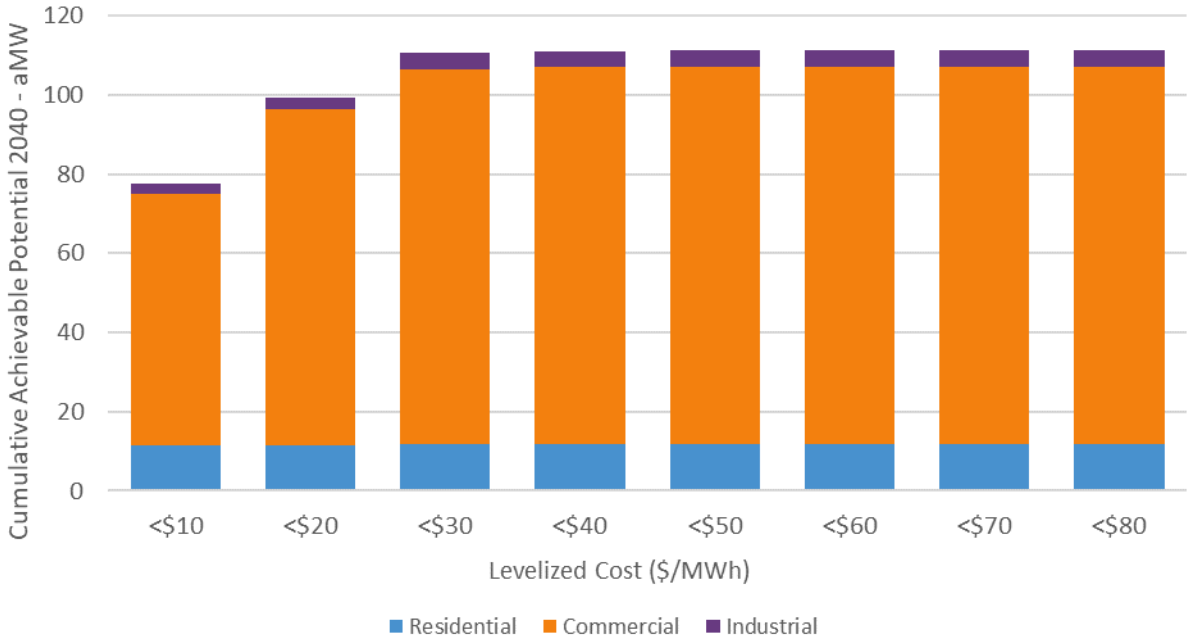
Figure 4.3. Incremental Achievable Economic Potential



Study results indicate that conservation serves as a low-cost resource, with roughly 99 aMW of achievable economic potential at a cost of less than $20/MWh levelized, representing 89 percent of total cumulative 21-year achievable potential. The conservation supply curve in Figure 4.4 shows cumulative achievable

potential in $10/MWh levelized cost increments. Cadmus identified cost-effective potential up to $30/MWh.

Figure 4.4. Supply Curve – Achievable Economic Potential (All Sectors)



Appendix F shows detailed measure-level results, including levelized costs and technical and achievable economic conservation potential for each measure. The remainder of this section provides detailed results by sector.

4.2. Residential

Residential customers in City Light's service territory account for 36 percent of 2040 total baseline sales. The sector, divided into single-family, multifamily low-rise, multifamily mid-rise, and multifamily high-rise homes, present of variety of potential savings sources, including equipment efficiency upgrades (e.g., water heaters and appliances), improvements to building shells (e.g., windows, insulation, and air sealing), and increases in lighting efficiency.

Based on resources included in this assessment, Cadmus estimated residential, cumulative, achievable potential of 11.7 aMW over 21 years, corresponding to nearly a 3 percent reduction in the residential baseline sales forecast by 2040, or approximately 15% of the forecast residential load growth. Table 4.4 shows cumulative 21-year residential conservation potential by segment.

TABLE 4.4. RESIDENTIAL POTENTIAL BY SEGMENT								
Segment	Baseline Sales	Cumulative 2040 - aMW						
		Technical Potential (TP)	TP % of Baseline	Economic Potential (EP)	EP % of Baseline	EP % of TP	Achievable Potential (AP)	AP % of EP
Single-Family	237.6	57.9	24.4%	17.5	7.3%	30.1%	8.7	49.6%
Multifamily – High-Rise	55.5	7.0	12.6%	1.5	2.8%	22.1%	0.8	50.1%
Multifamily – Mid-Rise	50.6	11.8	23.3%	1.4	2.8%	12.0%	0.7	50.1%
Multifamily – Low-Rise	96.1	23.6	24.6%	2.4	2.5%	10.3%	1.6	63.9%
Total	**439.8**	**100.3**	**22.8%**	**22.8**	**5.2%**	**22.8%**	**11.7**	**51.2%**

As shown in Table 4.4 and Figure 4.5, single-family homes account for 74 percent (9 aMW) of total achievable economic potential, followed by multifamily low-rise (2 aMW), multifamily high-rise (1 aMW), and multifamily mid-rise (1 aMW). Each home type's proportion of baseline sales drive this distribution, but segment-specific end-use saturations and fuel shares have a role as well. Appendix A includes detailed data on saturations and fuel shares for each segment.

Figure 4.5. Residential Cumulative Achievable Economic Potential by Segment

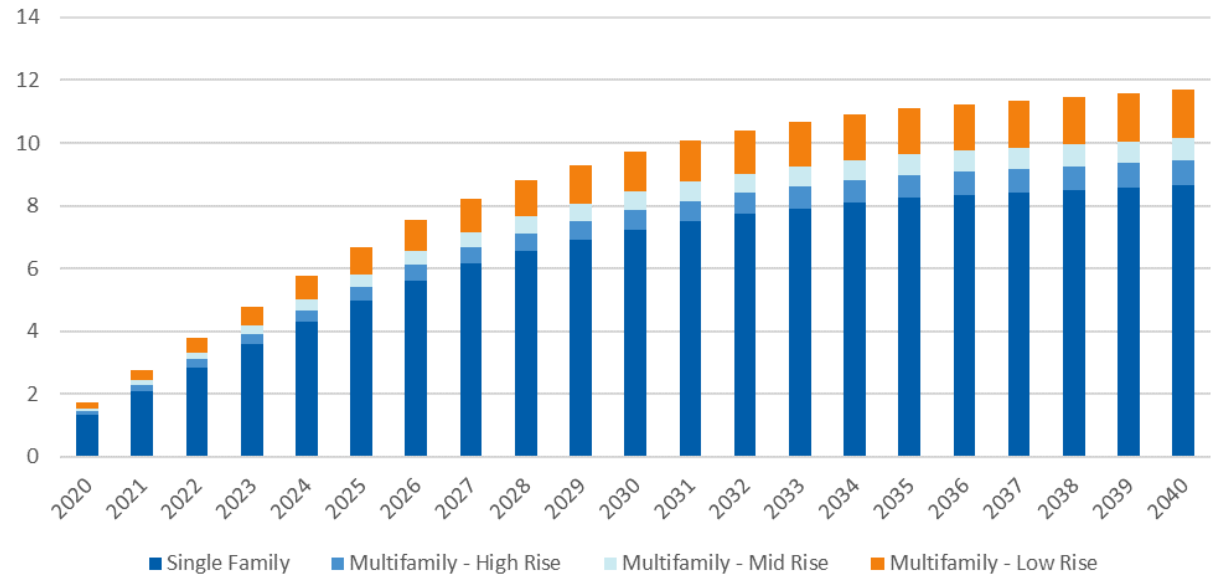


Figure 4.6 presents the cumulative achievable economic potential by construction type for the residential sector. Existing construction represents the majority of achievable economic potential, particularly in the early years of the study, as it accounts for 92.5% of the potential in the first two years of the study (2020-2021). However, by the final year of the study period (2040), new construction accounts for 22% of the total cumulative residential achievable economic potential.

Figure 4.6. Residential Cumulative Achievable Economic Potential by Construction Type

Lighting accounts for approximately 6 percent of total cumulative achievable economic potential by end use (as shown in Table 4.5); these savings almost entirely derive from installations of LED lighting in fixtures. Efficient upgrades to linear fluorescent fixtures in homes account for a small portion of total residential lighting savings. Cadmus modeled the residential lighting potential using the following assumptions:

- The baseline for general service lamp potential in the first year of the study (2020) is equivalent to the EISA 2020 backstop standard and the Washington State standard passed by the legislature in 2019.
- Inefficient lamps will sell through retail locations on one year.
- Achievable economic potential in 2020 is reduced by one-half to reflect City Light's plans to discontinue savings claims for residential lighting.

Weatherization savings appear primarily within the heating end use group but also within the cooling group as well. Savings from weatherization – the installation of which reduces both heating and cooling loads – represent only a small fraction (i.e. < 1%) of total residential achievable economic potential. The study determined that behavioral savings, such as home energy reports, were not cost effective and, therefore, these measures do not have any achievable economic potential.

TABLE 4.5. RESIDENTIAL POTENTIAL BY END USE

End Use	Baseline Sales	Cumulative 2040 - aMW						
		Technical Potential (TP)	TP % of Baseline	Economic Potential (EP)	EP % of Baseline	EP % of TP	Achievable Potential (AP)	AP % of EP
Miscellaneous	8.5	0.6	7.4%	0.5	5.5%	74.6%	0.4	85.0%
Electronics	97.5	8.1	8.3%	3.0	3.1%	37.1%	2.5	85.0%
Appliances	67.6	11.6	17.2%	0.0	0.0%	0.0%	0.0	0%
Cooling	3.7	0.7	19.4%	0.0	0.1%	0.3%	0.0	85.0%
Electric Vehicles	38.2	1.0	2.7%	0.0	0.0%	0.0%	0.0	0%
Heating	140.3	36.4	25.9%	0.1	0.1%	0.2%	0.1	84.9%
Exterior Lighting	2.1	0.8	37.2%	0.8	37.2%	100.0%	0.1	17.9%
Interior Lighting	18.4	9.8	53.3%	9.1	49.6%	93.0%	0.6	6.0%
Water Heating	63.5	31.3	49.2%	9.4	14.8%	30.1%	8.0	84.9%
Total	**439.8**	**100.3**	**22.8%**	**22.8**	**5.2%**	**22.8%**	**11.7**	**51.2%**

Incremental and cumulative potential over the 21-year study horizon varies by end use due to the application of ramp rates, which were assigned to each measure based on multiple factors, including availability, existing program activity, and market trends. Cadmus used the same ramp rates for each measure, as assigned by the Council in the Seventh Power Plan, with some adjustments as discussed in the Achievable Potential and Ramping in section 5 of this report. Figure 4.7 and Figure 4.8 show cumulative and incremental residential achievable potential, respectively.

Figure 4.7. Residential Cumulative Achievable Economic Potential

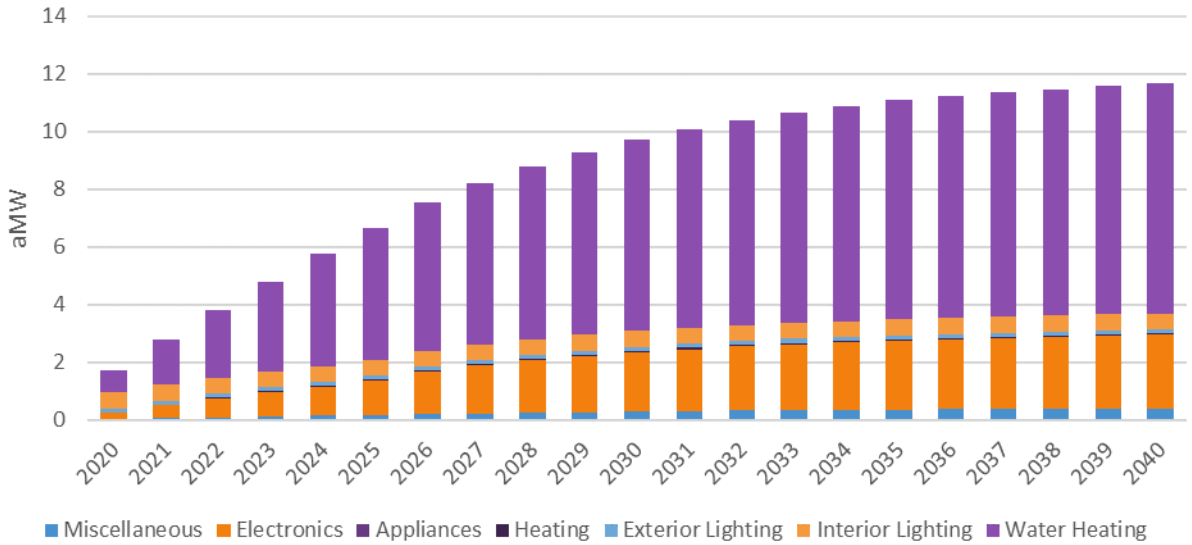
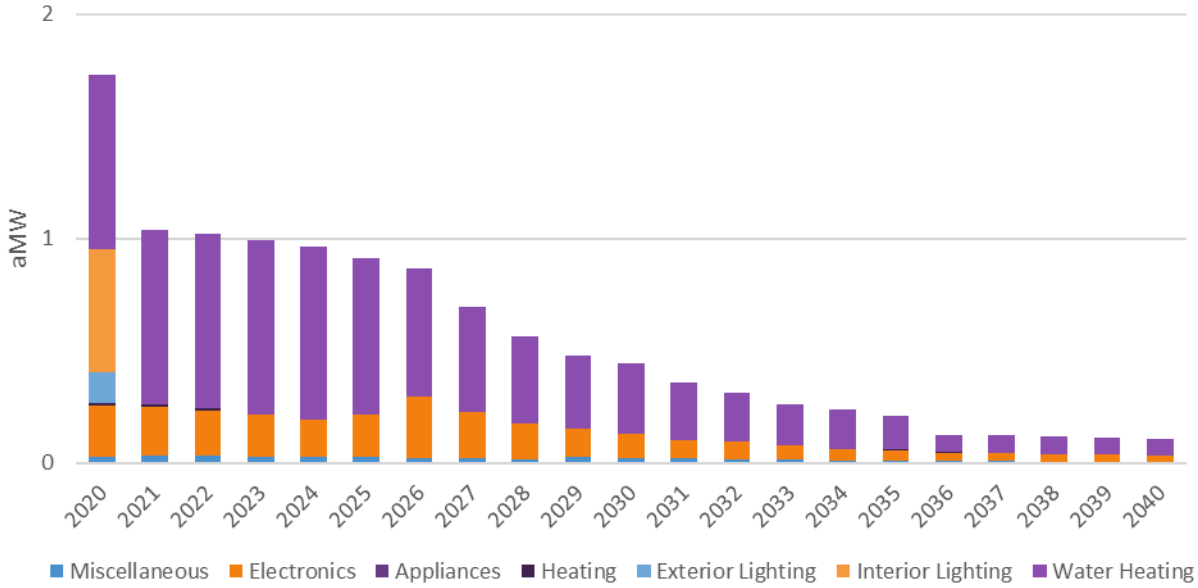


Figure 4.8. Residential Cumulative Achievable Economic Potential

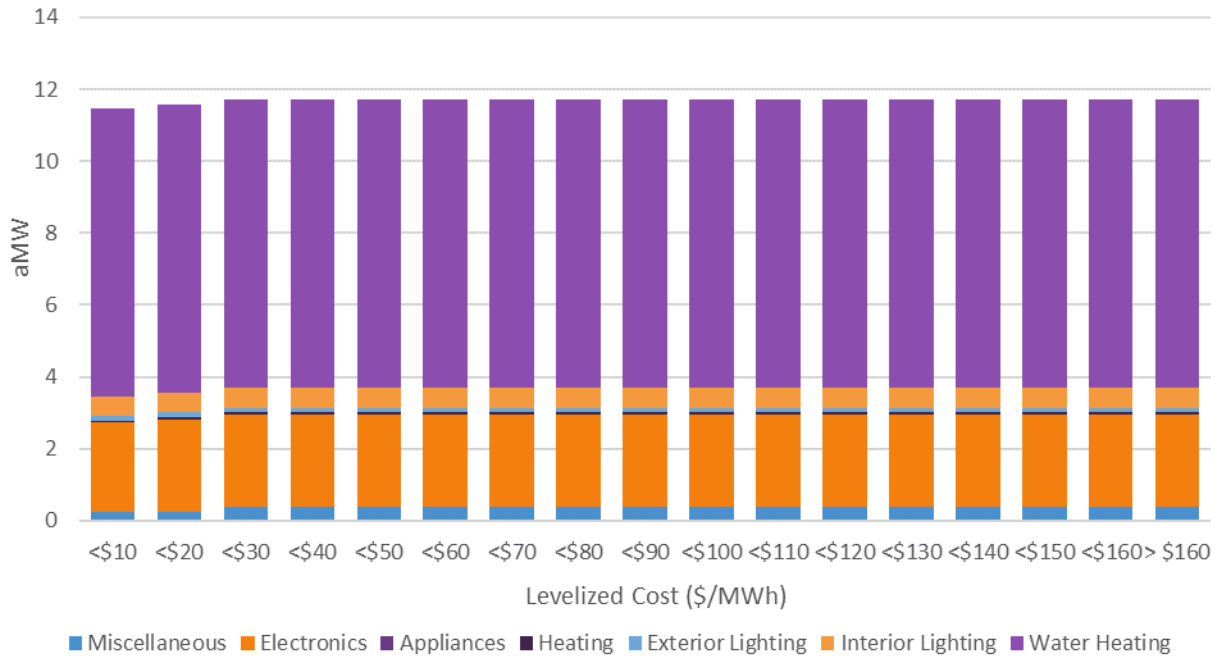


Measure ramp rates and effective useful lives (only for equipment replacement measures) determine the timing of savings shown in Figure 4.8. The spike in 2020 lighting savings results from interactions between lighting ramp rates and relatively short baseline measure lives for standard and specialty lighting measures (two years).

Overall, most (79 percent) of residential conservation potential is achievable within the first 10 years. Approximately 49 percent of 21-year residential achievable economic potential comes in the first five years, and 10 percent of this five-year potential comes from interior lighting.

Figure 4.9 shows 21-year cumulative residential potential by levelized cost (in $10/MWh increments).

Figure 4.9. Residential Supply Curve



Nearly 98 percent of total residential achievable economic potential comes from measures with a levelized cost of conserved energy of $10/MWh or less. Few cost-effective measures have levelized costs above $10/MWh. Clothes washers and SF showerheads are the top two saving residential measures, respectively. Table 4.6 lists the 15 top-saving residential measures.

TABLE 4.6. TOP-SAVING RESIDENTIAL MEASURES				
Measure Name	Achievable Economic Potential - aMW			Percent of Total (21-Year)
	2-Year	10-Year	21-Year	
Clothes Washer	0.59	2.39	2.99	26%
SF Showerhead	0.53	2.15	2.74	23%
LED	0.36	0.36	0.36	3%
LED - Specialty	0.33	0.33	0.33	3%
TV LCD - ENERGY STAR	0.31	1.39	1.84	16%
MF Showerhead	0.28	1.15	1.48	13%
Set Top Box	0.12	0.51	0.64	5%
SF Aerator	0.12	0.47	0.58	5%
MF Aerator	0.07	0.27	0.34	3%
ENERGY STAR Air Purifier	0.03	0.16	0.26	2%
Heat Pump - Federal Standard 2023	0.02	0.02	0.04	0%
Engine Block Heater Controls	0.01	0.05	0.06	1%
Wall Insulation	<0.01	0.02	0.02	<1%
Attic Insulation	<0.01	<0.01	<0.01	<1%
Multifunction Device	<0.01	<0.01	<0.01	<1%

Note that Table 4.6 *only* includes measures that pass the benefit-cost screen. Multifamily ductless heat pump (DHP) upgrades, for example, have the highest technical potential of any residential measure, but they are not cost-effective from a TRC perspective, as the present value of the TRC costs outweigh the TRC benefits for this measure by a factor of almost five-to-one. Additional residential measures with high technical potential savings that did not pass the benefit-cost test include tier 3 heat pump water heaters, single family zonal-to-DHP measures, and high efficiency class-22 window replacements.

4.3. Commercial

City Light's commercial sector accounts for 57 percent of City Light's baseline sales in 2040 and 86 percent of total achievable economic potential. The commercial sector makes up a higher proportion of potential compared to its share of baseline sales as commercial measures generally prove more cost-effective and offer more savings potential than measures found in other sectors. Cadmus estimated potential for the 22 commercial segments included in Table 3. (grouped into 15 segments for this report). Table 4.7 summarizes 21-year cumulative technical, economic, and achievable economic potential by commercial segment.

TABLE 4.7. COMMERCIAL POTENTIAL BY SEGMENT

Segment	Baseline Sales	Cumulative 2040 - aMW						
		Technical Potential (TP)	TP % of Baseline	Economic Potential (EP)	EP % of Baseline	EP % of TP	Achievable Potential (AP)	AP % of EP
Assembly	37	8	22%	5	14%	64%	4	82%
Hospital	46	9	19%	6	14%	74%	5	85%
Large Grocery	30	7	25%	5	18%	73%	5	85%
Large Office	248	64	26%	40	16%	63%	34	84%
Lodging	37	8	22%	5	14%	63%	4	84%
MF Common Area	22	9	40%	8	36%	91%	7	83%
Miscellaneous	16	8	48%	5	32%	67%	4	84%
Other Health	19	5	26%	4	19%	74%	3	85%
Restaurant	28	6	21%	3	11%	53%	3	85%
Retail	73	16	21%	10	14%	67%	9	83%
School	20	8	39%	6	28%	71%	5	82%
Small Grocery	6	2	25%	1	18%	73%	1	85%
Small Office	57	15	26%	8	14%	55%	7	81%
University	20	4	20%	3	14%	71%	2	84%
Warehouse	34	6	16%	4	12%	75%	3	80%
Total	**693**	**173**	**25%**	**115**	**17%**	**66%**	**96**	**83%**

Approximately 36 percent of 21-year commercial achievable potential arises within the large office segment, as shown in Figure 4.8. Collectively, large and small offices account for 44 percent of commercial achievable economic potential. The miscellaneous segment has the highest technical potential savings relative to baseline sales. The Multifamily Common Area segment has the highest economic potential relative to baseline sales due to high savings potential for interior, exterior, and parking lighting upgrades.

Figure 4.8. Cumulative Commercial Achievable Economic Potential by Segment

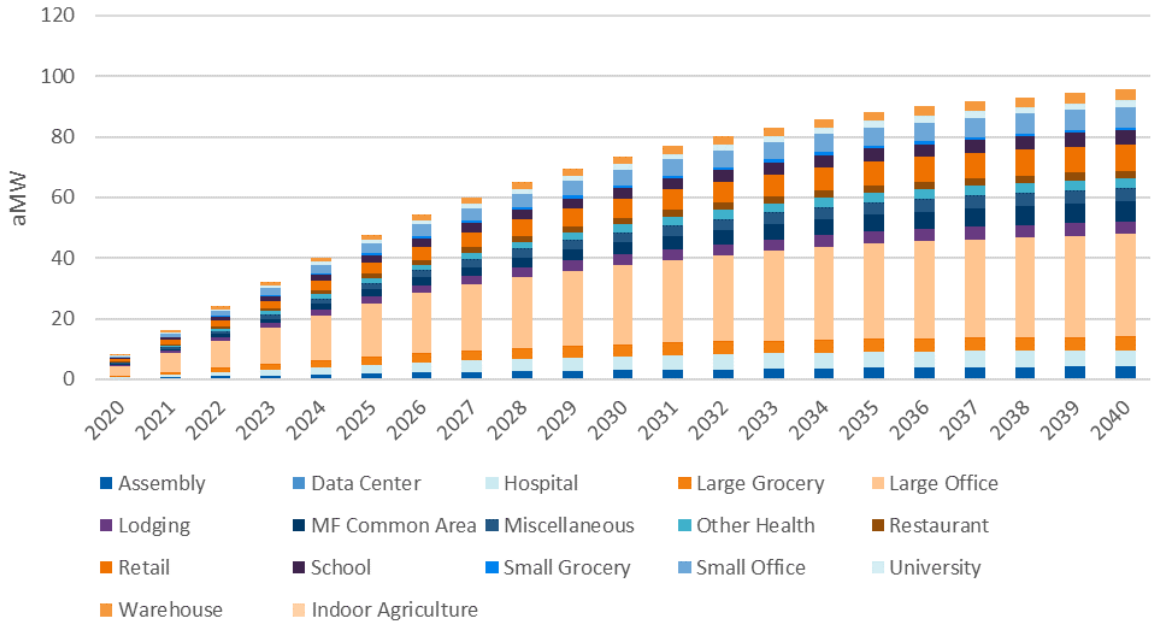
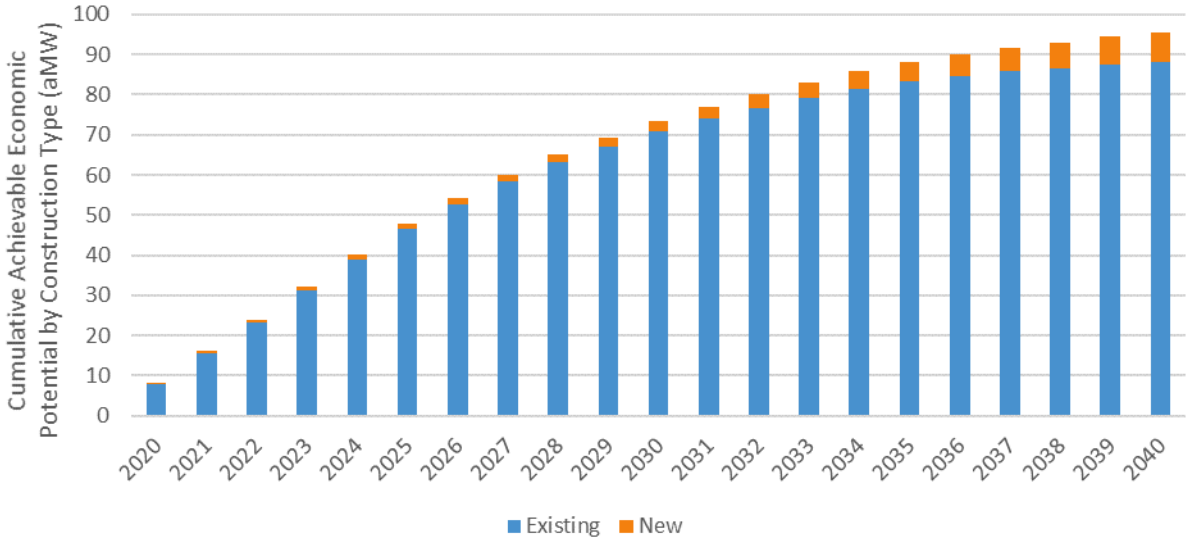


Figure 4.11 presents the cumulative achievable economic potential by construction type for the commercial sector. Existing construction represents the majority of achievable economic potential, particularly in the early years of the study, as it accounts for 96.7% of the potential in the first two years of the study (2020-2021). However, by the final year of the study period (2040), new construction accounts for 9.5% of the total cumulative commercial achievable economic potential.

Figure 4.11. Cumulative Commercial Achievable Economic Potential by Segment



Across each of these segments, lighting accounts for a high portion of total achievable economic potential. Table 4.8 shows 21-year cumulative commercial potential by end use.

TABLE 4.8. COMMERCIAL POTENTIAL BY END USE								
End Use	Baseline Sales	Cumulative 2040 - aMW						
		Technical Potential (TP)	TP % of Baseline	Economic Potential (EP)	EP % of Baseline	EP % of TP	Achievable Potential (AP)	AP % of EP
Cooking	2	1	29%	0	20%	67%	0	85%
Cooling	96	22	22%	7	8%	34%	6	85%
Data Center	51	20	39%	18	35%	91%	15	85%
Heat Pump	20	5	22%	2	8%	35%	1	85%
Heating	25	8	31%	4	14%	46%	3	85%
Lighting	285	89	31%	74	26%	83%	61	83%
Miscellaneous	76	6	8%	2	3%	41%	2	85%
Refrigeration	32	5	15%	3	9%	61%	3	85%
Ventilation	89	19	21%	4	5%	24%	4	85%
Water Heat	16	1	5%	0	3%	61%	0	85%
Total	**693**	**173**	**25%**	**115**	**17%**	**66%**	**96**	**83%**

Over one-half (63 percent) of commercial achievable potential comes from interior lighting equipment upgrades, exterior lighting equipment upgrades, and controls. Lighting's 21-year technical potential is equivalent to a 31 percent reduction in baseline lighting consumption. Overall, 83 percent of lighting technical potential proves cost-effective. Only 83 percent of lighting potential is achievable over the study's horizon as a high portion of the end-use savings comes from natural replacement measures, which do not always reach 85 percent achievability, depending on the measure's lifetime and the ramp rate.

As with the residential sector, a large portion commercial potential is achieved within the first 10 years of the study horizon. Figure 4.9 and Figure 4.10 show cumulative and incremental achievable potential for the commercial sector, respectively.

Figure 4.9. Commercial Cumulative Achievable Economic Potential

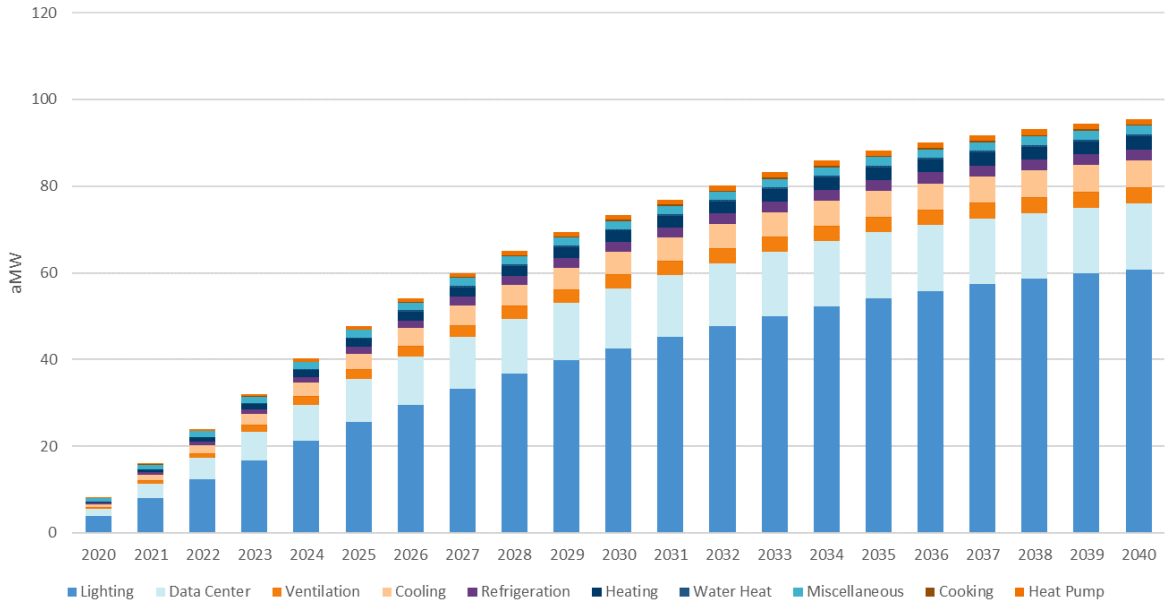
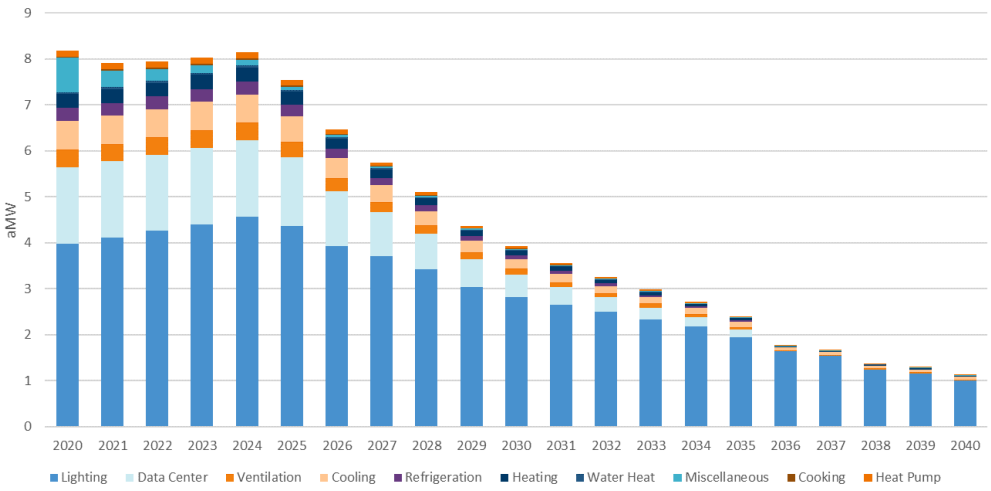


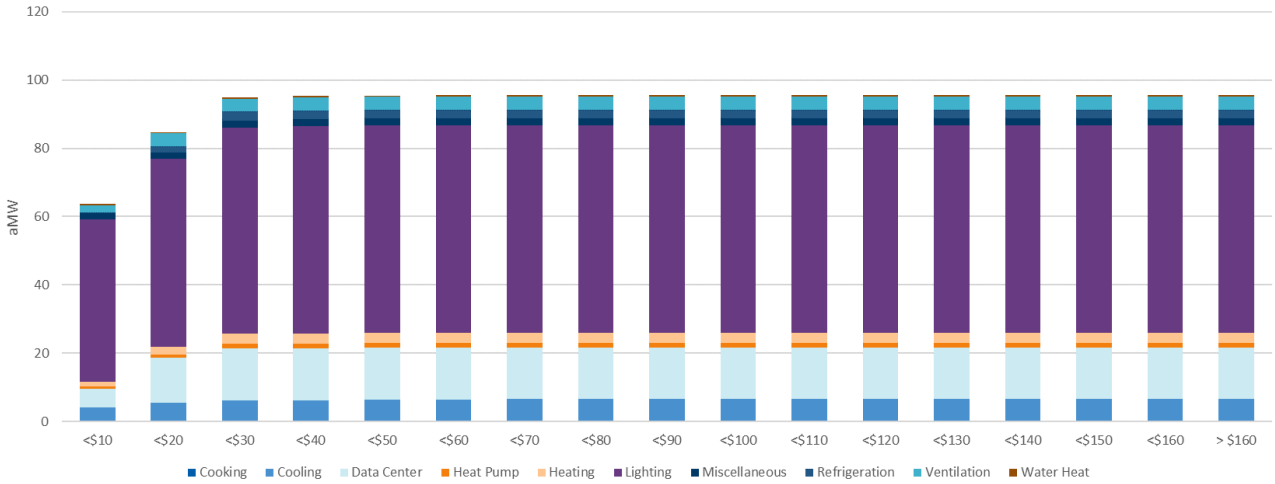
Figure 4.10. Commercial Incremental Achievable Economic Potential



Approximately 73 percent of 21-year commercial achievable economic potential falls within the first 10 years of the study horizon. Much commercial retrofit potential for existing buildings becomes exhausted within the first 10 years. Most savings within the last 10 years of the study's horizon come from natural turnover and replacement of inefficient lighting fixtures with LEDs.

Commercial savings are not only abundant—they are inexpensive. Figure 4.11 shows cumulative 2040 achievable economic for the commercial sector by end use and levelized cost.

Figure 4.11. Commercial Supply Curve by End Use



Most cumulative achievable economic potential by 2040 costs less than $10/MWh from a TRC perspective; 75 percent of these savings come from lighting measures. Although LED technologies remain more expensive than their incandescent, halogen, and fluorescent counterparts, the technology often has a much longer measure life, meaning that installing it defers future replacements of the baseline technology. For some measures, these deferred replacement costs exceed the incremental measure cost, producing negative levelized costs.

Lighting, server virtualization, and direct digital controls have significant conservation potential. Table 4.9 shows the top 15 commercial measures, sorted by 20-year achievable economic potential.

TABLE 4.9. TOP-SAVING COMMERCIAL MEASURES

Measure Name	Achievable Economic Potential - aMW			Percent of Total (21-Year)
	2-Year	10-Year	21-Year	
LED - Linear Fluorescent	2.79	16.75	30.13	32%
Server virtualization/consolidation	1.63	6.54	7.43	8%
Direct Digital Controls Energy Management	0.86	3.44	4.21	4%
LED - Other	0.71	2.86	3.25	3%
LED - Recessed Can	0.64	3.61	5.90	6%
ENERGY STAR Desktop	0.64	0.99	1.05	1%
Commercial HVAC and DHW Pump	0.63	2.53	3.07	3%
Exterior Lighting: Parking Lot - HPS 250W - NR	0.59	2.36	2.68	3%
LED Parking Garage Lighting	0.52	2.08	2.37	2%

TABLE 4.9. TOP-SAVING COMMERCIAL MEASURES				
Commercial Strategic Energy Management	0.50	2.06	2.85	3%
Market Average HP Low Power T8 Shift	0.44	1.79	2.16	2%
Decommissioning of unused servers	0.41	1.63	1.85	2%
Economizer	0.38	1.54	1.75	2%
ENERGY STAR Display	0.38	0.58	0.62	1%
LED - Display or Track	0.37	1.59	2.04	2%

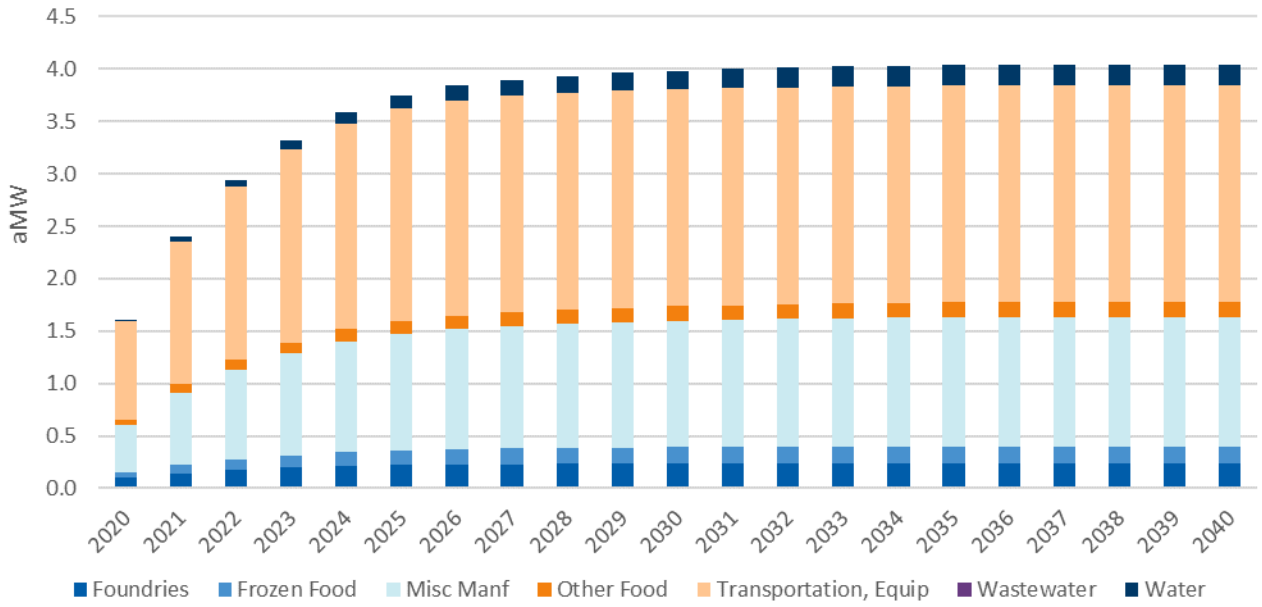
The highest savings measure is LED tube replacements of linear fluorescent lighting, accounting for 30.1 aMW by 2040—32 percent of total commercial potential.

4.4. Industrial

Cadmus estimated conservation potential for the industrial sector using the Council's Seventh Power Plan analysis tool. The conservation potential addressed eight industrial segments in City Light's service territory, based on allocations developed from City Light's nonresidential database. The assessment identified approximately 4 aMW of achievable economic potential by 2040. Table 4.10 shows cumulative industrial potential by segment in 2040, and Figure 4.12 shows industrial achievable economic potential by segment.

TABLE 4.10. INDUSTRIAL POTENTIAL BY SEGMENT								
Segment	Baseline Sales	Cumulative 2040 - aMW						
		Technical Potential (TP)	TP % of Baseline	Economic Potential (EP)	EP % of Baseline	EP % of TP	Achievable Potential (AP)	AP % of EP
Foundries	19.7	0.8	4%	0.3	1%	36%	0.2	85%
Frozen Food	2.3	0.6	28%	0.2	8%	30%	0.2	85%
Miscellaneous Manufacturing	32.4	2.3	7%	1.4	4%	64%	1.2	85%
Other Food	4.0	0.9	22%	0.2	4%	18%	0.1	85%
Transportation, Equipment	26.4	3.1	12%	2.4	9%	78%	2.1	85%
Wastewater	1.3	0.6	47%	0.0	0%	0%	0.0	85%
Water	2.2	0.2	11%	0.2	11%	100%	0.2	85%
Total	**88.4**	**8.5**	**10%**	**4.8**	**5%**	**56%**	**4.0**	**85%**

Figure 4.12. Industrial Achievable Economic Potential by Segment



The distribution of industrial achievable economic potential by segment is very similar to the distribution of baseline sales. Transportation equipment manufacturing accounts for 51 percent of 21-year industrial achievable economic potential—2.1 aMW. Table 4.11 shows 21-year potential by industrial end use.

TABLE 4.11. INDUSTRIAL POTENTIAL BY END USE

End Use	Baseline Sales	Cumulative 2040 - aMW						
		Technical Potential (TP)	TP % of Baseline	Economic Potential (EP)	EP % of Baseline	EP % of TP	Achievable Potential (AP)	AP % of EP
Fans	7.0	1.1	16%	0.0	0%	0%	0.0	0%
HVAC	11.1	0.3	3%	0.3	3%	100%	0.3	85%
Lighting	8.9	4.0	45%	4.0	45%	100%	3.4	85%
Motors Other	11.9	0.4	4%	0.0	0%	0%	0.0	0%
Other	9.4	0.8	9%	0.2	2%	27%	0.2	85%
Process Air Compressor	5.9	0.5	9%	0.0	0%	0%	0.0	0%
Process Electro Chemical	4.2	0.1	1%	0.1	1%	100%	0.0	85%
Process Heat	12.4	0.0	0%	0.0	0%	0%	0.0	0%
Process Other	0.5	0.0	0%	0.0	0%	0%	0.0	0%
Process Refrigeration	7.4	0.6	8%	0.1	2%	20%	0.1	85%
Pumps	9.8	0.6	6%	0.0	0%	0%	0.0	0%
Total	**88.4**	**8.5**	**10%**	**4.8**	**5%**	**0%**	**4.0**	**85%**

Over three-fourths (85 percent) of industrial, achievable, economic potential comes from lighting measures, followed by HVAC (7 percent) and other (5 percent).

Figure 4.13 and Figure 4.14 show cumulative and incremental, achievable, economic potential over the 21-year study horizon, respectively.

Figure 4.13. Industrial Cumulative Achievable Economic Potential

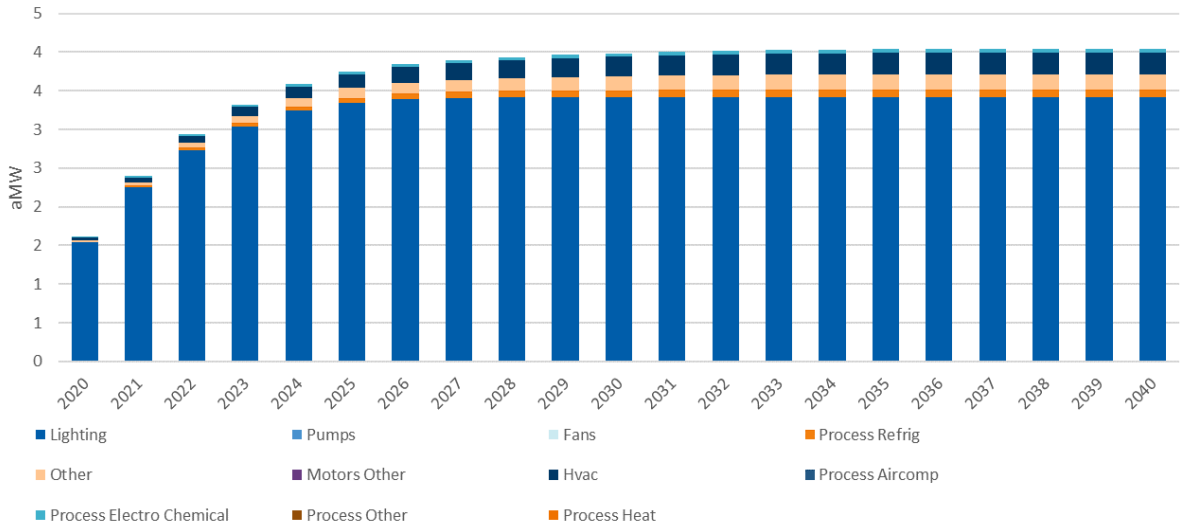
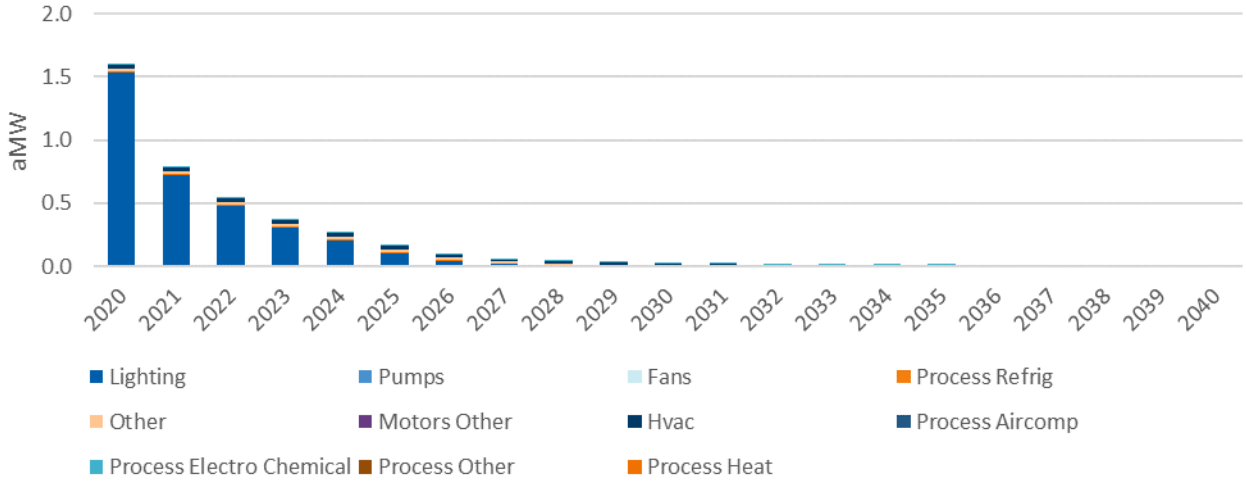


Figure 4.14. Industrial Incremental Achievable Economic Potential



Consistent with the Council's approach to the industrial sector, Cadmus modeled all industrial measures as retrofits and did not distinguish between new and existing construction. After applying ramp rates, approximately 98 percent of 21-year achievable economic potential is realized within the first 10 years.

Industrial measures are generally low cost; however, the 2020 CPA's lower avoided cost forecast resulted in estimates of economic potential equivalent to 56% of technical potential, compared with 97 percent in the 2018 CPA. Figure 4.15 shows cumulative achievable economic potential in 2040 for different levelized cost thresholds.

Figure 4.15. Industrial Supply Curve—Cumulative Achievable Economic Potential in 2040 by Levelized Cost

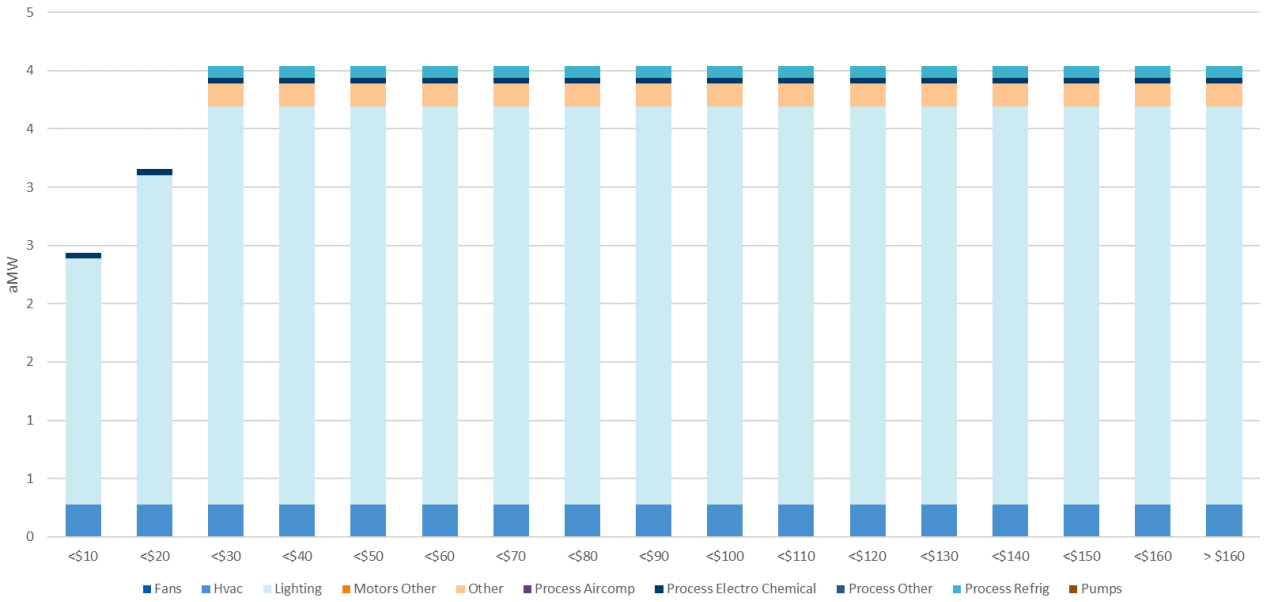


Table 4.12 shows the top saving industrial measures; collectively, these represent 90 percent of 21-year cumulative, achievable, economic potential.

TABLE 4.12. TOP-SAVING INDUSTRIAL MEASURES

Measure Name	Achievable Economic Potential - aMW			Percent of Total (21-Year)
	2-Year	10-Year	21-Year	
High Bay Lighting 2 Shift	0.57	0.86	0.86	21%
High Bay Lighting 1 Shift	0.47	0.72	0.72	18%
Lighting Controls	0.40	0.61	0.61	15%
High Bay Lighting 3 Shift	0.30	0.45	0.45	11%
Efficient Lighting 2 Shift	0.22	0.33	0.33	8%
Efficient Lighting 1 Shift	0.17	0.26	0.26	6%
Efficient Lighting 3 Shift	0.12	0.19	0.19	5%
Municipal Water Supply-Retro	0.04	0.17	0.20	5%
Fan Equipment Upgrade	<0.01	<0.01	<0.01	<1%

5. Comparison to 2018 CPA

5.1. Overview

Overall, the 2020 CPA identified higher technical potential and lower economic and achievable potential than the 2018 CPA. This section compares results from the two assessments and identifies reasons for the change in potential. The study focused on 21-year cumulative estimates of technical and economic potential and incremental estimates of achievable economic potential.

Table 5.1 compares cumulative technical potential, by sector, from the 2018 and 2020 CPAs.

TABLE 5.1. TECHNICAL POTENTIAL COMPARISON

Sector	2020 CPA			2018 CPA		
	Baseline Sales – 21 Year (aMW)	Technical Potential – 21 Year (aMW)	Technical Potential as % of Baseline Sales	Baseline Sales – 21 Year (aMW)	Technical Potential – 20 Year (aMW)	Technical Potential as % of Baseline Sales
Residential	440	100	23%	336	85	25%
Commercial	693	173	25%	747	180	24%
Industrial	88	9	10%	150	13	9%
Street Lighting	5	0	0%	10	1	12%
Total	**1,226**	**282**	**23%**	**1,242**	**279**	**22%**

5.1.1. Technical Potential

The 2020 CPA identified 282 aMW of technical potential, compared to 279 aMW in the 2018 CPA. This slight increase is due to changes in the residential and commercial sectors. Changes that contribute to higher technical potential include:

- Higher residential baseline load forecasts
- New residential measures not previously considered in the 2018 CPA
- Additional commercial measures not previously included in the 2018 CPA
- Lower industrial baseline load forecasts due to the re-classification of some industrial customer premise loads in the commercial sector

Each of these factors are discussed in following sections.

5.1.2. Economic Potential and Avoided Costs

Table 5.2 compares economic potential for IRP-preferred, avoided cost scenario in the 2018 CPA and the market, avoided cost scenario in the 2020 CPA.

TABLE 5.2. ECONOMIC POTENTIAL COMPARISON						
	2020 CPA (Market Avoided Costs)			2018 CPA (IRP Avoided Costs)		
Sector	Economic Potential – 21 Year (aMW)	Economic Potential as % of Baseline Sales	Economic as a % of Technical Potential	Economic Potential – 20 Year (aMW)	Economic Potential as % of Baseline Sales	Economic as a % of Technical Potential
Residential	23	5%	23%	21	6%	25%
Commercial	115	17%	66%	131	17%	72%
Industrial	5	5%	56%	10	7%	77%
Street Lighting	0	0%	0%	1	12%	100%
Total	**142**	**12%**	**50%**	**163**	**13%**	**58%**

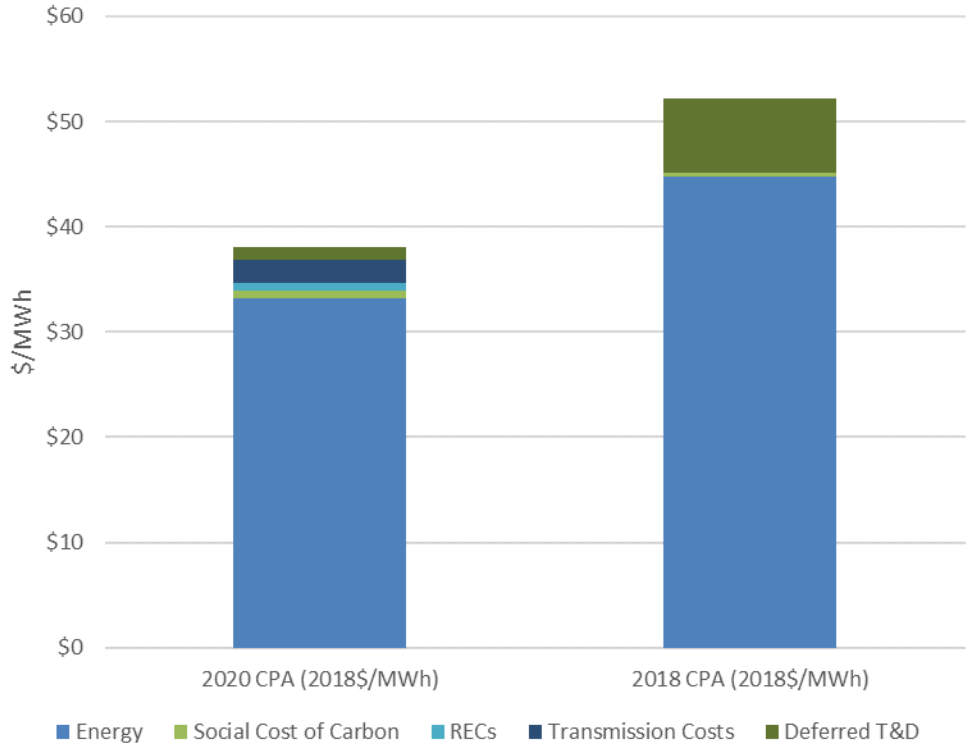
The 2020 CPA identified 142 aMW of economic potential, compared to 163 aMW in the 2018 CPA. Lower avoided energy and capacity costs contributed to a decrease in economic potential in the residential, commercial, and industrial sectors, in addition to factors contributing to lower technical potential. In the 2020 CPA, levelized avoided costs for the 2020 to 2040 period are approximately $38/MWh, compared to $52/MWh in the 2018 CPA, or nearly 27 percent lower.[18]

In addition to lower avoided energy costs, the 2020 CPA also updated assumptions regarding deferred transmission and distribution costs. Cadmus used forecast values from the Council's presentation in March of 2019, which reflected values of $3.08/kW-year and $6.85/kW-year for transmission and distribution, respectively, which were converted from 2016 to 2018 dollars.[19]

[18] Both the 2018 CPA and 2020 CPA levelized cost values are expressed in 2018 dollars for comparison purposes

[19] The Council's values were presented in its March 2019 meeting and reflect weighted average values from several regional utilities and are expressed in $2016, levelized. https://www.nwcouncil.org/sites/default/files/2019_0312_p3.pdf

Figure 5.1. Change in Residential Economic Potential by End Use



The lower avoided costs in the 2020 CPA contribute to the lower economic potential in each sector. The industrial sector had the most pronounced decline in economic potential, as illustrated in Table 5.3, which shows economic potential expressed as a fraction of technical potential. The industrial sector experienced a decline in the percent of technical potential that is economic due to the lower avoided energy and deferred T&D costs, as several large savings measures that were marginally cost effective in the 2018 CPA were not cost effective in the 2020 CPA, including plant energy management. The residential and commercial sectors also exhibited declines in the economic potential as a percent of technical.

TABLE 5.3. COMPARISON OF CUMULATIVE ECONOMIC POTENTIAL AS A PERCENT OF TECHNICAL POTENTIAL

Sector	2020 CPA	2018 CPA
Residential	23%	25%
Commercial	66%	72%
Industrial	56%	77%
Street Lighting	0%	100%
Total	50%	58%

5.2. Residential Sector Changes

The residential sector had increased technical and economic potential and a slight decline in achievable potential. These changes were driven by factors including a higher customer forecast, higher potential in three key end uses, but lower avoided energy and T&D capacity costs. Table 5.4 compares technical and economic potential in the 2018 and 2020 CPA and identifies key reasons for the changes.

TABLE 5.4. RESIDENTIAL TECHNICAL AND ECONOMIC POTENTIAL COMPARISON

Component	2020 CPA	2018 CPA	Reason for Change
Baseline Sales	440	336	Higher customer forecast; baseline forecast calibrated to base year (2019)
Technical Potential	100	85	Higher load forecast; new MF DHP measures
Technical Potential as % of Baseline	23%	25%	
Economic Potential	23	21	Lower avoided energy and T&D capacity cost forecasts
Economic Potential as % of Baseline	5%	5%	
Economic Potential as % of Technical	23%	21%	

5.2.1. Higher Residential Forecast Sales

City Light's forecasted residential final study year (2040) sales were approximately 31 percent higher than the 2018 CPA final year (2037). Several key factors contributed to the increased residential sales forecast:

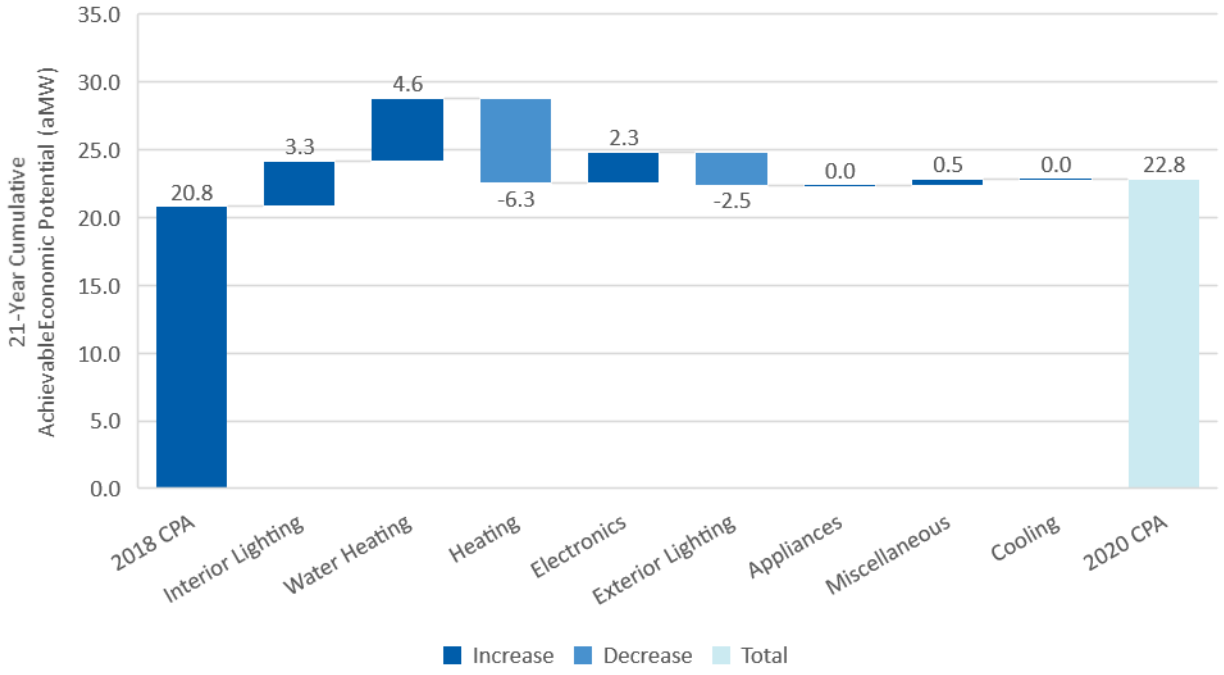
- City Light's underlying residential customer forecast increased from approximately 410,000 residential customers to over 508,000 in 2040. The residential customer forecast used in the 2018 showed residential customer growth from 385,000 in 2017 to 427,000 in 2037.
- The 2020 CPA baseline sales forecast includes additional load from City Light's internal EV forecast; this forecast shows an additional 38 aMW of residential customer EV load in 2040. The 2018 CPA baseline forecast did not explicitly account for EVs.
- The 2020 CPA adjusted end-use equipment saturations and fuel shares for several residential HVAC end uses (central air conditioning, room cooling, and heat pumps) based on discussion and agreement with City Light's load forecast technical team.
- Cadmus calibrated the residential bottom-up forecast in the base year (2019) to City Light's sales forecast but did not otherwise adjust or calibrate any other years. The 2018 CPA calibrated the baseline forecast to City Light's energy sales forecast.
- Furthermore, unlike the 2018 CPA, Cadmus calibrated the baseline sales forecast only in the base year (2019) to City Light's retail sales forecast, rather than for every year of the study.

5.2.2. Higher Interior Lighting and Water Heating Potential and Lower Heating and Exterior Lighting

Figure 5.2 illustrates the change in residential economic potential. Rises in economic potential for the interior lighting, water heating, electronics, and miscellaneous end uses contributed to the overall rise in

residential economic potential; on the other hand, the heating and exterior lighting end uses both experienced declines in economic potential.

Figure 5.2. Change in Residential Economic Potential by End Use



Compared with the 2018 CPA, the heating and exterior lighting end uses experienced significantly lower economic potential of approximately 7.9 aMW combined. The following heating measures exhibited economic potential in the 2018 CPA but not the 2020 CPA:

- Motor – ECM. This measure became federal standard in 2019.
- DHP in existing single family with forced air furnace.
- Floor, wall, and attic insulation.

Conversely, the interior lighting, water heating, electronics, and miscellaneous end uses showed increased economic potential compared with the 2018 CPA. Examples of these measures include clothes washers, showerheads, aerators (not previously considered in the 2018 CPA), and engine block heater controls.

5.3. Commercial Sector Changes

The 2020 CPA identified lower 21-year cumulative technical and economic potential than the 2018 CPA, with the decrease in technical potential due to a lower commercial baseline energy forecast as City Light expects lower load growth for enterprise data centers compared with the previous CPA. However, the potential technical potential as a percent of baseline sales actually increased, due primarily to the incorporation of additional advanced rooftop controls measures approved by the RTF since the 2018 CPA. Table 5.5 compares technical and economic potential in the commercial sector for the two CPAs.

TABLE 5.5. COMMERCIAL TECHNICAL AND ECONOMIC POTENTIAL COMPARISON			
Component	**2020 CPA**	**2018 CPA**	**Reason for Change**
Baseline Sales	693	747	Lower data center loads; Lower baseline sales forecast; Additional advanced rooftop controller measures
Technical Potential	173	180	
Technical Potential as % of Baseline	25%	24%	
Economic Potential	115	131	Lower avoided capacity and energy costs
Economic Potential as % of Baseline	17%	17%	
Economic Potential as % of Technical	66%	72%	

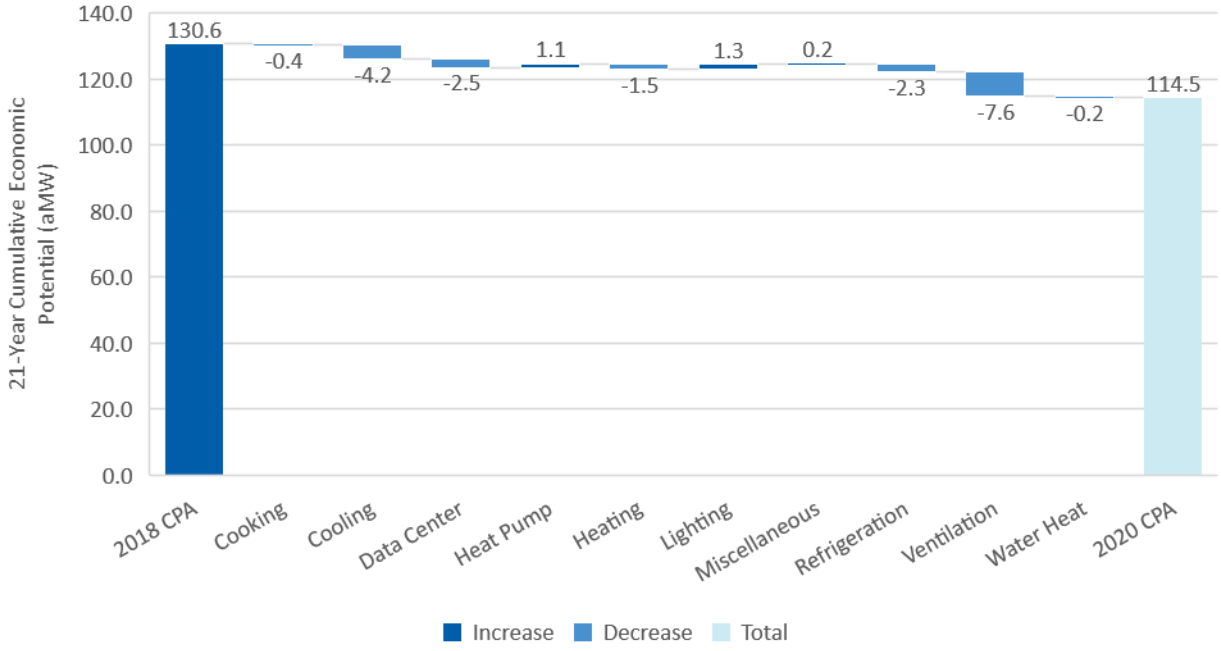
Although the 2018 CPA included an advanced rooftop controller measure from the Seventh Power Plan, the three additional measures in the 2020 CPA from the RTF's recent work include the following:[20]

- Gas Rooftop Unit (RTU) Advanced Rooftop Controls (12.3 aMW technical potential)
- Heat Pump RTU Advanced Rooftop Controls (3.6 aMW)
- Gas RTU Supply Fan VFD and Controller (3.3 aMW)

Despite the increase in technical potential from these measures, the economic potential remains relatively consistent with the 2018 CPA, at least in terms of economic potential as a percent of baseline sales. Figure 5.3 illustrates the change in commercial economic potential between the 2018 and 2020 CPAs by end use. End uses exhibiting decreased economic include cooling, data center, heating, refrigeration, and ventilation.

[20] https://rtf.nwcouncil.org/measure/advanced-rooftop-controls

Figure 5.3. Change in Commercial Economic Potential by End Use



5.4. Achievable Potential and Ramping

As with assessments of economic potential, Cadmus identified lower, cumulative, achievable economic potential. As 20-year cumulative achievable potential is a subset of economic potential, factors contributing to lower cumulative achievable potential are the same as those previously discussed for economic potential. Incremental achievable potential in the first two years of the 2020 CPA is about 13% lower than the first two years of the 2018 CPA . Figure 5.4 shows incremental achievable economic potential from the 2020 CPA, and Figure 5.5 shows incremental achievable economic potential from the 2018 CPA.

Figure 5.4. Incremental Achievable Potential—2020 CPA

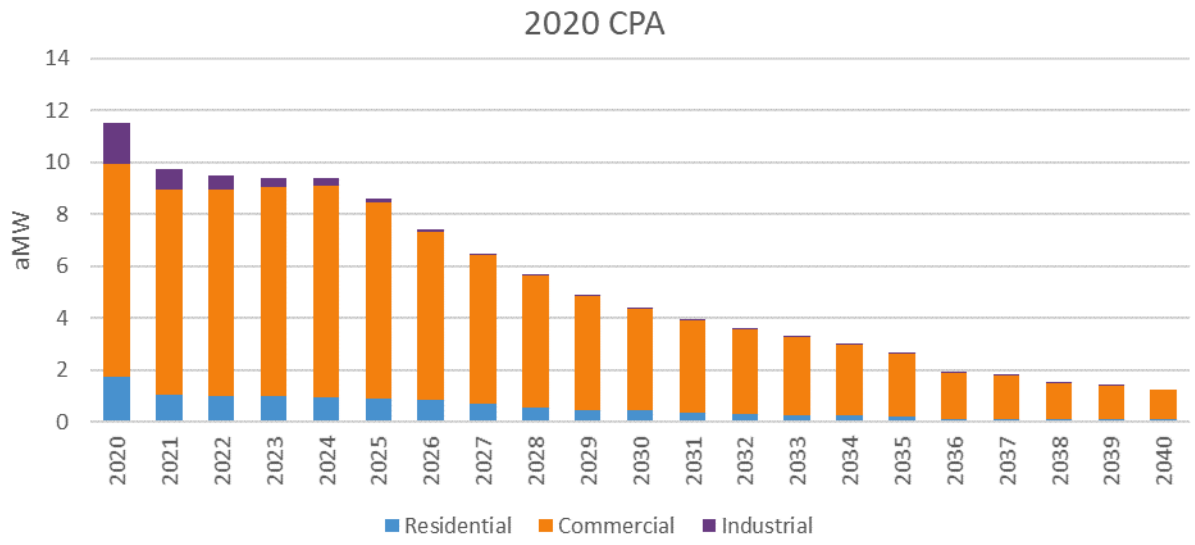


Figure 5.5. Incremental Achievable Potential—2018 CPA

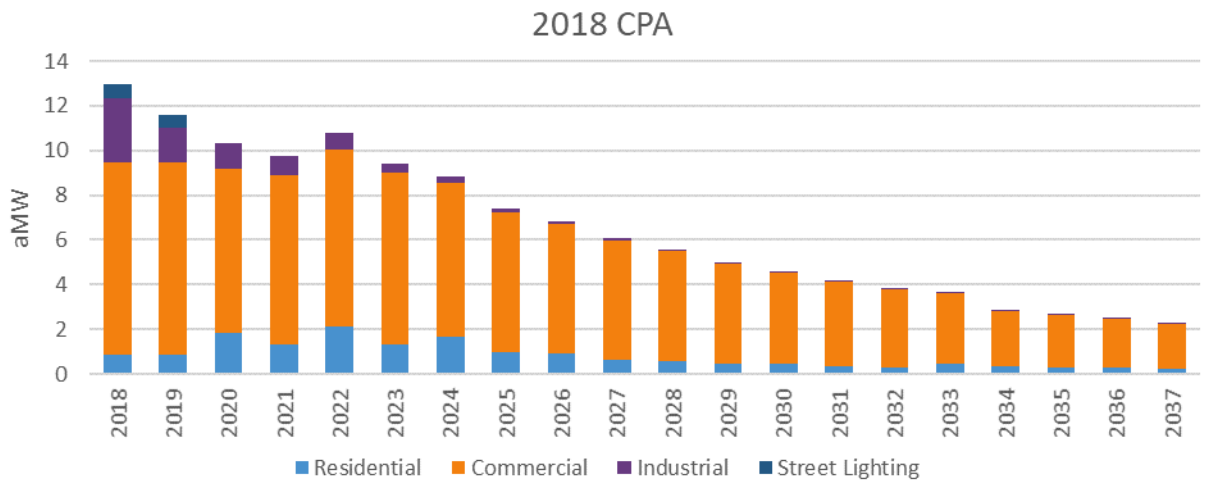


Figure 5.4 shows that the 2020 CPA determines that a higher proportion of total available potential will be realized in the study's early years. The two-year achievable potential is equal to approximately 19% of the total 21-year achievable economic potential, which is relatively consistent with the 2018 CPA, despite the lower total available achievable potential in the 2020 CPA. This change results from one key factor: the shift in the timing of lost opportunity ramp rates. For lost opportunity measures, we used the same ramp rates as those used in the Seventh Power Plan; however, we aligned the first year of this study (2020) with the fifth year of the Seventh Plan (2020) for each lost opportunity ramp rate. The result is that a greater percentage of each lost opportunity measure's potential is achieved.

6. Glossary of Terms

These definitions draw heavily from the NAPEE Guide for Conducting Energy Efficiency Potential Studies and the State and Local Energy Efficiency Action Network.[21]

Achievable potential: The amount of energy use that efficiency can realistically be expected to displace.

Benefit-cost ratio: The ratio (as determined by the Total Resource Cost test) of discounted total benefits of the program to discounted total costs over some specified time period.

Conservation Potential Assessment: A quantitative analysis of the amount of energy savings that exists, proves cost-effective, or could potentially be realized through implementation of energy-efficient programs and policies.

Cost-effectiveness: A measure of relevant economic effects resulting from implementation of an energy efficiency measure. If the benefits of this selection outweigh its costs, the measure is considered cost-effective.

Economic potential: Refers to the subset of technical potential that is economically cost-effective compared to conventional supply-side energy resources.

End use: A category of equipment or service that consumes energy (e.g., lighting, refrigeration, heating, process heat).

End Use Consumption: Used for the residential sector, this represents per-UEC consumption for a given end use, expressed in annual kWh per unit. (Also called unit energy consumption [UEC]).

End-use intensities: Used in the commercial and institution sectors, energy consumption per square foot for a given end use, expressed in annual kWh per square foot per unit.

Energy efficiency: The use of less energy to provide the same or an improved service level to an energy consumer in an economically efficient way.

Effective useful life: An estimate of the duration of savings from a measure. EUL is estimated through various means, including the median number of years that energy efficiency measures installed under a program remain in place and operable. EUL also is sometimes defined as the date at which 50 percent of installed units remain in place and operational.

Levelized cost: The result of a computational approach used to compare the cost of different projects or technologies. The stream of each project's net costs is discounted to a single year using a discount rate (creating a net present value) and divided by the project's expected lifetime output (MWhs).

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[21] SEEAction. Energy Efficiency Program Impact Evaluation Guide. NAPEE Guide for Conducting Energy Efficiency Potential Studies and the State and Local Energy Efficiency Action Network. 2012. Prepared by Steven R. Schiller, Schiller Consulting, Inc. Available online: www.seeaction.energy.gov

Lost opportunity: Refers to an efficiency measure or efficiency program seeking to encourage selection of higher-efficiency equipment or building practices than that typically chosen at the time of a purchase or design decision.

Measure: Installation of equipment, subsystems, or systems, or modifications of equipment, subsystems, systems, or operations on the customer side of the meter, designed to improve energy efficiency.

Portfolio: Either (a) a collection of similar programs addressing the same market, technology, or mechanisms; or (b) the set of all programs conducted by one organization.

Program: A group of projects with similar characteristics and installed in similar applications.

Retrofit: An efficiency measure or efficiency program intended to encourage replacement of functional equipment before the end of its operating life with higher-efficiency units (also called "early-retirement"), or the installation of additional controls, equipment, or materials in existing facilities for reducing energy consumption (e.g., increased insulation, lighting occupancy controls, economizer ventilation systems).

Technical potential: The theoretical maximum amount of energy use that could be displaced by efficiency, disregarding all non-engineering constraints (such as cost-effectiveness or the willingness of end-users to adopt the efficiency measures).

Total resource cost (TRC) test: A cost-effectiveness test that assesses the impacts of a portfolio of energy efficiency initiatives on the economy at large. The test compares the present value of efficiency costs for all members of society (including costs to participants and program administrators) compared to the present value of benefits, including avoided energy supply and demand costs.

Utility cost test (UCT): A cost-effectiveness test that evaluates impacts of efficiency initiatives on an administrator or an energy system. It compares administrator costs (e.g., incentives paid, staff labor, marketing, printing, data tracking, reporting) to accrued benefits, including avoided energy and demand supply costs. Also called the Program Administrator Cost Test (PACT).

SUMMARY and FISCAL NOTE*

Department:	Dept. Contact/Phone:	CBO Contact/Phone:
Seattle City Light	Jennifer Finnigan/6-9153	Greg Shiring/6-4085

** Note that the Summary and Fiscal Note describes the version of the bill or resolution as introduced; final legislation including amendments may not be fully described.*

1. BILL SUMMARY

Legislation Title: A RESOLUTION relating to the City Light Department; acknowledging and approving City Light's adoption of a biennial energy conservation target for 2020-2021 and a ten-year conservation potential.

Summary and background of the Legislation: To comply with RCW 19.285 (also known as I-937 or the Energy Independence Act), City Light must establish and make publicly available a biennial acquisition target for cost-effective conservation and a ten-year conservation potential. This Resolution establishes a 21.27 average megawatt (aMW) conservation target for 2020-2021 and a ten-year conservation potential of 82.67 aMW.

Initiative 937 was passed by Washington state voters in November 2006 to establish renewable and energy efficiency targets for electric utilities serving more than 25,000 retail customers. In complying with RCW 19.285.040, each qualifying utility shall pursue all available conservation that is cost-effective, reliable, and feasible. RCW 19.285.040 (1)(a) states: "By January 1, 2010, using methodologies consistent with those used by the Pacific Northwest electric power and conservation planning council in the most recently published regional power plan as it existed on June 12, 2014, or a subsequent date as may be provided by the department or the commission by rule, each qualifying utility shall identify its achievable cost-effective conservation potential through 2019. Nothing in the rule adopted under this subsection precludes a qualifying utility from using its utility specific conservation measures, values, and assumptions in identifying its achievable cost-effective conservation potential. At least every two years thereafter, the qualifying utility shall review and update this assessment for the subsequent ten-year period."

And, RCW 19.285.040 (1)(b) states: "Beginning January 2010, each qualifying utility shall establish and make publicly available a biennial acquisition target for cost-effective conservation consistent with its identification of achievable opportunities in section (a) of this subsection, and meet that target during the subsequent two-year period. At a minimum, each biennial target must be no lower than the qualifying utility's pro rata share for that two-year period of its cost-effective conservation potential for the subsequent ten-year period;"

WAC 194-37-070 Section (5) provides further guidance that the development of the biennial target and the ten-year potential should follow the methodologies used by the Northwest Power and Conservation Council (NWPPC) and this section offers a series of methodical details to ensure consistency with this regional effort. Section (4) also calls for electric utilities to "establish its ten-year potential and biennial target by action of the utility's governing board, after public notice and opportunity for public comment."

City Light initiated a Conservation Potential Assessment (CPA) to identify the biennial acquisition target and the ten-year potential for the service territory. City Light hired the consulting firm Cadmus to complete the CPA that is consistent with the methodology outlined in both RCW 19.285.040 and WAC 194-37-070 and is also consistent with the Northwest Power and Conservation Council's methodology used for their Seventh Power Plan. This CPA has identified a total of 21.27 aMW being achievable within the City Light service territory for 2020-2021 and a total conservation potential of 82.67 aMW for the ten-year period starting in 2020.

City Light anticipates meeting or exceeding the 21.27 aMW biennial target for 2020-2021. It is anticipated that City Light's proposed 2020 budget and the spending plan adopted in the Strategic Plan's rate path for the 2021 budget will be sufficient to meet the biennial acquisition targets. No increase in budget levels for either 2020 or 2021 is expected to be necessary as a result of this legislation.

This Resolution is necessary as outlined in WAC 194-37-070 section (4) which states "Each utility must establish its ten-year potential and biennial target by action of the utility's governing board, after public notice and opportunity for public comment."

As a point of reference, this is the sixth Resolution to establish the biennial target and ten-year potential for the utility. The most recent legislation, Resolution #31765 established the 2018-2019 conservation target of 24.5 aMW and ten-year potential of 90.3 aMW. The 2020-2021 target of 21.27 aMW is a decrease from the 2018-2019 conservation target of approximately 13%. The decrease is due to lower avoided energy costs, increased stringency in energy codes, and forty years of conservation program achievement that has captured much of the easy-to-attain conservation such as LED lighting. Other than the energy savings target and ten-year potential, this Resolution is nearly identical to Resolution #31765 in its language and intent.

2. CAPITAL IMPROVEMENT PROGRAM

Does this legislation create, fund, or amend a CIP Project? ___ Yes __X__ No

3. SUMMARY OF FINANCIAL IMPLICATIONS

Does this legislation amend the Adopted Budget? ___ Yes __X__ No

Does the legislation have other financial impacts to the City of Seattle that are not reflected in the above, including direct or indirect, short-term or long-term costs?
There is no direct financial impact of implementing this legislation; the adoption of this Resolution is an administrative formality designed to comply with state law. However, failing to meet the biennial conservation targets may result in an administrative penalty outlined in RCW 19.285.060: "(1) Except as provided in subsection (2) of this section, a qualifying utility that fails to comply with the energy conservation or renewable energy targets established in RCW 19.285.040 shall pay an administrative penalty to the state of

Washington in the amount of fifty dollars for each megawatt-hour of shortfall. Beginning in 2007, this penalty shall be adjusted annually according to the rate of change of the inflation indicator, gross domestic product-implicit price deflator, as published by the bureau of economic analysis of the United States department of commerce or its successor."

City Light's proposed 2020 budget and the spending plan adopted in the Strategic Plan's rate path for the 2021 budget provide the resources necessary to meet the target and it is anticipated that adequate resources will be available to meet the biennial acquisition targets for 2020-2021. City Light does not expect to propose any significant increase in budget levels to implement this legislation.

Is there financial cost or other impacts of *not* implementing the legislation?
There is no direct financial cost of not implementing this legislation. However, City Light is required by state law to set the conservation targets as outlined in RCW 19.285.040. City Light anticipates meeting the conservation targets with anticipated budgets.

4. OTHER IMPLICATIONS

a. Does this legislation affect any departments besides the originating department?
No

b. Is a public hearing required for this legislation?
Yes. Consistent with WAC 194-37-070 section (4), the utility must establish its ten-year potential and biennial target by action of the utility's governing board, after public notice and opportunity for comment.

c. Does this legislation require landlords or sellers of real property to provide information regarding the property to a buyer or tenant?
No

d. Is publication of notice with *The Daily Journal of Commerce* and/or *The Seattle Times* required for this legislation?
No

e. Does this legislation affect a piece of property?
No

f. Please describe any perceived implication for the principles of the Race and Social Justice Initiative. Does this legislation impact vulnerable or historically disadvantaged communities? What is the Language Access plan for any communications to the public?
No, this resolution sets an overall savings target for Seattle City Light, but does not alter the way the organization offers services to vulnerable or historically disadvantaged communities.

g. If this legislation includes a new initiative or a major programmatic expansion: What are the specific long-term and measurable goal(s) of the program? How will this legislation help achieve the program's desired goal(s).

This is not a new initiative or major programmatic expansion; this effort is consistent with Seattle City Light's commitment to energy efficiency.

List attachments/exhibits below:
None

Seattle City Light

2020 Conservation Potential Assessment—Volume II

Project Lead/By: Jennifer Finnigan
Prepared by: Lakin Garth, Cadmus
11/26/2019

Washington Initiative 937 (I-937) Compliance Documentation

The Washington Administrative Code chapter 194-37-070 says CPAs must use methodologies consistent with the most recently published regional power plan and satisfy the 15 criteria. Table 1 lists these items and describes how City Light's 2020 CPA satisfies the criteria.

Following Table 1 the "Methodology Comparison" section discusses key parts of the Council's methodology for assessing conservation potential and explains how Cadmus' approach for City Light's 2020 CPA is consistent.

TABLE-1 WAC 194-37-070 DOCUMENTATION	
Northwest Power and Conservation Council Methodology	**Cadmus Methodology**
(a) Analyze a broad range of energy efficiency measures considered technically feasible;	Cadmus analyzed all of the most up-do-date, active measures from the Regional Technical Forum (RTF) and measures from the Northwest Power and Conservation Council's (Council) Seventh Power Plan. This study considered over 4,200 measure permutations.
(b) Perform a life-cycle cost analysis of measures or programs, including the incremental savings and incremental costs of measures and replacement measures where resources or measures have different measure lifetimes;	Cadmus performed life-cycle cost analysis in a manner consistent with the Council's PROCOST model. As a basis, the analysis used incremental costs, energy savings, and measure lives from the Seventh Power Plan and RTF workbooks.
(c) Set avoided costs equal to a forecast of regional market prices, which represents the cost of the next increment of available and reliable power supply available to the utility for the life of the energy efficiency measures to which it is compared;	City Light provided avoided-cost forecasts, consistent with City Light's IRP. Cadmus estimated potential for two avoided cost scenarios—one based on regional market prices; and the other based on City Light's preferred portfolio, selected by City Light's previous IRP. Conservation potential and targets were based on City Light's "IRP preferred" avoided costs.
(d) Calculate the value of the energy saved based on when it is saved. In performing this calculation, use time differentiated avoided costs to conduct the analysis that determines the financial value of energy saved through conservation;	Cadmus used measure load shapes to calculate time of day and year usage, and weighting of measure values was based upon peak and off-peak pricing, performed in a manner consistent with the Council's PROCOST model.
(e) Conduct a total resource cost analysis that assesses all costs and all benefits of conservation measures regardless of who pays the costs or receives the benefits. The NWPCC identifies conservation measures that pass the total resource cost test as economically achievable;	Cadmus conducted benefit-cost analysis according to the Council's methodology. The cost side considered capital costs, administrative costs, annual O&M costs and periodic replacement costs. The benefits side included energy, non-energy, operations and maintenance (O&M), and all other quantifiable benefits. The Total Resource Cost (TRC) benefit-cost ratio served to screen measures for cost-effectiveness (i.e., those greater than one were considered cost-effective).
(f) Identify conservation measures that pass the total resource cost test, by having a benefit/cost ratio of one or greater as economically achievable;	Cadmus considered measures achieving a BCR ratio (on a TRC basis) greater than or equal to one as achievable and cost-effective.
(g) Include the increase or decrease in annual or periodic operations and maintenance costs due to conservation measures;	Cadmus accounted for each measure's O&M costs in the total resource cost, according to the Council's assumptions.

TABLE-1 WAC 194-37-070 DOCUMENTATION	
(h) Include deferred capacity expansion benefits for transmission and distribution systems in its cost-effectiveness analysis;	Cost-benefit ratios and levelized costs incorporated City Light's avoided transmission and distribution cost forecasts.
(i) Include all non-power benefits that a resource or measure may provide that can be quantified and monetized;	Cadmus included quantifiable non-energy benefits for the appropriate measures. For example, non-energy benefits included water savings from clothes washers. The source of these benefits derived either the RTF or the Seventh Plan, depending upon the measure.
(j) Include an estimate of program administrative costs;	This study used a 20% residential and 23% commercial and industrial administrative cost (percent of incremental cost). Cadmus derived these cost adders from City Light's 2015 program expenditures.
(k) Discount future costs and benefits at a discount rate based on a weighted, after-tax, cost of capital for utilities and their customers for the measure lifetime;	Cadmus applied discount rates to each measure in the study, using the Council's methodology (with a 3% real discount rate used).
(l) Include estimates of the achievable conservation penetration rates for conservation measures;	Cadmus determined achievable potential estimates for each measure by applying the Council's 85% achievability factor and ramp rates, consistent with the Council's methodology.
(m) Include a ten percent bonus for conservation measures as defined in 16 U.S.C. § 839a of the Pacific Northwest Electric Power Planning and Conservation Act;	Cadmus applied the 10% bonus for conservation measures, as defined in 16 U.S.C. § 839a of the Pacific Northwest Electric Power Planning and Conservation Act to all measures in the study. This adder was included in avoided cost forecasts for cost-benefit analysis and in the calculation of levelized costs.
(n) Analyze the results of multiple scenarios. This includes testing scenarios that accelerate the rate of conservation acquisition in the earlier years; and	Cadmus considered two scenarios reflecting different avoided cost forecast, testing scenarios with accelerated ramp rates, increasing conservation in early years.
(o) Analyze the costs of estimated future environmental externalities in the multiple scenarios that estimate costs and risks.	The study considered two avoided cost scenarios to capture price uncertainty. Both forecasts included the value of avoided CO2 offsets, and the market price forecast included the value of avoided renewable energy credit purchases.

1.1. Methodology Comparison

To facilitate comparisons with the 7th Power Plan, the Council prepared an overview of the methodology used in developing the 7th Power Plan's conservation potential estimates. This appendix compares the methodology used in SCL's 2020 CPA to benchmarks established by the Council.

Italics denote descriptions of methodologies used in this study.

1.1.1. Technical Resource Potential Assessment

The assessment reviewed a wide array of energy efficiency technologies and practices, across all sectors and major end uses.

The study considered measures from a variety of sources, including the 7th Plan and RTF. Appendix D provides descriptions of all measures analyzed.

1.1.1.1 Methodology

- Technically feasibility savings = Number of applicable units * incremental savings/applicable units
- "Applicable" units accounted for:
  - Fuel saturations (e.g., electric vs. gas DHW).

    Whenever possible, fuel saturations were based on data specific to City Light's service territory. City Light's oversamples for the 2014 Commercial Building Stock Assessment (CBSA) and the 2017 Residential Building Stock Assessment (RBSA) served as the primary sources of this information.
  - Building characteristics (e.g., single-family vs. mobile homes, basement/non-basement).

    Data derived from NEEA's 2017 Residential Building Stock Assessment (RBSA), CBSA, and City Light's customer database.
  - System saturations (e.g., heat pump vs. zonal, central AC vs. window AC).

    Whenever possible, system saturations were based on data specific to City Light's service territory. City Light's oversamples for the 2014 Commercial Building Stock Assessment (CBSA) and the 2017 Residential Building Stock Assessment (RBSA) served as the primary sources of this information.
  - Current measure saturations.

    Current saturations were incorporated into the applicability, based on information from RBSA, CBSA, the 7th Plan, and RTF.
  - New and existing units.

    Existing and new units were calculated based on current and forecasted customers, respectively.
  - Measure life (stock turnover cycle).

Measure decay rates were applied to lost opportunity measures, based on measure life. Discretionary measures were assumed to be reinstalled at the end of their useful life.

- Measure substitutions (e.g., duct sealing of homes with forced-air resistance furnaces vs. conversion of homes to heat pumps with sealed ducts).

  The measure share applicability factor accounted for competition between measures to avoid double-counting.

- "Incremental" savings/applicable unit accounted for:
  - Expected kW and kWh savings, shaped by time-of-day, day of week, and month of year.

    Energy and demand savings were either based on deemed values or calculated as a percent reduction in baseline end-use consumption.

  - Savings over baseline efficiency. Baseline set by codes/standards or current practices.

    Baselines were set based on current codes, standards, or current practices. Standards passed but not yet implemented became the baseline at the time mandated in the new standard.

    Not always equivalent to savings over "current use" (e.g., new refrigerator savings measured as a "increment above current federal standards," not the refrigerator being replaced).

    Savings from equipment upgrades were calculated based on the market average efficiency level available at the time of burnout.

  - Climate: heating, cooling degree days, and solar availability.

    Savings were based on the typical climate in City Light's service territory.

  - Measure interactions (e.g., lighting and HVAC, duct sealing and heat pump performance, heat pump conversion, and weatherization savings).

    These interactive effects were treated as a reduction in measure savings (e.g., commercial lighting measures might save less due to increased heating requirements).

1.1.2. Economic Potential: Ranking Based on Resource Valuation

- The TRC served as the criterion for economic screening, and included all measure costs and benefits, regardless of the parties paying for or receiving them.
  - TRC B/C Ratio > = 1.0

    Benefit-cost analysis was conducted according to the Council's methodology. Capital cost, administrative cost, annual O&M cost and periodic replacement costs were all considered on the cost side. Energy, non-energy, O&M, and all other quantifiable benefits were included on the benefits side. The TRC benefit cost ratio was used to screen measures for cost-effectiveness (i.e., those greater than 1 are cost-effective).

- Levelized cost of conserved energy (CCE) < levelized avoided cost for the savings' load shape could substitute for TRC if adjusting "CCE" to account for "non-kWh" benefits, including deferred T&D, non-energy benefits, environmental benefits, and the Act's 10% conservation credit.

  Levelized costs, on a TRC basis, were calculated for each measure in comparison with the Integrated Resource Planning's (IRP) supply-side resources. The levelized cost calculation incorporated deferred T&D (for electric resources), non-energy benefits, secondary fuel benefits, and the Act's 10% conservation credit (for electric resources).

1.1.2.1 Methodology

- The energy and capacity value (i.e., benefit) of savings was based on the avoided cost of future wholesale market purchases (i.e., forward price curves).

  The study considered two avoided cost forecasts—one based on the avoided cost of future wholesale market purchases and a second based on the avoided cost of future market purchases and the construction of new renewable generation
- The energy and capacity values accounted for the savings shape (i.e., used time and seasonally differentiated avoided costs and measure savings).

  The analysis relied time differentiated avoided costs and savings to calculate the value of avoided energy and capacity
- Performing the valuation under a wide range of future market price scenarios during the IRP process accounted for uncertainties in future market prices.

  Two avoided cost scenarios were considered to account for price uncertainty
- Costs inputs (resource cost elements):

  All costs listed below were included in the per-unit measure costs, where appropriate.
  - Full incremental measure costs (material and labor).
  - Applicable ongoing O&M expenses (plus or minus).
  - Applicable periodic O&M expenses (plus or minus).
  - Utility administrative costs (e.g., program planning, marketing, delivery, ongoing administration, evaluation).
- Benefit inputs (resource value elements):

  All benefits listed below were assessed in calculating the levelized CCE and benefit-cost ratios, where appropriate.
  - Direct energy savings.
  - Direct capacity savings.
  - Avoided T&D losses.
  - Deferral value of transmission and distribution system expansion (if applicable).
  - Non-energy benefits (e.g., water savings).

- Environmental externalities.

- Discounted presented value inputs:
  - Rate = After-tax average cost of capital, weighted for project participants (real or nominal).

    The analysis used City Light's discount rate of 3.0%.
  - Term = Project life, generally equivalent to life of resources added during the planning period.

    Costs were levelized over each measure's expected useful life. Any reinstallation costs over the 21-year planning period were similarly levelized.
  - Money was discounted, not energy savings.

    The value of energy savings ($) is discounted

1.1.3. Achievable Potential

- Annual acquisition targets, established through the IRP process (i.e., portfolio modeling).

  Acquisition targets were established in accordance to WAC 194-37. The CPA determined conservation targets based on the pro-rata share of ten-year conservation potential and 2-year conservation potential. This level of conservation was included in City Light's IRP modeling.
- Conservation competed against all other resource options in portfolio analysis. Conservation resource supply curves separated into the following:
  - Discretionary (non-lost opportunity).

    Defined as retrofit opportunities in existing facilities.
  - Lost-opportunity.

    Including equipment replacements in existing facilities and all new construction measures.
  - Annual achievable potential, constrained by historic "ramp rates" for discretionary and lost-opportunity resources:

    The maximum ramp-up/ramp-down rate for discretionary was 3x the prior year for discretionary, with an upper limit of 85% over the 21-year planning period.

    Analysis assumed 85% of discretionary resources could be acquired within at least a 20-year timeframe.

    A lost-opportunity used a 15% ramp rate in the first year, growing to 85% by the 12th year.

    Lost opportunity ramp rates varied by measure and were based on City Light's program history.

    Achievable potentials could vary by the type of measure, customer sector, and program design (e.g., measures subject to federal standards could have 100% "achievable" potential).

While the analysis removed savings from known standards, it did not attempt to predict which savings would be acquired from future codes or standards.

- Revised technical, economic, and achievable potential were based on changes in market conditions (e.g., revised codes or standards), program accomplishments, evaluations, and experience.

  Changes taking effect after the finalization of the 2018 CPA are reflected in the 2020 CPA.
- All programs should incorporate Measurement and Verification (M&V) plans that, at a minimum, track administrative and measure costs and savings.
- The International Performance Measurement and Verification Protocols (IPMVP) should be used as a guide.

Baseline Data

Appendix B includes summaries of baseline forecasts for the residential, commercial, and industrial sectors. Cadmus calibrated these forecasts to City Light's load forecasts, though individual sector forecasts may differ from City Light's due to adjustments for future equipment standards. This appendix also includes detailed baseline inputs for the residential and commercial sectors, such as end-use saturations, fuel shares, and unit energy consumption (UEC) or end-use energy-use intensities (EUIs). UECs, applying to the residential sector, are expressed in kWh per unit. EUIs, applying to the commercial sector, are expressed in kWh per square foot.

B.1. Residential Baseline Data

Figure B-1. Residential Baseline Forecast by Segment

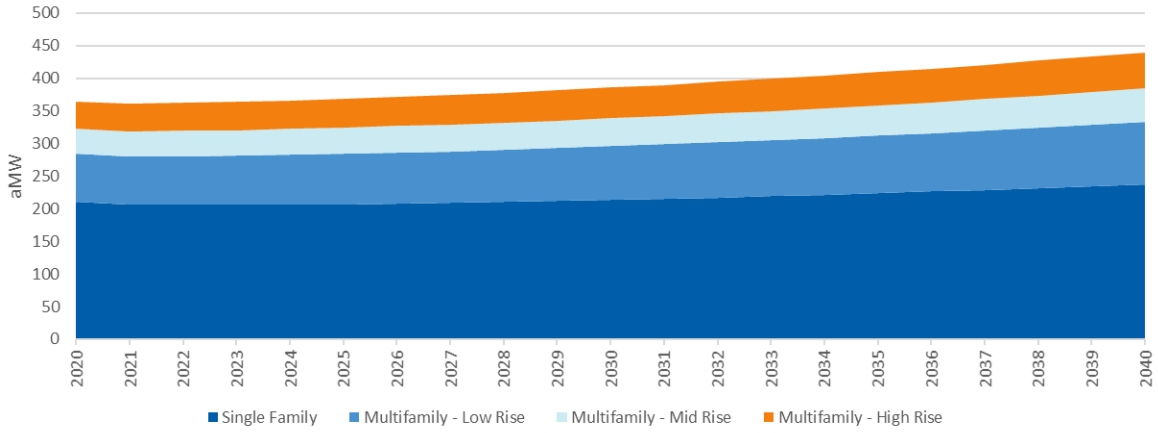


Figure B-2. Residential Baseline Forecast by End Use

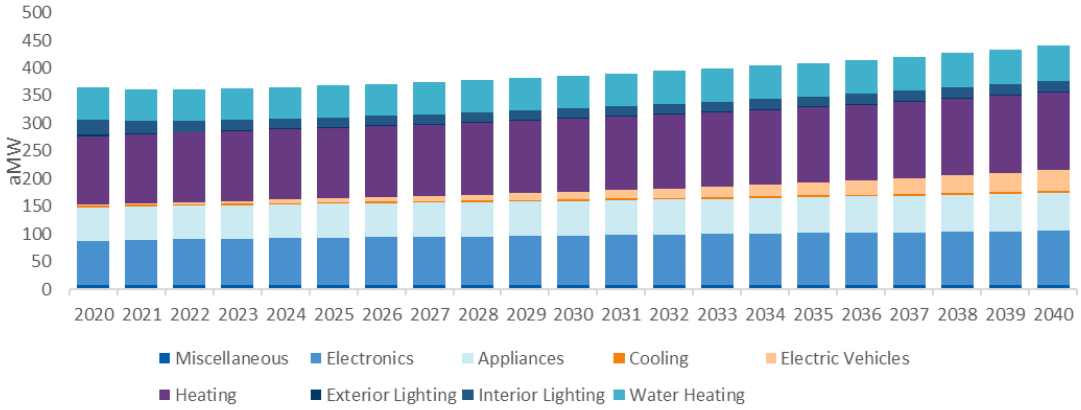


TABLE B-1. RESIDENTIAL SATURATION FUEL SHARES AND UECS					
Segment	**End Use**	**Saturation**	**Fuel Share**	**Weighted Average UEC Existing (kWh/Unit)**	**Weighted Average UEC New (kWh/Unit)**
Multifamily - High Rise	Air Purifier	0.0	100%	233.50	224.46
Multifamily - High Rise	Computer - Desktop	0.4	100%	65.01	65.01
Multifamily - High Rise	Computer - Laptop	0.4	100%	18.91	18.91
Multifamily - High Rise	Cooking Oven	1.0	93%	73.42	73.42
Multifamily - High Rise	Cooking Range	1.0	93%	49.95	49.95
Multifamily - High Rise	Cool Central	0.0	100%	41.81	12.22
Multifamily - High Rise	Cool Room	0.2	100%	13.43	12.97
Multifamily - High Rise	Copier	0.0	100%	225.54	224.51
Multifamily - High Rise	Dryer	0.4	100%	185.31	139.32
Multifamily - High Rise	DVD Player	1.2	100%	10.19	10.19
Multifamily - High Rise	Electric Vehicles	0.0	100%	1895.44	1895.44
Multifamily - High Rise	Freezer	0.0	100%	97.62	87.47
Multifamily - High Rise	Heat Central	0.0	0%	7269.04	3531.37
Multifamily - High Rise	Heat Pump	0.0	100%	562.97	248.40
Multifamily - High Rise	Heat Room	0.8	97%	957.93	957.93
Multifamily - High Rise	Home Audio System	0.5	100%	50.64	50.64
Multifamily - High Rise	Lighting Exterior Standard	0.1	100%	8.16	2.83
Multifamily - High Rise	Lighting Interior Linear Fluorescent	1.6	100%	4.93	4.93
Multifamily - High Rise	Lighting Interior Specialty	6.5	100%	7.54	7.54
Multifamily - High Rise	Lighting Interior Standard	9.2	100%	3.40	1.50
Multifamily - High Rise	Microwave	0.7	100%	40.61	40.61
Multifamily - High Rise	Monitor	0.3	100%	30.44	30.44
Multifamily - High Rise	Multifunction Device	0.9	100%	79.06	77.75

TABLE B-1. RESIDENTIAL SATURATION FUEL SHARES AND UECS					
Multifamily - High Rise	Other	1.0	100%	0.00	0.00
Multifamily - High Rise	Plug Load Other	1.0	100%	302.63	302.63
Multifamily - High Rise	Printer	0.3	100%	57.79	57.79
Multifamily - High Rise	Refrigerator	1.0	100%	80.78	79.01
Multifamily - High Rise	Set Top Box	0.3	100%	73.35	73.35
Multifamily - High Rise	Television	0.7	100%	102.79	102.79
Multifamily - High Rise	Television - Big Screen	0.4	100%	219.99	219.99
Multifamily - High Rise	Ventilation and Circulation	0.0	100%	248.40	155.90
Multifamily - High Rise	Waste Water	1.0	100%	82.55	82.55
Multifamily - High Rise	Water Heat GT 55 Gal	0.0	100%	187.83	92.05
Multifamily - High Rise	Water Heat LE 55 Gal	0.3	100%	173.82	169.82
Multifamily - Low Rise	Air Purifier	0.0	100%	233.50	224.46
Multifamily - Low Rise	Computer - Desktop	0.2	100%	65.01	65.01
Multifamily - Low Rise	Computer - Laptop	0.6	100%	18.91	18.91
Multifamily - Low Rise	Cooking Oven	1.0	89%	73.42	73.42
Multifamily - Low Rise	Cooking Range	1.0	89%	49.95	49.95
Multifamily - Low Rise	Cool Central	0.0	100%	50.06	14.63
Multifamily - Low Rise	Cool Room	0.2	100%	13.43	12.97
Multifamily - Low Rise	Copier	0.0	100%	225.54	224.51
Multifamily - Low Rise	Dryer	0.1	100%	173.81	139.32
Multifamily - Low Rise	DVD Player	1.2	100%	10.19	10.19
Multifamily - Low Rise	Electric Vehicles	0.0	100%	1895.44	1895.44
Multifamily - Low Rise	Freezer	0.1	100%	97.62	87.47
Multifamily - Low Rise	Heat Central	0.0	0%	8703.25	4228.13
Multifamily - Low Rise	Heat Pump	0.0	100%	674.05	297.41
Multifamily - Low Rise	Heat Room	0.9	100%	1123.31	1123.31
Multifamily - Low Rise	Home Audio System	0.5	100%	50.04	50.04

TABLE B-1. RESIDENTIAL SATURATION FUEL SHARES AND UECS					
Multifamily - Low Rise	Lighting Exterior Standard	0.0	100%	8.16	2.83
Multifamily - Low Rise	Lighting Interior Linear Fluorescent	1.6	100%	4.93	4.93
Multifamily - Low Rise	Lighting Interior Specialty	3.5	100%	7.54	7.54
Multifamily - Low Rise	Lighting Interior Standard	12.5	100%	3.40	1.50
Multifamily - Low Rise	Microwave	0.7	100%	40.61	40.61
Multifamily - Low Rise	Monitor	0.4	100%	30.44	30.44
Multifamily - Low Rise	Multifunction Device	0.9	100%	79.06	77.75
Multifamily - Low Rise	Other	1.0	100%	0.00	0.00
Multifamily - Low Rise	Plug Load Other	1.0	100%	302.63	302.63
Multifamily - Low Rise	Printer	0.3	100%	57.79	57.79
Multifamily - Low Rise	Refrigerator	1.0	100%	80.06	78.65
Multifamily - Low Rise	Set Top Box	0.8	100%	62.84	62.84
Multifamily - Low Rise	Television	1.0	100%	92.11	92.11
Multifamily - Low Rise	Television - Big Screen	0.4	100%	200.31	200.31
Multifamily - Low Rise	Ventilation and Circulation	0.0	100%	248.40	155.90
Multifamily - Low Rise	Waste Water	1.0	100%	101.80	101.80
Multifamily - Low Rise	Water Heat GT 55 Gal	0.0	0%	231.64	113.52
Multifamily - Low Rise	Water Heat LE 55 Gal	0.6	100%	214.36	209.42
Multifamily - Mid Rise	Air Purifier	0.0	100%	233.50	224.46
Multifamily - Mid Rise	Computer - Desktop	0.4	100%	65.01	65.01
Multifamily - Mid Rise	Computer - Laptop	0.4	100%	18.91	18.91
Multifamily - Mid Rise	Cooking Oven	1.0	93%	73.42	73.42
Multifamily - Mid Rise	Cooking Range	1.0	93%	49.95	49.95
Multifamily - Mid Rise	Cool Central	0.0	100%	41.81	12.22

TABLE B-1. RESIDENTIAL SATURATION FUEL SHARES AND UECS					
Multifamily - Mid Rise	Cool Room	0.2	100%	13.43	12.97
Multifamily - Mid Rise	Copier	0.0	100%	225.54	224.51
Multifamily - Mid Rise	Dryer	0.4	100%	185.31	139.32
Multifamily - Mid Rise	DVD Player	1.2	100%	10.19	10.19
Multifamily - Mid Rise	Electric Vehicles	0.0	100%	1895.44	1895.44
Multifamily - Mid Rise	Freezer	0.0	100%	97.62	87.47
Multifamily - Mid Rise	Heat Central	0.0	0%	7269.04	3531.37
Multifamily - Mid Rise	Heat Pump	0.0	100%	562.97	248.40
Multifamily - Mid Rise	Heat Room	0.8	97%	934.30	934.30
Multifamily - Mid Rise	Home Audio System	0.5	100%	50.64	50.64
Multifamily - Mid Rise	Lighting Exterior Standard	0.1	100%	8.16	2.83
Multifamily - Mid Rise	Lighting Interior Linear Fluorescent	1.6	100%	4.93	4.93
Multifamily - Mid Rise	Lighting Interior Specialty	6.5	100%	7.54	7.54
Multifamily - Mid Rise	Lighting Interior Standard	9.2	100%	3.40	1.50
Multifamily - Mid Rise	Microwave	0.7	100%	40.61	40.61
Multifamily - Mid Rise	Monitor	0.3	100%	30.44	30.44
Multifamily - Mid Rise	Multifunction Device	0.9	100%	79.06	77.75
Multifamily - Mid Rise	Other	1.0	100%	0.00	0.00
Multifamily - Mid Rise	Plug Load Other	1.0	100%	302.63	302.63
Multifamily - Mid Rise	Printer	0.3	100%	57.79	57.79
Multifamily - Mid Rise	Refrigerator	1.0	100%	80.78	79.01
Multifamily - Mid Rise	Set Top Box	0.3	100%	73.35	73.35
Multifamily - Mid Rise	Television	0.7	100%	102.79	102.79
Multifamily - Mid Rise	Television - Big Screen	0.4	100%	219.99	219.99
Multifamily - Mid Rise	Ventilation and Circulation	0.0	100%	248.40	155.90
Multifamily - Mid Rise	Waste Water	1.0	100%	82.55	82.55

TABLE B-1. RESIDENTIAL SATURATION FUEL SHARES AND UECS					
Multifamily - Mid Rise	Water Heat GT 55 Gal	0.0	100%	187.83	92.05
Multifamily - Mid Rise	Water Heat LE 55 Gal	0.3	100%	173.82	169.82
Single Family	Air Purifier	0.0	100%	233.50	224.46
Single Family	Computer - Desktop	0.8	100%	69.69	69.69
Single Family	Computer - Laptop	0.7	100%	19.74	19.74
Single Family	Cooking Oven	1.1	81%	73.90	73.90
Single Family	Cooking Range	1.1	76%	49.95	49.95
Single Family	Cool Central	0.1	100%	105.81	30.92
Single Family	Cool Room	0.1	100%	13.43	12.97
Single Family	Copier	0.0	100%	225.54	224.51
Single Family	Dryer	1.0	86%	185.90	139.32
Single Family	DVD Player	1.6	100%	10.19	10.19
Single Family	Electric Vehicles	0.0	100%	1895.44	1895.44
Single Family	Freezer	0.3	100%	97.62	87.47
Single Family	Heat Central	0.6	2%	9198.06	4468.51
Single Family	Heat Pump	0.0	100%	1214.18	532.97
Single Family	Heat Room	0.3	70%	1431.75	1431.75
Single Family	Home Audio System	0.9	100%	51.70	51.70
Single Family	Lighting Exterior Standard	4.7	100%	8.16	2.83
Single Family	Lighting Interior Linear Fluorescent	4.4	100%	4.93	4.93
Single Family	Lighting Interior Specialty	24.2	100%	7.54	7.54
Single Family	Lighting Interior Standard	24.2	100%	3.40	1.50
Single Family	Microwave	0.8	100%	40.61	40.61
Single Family	Monitor	0.7	100%	31.01	31.01
Single Family	Multifunction Device	1.2	100%	79.06	77.75

TABLE B-1. RESIDENTIAL SATURATION FUEL SHARES AND UECS					
Single Family	Other	1.0	100%	0.00	0.00
Single Family	Plug Load Other	1.0	100%	720.38	720.38
Single Family	Pool Pump	0.0	100%	266.54	266.54
Single Family	Printer	0.7	100%	57.79	57.79
Single Family	Refrigerator	1.4	100%	80.48	78.77
Single Family	Set Top Box	0.9	100%	85.70	85.70
Single Family	Television	1.2	100%	113.53	113.53
Single Family	Television - Big Screen	0.6	100%	238.23	238.23
Single Family	Ventilation and Circulation	0.6	100%	248.40	155.90
Single Family	Waste Water	1.0	100%	153.00	153.00
Single Family	Water Heat GT 55 Gal	0.2	88%	348.14	170.61
Single Family	Water Heat LE 55 Gal	0.8	64%	322.17	314.74

B.2. Commercial Baseline Data

Figure B-3. Commercial Baseline Forecast by Sector

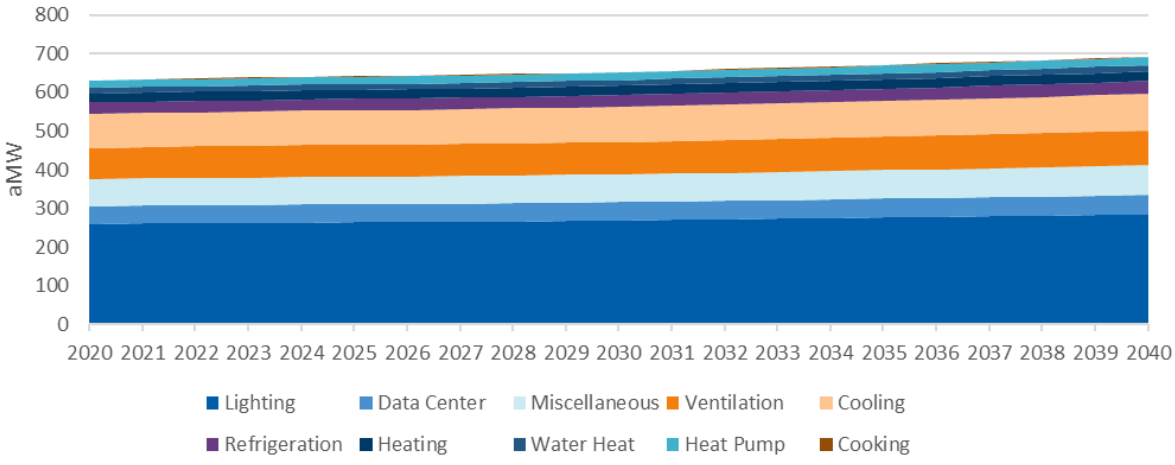


Figure B-4. Commercial Baseline Forecast by End Use

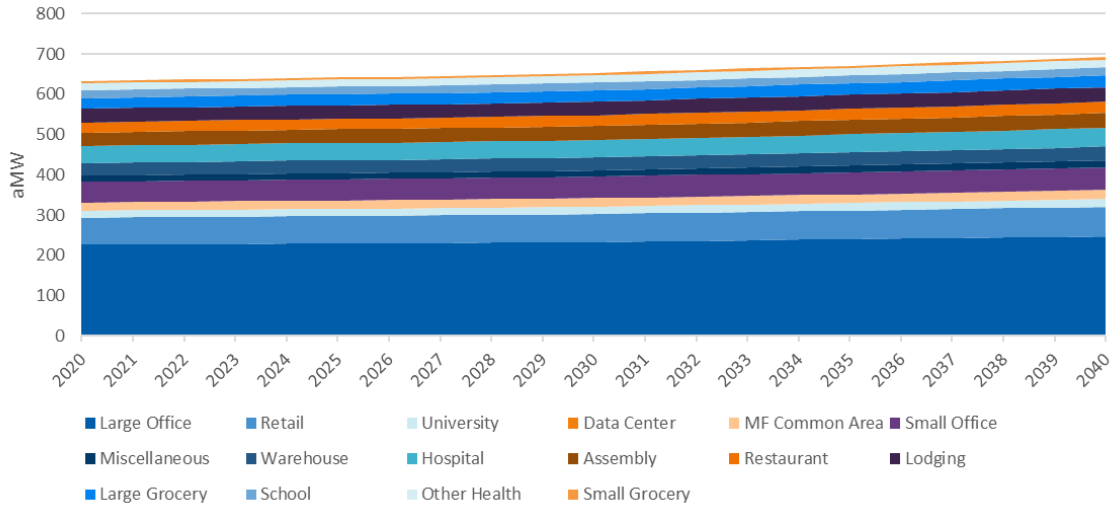


TABLE B-2. COMMERCIAL SATURATION FUEL SHARES AND UECS					
Segment	**End Use**	**Saturation**	**Fuel Share**	**Weighted Average UEC Existing (kWh/Unit)**	**Weighted Average UEC New (kWh/Unit)**
Assembly	Compressed Air	3%	100%	0.71	0.71
Assembly	Cooking	0%	0%	0.00	0.00
Assembly	Cool Central	41%	100%	3.32	3.32
Assembly	Data Center	100%	100%	0.44	0.44
Assembly	Exterior Lighting	100%	100%	1.12	1.12
Assembly	Heat Central	75%	13%	2.37	2.37
Assembly	Heat Pump	22%	100%	2.73	2.73
Assembly	Interior Lighting	100%	100%	3.56	3.56
Assembly	Other	100%	100%	0.00	0.00
Assembly	Plug Load Other	100%	100%	1.30	1.30
Assembly	Refrigeration	100%	100%	0.17	0.17
Assembly	Ventilation	97%	100%	1.93	1.93
Assembly	Waste Water	100%	100%	0.12	0.12
Assembly	Water Heat GT 55 Gal	35%	63%	0.35	0.35
Assembly	Water Heat LE 55 Gal	65%	85%	0.32	0.32
Hospital	Compressed Air	0%	100%	0.00	0.00
Hospital	Cooking	100%	13%	0.65	0.65
Hospital	Cool Central	65%	100%	4.56	4.56
Hospital	Data Center	100%	100%	1.75	1.75
Hospital	Exterior Lighting	100%	100%	0.70	0.70
Hospital	Heat Central	76%	34%	1.52	1.52
Hospital	Heat Pump	23%	100%	4.36	4.36
Hospital	Interior Lighting	100%	100%	7.26	7.26
Hospital	Other	100%	100%	0.00	0.00
Hospital	Plug Load Other	100%	100%	5.05	5.05
Hospital	Refrigeration	100%	100%	0.59	0.59

TABLE B-2. COMMERCIAL SATURATION FUEL SHARES AND UECS					
Segment	**End Use**	**Saturation**	**Fuel Share**	**Weighted Average UEC Existing (kWh/Unit)**	**Weighted Average UEC New (kWh/Unit)**
Hospital	Ventilation	99%	100%	6.46	6.46
Hospital	Waste Water	100%	100%	0.26	0.26
Hospital	Water Heat GT 55 Gal	79%	4%	1.70	1.70
Hospital	Water Heat LE 55 Gal	21%	67%	1.59	1.59
Large Off	Compressed Air	0%	100%	0.00	0.00
Large Off	Cooking	0%	0%	0.00	0.00
Large Off	Cool Central	87%	100%	3.86	3.86
Large Off	Data Center	100%	100%	1.75	1.75
Large Off	Exterior Lighting	100%	100%	0.54	0.54
Large Off	Heat Central	85%	31%	3.39	3.39
Large Off	Heat Pump	14%	100%	3.16	3.16
Large Off	Interior Lighting	100%	100%	4.81	4.81
Large Off	Other	100%	100%	0.00	0.00
Large Off	Plug Load Other	100%	100%	1.47	1.47
Large Off	Refrigeration	100%	100%	0.09	0.09
Large Off	Ventilation	98%	100%	1.62	1.62
Large Off	Waste Water	100%	100%	0.21	0.21
Large Off	Water Heat GT 55 Gal	41%	53%	0.50	0.50
Large Off	Water Heat LE 55 Gal	59%	100%	0.47	0.47
Large Ret	Compressed Air	48%	100%	0.15	0.15
Large Ret	Cooking	0%	0%	0.00	0.00
Large Ret	Cool Central	97%	100%	1.94	1.94
Large Ret	Data Center	100%	100%	0.44	0.44
Large Ret	Exterior Lighting	100%	100%	1.14	1.14
Large Ret	Heat Central	98%	6%	2.07	2.07

TABLE B-2. COMMERCIAL SATURATION FUEL SHARES AND UECS					
Segment	**End Use**	**Saturation**	**Fuel Share**	**Weighted Average UEC Existing (kWh/Unit)**	**Weighted Average UEC New (kWh/Unit)**
Large Ret	Heat Pump	0%	100%	2.98	2.98
Large Ret	Interior Lighting	100%	100%	7.53	7.53
Large Ret	Other	100%	100%	0.00	0.00
Large Ret	Plug Load Other	100%	100%	0.83	0.83
Large Ret	Refrigeration	100%	100%	0.08	0.08
Large Ret	Ventilation	98%	100%	2.79	2.79
Large Ret	Waste Water	100%	100%	0.13	0.13
Large Ret	Water Heat GT 55 Gal	43%	11%	0.30	0.30
Large Ret	Water Heat LE 55 Gal	57%	50%	0.28	0.28
Lodging	Compressed Air	0%	100%	0.00	0.00
Lodging	Cooking	100%	11%	0.53	0.53
Lodging	Cool Central	50%	100%	2.71	2.71
Lodging	Data Center	100%	100%	0.44	0.44
Lodging	Exterior Lighting	100%	100%	0.54	0.54
Lodging	Heat Central	63%	46%	3.25	3.25
Lodging	Heat Pump	35%	100%	3.08	3.08
Lodging	Interior Lighting	100%	100%	5.65	5.65
Lodging	Other	100%	100%	0.00	0.00
Lodging	Plug Load Other	100%	100%	0.92	0.92
Lodging	Refrigeration	100%	100%	0.22	0.22
Lodging	Ventilation	98%	100%	2.63	2.63
Lodging	Waste Water	100%	100%	0.32	0.32
Lodging	Water Heat GT 55 Gal	87%	12%	1.41	1.41
Lodging	Water Heat LE 55 Gal	13%	100%	1.32	1.32
Medium Off	Compressed Air	0%	100%	0.00	0.00

TABLE B-2. COMMERCIAL SATURATION FUEL SHARES AND UECS					
Segment	**End Use**	**Saturation**	**Fuel Share**	**Weighted Average UEC Existing (kWh/Unit)**	**Weighted Average UEC New (kWh/Unit)**
Medium Off	Cooking	0%	0%	0.00	0.00
Medium Off	Cool Central	87%	100%	4.08	4.08
Medium Off	Data Center	100%	100%	1.75	1.75
Medium Off	Exterior Lighting	100%	100%	0.57	0.57
Medium Off	Heat Central	85%	31%	3.57	3.57
Medium Off	Heat Pump	14%	100%	3.34	3.34
Medium Off	Interior Lighting	100%	100%	5.07	5.07
Medium Off	Other	100%	100%	0.00	0.00
Medium Off	Plug Load Other	100%	100%	1.55	1.55
Medium Off	Refrigeration	100%	100%	0.10	0.10
Medium Off	Ventilation	98%	100%	1.70	1.70
Medium Off	Waste Water	100%	100%	0.21	0.21
Medium Off	Water Heat GT 55 Gal	41%	53%	0.52	0.52
Medium Off	Water Heat LE 55 Gal	59%	100%	0.49	0.49
Medium Ret	Compressed Air	48%	100%	0.15	0.15
Medium Ret	Cooking	0%	0%	0.00	0.00
Medium Ret	Cool Central	97%	100%	1.67	1.67
Medium Ret	Data Center	100%	100%	0.44	0.44
Medium Ret	Exterior Lighting	100%	100%	0.98	0.98
Medium Ret	Heat Central	98%	6%	1.79	1.79
Medium Ret	Heat Pump	0%	100%	2.57	2.57
Medium Ret	Interior Lighting	100%	100%	6.50	6.50
Medium Ret	Other	100%	100%	0.00	0.00
Medium Ret	Plug Load Other	100%	100%	0.72	0.72
Medium Ret	Refrigeration	100%	100%	0.07	0.07
Medium Ret	Ventilation	98%	100%	2.41	2.41

TABLE B-2. COMMERCIAL SATURATION FUEL SHARES AND UECS					
Segment	**End Use**	**Saturation**	**Fuel Share**	**Weighted Average UEC Existing (kWh/Unit)**	**Weighted Average UEC New (kWh/Unit)**
Medium Ret	Waste Water	100%	100%	0.13	0.13
Medium Ret	Water Heat GT 55 Gal	43%	11%	0.26	0.26
Medium Ret	Water Heat LE 55 Gal	57%	50%	0.24	0.24
MiniMart	Compressed Air	29%	100%	2.62	2.62
MiniMart	Cooking	100%	9%	1.98	1.98
MiniMart	Cool Central	71%	100%	1.27	1.27
MiniMart	Data Center	100%	100%	0.44	0.44
MiniMart	Exterior Lighting	100%	100%	0.78	0.78
MiniMart	Heat Central	74%	45%	1.59	1.59
MiniMart	Heat Pump	13%	100%	3.39	3.39
MiniMart	Interior Lighting	100%	100%	6.86	6.86
MiniMart	Other	100%	100%	0.00	0.00
MiniMart	Plug Load Other	100%	100%	0.91	0.91
MiniMart	Refrigeration	100%	100%	15.11	15.11
MiniMart	Ventilation	87%	100%	1.59	1.59
MiniMart	Waste Water	100%	100%	0.09	0.09
MiniMart	Water Heat GT 55 Gal	1%	33%	0.23	0.23
MiniMart	Water Heat LE 55 Gal	99%	71%	0.21	0.21
Multi Family Common Area	Compressed Air	100%	100%	0.00	0.00
Multi Family Common Area	Cooking	100%	100%	0.00	0.00
Multi Family Common Area	Cool Central	100%	100%	0.00	0.00
Multi Family Common Area	Data Center	100%	100%	0.00	0.00
Multi Family Common	Exterior Lighting	100%	100%	0.00	0.00

TABLE B-2. COMMERCIAL SATURATION FUEL SHARES AND UECS					
Segment	**End Use**	**Saturation**	**Fuel Share**	**Weighted Average UEC Existing (kWh/Unit)**	**Weighted Average UEC New (kWh/Unit)**
Area					
Multi Family Common Area	Heat Central	100%	100%	0.00	0.00
Multi Family Common Area	Heat Pump	100%	100%	0.00	0.00
Multi Family Common Area	Interior Lighting	100%	100%	2.75	2.75
Multi Family Common Area	Other	100%	100%	0.00	0.00
Multi Family Common Area	Plug Load Other	100%	100%	0.00	0.00
Multi Family Common Area	Refrigeration	100%	100%	0.00	0.00
Multi Family Common Area	Ventilation	100%	100%	0.00	0.00
Multi Family Common Area	Waste Water	100%	100%	0.00	0.00
Multi Family Common Area	Water Heat GT 55 Gal	100%	100%	0.00	0.00
Multi Family Common Area	Water Heat LE 55 Gal	100%	100%	0.00	0.00
Other	Compressed Air	23%	100%	0.29	0.29
Other	Cooking	0%	0%	0.00	0.00
Other	Cool Central	70%	100%	1.59	1.59
Other	Data Center	100%	100%	0.18	0.18
Other	Exterior Lighting	100%	100%	0.53	0.53
Other	Heat Central	87%	21%	1.13	1.13
Other	Heat Pump	10%	100%	1.30	1.30
Other	Interior Lighting	100%	100%	1.70	1.70
Other	Other	100%	100%	0.00	0.00
Other	Plug Load Other	100%	100%	0.62	0.62
Other	Refrigeration	100%	100%	0.08	0.08

TABLE B-2. COMMERCIAL SATURATION FUEL SHARES AND UECS					
Segment	**End Use**	**Saturation**	**Fuel Share**	**Weighted Average UEC Existing (kWh/Unit)**	**Weighted Average UEC New (kWh/Unit)**
Other	Ventilation	97%	100%	0.92	0.92
Other	Waste Water	100%	100%	0.11	0.11
Other	Water Heat GT 55 Gal	49%	16%	0.16	0.16
Other	Water Heat LE 55 Gal	51%	72%	0.15	0.15
Residential Care	Compressed Air	0%	100%	0.00	0.00
Residential Care	Cooking	0%	0%	0.00	0.00
Residential Care	Cool Central	65%	100%	2.01	2.01
Residential Care	Data Center	100%	100%	0.44	0.44
Residential Care	Exterior Lighting	100%	100%	0.31	0.31
Residential Care	Heat Central	76%	34%	0.67	0.67
Residential Care	Heat Pump	23%	100%	1.92	1.92
Residential Care	Interior Lighting	100%	100%	3.21	3.21
Residential Care	Other	100%	100%	0.00	0.00
Residential Care	Plug Load Other	100%	100%	2.23	2.23
Residential Care	Refrigeration	100%	100%	0.26	0.26
Residential Care	Ventilation	99%	100%	2.85	2.85
Residential Care	Waste Water	100%	100%	0.26	0.26
Residential Care	Water Heat GT 55 Gal	79%	4%	0.75	0.75
Residential Care	Water Heat LE 55 Gal	21%	67%	0.70	0.70
Restaurant	Compressed Air	0%	100%	0.00	0.00
Restaurant	Cooking	100%	11%	7.08	7.08
Restaurant	Cool Central	73%	100%	3.09	3.09
Restaurant	Data Center	100%	100%	0.44	0.44
Restaurant	Exterior Lighting	100%	100%	1.77	1.77
Restaurant	Heat Central	88%	9%	1.02	1.02

TABLE B-2. COMMERCIAL SATURATION FUEL SHARES AND UECS					
Segment	**End Use**	**Saturation**	**Fuel Share**	**Weighted Average UEC Existing (kWh/Unit)**	**Weighted Average UEC New (kWh/Unit)**
Restaurant	Heat Pump	7%	100%	3.66	3.66
Restaurant	Interior Lighting	100%	100%	6.44	6.44
Restaurant	Other	100%	100%	0.00	0.00
Restaurant	Plug Load Other	100%	100%	1.21	1.21
Restaurant	Refrigeration	100%	100%	4.01	4.01
Restaurant	Ventilation	96%	100%	2.68	2.68
Restaurant	Waste Water	100%	100%	1.92	1.92
Restaurant	Water Heat GT 55 Gal	53%	26%	6.65	6.65
Restaurant	Water Heat LE 55 Gal	47%	43%	6.24	6.24
School K-12	Compressed Air	0%	100%	0.00	0.00
School K-12	Cooking	100%	14%	0.17	0.17
School K-12	Cool Central	53%	100%	0.54	0.54
School K-12	Data Center	100%	100%	0.88	0.88
School K-12	Exterior Lighting	100%	100%	0.57	0.57
School K-12	Heat Central	85%	3%	4.29	4.29
School K-12	Heat Pump	14%	100%	2.04	2.04
School K-12	Interior Lighting	100%	100%	2.58	2.58
School K-12	Other	100%	100%	0.00	0.00
School K-12	Plug Load Other	100%	100%	0.62	0.62
School K-12	Refrigeration	100%	100%	0.37	0.37
School K-12	Ventilation	100%	100%	1.00	1.00
School K-12	Waste Water	100%	100%	0.25	0.25
School K-12	Water Heat GT 55 Gal	63%	21%	1.14	1.14
School K-12	Water Heat LE 55 Gal	37%	35%	1.07	1.07
Small Off	Compressed Air	0%	100%	0.00	0.00

TABLE B-2. COMMERCIAL SATURATION FUEL SHARES AND UECS					
Segment	**End Use**	**Saturation**	**Fuel Share**	**Weighted Average UEC Existing (kWh/Unit)**	**Weighted Average UEC New (kWh/Unit)**
Small Off	Cooking	0%	0%	0.00	0.00
Small Off	Cool Central	65%	100%	3.35	3.35
Small Off	Data Center	100%	100%	1.75	1.75
Small Off	Exterior Lighting	100%	100%	0.47	0.47
Small Off	Heat Central	67%	51%	2.93	2.93
Small Off	Heat Pump	29%	100%	2.74	2.74
Small Off	Interior Lighting	100%	100%	4.17	4.17
Small Off	Other	100%	100%	0.00	0.00
Small Off	Plug Load Other	100%	100%	1.27	1.27
Small Off	Refrigeration	100%	100%	0.08	0.08
Small Off	Ventilation	96%	100%	1.40	1.40
Small Off	Waste Water	100%	100%	0.21	0.21
Small Off	Water Heat GT 55 Gal	20%	83%	0.43	0.43
Small Off	Water Heat LE 55 Gal	80%	93%	0.40	0.40
Small Ret	Compressed Air	23%	100%	0.52	0.52
Small Ret	Cooking	0%	0%	0.00	0.00
Small Ret	Cool Central	54%	100%	2.05	2.05
Small Ret	Data Center	100%	100%	0.44	0.44
Small Ret	Exterior Lighting	100%	100%	1.20	1.20
Small Ret	Heat Central	79%	18%	2.19	2.19
Small Ret	Heat Pump	15%	100%	3.15	3.15
Small Ret	Interior Lighting	100%	100%	7.96	7.96
Small Ret	Other	100%	100%	0.00	0.00
Small Ret	Plug Load Other	100%	100%	0.88	0.88
Small Ret	Refrigeration	100%	100%	0.08	0.08
Small Ret	Ventilation	94%	100%	2.95	2.95

TABLE B-2. COMMERCIAL SATURATION FUEL SHARES AND UECS					
Segment	**End Use**	**Saturation**	**Fuel Share**	**Weighted Average UEC Existing (kWh/Unit)**	**Weighted Average UEC New (kWh/Unit)**
Small Ret	Waste Water	100%	100%	0.06	0.06
Small Ret	Water Heat GT 55 Gal	4%	100%	0.31	0.31
Small Ret	Water Heat LE 55 Gal	96%	73%	0.29	0.29
Supermarket	Compressed Air	7%	100%	0.06	0.06
Supermarket	Cooking	100%	15%	2.55	2.55
Supermarket	Cool Central	81%	100%	1.64	1.64
Supermarket	Data Center	100%	100%	0.44	0.44
Supermarket	Exterior Lighting	100%	100%	1.00	1.00
Supermarket	Heat Central	92%	10%	2.04	2.04
Supermarket	Heat Pump	0%	100%	4.36	4.36
Supermarket	Interior Lighting	100%	100%	8.81	8.81
Supermarket	Other	100%	100%	0.00	0.00
Supermarket	Plug Load Other	100%	100%	1.17	1.17
Supermarket	Refrigeration	100%	100%	19.42	19.42
Supermarket	Ventilation	92%	100%	2.04	2.04
Supermarket	Waste Water	100%	100%	0.06	0.06
Supermarket	Water Heat GT 55 Gal	40%	27%	0.29	0.29
Supermarket	Water Heat LE 55 Gal	60%	54%	0.27	0.27
University	Compressed Air	0%	100%	0.00	0.00
University	Cooking	100%	14%	0.77	0.77
University	Cool Central	53%	100%	1.30	1.30
University	Data Center	100%	100%	0.88	0.88
University	Exterior Lighting	100%	100%	1.39	1.39
University	Heat Central	85%	3%	10.36	10.36
University	Heat Pump	14%	100%	4.92	4.92

TABLE B-2. COMMERCIAL SATURATION FUEL SHARES AND UECS					
Segment	**End Use**	**Saturation**	**Fuel Share**	**Weighted Average UEC Existing (kWh/Unit)**	**Weighted Average UEC New (kWh/Unit)**
University	Interior Lighting	100%	100%	6.20	6.20
University	Other	100%	100%	0.00	0.00
University	Plug Load Other	100%	100%	1.50	1.50
University	Refrigeration	100%	100%	0.90	0.90
University	Ventilation	100%	100%	2.42	2.42
University	Waste Water	100%	100%	0.26	0.26
University	Water Heat GT 55 Gal	63%	21%	2.76	2.76
University	Water Heat LE 55 Gal	37%	35%	2.59	2.59
Warehouse	Compressed Air	21%	100%	1.52	1.52
Warehouse	Cooking	0%	0%	0.00	0.00
Warehouse	Cool Central	37%	100%	0.52	0.52
Warehouse	Data Center	100%	100%	0.44	0.44
Warehouse	Exterior Lighting	100%	100%	0.39	0.39
Warehouse	Heat Central	82%	3%	1.56	1.56
Warehouse	Heat Pump	0%	100%	1.00	1.00
Warehouse	Interior Lighting	100%	100%	4.03	4.03
Warehouse	Other	100%	100%	0.00	0.00
Warehouse	Plug Load Other	100%	100%	0.61	0.61
Warehouse	Refrigeration	100%	100%	0.04	0.04
Warehouse	Ventilation	83%	100%	0.80	0.80
Warehouse	Waste Water	100%	100%	0.19	0.19
Warehouse	Water Heat GT 55 Gal	11%	55%	0.27	0.27
Warehouse	Water Heat LE 55 Gal	89%	80%	0.26	0.26
Xlarge Ret	Compressed Air	48%	100%	0.15	0.15
Xlarge Ret	Cooking	0%	0%	0.00	0.00

TABLE B-2. COMMERCIAL SATURATION FUEL SHARES AND UECS					
Segment	**End Use**	**Saturation**	**Fuel Share**	**Weighted Average UEC Existing (kWh/Unit)**	**Weighted Average UEC New (kWh/Unit)**
Xlarge Ret	Cool Central	97%	100%	1.57	1.57
Xlarge Ret	Data Center	100%	100%	0.44	0.44
Xlarge Ret	Exterior Lighting	100%	100%	0.93	0.93
Xlarge Ret	Heat Central	98%	6%	1.68	1.68
Xlarge Ret	Heat Pump	0%	100%	2.42	2.42
Xlarge Ret	Interior Lighting	100%	100%	6.11	6.11
Xlarge Ret	Other	100%	100%	0.00	0.00
Xlarge Ret	Plug Load Other	100%	100%	0.68	0.68
Xlarge Ret	Refrigeration	100%	100%	0.06	0.06
Xlarge Ret	Ventilation	98%	100%	2.26	2.26
Xlarge Ret	Waste Water	100%	100%	0.13	0.13
Xlarge Ret	Water Heat GT 55 Gal	43%	11%	0.24	0.24
Xlarge Ret	Water Heat LE 55 Gal	57%	50%	0.23	0.23

B.3. Industrial Baseline Data

Figure B-5. Industrial Baseline Forecast by Industry

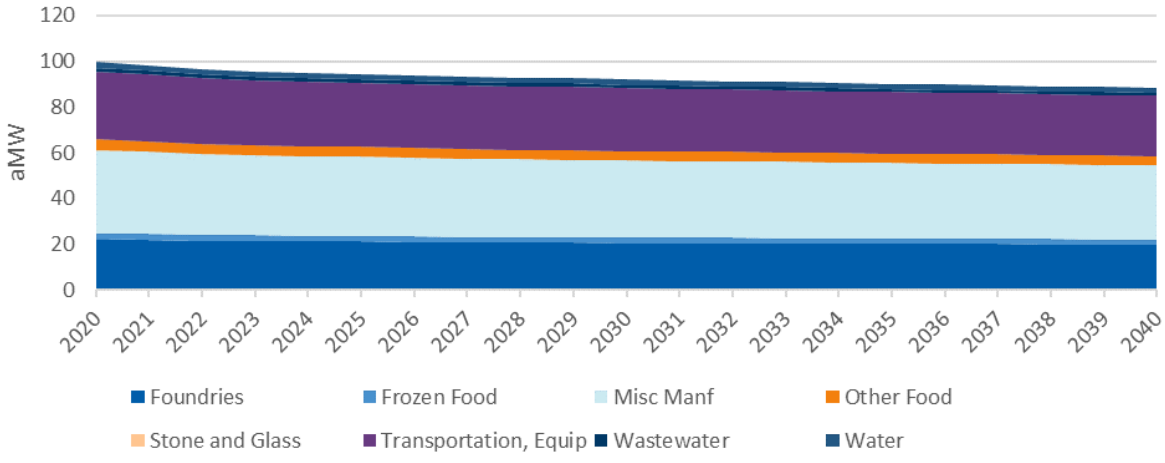
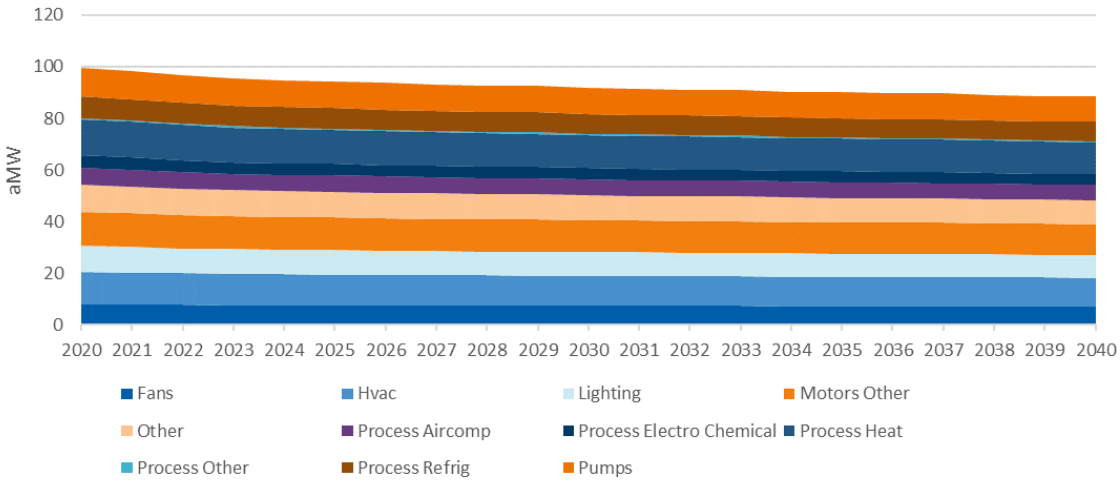


Figure B-6. Industrial Baseline Forecast by End Use



Measure Descriptions

This section presents a brief description of each measure used in the energy efficiency potential.

C.1. Residential Electric Retrofit Measure Descriptions

C.1.1. Heating and Cooling

Controlled Optimization Program. This measure represents a suite of behavioral measures, including the following:

- Water heater setback thermostat
- Lighting hours-of-use reduction
- HVAC usage reduction

Based on the 7th Plan workbook "res-cop-7p_v2".

Measure Name	Measure Efficiency
Controlled Optimization Program—Lighting	Controlled Optimization Program—Lighting
Controlled Optimization Program—HVAC	Controlled Optimization Program—HVAC
Controlled Optimization Program—Water Heat	Controlled Optimization Program—Water Heat

Controls Commissioning and Sizing. The installation of a heat pump with the proper sizing and commissioning of control setpoint temperatures can save energy through enhanced performance. Correctly sized HVAC systems operate for longer periods of time (instead of cycling on and off frequently), resulting in optimum equipment operating efficiencies and better control. Based on the 7th Plan workbook "res-ccs-7p_v4".

Measure Name	Measure Efficiency
SF CC&S + HZ1	Heating Savings
SF CC&S + HZ1	Cooling Savings

Duct Sealing. Duct sealing cost-effectively saves energy, improves air and thermal distribution (comfort and ventilation), and reduces cross contamination between different zones in a building (such as smoking vs. non-smoking, bio-aerosols, and localized indoor air pollutants). Based on the 7th Plan workbook "res-duct_seal-7p_v4".

Measure Name	Measure Efficiency
SF Performance-based Duct Sealing—Heat Pump + HZ1	SF Performance-based Duct Sealing—Heat Pump + HZ1
New SF Performance-based Duct Sealing—Heat Pump + HZ1	New SF Performance-based Duct Sealing—Heat Pump + HZ1

Heat Pump—Single-Family. This measure represents a suite of measures, including the following:

- Converting an electric furnace to a heat pump
- Converting an electric furnace and a central air conditioner to a heat pump
- Replace an existing heat pump with a more efficient, variable-capacity heat pump
- Replace zonal heating and cooling with a ductless heat pump

Based on the 7th Plan workbook "res-sf_hp-7p_v5".

Measure Name	Measure Efficiency
Existing Single-Family Home HVAC Conversion—Convert FAF w/CAC to Heat Pump—House with "Good Insulation" + HZ1	Heating Savings
Existing Single-Family Home HVAC Conversion—Convert FAF w/o CAC to Heat Pump—House with "Good Insulation" + HZ1CZ1	Heating Savings
Existing Single-Family Home HVAC Conversion—Convert FAF w/CAC to Heat Pump—House with "Good Insulation" + HZ1	Cooling Savings
Existing Single-Family Home HVAC Conversion—Convert FAF w/o CAC to Heat Pump—House with "Good Insulation" + HZ1CZ1	Cooling Savings

Heat Recovery Ventilation (HRV). This measure mechanically ventilates homes in cold climates. During the winter, it transfers heat from exhausted air to outside air entering the home, with between 50% and 80% of the heat normally lost in exhausted air returned to the house. Air-to-air heat exchangers can be installed as part of a central heating and cooling system or in walls or windows. Wall- and window-mounted units, resembling air conditioners, ventilate one room or area. Based on the 7th Plan workbook "res-hrv-7p_v1".

Measure Name	Measure Efficiency
SF RNC HRV ACH3 HZ1CZ1	Heating Savings
SF RNC HRV ACH3 HZ1CZ1	Cooling Savings

Weatherization—Multifamily. This measure represents a suite of measures, including the following:

- Attic insulation R-value improvement
- Floor insulation R-value improvement
- Wall insulation R-value improvement
- Window U-value improvement

Based on the 7th Plan workbook "res-mf_wx-7p_v7".

Measure Name	Measure Efficiency
WALL R0—R11_Electric Zonal	WALL R0—R11
FLOOR R0—R19_Electric Zonal	FLOOR R0—R19
FLOOR R0—R30_Electric Zonal	FLOOR R0—R30
ATTIC R0—R19_Electric Zonal	ATTIC R0—R19
ATTIC R0—R38_Electric Zonal	ATTIC R0—R38
ATTIC R0—R49_Electric Zonal	ATTIC R0—R49
ATTIC R19—R30_Electric Zonal	ATTIC R19—R30
ATTIC R19—R38_Electric Zonal	ATTIC R19—R38
ATTIC R19—R49_Electric Zonal	ATTIC R19—R49
WINDOW CL22 Prime Window Replacement of Single-Pane Base_Electric Zonal	WINDOW CL22 Prime Window Replacement of Single-Pane Base
WINDOW CL22 Prime Window Replacement of Double-Pane Base_Electric Zonal	WINDOW CL22 Prime Window Replacement of Double-Pane Base
WINDOW CL30 Prime Window Replacement of Single-Pane Base_Electric Zonal	WINDOW CL30 Prime Window Replacement of Single-Pane Base
WINDOW CL30 Prime Window Replacement of Double-Pane Base_Electric Zonal	WINDOW CL30 Prime Window Replacement of Double-Pane Base
WALL R0—R11_Electric FAF	WALL R0—R11
FLOOR R0—R19_Electric FAF	FLOOR R0—R19
FLOOR R0—R30_Electric FAF	FLOOR R0—R30
ATTIC R0—R19_Electric FAF	ATTIC R0—R19
ATTIC R0—R38_Electric FAF	ATTIC R0—R38
ATTIC R0—R49_Electric FAF	ATTIC R0—R49
ATTIC R19—R30_Electric FAF	ATTIC R19—R30
ATTIC R19—R38_Electric FAF	ATTIC R19—R38
ATTIC R19—R49_Electric FAF	ATTIC R19—R49
WINDOW CL22 Prime Window Replacement of Single-Pane Base_Electric FAF	WINDOW CL22 Prime Window Replacement of Single-Pane Base
WINDOW CL22 Prime Window Replacement of Double-Pane Base_Electric FAF	WINDOW CL22 Prime Window Replacement of Double-Pane Base
WINDOW CL30 Prime Window Replacement of Single-Pane Base_Electric FAF	WINDOW CL30 Prime Window Replacement of Single-Pane Base
WINDOW CL30 Prime Window Replacement of Double-Pane Base_Electric FAF	WINDOW CL30 Prime Window Replacement of Double-Pane Base
WALL R0—R11_Heat Pump	WALL R0—R11
FLOOR R0—R19_Heat Pump	FLOOR R0—R19
FLOOR R0—R30_Heat Pump	FLOOR R0—R30

Measure Name	Measure Efficiency
ATTIC R0—R19_Heat Pump	ATTIC R0—R19
ATTIC R0—R38_Heat Pump	ATTIC R0—R38
ATTIC R0—R49_Heat Pump	ATTIC R0—R49
ATTIC R19—R30_Heat Pump	ATTIC R19—R30
ATTIC R19—R38_Heat Pump	ATTIC R19—R38
ATTIC R19—R49_Heat Pump	ATTIC R19—R49
WINDOW CL22 Prime Window Replacement of Single-Pane Base_Heat Pump	WINDOW CL22 Prime Window Replacement of Single-Pane Base
WINDOW CL22 Prime Window Replacement of Double-Pane Base_Heat Pump	WINDOW CL22 Prime Window Replacement of Double-Pane Base
WINDOW CL30 Prime Window Replacement of Single-Pane Base_Heat Pump	WINDOW CL30 Prime Window Replacement of Single-Pane Base
WINDOW CL30 Prime Window Replacement of Double-Pane Base_Heat Pump	WINDOW CL30 Prime Window Replacement of Double-Pane Base

Weatherization — Single-Family. This measure represents a suite of measures including the following:

- Attic insulation R-value improvement
- Floor insulation R-value improvement
- Wall insulation R-value improvement
- Window U-value improvement
- Infiltration reduction

Based on the 7th Plan workbook "res-sf_wx-7p_v7".

Measure Name	Measure Efficiency
ATTIC R0—R38_Electric FAF	ATTIC R0—R38
ATTIC R0—R49_Electric FAF	ATTIC R0—R49
ATTIC R11—R38_Electric FAF	ATTIC R11—R38
ATTIC R11—R49_Electric FAF	ATTIC R11—R49
ATTIC R19—R38_Electric FAF	ATTIC R19—R38
ATTIC R19—R49_Electric FAF	ATTIC R19—R49
WALL R0—R11_Electric FAF	WALL R0—R11
FLOOR R0—R19_Electric FAF	FLOOR R0—R19
FLOOR R0—R25_Electric FAF	FLOOR R0—R25
FLOOR R0—R30_Electric FAF	FLOOR R0—R30
WINDOW CL30 Prime Window Replacement of Single-Pane Base_Electric FAF	WINDOW CL30 Prime Window Replacement of Single-Pane Base
WINDOW CL30 Prime Window Replacement of Double-Pane Base_Electric FAF	WINDOW CL30 Prime Window Replacement of Double-Pane Base
WINDOW CL22 Prime Window Replacement of Single-Pane Base_Electric FAF	WINDOW CL22 Prime Window Replacement of Single-Pane Base
WINDOW CL22 Prime Window Replacement of Double-Pane Base_Electric FAF	WINDOW CL22 Prime Window Replacement of Double-Pane Base
CFM50 Infiltration Reduction_Electric FAF	CFM50 Infiltration Reduction
ATTIC R0—R38_Electric Zonal	ATTIC R0—R38
ATTIC R0—R49_Electric Zonal	ATTIC R0—R49
ATTIC R11—R38_Electric Zonal	ATTIC R11—R38
ATTIC R11—R49_Electric Zonal	ATTIC R11—R49
ATTIC R19—R38_Electric Zonal	ATTIC R19—R38
ATTIC R19—R49_Electric Zonal	ATTIC R19—R49
WALL R0—R11_Electric Zonal	WALL R0—R11
FLOOR R0—R19_Electric Zonal	FLOOR R0—R19
FLOOR R0—R25_Electric Zonal	FLOOR R0—R25
FLOOR R0—R30_Electric Zonal	FLOOR R0—R30
WINDOW CL30 Prime Window Replacement of Single-Pane Base_Electric Zonal	WINDOW CL30 Prime Window Replacement of Single-Pane Base
WINDOW CL30 Prime Window Replacement of Double-Pane Base_Electric Zonal	WINDOW CL30 Prime Window Replacement of Double-Pane Base
WINDOW CL22 Prime Window Replacement of Single-Pane Base_Electric Zonal	WINDOW CL22 Prime Window Replacement of Single-Pane Base
WINDOW CL22 Prime Window Replacement of Double-Pane Base_Electric Zonal	WINDOW CL22 Prime Window Replacement of Double-Pane Base

Measure Name	Measure Efficiency
CFM50 Infiltration Reduction_Electric Zonal	CFM50 Infiltration Reduction
ATTIC R0—R38_Heat Pump	ATTIC R0—R38_Heat Pump
ATTIC R0—R49_Heat Pump	ATTIC R0—R49_Heat Pump
ATTIC R11—R38_Heat Pump	ATTIC R11—R38_Heat Pump
ATTIC R11—R49_Heat Pump	ATTIC R11—R49_Heat Pump
ATTIC R19—R38_Heat Pump	ATTIC R19—R38_Heat Pump
ATTIC R19—R49_Heat Pump	ATTIC R19—R49_Heat Pump
WALL R0—R11_Heat Pump	WALL R0—R11_Heat Pump
FLOOR R0—R19_Heat Pump	FLOOR R0—R19_Heat Pump
FLOOR R0—R25_Heat Pump	FLOOR R0—R25_Heat Pump
FLOOR R0—R30_Heat Pump	FLOOR R0—R30_Heat Pump
WINDOW CL30 Prime Window Replacement of Single-Pane Base_Heat Pump	WINDOW CL30 Prime Window Replacement of Single-Pane Base_Heat Pump
WINDOW CL30 Prime Window Replacement of Double-Pane Base_Heat Pump	WINDOW CL30 Prime Window Replacement of Double-Pane Base_Heat Pump
WINDOW CL22 Prime Window Replacement of Single-Pane Base_Heat Pump	WINDOW CL22 Prime Window Replacement of Single-Pane Base_Heat Pump
WINDOW CL22 Prime Window Replacement of Double-Pane Base_Heat Pump	WINDOW CL22 Prime Window Replacement of Double-Pane Base_Heat Pump
CFM50 Infiltration Reduction_Heat Pump	CFM50 Infiltration Reduction_Heat Pump
ATTIC R0—R38_DHP	ATTIC R0—R38
ATTIC R0—R49_DHP	ATTIC R0—R49
ATTIC R11—R38_DHP	ATTIC R11—R38
ATTIC R11—R49_DHP	ATTIC R11—R49
ATTIC R19—R38_DHP	ATTIC R19—R38
ATTIC R19—R49_DHP	ATTIC R19—R49
WALL R0—R11_DHP	WALL R0—R11
FLOOR R0—R19_DHP	FLOOR R0—R19
FLOOR R0—R25_DHP	FLOOR R0—R25
FLOOR R0—R30_DHP	FLOOR R0—R30
WINDOW CL30 Prime Window Replacement of Single-Pane Base_DHP	WINDOW CL30 Prime Window Replacement of Single-Pane Base
WINDOW CL30 Prime Window Replacement of Double-Pane Base_DHP	WINDOW CL30 Prime Window Replacement of Double-Pane Base
WINDOW CL22 Prime Window Replacement of Single-Pane Base_DHP	WINDOW CL22 Prime Window Replacement of Single-Pane Base

Measure Name	Measure Efficiency
WINDOW CL22 Prime Window Replacement of Double-Pane Base_DHP	WINDOW CL22 Prime Window Replacement of Double-Pane Base
CFM50 Infiltration Reduction_DHP	CFM50 Infiltration Reduction

Wi-Fi Thermostat. Thermostats connected to the Internet can be controlled from any location with an Internet connection and follow occupants' schedules for heating and cooling, decreasing run times for heating and cooling. Based on the 7th Plan workbook "res-wifitstat-7p_v3".

Measure Name	Measure Efficiency
Single-Family WIFI Enabled Thermostat HZ1	WIFI HZ1

C.1.2. Water Heat

Clothes Washer. High-efficiency clothes washer that meet CEE efficiency level tiers[1] use less energy and water than regular washers. Cadmus compared three efficiency levels in units of the corresponding Integrated Modified Energy Factor (IMEF) —for this measure. The baseline IMEF represents the average IMEF of non-ENERGY STAR and ENERGY STAR-qualified models below the CEE efficiency tiers. Based on the 7th Plan workbook "res-clotheswasher-7p_v4".

[1] http://library.cee1.org/sites/default/files/library/12282/CEE_ResidentialClothesWasherSpec_07Mar2015.pdf

Measure Name	Measure Efficiency
Single-Family CEE Tier 1 Clothes Washer—Any DHW, Any Dryer—54% ENERGY STAR Baseline	Washer Savings
Single-Family CEE Tier 2 Clothes Washer—Any DHW, Any Dryer—54% ENERGY STAR Baseline	Washer Savings
Single-Family CEE Tier 3 Clothes Washer—Any DHW, Any Dryer—54% ENERGY STAR Baseline	Washer Savings
Single-Family CEE Tier 1 Clothes Washer—Any DHW, Any Dryer—54% ENERGY STAR Baseline	Dryer Savings
Single-Family CEE Tier 2 Clothes Washer—Any DHW, Any Dryer—54% ENERGY STAR Baseline	Dryer Savings
Single-Family CEE Tier 3 Clothes Washer—Any DHW, Any Dryer—54% ENERGY STAR Baseline	Dryer Savings
Single-Family CEE Tier 1 Clothes Washer—Any DHW, Any Dryer—54% ENERGY STAR Baseline	Waste Water Energy
Single-Family CEE Tier 2 Clothes Washer—Any DHW, Any Dryer—54% ENERGY STAR Baseline	Waste Water Energy
Single-Family CEE Tier 3 Clothes Washer—Any DHW, Any Dryer—54% ENERGY STAR Baseline	Waste Water Energy
Multifamily—Low-Rise CEE Tier 1 Clothes Washer—Any DHW, Any Dryer—4% ENERGY STAR Baseline	Washer Savings
Multifamily—Low-Rise CEE Tier 2 Clothes Washer—Any DHW, Any Dryer—54% ENERGY STAR Baseline	Washer Savings
Multifamily—Low-Rise CEE Tier 3 Clothes Washer—Any DHW, Any Dryer—54% ENERGY STAR Baseline	Washer Savings
Multifamily—Low-Rise CEE Tier 1 Clothes Washer—Any DHW, Any Dryer—54% ENERGY STAR Baseline	Dryer Savings
Multifamily—Low-Rise CEE Tier 2 Clothes Washer—Any DHW, Any Dryer—54% ENERGY STAR Baseline	Dryer Savings
Multifamily—Low-Rise CEE Tier 3 Clothes Washer—Any DHW, Any Dryer—54% ENERGY STAR Baseline	Dryer Savings
Multifamily—Low-Rise CEE Tier 1 Clothes Washer—Any DHW, Any Dryer—54% ENERGY STAR Baseline	Waste Water Energy
Multifamily—Low-Rise CEE Tier 2 Clothes Washer—Any DHW, Any Dryer—54% ENERGY STAR Baseline	Waste Water Energy
Multifamily—Low-Rise CEE Tier 3 Clothes Washer—Any DHW, Any Dryer—54% ENERGY STAR Baseline	Waste Water Energy
Multifamily—High-Rise CEE Tier 1 Clothes Washer—Any DHW, Any Dryer—54% ENERGY STAR Baseline	Washer Savings
Multifamily—High-Rise CEE Tier 2 Clothes Washer—Any DHW, Any Dryer—54% ENERGY STAR Baseline	Washer Savings

Measure Name	Measure Efficiency
Multifamily—High-Rise CEE Tier 3 Clothes Washer—Any DHW, Any Dryer—54% ENERGY STAR Baseline	Washer Savings
Multifamily—High-Rise CEE Tier 1 Clothes Washer—Any DHW, Any Dryer—54% ENERGY STAR Baseline	Dryer Savings
Multifamily—High-Rise CEE Tier 2 Clothes Washer—Any DHW, Any Dryer—54% ENERGY STAR Baseline	Dryer Savings
Multifamily—High-Rise CEE Tier 3 Clothes Washer—Any DHW, Any Dryer—54% ENERGY STAR Baseline	Dryer Savings
Multifamily—High-Rise CEE Tier 1 Clothes Washer—Any DHW, Any Dryer—54% ENERGY STAR Baseline	Waste Water Energy
Multifamily—High-Rise CEE Tier 2 Clothes Washer—Any DHW, Any Dryer—54% ENERGY STAR Baseline	Waste Water Energy
Multifamily—High-Rise CEE Tier 3 Clothes Washer—Any DHW, Any Dryer—54% ENERGY STAR Baseline	Waste Water Energy

Dishwasher. This dishwasher uses advanced technology to clean dishes using less water and energy. The efficient model uses less than 295 kWh/year (including standby consumption). The baseline model consumes 307 kWh/year. Based on the 7th Plan workbook "res-dishwasher-7p_v4".

Measure Name	Measure Efficiency
Single-Family ENERGY STAR Dishwasher—Any DHW	All Except Waste Water Energy
Single-Family ENERGY STAR Dishwasher—Any DHW	Waste Water Energy
Multifamily—Low-Rise ENERGY STAR Dishwasher—Any DHW	All Except Waste Water Energy
Multifamily—Low-Rise ENERGY STAR Dishwasher—Any DHW	Waste Water Energy
Multifamily—High-Rise ENERGY STAR Dishwasher—Any DHW	All Except Waste Water Energy
Multifamily—High-Rise ENERGY STAR Dishwasher—Any DHW	Waste Water Energy

Drain Water Heat Recovery. Also called gravity film heat exchanges, this device recovers heat energy from domestic drain water, and then uses this to pre-heat cold water entering the hot water tank. This minimizes the temperature difference between the heating setpoint and the temperature of water entering the system. Based on the 7th Plan workbook "res-gfx-7p_v3".

Measure Name	Measure Efficiency
Single-Family GFHX DHW & Shower Preheat, Electric Resistance	GFHX DHW & Shower Preheat, Electric Resistance
Single-Family GFHX DHW & Shower Preheat, Heat Pump	GFHX DHW & Shower Preheat, Heat Pump
Single-Family GFHX DHW Preheat, Electric Resistance	GFHX DHW Preheat, Electric Resistance
Single-Family GFHX DHW Preheat, Heat Pump	GFHX DHW Preheat, Heat Pump

Measure Name	Measure Efficiency
Multifamily GFHX DHW & Shower Preheat, Electric Resistance	GFHX DHW & Shower Preheat, Electric Resistance
Multifamily GFHX DHW & Shower Preheat, Heat Pump	GFHX DHW & Shower Preheat, Heat Pump
Multifamily GFHX DHW Preheat, Electric Resistance	GFHX DHW Preheat, Electric Resistance
Multifamily GFHX DHW Preheat, Heat Pump	GFHX DHW Preheat, Heat Pump

Faucet Aerators, Bathroom. By mixing water and air, faucet aerators reduce water amounts flowing through faucets. The faucet aerator creates a fine water spray, using a screen inserted in the faucet head. Based on the 7th Plan workbook "res-aerator-7p_v5".

Measure Name	Measure Efficiency
Single-Family Bathroom Aerator 1.0 GPM AnyWH	Aerator 2.48 to 1.0 GPM
Single-Family Bathroom Aerator 1.0 GPM AnyWH	Aerator 2.48 to 1.0 GPM
Multifamily—Low-Rise Bathroom Aerator 1.0 GPM AnyWH	Aerator 2.48 to 1.0 GPM
Multifamily—High-Rise Bathroom Aerator 1.0 GPM AnyWH	Aerator 2.48 to 1.0 GPM
Single-Family Bathroom Aerator 1.0 GPM HPWH	Aerator 2.48 to 1.0 GPM

Low-Flow Showerheads. Low-flow showerheads mix water and air to reduce the amount of water flowing through a showerhead. The showerhead creates a fine water spray through an screen inserted in the showerhead. Based on the 7th Plan workbook "res-showerhead-7p_v5".

Measure Name	Measure Efficiency
SF Showerhead Replace_2_00gpm_Any Shower_ AnyWH	SF Showerhead Replace_2_00gpm_Any Shower_ AnyWH
SF Showerhead Replace_1_75gpm_Any Shower_ AnyWH	SF Showerhead Replace_1_75gpm_Any Shower_ AnyWH
SF Showerhead Replace_1_50gpm_Any Shower_ AnyWH	SF Showerhead Replace_1_50gpm_Any Shower_ AnyWH
SF Showerhead Replace_1_50GPM_any shower_HPWH	SF Showerhead Replace_1_50GPM_any shower_HPWH
MF Showerhead Replace_2_00gpm_Any Shower_ AnyWH	MF Showerhead Replace_2_00gpm_Any Shower_ AnyWH
MF Showerhead Replace_1_75gpm_Any Shower_ AnyWH	MF Showerhead Replace_1_75gpm_Any Shower_ AnyWH
MF Showerhead Replace_1_50gpm_Any Shower_ AnyWH	MF Showerhead Replace_1_50gpm_Any Shower_ AnyWH

C.1.3. Appliances

Fridge and Freezer Decommissioning. This refers to environmentally friendly disposal of unneeded or inefficient appliances (e.g., refrigerators, standalone freezers). Based on the RTF workbook "ResFridgeFreezeDecommissioning_v4_4".

Measure Name	Measure Efficiency
Refrigerator Decommissioning and Recycling	Refrigerator Decommissioning and Recycling
Freezer Decommissioning and Recycling	Freezer Decommissioning and Recycling

C.1.4. Plug Load

Advanced Power Strip. Advanced power strips turn off power to all devices plugged into the strip (e.g., computers, desk lights, entertainment equipment), based on occupancy within the area, reduced load below a certain wattage threshold, or lack of infrared activity within a set timeframe. Based on the 7th Plan workbook "res-powerstrips-7p_v6".

Measure Name	Measure Efficiency
Load-sensing advanced power strip	Load-sensing advanced power strip
Occupancy-sensing advanced power strip	Occupancy-sensing advanced power strip
Infrared-sensing advanced power strip	Infrared-sensing advanced power strip

C.1.5. Other (Pool)

Advanced Power Strip. Advanced power strips turn off power to all devices plugged into the strip (e.g., computers, desk lights, entertainment equipment), based on occupancy within the area, reduced load below a certain wattage threshold, or lack of infrared activity within a set timeframe. Based on the 7th Plan workbook "res-powerstrips-7p_v6".

Measure Name	Measure Efficiency
Load-sensing advanced power strip	Load-sensing advanced power strip
Occupancy-sensing advanced power strip	Occupancy-sensing advanced power strip
Infrared-sensing advanced power strip	Infrared-sensing advanced power strip

C.2. Residential Electric Equipment Measure Descriptions

C.2.1. Heating and Cooling

Air or Ground Source Heat Pump (ASHP or GSHP). Electric heat pumps move heat to or from the air or the ground to cool and heat a home. Based on the 7th Plan workbooks "res-sf_hp-7p_v5" and "res-gshp-7p_v2".

Measure Name	Measure Efficiency	Baseline Efficiency
Existing Single-Family Home HVAC Upgrade + HZ1	Existing Single-Family Home HVAC Upgrade + HZ1	Market Average Heat Pump
New SF HVAC Upgrade—Heat Pump Upgrade to 9.0 HSPF/14 SEER	New SF HVAC Upgrade — Heat Pump Upgrade to 9.0 HSPF/14 SEER	Market Average Heat Pump
Existing Single-Family Home HVAC Upgrade—Central Heat Pump Upgrade to Variable Capacity Central Heat Pump + HZ1CZ1	Existing Single-Family Home HVAC Upgrade—Central Heat Pump Upgrade to Variable Capacity Central Heat Pump + HZ1CZ1	Market Average Heat Pump
New SF HVAC Upgrade—Central Heat Pump Upgrade to Variable Capacity Central Heat Pump	New SF HVAC Upgrade—Central Heat Pump Upgrade to Variable Capacity Central Heat Pump	Market Average Heat Pump
GSHP Upgrade from ASHP—With Desuperheater—Existing House less than 4,000 square feet	GSHP Upgrade from ASHP—With Desuperheater—Existing House less than 4,000 square feet	Market Average Heat Pump
GSHP Upgrade from ASHP—With Desuperheater—New House less than 4,000 square feet	GSHP Upgrade from ASHP—With Desuperheater—New House less than 4,000 square feet	Market Average Heat Pump

Central Air Conditioner. This measure consists of two different air conditioner technology/efficiency levels. The baseline size is the same as the measure size.

Measure Name	Measure Efficiency	Baseline Efficiency
Central Air Conditioner—ENERGY STAR	ENERGY STAR Central Air Conditioner SEER/EER 14.5/12 (Split System)	Market Average Central Air Conditioner SEER/EER 13/11.2 (Split System)
Central Air Conditioner—CEE Tier 3	CEE Tier 3 Central Air Conditioner SEER/EER 16/13 (Split System)	Market Average Central Air Conditioner SEER/EER 13/11.2 (Split System)

Conversion Baseboard Heating to Ductless Heat Pump (DHP). DHPs move heat to or from the air to cool and heat a home without the need for costly ductwork. This method of heating has a HSPF value of 9.5, consuming less energy than baseboard heating that has a HSPF value of 3.412. Based on the 7th Plan workbook "res-sf_hp-7p_v5".

Measure Name	Measure Efficiency	Baseline Efficiency
Zonal to DHP No Screen + HZ1CZ1	Heating Savings	Market Average Zonal Heating
New SF Zonal to DHP	Heating Savings	Market Average Zonal Heating

Conversion Forced Air Furnace to DHP. DHPs move heat to or from the air to cool and heat a home without the need for costly ductwork. This heating method has a HSPF value of 9.5, consuming less energy than a forced air furnace with a HSPF value of 3.412. Based on the 7th Plan workbook "res-faf_to_dhp-7p_v2".

Measure Name	Measure Efficiency	Baseline Efficiency
Install DHP in House with Existing FAF—Single-Family Home + HZ1	Install DHP in House with Existing FAF—Single-Family Home—HZ1	Standard Electric Furnace HSPF = 3.412

Room AC Conversion to DHP. DHPs use less energy than room ACs while producing less noise and requiring no costly ductwork. Based on the 7th Plan workbook "res-sf_hp-7p_v5".

Measure Name	Measure Efficiency	Baseline Efficiency
New SF Zonal to DHP	Cooling Savings	Room AC—Market Average (8,000–13,999 Btuh)

Motor—ECM. Electronically commutated motors (ECMs) consume less power than standard motors used in ventilation and circulation systems.

Measure Name	Measure Efficiency	Baseline Efficiency
Motor—ECM	ECM Motor	Standard Motor

C.2.2. Lighting

Lighting Exterior. This measure represents improvements to exterior lighting technologies by replacing existing lamps with more efficient lighting technologies: CFLs and LEDs. Based on the 7th Plan workbooks "res-lighting-7p_v5" and "res-lighting_ppa-7p_v5".

Measure Name	Measure Efficiency	Baseline Efficiency
Incandescent—2020 EISA* Backstop Provisions	Incandescent—2020 EISA Backstop Provisions	Market Average Lighting Exterior Standard
CFL	CFL	Market Average Lighting Exterior Standard
LED—Exterior	LED—Exterior	CFL

**Energy Independence and Security Act*

- **CFLs—Exterior.** Standard CFLs use 5% less energy than typical exterior (market average) bulbs.
- **General Service Lamp—2020 EISA Backstop Provisions.** EISA contains a backstop provision that requires a minimum efficacy of 45 lumens-per-watt lighting technologies, beginning in 2020.
- **LEDs—Exterior.** Standard LEDs use 21% less energy than CFL bulbs.

Lighting Interior Linear Fluorescent. Represents improvements to interior lighting with linear fluorescent technologies that replace existing T12 f-foot and 8-foot fixtures with the more efficient, high-performance T8 (T8HP) 4-foot fixtures. Based on the RTF workbook "ResLightingHPT8Lamps_v1_3".

Measure Name	Measure Efficiency	Baseline Efficiency
Linear Fluorescent—T8HP	T8HP Linear Fluorescent	Market Average Linear Fluorescent

Lighting Interior Specialty. Represents improvements to interior lighting technologies not impacted by EISA by replacing existing lamps with more efficient lighting technologies: CFLs and LEDs. Based on the 7th Plan workbook "res-lighting-7p_v5".

Measure Name	Measure Efficiency	Baseline Efficiency
CFL—Specialty	CFL—Specialty	Incandescent—Specialty
LED—Specialty	LED—Specialty	Incandescent—Specialty

- **CFLs—Specialty.** Specialty (or EISA exempt) bulbs include three-way, candelabra, some globes, and some reflectors. CFLs use up to 77% less energy and have a longer life than incandescent specialty light bulb.

- **LEDs—Specialty.** Specialty LEDs are solid-state devices that convert electricity to light, use 84% less energy, and have a long life.

Lighting Interior Standard. Represents improvements to interior lighting technologies impacted by EISA by replacing existing lamps with more efficient lighting technologies: CFLs and LEDs. Based on the 7th Plan workbooks "res-lighting-7p_v5" and "res-lighting_ppa-7p_v5".

Measure Name	Measure Efficiency	Baseline Efficiency
EISA 2020 Backstop	EISA 2020 Backstop Interior General-Purpose Bulb	Market Average Lighting Interior Standard
CFL	CFL	Market Average Lighting Interior Standard
LED Interior General Purpose Bulb	LED Interior General-Purpose Bulb	CFL

- **CFLs—Standard.** Standard CFLs use 14% less energy than the typical interior (market average) bulbs.
- **General Service Lamp—2020 EISA Backstop Provisions.** EISA contains a backstop provision requiring a minimum efficacy of 45 lumens per watt lighting technologies, beginning in 2020.
- **LEDs—Standard.** Standard LEDs use 25% less energy than the CFL bulbs.

C.2.3. Water Heat

Water Heater, Heat Pump and Solar. This measure represents two end uses: Water Heat LE 55 Gal (less than 55 gallons) and Water Heat GT 55 Gal (greater than 55 gallons). A high-efficiency heat pump water heater measure moves heat from a warm reservoir (such as air) into the hot water system, reducing the heat amount needed from electric resistance heating. Solar Water Heaters use thermal energy to heat water without use of electricity, gas, or heating oil. Based on the 7th Plan workbooks "res-hpwh-7p_v3p" and "res-swh-7p_v1p".

End Use	Measure Efficiency	Baseline Efficiency
Water Heat LE 55 Gal	Single-Family Tier1_buffered	Market Standard Storage Water Heater
Water Heat LE 55 Gal	Single-Family Tier1_indor2	Market Standard Storage Water Heater
Water Heat LE 55 Gal	Single-Family Tier2_buffered	Market Standard Storage Water Heater
Water Heat LE 55 Gal	Single-Family Tier2_indor2	Market Standard Storage Water Heater
Water Heat LE 55 Gal	SHW Solar Zone 1	Market Standard Storage Water Heater
Water Heat GT 55 Gal	SHW Solar Zone 1	Market Standard Water Heater

C.2.4. Appliances

Cooking Oven, High Efficiency. A high-efficiency cooking oven uses fans to circulate heat evenly throughout the oven (convection heat), operating at lower temperatures and achieving cooking times

quicker than a standard oven. The baseline is a standard oven. Based on the 7th Plan workbook "res-oven-7p_v3".

Measure Name	Measure Efficiency	Baseline Efficiency
Efficient Oven	Efficient Oven	Federal Standard 2012 Cooking Oven

Dryer, High Efficiency. A high-efficiency dryer incorporates features (such as moisture sensors) that minimize energy usage while retaining performance. A heat pump dryer moves heat from a warm reservoir (such as air) into the dryer, reducing the amount of heat needed from electric resistance heating. Based on the 7th Plan workbook "res-clothesdryer-7p_v2".

Measure Name	Measure Efficiency	Baseline Efficiency
Heat Pump Dryer	Heat Pump Dryer	Market Average Dryer

Freezer, ENERGY STAR. ENERGY STAR-qualified freezers use less energy than standard models due to improvements in insulation and compressors. Based on the 7th Plan workbook "res-refrigfreezer-7p_v3p".

Measure Name	Measure Efficiency	Baseline Efficiency
Std Size Freezer—ENERGY STAR	Std Size Freezer—ENERGY STAR	Market Average Freezer

Microwave, High-Efficiency. High-efficiency microwaves use more efficient power supplies, fans, magnetron, and reflective surfaces that provide energy savings compared to conventional microwaves. Based on the 7th Plan workbook "res-microwave-7p_v3".

Measure Name	Measure Efficiency	Baseline Efficiency
Microwave Top Tier	TSL4 Efficiency	Market Average Microwave

Refrigerator, ***High-Efficiency.*** CEE-qualified refrigerators use less energy than standard models due to improvements in insulation and compressors. Based on the 7th Plan workbook "res-refrigfreezer-7p_v4".

Measure Name	Measure Efficiency	Baseline Efficiency
Std Size Refrig and Refrig-Freezer—CEE Tier 1	Std Size Refrig and Refrig-Freezer—CEE Tier 1	Market Average Refrigerator
Std Size Refrig and Refrig-Freezer—CEE Tier 2	Std Size Refrig and Refrig-Freezer—CEE Tier 2	Market Average Refrigerator
Std Size Refrig and Refrig-Freezer—CEE Tier 3	Std Size Refrig and Refrig-Freezer—CEE Tier 3	Market Average Refrigerator

C.2.5. Plug Load

Air Purifier, ENERGY STAR. **ENERGY STAR certified room air purifiers** are 40% more energy-efficient than standard models.[2]

Measure Name	Measure Efficiency	Baseline Efficiency
Air Purifier—ENERGY STAR	ENERGY STAR Air Purifier	Standard Air Purifier

Computer, ENERGY STAR. ENERGY STAR computers consume less than 2 watts in sleep- and off- modes, and operate more efficiently than conventional units in idle mode, resulting in 40% energy savings. Based on the 7th Plan workbook "res-computers-7p_v4".

Measure Name	Measure Efficiency	Baseline Efficiency
ENERGY STAR Desktops	ENERGY STAR Desktop	Standard Desktop Computer
ENERGY STAR Laptops	ENERGY STAR Notebook	Standard Laptop Computer

DVD, ENERGY STAR. ENERGY STAR-qualified DVD products that meet new requirements use up to 50% less energy than standard models.[3] ENERGY STAR DVD players use as little as one-fourth of the energy of standard models in the off mode. The baseline for this measure is a standard DVD player.

Measure Name	Measure Efficiency	Baseline Efficiency
DVD—ENERGY STAR	ENERGY STAR DVD Player	Standard DVD Player

Home Audio System, ENERGY STAR. ENERGY STAR home audio systems can achieve 20% energy savings over standard home audio systems.

Measure Name	Measure Efficiency	Baseline Efficiency
Home Audio System—ENERGY STAR	ENERGY STAR Home Audio System	Standard Home Audio System

2 https://www.energystar.gov/products/certified-products/detail/air-purifiers-cleaners

3 https://www.energystar.gov/products/certified-products/detail/audiovideo

Monitor, ENERGY STAR. ENERGY STAR monitors feature: (1) on mode, where the maximum allowed power varies based on the computer monitor's resolution; (2) sleep mode, where computer monitors must consume 2 watts or less; and (3) off mode, where computer monitors must consume 1 watt or less. The baseline equipment does not include these features.[4] Based on the 7th Plan workbook "res-computers-7p_v4".

Measure Name	Measure Efficiency	Baseline Efficiency
ENERGY STAR Monitors	ENERGY STAR LCD Display	Standard Monitor

Multifunction Device (All-in-One). ENERGY STAR models meeting the most recent ENERGY STAR requirements are more energy efficient and feature efficient designs that help the equipment run cooler and last longer.

Measure Name	Measure Efficiency	Baseline Efficiency
Multifunction Device (All-in-one)—ENERGY STAR	ENERGY STAR Multifunction Device (All-in-one)	Standard Multifunction Device (All-in-one)

Office Copier, ENERGY STAR. ENERGY STAR copy machines operate more efficiently and use less energy than standard office copy machines.

Measure Name	Measure Efficiency	Baseline Efficiency
Office Copier—ENERGY STAR	ENERGY STAR Office Copier	Standard Office Copier

Office Printer, ENERGY STAR. Printers earning the ENERGY STAR rating operate at least 30% more efficiently than conventional models.[5] The baseline measure is a standard printer.

Measure Name	Measure Efficiency	Baseline Efficiency
Office Printer—ENERGY STAR	ENERGY STAR Office Printer	Standard Office Printer

Set Top Box, ENERGY STAR. Set top boxes earning the ENERGY STAR rating operate at least 35% more efficiently than conventional models.[6] The baseline measure is a standard set top box.

Measure Name	Measure Efficiency	Baseline Efficiency
Set Top Box—ENERGY STAR	ENERGY STAR Set Top Box	Standard Set Top Box

4 https://www.energystar.gov/products/certified-products/detail/displays
5 https://www.energystar.gov/products/certified-products/detail/imaging-equipment
6 https://www.energystar.gov/products/certified-products/detail/set-top-boxes-cable-boxes

TV, ENERGY STAR. ENERGY STAR-qualified TVs use roughly 25% less energy than standard units.[7] ENERGY STAR models are required to consume no more than 1 watt while in sleep mode. The baseline is a standard television, which generally consumes more than 3 watts when turned off.

Measure Name	Measure Efficiency	Baseline Efficiency
TV LCD—ENERGY STAR	ENERGY STAR LED-LCD TV (0-40in.)	Standard LCD TV (0-40in.)
TV LCD—ENERGY STAR	ENERGY STAR LED-LCD TV (40+in.)	Standard LCD TV (40+in.)

C.2.6. Other (Pool)

Pool Pumps, VSD. This measure enables a pool pump motor to operate at variable speeds as opposed to running constantly at full power. This measure's baseline is a standard two-speed motor

Measure Name	Measure Efficiency	Baseline Efficiency
Pool Pump—VSD	VSD Pool Pump	Two-Speed Pool Pump

C.3. Commercial Electric Measure Description

C.3.1. HVAC (and Envelope)

Advanced Rooftop Controller. Advanced controllers for rooftop units with single-zone, ducted systems. Retrofitting existing packaged rooftop units with advanced control strategies not ordinarily used for packaged units. Savings come primarily from fan energy savings through using advanced controls with a variable-speed drive. Applied only to systems with constant speed fans. Based on the 7th Plan workbook "com-rooftopcontroller-7p_v6".

Commercial Energy Management. Energy management measures for commercial buildings, excluding single-zone ducted systems. A suite of measures, most of which focus on making HVAC systems work better through control changes. Based on the 7th Plan workbook "com-em-7p_v5".

DCV Hood and DCV Hood w/ MUA. Utilizing sensors and two-speed or variable speed fans, hood controls reduce exhaust (and makeup) airflow when appliances do not run at capacity (or have been turned off). The baseline for this measure is a unit without hood controls. Based on the 7th Plan workbook "com-dcv-kitchenvent-7p_v3".

DCV Parking Garage. Where the ventilation system automatically adjusts air flow when CO_2 rises above a specified level. CO_2 controls maintain a minimum ventilation rate at all times to control non-occupant contaminants (e.g., off-gassing from furniture, equipment, building components). This measure's baseline is an existing ventilation system that runs constantly. Based on the 7th Plan workbook "com-dcv-garage-7p_v3".

[7] https://www.energystar.gov/products/certified-products/detail/televisions

Demand Controlled Ventilation (DCV). Evaluates retrofit DCV and Dedicated Outdoor Air Supply (DOAS). Both DVC and the DOAS measures reduce the amount of ventilation air required to be conditioned and the amount of distribution fan energy used to move cooling or heating to occupants. The single-zone DOAS measures uses a fleet strategy, which involves designating some HVAC fleet units as ventilation units, while letting other units cycle on call for heating, cooling, or additional, required ventilation. The designated units can be standalone HRV units or rooftop units with added HRV/ERVs, where only a small fraction of units operate, or standard rooftops with one-half of units operating to provide ventilation. Based on the 7th Plan workbook "com-dcv-7p_v5".

Ductless Heat Pumps (DHP). DHPs move heat to or from the air, cooling and heating buildings without costly ductwork. This measure provides savings compared to electric resistance heating. Based on the 7th Plan workbook "com-dhp-7p_v2".

ECM VAV. High-efficiency, electronically commutated, permanent magnet (ECM or ECPM) motors with built-in variable speed controls for VAV fans. Based on the 7th Plan workbook "com-ecm-vav-7p_v4".

Economizer. An air-side economizer mixes return air with outside air to cool indoor spaces, saving energy as less air must be cooled. This measure reflects optimizing economizers, coil cleaning, and adjusting refrigerant charges. Based on the 7th Plan workbook "com-economizer-7p_v2".

Motors Rewind. This measure follows the Green Motors Practices Group™ recommendations for best practices in maintaining original efficiencies, commonly called a Green Rewind.[8] A failed motor can be rewound to a lower efficiency, rewound to maintain the original efficiency, or replaced. Based on the 7th Plan workbook "com-motorsrewind-7p_v3".

VRF. A variable refrigerant flow (VRF) system is an energy-efficient heating and cooling system using inverter-driven compressor technology without ducting. Baseline technology is assumed to be a typical VAV rooftop HVAC system. Based on the 7th Plan workbook "com-vrf-7p_v6".

WEPT. Web-enabled programmable thermostats (WEPT) control setpoint temperatures automatically, ensuring HVAC system do not run during low-occupancy hours. Based on the 7th Plan workbook "com-wept-7p_v2".

Windows—Secondary Glazing Systems. A permanent window unit is installed on the inside of an existing primary window. Based on the 7th Plan workbook "com-windowsgs-7p_v5".

C.3.2. Lighting

Bi-Level Stairway Lighting. This measure allows an occupancy sensor to reduce light loads in an unoccupied stairwell by 50% for a set period of time. The baseline is continuous operation at full power. Based on the 7th Plan workbook "com-bi-level-stairwell-7p_v4".

Exterior Lighting Improvements. Measures going from existing technology to LED technology. Based on the 7th Plan workbook "com-exteriorlighting-7p_v14".

8 http://www.bpa.gov/energy/n/industrial/Green_motors/

Measure Group
Exterior Lighting: Façade—LED
Exterior Lighting: Parking Lot—LED
Exterior Lighting: Walkway—LED

Interior Lighting Improvements. The measures go from existing technology to LED technology, or other high-performance lighting, fixtures, or redesign elements. Based on the 7th Plan workbook "com-lightinginterior-7p_v41".

Measure Group
CFL—Other
LED—Display or Track
LED—High-Bay
LED—Linear Fluorescent
LED—Recessed Can
LED—Other
Linear Fluorescent—High-Bay
Linear Fluorescent RDX—Linear Fluorescent
Metal Halide—Display or Track

LEC Exit Sign. Light Emitting Capacitor (LEC) exit signs consume less than one watt, resulting in energy savings over traditional exit signs. The assumed baseline is a LED exit sign. Based on the 7th Plan workbook "com-exitsign-7p_v3".

LED Case Lighting. LEDs are highly efficient bulbs that can be used for refrigeration case lights, resulting in energy savings over standard fluorescent case lights. Based on the 7th Plan workbook "com-grocery-7p_v7".

LED Motion Sensors on Display Case. Savings result from direct reductions in lighting runtimes, and reduced cooling loads from addition of display case motion sensors. Based on the 7th Plan workbook "com-grocery-7p_v7".

LED Parking Garage Lighting. Replacing inefficient metal halide lamps with LED fixtures and bi-level occupancy controls, reducing energy use of covered parking garages. Based on the 7th Plan workbook "com-parkinggaragelighting-7p_v7".

Lighting Controls. This represents two measures: 1) Embedded unitary controls for occupancy, daylight harvest, and personal dimming; and 2) Integrated controls where a control module is addressable remotely and can log conditions data. Based on the 7th Plan workbook "com-interiorlightingcontrols-7p_v10".

Market Average HP Low-Power T8 Shift. Shifting a mix of T8 Fluorescent lamps from 32W to 28W and 25W. Based on the 7th Plan workbook "com-hplowpowergsfl-7p_v8".

TLED Over Ballast on SP32WT8. Replacing a two-lamp, four-foot T8 fixture with 21W LED linear tubes (TLED). Based on the 7th Plan workbook "com-hplowpowergsfl-7p_v8".

C.3.3. Water Heat

Efficient Water Tanks. High-efficiency water heaters operate more efficiently than standard electric water heaters due to reduced standby losses. Based on the 7th Plan workbook "com-whtanks-7p_v6"

Pre-Rinse Spray Valve. Low-flow spray valves mix water and air to reduce water amounts flowing through spray heads, creating a fine water spray through an inserted screen in the spray head. Based on the 7th Plan workbook "com-prerinsespray-7p_v3".

Showerheads. Low-flow showerheads mix water and air to reduce amounts of water flowing through the showerhead, which creates a fine water spray using an inserted screen in the showerhead. The assumed efficiency of the installed showerhead is 1.5 GPM. Based on the 7th Plan workbook "com-showerhead-7p_v5".

C.3.4. Refrigeration

Anti-Sweat Heater Controls. This measure enables users to turn refrigeration display case, anti-sweat heaters off when the ambient relative humidity become low enough to prevent sweating. Without controls, heaters generally run continuously. Based on the 7th Plan workbook "com-grocery-7p_v7".

ECM Controllers on Walk-In Evaporator Motors. A walk-in fan is a component of refrigeration systems. ECMs typically have small horsepower motors (less than 1 HP), factory programmed to run at certain speeds. ECMs operate from a single-phase power source, with an electronic controller in or on the motor. The baseline measure is a standard efficiency motor. Based on the 7th Plan workbook "com-grocery-7p_v7".

Floating Head Pressure Control. This measure adds controls to floating head pressure temperatures down during periods of low load. The base case is a standard multiplex system with a fixed condensing setpoint. Based on the 7th Plan workbook "com-grocery-7p_v7".

Freezer Decommissioning and Recycling. This refers to environmentally friendly disposal of unneeded appliances, such as standalone freezers. Based on the RTF workbook "ComRefrigeratorFreezerDecommissioning_v2_4".

Refrigerator Decommissioning and Recycling. This refers to environmentally friendly disposal of unneeded appliances, such as secondary refrigerators. Based on the RTF workbook "ComRefrigeratorFreezerDecommissioning_v2_4".

Replace Shaded Pole with ECM in Walk-in Cooler. A walk-in fan is a component of refrigeration systems. ECMs typically have small horsepower motors (less than 1 HP), factory programmed to run at certain speeds. ECMs operate from a single-phase power source, with an electronic controller in or on the

motor. The baseline measure is a standard efficiency motor. Based on the 7th Plan workbook "com-grocery-7p_v7".

Strip Curtains: Walk-In Coolers/ Freezers. This measure reduces infiltration of warm air into the refrigerated space by improving the barrier between refrigerated and ambient air. Based on the 7th Plan workbook "com-grocery-7p_v7".

C.3.5. Cooking

Combi Oven. This measure uses dry heat and steam, injected into the oven when required by cooking food. ENERGY STAR combination ovens use less energy than standard combination ovens. Equipment sizes are based on ENERGY STAR v2.0 eligibility criteria for ≥ 6 pan and ≤ 20 pan. Based on the 7th Plan workbook "com-cooking-7p_v5".

Convection Oven (Wt Average). This measure meets specification requirements of 70% cooking energy efficiency and an idle energy rate of 1.6 kW. Standard electric convection ovens have a 65% cooking energy efficiency and an idle energy rate of 2 kW. Equipment sizes are based on ENERGY STAR v2.0 eligibility criteria. Based on the 7th Plan workbook "com-cooking-7p_v5".

Fryers. ENERGY STAR fryers operate 80% more efficiently, resulting in energy savings when compared to non-ENERGY STAR commercial fryers with a baseline efficiency of 75%. Equipment sizes based on ENERGY STAR v2.0 eligibility criteria. Based on the 7th Plan workbook "com-cooking-7p_v5".

Hot Food Holding Cabinet (Wt Average Size). Installation of a new electric HFHC meeting ENERGY STAR v2.0 requirements. The baseline measure is a conventional holding cabinet. Based on the 7th Plan workbook "com-cooking-7p_v5".

Steamer (Wt Average Size). This measure operates at a cooking efficiency of 68%, with idle energy rates that vary depending upon pan sizes. The baseline efficiency is a standard commercial steam cooker with 26% efficiency. Based on the 7th Plan workbook "com-cooking-7p_v5".

C.3.6. Data Center

Data Center Improvements. A total of 22 efficiency measures, divided into three tiers: Best Practice; Commercial Technology; and Cutting Edge. Based on CBSA's 2014 data on data centers embedded in commercial buildings. Based on the 7th Plan workbook "com-datacenters-7p_v6".

Measure Type	Measure Name
Best Practice	Decommissioning of unused servers
Best Practice	Energy-efficient data storage management
Best Practice	Server power management
Best Practice	Server virtualization/consolidation
Commercial Technology	Air-side economizer
Commercial Technology	Efficient network topology
Commercial Technology	Energy-efficient lighting
Commercial Technology	Energy-efficient power supplies (UPS)
Commercial Technology	Energy-efficient servers
Commercial Technology	Energy-efficient transformers
Commercial Technology	Hot or cold aisle configuration
Commercial Technology	Hot or cold aisle configuration, plus containment (e.g., strip curtains or rigid enclosures)
Commercial Technology	In-row cooling
Commercial Technology	Install misters, foggers, or ultrasonic humidifiers
Commercial Technology	Massive array of idle disks (MAID)
Commercial Technology	Premium efficiency motors
Commercial Technology	Variable-speed drives on pumps/fans
Commercial Technology	Water-side economizer
Cutting Edge	Direct current (as opposed to AC) to the racks
Cutting Edge	Direct liquid cooling of chips
Cutting Edge	Efficient network topology
Cutting Edge	Solid-state storage

C.3.7. Other

Compressed Air Upgrade. A suite of energy-efficient air compressor measures including the following:

- Demand reduction
- VFD controls
- Equipment upgrades

Based on the 7th Plan workbook "com-compressedair-7p_v4".

ENERGY STAR Desktop. ENERGY STAR computers consume less than 2 watts in "sleep" and "off" modes, operating more efficiently than conventional units in "idle" modes, resulting in 42% energy savings. Based on the 7th Plan workbook "com-computers-7p_v3".

ENERGY STAR Display. ENERGY STAR monitors feature the following: (1) an "on" mode, where the maximum allowed power varies, based on the computer monitor's resolution; (2) a "sleep" mode, where computer monitor models must consume 2 watts or less; and (3) an "off" mode, where computer monitor models must consume 1 watt or less. The baseline equipment does not include these features. Based on the 7th Plan workbook "com-computers-7p_v3".

ENERGY STAR Laptop. ENERGY STAR computers consume less than 2 watts in "sleep" and "off" modes, and operate more efficiently than conventional units in "idle" modes, resulting in 42% energy savings. Based on the 7th Plan workbook "com-computers-7p_v3".

Indoor Agriculture. A suite of energy-efficient indoor agriculture measures, including the following:

- **LED Fixture.** Replacing existing metal halide or high-pressure sodium grow lights with LED fixtures results in energy savings due to reduced wattage of LED fixtures. Additionally, LED fixtures produce less heat than metal halide or high-pressure sodium fixtures, resulting in a reduced HVAC cooling load.
- **Premium Air Conditioning Equipment.** Represents installing a 12.0 EER air conditioning system, resulting in energy savings over a federal standard air conditioner. The baseline equipment efficiency is 11.2 EER.
- **High-Efficiency Ventilation System.** Increasing the CFM per watt of the ventilation system saves energy by providing the same amount of ventilation, but at a decreased wattage. Represents savings from replacing room ventilation systems and lighting ventilation systems.
- **Mini-Split Heat Pump.** Represents installing a 12.0 EER and 3.6 COP mini-split heat pump, resulting in energy savings over a federal standard heat pump. The baseline equipment efficiency is 11.2 EER and 3.2 COP.

Premium Fume Hood—NR. A package of high-performance technologies that minimizes energy consumption of laboratory fume hoods. The package would include high-efficiency variable-speed fans and heat recovery to recover some energy in the conditioned air drawn from the laboratory space around the hood. Automatic sash positioning also could be implemented, with an occupancy sensor automatically closing the sash when occupants are not detected and the fume hood is not in use. Based on the 7th Plan workbook "com-fumehood-7p_v2".

Smart Plug Power Strips—Retro. In commercial office spaces, installation of a power strip that turns office equipment off outside of regular office hours, resulting in energy savings. A master outlet controls other outlets, turned off based on the master outlet's load sensor reading. Does not include computer or monitor savings. Occupancy-sensing power strips are also included. Based on the 7th Plan workbook "com-powerstrips-7p_v5".

Water Cooler Timer. This represents two measures: upgrading from a market average cooler to an ENERGY STAR 2.0 cooler; and a timer on the ENERGY STAR 2.0 cooler. The timer turns the cooler off during unoccupied periods. Based on the 7th Plan workbook "com-watercooler-7p_v6".

C.4. Industrial Electric Measure Descriptions

Air Compressor Improvements. These measures improve an overall compressed air system by improved system designs, leak repairs, usage practices, more efficient dryer and storage systems, and compressor upgrades.

Measure Name
Air Compressor Demand Reduction
Air Compressor Equipment1
Air Compressor Equipment2
Air Compressor Optimization

Clean Room Improvements. These measures save energy through improved clean room equipment and practices. Savings can be attributed to optimization of chiller operating parameters, upgrading to more efficient equipment, and improving filter replacement strategies.

Measure Name
Clean Room: Change Filter Strategy
Clean Room: Chiller Optimize
Clean Room: Clean Room HVAC

Efficiency Centrifugal Fan. This measure achieves energy savings through an improved fan design.

Measure Name
Efficient Centrifugal Fan

Fan System Optimization. This measure involves overall optimization of fan systems with improved system designs, enhanced flow designs, better maintenance practices, and adjustments to system parameters.

Measure Name
Fan System Optimization

Food Manufacturing (Cooling and Storage, Refrigerator Storage Tune-up). These measures maintain and enhance cooling equipment for each facility type. Tune-ups may include refrigerant charges, equipment cleaning, general maintenance, and improved practices.

Measure Name
Food: Cooling and Storage
Food: Refrig Storage Tune Up

General Process Improvements. This measure includes upgrading/replacing equipment and using optimum size/capacity equipment.

Measure Name
Metal: New Arc Furnace

High-Efficiency Fans. This measure involves upgrading motors to higher-efficiency units. As NEMA Premium motors are becoming the baseline code requirement in 2010, this measure is based on super-premium motors with efficiency levels at least one efficiency band above NEMA premium.

Measure Name
Fan Equipment Upgrade

LED Street Light Conversions. LED street lights can replace standard high-pressure sodium (HPS) street lights, with similar lumens achieved with less wattage.

Measure Name
LED HPS Replacement—135 W LED
LED HPS Replacement—270 W LED

Lighting Improvements. Changes to overall illumination levels, use of natural lighting, or technology improvements to more efficient bulbs or ballasts can decrease overall lighting energy consumption. These measures include upgrades from T12 to T8 systems, T8 to high-performance T8 systems, HID to fluorescent conversions, standard HID to high-efficiency HID systems, and occupancy and day lighting controls.

Measure Name
Efficient Lighting 1 Shift
Efficient Lighting 2 Shift
Efficient Lighting 3 Shift
High-Bay Lighting 1 Shift
High-Bay Lighting 2 Shift
High-Bay Lighting 3 Shift
Lighting Controls

Motor Rewind. This measure follows the Green Motors Practices Group™ best practices recommendations to maintain original efficiency, commonly called a Green Rewind.[9] A failed motor can be rewound to a lower efficiency, rewound to maintain the original efficiency, or replaced.

Measure Name
Motors: Rewind 20-50 HP
Motors: Rewind 51-100 HP
Motors: Rewind 101-200 HP
Motors: Rewind 201-500 HP
Motors: Rewind 501-5000 HP

Municipal Water Supply. Municipal water supply savings, primarily achieved from reduced pumping energy. Measures include more-efficient pumps/drives, water end-use efficiency improvements, leak reduction, water treatment, and compressed air improvements. Based on the 7th Plan workbook "com-watersupply-7p_v5p".

Measure Name
Municipal Water Supply—Retro

Optimize Municipal Sewage. Measures defined based the size of the treatment plant: <1 MGD, 1 to 10 MGD, and >10 MGD (MGD = Million Gallons per Day). Baseline consumption is defined for each of these three categories in Million kWh/MGD. Electricity saved per flow rate (Million kWh/MGD flow) is based on case studies. Based on the 7th Plan workbook "com-wastewater-7p_v5p".

Measure Name
Optimize Municipal Sewage; <1 MGD Design Capacity
Optimize Municipal Sewage; >10 MGD Design Capacity
Optimize Municipal Sewage; 1 to 10 MGD Design Capacity

Pump Equipment Upgrade. This measure achieves energy savings through improved pump design and sizing.

Measure Name
Pump Equipment Upgrade

[9] http://www.bpa.gov/energy/n/industrial/Green_motors/

Pump Improvements (Pump Energy Management, Pump System Optimization). This measure optimizes overall pump systems with improved system designs, enhanced flow designs, better maintenance practices, and adjustments to system parameters.

Measure Name
Pump Energy Management
Pump System Optimization

Synchronous Belts. This measure contains mating, corresponding grooves in a drive sprocket, preventing slip and reducing energy losses.

Measure Name
Synchronous Belts

Transformers. Energy-efficient transformers provide improved power quality while minimizing losses.

Measure Name
Transformers—Retrofit
Transformers—New

Whole Plant Improvements. These measures include synergistic savings of plantwide energy management and improvements across multiple systems (e.g., compressed air, pumping, fan systems).

Measure Name
Energy Project Management
Fan Energy Management
Integrated Plant Energy Management
Plant Energy Management

Detailed Energy Efficiency Potential

D.1. Detailed Energy Efficiency Potential

Appendix D summarizes total cumulative achievable economic potential in 2040 (21-year cumulative) for the IRP avoided cost scenario by segment, sector, and end use. Note: for end uses for which the share of total potential is less than 1% is expressed as "0%" in the pie charts.

D.2. Energy Efficiency Potential Summary

Figure D-1. Achievable Economic Potential: Residential by Segment

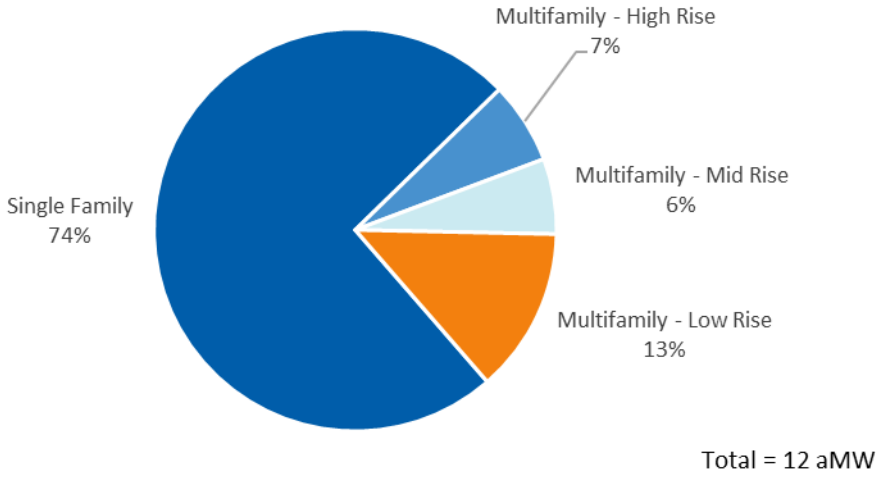


Figure D-2. Achievable Economic Potential: Commercial by Segment

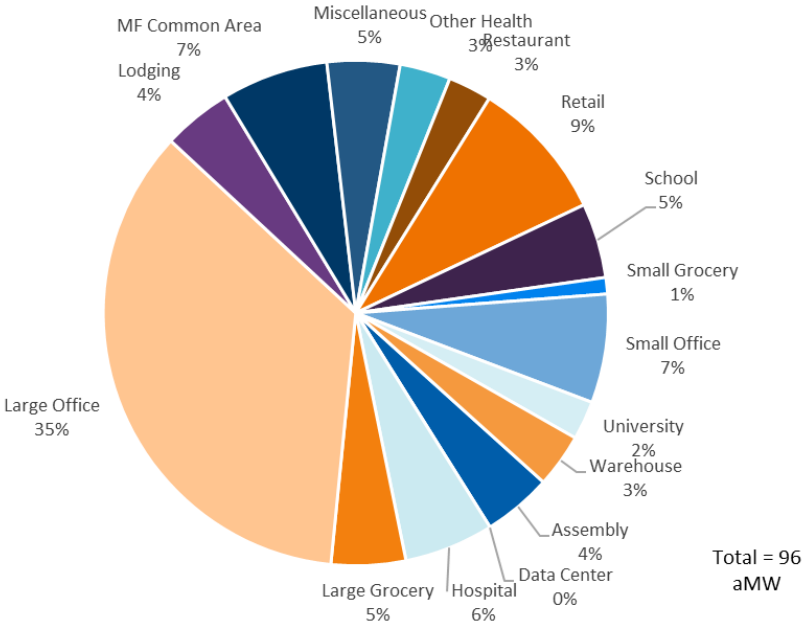


Figure D-3. Achievable Economic Potential: Industrial by Segment

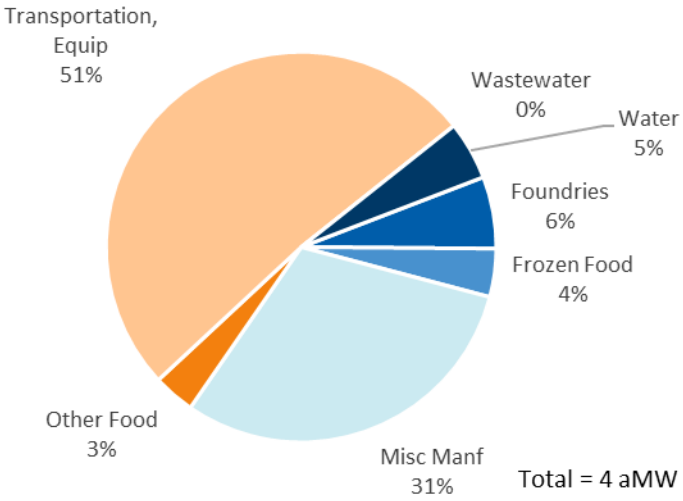


Figure D-4. Achievable Economic Potential: Residential by End Use

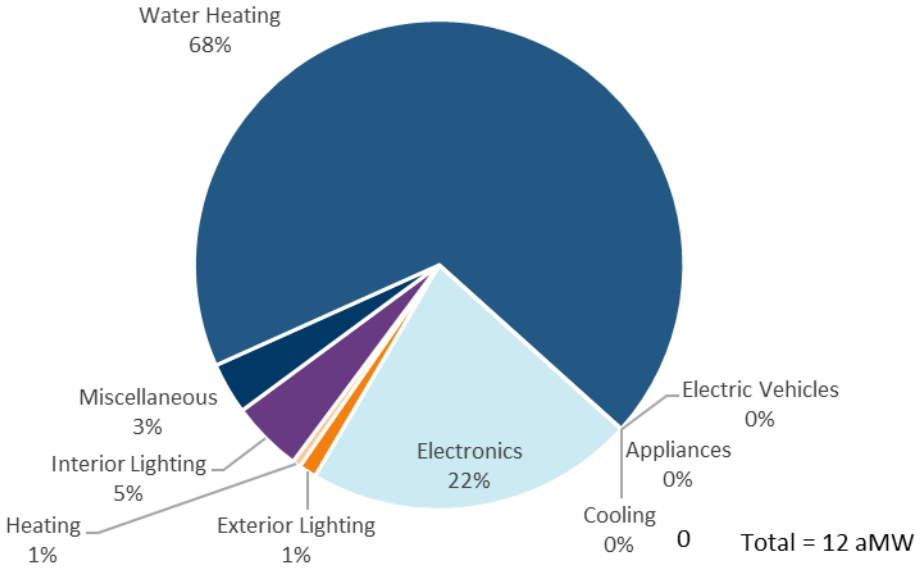


Figure D-5. Achievable Economic Potential: Commercial by End Use

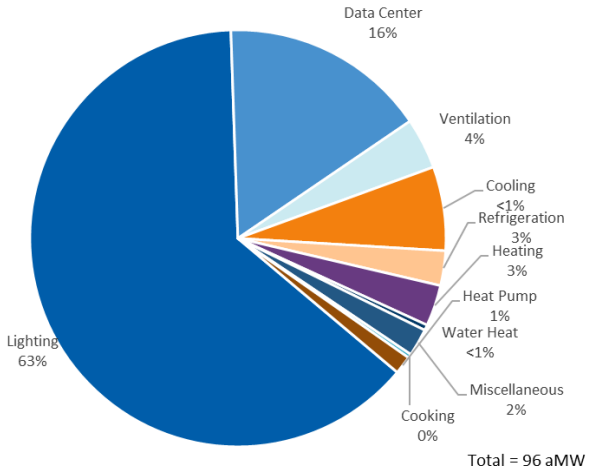
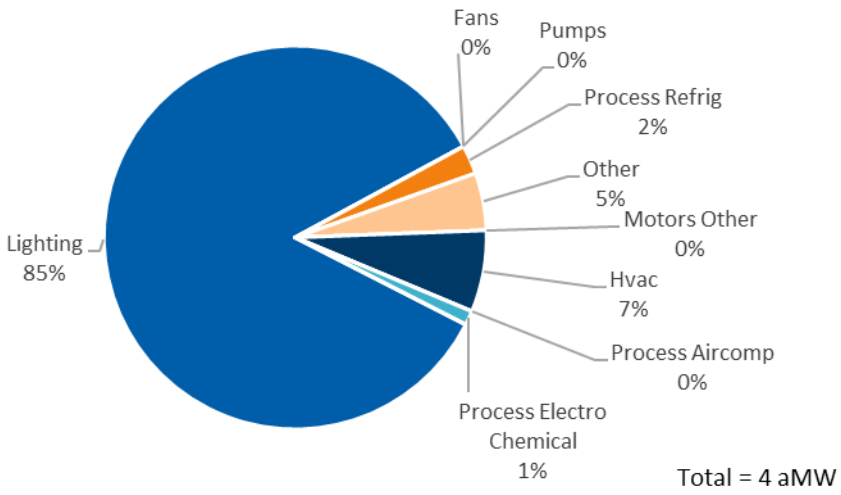


Figure D-6. Achievable Economic Potential: Industrial by End Use



D.3. Residential Segments by End Use

Figure D-7. Achievable Economic Potential: Residential Single Family by End Use

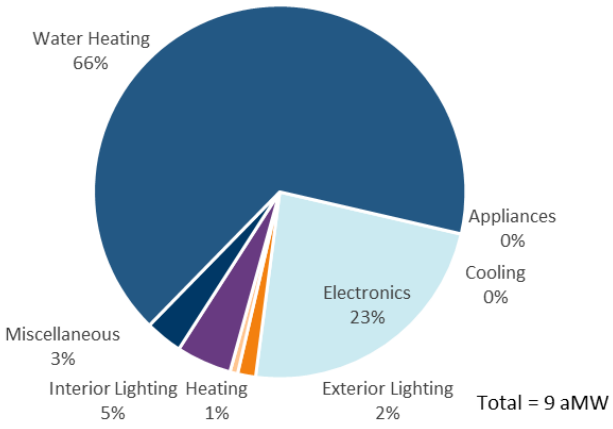


Figure D-8. Achievable Economic Potential: Residential Multifamily – Mid Rise by End Use

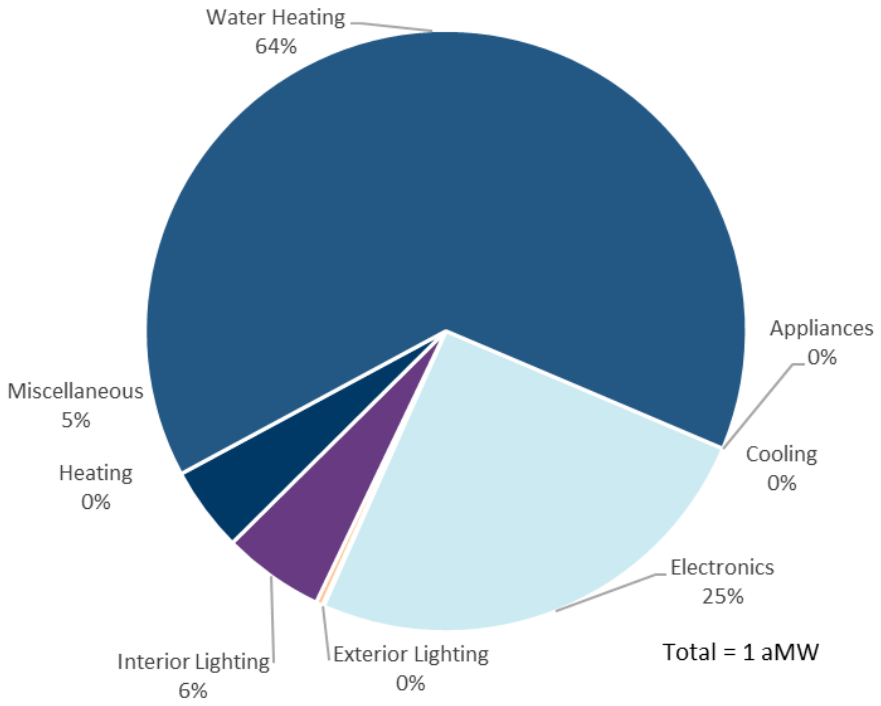


Figure D-9. Achievable Economic Potential: Residential Multifamily – Low Rise by End Use

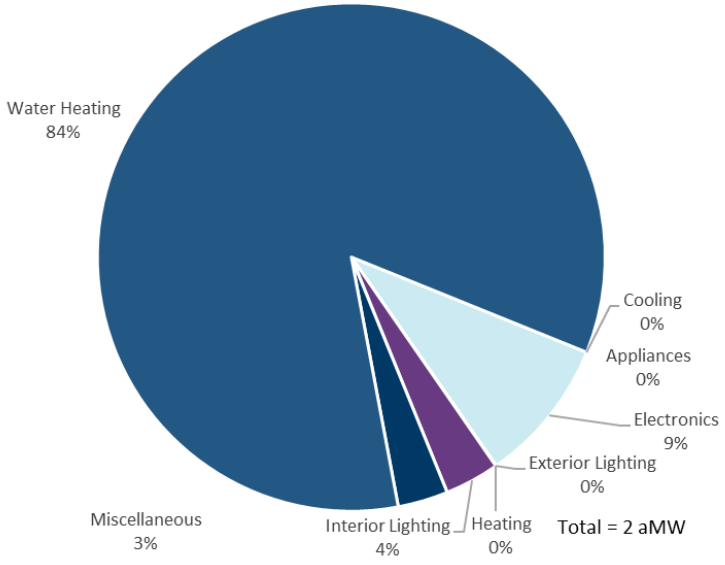
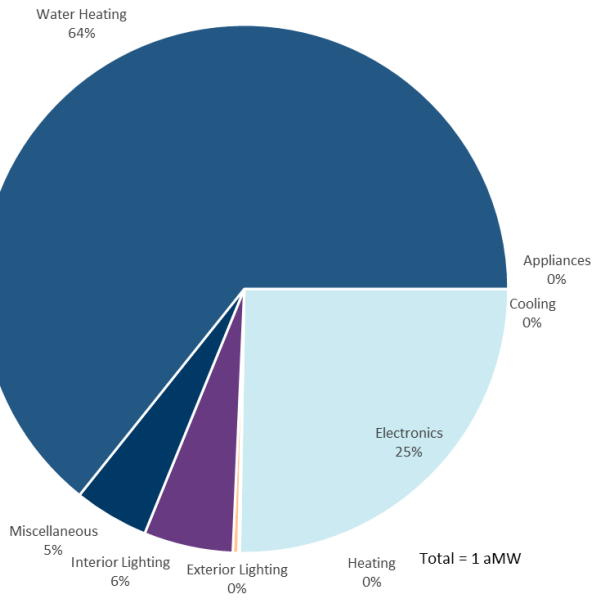


Figure D-10. Achievable Economic Potential: Residential Multifamily – High Rise by End Use



D.4. Commercial Segments by End Use

Figure D-11. Achievable Economic Potential: Commercial Assembly by End Use

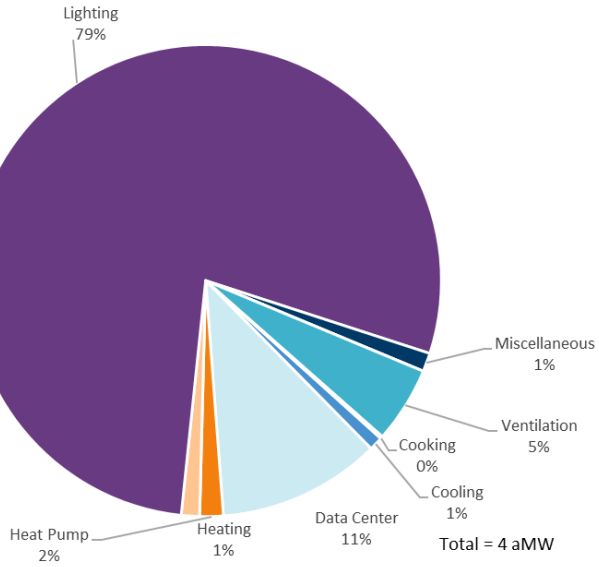


Figure D-12. Achievable Economic Potential: Commercial Hospital by End Use

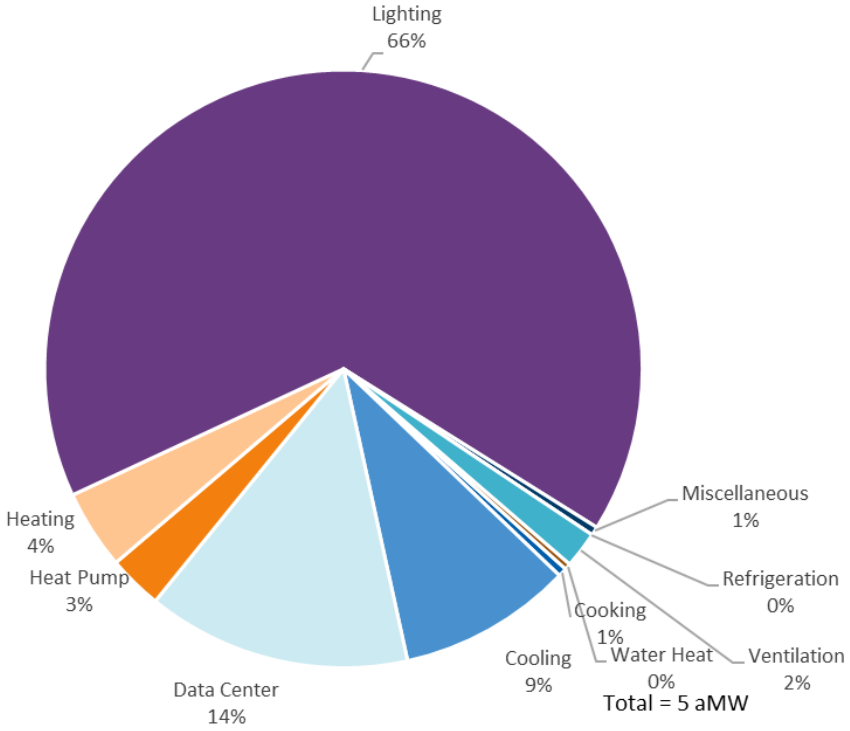


Figure D-13. Achievable Economic Potential: Commercial Large Grocery by End Use

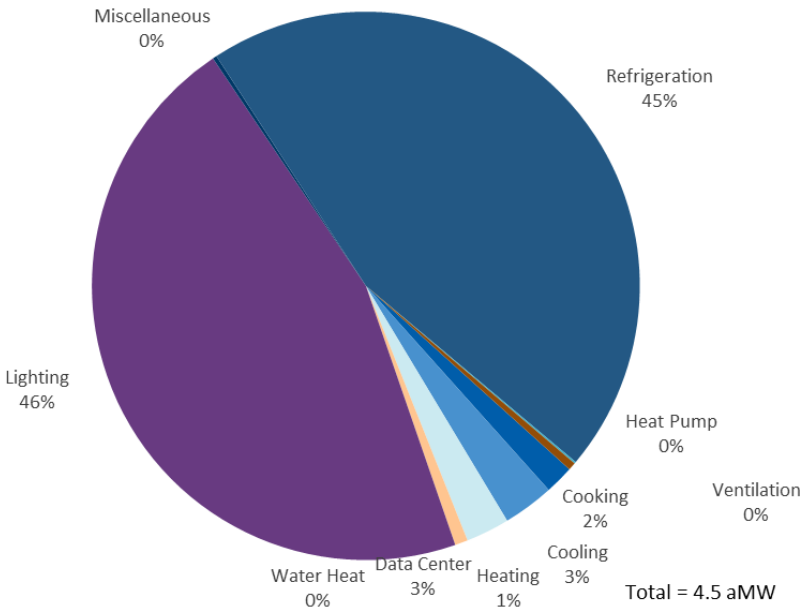


Figure D-14. Achievable Economic Potential: Commercial Large Office by End Use

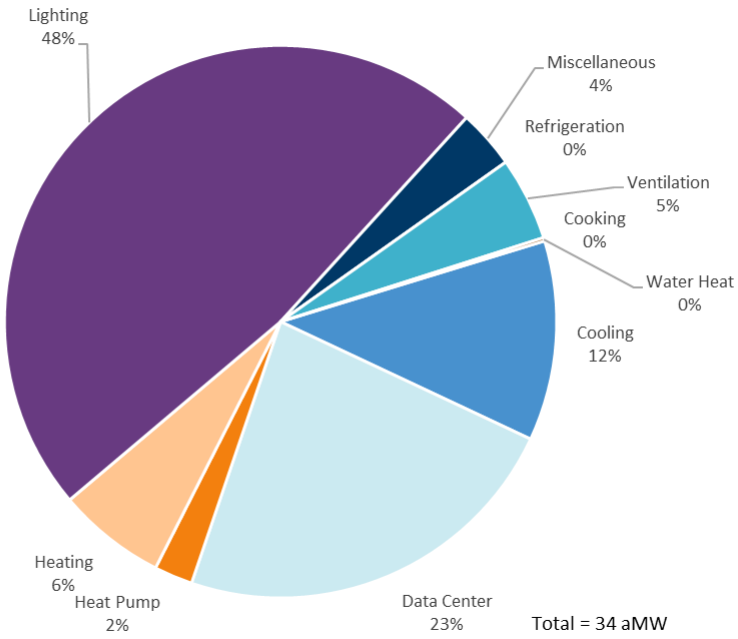


Figure D-15. Achievable Economic Potential: Commercial Lodging by End Use

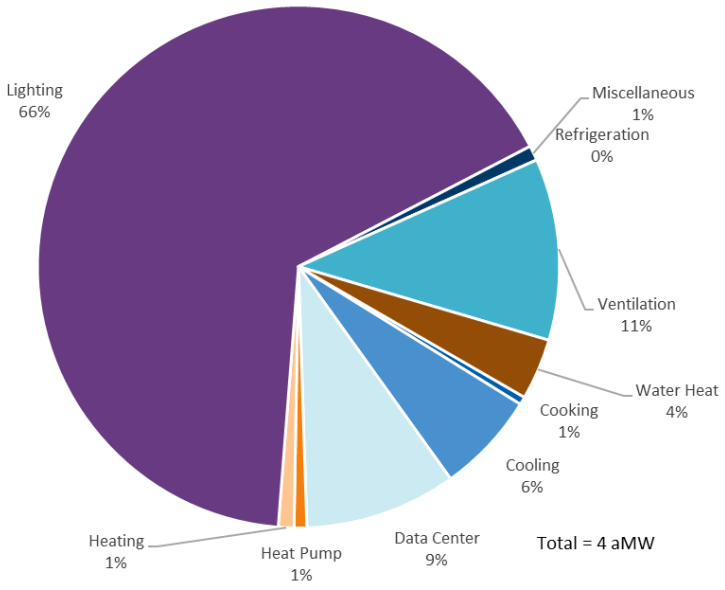


Figure D-16. Achievable Economic Potential: Commercial MF Common Area by End Use

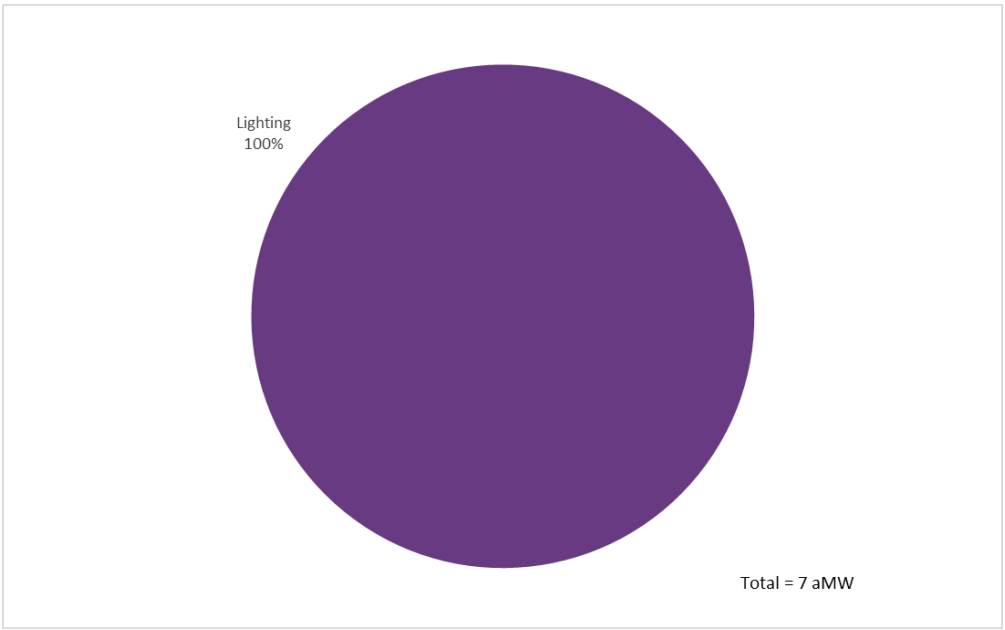


Figure D-17. Achievable Economic Potential: Commercial Miscellaneous by End Use

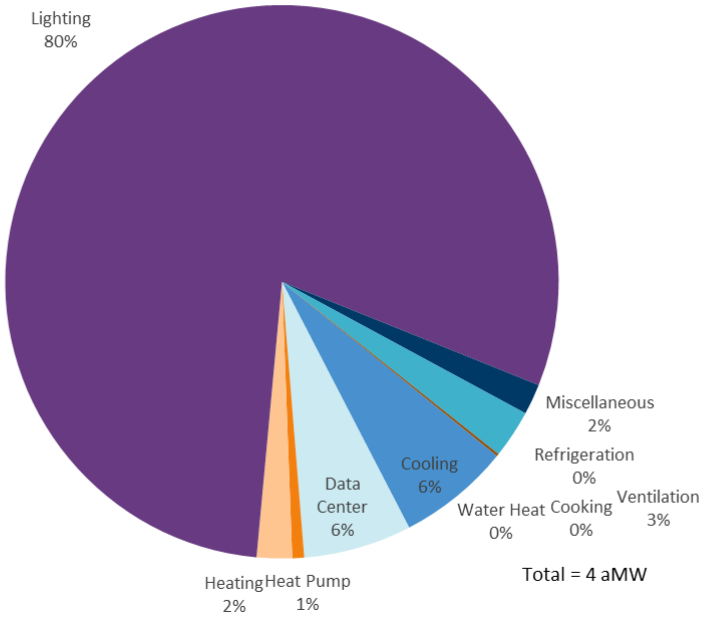


Figure D-18. Achievable Economic Potential: Commercial Other Health by End Use

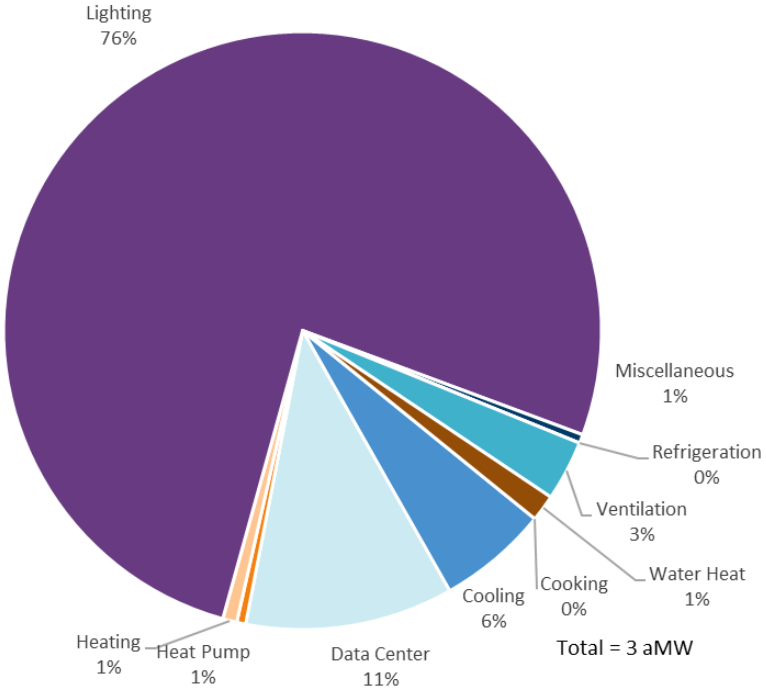


Figure D-19. Achievable Economic Potential: Commercial Restaurant by End Use

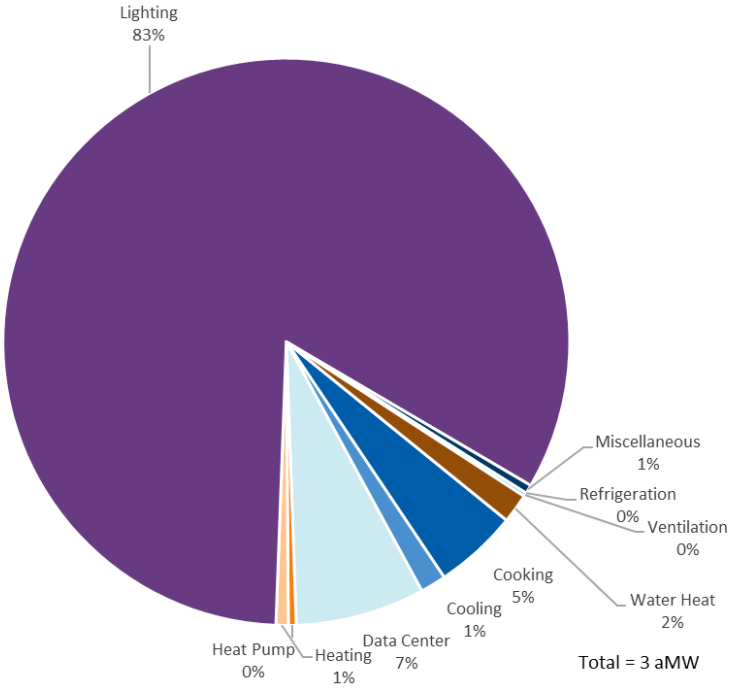


Figure D-20. Achievable Economic Potential: Commercial Retail by End Use

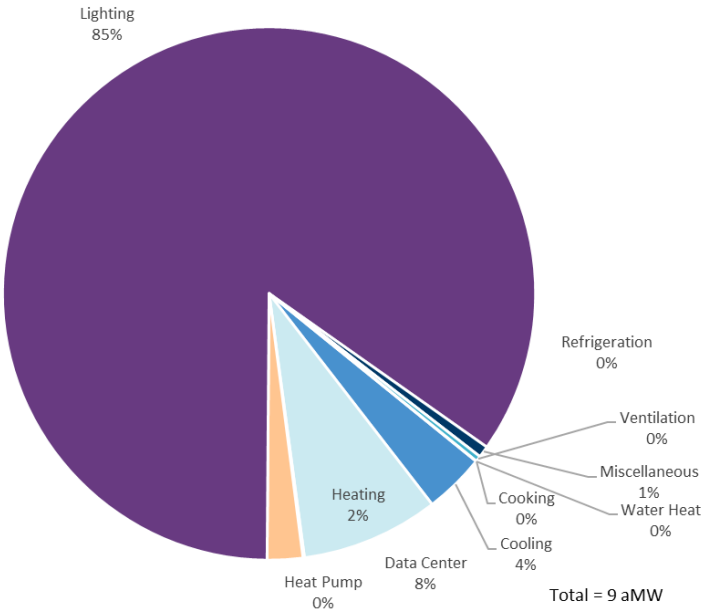


Figure D-21. Achievable Economic Potential: Commercial School by End Use

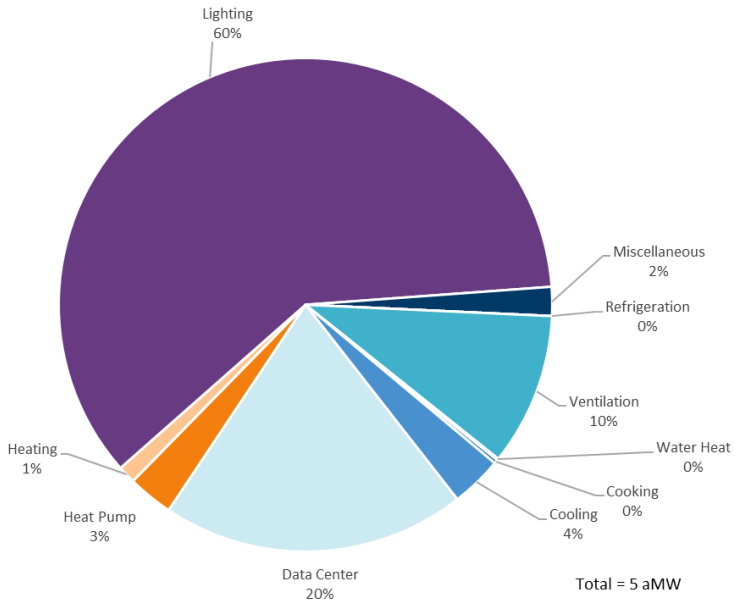


Figure D-22. Achievable Economic Potential: Commercial Small Grocery by End Use

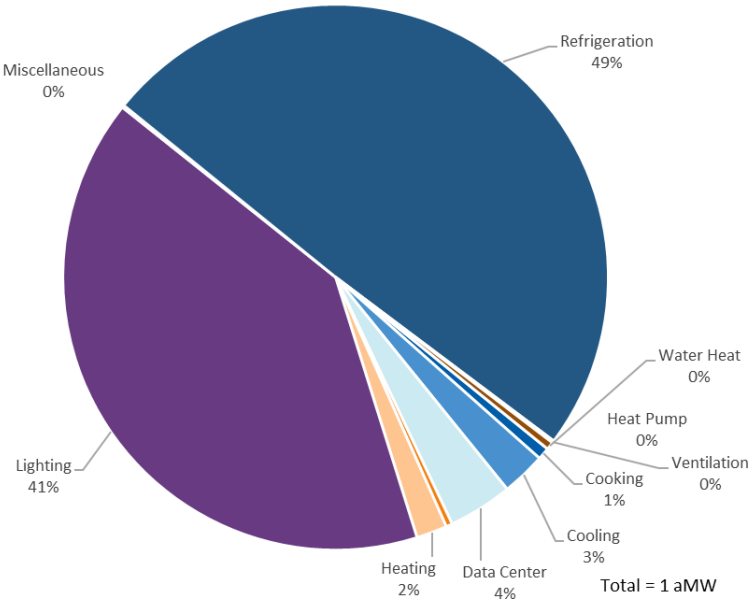


Figure D-23. Achievable Economic Potential: Commercial Small Office by End Use

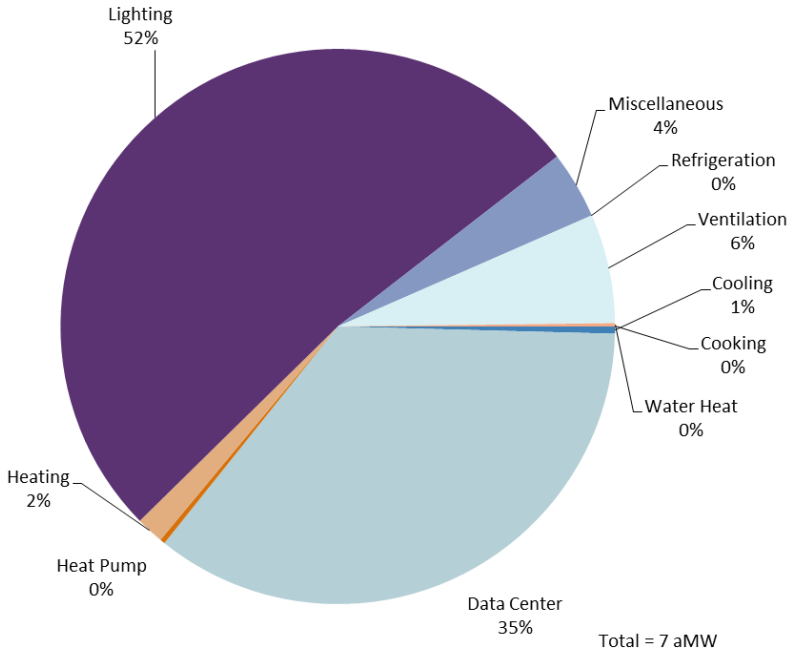


Figure D-24. Achievable Economic Potential: Commercial University by End Use

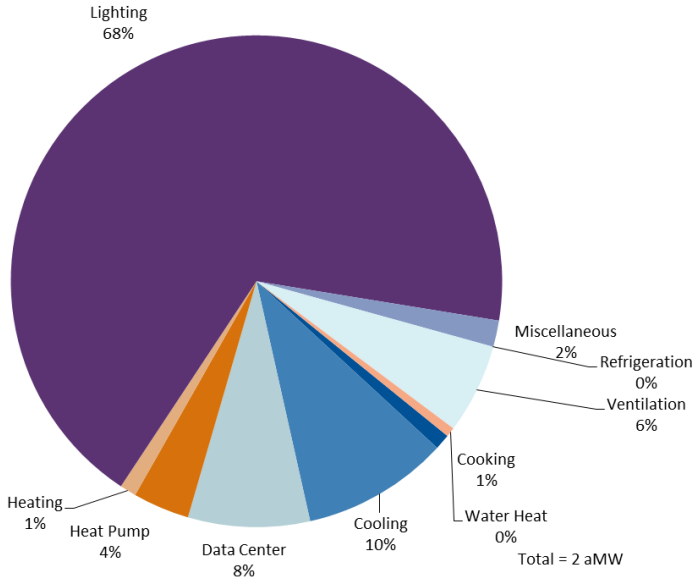
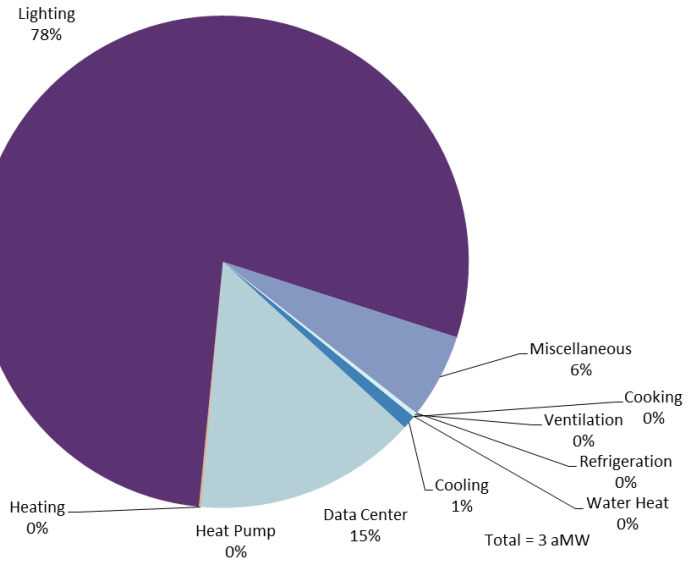


Figure D-25. Achievable Economic Potential: Commercial Warehouse by End Use



D.5. Industrial Segments by End Use

Figure D-26. Achievable Economic Potential: Industrial – Other Food by End Use

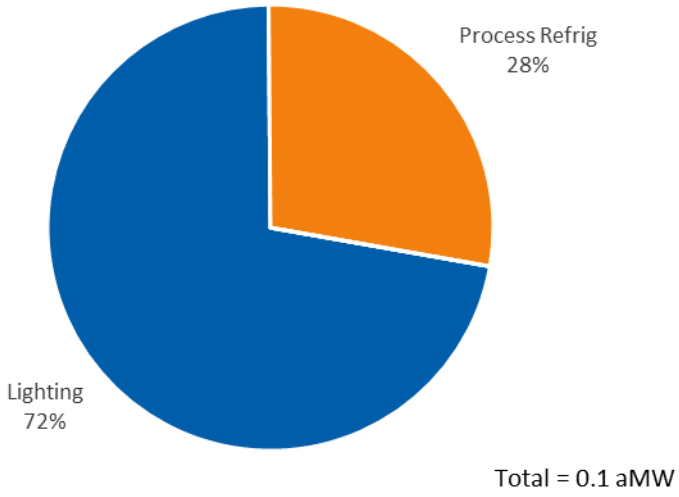


Figure D-27. Achievable Economic Potential: Industrial – Misc. Manufacturing by End Use

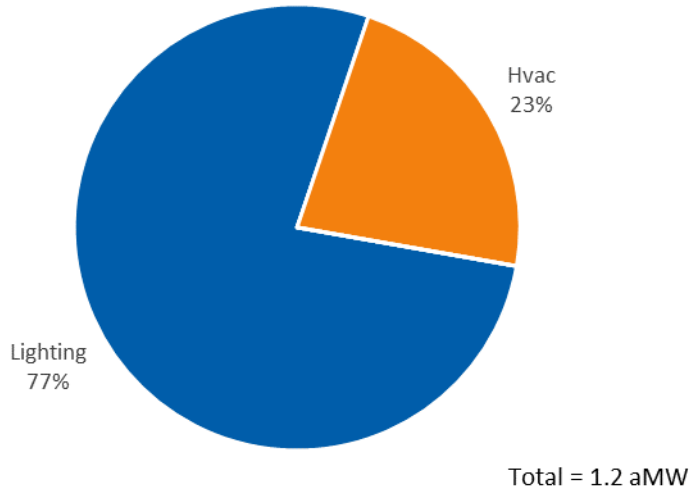


Figure D-28. Achievable Economic Potential: Industrial – Foundries by End Use

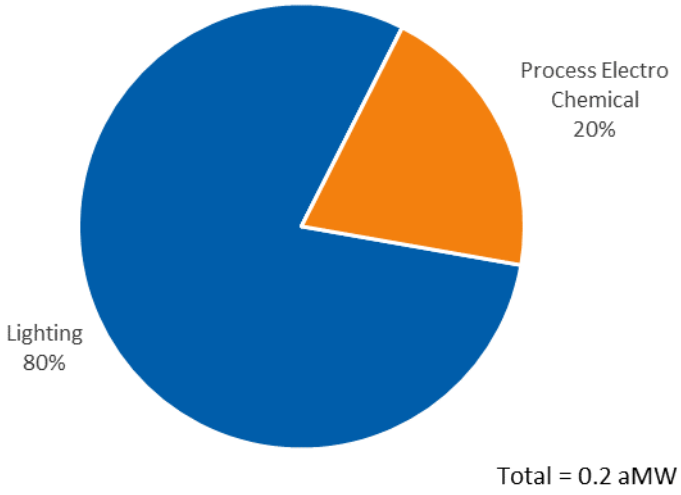


Figure D-29. Achievable Economic Potential: Industrial – Transportation, Equip by End Use

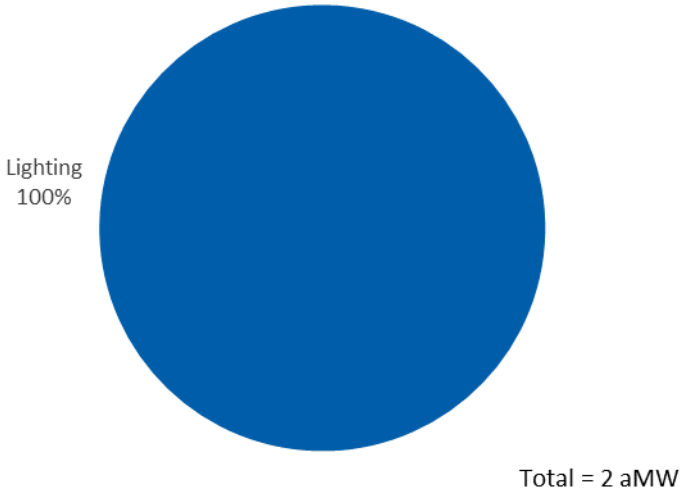


Figure D-30. Achievable Economic Potential: Industrial – Wastewater by End Use

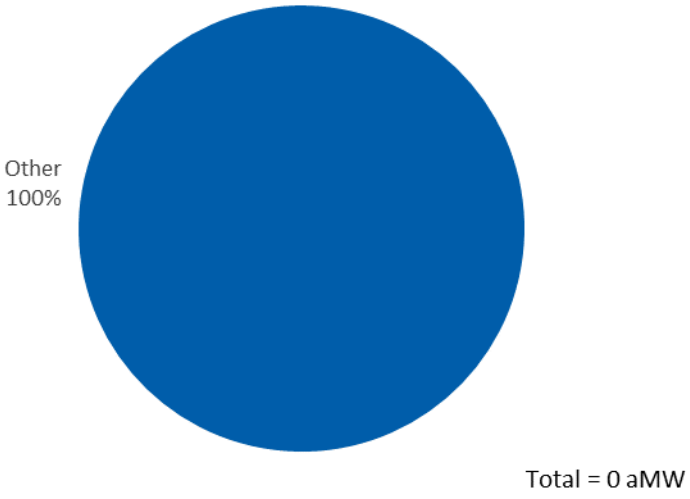


Figure D-31. Achievable Economic Potential: Industrial – Water by End Use

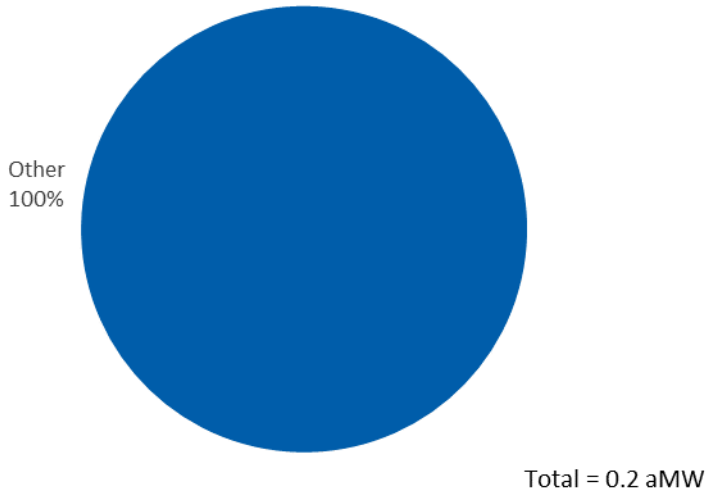
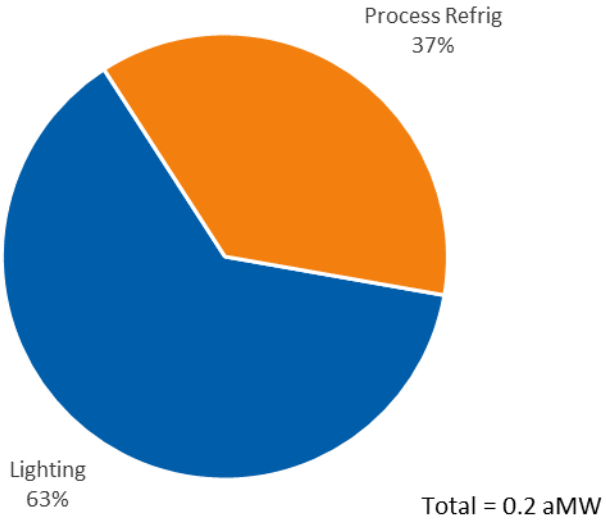


Figure D-32. Achievable Economic Potential: Industrial – Frozen Food by End Use



Measure Details

E.1. Measure Details

Appendix E includes detailed measure costs, savings, and applicability factors for all measure permutations considered in this study. This appendix includes three separate tables for each sector: residential, commercial, and industrial.

- **Segment**
- **End Use**
- **Construction Vintage:** New or Existing
- **Measure Name**
- **Measure Description**
- **Baseline Description**
- **Unit Description**: Units of savings and costs (e.g., per square foot, per unit, per industry).
- **Savings per Unit**: Per-unit standalone savings for the energy efficiency measure.
- **Measure Life**: Expected useful lifetime of a given measure (years).
- **Incremental Cost ($)**: Incremental cost to install an energy efficiency measure (including capital costs, labor, and annual operations and maintenance); industrial costs expressed in thousands of dollars.
- **Levelized Cost**: The total resource cost (TRC), levelized cost of conserved energy, discounted over the 20-year study horizon.
- **TRC Benefit-Cost (B/C) Ratio**: The ratio of net present value TRC benefits to net present value TRC costs.
- **Technical Potential**: Cumulative, 20-year, technically feasible, energy efficiency potential, expressed in MWh.
- **Economic Potential**: Cumulative, 20-year, energy efficiency potential for cost-effective measures, expressed in MWh. Note: due to interactions, economic potential may exceed technical potential for some measures.
- **Achievable Economic Potential**: IRP scenario cumulative, 20-year, achievable potential, expressed in MWh.

Appendix E is included as an attachment to this volume of the report.

SEATTLE CITY COUNCIL
CENTRAL STAFF

February 11, 2020

M E M O R A N D U M

To: Transportation and Utilities Committee
From: Eric McConaghy, Analyst
Subject: Seattle City Light 2020-2021 Energy Conservation Target

On February 19, Seattle City Light (SCL) will brief the Transportation and Utilities Committee (Committee) on Resolution 31932 that would adopt SCL's proposed energy conservation targets for 2020-2021 and 10-year conservation potential. The Committee's agenda also includes a public hearing on these topics.

Background

Initiative 937 (I-937), also known as the Energy Independence Act (EIA), was passed by Washington state voters on November 7, 2006. To comply with the EIA[1], utilities including SCL[2], must pursue all energy conservation that is cost-effective, reliable and feasible. Utilities must identify the conservation potential for the utility over a 10-year period and then establish and make publicly available their two-year, conservation targets. The Washington State Department of Commerce oversees compliance with EIA. The Washington Administrative Code calls for municipal utilities to adopt the EIA-required, two-year conservation targets after public notice and opportunity for public comment.[3]

Energy Conservation Targets

SCL contracted with Cadmus, a technical consulting company, to complete the Conservation Potential Assessment (CPA) to estimate the "magnitude, timing, and costs of conservation resources" with SCL's service territory over the next 21 years. SCL's 131 square-mile service territory includes the City of Seattle, portions of seven adjacent cities, and parts of unincorporated King County. Cadmus completed the CPA for the time period of 21 years to provide inputs to SCL's next Integrated Resource Plan (IRP) covering the next 20 years. Council can expect to review and, if satisfactory, approve by resolution SCL's updated IRP later this year.

The CPA is also the source for SCL's conservation targets and potential over the next two and 10-year periods, respectively. Resolution 31932 would establish a 10-year conservation

[1] Revised Code of Washington (RCW) 19.285.040. https://app.leg.wa.gov/RCW/default.aspx?cite=19.285.040. Last accessed 02/10/2020.
[2] EIA requires electric utilities serving at least 25,000 retail customers to use renewable energy and energy conservation. There are 18 utilities subject to the EIA.
[3] Washington Administrative Code (WAC) 194-37-070. https://apps.leg.wa.gov/WAC/default.aspx?cite=194-37-070. Last accessed 02/10/2020.

potential of 82.67 average megawatts and a conservation target of 21.27 average megawatts[4] for 2020-2021 based on the CPA. The biennial target measures SCL's conservation goal for the first two years of that period; and it is a subset of the 10-year conservation potential that measures the power savings made possible through all achievable, cost-effective measures.

The proposed target and potential for 2020-2021 are both less than the target and potential for the previous period adopted by Resolution 31765. The 2020-2021 target of is a 13 percent decrease from the 2018-2019 conservation target. The 10-year conservation potential proposed to be established in Resolution 31932 is an 8.5 percent decrease compared to the previous iteration.

SCL explains the reduction in the target and potential as resulting from:

(1) lower avoided energy costs;

(2) increased stringency in building energy codes; and

(3) already-attained conservation measures, such as using inexpensive, light-emitting diode (LED) lighting.

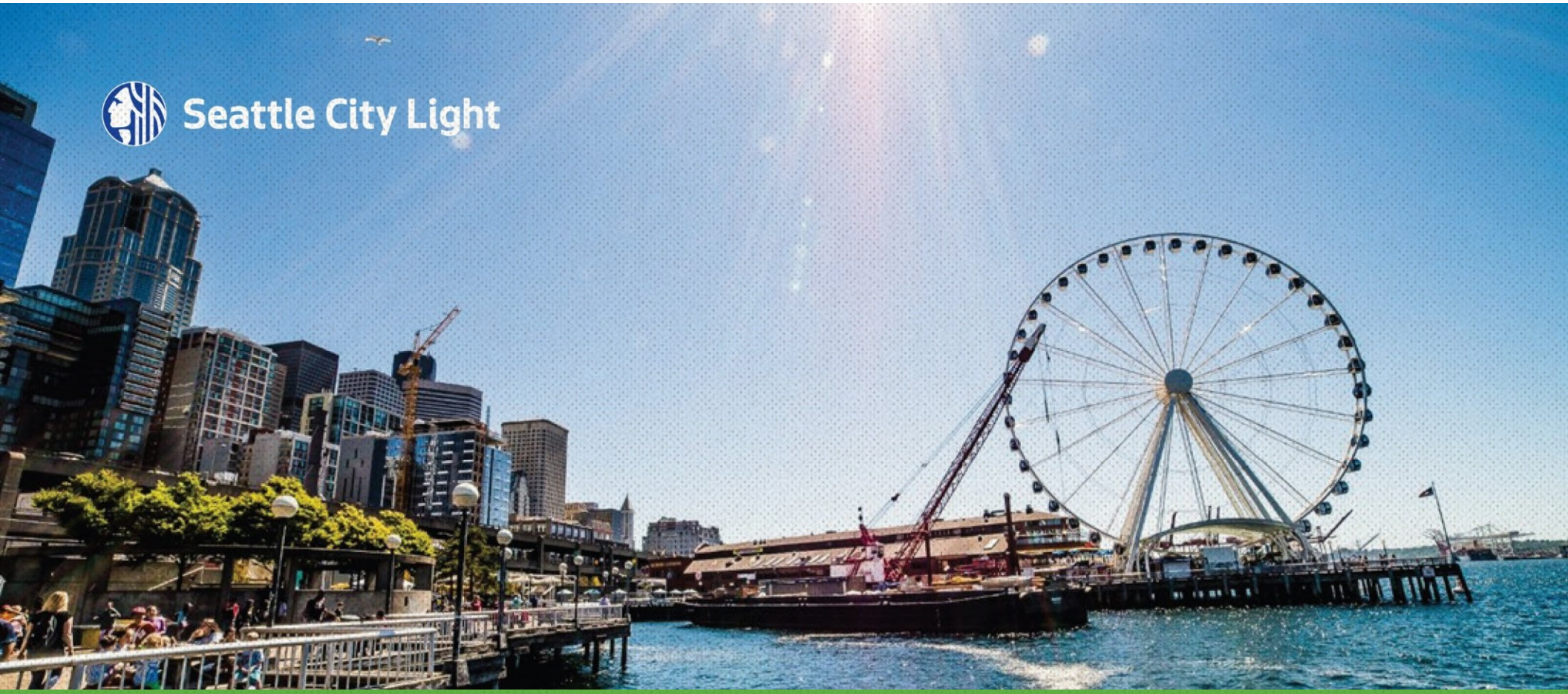
Generally, avoided energy costs are costs SCL would otherwise incur to acquire energy if conservation measures were not implemented. Lower avoided energy costs mean more expensive conservation measures are less cost-effective. Newer building energy codes with increased stringency in energy efficiency means that newly constructed buildings have less room for improvement in conservation compared to older buildings approved under previous energy code requirements. Finally, already-attained conservation is the "low-hanging fruit" of energy conservation that has largely been previously "picked."

Next steps

If the Committee takes action on the resolution during the meeting on February 19, then Council could schedule final action on the resolution as soon as February 24.

cc: Kirstan Arestad, Executive Director
Dan Eder, Deputy Director

[4] An average megawatt (aMW) is defined as one million watts delivered continuously 24 hours a day for a year (8,760 hours). For scale, the CPA estimates SCL's annual 2020 sales of power to all residential customers as 364 aMW.



2020-2021 CONSERVATION TARGET

Presentation to the Transportation and Utilities Committee

Jennifer Finnigan | February 19, 2020

Presentation overview

1. Introduction to conservation

2. Conservation target for 2020-2021

3. What this target means for City Light

Conservation at City Light

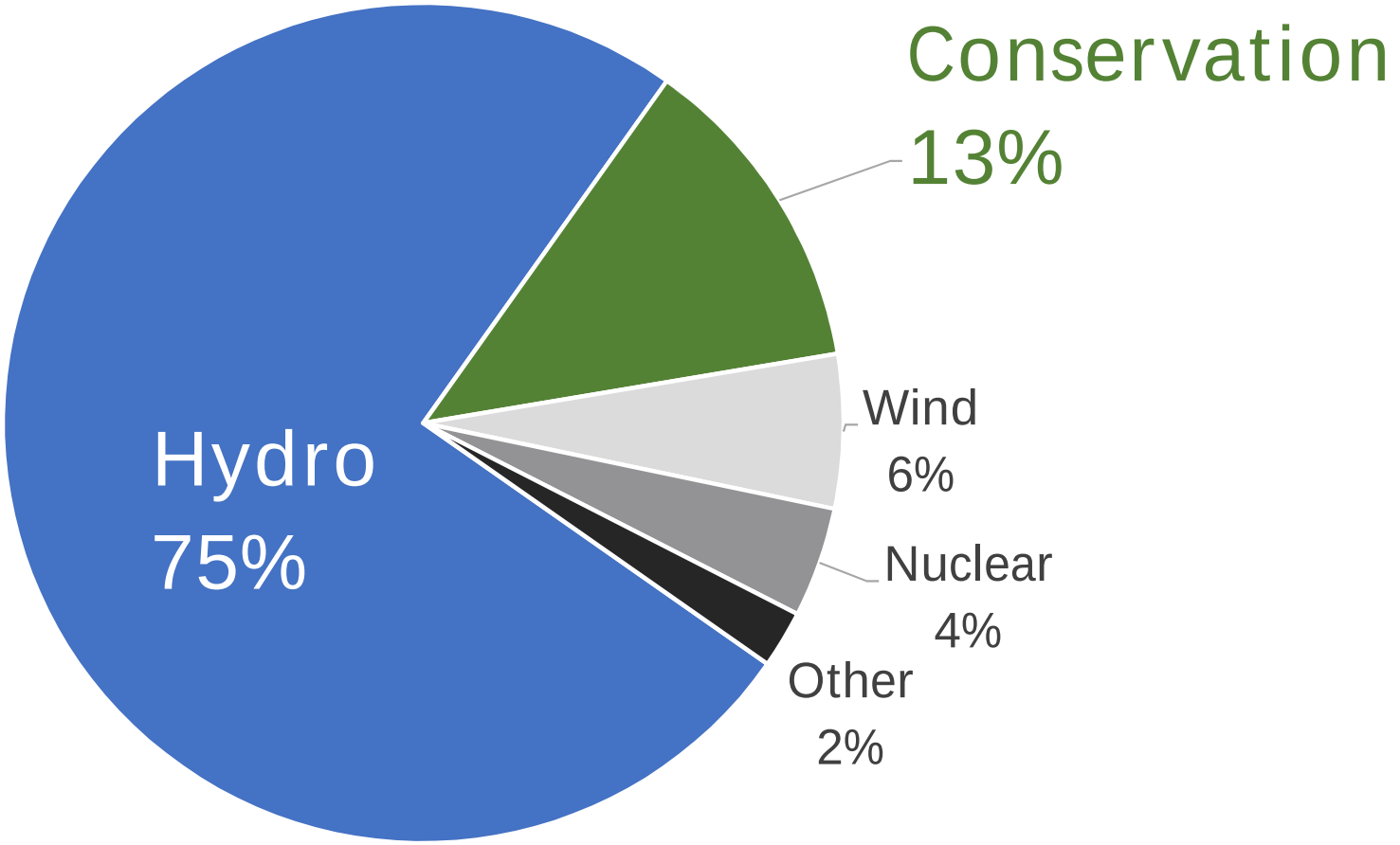
Since 1977 we have saved the equivalent annual electricity use of 190,000 average Seattle homes

In 2018 we saved the equivalent annual electricity use of 17,000 average Seattle homes

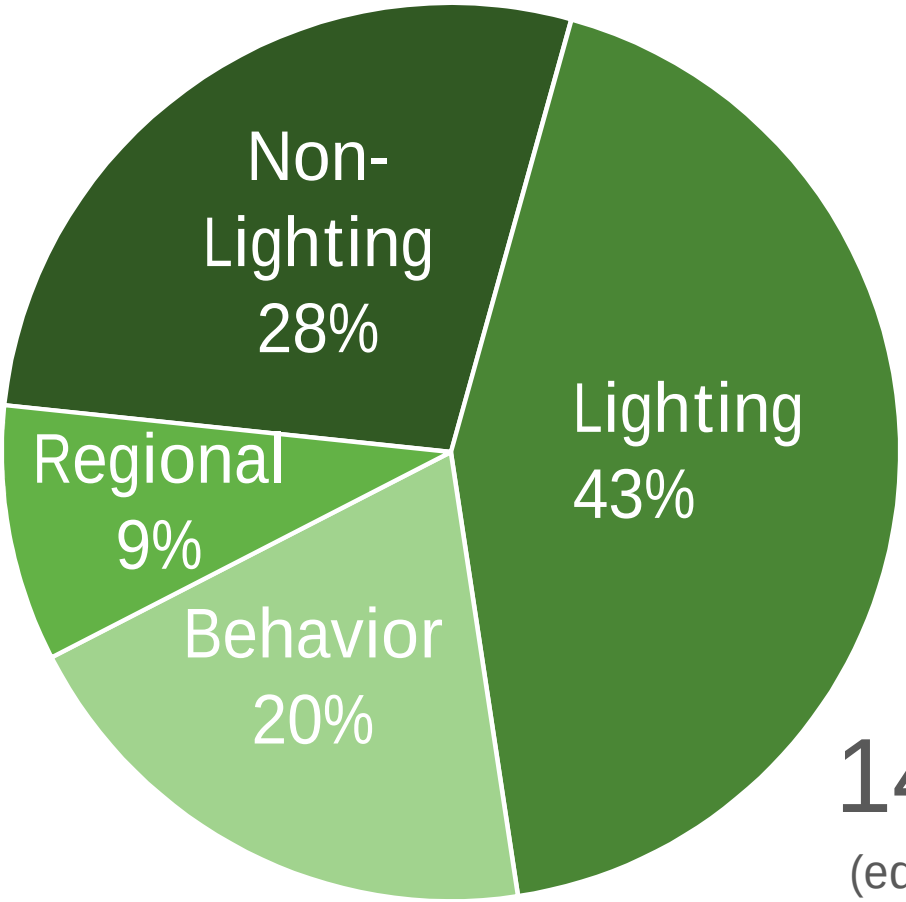
Conservation = energy efficiency

Seattle City Light

Conservation is a clean resource



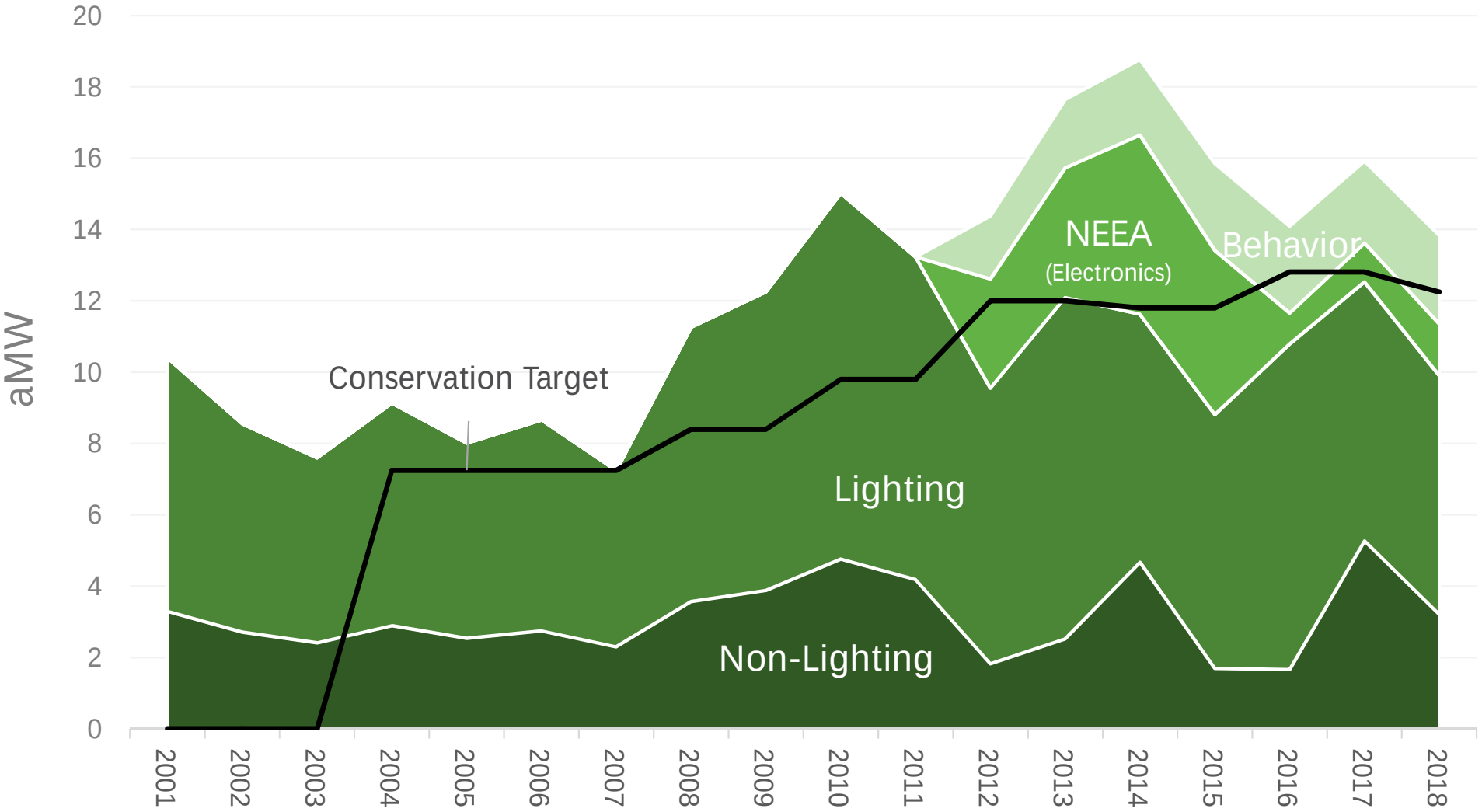
Conservation is currently dominated by lighting



14 aMW

(equivalent to ~17,000 homes)

Looking back: annual energy savings



Initiative 937

Approved by voters in 2006

Methodologies consistent with NWPCC's Power Plan

All utilities with >25K customers

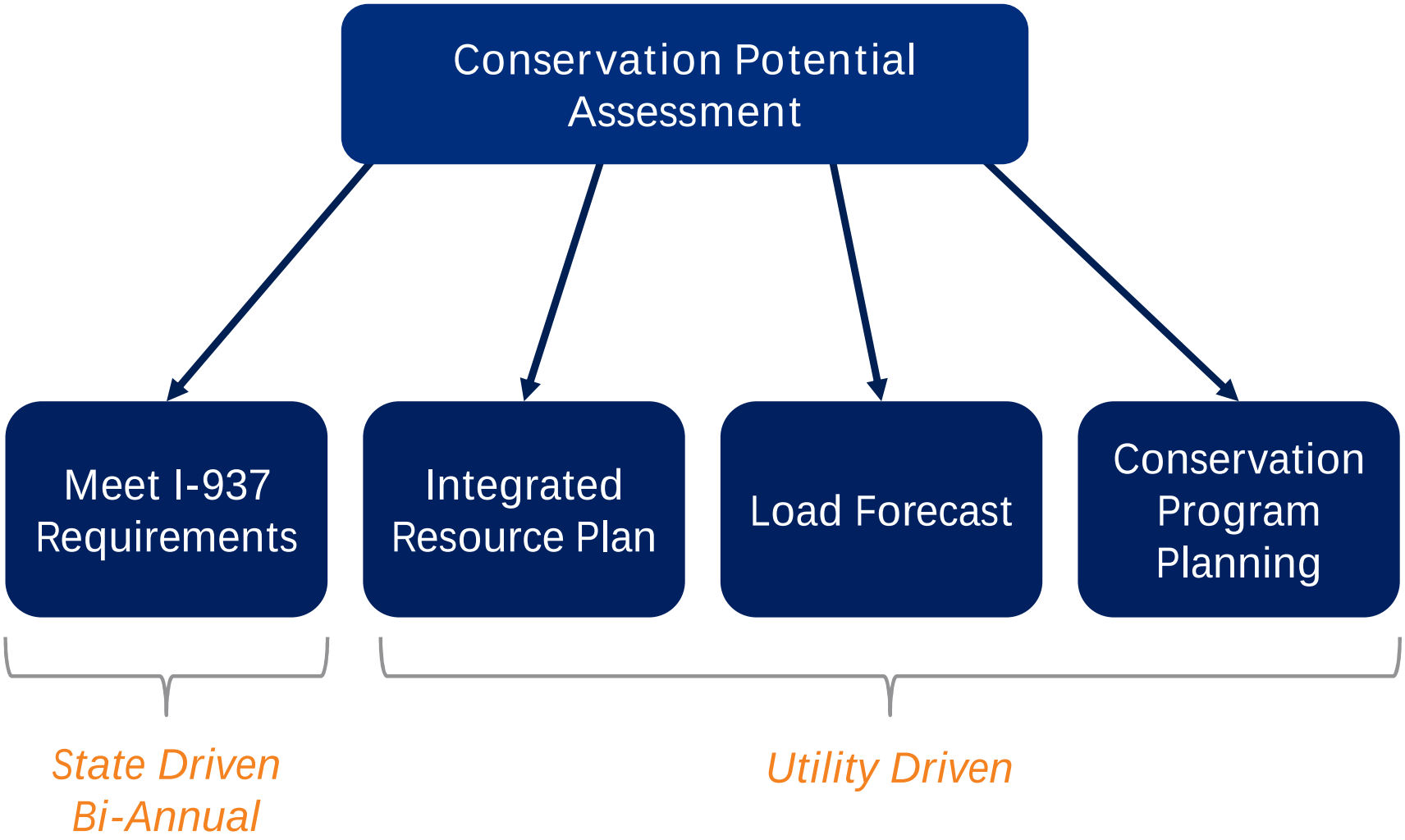
2

Two-year cycles (2016-2017, 2018-19, etc)

Identify and pursue "all available conservation that is cost-effective"

Report savings and targets to the State

How and why we set a conservation target



2020 conservation targets

	2020-2021	2020-2029
Residential	2.8	9.3
Commercial	16.1	69.4
Industrial	2.4	4.0
Total	21.3 aMW (~26,000 homes)	82.7 aMW (~100,000 homes)

How the two-year target compares

	2020-2021	2018-2019
Residential	2.8	1.7
Commercial	16.1	17.2
Industrial	2.4	4.4
Street Lighting (LED Conversion)	--	1.2
Total	21.3 aMW (~26,000 homes)	24.6 aMW (~30,000 homes)

191

What changed?

Renewable energy costs have decreased

Electricity demand is flat

Due to past program achievement

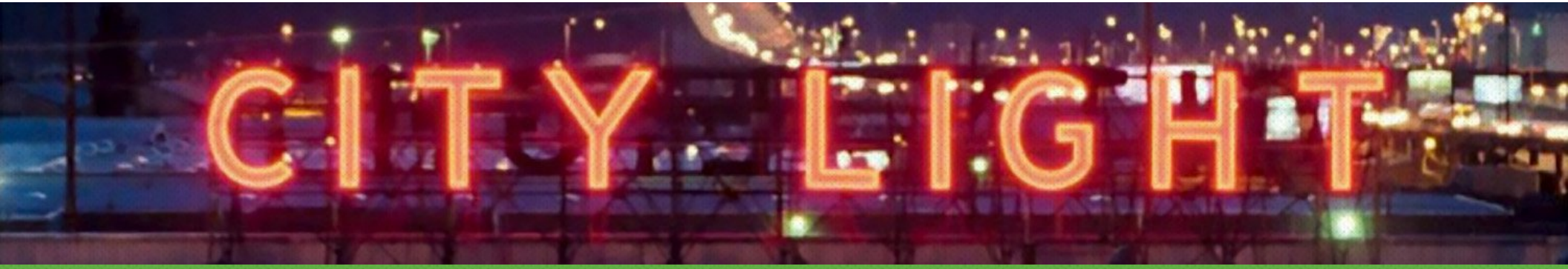
New energy codes

What this means for City Light

We will continue our strong investment in conservation

Our opportunities are evolving

- Pivot to whole building
- More focus on social equity
- Not all conservation is created equal; will consider location and time value
- As we march toward electrification, efficiency in buildings is key



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

THE NATION'S GREENEST UTILITY
SINCE 1905
SEATTLE CITY LIGHT

Seattle City Light

File #: CB 119741, **Version:** 1

CITY OF SEATTLE

ORDINANCE _____

COUNCIL BILL _____

AN ORDINANCE relating to the Central Puget Sound Regional Transit Authority ("Sound Transit"); authorizing execution of a Funding and Cooperative Agreement for Northgate Station Area Access Improvements between Sound Transit and The City of Seattle; and ratifying and confirming certain prior acts.

WHEREAS, the Northgate Link Light Rail Extension with station stops at University District, Roosevelt, and Northgate is a Central Puget Sound Regional Transit Authority ("Sound Transit") project approved by regional voters in 2008; and

WHEREAS, the Northgate neighborhood is a designated regional residential and employment center with an existing transit center that currently serves over 6,000 bus passengers a day, and where the light rail station is expected to serve over 15,000 passengers per day, and The City of Seattle ("City") has long envisioned a station area that integrates safe and efficient pedestrian, bicycle, and bus connections amidst transit oriented development to serve a growing residential population along with abundant employment and educational opportunities; and

WHEREAS, in 2012, by its Motion M2012-42, the Sound Transit Board authorized a Northgate access improvement study to identify potential pedestrian and bicycle access improvements to enhance access to the current Northgate Transit Center and the future Northgate Station inter-modal transit facility as part of the Northgate Link Extension; and

WHEREAS, Motion M2012-42 also stated that Sound Transit's funding contribution for proposed Northgate pedestrian and bicycle access improvements would match City funding up to $10 million ($5 million for

a proposed pedestrian and bicycle bridge over Interstate 5, and up to $5 million for other proposed pedestrian and bicycle improvements) with full funding partnership agreements in place to complete the improvements by 2021; and

WHEREAS, the Seattle City Council in Resolution 31389, adopted on June 25, 2012, expressed its intent to match Sound Transit's funding by committing $5 million for the proposed pedestrian and bicycle bridge and $5 million for other pedestrian and bicycle improvements; and

WHEREAS, with the passage of Seattle Proposition 1 in November 2015, the City has secured the monies for the pedestrian and bicycle bridge and intends to commit the remainder of the matching funds to the projects identified on "Exhibit B" of Attachment A to this ordinance; and

WHEREAS, the Northgate Pedestrian and Bicycle Bridge will soon be under construction and, along with all the other projects listed in the attached proposed Funding and Cooperative Agreement, is on schedule to be completed by Sound Transit's scheduled opening of the Northgate Extension in the fall of 2021; NOW, THEREFORE,

BE IT ORDAINED BY THE CITY OF SEATTLE AS FOLLOWS:

Section 1. As requested by the Director of Transportation and recommended by the Mayor, the Director of Transportation or the Director's designee is authorized to execute, for and on behalf of The City of Seattle, the "Funding and Cooperative Agreement Between the Central Puget Sound Regional Transit Agency and The City of Seattle for the Northgate Station Area Access Improvements GA 0101-17," substantially in the form of Attachment A to this ordinance, providing for Sound Transit reimbursement up to $10 million to the City for Northgate Access Projects as spelled out within the agreement, defining dispute resolution procedures and allocating responsibilities among the parties for right-of-way acquisition, construction access, asset ownership and maintenance, and other terms as stated in Attachment A.

Section 2. Any act consistent with the authority of this ordinance taken after its passage and prior to its effective date is ratified and confirmed.

Section 3. This ordinance shall take effect and be in force 30 days after its approval by the Mayor, but if not approved and returned by the Mayor within ten days after presentation, it shall take effect as provided by Seattle Municipal Code Section 1.04.020.

Passed by the City Council the _____ day of _____, 2020, and signed by me in open session in authentication of its passage this _____ day of _____, 2020.

_____

President _____ of the City Council

Approved by me this _____ day of _____, 2020.

_____

Jenny A. Durkan, Mayor

Filed by me this _____ day of _____, 2020.

_____

Monica Martinez Simmons, City Clerk

(Seal)

Attachments:
Attachment A - Funding and Cooperative Agreement Between the Central Puget Sound Regional Transit Authority and The City of Seattle for the Northgate Station Area Access Improvements GA-0101-17

FUNDING AND COOPERATIVE AGREEMENT
BETWEEN
THE CENTRAL PUGET SOUND REGIONAL TRANSIT AUTHORITY
AND
THE CITY OF SEATTLE
FOR
THE NORTHGATE STATION AREA ACCESS IMPROVEMENTS
GA 0101-17

This funding and cooperative agreement ("**Agreement**") is between the Central Puget Sound Regional Transit Authority, a regional transit authority organized under RCW 81.112 ("**Sound Transit**") and the City of Seattle, a Washington municipal corporation ("**City**").

RECITALS

A. The Northgate Link Extension is a voter-approved project of Sound Transit to extend light rail to the Northgate region of the City, with station stops at University District, Roosevelt, and Northgate.

B. The Northgate area is one of the Puget Sound region's major residential and employment centers. The existing Northgate transit center currently serves over 6,000 passengers a day, and the future light rail station is expected to serve over 15,000 passengers per day. The Parties anticipate integrated access modes serving Northgate Station will include the Link light rail system, a safe and inviting pedestrian environment, protected bicycle lanes, King County Metro and Sound Transit bus service, transit oriented development, passenger drop off/pick up, and park-and-ride facilities.

C. The City and Sound Transit have been working together to coordinate strategies for ensuring that transit riders will be able to access the Northgate Station by multiple modes and intend to work cooperatively as the project proceeds, including coordinating construction activities to ensure that City-built access improvements can be built without impacting the schedule for the Northgate Link Extension project.

D. In 2012, by its Motion M2012-42, the Sound Transit Board authorized a Northgate access improvement study to identify potential pedestrian and bicycle access

improvements to enhance access to the current Northgate Transit Center and the future Northgate Station inter-modal transit facility as part of the Northgate Link Extension.

E. Motion M2012-42 also stated that Sound Transit's funding contribution for proposed Northgate pedestrian and bicycle access improvements would be capped at $10 million, which includes credits for current project commitments as included in the baselined Northgate Link Extension Project budget. In addition, Motion M2012-42 stated that before Sound Transit money will be authorized towards the improvements, the City of Seattle must match Sound Transit's funding contribution, which includes cash contributions and credit for work performed, must complete appropriate environmental review for the proposed pedestrian and bicycle access improvements, and must have full funding partnership agreements in place to complete the improvements by 2021. Up to $5 million of Sound Transit's funding contribution is designated for the proposed pedestrian and bicycle bridge (the "Bridge") over Interstate 5, and up to $5 million is designated for other proposed pedestrian and bicycle improvements in the Northgate Station area. In 2015, by its Motion M2015-26, the Sound Transit Board authorized an extension of its funding commitment.

F. The City's matching funding commitment is contained in Resolution 31389, adopted by the Seattle City Council on June 25, 2012.

G. With the passage of Seattle Proposition 1 in November 2015, the City has secured the monies for the Bridge and intends to commit the remainder of the matching funds to the projects identified below. See full funding letter attached as "Exhibit C."

H. The City evaluated the environmental impacts of the Bridge and the 1st Ave NE protected bike lane and multi-use path from NE 92nd Street to NE Northgate Way ("1st Ave NE Bike Facility") under the State Environmental Policy Act (SEPA) in a SEPA Checklist and issued a Mitigated Determination of Non-Significance (MDNS) on April 2, 2018. On September 4, 2018, the Federal Highway Administration issued a documented categorical exclusion under the National Environmental Policy Act.

NOW, THEREFORE, in consideration of the terms and conditions set forth herein, the Parties agree to the following:

AGREEMENT

1. **Purpose.** The purpose of this Agreement is to set forth the roles and responsibilities of the Parties in designing, constructing, and funding certain pedestrian and bicycle access improvements in the vicinity of the future Northgate Link light rail station according to an agreed-upon timeframe.

2. **Cooperation of the Parties**. The provisions contained in this Agreement depend upon timely and open communication and cooperation between the Parties. In this regard, communication of issues, changes, or problems that arise should occur as early as possible in the process, and not wait for explicit due dates or deadlines. The Parties will work cooperatively and in good faith toward resolution of issues in a manner that ensures adequate time for each Party to consider and address the issues. This Agreement contemplates the execution and delivery of a number of future documents, instruments, and permits, the final form and contents of which are not presently determined. The Parties will provide the necessary resources and work in good faith to develop in a diligent and timely manner the final form and content of such documents, instruments, and permits.

3. **Description and Location of Access Improvements.** Following the completion of an access improvement study authorized by Sound Transit Board Motion M2012-42, Sound Transit and the City have identified certain bicycle and pedestrian connectivity improvements within the Northgate Station Area. The approximate location and design concept of the Bridge is shown on the attached "Exhibit A." The improvements tentatively identified on the attached "Exhibit B" include the Bridge as well as bicycle and pedestrian improvements in the vicinity of Northgate Station (the "Other Non-Motorized Access Improvements"). Collectively, the Bridge and the Other Non-Motorized Access Improvements are referred to herein as the "Northgate Access Projects."

4. Project Management and Construction

4.1. The Projects. The City will design and construct the Northgate Access Projects as identified in **Exhibit B**, including without limitation environmental review and mitigation, hazardous waste removal or mitigation, coordination of all required approvals and permits, acquisition of right-of-way, air rights and other property rights, community involvement and construction management, except as provided in Section 5.2 regarding Sound Transit's design and construction to accommodate the Bridge and the 1st Ave NE Bike Facility. Notwithstanding the foregoing or anything to the contrary herein, the City's obligation to complete design and construction of the Northgate Access Projects is subject to the City's budget process and City Council approval of funding for construction of such projects.

4.2. Environmental Review. The City is the "Lead Agency" for purposes of the Northgate Access Projects' compliance with the State Environmental Policy Act (SEPA), Ch. 43.21C RCW. The City shall complete the required environmental documentation for SEPA and the National Environmental Policy Act (NEPA), design and obtain the necessary permits to construct the Bridge and the Other Non-Motorized Access Improvements.

4.2.1. Sound Transit will cooperate with the City to complete the environmental documentation and secure the required permits but shall not be required to incur out of pocket (non-staff time) costs in connection with its efforts without the City providing reimbursement/credit consistent with Section 5.1.

4.3. Design Review

4.3.1. The City will host regular design coordination meetings with representatives from Sound Transit and King County to review the design of the Northgate Access Projects. Sound Transit's review, approval, inspection, participation, attendance at meetings, or other involvement in the design of the Northgate Access Projects does not make Sound Transit responsible or liable for design of any Northgate Access Projects or for

construction of the City-constructed portions of the Northgate Access Projects, nor relieve the City of responsibility therefor.

4.3.2. The City will provide Sound Transit with the opportunity to provide design review, approval, and coordination during construction to ensure that the Northgate Access Projects to which Sound Transit has contributed funding are consistent with the scope of work as shown in **Exhibits A and B**; to ensure the Northgate Access Projects do not interfere with Sound Transit's construction of the Northgate Station and Northgate Link Extension, and to identify design issues impacting Northgate Station operations. Sound Transit will review and provide written comments on design documents at 30-, 60- and 90- percent completion, within 14 calendar days of receipt by Sound Transit, or as otherwise agreed upon by the Designated Representatives designated in Section 13.4. If Sound Transit submits reasonable written objections or comments within the time frame identified above to prevent delays to Sound Transit's construction of the Northgate Station and Northgate Link Extension and/or to prevent interference with Sound Transit's operation and maintenance of light rail, the City will cause its designer to make changes to the drawings or specifications consistent with Sound Transit's construction schedule and operations and maintenance requirements. The City will address and respond to every written comment submitted by Sound Transit.

4.3.3. All of the Northgate Access Projects must meet current Americans with Disabilities Act (ADA) standards, and such standards are to be maintained at the expense of the City through the life of the Projects.

5. Sound Transit's Financial Participation-Capital Expenditures

5.1. Maximum Funding Contribution to the Project. Sound Transit will contribute up to $10 million to the City for the Northgate Access Projects. Notwithstanding any cost overruns, Sound Transit will not be obligated beyond its maximum funding contribution. Sound Transit's contribution will be as follows:

5.1.1. Sound Transit will match the City's investment for the design and/or construction of the Other Non-Motorized Access Improvements, including the 1st Ave NE Bike Facility, up to $5 million. Sound Transit funds may be applied to the 1st Ave NE Bike Facility or Other Non-Motorized Access Improvements; provided that Sound Transit's funds may only be applied to a project which has completed any applicable environmental review process. The City may use funding contributions to any Other Non-Motorized Access Improvements that are completed in or before 2021 as City matching funds.

5.1.2. Sound Transit will match the City's investment for the design and construction of the Bridge up to $5 million.

5.2. Credits for Sound Transit Design and Construction Costs. Sound Transit has incurred and will continue to incur costs to design and construct its facilities to accommodate the Bridge and the 1st Ave NE Bike Facility. Sound Transit has designed the Northgate Station mezzanine level to accommodate a future bridge connection to the elevated station structure. The current design of the Station has been modified to ensure that the placement of columns for the elevated guideway will not preclude the development of the 1st Ave NE Bike Facility or connection to the Bridge.

5.2.1. For Sound Transit's design, construction, and related administrative costs in excess of $1 million incurred to accommodate the Northgate Access Projects, Sound Transit may deduct the amount of such costs, not to exceed $2.7 million in total, from its funding contributions. Of the not to exceed $2.7 million, Sound Transit may not credit any more than $0.7 million toward the Bridge nor any more than $2 million toward the 1st Ave NE Bike Facility. However, if the City redesigns either Project and that redesign requires Sound Transit to redesign its project, then the $2.7 million credit cap will be lifted. Sound Transit will undertake additional work that would cause it to exceed its credit cap only if the City approves in writing a scope and cost estimate for the additional work. An itemized list of Sound Transit costs incurred through August 30,

2017 to accommodate the Bridge and the 1st Ave NE Bike Facility is attached hereto as "Exhibit D." Accordingly, if Sound Transit deducts the maximum of $0.7 million toward the Bridge, then its monetary contribution to the City would be capped at $4.3 million. And if Sound Transit deducts the maximum of $2 million toward the 1st Ave NE Bike Facility, then its monetary contribution to the City for Other Non-Motorized Access Improvements would be capped at $3 million.

5.2.2. Sound Transit will amend its Temporary Construction Airspace Lease with Washington State Department of Transportation ("WSDOT") to accommodate the City's Trail Lease with WSDOT for the Bridge and 1st Ave NE Bike Facility construction on the east side of Interstate 5 at no charge to the City. Sound Transit will also modify its N160 nationwide permit from the U.S. Army Corps of Engineers to accommodate the City's construction plans impacting the North Watercourse at no charge to the City.

5.3. Payment Schedule.

5.3.1. The City is expecting to advertise and construct the Bridge and the 1st Ave NE Bike Facility as part of the same bid package, but the City will track costs for each component separately. After issuance of the City's notice to proceed to the contractor for the combined Bridge and 1st Ave NE Bike Facility project, the City may begin sending Sound Transit quarterly reimbursement requests. The reimbursement request amount may include the City's internal costs and external expenditures to its construction contractor and other external consultants for the Bridge and all Other Non-Motorized Access Improvements. The City's request will include a summary of the City's costs and Sound Transit's share as detailed in the next paragraph. The City will provide supporting documentation to its invoices at Sound Transit's request. Sound Transit may audit or request additional supporting documentation any time after the City submits its final invoice. Sound Transit will make quarterly reimbursement payments to the City for Sound Transit's matching share.

5.3.2. Sound Transit's share for each of the Bridge and Other Non-Motorized Access Improvements will be 50% of the total costs (City costs and Sound Transit's costs), less Sound Transit's applicable credits and the limitations in section 5.1 and 5.2 above (a diagram and example of the formula for determining Sound Transit's share is attached as Exhibit G). For purposes of interim reimbursement requests, it will be assumed that Sound Transit has already incurred the full amount of credits. The City's invoice must itemize the reimbursement request showing the request for Bridge funding and Other Non-Motorized Access Improvements separately so that the limitations of section 5.1 and 5.2 can be applied to each correctly. In addition, Sound Transit may hold back matching funds of $500,000 for the Bridge and $500,000 for the Other Non-Motorized Access Improvements until the City provides notice of substantial completion of the Bridge and 1st Ave NE Bike Facility respectively. The City will only apply Sound Transit funds to the (i) Bridge and (ii) the 1st Ave NE Bike Facility or Other Non-Motorized Access Improvements; provided that Sound Transit's funds may only be applied to a project which has completed any applicable environmental review process. Notwithstanding the foregoing quarterly payment schedule, Sound Transit will make a final lump-sum payment, including the $500,000 withholding amount, for any remaining matching contribution amount for the contract component up to the maximum funding contribution, within 30 days of notice from the City that the respective contract component is substantially complete and open to the public, and the City submits a request for the final payment. In addition, notwithstanding any cost overruns, Sound Transit is only obligated to pay up to its maximum funding contribution for the Bridge and Non-Motorized Access Improvements, respectively.

5.4. Invoicing. All invoices, required reports, and documentation shall be submitted to: Sound Transit's Accounts Payable (accountspayable@soundtransit.org). Invoices shall bear the name and address of

the Party's representative designated in Section 13.4, purchase order number (if applicable), and reference to this Agreement. Invoices shall be signed by an authorized representative of the City, who shall verify that the invoice is accurate, that the services have been purchased or the work has been performed, and that the costs shown have been incurred in accordance with this Agreement. Invoices shall be properly completed and accompanied with documentation as reasonably required by Sound Transit. Sound Transit shall pay within 30 days of receipt of a complete invoice with appropriate documentation.

6. Schedule and Milestones.

6.1. Implementation Schedule. The City and Sound Transit acknowledge that timely completion of the Northgate Access Projects is critical to realizing integrated access modes serving Northgate Station. The City and Sound Transit will make reasonable efforts to comply with the implementation schedule milestones identified in Exhibit E, unless otherwise agreed in writing by the Parties.

6.2. Completion of Northgate Access Projects. The City will make best efforts to open the Northgate Access Projects for public use by the start of light rail revenue service at the Northgate Station, or December 31, 2021, whichever is later.

6.3. Non-interference with Operation of New Northgate Station. To avoid interference with transit operations at the new Northgate Station, the City will complete all construction and/or restoration activities related to the Northgate Access Projects in the areas identified in Exhibit F by September 1, 2021 or one month prior to the start of light rail revenue service at the Northgate Station, whichever is later. The City will complete construction of the Bridge spur connection to the light rail station mezzanine by September 1, 2021 or one month prior to the start of light rail revenue service at the Northgate Station, whichever is later.

6.4. Construction Coordination. Within 60 days of the full Notice to Proceed for the Bridge and 1st Ave NE Bike Facility construction contract, the City will

make reasonable efforts to develop a construction phasing plan that takes into account key construction and revenue service milestones for Northgate Station, Elevated Guideway, and Parking Garage and Lynnwood Link Extension during its construction of the Northgate Access Projects. The phasing plan is to be a coordinated effort between the Parties to avoid conflicts during construction and transit operations and identify workable solutions to minimize disruption to both Parties' construction and operations.

7. Right of Way Acquisition, Access, Ownership and Maintenance

7.1. Costs in Excess of Sound Transit Funding Obligation. The City will operate and maintain the Bridge and the Other Non-Motorized Access Improvements at its own expense, including but not limited to utilities, cleaning, security, and major and minor repairs. Sound Transit will operate and maintain the Northgate Station at its own expense, including but not limited to utilities, cleaning, security, and major and minor repairs.

7.2. WSDOT Right of Way. The City must obtain the necessary property rights from the Washington State Department of Transportation ("WSDOT") for air rights over Interstate 5 and from any other property owners, to allow for the Bridge's construction and placement.

7.3. Sound Transit Access. For the useful life of the completed Bridge, Sound Transit and its transit users shall have the right to use the Bridge jointly and in common with the general public. The City acknowledges that Sound Transit's contribution to the design and construction of the Bridge is sufficient consideration for its use, and no additional compensation or charge shall be due from Sound Transit.

7.4. Acknowledgement of Funding. The City will ensure acknowledgement of Sound Transit funds for the Northgate Access Projects is noted in any Project advertisements and postings related to the Project. The graphic identity of the facilities and collateral and web-based materials will incorporate both the City's logo and the Sound Transit logo and identity.

7.5. Ownership and Use of Facilities. The City will own the Project facilities and operate and maintain the Project facilities for their useful life.

7.6. Survival of this Section. The terms and responsibilities of the Parties under this Section 7 will survive termination of this Agreement.

8. Dispute Resolution

8.1. Sound Transit and the City will confer to resolve disputes that arise under this Agreement as requested by either Party. The individuals identified in Section 13.4 are the Designated Representatives of the Parties for the purpose of resolving disputes that arise under this Agreement.

8.2. Level One – Sound Transit's Designated Representative and the City's Designated Representative will meet to discuss and attempt to resolve the dispute in a timely manner. If they cannot resolve the dispute within fourteen days, either Party may refer the dispute to Level Two.

8.3. Level Two – The Executive Director of Design Engineering and Construction Management of Sound Transit and the Director of the City's Department of Transportation, or their designees, will confer and resolve the dispute. If they cannot resolve the dispute within fourteen days, either Party may refer the dispute to Level Three.

8.4. Level Three – Sound Transit's Chief Executive Officer and the City Mayor, or their designees, will meet to discuss and attempt to resolve the dispute in a timely manner.

8.5. Neither Party may seek relief in a court of law until and unless the Dispute Resolution process has been exhausted.

8.6. At all times prior to resolution of the dispute, the Parties will continue to perform any undisputed obligations and make any undisputed required payments under this Agreement in the same manner and under the same terms as existed prior to the dispute.

9. Termination of the Agreement

9.1. Termination if Project Deemed Too Expensive. If accepting the lowest responsive responsible bid(s), or the Maximum Allowable Construction Cost ("MACC") for any Project work obtained by the City would commit the City to pay more than the funds available to the City for the Project work, the bids or the MACC may be rejected. In the event the Bridge and 1st Project exceeds the City's Project budget and the City gives notice to Sound Transit that it will not proceed with construction, either Party may terminate the portion of this Agreement that relates to funding the Bridge after eighteen months from the date that such notice has been delivered to Sound Transit. Sound Transit will not make cash contributions to Projects that do not proceed to construction.

9.2. Survival of this Section. The terms and responsibilities of the Parties under this Section 9 will survive termination of this Agreement.

10. Intentionally Deleted.

11. Audit. The City agrees to cooperate fully with Sound Transit's auditor or an independent auditor chosen, retained, and paid by Sound Transit to audit costs incurred in design, construction, operation and maintenance of the Projects. If the audit determines that Sound Transit has paid the City in excess of the amounts agreed to under this Agreement, the excess amount will be repaid to Sound Transit within thirty days of the audit determination plus interest of 5 percent per annum. If the City disagrees with the audit determination, then the City may invoke the dispute resolution process in this Agreement. If the audit determines that Sound Transit has not paid the amount due under Section 5 of this Agreement and the City has incurred costs for the Work that exceeds payment made by Sound Transit, then Sound Transit shall pay City the amount owed plus interest of 5 percent per annum.

12. General Provisions.

12.1. No Agency or Employee Relationship. No joint venture or partnership is formed as a result of this Agreement. No employees, agents or subcontractors of one Party shall be deemed, or represent themselves to be, employees of any other

Party. In performing work and services pursuant to this Agreement, neither Party, its employees, consultants, agents, and representatives shall be acting as agents of the other Party and shall not be deemed or construed to be employees or agents of the other Party in any manner whatsoever. Neither Party shall hold itself out as, or claim to be, an officer or employee of the other Party and will not make any claim, demand, or application to or for any right or privilege applicable to an officer or employee of the other Party. Each Party shall be solely responsible for any claims for wages or compensation by their employees, consultants, agents, and representatives, including sub-consultants, or any agency, and shall defend, indemnify and hold the other Party harmless therefrom.

12.2. Indemnity.

12.2.1. Generally. To extent permitted by law, including RCW 35.32A.090, each Party to this Agreement shall protect, defend, indemnify, and save harmless the other Party, its officers, officials, employees, and agents, while acting within the scope of their employment as such, from any and all costs, claims, judgment, and/or awards of damages, arising out of, or in any way resulting from the first Party's negligent or grossly negligent acts or omissions or its intentional misconduct or that of its officers, officials, employees or agents. Neither Party will be required to indemnify, defend, or save harmless the other Party if the claim, suit, or action for injuries, death, or damages is caused by the sole negligence of the other Party. Where such claims, suits, or actions result from concurrent negligence of the Parties, the indemnity provisions provided herein shall be valid and enforceable only to the extent of the Party's own negligence. Each Party agrees that its obligations under this subparagraph extend to any claim, demand, and/or cause of action brought by, or on behalf of, any of its employees or agents. For this purpose, each Party, by mutual negotiation, hereby waives, with respect to the other Party only, any immunity that would otherwise be available against such claims under the Industrial Insurance provisions of Title 51 RCW. Sound Transit's design review of City plans does not

impose a duty upon Sound Transit to correctly identify errors or omissions present in the City plans. Each party shall be responsible for its own attorney's fees in any dispute relating to this Agreement.

12.2.2. Taxes. Taxes, including taxes relating to Sound Transit's reimbursement of the City's cost, are a reimbursable cost under this Agreement subject to Sound Transit's funding limitations in Section 5.

12.2.3. Survival. The indemnification responsibilities provided in this section will survive the termination of this Agreement.

13. Miscellaneous

13.1. Entire Agreement. This Agreement and the attached exhibits constitute the entire agreement and understanding between City and Sound Transit relating to the Project. There are no restrictions, promises, representations, warranties, covenants or undertakings, oral or otherwise, except those expressly set forth or referenced in this Agreement.

13.2. Amendments. Waivers, modifications, additions, or amendments to this Agreement must be in writing and signed by the authorized representatives of each Party. Except for amending Exhibits B and D, the City may not waive, modify, add to, or amend this Agreement without City Council approval by resolution or ordinance.

13.3. Severability. In the event that any term, covenant, condition, or provision of this Agreement, or the application of the Agreement to any person or circumstance, is found to be invalid or unenforceable in any respect, the remainder of this Agreement, and the application of such term or provision to other persons or circumstances nevertheless will be binding with the same effect as if the invalid or unenforceable provision were originally deleted. The Parties agree to bargain in good faith to reform this Agreement or replace any invalid or unenforceable provision with a valid and enforceable provision that comes as close as possible to the intention of the invalid or unenforceable provision.

13.4. Designated Representatives. Each Party designates the following persons as their representatives (the "Designated Representatives") who shall be

responsible for coordination of communication between the Parties and shall act as the point of contact for each Party. The Designated Representatives shall communicate regularly as to discuss the status of the tasks to be performed, identify upcoming decisions and any information or input necessary to inform those decisions, and resolve any issues or disputes related to the Northgate Access Projects. The Designated Representatives are:

SOUND TRANSIT:	CITY OF SEATTLE:
Kristin Hoffman	Eric Strauch
Senior Project Manager	Project Manager
Sound Transit	City of Seattle
401 S. Jackson Street	700 5th Ave, Suite 3800
Seattle, WA 98104	Seattle, WA 98124
(206) 903-7401	(206) 233-7208
kristin.hoffman@soundtransit.org	Eric.Strauch@seattle.gov

Each Designated Representative is also responsible for coordinating the input and work of its agency, consultants, and staff as it relates to the objectives of this Agreement. The Parties may change their Designated Representative by written notice to the other Party during the term of this Agreement.

13.5. Notices. Except as otherwise expressly provided in this Agreement, all requests, notices, demands, authorizations, directions, consents, waivers or other communications required or permitted under this Agreement shall be in writing and shall be either: (i) delivered in person, (ii) deposited postage prepaid in the certified mails of the United States, return receipt requested, (iii) delivered by a nationally recognized overnight or same-day courier service that obtains receipts, or (iv) delivered electronically to the other Party's Designated Representative. However, notice under Section 9, Termination of the Agreement, must be delivered in person or by certified mail, return receipt requested.

13.6. Rights and Remedies. The duties and obligations imposed by this Agreement and the rights and remedies available hereunder are in addition to and not a limitation of or waiver regarding any duties, obligations, rights, and

remedies otherwise available by law. Waiver by either Party of any default will not affect or impair any right arising from any subsequent default. The failure of either Party to insist at any time upon the strict observance or performance of any of the provisions of this Agreement or to exercise any right or remedy provided for in this Agreement shall not impair any such right or remedy nor be construed as a waiver or relinquishment thereof.

13.7. Choice of Forum. In the event that either Party deems it necessary to institute legal action or proceedings to enforce any right or obligation under this Agreement, the Parties agree that any such action or proceedings will be brought in a court of competent jurisdiction in King County, Washington.

13.8. Transfer/Assignment. Neither Party may assign any interest, obligation, or benefit in this Agreement or transfer any interest in the same, whether by assignment or novation, without prior written consent by the other Party. This Agreement is binding upon, and inures to the benefit of, the Parties and their respective permitted successors and assigns.

13.9. Benefits. This Agreement is intended for the sole benefit of the Parties to this Agreement. Nothing in this Agreement is intended to give any person or entity, other than the Parties any legal or equitable right, remedy, or claim under this Agreement.

13.10. Preparation. The Parties and their legal counsel have cooperated in the drafting of this Agreement. Accordingly, the Parties intend that this Agreement is the joint work product of the Parties. The Parties do not intend for any provision of this Agreement to be construed against a Party on the basis of authorship.

13.11. Counterparts. This Agreement may be simultaneously executed in duplicate counterparts, each of which will be deemed to be an original, and such counterparts together shall constitute one and the same instrument.

13.12. Authority. The persons signing this Agreement warrant that they have the respective power and authority to sign this Agreement on behalf of their city or regional transit authority, respectively.

13.13. City Council Approval. This Agreement is subject to City Council approval.

14. Term of Agreement. The term of this Agreement is from the last date written below and, unless it is otherwise terminated in accordance with the provisions of this Agreement, until the Northgate Access Projects are open for public use and Sound Transit has made all cash payments owed to the City under this Agreement.

15. Survival. Section 11 and Subsection 12.2 will survive termination of this Agreement.

The authorized representatives of Sound Transit and City are signing this Agreement and the effective date shall be the last date written below.

CENTRAL PUGET SOUND REGIONAL TRANSIT AUTHORITY	CITY OF SEATTLE
Signed: _____	Signed: _____
Title: _____	Title: _____
Dated: _____	Dated: _____

Approved to form

Legal Counsel:

_____

Dated: _____

Exhibit A

Northgate Pedestrian and Bicycle Bridge

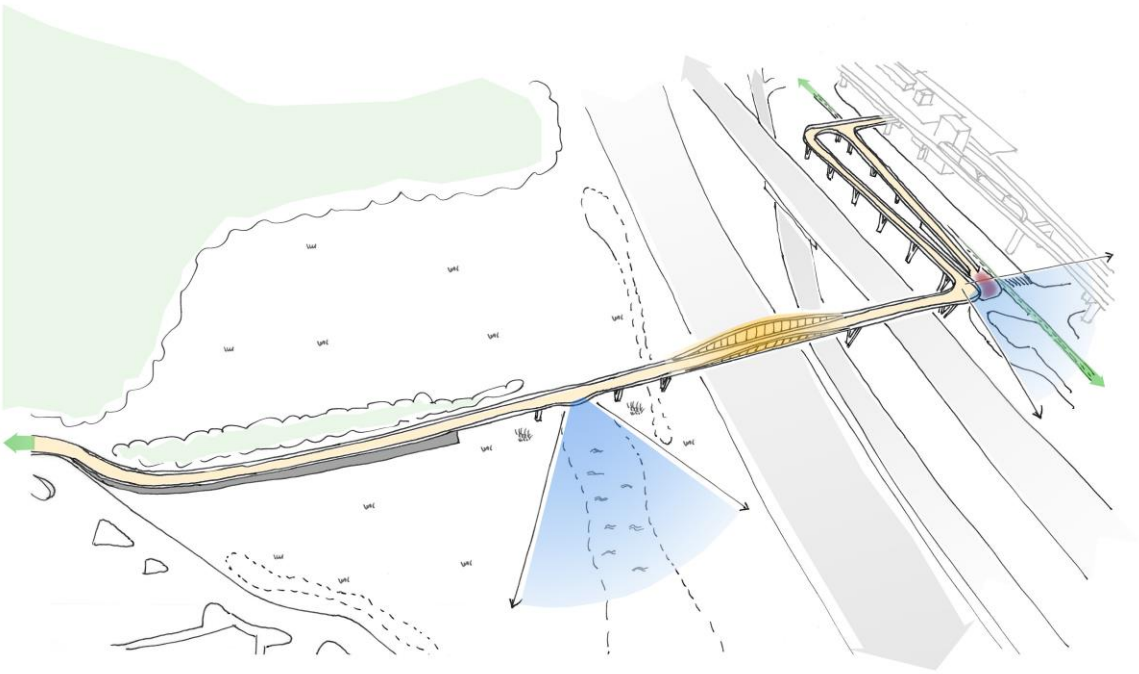


Exhibit B

Bridge and Other Non-Motorized Access Improvements

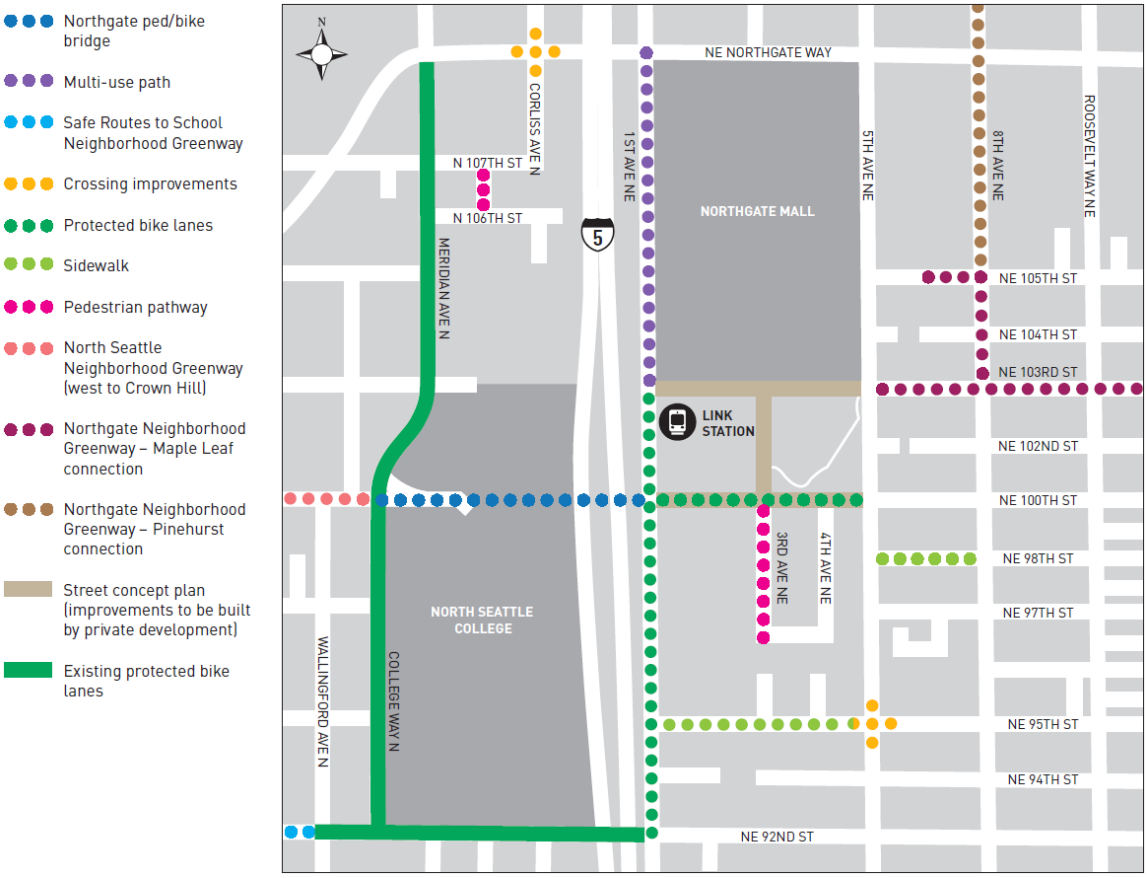


Exhibit C

City of Seattle Funding Certification Letter

City of Seattle
Edward B. Murray, Mayor

Department of Transportation
Scott Kubly, Director

January 13, 2016

Sound Transit
Attention Ahmad Fazel
Union Station
401 S. Jackson St.
Seattle, WA 98104

RE: Northgate Bridge Funding

Dear Mr. Fazel:

This letter confirms that Seattle has matching funds of $5 million for the Northgate Bicycle and Pedestrian Bridge and $5 million for other bicycle and pedestrian improvements in the station area as committed by Resolution 31389. Monies are available to fund these projects and Seattle has initiated design of the bridge and the 1st Avenue protected bike lane and will be initiating design of additional bicycle and pedestrian projects in 2016.

With the passage of the Levy to Move Seattle, the bridge is now fully funded and continues to move forward through final design. With this project being fully funded, the commitment satisfies the City's obligation to Sound Transit by having the bridge fully funded by February 1, 2016 (ST Motion M2015-26). We appreciate the continuing coordination and partnership with Sound Transit that has furthered this design of this station amenity and community catalyst project.

We also acknowledge that this funding obligation by Sound Transit will terminate upon the opening of Northgate Station or no later than September 30, 2021. Should the station opening extend past September 30, 2021, we would request that the funding obligation be extended concurrently.

Please contact me or our staff contact Michael James with any question or updates regarding the funding or schedule impacts of delivering the Northgate Station and related projects.

Sincerely,

Scott Kubly
Director, Department of Transportation

City of Seattle

CC: Fred Wilhelm, Sound Transit

Seattle Municipal Tower
700 5th Avenue
Suite 3800
PO Box 34996
Seattle, Washington 98124-4996

Tel (206) 684-ROAD / (206) 684-5000
Fax: (206) 684-5180
Hearing Impaired use the Washington Relay Service (7-1-1)
www.seattle.gov/transportation

Exhibit D

Sound Transit Design and Construction Costs Incurred Through August 30, 2017

Overview of costs incurred to date to accomodate Northgate Access Projects - Design and Construction	Design Cost	Construction cost estimate
1st Ave NE Bike Facility		
Bicycle Lane Study (SIP) Work included conceptual design options for the SDOT Bike Facility and methods for the elevated guideway and the civil work to accommodate the bike lanes and required barriers and clear distances. Design work includes coordination meetings with SDOT and ST to review. Construction costs include the cantilevered portion of the N125 MLP Retained structure that was redesigned to make space for bike facility.	$ 34,811	$ 28,310
N160 Elevated Guideway Design ST directed the design team to modify column location and add two straddle bents to accommodate cycle track and multi use track. Work included design cost to recalculate the N160 Guideway. Construction Costs included modification of A6 and A7 single T bent to double column straddle bents and modifications to B7 and B8. These modifications included minor changes to the column location to avoid existing vaults and to accommodate the bike path.	$ 100,632	$ 1,898,659
Ped Access NE 100th St Design and construction to accommodate sidewalk on west side of 1 Ave NE. Construction costs for the ADA curb and sidewalk treatments. Construction cost for pedestrian access improvements within the Park and Ride Lot, the 1 Ave NE crossing	$ 81,247	$ 16,096

Overview of costs incurred to date to accomodate Northgate Access Projects - Design and Construction	Design Cost	Construction cost estimate	
N160 90% design work - Cycle-track SPU Request - Develop design solution which accommodates the future SDOT Cycle Track adjacent to both the Jurisdictional Ditch and S Watercourse. Work includes design studies which pipe a portion of the ditch to accommodate water flow and allow the future SDOT Cycle Track to placed adjacent to the ditch and Street ROW.	$ 84,130	$ 306,187	
N160 100% Design - Site Restoration for Cycle-track ST Request - Modify Sidewalk and Shoulder Restoration at 1 Ave NE, NE 103 St to NE 105th St; east side to accommodate the SDOT Bike facility widths and sidewalk pavement requirements. The following construction costs can be attributed to construction of pedestrian elements 1. Cost delta between current 60% restoration plans, and modifications to incorporate the sidewalk and paving sections		$ 80,037	
1st Ave Channelization Work developed lane channelization option for review with SDOT and KCM. Work focused on 1 Ave NE, between NE 100 and 103 St. Options provided channelization which accommodated the cycle track, turning movements and KCM bus lanes. 100% design cost	$ 2,978		
Wetland restoration - PBL		$ 74,807	
ST administrative costs - 10%	$ 30,380	$ 240,410	
Sub-total (1st Ave NE Bike Facility)	$ 334,177	$ 2,644,506	$ 2,978,684

Overview of costs incurred to date to accomodate Northgate Access Projects - Design and Construction	Design Cost	Construction cost estimate	
I-5 Pedestrian Bridge Improvements			
Mezzanine Level Changes Work modified the original scope to incorporate a mezzanine level within the station design. The mezzanine allows for a more open surface level and allows for a direct, overhead pedestrian crossing above 1 Ave NE. Assumed 10% of mezzanine construction cost attributable to pedestrian bridge.	$ 119,718	$ 143,667	
** **Ped Bridge Foundation** PCR will design and document a foundation or column shaft within the N160 Plaza. Intent is to include this work within the N160 Contract to provide a foundation ahead of station plaza finishes. This is to minimize disruption on the plaza level. Construction cost would a drilled shaft casing, with partial shaft installed with reinforcing steel exposed	$ 20,000	$ 338,561	
ST administrative costs - 10%	$ 13,972	$ 48,223	
Sub-total (Bridge)	$ 153,690	$ 530,451	$ 684,141
Total ST costs incurred to date to date	$ 487,867	$ 3,174,957	$ 3,662,824
Potential credits for Other Non-Motorized Access Projects projects per M2012-42			
Total Design and Construction 1st Ave NE Bike Facility			$ 2,978,684
ST Credit (costs exceeding $1M)			$ 1,978,684
ST contribution less credit			$ 3,021,316
Potential credits for I-5 Ped Bridge per M2012-42			
Total Design and Construction I-5 Ped Bridge			$ 684,141
ST contribution less credit			$ 4,315,859

Exhibit E

Milestone Schedule

Sound Transit Northgate Station milestones:

1. 4Q2018 – Complete Parking garage
2. 1Q2020 – N160 Northgate Station, Elevated Guideway and Parking Garage contract substantial completion
3. 3Q2021 – Northgate Link begins revenue service

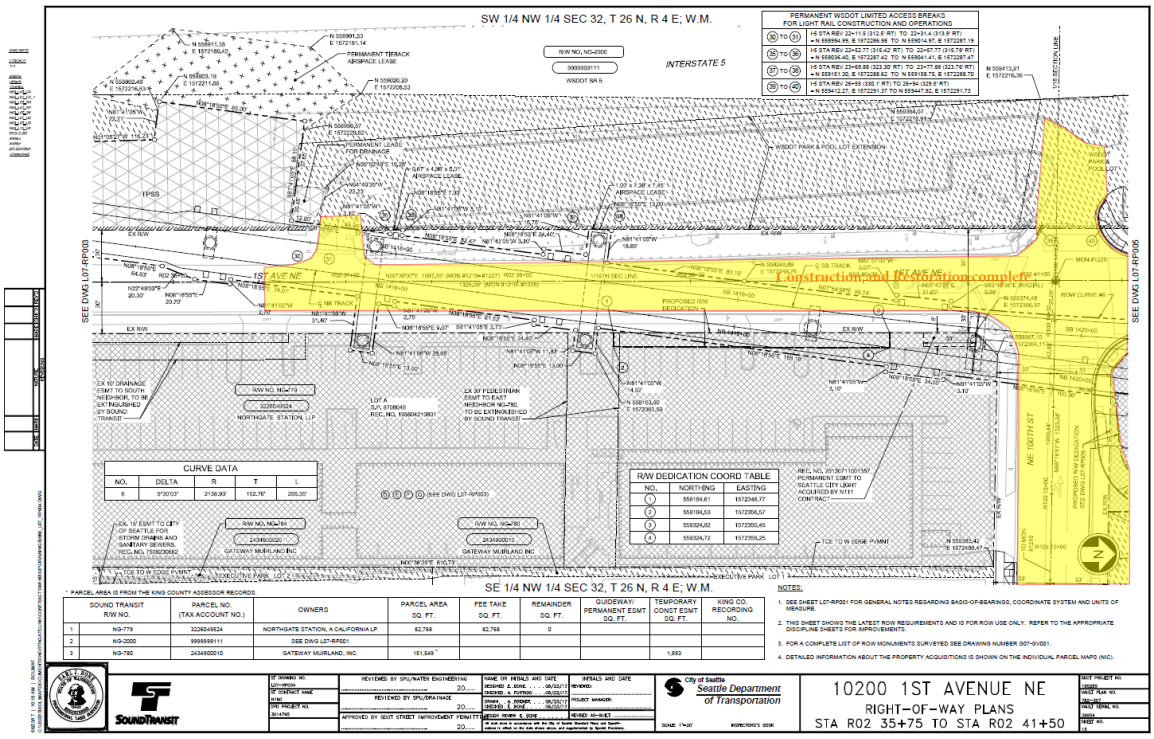
City milestones for the Bridge:

1. 1Q2019 – Complete final Bridge design
2. 3Q2019 – Award construction contract
3. 3Q2020 – Complete 50% construction of Bridge
4. 3Q2021 – Bridge construction complete, open for public use

City milestones for the Other Non-Motorized Improvements:

1. 3Q2021 – Construction complete

Exhibit F



A larger, more legible copy is on file with each of the Designated Representatives

Exhibit G

$$\frac{CI + CO + STI}{2} - STI = ST\$ \leq \$5M - STI$$

Key

CI	*City in-house costs*
CO	*City contractor costs*
STI	*ST in-house and contractor costs (subject to max credits described in Section 5.2.1)*
ST$	*ST cash contribution*

Example:

For Other Non-Motorized Improvements, if the City spends $8M (in-house and contractor), and Sound Transit spends $2M (max credit), then the formula would be:
($8M + $2M)/2 = $5M minus $2M = $3M cash reimbursement to the City.

SUMMARY and FISCAL NOTE*

Department:	Dept. Contact/Phone:	CBO Contact/Phone:
Seattle Dept of Transportation	Bill LaBorde/206.484.8662	Aaron Blumenthal/206.233.2656

** Note that the Summary and Fiscal Note describes the version of the bill or resolution as introduced; final legislation including amendments may not be fully described.*

1. BILL SUMMARY

Legislation Title: AN ORDINANCE relating to the Central Puget Sound Regional Transit Authority (Sound Transit); authorizing execution of a Funding and Cooperative Agreement For Northgate Station Area Access Improvements Agreement between Sound Transit and The City of Seattle; and ratifying and confirming certain prior acts.

Summary and background of the Legislation:

1. Agreement purpose
    - This agreement relates back to 2012 commitments and subsequent ST Board motions, along with Council Resolution 31389, passed June 2012. The agreement affirms roles and responsibilities for ST and the City with regard to designing and constructing certain listed access projects (Exhibit B), as well as clarifying caps on funding contributions from ST.
    - Newly specified elements include schedules for project delivery, payment schedules and solidifying how previous design work on the projects are allocated against ST's match commitment.
2. Identified access projects
    - Exhibit B is a map showing the location and type of access projects resulting from the agreed upon Station Access study, completed by Sound Transit in 2014, including the ped/bike bridge across I-5, 1st Ave NE PBL, completion of missing sidewalk segments, a Safe Routes to School project and pedestrian crossing improvements. Some of these projects have already been completed, while others are anticipated to be completed between now and time the Station opens in 2021.
3. Project Development/Construction Management
    - Assigns City risk for environmental mitigation and hazardous waste removal for access projects, subject to City's budget process. This is not considered a major factor beyond wetland issues already incorporated into cost of the ped/bike bridge
    - Environmental review: City is established as lead agency for SEPA review of access projects (environmental analysis for the bridge is complete); ST agrees to cooperate.
    - City will host agency design coordination meetings (already ongoing);
    - City will grant ST staff opportunity to review project design (standard practice for interagency projects)
    - ADA compliance required
4. Funding
    - Caps ST funding at $10 million , as anticipated in the 2012 commitments
    - Allows ST to credit costs for design and construction already completed to their match (see Exhibit D, which identifies qualified credits that reduce the balance of the remaining $10 million commitment to $7.3 million). The 2020-2025 Adopted CIP assumes the remaining $7.3 million in Sound Transit Funding.

- ST commits to amend its construction air rights agreement with WSDOT and US Army Corps permits to allow City to construct projects
- Establishes invoicing protocols and schedules for payment of ST contributions to City

5. Schedules and Milestones
    - Parties agree to coordinate on construction management and cooperate to get the projects completed in time for station opening in 2021 to extent possible without getting in ST's way in meeting its own schedule milestones (see Exhibit E)
6. ROW and access, ownership and maintenance responsibilities
    - Establishes that ST is responsible for O&M for station and City for O&M of bridge and other ped/bike access facilities
    - City required to seek authority from WSDOT to construct bridge over I-5
    - City and ST will co-brand construction postings and advertisements
7. Other terms
    - Standard ST/COS dispute resolution escalation procedures laid out
    - City reserves right to cancel bridge project if GC bids exceed engineers cost estimates
    - 10-13. General provisions: Cooperation with ST audit procedures, PM contacts for notices, severability, choice of dispute forum
    - 12 and 15. Indemnification terms are standard for interagency agreements – each party indemnifies the other to the extent permitted by law, except when one party is determined to be solely negligent, or responsible under state law for workers comp covered injuries
    - 14. Termination upon station opening and ST making final payments, except for indemnification and financial audit provisions

2. CAPITAL IMPROVEMENT PROGRAM

Does this legislation create, fund, or amend a CIP Project? _ _ Yes __x__ No

3. SUMMARY OF FINANCIAL IMPLICATIONS

Does this legislation amend the Adopted Budget? ___ Yes __x__No

Does the legislation have other financial impacts to the City of Seattle that are not reflected in the above, including direct or indirect, short-term or long-term costs?
No

Is there financial cost or other impacts of *not* implementing the legislation?
Yes, without approval of the underlying agreement, the City would not be able to receive the remaining balance of $10 million in station access commitments made by Sound Transit in 2012 – approximately $7.3 million, as reflected in the 2020-2025 Adopted CIP.

4. OTHER IMPLICATIONS

a. Does this legislation affect any departments besides the originating department?
No

b. Is a public hearing required for this legislation?
No

c. Does this legislation require landlords or sellers of real property to provide information regarding the property to a buyer or tenant?
No

d. Is publication of notice with *The Daily Journal of Commerce* and/or *The Seattle Times* required for this legislation?
No

e. Does this legislation affect a piece of property?
Yes, see maps on Exhibits A and B of the Agreement (Att A)

f. Please describe any perceived implication for the principles of the Race and Social Justice Initiative. Does this legislation impact vulnerable or historically disadvantaged communities? What is the Language Access plan for any communications to the public?
These station access projects, especially the Northgate Pedestrian and Bicycle Bridge, will greatly expand affordable, non-motorized access to the Northgate Link Light Rail station area, including to more affordable areas to the north of the station and west of I-5 with relatively high concentrations of people; as well as to North Seattle College, which provides several affordable academic, workforce development and job training programs for students from around the region.

g. If this legislation includes a new initiative or a major programmatic expansion: What are the specific long-term and measurable goal(s) of the program? How will this legislation help achieve the program's desired goal(s).
N/A

List attachments/exhibits below:

Northgate Station Access-
Sound Transit Funding and Cooperative Agreement

Sustainability and Transportation Committee
Eric Strauch /
02/19/2020

City of Seattle

SDOT vision, mission, and values

Vision: Seattle is a thriving, equitable community powered by dependable transportation.

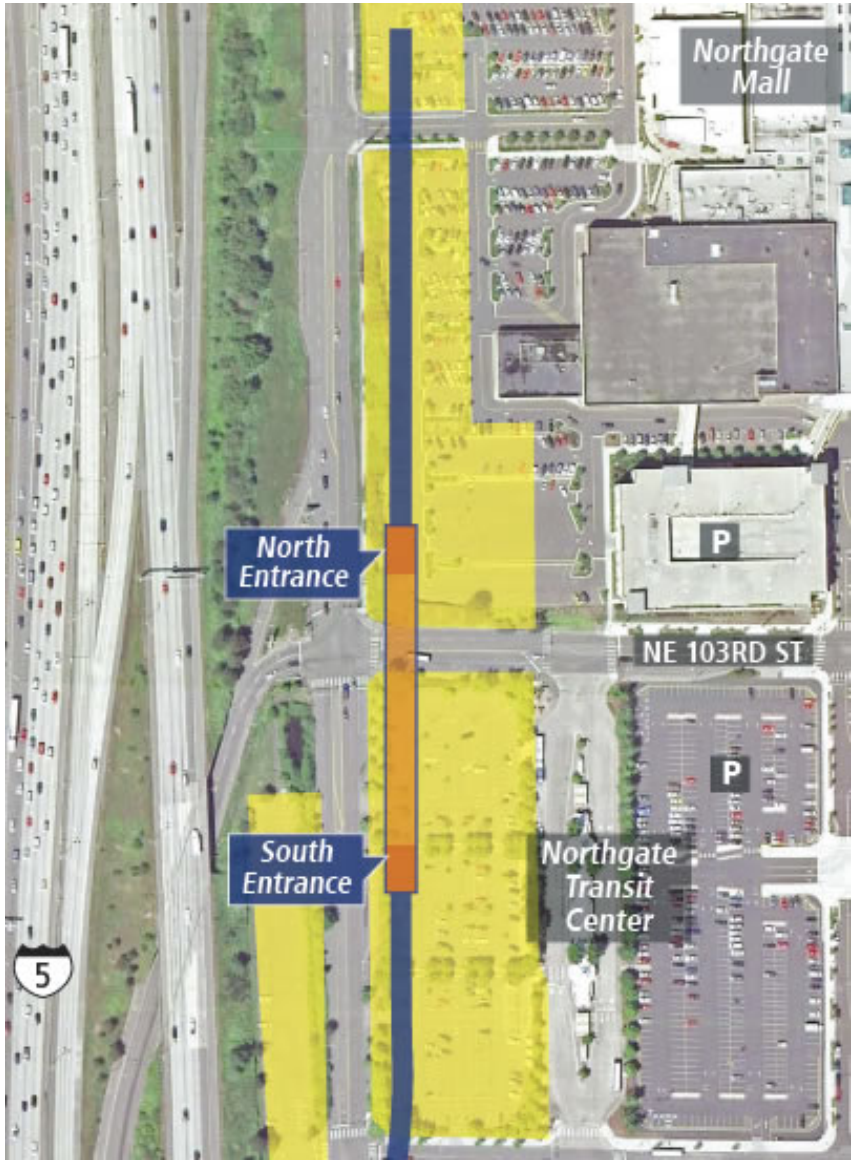
Mission: Our mission is to deliver a transportation system that provides safe and affordable access to places and opportunities.

Committed to 6 **core values:**

- Equity
- Safety
- Mobility
- Sustainability
- Livability
- Excellence

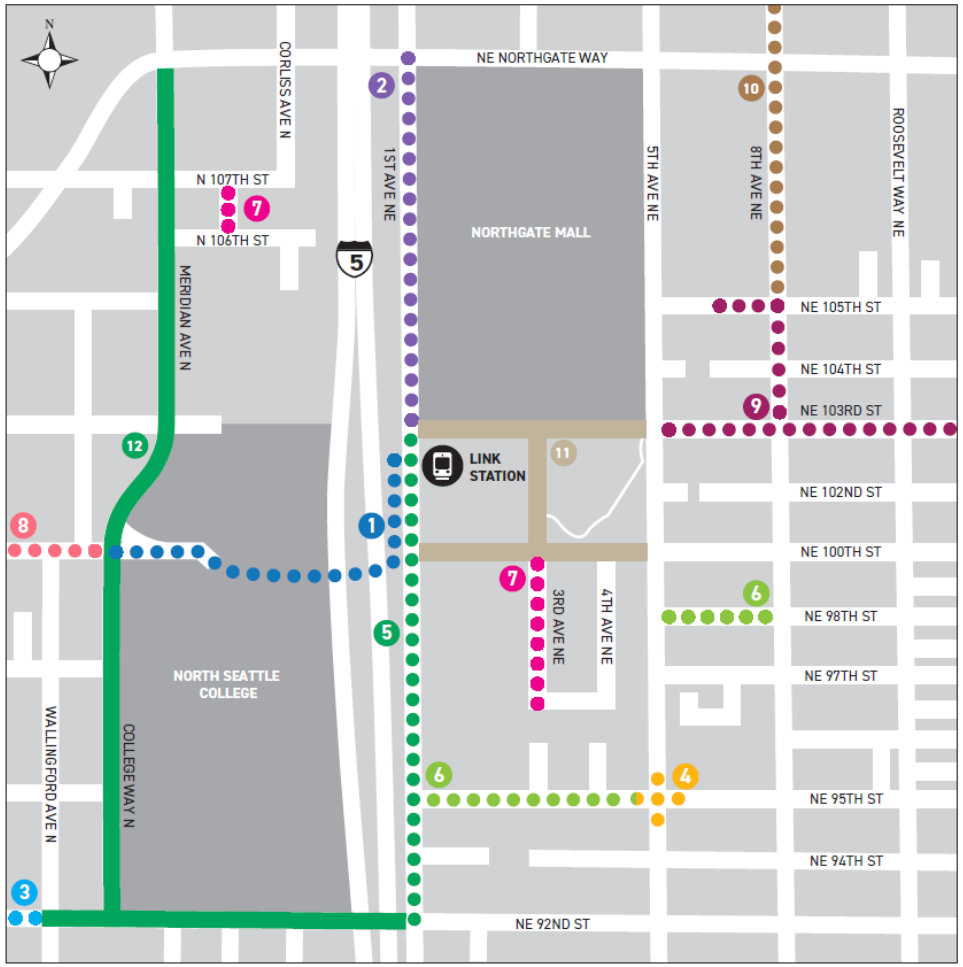
Background

- 2012: Sound Transit, King Co Metro and City agree on Northgate Station Access strategy
  - Cost sharing with KCM and limitations on new parking capacity
  - ST agreed to provide up to $10M in matching funds to City for non-motorized access projects, including Ped Bridge
  - Memorialized in Council Resolution 31389;
  - Sound Transit Board Motion 2012-42
- City secured matching funds following voter approval of Levy to Move Seattle, Nov 2015
- ST has incurred approx. $3.6M to date on ped bridge foundation at Station and 1st Ave NE sidewalks and bike facility

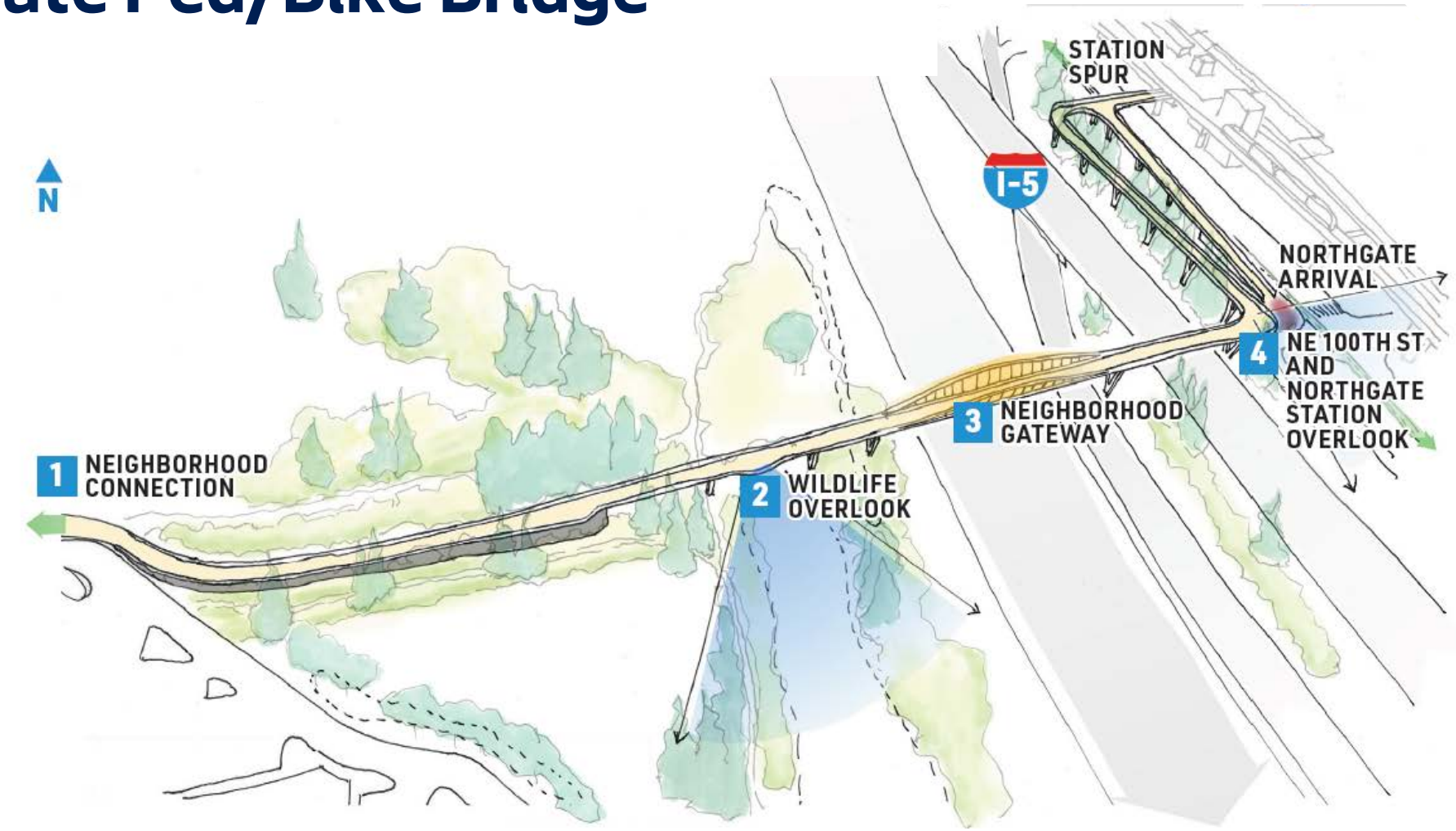


Northgate Non-motorized access projects

1. Northgate Ped/Bike Bridge
2. Multi-use path
3. Safe Routes to School Neighborhood Greenway
4. Crossing improvements
5. Protected bike lane
6. Sidewalk
7. Pedestrian pathway
8. North Seattle Neighborhood Greenway (west to Crown Hill)
9. Northgate Neighborhood Greenway – Maple Leaf connection
10. Northgate Neighborhood Greenway – Pinehurst connection
11. Street concept plan (future improvements to be completed by private development)
12. Existing protected bike lane



Northgate Ped/Bike Bridge



Proposed Agreement with Sound Transit

- Effectuates 2012 agreements
  - Affirms ST and City roles and responsibilities for design, permitting and construction of different access projects
  - Affirms STs $10 million contribution to access projects, including credits to ST for past work on Station bridge landing and 1st Ave NE ped/bike improvements

Proposed Agreement with Sound Transit

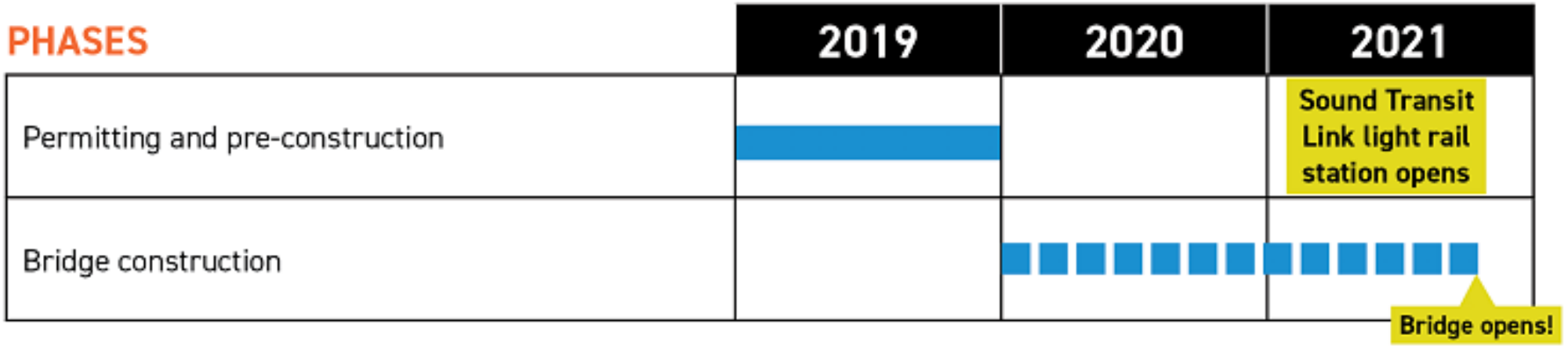
- Access projects (Exhibit B)
  - Final project list and schedules for completion
  - City as lead agency for environmental review
  - ST has right to review design and permitting documents
  - Grants construction access for Ped Bridge and other City projects and commits both parties to coordinate on construction management
  - City required to establish air rights agreement with WSDOT and Army Corps permits
  - City/ST co-branding on construction postings and advertisements

Proposed Agreement with Sound Transit

- Finance provisions
  - Procedures for invoicing and reimbursement by ST
  - Affirms ST Station asset ownership and O&M responsibility; City will own, operate and maintain access facilities
  - Standard Indemnification provisions
  - City can cancel projects that exceed engineer's cost estimates

Ped/Bike Bridge Schedule

SCHEDULE



Questions?

Eric.Strauch@seattle.gov | (206) 233-7208

www.seattle.gov/transportation

File #: CB 119743, **Version:** 1

CITY OF SEATTLE

ORDINANCE _____

COUNCIL BILL _____

AN ORDINANCE relating to grant funds from non-City sources; authorizing the Director of Transportation to accept specified grants and execute related agreements for and on behalf of the City; amending Ordinance 126000, which adopted the 2020 Budget, including the 2020-2025 Capital Improvement Program (CIP); changing appropriations for the Seattle Department of Transportation; revising allocations and spending plans for certain projects in the 2020-2025 CIP; and ratifying and confirming certain prior acts.

WHEREAS, The City of Seattle was awarded funds from Sound Transit's System Access Fund for Judkins Park Station Access and the Henderson Street Staircase projects; and

WHEREAS, these grant funds require execution of agreements; and

WHEREAS, spending of these grants will begin in early 2020 to support project delivery in 2022, requiring immediate budget authority; NOW, THEREFORE,

BE IT ORDAINED BY THE CITY OF SEATTLE AS FOLLOWS:

Section 1. The Director of the Seattle Department of Transportation is authorized to accept the following non-City funding from the grantor listed below, and to execute, deliver, and perform agreements for the purposes described below. The funds, when received, shall be deposited in the receiving fund identified below to support, or as reimbursement for, the corresponding appropriations set forth in Section 2 of this ordinance.

Item	Fund	Grantor	Purpose	Amount
1.1	Transportation Fund (13000)	Sound Transit System Access Fund	Judkins Park Station Access	$2,400,000

1.2	Transportation Fund (13000)	Sound Transit System Access Fund	Henderson Street Staircase	$900,000
	Total			**$3,300,000**

Section 2. Contingent upon the execution of grant or other funding agreements and receipt of the grant funds authorized in Section 1 of this ordinance, appropriations in the 2020 Budget and project allocations in the 2020-2025 Adopted Capital Improvement Program for the following items are increased as follows:

Item	**Fund**	**Budget Summary Level**	**Additional Budget Appropriation**	**Project Name**	**2020 CIP Allocation (in $000s)**
2.1	Transportation Fund (13000)	Mobility-Capital (BC-TR-19003)	$3,300,000	PMP - New Sidewalk Program (MC-TR-C058)	(($~~$12,407~~)) $15,707
	Net Change		**$3,300,000**		**$3,300**

Section 3. The dollar amount shown or established in the 2020 spending plan column for the following projects in the 2020-2025 Adopted Capital Improvement Program is modified as follows:

Item	**Department**	**CIP Project Name**	**CIP Project ID Code**	**2020 Amount (in $000s)**
3.1	Seattle Department of Transportation	PMP - New Sidewalk Program	MC-TR-C058	$(($~~12,407~~)) $15,707

Section 4. The modifications to the 2020-2025 Adopted Capital Improvement Program for the above items are as reflected in Attachment A to this ordinance.

Section 5. Any act consistent with the authority of this ordinance taken after its passage and prior to its effective date is ratified and confirmed.

Section 6. This ordinance shall take effect and be in force 30 days after its approval by the Mayor, but if

not approved and returned by the Mayor within ten days after presentation, it shall take effect as provided by Seattle Municipal Code Section 1.04.020.

Passed by the City Council the _____ day of _____, 2020, and signed by me in open session in authentication of its passage this _____ day of _____, 2020.

_____

President _____ of the City Council

Approved by me this _____ day of _____, 2020.

_____

Jenny A. Durkan, Mayor

Filed by me this _____ day of _____, 2020.

_____

Monica Martinez Simmons, City Clerk

(Seal)

Attachments:
Attachment A - CIP Project Page - Pedestrian Master Plan - New Sidewalks

Pedestrian Master Plan - New Sidewalks

Project No:	MC-TR-C058	**BSL Code:**	BC-TR-19003
Project Type:	Ongoing	**BSL Name:**	Mobility-Capital
Project Category:	New Facility	**Location:**	Citywide
Current Project Stage:	N/A	**Council District:**	Multiple
Start/End Date:	N/A	**Neighborhood District:**	Multiple
Total Project Cost:	N/A	**Urban Village:**	Multiple

This project enhances the pedestrian environment in Seattle's neighborhoods by dedicating funding to construct new sidewalks. The New Sidewalk Program draws funding from the School Safety Traffic and Pedestrian Improvement (SSTPI) Fund and the Move Seattle Levy to improve sidewalks and the pedestrian environment near schools. Additional funding is drawn from other sources to pay for new sidewalk construction that are not in a Seattle Public School walk zone.

Resources	**LTD Actuals**	**2019 Revised**	**2020**	**2021**	**2022**	**2023**	**2024**	**2025**	**Total**
Commercial Parking Tax	551	1,918	231	-	-	-	-	-	2,700
Developer Mitigation	8	829	-	-	-	-	-	-	837
Drainage and Wastewater Rates	-	613	163	7	-	-	-	-	783
Federal Grant Funds	420	1,202	750	200	-	-	-	-	2,572
General Fund	775	-	-	-	-	-	-	-	775
Private Funding/Donations	-	-	-	600	-	-	-	-	600
Real Estate Excise Tax II	3,471	919	-	11	-	-	-	-	4,401
School Camera Ticket Revenues	4,661	459	4,376	577	1,989	1,505	360	2,842	16,767
State Gas Taxes - City Street Fund	73	-	-	-	-	-	-	-	73
State Grant Funds	504	1,608	-	-	-	-	-	-	2,112
Traffic Enforcement Camera Revenue	5,329	6,838	-	-	-	-	-	-	12,167
Transportation Move Seattle Levy - Lid Lift	14,432	7,390	6,886	5,491	2,247	4,651	333	-	41,431
Vehicle Licensing Fees	419	804	-	-	-	-	-	-	1,223
Sound Transit Funds	-	-	3,300	-	-	-	-	-	3,300
Total:	**30,642**	**22,582**	**~~((12,407))~~ 15,707**	**6,886**	**4,235**	**6,155**	**693**	**2,842**	**~~((86,441))~~ 89,741**

Fund Appropriations / Allocations[1]	**LTD Actuals**	**2019 Revised**	**2020**	**2021**	**2022**	**2023**	**2024**	**2025**	**Total**
General Fund	775	-	-	-	-	-	-	-	775
Move Seattle Levy Fund	14,432	7,390	6,886	5,491	2,247	4,651	333	-	41,431
REET II Capital Fund	3,471	919	-	11	-	-	-	-	4,401
School Safety Traffic and Pedestrian Improvement Fund	9,990	7,297	4,376	577	1,989	1,505	360	2,842	28,934
Transportation Benefit District Fund	419	804	-	-	-	-	-	-	1,223
Transportation Fund	1,555	6,171	~~((1,144))~~ 4,444	807	-	-	-	-	~~((9,677))~~ 12,977
Total:	**30,642**	**22,582**	**~~((12,407))~~ 15,707**	**6,886**	**4,235**	**6,155**	**693**	**2,842**	**~~((86,441))~~ 89,741**

Unsecured Funding:	**LTD Actuals**	**2019 Revised**	**2020**	**2021**	**2022**	**2023**	**2024**	**2025**	**Total**
To Be Determined	-	-	-	-	-	-	-	3,759	3,759
Total:	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**3,759**	**3,759**

Unsecured Funding Strategy: Funding for this program beyond 2024 is dependent upon a future voter approved levy.

[1]Funds are appropriated through the Adopted Budget at the Budget Summary Level. All Amounts shown above are in thousands of dollars

O&M Impacts: SDOT has individual project budgets for the maintenance of painted markings, signage, signals, bridges and roadway structures, urban forestry, and sidewalks and pavement; these budgets are constrained by the availability of transportation specific and general funds. The SDOT Asset Management website (https://www.seattle.gov/transportation/about-sdot/asset-management) provides unconstrained operational cost forecasting by asset type, typical lifecycle and average maintenance cost ranges.

[1]Funds are appropriated through the Adopted Budget at the Budget Summary Level. All Amounts shown above are in thousands of dollars

SUMMARY and FISCAL NOTE*

Department:	Dept. Contact/Phone:	CBO Contact/Phone:
SDOT	Chloe Wilkes/233-0043	Aaron Blumenthal/233-2656

** Note that the Summary and Fiscal Note describes the version of the bill or resolution as introduced; final legislation including amendments may not be fully described.*

1. BILL SUMMARY

Legislation Title: AN ORDINANCE relating to grant funds from non-City sources; authorizing the Director of Transportation to accept specified grants and execute related agreements for and on behalf of the City; amending Ordinance 126000, which adopted the 2020 Budget, including the 2020-2025 Capital Improvement Program (CIP); changing appropriations for the Seattle Department of Transportation; revising allocations and spending plans for certain projects in the 2020-2025 CIP; and ratifying and confirming certain prior acts.

Summary and background of the Legislation:
The City of Seattle was awarded funding from the Sound Transit System Access Fund in late 2019. This ordinance will accept those grants and enable SDOT to execute agreements with the funding agencies. The ordinance will also appropriate budget authority that is tied to the grant agreements.

The grants from Sound Transit include:

- Sound Transit System Access Fund
  - Judkins Park Station Access - $2,400,000 (Local match - $600,000)
- Sound Transit System Access Fund
  - Henderson Street Staircase - $900,000 (Local match - $100,000)

The grants will be used for design and construction. Design is intended to begin on the Judkins Park Station Access project in March 2020, with expectations that the project will be delivered in 2022.

2. CAPITAL IMPROVEMENT PROGRAM

Does this legislation create, fund, or amend a CIP Project? _X__ Yes ____ No

Project Name:	Project I.D.:	Project Location:	Start Date:	End Date:	Total Project Cost Through 2024:
PMP – New Sidewalks	MC-TR-C058	Judkins Park	This is an ongoing Capital Program		
PMP – New Sidewalks	MC-TR-C058	Henderson Street	This is an ongoing Capital Program		

3. SUMMARY OF FINANCIAL IMPLICATIONS

Does this legislation amend the Adopted Budget? _X__ Yes ____ No

	General Fund $		Other $	
Appropriation change ($):	**2020**	**2021**	**2020**	**2021**
			$3,300,000	
	Revenue to General Fund		**Revenue to Other Funds**	
Estimated revenue change ($):	**2020**	**2021**	**2020**	**2021**
			$3,300,000	
	No. of Positions		**Total FTE Change**	
Positions affected:	**2020**	**2021**	**2020**	**2021**

Does the legislation have other financial impacts to the City of Seattle that are not reflected in the above, including direct or indirect, short-term or long-term costs?
No.

Is there financial cost or other impacts of *not* implementing the legislation?
We would lose the ability to use the grant funding to leverage our local funding to implement important transportation improvements and meet Move Seattle levy developments.

3.a. Appropriations

__X__ This legislation adds, changes, or deletes appropriations.

Fund Name and number	Dept	Budget Control Level Name/#*	2020 Appropriation Change	2021 Estimated Appropriation Change
Transportation Fund (13000)	SDOT	Mobility-Capital (BC-TR-19003)	$3,300,000	
TOTAL			**$3,300,000**	

***See budget book to obtain the appropriate Budget Control Level for your department.*

Is this change one-time or ongoing?
One-time.

3.b. Revenues/Reimbursements

_X___ This legislation adds, changes, or deletes revenues or reimbursements.

Anticipated Revenue/Reimbursement Resulting from this Legislation:

Fund Name and Number	Dept	Revenue Source	2020 Revenue	2021 Estimated Revenue
Transportation Fund (13000)	SDOT	Sound Transit System Access Grants	$3,300,000	
TOTAL			**$3,300,000**	

Is this change one-time or ongoing?
One-time.

3.c. Positions

____ This legislation adds, changes, or deletes positions.

4. OTHER IMPLICATIONS

a. Does this legislation affect any departments besides the originating department?
Seattle Parks and Recreation will be providing work on trail lighting for the Judkins Park Station Access project.

b. Is a public hearing required for this legislation?
No.

c. Does this legislation require landlords or sellers of real property to provide information regarding the property to a buyer or tenant?
No.

d. Is publication of notice with *The Daily Journal of Commerce* and/or *The Seattle Times* required for this legislation?
No.

e. Does this legislation affect a piece of property?
The work should be completed within the public right-of-way. Construction could require temporary construction easements.

f. Please describe any perceived implication for the principles of the Race and Social Justice Initiative. Does this legislation impact vulnerable or historically disadvantaged communities? What is the Language Access plan for any communications to the public?
N/A

g. If this legislation includes a new initiative or a major programmatic expansion: What are the specific long-term and measurable goal(s) of the program? How will this legislation help achieve the program's desired goal(s).
N/A

List attachments/exhibits below:

SDOT Grant Acceptance Ordinance

2020 Stand-alone

Transportation and Utilities Council Committee
Chloe Wilkes, David Burgesser
2/19/2020 Department of Transportation

City of Seattle

Our vision, mission, and core values

Vision: Seattle is a thriving equitable community powered by dependable transportation

Mission: to deliver a transportation system that provides safe and affordable access to places and opportunities

Committed to **6 core values**:

- Equity
- Safety
- Mobility
- Sustainability
- Livability
- Excellence

Ordinance Summary

- Accepts recent & time sensitive grant awards ($3.3M)
  - Two grants from the Sound Transit Systems Access Fund
  - SDOT is one of the first recipients of this new funding source
  - From Sound Transit:

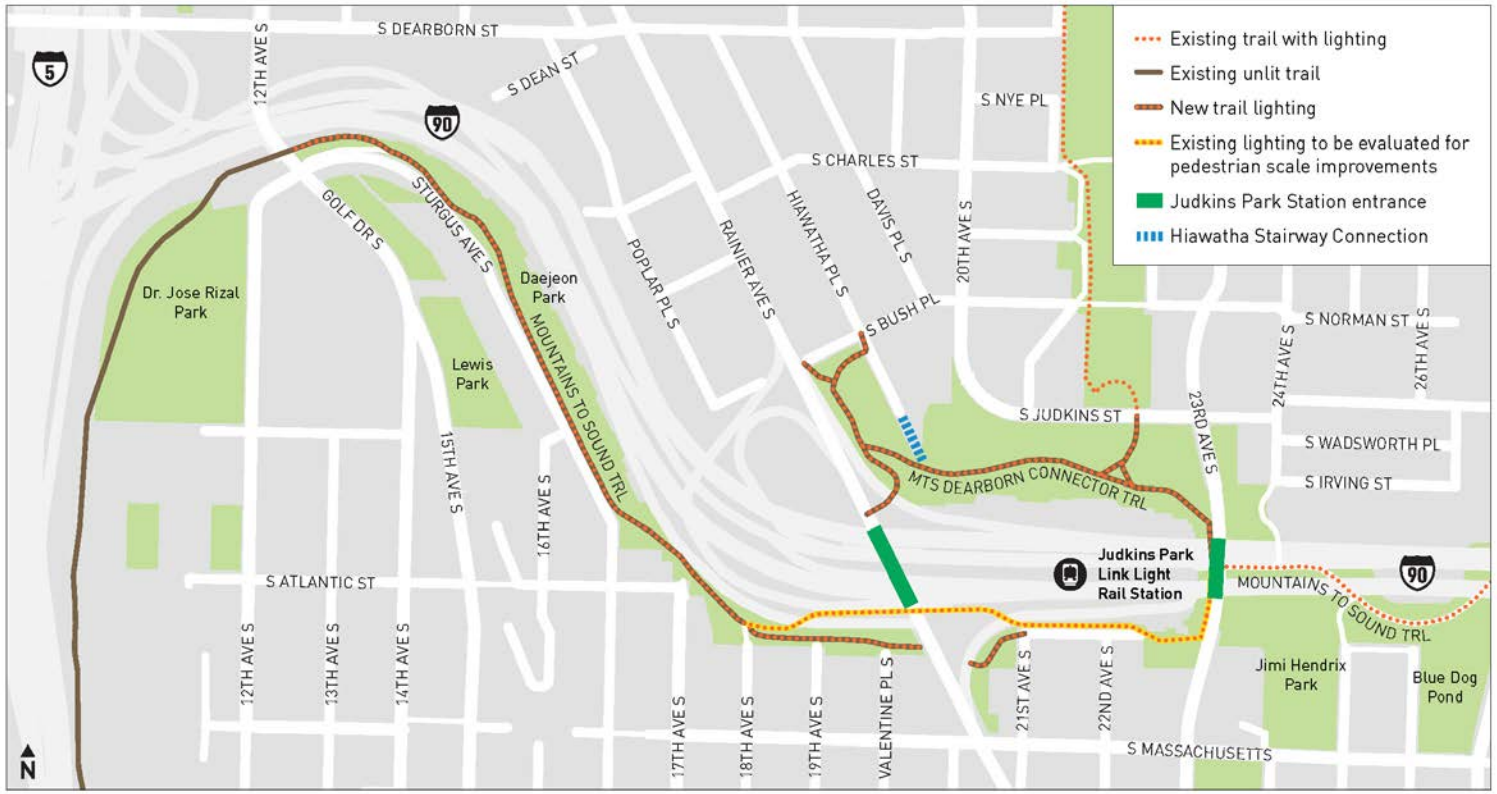
"The System Access Fund will help fund improvements that make it easier and more convenient for people to get to Sound Transit and partner transit services.

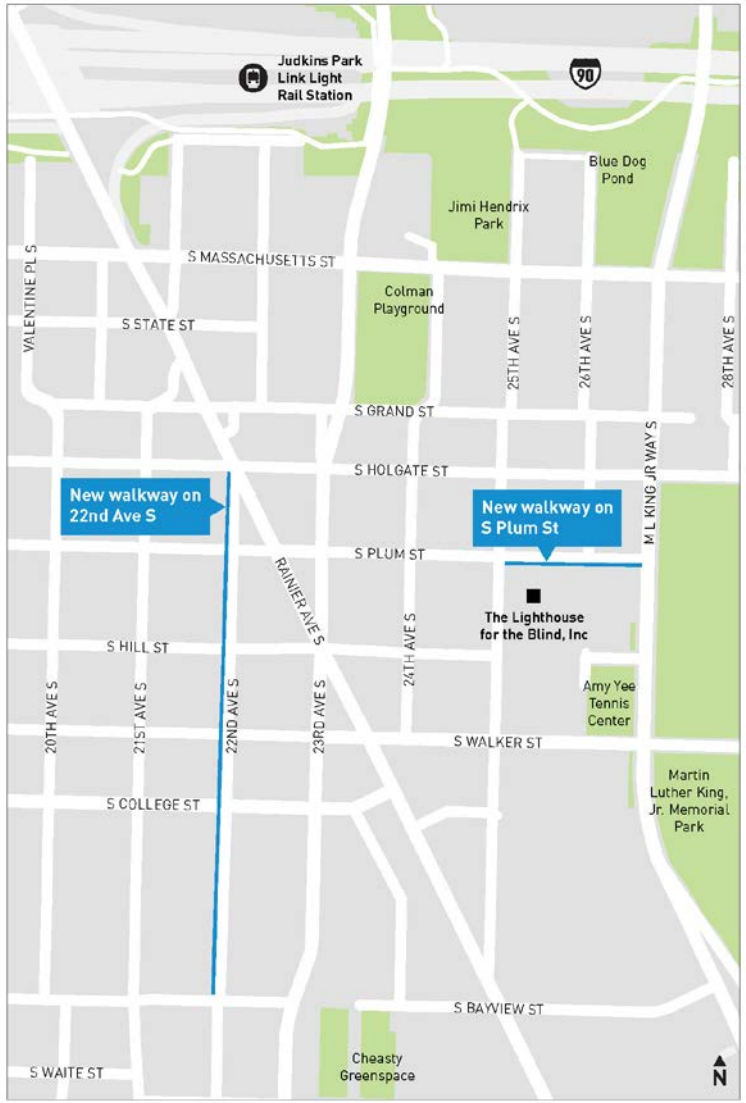
*The $100 million System Access Fund (SAF) included in the 2016 voter-approved Sound Transit 3 (ST3) measure is allocated equally among Sound Transit's **five subareas** for projects such as safe sidewalks, protected bike lanes, shared use paths, improved bus-rail integration, and new pick-up and drop-off areas."*

Grants Awarded/Accepting

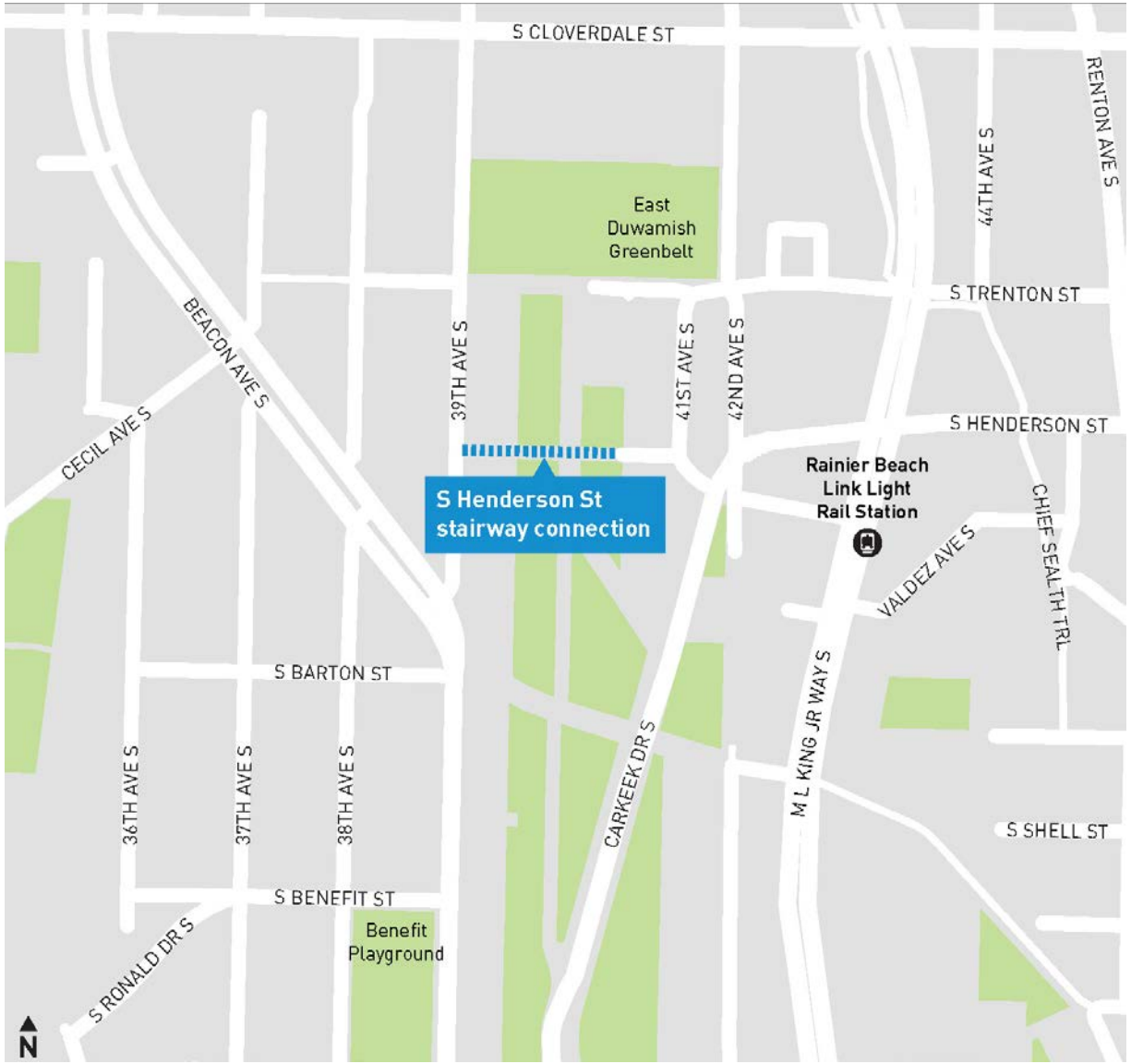
Grantor	Purpose	Amount
Sound Transit	**Judkins Park Station Access Project**	$2,400,000
	Mountains to Sound Trail Lighting	
	Hiawatha Pl S Stairway Connection	
	New Walkways on 22nd Ave S and S Plum St	
	Southeast Seattle High Priority Sidewalks and Walkways	$900,000
	S Henderson St Stairway Connection	
Total Grants Accepted		**$3,300,000**

Judkins Park Station Access Project





S Henderson St Stairway Connection



Questions?

Chloe.Wilkes@seattle.gov | (206) 233-0043

Brian.Dougherty@seattle.gov| (206) 684-5124

www.seattle.gov/transportation

File #: CB 119744, **Version:** 1

CITY OF SEATTLE

ORDINANCE _____

COUNCIL BILL _____

AN ORDINANCE relating to the Department of Transportation's Hazard Mitigation Program; authorizing the Director of the Department of Transportation to acquire, accept, and record on behalf of the City of Seattle, 11 catchment wall easements (From Daniel Bayeh, located in a portion of Lots 10 and 11, Block 3, Sturtevant's Rainier Beach Lake Front Tracts; a catchment wall easement from Blue Bird Rentals, LLC, a Washington limited liability company, located in a portion of Lots 14 through 17, Block 46, Rainier Beach; a catchment wall easement from Margaret Brown, located in a portion of Lots 17 and 18, Block 46, Rainier Beach; a catchment wall easement from Dan J. Del Duca and Mary F. Del Duca, located in a portion of Lots 1 and 2, Block 35, Rainier Beach; a catchment wall easement from Paul J. Farrington and Ronald F. Minter, located in Lots 5 and 6, Block 2, Mayes' Addition to the City of Seattle; a catchment wall easement from Mark Duane Lewis, located in a portion of Lots 2 and 3, Block 2, Mayes' Addition to the City of Seattle; a catchment wall easement from Gene Louie and Lena T. Louie, located in a portion of Lots 3 through 5, Block 2, Mayes' Addition to the City of Seattle; a catchment wall easement from Lincoln A. Louie and Ann Marie D. Louie, located in a portion of Lots 3 through 5, Block 35, Rainier Beach; a catchment wall easement from Robert Miller and Ana Miller, located in a portion of Lots 11 and 12, Block 3, Sturtevant's Rainier Beach Lake Front Tracts; a catchment wall easement from Ngoc Nguyen and My Chau Tran, located in a portion of Lots 9 and 10, Block 3, Sturtevant's Rainier Beach Lake Front Tracts; a catchment wall easement from F. D. Staats, the Trustee of the F. D. Staats Family Trust, located in a portion of Lots 6 and 7, Block 35, Rainier Beach), for the purpose of protecting the adjacent roadway of superficial surface erosion of the adjacent slopes along a portion of Rainier Avenue South; placing the real property rights under the jurisdiction of the Seattle Department of Transportation; and ratifying and confirming certain prior acts.

WHEREAS, the Landslide Mitigation Project under the Hazard Mitigation Program (the "Project") provides the Seattle Department of Transportation (SDOT) with the resources to identify landslide concerns that affect the right-of-way and prioritize and make repairs as necessary to maintain public safety; and

WHEREAS, historically, many landslide occurrences have been recorded along Rainier Avenue South between South Carver Street and South Norfolk Street ("Impacted Area"), and in 1998, the City closed 1,000 linear feet of sidewalk in response to the landslide vulnerabilities in the area; and

WHEREAS, in 2000, SDOT commissioned a geotechnical consultant to perform a slope reconnaissance along

the Impacted Area that determined this area to be a moderate to high risk landslide hazard; and

WHEREAS, in April 2013, SDOT closed a segment of the Impacted Area, between 57th Avenue South and Cornell Avenue South (the "Street Segment") in response to one of the most recent landslides that blocked Rainier Avenue South; and

WHEREAS, Ordinance 124374 was subsequently passed to accept an easement to construct and maintain a retaining wall along a portion of this Street Segment to mitigate potential adverse impacts due to a high probability of reoccurrence of landslide activity; and

WHEREAS, to that end, the City took permanent measures to restore and stabilize the steep slope above that portion of this Street Segment to prevent further slope erosion and protect the integrity of the roadway; and

WHEREAS, since these repairs, several more landslides have occurred in the area; and

WHEREAS, the City recognizes that more work needs to be done to stabilize an extended area of the steep slope along Rainier Avenue South from South Fletcher Street to the South City Limits near South Ryan Street ("Rainier Corridor"); and

WHEREAS, SDOT recently conducted an evaluation that identified five sites within the Rainier Corridor that are vulnerable to landslide activity and need work; and

WHEREAS, the Project recently received funding to facilitate the necessary repairs; and

WHEREAS, it is in the City's best interest to take permanent measures to prevent further slope erosion by restoring and arresting future superficial surface erosion debris from entering the right-of-way; and

WHEREAS, the Project work will include characterizing the adjacent slope, placing catchment walls to recover the existing sidewalk, and rebuilding failed sidewalk panels; and

WHEREAS, the City Council must accept the permanent catchment wall easements granted by various private property owners to build a catchment wall along the impacted slope areas to prevent further surface debris flow and complete the Project; and

WHEREAS, Project completion will immediately reduce landslide hazards to Rainier Avenue South, reduce annual maintenance cost for landslide cleanup, and initiate the reopening of the closed sidewalk for public access; NOW, THEREFORE,

BE IT ORDAINED BY THE CITY OF SEATTLE AS FOLLOWS:

Section 1. The catchment wall easement dated July 27, 2018, granted by Daniel Bayeh, recorded under King County Recording Number 20190404000485 and attached as Attachment 1 to this ordinance, granting to the City an easement to construct, repair, replace, and maintain a catchment wall and any other modifications associated with the catchment wall as described in the easement over property legally described and depicted in Exhibit A and Exhibit B of Attachment 1 to this ordinance is accepted.

Section 2. The catchment wall easement dated March 20, 2019, granted by BLUE BIRD RENTALS, LLC, a Washington limited liability company, recorded under King County Recording Number 20190430000373 and attached as Attachment 2 to this ordinance, granting to the City an easement to construct, repair, replace, and maintain a catchment wall and any other modifications associated with the catchment wall as described and depicted in the easement over property legally described in Exhibit A and Exhibit B of Attachment 2 to this ordinance is accepted.

Section 3. The catchment wall easement dated December 13, 2018, granted by Margaret Brown, recorded under King County Recording Number 20190404000484 and attached as Attachment 3 to this ordinance, granting to the City an easement to construct, repair, replace, and maintain a catchment wall and any other modifications associated with the catchment wall as described in the easement over property legally described and depicted in Exhibit A and Exhibit B of Attachment 3 to this ordinance is accepted.

Section 4. The catchment wall easement dated May 30, 2018, granted by Dan J. Del Duca and Mary F. Del Duca, a married couple, recorded under King County Recording Number 20190404000489 and attached as Attachment 4 to this ordinance, granting to the City an easement to construct, repair, replace, and maintain a catchment wall and any other modifications associated with the catchment wall as described in the easement

over property legally described and depicted in Exhibit A and Exhibit B of Attachment 4 to this ordinance is accepted.

Section 5. The catchment wall easement dated December 13, 2018, granted by Paul J. Farrington and Ronald F. Minter, each as their separate estate, recorded under King County Recording Number 20190404000487 and attached as Attachment 5 to this ordinance, granting to the City an easement to construct, repair, replace, and maintain a catchment wall and any other modifications associated with the catchment wall as described in the easement over property legally described and depicted in Exhibit A and Exhibit B of Attachment 5 to this ordinance is accepted.

Section 6. The catchment wall easement dated February 26, 2019, granted by Mark Duane Lewis, recorded under King County Recording Number 20190404000481 and attached as Attachment 6 to this ordinance, granting to the City an easement to construct, repair, replace, and maintain a catchment wall and any other modifications associated with the catchment wall as described in the easement over property legally described and depicted in Exhibit A and Exhibit B of Attachment 6 to this ordinance is accepted.

Section 7. The catchment wall easement dated December 13, 2018, granted by Gene Louie and Lena T. Louie, recorded under King County Recording Number 20190404000482 and attached as Attachment 7 to this ordinance, granting to the City an easement to construct, repair, replace, and maintain a catchment wall and any other modifications associated with the catchment wall as described in the easement over property legally described and depicted in Exhibit A and Exhibit B of Attachment 7 to this ordinance is accepted.

Section 8. The catchment wall easement dated May 30, 2018, granted by Lincoln A. Louie and Ann Marie D. Louie, a married couple, recorded under King County Recording Number 20190404000488 and attached as Attachment 8 to this ordinance, granting to the City an easement to construct, repair, replace, and maintain a catchment wall and any other modifications associated with the catchment wall as described in the easement over property legally described and depicted in Exhibit A and Exhibit B of Attachment 8 to this ordinance is accepted.

Section 9. The catchment wall easement dated December 13, 2018, granted by Robert Miller and Ana Miller, recorded under King County Recording Number 20190404000486 and attached as Attachment 9 to this ordinance, granting to the City an easement to construct, repair, replace, and maintain a catchment wall and any other modifications associated with the catchment wall as described in the easement over property legally described and depicted in Exhibit A and Exhibit B of Attachment 9 to this ordinance is accepted.

Section 10. The catchment wall easement dated December 13, 2018, granted by Ngoc Nguyen and My Chau Tran, recorded under King County Recording Number 20190404000483 and attached as Attachment 10 to this ordinance, granting to the City an easement to construct, repair, replace, and maintain a catchment wall and any other modifications associated with the catchment wall as described in the easement over property legally described and depicted in Exhibit A and Exhibit B of Attachment 10 to this ordinance is accepted.

Section 11. The catchment wall easement dated May 30, 2018, granted by F.D. Staats, the Trustee of the F.D. Staats Family Trust, recorded under King County Recording Number 20190404000490 and attached as Attachment 11 to this ordinance, granting to the City an easement to construct, repair, replace, and maintain a catchment wall and any other modifications associated with the catchment wall as described in the easement over property legally described and depicted in Exhibit A and Exhibit B of Attachment 11 to this ordinance is accepted.

Section 12. The easements are placed under the jurisdiction of the Seattle Department of Transportation.

Section 13. Any act consistent with the authority of this ordinance taken prior to its effective date is ratified and confirmed.

Section 14. This ordinance shall take effect and be in force 30 days after its approval by the Mayor, but if not approved and returned by the Mayor within ten days after presentation, it shall take effect as provided by Seattle Municipal Code Section 1.04.020.

Passed by the City Council the _____ day of _____, 2020, and signed by me in open session in authentication of its passage this _____ day of _____, 2020.

_____

President _____ of the City Council

Approved by me this _____ day of _____, 2020.

_____

Jenny A. Durkan, Mayor

Filed by me this _____ day of _____, 2020.

_____

Monica Martinez Simmons, City Clerk

(Seal)

Attachments:
Attachment 1 - Recorded Catchment Wall Easement granted by Daniel Bayeh
Attachment 2 - Recorded Catchment Wall Easement granted by Blue Bird Rentals, LLC
Attachment 3 - Recorded Catchment Wall Easement granted by Margaret Brown
Attachment 4 - Recorded Catchment Wall Easement granted by Dan J. Del Duca and Mary F. Del Duca
Attachment 5 - Recorded Catchment Wall Easement granted by Paul J. Farrington and Ronald F. Minter
Attachment 6 - Recorded Catchment Wall Easement granted by Mark Duane Lewis
Attachment 7 - Recorded Catchment Wall Easement granted by Gene Louie and Lena T. Louie
Attachment 8 - Recorded Catchment Wall Easement granted by Lincoln A. Louie and Ann Marie D. Louie
Attachment 9 - Recorded Catchment Wall Easement granted by Robert Miller and

Ana Miller
Attachment 10 - Recorded Catchment Wall Easement granted by Ngoc Nguyen and My Chau Tran
Attachment 11 - Recorded Catchment Wall Easement granted by F. D. Staats Family Trust

After recording return document to:

City of Seattle
Department of Transportation
700 5th Avenue – Suite 3800
PO Box 34996
Seattle, WA 98124-4966
Attn: Barret Aldrich

20190404000485
EASEMENT Rec: $105.00
4/4/2019 12:37 PM
KING COUNTY, WA

EXCISE TAX NOT REQUIRED
King Co. Records Division
By Amber Lee Deputy

Document Title: Catchment Wall Easement
Reference Number of Related Document: N/A
Grantor(s): Daniel Bayeh
Grantee: City of Seattle
Abbreviated Legal Description: Ptn of LOTS 10 & 11, BLK 3, STURTEVANT'S RAINIER BEACH LAKE FRONT TRACTS, King County, WA
Additional Legal Description is on Page(s) 5 of Document.
Assessor's Tax Parcel Number(s): 806900-0175

CATCHMENT WALL EASEMENT

Project: Rainier Avenue South Hazard Mitigation

The Grantor(s), **DANIEL BAYEH**, for and in consideration of mutual and offsetting benefits, other valuable consideration and the covenants and promises of the City hereinafter set forth, the receipt and sufficiency of which is hereby acknowledged, conveys and warrants unto the **CITY OF SEATTLE**, a municipal corporation of the State of Washington, and its assigns, an Easement over, under, across and upon the hereinafter described lands ("the Easement area") for the purposes of constructing, repairing, replacing and maintaining a catchment wall and other modifications associated therewith, to the same extent and purpose as if the rights herein granted had been acquired under Eminent Domain statutes of the State of Washington.

Tax Parcel Number 806900-0175
Project Parcel 10

CATCHMENT WALL EASEMENT

The Grantor reserves the right to use the Easement area for purposes that will not unreasonably interfere with the Grantee's full enjoyment of the rights granted by this Easement. Neither the Grantor nor their successors and assigns may erect or construct any building or structure, or excavate, within the Easement area without the prior written consent of the Seattle Department of Transportation ("SDOT"). Further, planting trees or any other vegetation, except for grass, shall not be allowed within the Easement area. Grantor will submit a proposed work plan to SDOT at least 120 days before any work is commenced in the Easement area. As used in this Easement, "building or structure" means anything constructed or erected on the ground or any improvement built up or composed of parts joined together in some definite manner and affixed to the ground, including fences, walls and signs.

To the extent allowed by law, Grantor(s), their successors and assigns agree to indemnify Grantee from and against any and all claims, demands, suits, damages, loss or liability of any kind arising out of, or resulting from, erosion and/or landslides. The foregoing indemnity shall run with the land and bind Grantor(s) successors and assigns.

Said lands being situated in King County, State of Washington, and described as follows:

See Exhibit A attached hereto and made a part hereof.

Grantor:

By Daniel Bayeh
DANIEL BAYEH

Date: 7/27, 2018

Tax Parcel Number 806900-0175
Project Parcel 10

CATCHMENT WALL EASEMENT

STATE OF WASHINGTON)
: §
County of King)

On this 27th day of July, 2018, before me personally appeared DANIEL BAYEH, to me known to be the individual described in and who executed the foregoing instrument, and acknowledged that they signed the same as their free and voluntary act and deed, for the uses and purposes therein mentioned.

WITNESS MY HAND AND OFFICIAL SEAL hereto affixed the day and year first above written.

Notary Seal
BARRET ALDRICH
Commission Expires
NOTARY
PUBLIC
12-01-2021
STATE OF WASHINGTON
Please stay within block.

Notary (print name) Barret Aldrich
Notary Public in and for the State of Washington,
residing at Kenmore WA
My Appointment expires 12-01-21

Tax Parcel Number 806900-0175
Project Parcel 10

CATCHMENT WALL EASEMENT

Approved and Accepted By:
CITY OF SEATTLE

By: _____
Linea Laird, Interim Director
Seattle Department of Transportation

Date: December 13, 2018

STATE OF WASHINGTON)
: §
County of King)

On this 13 day of December, 2018, before me personally appeared LINEA LAIRD, to me known to be the Interim Director of the Seattle Department of Transportation of the City of Seattle, a Washington Municipal Corporation, the municipal corporation that executed the within and foregoing instrument, and acknowledged the said instrument to be the free and voluntary act and deed of said municipal corporation for the uses and purposes therein mentioned, and on oath stated that he was authorized to execute said instrument.

WITNESS MY HAND AND OFFICIAL SEAL hereto affixed the day and year first above written.

Notary Seal
BARRET ALDRICH
Commission Expires
NOTARY
PUBLIC
12-01-2021
STATE OF WASHINGTON
Please stay within block.

_____
Notary (print name) Barret Aldrich
Notary Public in and for the State of Washington,
residing at Vashon WA
My Appointment expires Dec. 1, 2021

Tax Parcel Number 806900-0175
Project Parcel 10

CATCHMENT WALL EASEMENT

EXHIBIT A
FOR PORTIONS OF LOTS 10-11 BLOCK 3

STURTEVANT'S RAINIER BEACH LAKE FRONT TRACTS

THAT PORTION OF THE EASTERLY 35 FEET OF LOT 10, BLOCK 3, STURTEVANT'S RAINIER BEACH LAKE FRONT TRACTS, ACCORDING TO THE PLAT THEREOF RECORDED IN VOLUME 12 OF PLATS, PAGE 102, RECORDS OF KING COUNTY, WASHINGTON; TOGETHER WITH THAT PORTION OF LOT 11 IN SAID BLOCK 3 LYING WESTERLY OF THE FOLLOWING DESCRIBED LINE:

BEGINNING AT A POINT ON THE SOUTHERLY LINE OF SAID LOT 11 DISTANT 11.63 FEET WESTERLY (MEASURED ALONG SAID SOUTHERLY LINE) FROM THE SOUTHEAST CORNER THEREOF; THENCE NORTHEASTERLY TO A POINT ON THE NORTHERLY LINE OF SAID LOT 11 DISTANT 9.44 FEET (MEASURED ALONG SAID NORTHERLY LINE) FROM THE NORTHEAST CORNER THEREOF; EXCEPT THAT PORTION THEREOF CONDEMNED FOR RAINIER AVENUE BY KING COUNTY SUPERIOR COURT CAUSE NUMBER 87583, ORDINANCE NUMBER 29364 OF THE CITY OF SEATTLE; DESCRIBED AS FOLLOWS:

COMMENCING AT THE MOST NORTHWESTERLY CORNER OF SAID BLOCK 3, BEING THE INTERSECTION OF THE SOUTHERLY RIGHT OF WAY MARGIN OF RAINIER AVENUE SOUTH AND THE EASTERLY RIGHT OF WAY MARGIN OF 75TH AVENUE SOUTH, PER KING COUNTY SUPERIOR COURT CAUSE NO. 87583, SAID POINT BEING THE BEGINNING OF A 303.88 FOOT NON TANGENT CURVE, CONCAVE TO SOUTHWEST, WHICH RADIUS POINT BEARS S 11° 21' 26" W; THENCE SOUTHEASTERLY ALONG THE ARC OF SAID CURVE, ALSO BEING THE SOUTHERLY RIGHT OF WAY MARGIN OF RAINIER AVENUE SOUTH, THROUGH A CENTRAL ANGLE OF 9° 12' 36" A DISTANCE OF 48.85 FEET; THENCE S 69° 25' 58" E 416.75 FEET TO THE BEGINNING OF A 591.27 FOOT RADIUS TANGENT CURVE, CONCAVE TO SOUTHWEST; THENCE SOUTHEASTERLY ALONG THE ARC OF SAID CURVE, THROUGH A CENTRAL ANGLE OF 1° 20' 15" A DISTANCE OF 13.80 FEET TO THE **POINT OF BEGINNING**; THENCE CONTINUING ALONG THE ARC OF SAID CURVE THROUGH A CENTRAL ANGLE OF 8° 16' 01" A DISTANCE OF 85.31 FEET; THENCE LEAVING SAID RIGHT OF WAY MARGIN S 26° 47' 07" W 5.01 FEET TO THE BEGINNING OF A 586.27 FOOT NON TANGENT CURVE, CONCAVE TO SOUTHWEST WHICH RADIUS POINT BEARS S 30° 12' 02" W; THENCE NORTHWESTERLY ALONG THE ARC OF SAID CURVE THROUGH A CENTRAL ANGLE OF 8° 17' 04" A DISTANCE OF

Tax Parcel Number 806900-0175
Project Parcel 10

CATCHMENT WALL EASEMENT

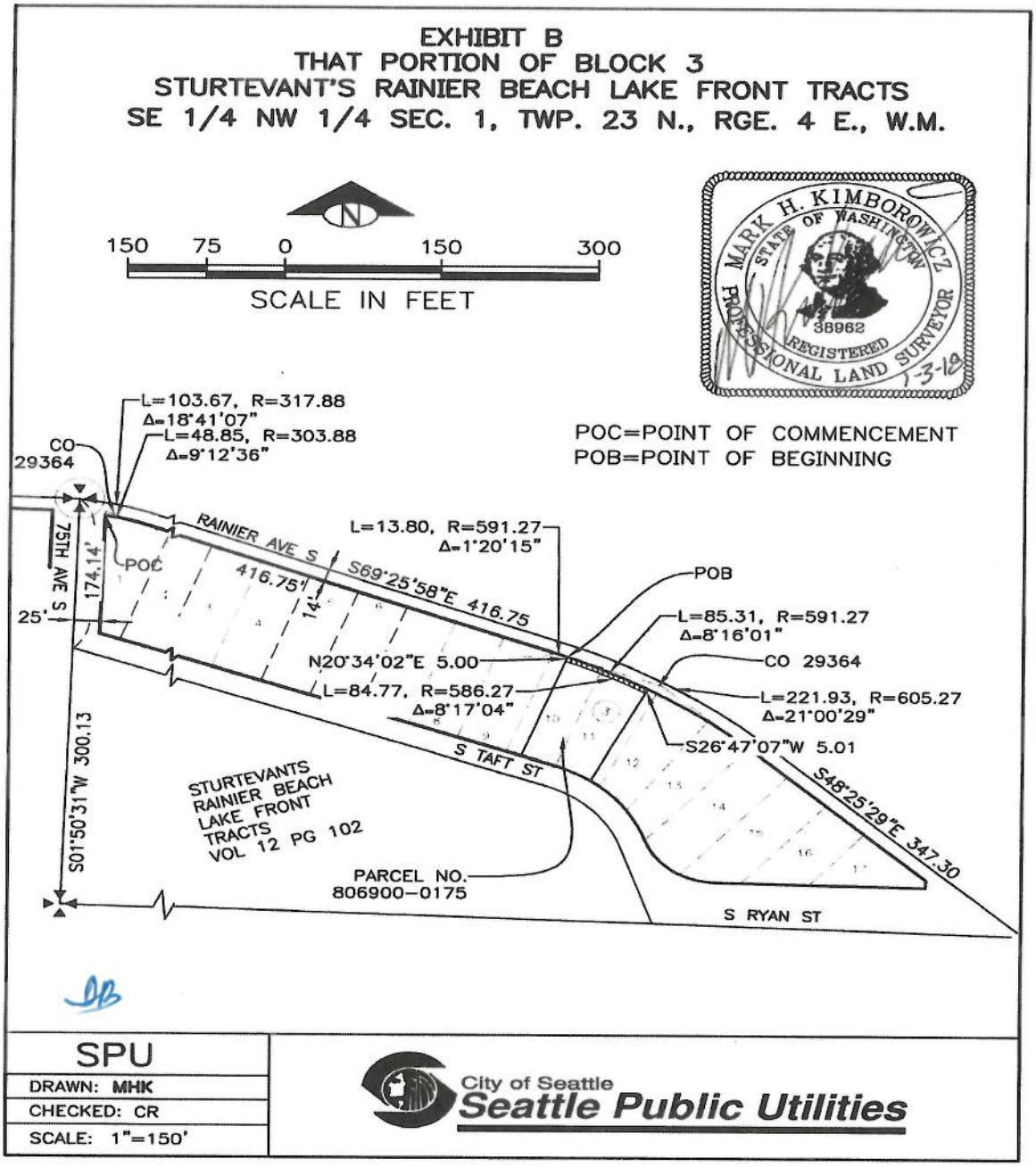
84.77 FEET; THENCE N 20° 34' 02" E 5.00 FEET TO THE **POINT OF BEGINNING.**

SITUATED IN THE CITY OF SEATTLE, COUNTY OF KING, STATE OF WASHINGTON.

CONTAINING 425 SQ. FT., MORE OR LESS

Tax Parcel Number 806900-0175
Project Parcel 10

CATCHMENT WALL EASEMENT



Tax Parcel Number 806900-0175
Project Parcel 10

20190430000373
EASEMENT Rec: $105.00
4/30/2019 9:54 AM
KING COUNTY, WA

After recording return document to:

City of Seattle
Department of Transportation
700 5th Avenue – Suite 3800
PO Box 34996
Seattle, WA 98124-4966
Attn: Barret Aldrich

EXCISE TAX NOT REQUIRED
King Co. Records Division
By _____, Deputy

Document Title: Catchment Wall Easement
Reference Number of Related Document: N/A
Grantor(s): Blue Bird Rentals, LLC
Grantee: City of Seattle
Abbreviated Legal Description: Ptn of LTS. 14-16 & PTN. LT. 17, BLK. 46, RAINIER BEACH, King County, WA
Additional Legal Description is on Page(s) 5 of Document.
Assessor's Tax Parcel Number(s): 712930-2955

CATCHMENT WALL EASEMENT

Project: Rainier Avenue South Hazard Mitigation

The Grantor(s), **BLUE BIRD RENTALS, LLC**, a Washington limited liability company, for and in consideration of mutual and offsetting benefits, other valuable consideration and the covenants and promises of the City hereinafter set forth, the receipt and sufficiency of which is hereby acknowledged, conveys and warrants unto the **CITY OF SEATTLE**, a municipal corporation of the State of Washington, and its assigns, an Easement the width of the parcel frontage, over, under, across and upon the hereinafter described lands ("the Easement area") for the purposes of constructing, repairing, replacing and maintaining a catchment wall and other modifications associated therewith, to the same extent and purpose as if the rights herein granted had been acquired under Eminent Domain statutes of the State of Washington.

Tax Parcel Number 712930-2955
Project Parcel 4

CATCHMENT WALL EASEMENT

The Grantor reserves the right to use the Easement area for purposes that will not unreasonably interfere with the Grantee's full enjoyment of the rights granted by this Easement. Neither the Grantor nor their successors and assigns may erect or construct any building or structure, or excavate, within the Easement area without the prior written consent of the Seattle Department of Transportation ("SDOT"). Further, planting trees or any other vegetation, except for grass, shall not be allowed within the Easement area. Grantor will submit a proposed work plan to SDOT at least 120 days before any work is commenced in the Easement area except for activities necessary for emergency water line repair. If the emergency work impacts the catchment wall, the Grantor shall notify SDOT immediately. In the event of a landslide or significant erosion on Grantor's non-Easement property, the Grantor shall have access over the Easement area to remove debris, rocks and dirt, and make repairs to Grantor's property that is not subject to this Easement. If debris removal or repairs impact the wall, the Grantor shall notify SDOT immediately. As used in this Easement, "building or structure" means anything constructed or erected on the ground or any improvement built up or composed of parts joined together in some definite manner and affixed to the ground, including fences, walls and signs.

To the extent allowed by law, Grantor(s), their successors and assigns agree to indemnify Grantee from and against any and all claims, demands, suits, damages, loss or liability of any kind arising out of, or resulting from, erosion and/or landslides. The foregoing indemnity shall run with the land and bind Grantor(s) successors and assigns.

Said lands being situated in King County, State of Washington, and described as follows:

See Exhibit A attached hereto and made a part hereof.

Signed this 6th day of March, 2019

BLUE BIRD RENTALS, LLC,
a Washington limited liability company

By: Linda Korten
Linda Korten
Its: Governor

Tax Parcel Number 712930-2955
Project Parcel 4

CATCHMENT WALL EASEMENT

By: James B. Burnison
James Burnison
Its: Governor

STATE OF WASHINGTON)
: §
County of King)

On this 6th day of March, 2019, before me personally appeared JAMES BURNISON and LINDA KORTEN, to me known to be the Representatives of BLUE BIRD RENTALS, LLC, a Washington limited liability company, who executed the foregoing instrument, and acknowledged that they signed the same as their free and voluntary act and deed, for the uses and purposes therein mentioned.

WITNESS MY HAND AND OFFICIAL SEAL hereto affixed the day and year first above written.

Notary Seal
Notary Public
State of Washington
ANNA T KIM
MY COMMISSION EXPIRES
APRIL 24, 2022
Please stay within block.

Anna T Kim
Notary (print name) Anna T Kim
Notary Public in and for the State of Washington,
residing at Seattle
My Appointment expires April 24, 2022

Tax Parcel Number 712930-2955
Project Parcel 4

CATCHMENT WALL EASEMENT

Approved and Accepted By:
CITY OF SEATTLE

By: _____
Sam Zimbabwe
Seattle Department of Transportation

Date: March 20, 2019

STATE OF WASHINGTON)
: §
County of King)

On this 20 day of March, 2019, before me personally appeared SAM ZIMBABWE, to me known to be the Director of the Seattle Department of Transportation of the City of Seattle, a Washington Municipal Corporation, the municipal corporation that executed the within and foregoing instrument, and acknowledged the said instrument to be the free and voluntary act and deed of said municipal corporation for the uses and purposes therein mentioned, and on oath stated that he was authorized to execute said instrument.

WITNESS MY HAND AND OFFICIAL SEAL hereto affixed the day and year first above written.

Notary Seal

Please stay within block.

_____
Notary (print name) Gretchen M. Haydel
Notary Public in and for the State of Washington,
residing at Seattle, WA
My Appointment expires April 30, 2020

Tax Parcel Number 712930-2955
Project Parcel 4

CATCHMENT WALL EASEMENT

EXHIBIT A

PERMANENT EASEMENT DESCRIPTION

FOR LOT 14, 15 AND 16 BLOCK 46 RAINIER BEACH

THAT PORTION OF THE FOLLOWING DESCRIBED PROPERTY; LOTS 14, 15 AND 16, BLOCK 46, RAINIER BEACH, ACCORDING TO THE PLAT THEREOF RECORDED IN VOLUME 8 OF PLATS, PAGE 11, RECORDS OF KING COUNTY, WASHINGTON; TOGETHER WITH THAT PORTION OF LOT 17, OF SAID BLOCK 46,

DESCRIBED AS FOLLOWS:

BEGINNING AT MOST WESTERLY CORNER OF SAID LOT 17;
THENCE NORTH 48°33'49" EAST 56.50 FEET ALONG NORTHWESTERLY LINE OF LOT 17; THENCE SOUTH 41°26'11" EAST 5.8 FEET; THENCE SOUTH 50°47'41" WEST 56.54 FEET TO THE SOUTHWESTERLY LINE OF LOT 17; THENCE NORTH 41°26'11" WEST 3.60 FEET TO THE POINT OF BEGINNING; SITUATED IN THE SOUTHWEST QUARTER OF THE SOUTHEAST QUARTER OF SECTION 35, TOWNSHIP 24 NORTH, RANGE 4 EAST, W.M.,

DESCRIBED AS FOLLOWS;

COMMENCING AT THE MOST NORTHEASTERLY CORNER OF SAID LOT 18 BEING THE INTERSECTION OF THE WESTERLY RIGHT OF WAY MARGIN OF SOUTH KEPPLER STREET AND THE SOUTHERLY RIGHT OF WAY MARGIN OF RAINIER AVENUE SOUTH, PER KING COUNTY SUPERIOR COURT CAUSE NO. 87583; SAID POINT BEING THE BEGINNING OF A 315.68 FOOT NON TANGENT CURVE CONCAVE TO SOUTHWEST, WHICH RADIUS POINT BEARS S 59° 17' 59" W; THENCE NORTHWESTERLY ALONG THE ARC OF SAID CURVE, ALSO BEING THE SOUTHERLY RIGHT OF WAY MARGIN OF RAINIER AVENUE SOUTH, THROUGH A CENTRAL ANGLE OF 11° 56' 12" A DISTANCE OF 65.77 FEET; THENCE N 42° 38' 08" W 4.49 FEET TO THE **POINT OF BEGINNING**; THENCE N 42° 38' 08" W 90.07 FEET TO THE NORTHERLY BOUNDARY LINE OF DESCRIBED PARCEL; THENCE LEAVING SAID RIGHT OF WAY MARGIN ALONG SAID BOUNDARY LINE S 49° 41' 44" W 5.00 FEET; THENCE S 42° 38' 08" E 90.07 FEET TO THE SOUTHERLY BOUNDARY LINE OF DESCRIBED PARCEL; THENCE N 49° 41' 51" E 5.00 FEET TO THE **POINT OF BEGINNING.**

Tax Parcel Number 712930-2955
Project Parcel 4

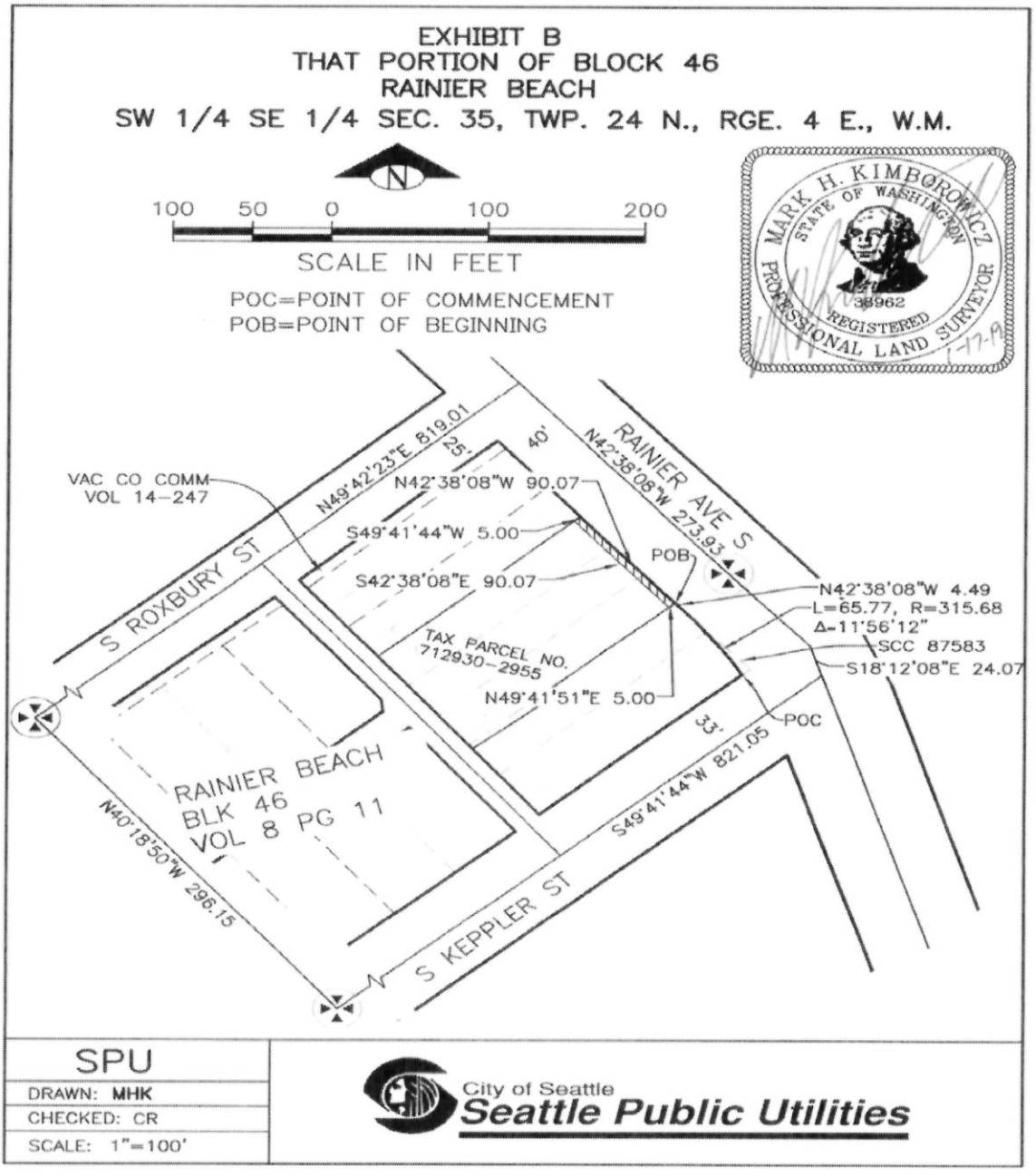
CATCHMENT WALL EASEMENT

SITUATED IN THE CITY OF SEATTLE, COUNTY OF KING, STATE OF WASHINGTON.

CONTAINING 450 SQ. FT., MORE OR LESS

Tax Parcel Number 712930-2955
Project Parcel 4

CATCHMENT WALL EASEMENT



Tax Parcel Number 712930-2955
Project Parcel 4

After recording return document to:

City of Seattle
Department of Transportation
700 5th Avenue – Suite 3800
PO Box 34996
Seattle, WA 98124-4966
Attn: Barret Aldrich

20190404000484
EASEMENT Rec: $105.00
4/4/2019 12:37 PM
KING COUNTY, WA

EXCISE TAX NOT REQUIRED
King Co. Records Division
By _____ Deputy
Amber Lee

Document Title: Catchment Wall Easement
Reference Number of Related Document: N/A
Grantor(s): Margaret Brown
Grantee: City of Seattle
Abbreviated Legal Description: Ptn of LOTS 17 & 18, BLK 46, RAINIER BEACH, King County, WA
Additional Legal Description is on Page(s) 5 of Document.
Assessor's Tax Parcel Number(s): 712930-2960

CATCHMENT WALL EASEMENT

Project: Rainier Avenue South Hazard Mitigation

The Grantor(s), **MARGARET BROWN**, for and in consideration of mutual and offsetting benefits, other valuable consideration and the covenants and promises of the City hereinafter set forth, the receipt and sufficiency of which is hereby acknowledged, conveys and warrants unto the **CITY OF SEATTLE**, a municipal corporation of the State of Washington, and its assigns, an Easement over, under, across and upon the hereinafter described lands ("the Easement area") for the purposes of constructing, repairing, replacing and maintaining a catchment wall and other modifications associated therewith, to the same extent and purpose as if the rights herein granted had been acquired under Eminent Domain statutes of the State of Washington.

Tax Parcel Number 712930-2960
Project Parcel 5

CATCHMENT WALL EASEMENT

The Grantor reserves the right to use the Easement area for purposes that will not unreasonably interfere with the Grantee's full enjoyment of the rights granted by this Easement. Neither the Grantor nor their successors and assigns may erect or construct any building or structure, or excavate, within the Easement area without the prior written consent of the Seattle Department of Transportation ("SDOT"). Further, planting trees or any other vegetation, except for grass, shall not be allowed within the Easement area. Grantor will submit a proposed work plan to SDOT at least 120 days before any work is commenced in the Easement area. As used in this Easement, "building or structure" means anything constructed or erected on the ground or any improvement built up or composed of parts joined together in some definite manner and affixed to the ground, including fences, walls and signs.

To the extent allowed by law, Grantor(s), their successors and assigns agree to indemnify Grantee from and against any and all claims, demands, suits, damages, loss or liability of any kind arising out of, or resulting from, erosion and/or landslides. The foregoing indemnity shall run with the land and bind Grantor(s) successors and assigns.

Said lands being situated in King County, State of Washington, and described as follows:

See Exhibit A attached hereto and made a part hereof.

Grantor:

By Margaret M Brown
MARGARET BROWN

Date: August 2, , 2018

Tax Parcel Number 712930-2960
Project Parcel 5

CATCHMENT WALL EASEMENT

STATE OF WASHINGTON)
: §
County of King)

On this 2nd day of August, 2018, before me personally appeared MARGARET BROWN, to me known to be the individual described in and who executed the foregoing instrument, and acknowledged that they signed the same as their free and voluntary act and deed, for the uses and purposes therein mentioned.

WITNESS MY HAND AND OFFICIAL SEAL hereto affixed the day and year first above written.

Notary Seal
BARRET ALDRICH
Commission Expires
NOTARY
PUBLIC
12-01-2021
STATE OF WASHINGTON
Please stay within block.

Notary (print name) Barret Aldrich
Notary Public in and for the State of Washington,
residing at Vashon WA
My Appointment expires 12-20-21

Tax Parcel Number 712930-2960
Project Parcel 5

CATCHMENT WALL EASEMENT

Approved and Accepted By:
CITY OF SEATTLE

By: _____
Linea Laird, Interim Director
Seattle Department of Transportation

Date: December 13, 2018

STATE OF WASHINGTON)
: §
County of King)

On this 13 day of December, 2018, before me personally appeared LINEA LAIRD, to me known to be the Interim Director of the Seattle Department of Transportation of the City of Seattle, a Washington Municipal Corporation, the municipal corporation that executed the within and foregoing instrument, and acknowledged the said instrument to be the free and voluntary act and deed of said municipal corporation for the uses and purposes therein mentioned, and on oath stated that he was authorized to execute said instrument.

WITNESS MY HAND AND OFFICIAL SEAL hereto affixed the day and year first above written.

Notary Seal
BARRET ALDRICH
Commission Expires
NOTARY
PUBLIC
12-01-2021
STATE OF WASHINGTON
Please stay within block.

_____
Notary (print name) Barret Aldrich
Notary Public in and for the State of Washington,
residing at Vashon, WA
My Appointment expires Dec 1, 2021

Tax Parcel Number 712930-2960
Project Parcel 5

CATCHMENT WALL EASEMENT

EXHIBIT A
PERMANENT EASEMENT DESCRIPTION
FOR LOT 17-18 BLOCK 46 RAINIER BEACH

THAT PORTION OF LOT 17 AND 18 BLOCK 46 OF RAINIER BEACH, AS RECORDED IN VOLUME 8 OF PLATS, PAGE 46, RECORDS OF KING COUNTY, WASHINGTON, EXCEPT THAT PORTION THEREOF CONDEMNED IN KING COUNTY SUPERIOR COURT CAUSE NO. 87583 FOR RAINIER AVENUE; AND EXCEPT THAT PORTION OF LOT 17, DESCRIBED AS FOLLOWS:

BEGINNING AT MOST WESTERLY CORNER OF SAID LOT 17;
THENCE NORTH 48°33'49" EAST 56.50 FEET ALONG NORTHWESTERLY LINE OF LOT 17; THENCE SOUTH 41°26'11" EAST 5.80 FEET;
THENCE SOUTH 50°47'41" WEST 56.54 FEET TO THE SOUTHWESTERLY LINE OF LOT 17; THENCE NORTH 41°26'11" WEST 3.60 FEET TO THE POINT OF BEGINNING; SITUATED IN THE SOUTHWEST QUARTER OF THE SOUTHEAST QUARTER OF SECTION 35, TOWNSHIP 24 NORTH, RANGE 4 EAST, W.M., DESCRIBED AS FOLLOWS;

COMMENCING AT THE MOST NORTHEASTERLY CORNER OF SAID LOT 18 BEING THE INTERSECTION OF THE WESTERLY RIGHT OF WAY MARGIN OF SOUTH KEPPLER STREET AND THE SOUTHERLY RIGHT OF WAY MARGIN OF RAINIER AVENUE SOUTH, PER KING COUNTY SUPERIOR COURT CAUSE NO. 87583; SAID POINT BEING THE BEGINNING OF A 315.68 FOOT NON TANGENT CURVE, CONCAVE TO SOUTHWEST, WHICH RADIUS POINT BEARS S 59° 17' 59" W; THENCE NORTHWESTERLY ALONG THE ARC OF SAID CURVE, ALSO BEING THE SOUTHERLY RIGHT OF WAY MARGIN OF RAINIER AVENUE SOUTH, THROUGH A CENTRAL ANGLE OF 7° 07' 21" A DISTANCE OF 39.24 FEET TO THE **POINT OF BEGINNING**; THENCE CONTINUING NORTHWESTERLY ALONG THE ARC OF SAID CURVE, THROUGH A CENTRAL ANGLE OF 4° 48' 50" A DISTANCE OF 26.52 FEET; THENCE N 42° 38' 08" W 4.49 FEET; THENCE LEAVING SAID RIGHT OF WAY MARGIN S 49° 41' 44" W 5.00 FEET; THENCE S 42° 38' 08" E 4.69 FEET TO THE BEGINNING OF A 310.68 FOOT RADIUS NON TANGENT CURVE CONCAVE TO SOUTHWEST WHICH RADIUS POINT BEARS S 47° 21' 47" E; THENCE SOUTHEASTERLY ALONG THE ARC OF SAID CURVE, THROUGH A CENTRAL ANGLE OF 4° 51' 14" A DISTANCE OF 26.32 FEET; THENCE N 49° 41' 44" E 5.00 FEET TO THE **POINT OF BEGINNING.**

Tax Parcel Number 712930-2960
Project Parcel 5

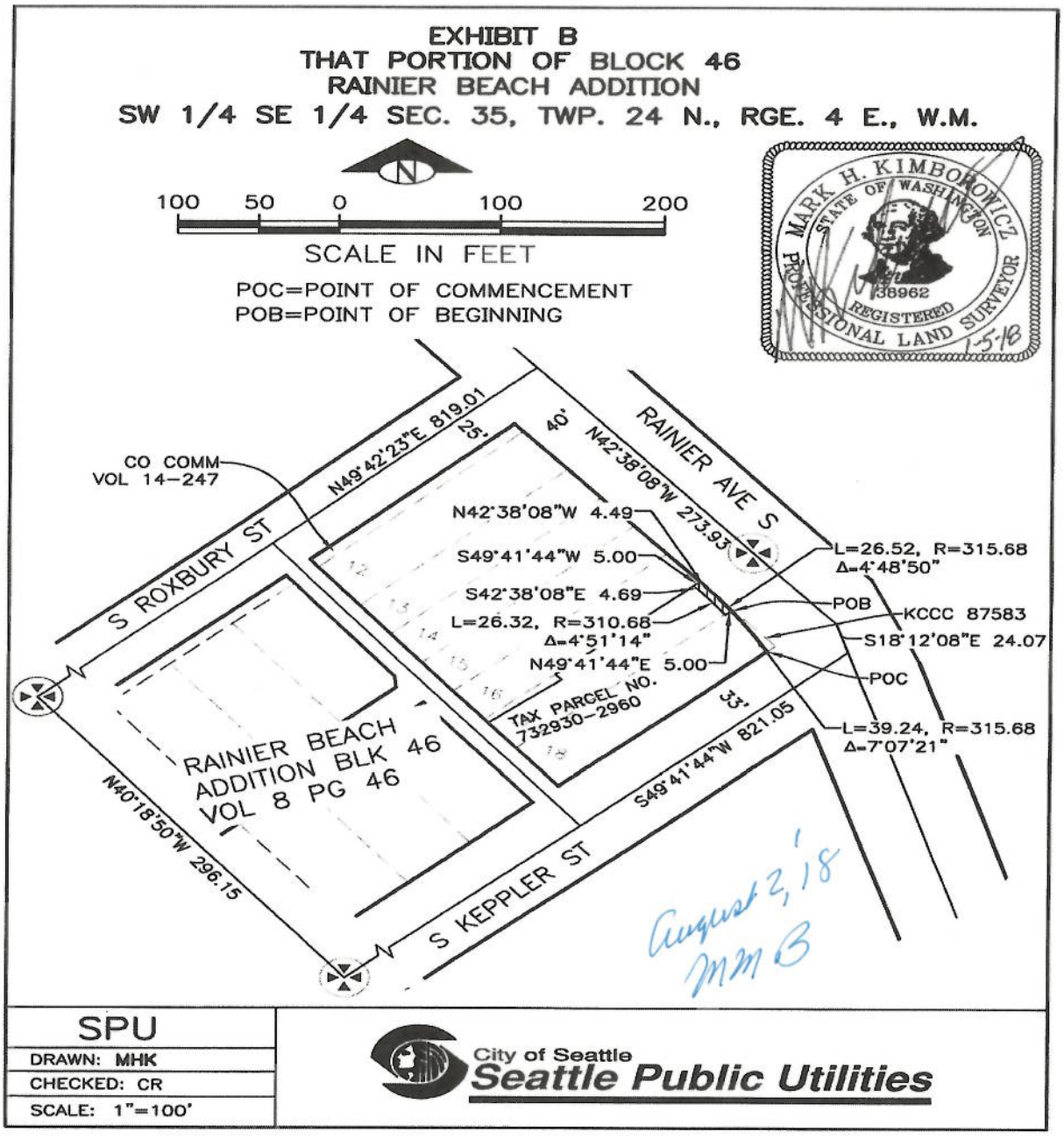
CATCHMENT WALL EASEMENT

SITUATED IN THE CITY OF SEATTLE, COUNTY OF KING, STATE OF WASHINGTON.

CONTAINING 155 SQ. FT., MORE OR LESS

Tax Parcel Number 712930-2960
Project Parcel 5

CATCHMENT WALL EASEMENT



Tax Parcel Number 712930-2960
Project Parcel 5

After recording return document to:

City of Seattle
Department of Transportation
700 5th Avenue – Suite 3800
PO Box 34996
Seattle, WA 98124-4966
Attn: Barret Aldrich

20190404000489
EASEMENT Rec: $105.00
4/4/2019 12:37 PM
KING COUNTY, WA

EXCISE TAX NOT REQUIRED
King Co. Records Division
By _____, Deputy
Amber Lee

Document Title: Catchment Wall Easement
Reference Number of Related Document: N/A
Grantor(s): Dan J. and Mary F. Del Duca
Grantee: City of Seattle
Abbreviated Legal Description: Ptn of LTS. 1 & 2, BLK. 35, RAINIER BEACH, King County, WA
Additional Legal Description is on Page(s) 5 of Document.
Assessor's Tax Parcel Number(s): 712930-1740

CATCHMENT WALL EASEMENT

Project: Rainier Avenue South Hazard Mitigation

The Grantor(s), **DAN J. DEL DUCA** and **MARY F. DEL DUCA**, a married couple, for and in consideration of mutual and offsetting benefits, other valuable consideration and the covenants and promises of the City hereinafter set forth, the receipt and sufficiency of which is hereby acknowledged, conveys and warrants unto the **CITY OF SEATTLE**, a municipal corporation of the State of Washington, and its assigns, an Easement over, under, across and upon the hereinafter described lands ("the Easement area") for the purposes of constructing, repairing, replacing and maintaining a catchment wall and other modifications associated therewith, to the same extent and purpose as if the rights herein granted had been acquired under Eminent Domain statutes of the State of Washington.

CATCHMENT WALL EASEMENT

The Grantor reserves the right to use the Easement area for purposes that will not unreasonably interfere with the Grantee's full enjoyment of the rights granted by this Easement. Neither the Grantor nor their successors and assigns may erect or construct any building or structure, or excavate, within the Easement area without the prior written consent of the Seattle Department of Transportation ("SDOT"). Further, planting trees or any other vegetation, except for grass, shall not be allowed within the Easement area. Grantor will submit a proposed work plan to SDOT at least 120 days before any work is commenced in the Easement area. As used in this Easement, "building or structure" means anything constructed or erected on the ground or any improvement built up or composed of parts joined together in some definite manner and affixed to the ground, including fences, walls and signs.

To the extent allowed by law, Grantor(s), their successors and assigns agree to indemnify Grantee from and against any and all claims, demands, suits, damages, loss or liability of any kind arising out of, or resulting from, erosion and/or landslides. The foregoing indemnity shall run with the land and bind Grantor(s) successors and assigns.

Said lands being situated in King County, State of Washington, and described as follows:

See Exhibit A attached hereto and made a part hereof.

Grantor:

By Dan J Del Duca
Dan J. Del Duca

Date: 5-16-18, 2018

By Mary F. Del Duca
Mary F. Del Duca

Date: 5-16-18, 2018

Tax Parcel Number 712930-1740

CATCHMENT WALL EASEMENT

STATE OF WASHINGTON)
: §
County of King)

On this 16th day of May, 2018, before me personally appeared DAN J. DEL DUCA , to me known to be the individual described in and who executed the foregoing instrument, and acknowledged that they signed the same as their free and voluntary act and deed, for the uses and purposes therein mentioned.

WITNESS MY HAND AND OFFICIAL SEAL hereto affixed the day and year first above written.

Notary Seal
BARRET ALDRICH
Commission Expires
NOTARY
PUBLIC
12-01-2021
STATE OF WASHINGTON
Please stay within block.

Notary (print name) Barret Aldrich
Notary Public in and for the State of Washington,
residing at Kenmore WA
My Appointment expires Dec 1, 2021

Tax Parcel Number 712930-1740

CATCHMENT WALL EASEMENT

STATE OF WASHINGTON)
: §
County of King)

On this 16th day of May, 2018, before me personally appeared MARY F. DEL DUCA, to me known to be the individual described in and who executed the foregoing instrument, and acknowledged that they signed the same as their free and voluntary act and deed, for the uses and purposes therein mentioned.

WITNESS MY HAND AND OFFICIAL SEAL hereto affixed the day and year first above written.

Notary Seal
BARRET ALDRICH
Commission Expires
NOTARY
PUBLIC
12-01-2021
STATE OF WASHINGTON
Please stay within block.

Notary (print name) Barret Aldrich
Notary Public in and for the State of Washington,
residing at Kenmore WA
My Appointment expires Dec 1. 2021

Tax Parcel Number 712930-1740

CATCHMENT WALL EASEMENT

Approved and Accepted By:
CITY OF SEATTLE

By: _____
Goran Sparrman, Interim Director
Seattle Department of Transportation

Date: 5/30, 2018

STATE OF WASHINGTON)
: §
County of King)

On this 30 day of May, 2018, before me personally appeared GORAN SPARRMAN, to me known to be the Interim Director of the Seattle Department of Transportation of the City of Seattle, a Washington Municipal Corporation, the municipal corporation that executed the within and foregoing instrument, and acknowledged the said instrument to be the free and voluntary act and deed of said municipal corporation for the uses and purposes therein mentioned, and on oath stated that he was authorized to execute said instrument.

WITNESS MY HAND AND OFFICIAL SEAL hereto affixed the day and year first above written.

Notary Seal
BARRET ALDRICH
Commission Expires
NOTARY PUBLIC
12-01-2021
STATE OF WASHINGTON
Please stay within block.

_____
Notary (print name) Barret Aldrich
Notary Public in and for the State of Washington,
residing at Kenmore WA
My Appointment expires 12-1-21

Tax Parcel Number 712930-1740

CATCHMENT WALL EASEMENT

EXHIBIT A
FOR LOT 2, BLOCK 35
RAINIER BEACH

THAT PORTION OF LOT 2 BLOCK 35, OF RAINIER BEACH, AS RECORDED IN VOLUME 8 OF PLATS, PAGE 11, RECORDS OF KING COUNTY, WASHINGTON, SITUATED IN THE NORTHEAST QUARTER OF THE NORTHEAST QUARTER OF SECTION 2, TOWNSHIP 23 NORTH, RANGE 4 EAST, W.M., DESCRIBED AS FOLLOWS;

COMMENCING AT THE INTERSECTION OF THE SOUTHERLY MARGIN OF RAINIER AVENUE SOUTH AND THE SOUTHERLY MARGIN OF SOUTH PERRY STREET, ALSO KNOWN AS THE NORTHWESTERLY CORNER OF LOT 1, OF SAID BLOCK 35, TOGETHER WITH THAT PORTION OF SOUTH PERRY STREET AS VACATED BY COUNTY COMMISSION UNDER VOLUME 14-247 AND WHICH ATTACHED BY OPERATION OF LAW; THENCE ALONG SAID SOUTHERLY MARGIN OF RAINIER AVENUE SOUTH, S 40° 18' 47" E A DISTANCE OF 68.70 FEET TO THE **POINT OF BEGINNING;**
THENCE CONTINUING ALONG SAID MARGIN S 40° 18' 47" E A DISTANCE OF 39.30 FEET TO THE NORTHEASTERLY PROPERTY CORNER OF SAID LOT 2;
THENCE ALONG SAID PROPERTY LINE S 49° 42' 00" W 5.00 FEET:
THENCE LEAVING SAID PROPERTY LINE N 40° 18' 47" W 39.30 FEET:
THENCE N 49° 42' 00" E A DISTANCE OF 5.00 FEET TO THE **POINT OF BEGINNING.**

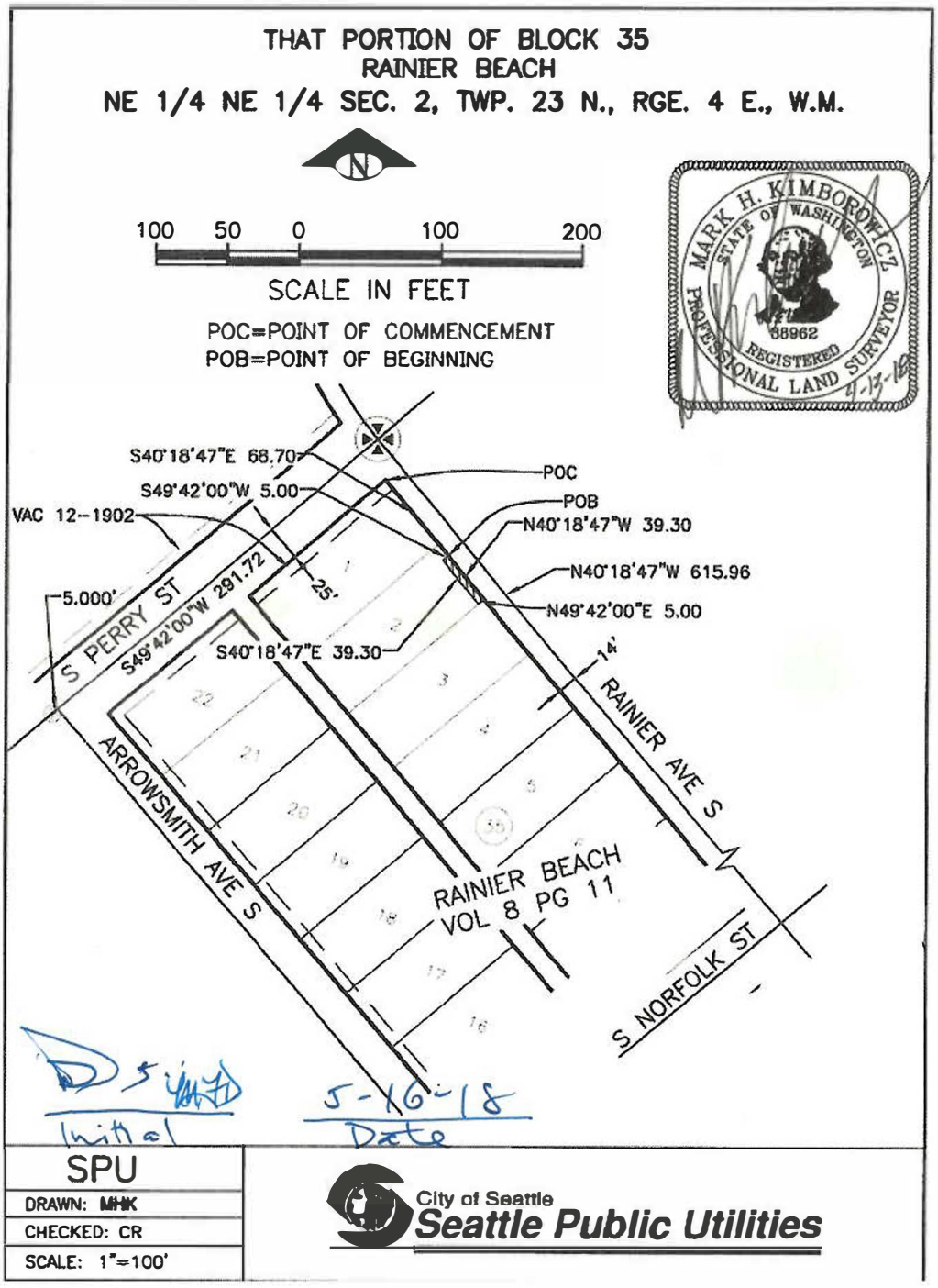
SITUATED IN THE CITY OF SEATTLE, COUNTY OF KING, STATE OF WASHINGTON.

CONTAINING 196.5 SQ. FT., MORE OR LESS

Tax Parcel Number 712930-1740

EXHIBIT B

CATCHMENT WALL EASEMENT



Tax Parcel Number 712930-1740

After recording return document to:

City of Seattle
Department of Transportation
700 5th Avenue – Suite 3800
PO Box 34996
Seattle, WA 98124-4966
Attn: Julie Aune

20190404000487
EASEMENT Rec: $104.00
4/4/2019 12:37 PM
KING COUNTY, WA

EXCISE TAX NOT REQUIRED
King Co. Records Division
By _____ Deputy
Amber Lee

Document Title: Catchment Wall Easement
Reference Number of Related Document: N/A
Grantor(s): Farrington, Paul J. and Ronald F. Minter
Grantee: City of Seattle
Legal Description (abbreviated): LOT 6 & PTN LOT 5, BLK 2 MAYES' ADD. TO SEATTLE
Assessor's Tax Parcel Number: 524180-0085

CATCHMENT WALL EASEMENT

Project: Rainier Avenue South Hazard Mitigation

The Grantor(s), **PAUL J. FARRINGTON AND RONALD F. MINTER,** each as their separate estate, for and in consideration of mutual and offsetting benefits, other valuable consideration and the covenants and promises of the City hereinafter set forth, the receipt and sufficiency of which is hereby acknowledged, conveys and warrants unto the **CITY OF SEATTLE**, a municipal corporation of the State of Washington, and its assigns, an Easement over, under, across and upon the hereinafter described lands ("the Easement area") for the purposes of constructing, repairing, replacing and maintaining a catchment wall and other modifications associated therewith, to the same extent and purpose as if the rights herein granted had been acquired under Eminent Domain statutes of the State of Washington.

The Grantor reserves the right to use the Easement area for purposes that will not unreasonably interfere with the Grantee's full enjoyment of the rights granted by this Easement. Neither the Grantor nor their successors and assigns may erect or construct any building or structure, or excavate, within the Easement area without the prior written consent of the Seattle Department of Transportation ("SDOT"). Further, planting trees or

CATCHMENT WALL EASEMENT

any other vegetation, except for grass, shall not be allowed within the Easement area. Grantor will submit a proposed work plan to SDOT at least 120 days before any work is commenced in the Easement area. As used in this Easement, "building or structure" means anything constructed or erected on the ground or any improvement built up or composed of parts joined together in some definite manner and affixed to the ground, including fences, walls and signs.

To the extent allowed by law, Grantor(s), their successors and assigns agree to indemnify Grantee from and against any and all claims, demands, suits, damages, loss or liability of any kind arising out of, or resulting from, erosion and/or landslides. The foregoing indemnity shall run with the land and bind Grantor(s) successors and assigns.

Said lands being situated in King County, State of Washington, and described as follows:

See Exhibit A attached hereto and made a part hereof.

Grantor:

By _____
Paul J. Farrington

By _____
Ronald F. Minter

Date: 31 JULY, 2018

Tax Parcel Number 524180-0085
Project Parcel 3a

CATCHMENT WALL EASEMENT

STATE OF WASHINGTON)
: §
County of King)

On this 31st day of July, 2018, before me personally appeared PAUL J. FARRINGTON, to me known to be the individual described in and who executed the foregoing instrument and acknowledged that they signed the same as his free and voluntary act and deed for the uses and purposes therein mentioned.

WITNESS MY HAND AND OFFICIAL SEAL hereto affixed the day and year first above written.

Notary Seal

Notary Public
State of Washington
GLENN P SADANG
MY COMMISSION EXPIRES
November 15, 2018

Please stay within block.

Notary (print name) Glenn P Sadang
Notary Public in and for the State of Washington,
residing at Seattle WA
My Appointment expires 11/15/2018

STATE OF WASHINGTON)
: §
County of King)

On this 31st day of July, 2018, before me personally appeared PAUL J. FARRINGTON, to me known to be the individual described in and who executed the foregoing instrument and acknowledged that they signed the same as his free and voluntary act and deed for the uses and purposes therein mentioned.

WITNESS MY HAND AND OFFICIAL SEAL hereto affixed the day and year first above written.

Notary Seal

Notary Public
State of Washington
GLENN P SADANG
MY COMMISSION EXPIRES
November 15, 2018

Please stay within block.

Notary (print name) Glenn P Sadang
Notary Public in and for the State of Washington,
residing at Seattle WA
My Appointment expires 11/15/2018

Tax Parcel Number 524180-0085
Project Parcel 3a

CATCHMENT WALL EASEMENT

Approved and Accepted By:
CITY OF SEATTLE

By: _____
Linea Laird, Interim Director
Seattle Department of Transportation

Date: December 13, 2018

STATE OF WASHINGTON)
: §
County of King)

On this 13 day of December, 2018, before me personally appeared LINEA LAIRD, to me known to be the Interim Director of the Seattle Department of Transportation of the City of Seattle, a Washington Municipal Corporation, the municipal corporation that executed the within and foregoing instrument, and acknowledged the said instrument to be the free and voluntary act and deed of said municipal corporation for the uses and purposes therein mentioned, and on oath stated that he was authorized to execute said instrument.

WITNESS MY HAND AND OFFICIAL SEAL hereto affixed the day and year first above written.

Notary Seal
BARRET ALDRICH
Commission Expires
NOTARY
PUBLIC
12-01-2021
STATE OF WASHINGTON
Please stay within block.

_____
Notary (print name) Barret Aldrich
Notary Public in and for the State of Washington,
residing at Vashon, WA
My Appointment expires Dec 1, 2021

Tax Parcel Number 524180-0085
Project Parcel 3a

CATCHMENT WALL EASEMENT

EXHIBIT A

PERMANENT EASEMENT DESCRIPTION

FOR LOTS 5 AND 6 BLOCK 2 MAYES ADDITION TO THE CITY OF SEATTLE

THAT PORTION OF THE SOUTHEAST HALF OF LOT 5, ALL OF LOT 6, BLOCK 2, MAYES ADDITION TO THE CITY OF SEATTLE, ACCORDING TO THE PLAT THEREOF RECORDED IN VOLUME 27 OF PLATS, PAGE 43, IN KING COUNTY, WASHINGTON, SITUATED IN THE SOUTHWEST QUARTER OF THE SOUTHEAST QUARTER OF SECTION 35, TOWNSHIP 24 NORTH, RANGE 4 EAST, W.M., DESCRIBED AS FOLLOWS;

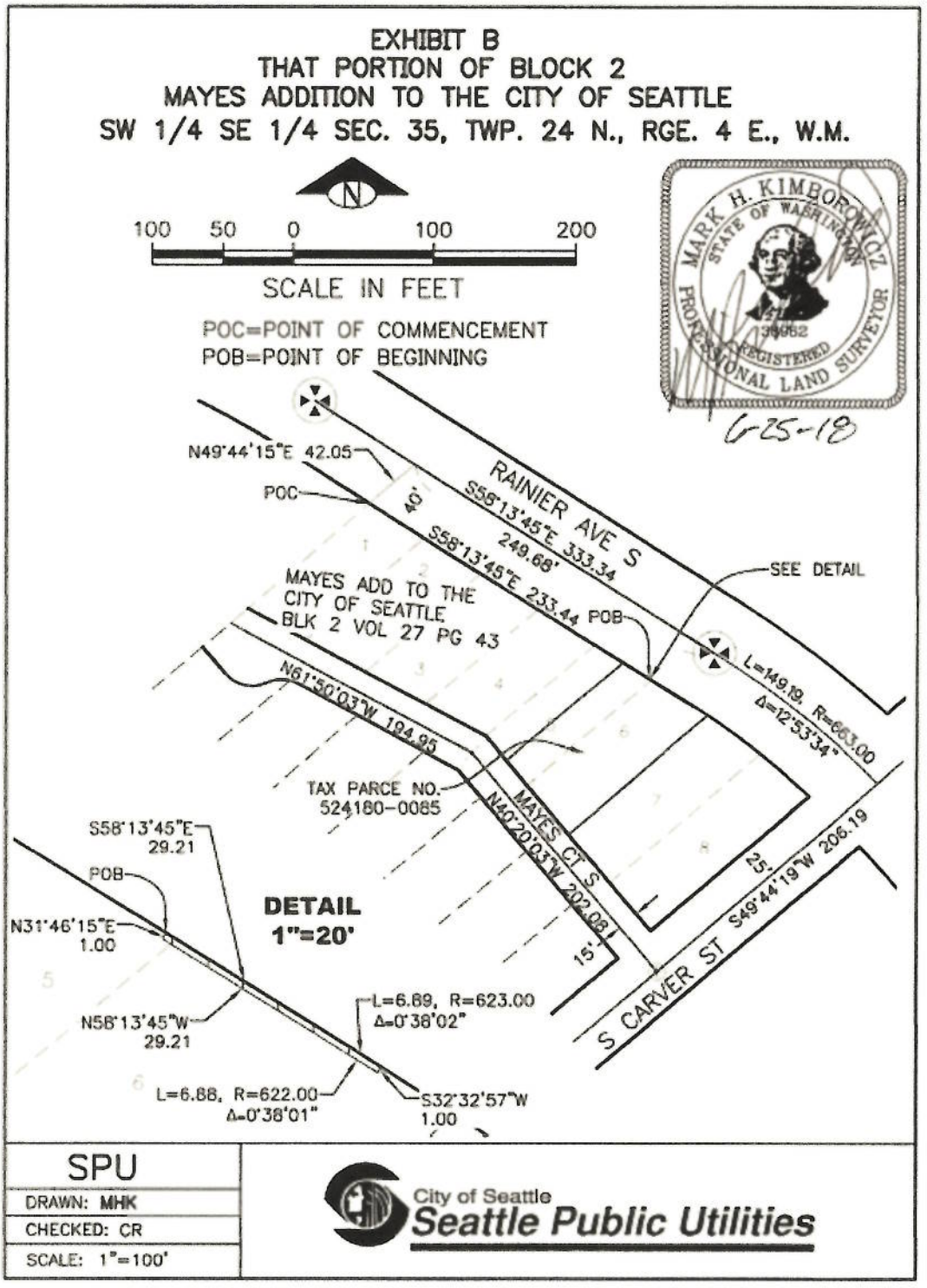
COMMENCING AT THE MOST NORTHWESTERLY CORNER OF LOT 1, BLOCK 2 OF SAID PLAT; THENCE ALONG THE SOUTHERLY RIGHT OF WAY MARGIN OF RAINIER AVENUE SOUTH S 58° 13' 45" E 233.44 FEET TO THE **POINT OF BEGINNING;** THENCE CONTINUING ALONG SAID RIGHT OF WAY MARGIN S 58° 13' 45" E 29.21 FEET TO THE BEGINNING OF A 623.00 FOOT TANGENT CURVE, CONCAVE TO SOUTHWEST; THENCE SOUTHEASTERLY ALONG THE ARC OF SAID CURVE THROUGH A CENTRAL ANGLE OF 0° 38' 02" A DISTANCE OF 6.89 FEET; THENCE LEAVING SAID RIGHT OF WAY MARGIN S 32° 32' 57" W 1.00 F00T TO THE BEGINNING OF A 622.00 FOOT NON TANGENT CURVE CONCAVE TO SOUTHWEST WHICH RADIUS POINT BEARS S 32° 24' 16" W; THENCE NORTHWESTERLY ALONG THE ARC OF SAID CURVE THROUGH A CENTRAL ANGLE OF 0° 38' 01" A DISTANCE OF 6.88 FEET; THENCE N 58° 13' 45" W 29.21 FEET; THENCE N 31° 46' 15" E 1.00 FOOT TO THE **POINT OF BEGINNING.**

SITUATED IN THE CITY OF SEATTLE, COUNTY OF KING, STATE OF WASHINGTON.

CONTAINING 36 SQ. FT., MORE OR LESS

Tax Parcel Number 524180-0085
Project Parcel 3a

CATCHMENT WALL EASEMENT



Tax Parcel Number 524180-0085
Project Parcel 3a

After recording return document to:

City of Seattle
Department of Transportation
700 5th Avenue – Suite 3800
PO Box 34996
Seattle, WA 98124-4966
Attn: Barret Aldrich

20190404000481
EASEMENT Rec: $104.00
4/4/2019 12:37 PM
KING COUNTY, WA

EXCISE TAX NOT REQUIRED
King Co. Records Division
By Amber Lee Deputy

Document Title: Catchment Wall Easement
Reference Number of Related Document: N/A
Grantor(s): Mark Duane Lewis
Grantee: City of Seattle
Abbreviated Legal Description: Ptn of PTN LOTS 2 & 3, BLK 2, MAYES ADD TO SEATTLE, King County, WA
Additional Legal Description is on Page(s) 5 of Document.
Assessor's Tax Parcel Number(s): 524180-0066

CATCHMENT WALL EASEMENT

Project: Rainier Avenue South Hazard Mitigation

The Grantor(s), **MARK DUANE LEWIS**, for and in consideration of mutual and offsetting benefits, other valuable consideration and the covenants and promises of the City hereinafter set forth, the receipt and sufficiency of which is hereby acknowledged, conveys and warrants unto the **CITY OF SEATTLE**, a municipal corporation of the State of Washington, and its assigns, an Easement over, under, across and upon the hereinafter described lands ("the Easement area") for the purposes of constructing, repairing, replacing and maintaining a catchment wall and other modifications associated therewith, to the same extent and purpose as if the rights herein granted had been acquired under Eminent Domain statutes of the State of Washington.

Tax Parcel Number 524180-0066
Project Parcel 2

CATCHMENT WALL EASEMENT

The Grantor reserves the right to use the Easement area for purposes that will not unreasonably interfere with the Grantee's full enjoyment of the rights granted by this Easement. Neither the Grantor nor their successors and assigns may erect or construct any building or structure, or excavate, in the Easement area without the prior written consent of the Seattle Department of Transportation ("SDOT"). Further, planting trees or any other vegetation, except for grass, shall not be allowed within the Easement area. Grantor will submit a proposed work plan to SDOT at least 60 days before any work is commenced in the Easement area. As used in this Easement, "building or structure" means anything constructed or erected on the ground or any improvement built up or composed of parts joined together in some definite manner and affixed to the ground, including fences, walls and signs.

To the extent allowed by law, Grantor(s), their successors and assigns agree to indemnify Grantee from and against any and all claims, demands, suits, damages, loss or liability of any kind arising out of, or resulting from, erosion and/or landslides. The foregoing indemnity shall run with the land and bind Grantor(s) successors and assigns.

Said lands being situated in King County, State of Washington, and described as follows:

See Exhibit A attached hereto and made a part hereof.

Grantors:

By: Mark D. Lewis
MARK DUANE LEWIS

Date: 02/21/19 ~~, 2018~~

Tax Parcel Number 524180-0066
Project Parcel 2

CATCHMENT WALL EASEMENT

STATE OF WASHINGTON)
: §
County of King)

On this 21 day of February, 2018, before me personally appeared MARK DUANE LEWIS to me known to be the individual described in and who executed the foregoing instrument, and acknowledged that they signed the same as their free and voluntary act and deed, for the uses and purposes therein mentioned.

WITNESS MY HAND AND OFFICIAL SEAL hereto affixed the day and year first above written.

Notary Seal
BARRET ALDRICH
Commission Expires
NOTARY
PUBLIC
12-01-2021
STATE OF WASHINGTON
Please stay within block.

Notary (print name) Barret Aldrich
Notary Public in and for the State of Washington,
residing at Vashon WA
My Appointment expires Dec. 1, 2021

Tax Parcel Number 524180-0066
Project Parcel 2

CATCHMENT WALL EASEMENT

Approved and Accepted By:
CITY OF SEATTLE

By: _____
Sam Zimbabwe, Director
Seattle Department of Transportation

Date: 2/26, 2019

STATE OF WASHINGTON)
: §
County of King)

On this 26th day of February, 2019, before me personally appeared SAM ZIMBABWE, to me known to be the Director of the Seattle Department of Transportation of the City of Seattle, a Washington Municipal Corporation, the municipal corporation that executed the within and foregoing instrument, and acknowledged the said instrument to be the free and voluntary act and deed of said municipal corporation for the uses and purposes therein mentioned, and on oath stated that he was authorized to execute said instrument.

WITNESS MY HAND AND OFFICIAL SEAL hereto affixed the day and year first above written.

Notary Seal
GRETCHEN M HAYDEL
NOTARY PUBLIC
COMMISSION EXPIRES APRIL 30, 2020
STATE OF WASHINGTON
Please stay within block.

_____
Notary (print name) Gretchen M Haydel
Notary Public in and for the State of Washington,
residing at Seattle, WA
My Appointment expires April 30 2020

Tax Parcel Number 524180-0066
Project Parcel 2

CATCHMENT WALL EASEMENT

EXHIBIT A

PERMANENT EASEMENT DESCRIPTION

FOR LOT 2 AND 3 BLOCK 2 MAYES ADDITION TO THE CITY OF SEATTLE

THAT PORTION OF LOT 2 LYING SOUTHEASTERLY OF A LINE WHICH BEGINS AT A POINT ON THE SOUTHWESTERLY LINE OF SAID LOT 2 DISTANT SOUTH 62°56'11" EAST, 59.17 FEET FROM THE MOST WESTERLY CORNER OF SAID LOT 1 IN SAID BLOCK 2 AND RUNS;
THENCE NORTH 48°33'49" EAST, PARALLEL WITH THE NORTHEASTERLY LINE OF SAID LOT 1 AND THE NORTHWESTERLY HALF OF LOT 3, BLOCK 2, MAYES ADDITION TO CITY OF SEATTLE, ACCORDING TO THE PLAT THEREOF RECORDED IN VOLUME 27 OF PLATS, PAGE 43, RECORDS OF KING COUNTY, WASHINGTON, SITUATED IN THE SOUTHWEST QUARTER OF THE SOUTHEAST QUARTER OF SECTION 35, TOWNSHIP 24 NORTH, RANGE 4 EAST, W.M., DESCRIBED AS FOLLOWS;

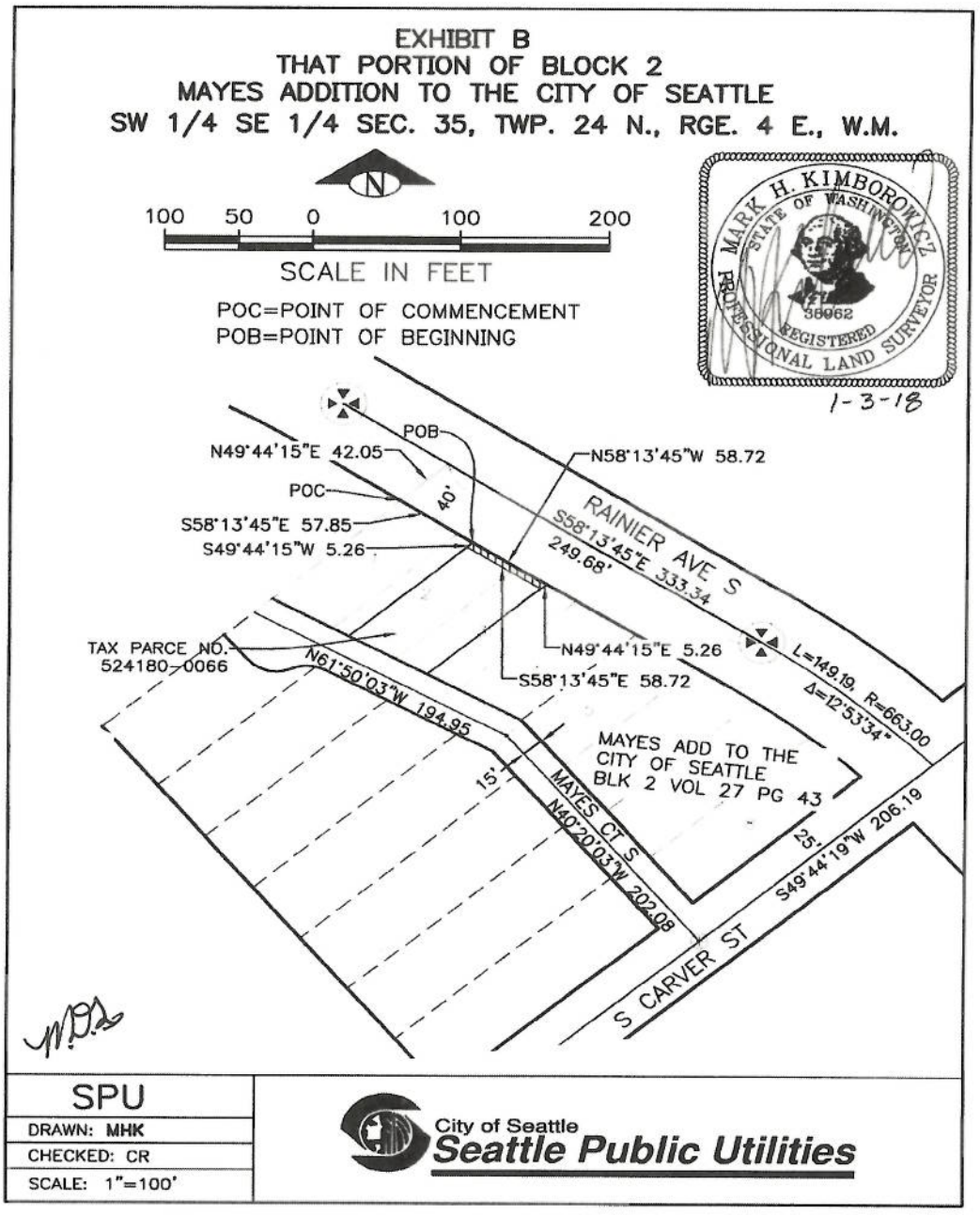
COMMENCING AT THE MOST NORTHWESTERLY CORNER OF LOT 1, BLOCK 2 OF SAID PLAT; THENCE ALONG THE SOUTHERLY RIGHT OF WAY MARGIN OF RAINIER AVENUE SOUTH S 58° 13' 45" E 57.85 FEET TO THE **POINT OF BEGINNING**; THENCE CONTINUING ALONG SAID RIGHT OF WAY MARGIN S 58° 13' 45" E 58.72 FEET; THENCE LEAVING SAID RIGHT OF WAY MARGIN S 49° 44' 15" W 5.26 FEET; THENCE N 58° 13' 45" W 58.72 FEET; THENCE N 49° 44' 15" E 5.26 FEET TO THE **POINT OF BEGINNING.**

SITUATED IN THE CITY OF SEATTLE, COUNTY OF KING, STATE OF WASHINGTON.

CONTAINING 294 SQ. FT., MORE OR LESS

Tax Parcel Number 524180-0066
Project Parcel 2

CATCHMENT WALL EASEMENT



Tax Parcel Number 524180-0066
Project Parcel 2

After recording return document to:

City of Seattle
Department of Transportation
700 5th Avenue – Suite 3800
PO Box 34996
Seattle, WA 98124-4966
Attn: Barret Aldrich

20190404000482
EASEMENT Rec: $104.00
4/4/2019 12:37 PM
KING COUNTY, WA

EXCISE TAX NOT REQUIRED
King County Records Division
By _____ Deputy
Amber Lee

Document Title: Catchment Wall Easement
Reference Number of Related Document: N/A
Grantor(s): Gene Louie and Lena T. Louie
Grantee: City of Seattle
Abbreviated Legal Description: Ptn of LT. 4, PTN. LTS. 3 & 5, BLK. 2, MAYE'S ADD. TO THE CITY OF SEATTLE, King County, WA
Additional Legal Description is on Page(s) 5 of Document.
Assessor's Tax Parcel Number(s): 524180-0071

CATCHMENT WALL EASEMENT

Project: Rainier Avenue South Hazard Mitigation

The Grantor(s), **GENE LOUIE** and **LENA T. LOUIE**, for and in consideration of mutual and offsetting benefits, other valuable consideration and the covenants and promises of the City hereinafter set forth, the receipt and sufficiency of which is hereby acknowledged, conveys and warrants unto the **CITY OF SEATTLE**, a municipal corporation of the State of Washington, and its assigns, an Easement over, under, across and upon the hereinafter described lands ("the Easement area") for the purposes of constructing, repairing, replacing and maintaining a catchment wall and other modifications associated therewith, to the same extent and purpose as if the rights herein granted had been acquired under Eminent Domain statutes of the State of Washington.

Tax Parcel Number 524180-0071
Project Parcel 3

CATCHMENT WALL EASEMENT

The Grantor reserves the right to use the Easement area for purposes that will not unreasonably interfere with the Grantee's full enjoyment of the rights granted by this Easement. Neither the Grantor nor their successors and assigns may erect or construct any building or structure, or excavate, in the Easement area without the prior written consent of the Seattle Department of Transportation ("SDOT"). Further, planting trees or any other vegetation, except for grass, shall not be allowed within the Easement area. Grantor will submit a proposed work plan to SDOT at least 120 days before any work is commenced in the Easement area. As used in this Easement, "building or structure" means anything constructed or erected on the ground or any improvement built up or composed of parts joined together in some definite manner and affixed to the ground, including fences, walls and signs.

To the extent allowed by law, Grantor(s), their successors and assigns agree to indemnify Grantee from and against any and all claims, demands, suits, damages, loss or liability of any kind arising out of, or resulting from, erosion and/or landslides. The foregoing indemnity shall run with the land and bind Grantor(s) successors and assigns.

Said lands being situated in King County, State of Washington, and described as follows:

See Exhibit A attached hereto and made a part hereof.

Grantors:

By: _____
GENE LOUIE

By: _____
LENA T. LOUIE

Date: August 23, 2018

Tax Parcel Number 524180-0071
Project Parcel 3

CATCHMENT WALL EASEMENT

STATE OF WASHINGTON)
: §
County of King)

On this 23 day of August, 2018, before me personally appeared GENE LOUIE and LENA T. LOUIE to me known to be the individuals described in and who executed the foregoing instrument, and acknowledged that they signed the same as their free and voluntary act and deed, for the uses and purposes therein mentioned.

WITNESS MY HAND AND OFFICIAL SEAL hereto affixed the day and year first above written.

Notary Seal
BARRET ALDRICH
Commission Expires
NOTARY
PUBLIC
12-01-2021
STATE OF WASHINGTON
Please stay within block.

Notary (print name) Barret Aldrich
Notary Public in and for the State of Washington,
residing at Kenmore WA
My Appointment expires 12-01-21

Tax Parcel Number 524180-0071
Project Parcel 3

CATCHMENT WALL EASEMENT

Approved and Accepted By:
CITY OF SEATTLE

By: _____
Linea Laird, Interim Director
Seattle Department of Transportation

Date: December 13, 2018

STATE OF WASHINGTON)
: §
County of King)

On this 13 day of December, 2018, before me personally appeared LINEA LAIRD, to me known to be the Interim Director of the Seattle Department of Transportation of the City of Seattle, a Washington Municipal Corporation, the municipal corporation that executed the within and foregoing instrument, and acknowledged the said instrument to be the free and voluntary act and deed of said municipal corporation for the uses and purposes therein mentioned, and on oath stated that he was authorized to execute said instrument.

WITNESS MY HAND AND OFFICIAL SEAL hereto affixed the day and year first above written.

Notary Seal
BARRET ALDRICH
Commission Expires
NOTARY
PUBLIC
12-01-2021
STATE OF WASHINGTON
Please stay within block.

_____
Notary (print name) Barret Aldrich
Notary Public in and for the State of Washington,
residing at Vashon, WA
My Appointment expires Dec 1, 2021

Tax Parcel Number 524180-0071
Project Parcel 3

CATCHMENT WALL EASEMENT

EXHIBIT A

PERMANENT EASEMENT DESCRIPTION

FOR LOTS 3 AND 4 BLOCK 2 MAYES ADDITION TO THE CITY OF SEATTLE

THAT PORTION OF THE SOUTHEAST HALF OF LOT 3, ALL OF LOT 4, AND THE NORTHWEST HALF OF LOT 5, BLOCK 2, MAYE'S ADDITION TO THE CITY OF SEATTLE, ACCORDING TO THE PLAT THEREOF RECORDED IN VOLUME 27 OF PLATS, PAGE 43, IN KING COUNTY, WASHINGTON, SITUATED IN THE SOUTHWEST QUARTER OF THE SOUTHEAST QUARTER OF SECTION 35, TOWNSHIP 24 NORTH, RANGE 4 EAST, W.M., DESCRIBED AS FOLLOWS;

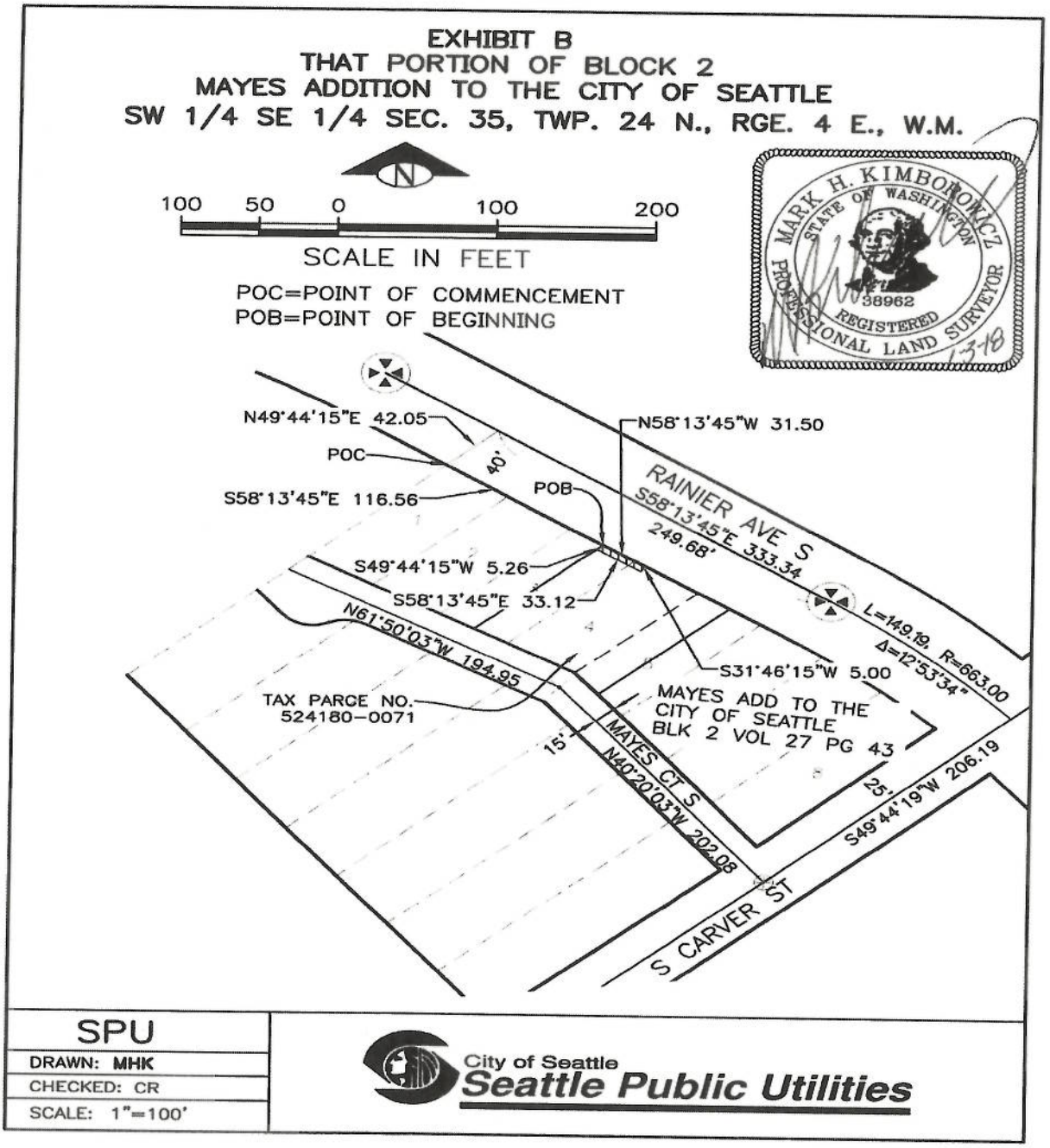
COMMENCING AT THE MOST NORTHWESTERLY CORNER OF LOT 1, BLOCK 2 OF SAID PLAT; THENCE ALONG THE SOUTHERLY RIGHT OF WAY MARGIN OF RAINIER AVENUE SOUTH S 58° 13' 45" E 116.56 FEET TO THE **POINT OF BEGINNING**; THENCE CONTINUING ALONG SAID RIGHT OF WAY MARGIN S 58° 13' 45" E 31.50 FEET; THENCE LEAVING SAID RIGHT OF WAY MARGIN S 31° 46' 15" W 5.00 FEET; THENCE N 58° 13' 45" W 33.12 FEET; THENCE N 49° 44' 15" E 5.26 FEET TO THE **POINT OF BEGINNING.**

SITUATED IN THE CITY OF SEATTLE, COUNTY OF KING, STATE OF WASHINGTON.

CONTAINING 162 SQ. FT., MORE OR LESS

Tax Parcel Number 524180-0071
Project Parcel 3

CATCHMENT WALL EASEMENT



Tax Parcel Number 524180-0071
Project Parcel 3

After recording return document to:

City of Seattle
Department of Transportation
700 5th Avenue – Suite 3800
PO Box 34996
Seattle, WA 98124-4966
Attn: Barret Aldrich

20190404000488
EASEMENT Rec: $104.00
4/4/2019 12:37 PM
KING COUNTY, WA

EXCISE TAX NOT REQUIRED
King Co. Records Division
By _____, Deputy
Amber Lee

Document Title: Catchment Wall Easement
Reference Number of Related Document: N/A
Grantor(s): Lincoln A. Louie and Ann Marie D. Louie
Grantee: City of Seattle
Abbreviated Legal Description: Ptn of LOTS 3, 4 & 5, BLK 35, RAINIER BEACH ADD, ACC. TO PLAT THEREOF REC. IN VOL 8, PG 11, King County, WA
Additional Legal Description is on Page(s) 5 of Document.
Assessor's Tax Parcel Number(s): 712930-1750

CATCHMENT WALL EASEMENT

Project: Rainier Avenue South Hazard Mitigation

The Grantor(s), **LINCOLN A. LOUIE** and **ANN MARIE D. LOUIE**, a married couple, for and in consideration of mutual and offsetting benefits, other valuable consideration and the covenants and promises of the City hereinafter set forth, the receipt and sufficiency of which is hereby acknowledged, conveys and warrants unto the **CITY OF SEATTLE**, a municipal corporation of the State of Washington, and its assigns, an Easement over, under, across and upon the hereinafter described lands ("the Easement area") for the purposes of constructing, repairing, replacing and maintaining a catchment wall and other modifications associated therewith, to the same extent and purpose as if the rights herein granted had been acquired under Eminent Domain statutes of the State of Washington.

Tax Parcel Number 712930-1750
Project Parcel 7

CATCHMENT WALL EASEMENT

The Grantor reserves the right to use the Easement area for purposes that will not unreasonably interfere with the Grantee's full enjoyment of the rights granted by this Easement. Neither the Grantor nor their successors and assigns may erect or construct any building or structure, or excavate, within the Easement area without the prior written consent of the Seattle Department of Transportation ("SDOT"). Further, planting trees or any other vegetation, except for grass, shall not be allowed within the Easement area. Grantor will submit a proposed work plan to SDOT at least 120 days before any work is commenced in the Easement area. As used in this Easement, "building or structure" means anything constructed or erected on the ground or any improvement built up or composed of parts joined together in some definite manner and affixed to the ground, including fences, walls and signs.

To the extent allowed by law, Grantor(s), their successors and assigns agree to indemnify Grantee from and against any and all claims, demands, suits, damages, loss or liability of any kind arising out of, or resulting from, erosion and/or landslides. The foregoing indemnity shall run with the land and bind Grantor(s) successors and assigns.

Said lands being situated in King County, State of Washington, and described as follows:

See Exhibit A attached hereto and made a part hereof.

Grantors:

By _____
LINCOLN A. LOUIE

Date: May 14, 2018

By _____
ANN MARIE D. LOUIE

Date: 5/14, 2018

Tax Parcel Number 712930-1750
Project Parcel 7

CATCHMENT WALL EASEMENT

STATE OF WASHINGTON)
: §
County of King)

On this 14TH day of MAY, 2018, before me personally appeared LINCOLN A. LOUIE and ANN MARIE D. LOUIE, to me known to be the individuals described in and who executed the foregoing instrument, and acknowledged that they signed the same as their free and voluntary act and deed, for the uses and purposes therein mentioned.

WITNESS MY HAND AND OFFICIAL SEAL hereto affixed the day and year first above written.

Notary Seal
Please stay within block.

SUE H. CHOW
NOTARY PUBLIC
COMMISSION EXPIRES
7-09-19
STATE OF WASHINGTON

Notary (print name) SUE H CHOW
Notary Public in and for the State of Washington,
residing at BELLEVUE, WA
My Appointment expires JULY 9, 2019

Tax Parcel Number 712930-1750
Project Parcel 7

CATCHMENT WALL EASEMENT

Approved and Accepted By:
CITY OF SEATTLE

By: _____
Goran Sparrman, Interim Director
Seattle Department of Transportation

Date: 5/30, 2018

STATE OF WASHINGTON)
: §
County of King)

On this 30 day of May, 2018, before me personally appeared GORAN SPARRMAN, to me known to be the Interim Director of the Seattle Department of Transportation of the City of Seattle, a Washington Municipal Corporation, the municipal corporation that executed the within and foregoing instrument, and acknowledged the said instrument to be the free and voluntary act and deed of said municipal corporation for the uses and purposes therein mentioned, and on oath stated that he was authorized to execute said instrument.

WITNESS MY HAND AND OFFICIAL SEAL hereto affixed the day and year first above written.

Notary Seal
BARRET ALDRICH Commission Expires NOTARY PUBLIC 12-01-2021 STATE OF WASHINGTON
Please stay within block.

_____
Notary (print name) Barret Aldrich
Notary Public in and for the State of Washington,
residing at Kenmore WA
My Appointment expires 12-1-21

Tax Parcel Number 712930-1750
Project Parcel 7

CATCHMENT WALL EASEMENT

EXHIBIT A

PERMANENT EASEMENT DESCRIPTION

FOR LOTS 3 THROUGH 5, BLOCK 35

RAINIER BEACH

THAT PORTION OF LOTS 3 THROUGH 5 BLOCK 35, OF RAINIER BEACH, AS RECORDED IN VOLUME 8 OF PLATS, PAGE 11, RECORDS OF KING COUNTY, WASHINGTON, SITUATED IN THE NORTHEAST QUARTER OF THE NORTHEAST QUARTER OF SECTION 2, TOWNSHIP 23 NORTH, RANGE 4 EAST, W.M., DESCRIBED AS FOLLOWS;

COMMENCING AT THE INTERSECTION OF THE SOUTHERLY MARGIN OF RAINIER AVENUE SOUTH AND THE SOUTHERLY MARGIN OF SOUTH PERRY STREET ALSO KNOWN AS THE NORTHWESTERLY CORNER OF LOT 1, OF SAID BLOCK 35, TOGETHER WITH THAT PORTION OF SOUTH PERRY STREET AS VACATED BY COUNTY COMMISSION UNDER VOLUME 14-247 AND WHICH ATTACHED BY OPERATION OF LAW; THENCE ALONG SAID SOUTHERLY MARGIN OF RAINIER AVENUE SOUTH, S 40° 18' 47" E A DISTANCE OF 108.00 FEET TO THE NORTHWESTERLY PROPERTY CORNER OF LOT 3 AND THE **POINT OF BEGINNING;**
THENCE CONTINUING ALONG SAID RIGHT OF WAY MARGIN S 40° 18' 47" E A DISTANCE OF 150.00 FEET TO THE SOUTHEASTERLY PROPERTY LINE OF LOT 5; THENCE ALONG SAID PROPERTY LINE S 49° 42' 00" W 5.00 FEET;
THENCE LEAVING SAID PROPERTY LINE N 40° 18' 47" W 150.00 FEET TO THE NORTHWESTERLY PROPERTY LINE OF LOT 3;
THENCE ALONG SAID PROPERTY LINE N 49° 42' 00" E A DISTANCE OF 5.00 FEET TO THE **POINT OF BEGINNING.**

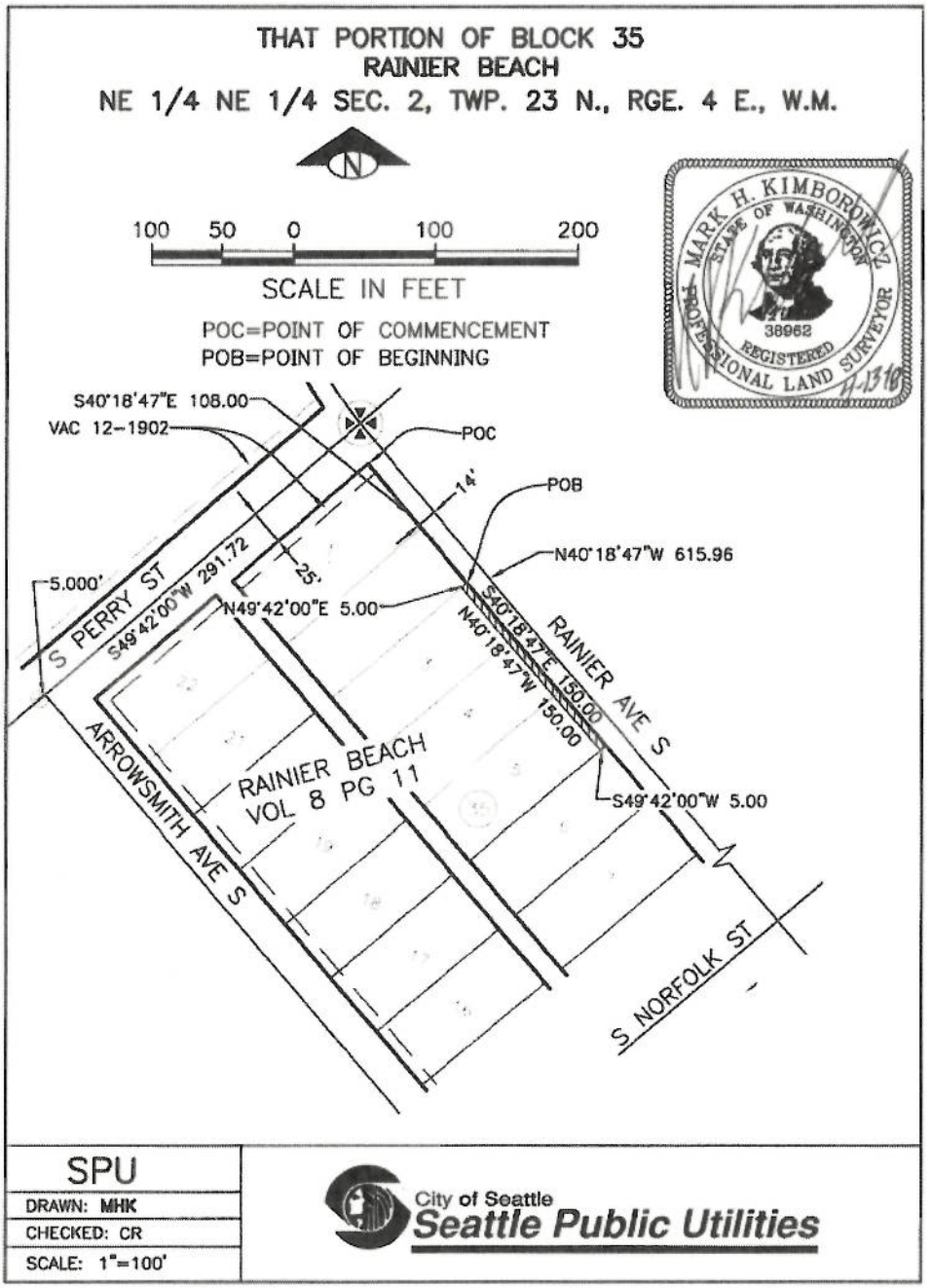
SITUATED IN THE CITY OF SEATTLE, COUNTY OF KING, STATE OF WASHINGTON.

CONTAINING 750 SQ. FT., MORE OR LESS

Tax Parcel Number 712930-1750
Project Parcel 7

EXHIBIT B

CATCHMENT WALL EASEMENT



Tax Parcel Number 712930-1750
Project Parcel 7

20190404000486
EASEMENT Rec: $105.00
4/4/2019 12:37 PM
KING COUNTY, WA

After recording return document to:

City of Seattle
Department of Transportation
700 5th Avenue – Suite 3800
PO Box 34996
Seattle, WA 98124-4966
Attn: Barret Aldrich

EXCISE TAX NOT REQUIRED
King Co. Records Division
By Amber Lee Deputy

Document Title: Catchment Wall Easement
Reference Number of Related Document: N/A
Grantor(s): Robert Miller and Ana Miller
Grantee: City of Seattle
Abbreviated Legal Description: Ptn of STURTEVANTS LAKE FRONT TRS 12 & POR 11 ELY OF LN RNNG FR PT 9.44 FT NWLY OF NE COR TO PT 11.63 FT NWLY OF SE COR LESS ST, Block: 3, Lot: 11-12, King County, WA
Additional Legal Description is on Page(s) 5 of Document.
Assessor's Tax Parcel Number(s): 806900-0180

CATCHMENT WALL EASEMENT

Project: Rainier Avenue South Hazard Mitigation

The Grantor(s), **ROBERT MILLER** and **ANA MILLER**, for and in consideration of mutual and offsetting benefits, other valuable consideration and the covenants and promises of the City hereinafter set forth, the receipt and sufficiency of which is hereby acknowledged, conveys and warrants unto the **CITY OF SEATTLE**, a municipal corporation of the State of Washington, and its assigns, an Easement over, under, across and upon the hereinafter described lands ("the Easement area") for the purposes of constructing, repairing, replacing and maintaining a catchment wall and other modifications associated therewith, to the same extent and purpose as if the rights herein granted had been acquired under Eminent Domain statutes of the State of Washington.

Tax Parcel Number 806900-0180
Project Parcel 11

CATCHMENT WALL EASEMENT

The Grantor reserves the right to use the Easement area for purposes that will not unreasonably interfere with the Grantee's full enjoyment of the rights granted by this Easement. Neither the Grantor nor their successors and assigns may erect or construct any building or structure, or excavate, within the Easement area without the prior written consent of the Seattle Department of Transportation ("SDOT"). Further, planting trees or any other vegetation, except for grass, shall not be allowed within the Easement area. Grantor will submit a proposed work plan to SDOT at least 120 days before any work is commenced in the Easement area. As used in this Easement, "building or structure" means anything constructed or erected on the ground or any improvement built up or composed of parts joined together in some definite manner and affixed to the ground, including fences, walls and signs.

To the extent allowed by law, Grantor(s), their successors and assigns agree to indemnify Grantee from and against any and all claims, demands, suits, damages, loss or liability of any kind arising out of, or resulting from, erosion and/or landslides. The foregoing indemnity shall run with the land and bind Grantor(s) successors and assigns.

Said lands being situated in King County, State of Washington, and described as follows:

See Exhibit A attached hereto and made a part hereof.

Grantors: Date: 07-27, 2018

By _____
Robert Miller

By _____
Ana Miller

Tax Parcel Number 806900-0180
Project Parcel 11

CATCHMENT WALL EASEMENT

STATE OF WASHINGTON)
: §
County of King)

On this 27th day of June, 2018, before me personally appeared ROBERT MILLER and ANA MILLER, to me known to be the individuals described in and who executed the foregoing instrument, and acknowledged that they signed the same as their free and voluntary act and deed, for the uses and purposes therein mentioned.

WITNESS MY HAND AND OFFICIAL SEAL hereto affixed the day and year first above written.

Notary Seal
Please stay within block.

Notary (print name) Barret Aldrich
Notary Public in and for the State of Washington,
residing at Kenmore WA
My Appointment expires 12-01-21

BARRET ALDRICH
Commission Expires
NOTARY
PUBLIC
12-01-2021
STATE OF WASHINGTON

Tax Parcel Number 806900-0180
Project Parcel 11

CATCHMENT WALL EASEMENT

Approved and Accepted By:
CITY OF SEATTLE

By: _____
Linea Laird, Interim Director
Seattle Department of Transportation

Date: December 13, 2018

STATE OF WASHINGTON)
: §
County of King)

On this 13 day of December, 2018, before me personally appeared LINEA LAIRD, to me known to be the Interim Director of the Seattle Department of Transportation of the City of Seattle, a Washington Municipal Corporation, the municipal corporation that executed the within and foregoing instrument, and acknowledged the said instrument to be the free and voluntary act and deed of said municipal corporation for the uses and purposes therein mentioned, and on oath stated that he was authorized to execute said instrument.

WITNESS MY HAND AND OFFICIAL SEAL hereto affixed the day and year first above written.

Notary Seal
BARRET ALDRICH
Commission Expires
NOTARY
PUBLIC
12-01-2021
STATE OF WASHINGTON
Please stay within block.

_____
Notary (print name) Barret Aldrich
Notary Public in and for the State of Washington,
residing at Vashon, WA
My Appointment expires Dec 1, 2021

Tax Parcel Number 806900-0180
Project Parcel 11

CATCHMENT WALL EASEMENT

EXHIBIT A

FOR PORTIONS OF LOTS 11-12 BLOCK 3

STURTEVANT'S RAINIER BEACH LAKE FRONT TRACTS

THAT PORTION OF LOT 12, AND THAT PORTION OF LOT 11, BLOCK 3, STURTEVANT'S RAINIER BEACH LAKE FRONT TRACTS, ACCORDING TO THE PLAT THEREOF RECORDED IN VOLUME 12 OF PLATS, PAGE 102, IN KING COUNTY, WASHINGTON, DESCRIBED AS FOLLOWS:

BEGINNING AT THE SOUTHEAST CORNER OF SAID LOT 11;
THENCE NORTHEASTERLY ALONG THE SOUTHEASTERLY LINE OF LOT 11, 132.10 FEET TO THE NORTHEAST CORNER OF SAID LOT;
THENCE NORTH 70°37' WEST ALONG THE NORTHERLY LINE OF LOT 11, 9.44 FEET; THENCE SOUTHWESTERLY TO A POINT ON THE SOUTHERLY LINE OF LOT 11 WHICH IS 11.63 FEET WESTERLY (MEASURED ALONG THE SOUTHERLY LINE) FROM THE SOUTHEAST CORNER OF LOT 11; THENCE EASTERLY ALONG THE SOUTHERLY LINE OF LOT 11, 11.63 FEET TO THE POINT OF BEGINNING; EXCEPT THAT PORTION THEREOF CONDEMNED FOR RAINIER AVENUE BY KING COUNTY SUPERIOR COURT CAUSE NUMBER 87583, ORDINANCE NUMBER 29364 OF THE CITY OF SEATTLE; DESCRIBED AS FOLLOWS:

COMMENCING AT THE MOST NORTHWESTERLY CORNER OF SAID BLOCK 3, BEING THE INTERSECTION OF THE SOUTHERLY RIGHT OF WAY MARGIN OF RAINIER AVENUE SOUTH AND THE EASTERLY RIGHT OF WAY MARGIN OF 75TH AVENUE SOUTH, PER KING COUNTY SUPERIOR COURT CAUSE NO. 87583, SAID POINT BEING THE BEGINNING OF A 303.88 FOOT NON TANGENT CURVE, CONCAVE TO SOUTHWEST, WHICH RADIUS POINT BEARS S 11° 21' 26" W; THENCE SOUTHEASTERLY, ALONG THE ARC OF SAID CURVE, ALSO BEING THE SOUTHERLY RIGHT OF WAY MARGIN OF RAINIER AVENUE SOUTH, THROUGH A CENTRAL ANGLE OF 9° 12' 36" A DISTANCE OF 48.85 FEET; THENCE S 69° 25' 58" E 416.75 FEET TO THE BEGINNING OF A 591.27 FOOT RADIUS TANGENT CURVE CONCAVE TO SOUTHWEST; THENCE SOUTHEASTERLY ALONG THE ARC OF SAID CURVE, THROUGH A CENTRAL ANGLE OF 9° 36' 16" A DISTANCE OF 99.11 FEET TO THE **POINT OF BEGINNING**; THENCE CONTINUING ALONG THE ARC OF SAID CURVE, THROUGH A CENTRAL ANGLE OF 2° 30' 00" A DISTANCE OF 25.80 FEET; THENCE LEAVING SAID RIGHT OF WAY MARGIN S 32° 40' 19" W 5.00 FEET, TO THE BEGINNING OF A 586.27 FOOT NON TANGENT CURVE CONCAVE TO SOUTHWEST WHICH RADIUS POINT BEARS S 32° 40' 19" W; THENCE NORTHWESTERLY ALONG THE ARC OF

Tax Parcel Number 806900-0180
Project Parcel 11

CATCHMENT WALL EASEMENT

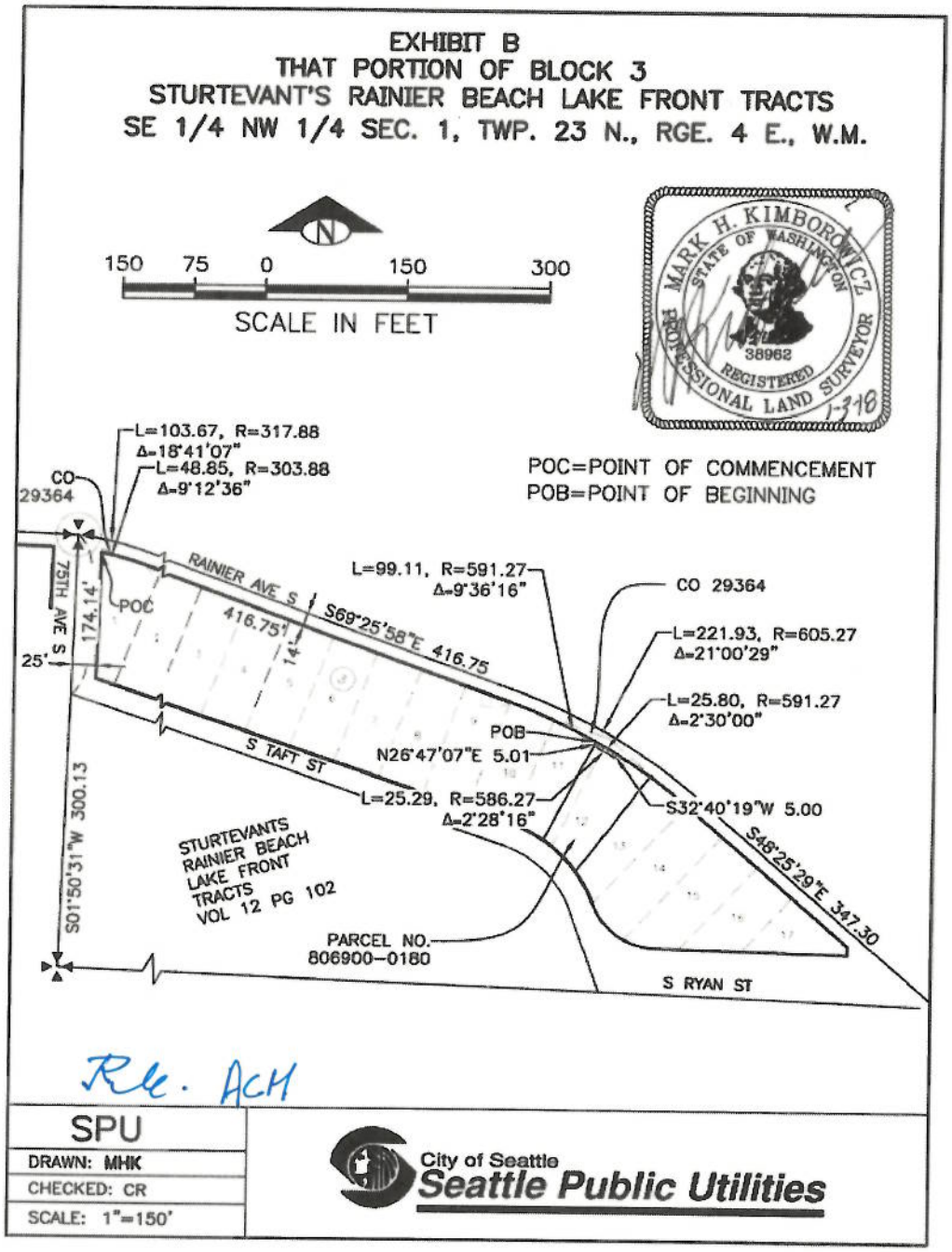
SAID CURVE THROUGH A CENTRAL ANGLE OF 2° 28' 16" A DISTANCE OF 25.29 FEET; THENCE N 26° 47' 07" W 5.01 FEET TO THE **POINT OF BEGINNING.**

SITUATED IN THE CITY OF SEATTLE, COUNTY OF KING, STATE OF WASHINGTON.

CONTAINING 128 SQ. FT., MORE OR LESS

Tax Parcel Number 806900-0180
Project Parcel 11

CATCHMENT WALL EASEMENT



Tax Parcel Number 806900-0180
Project Parcel 11

After recording return document to:

City of Seattle
Department of Transportation
700 5th Avenue – Suite 3800
PO Box 34996
Seattle, WA 98124-4966
Attn: Barret Aldrich

20190404000483
EASEMENT Rec: $104.00
4/4/2019 12:37 PM
KING COUNTY, WA

EXCISE TAX NOT REQUIRED
King Co. Records Division
By Amber Lee Deputy

Document Title: Catchment Wall Easement
Reference Number of Related Document: N/A
Grantor(s): Ngoc Nguyen and My Chau Tran
Grantee: City of Seattle
Abbreviated Legal Description: Ptn of STURTEVANTS LAKE FRONT TRS 9 & WLY 15 FT OF 10 LESS ST, Block: 3 Lot: 9-10, King County, WA
Additional Legal Description is on Page(s) 5 of Document.
Assessor's Tax Parcel Number(s): 806900-0170

CATCHMENT WALL EASEMENT

Project: Rainier Avenue South Hazard Mitigation

The Grantor(s), **NGOC NGUYEN** and **MY CHAU TRAN**, for and in consideration of mutual and offsetting benefits, other valuable consideration and the covenants and promises of the City hereinafter set forth, the receipt and sufficiency of which is hereby acknowledged, conveys and warrants unto the **CITY OF SEATTLE**, a municipal corporation of the State of Washington, and its assigns, an Easement over, under, across and upon the hereinafter described lands ("the Easement area") for the purposes of constructing, repairing, replacing and maintaining a catchment wall and other modifications associated therewith, to the same extent and purpose as if the rights herein granted had been acquired under Eminent Domain statutes of the State of Washington.

Tax Parcel Number 806900-0170
Project Parcel 9

CATCHMENT WALL EASEMENT

The Grantor reserves the right to use the Easement area for purposes that will not unreasonably interfere with the Grantee's full enjoyment of the rights granted by this Easement. Neither the Grantor nor their successors and assigns may erect or construct any building or structure, or excavate, within the Easement area without the prior written consent of the Seattle Department of Transportation ("SDOT"). Further, planting trees or any other vegetation, except for grass, shall not be allowed within the Easement area. Grantor will submit a proposed work plan to SDOT at least 120 days before any work is commenced in the Easement area. As used in this Easement, "building or structure" means anything constructed or erected on the ground or any improvement built up or composed of parts joined together in some definite manner and affixed to the ground, including fences, walls and signs.

To the extent allowed by law, Grantor(s), their successors and assigns agree to indemnify Grantee from and against any and all claims, demands, suits, damages, loss or liability of any kind arising out of, or resulting from, erosion and/or landslides. The foregoing indemnity shall run with the land and bind Grantor(s) successors and assigns.

Said lands being situated in King County, State of Washington, and described as follows:

See Exhibit A attached hereto and made a part hereof.

Grantors:

By: _____
NGOC NGUYEN

By: _____
MY CHAU TRAN

Date: 08/16/18, 2018

Tax Parcel Number 806900-0170
Project Parcel 9

CATCHMENT WALL EASEMENT

STATE OF WASHINGTON)
: §
County of King)

On this 17th day of August, 2018, before me personally appeared NGOC NGUYEN and MY CHAU TRAN to me known to be the individuals described in and who executed the foregoing instrument, and acknowledged that they signed the same as their free and voluntary act and deed, for the uses and purposes therein mentioned.

WITNESS MY HAND AND OFFICIAL SEAL hereto affixed the day and year first above written.

Notary Seal

Notary Public
State of Washington
GLENN P SADANG
MY COMMISSION EXPIRES
November 15, 2018

Please stay within block.

Notary (print name) Glenn P Sadang
Notary Public in and for the State of Washington,
residing at Seattle WA
My Appointment expires 11/15/2018

Tax Parcel Number 806900-0170
Project Parcel 9

CATCHMENT WALL EASEMENT

Approved and Accepted By:
CITY OF SEATTLE

By: _____
Linea Laird, Interim Director
Seattle Department of Transportation

Date: December 13, 2018

STATE OF WASHINGTON)
: §
County of King)

On this 13 day of December, 2018, before me personally appeared LINEA LAIRD, to me known to be the Interim Director of the Seattle Department of Transportation of the City of Seattle, a Washington Municipal Corporation, the municipal corporation that executed the within and foregoing instrument, and acknowledged the said instrument to be the free and voluntary act and deed of said municipal corporation for the uses and purposes therein mentioned, and on oath stated that he was authorized to execute said instrument.

WITNESS MY HAND AND OFFICIAL SEAL hereto affixed the day and year first above written.

Notary Seal
BARRET ALDRICH
Commission Expires
NOTARY
PUBLIC
12-01-2021
STATE OF WASHINGTON
Please stay within block.

_____
Notary (print name) Barret Aldrich
Notary Public in and for the State of Washington,
residing at Vashon WA
My Appointment expires Dec. 1, 2021

Tax Parcel Number 806900-0170
Project Parcel 9

CATCHMENT WALL EASEMENT

EXHIBIT A

FOR PORTIONS OF LOT 9-10 BLOCK 3

STURTEVANT'S RAINIER BEACH LAKE FRONT TRACTS

THAT PORTION OF LOT 9, AND THE WESTERLY 15 FEET OF LOT 10 IN BLOCK 3 OF STURTEVANT'S RAINIER BEACH LAKE FRONT TRACTS, AS PER PLAT RECORDED IN VOLUME 12 OF PLATS, PAGE 102, RECORDS OF KING COUNTY AUDITOR; EXCEPT THAT PORTION THEREOF CONDEMNED FOR RAINIER AVENUE BY KING COUNTY SUPERIOR COURT CAUSE NUMBER 87583, ORDINANCE NUMBER 29364 OF THE CITY OF SEATTLE; DESCRIBED AS FOLLOWS:

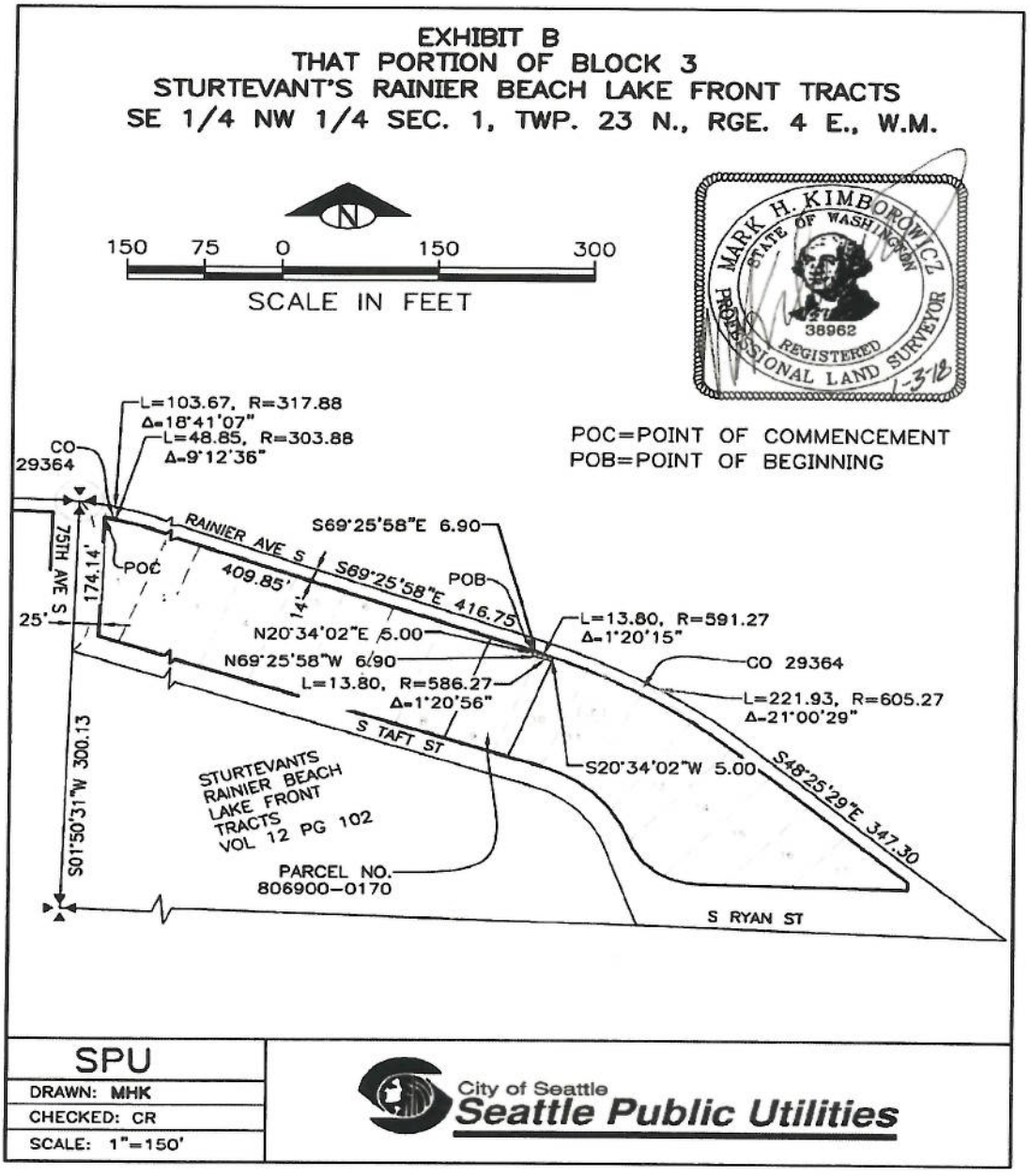
COMMENCING AT THE MOST NORTHWESTERLY CORNER OF SAID BLOCK 3, BEING THE INTERSECTION OF THE SOUTHERLY RIGHT OF WAY MARGIN OF RAINIER AVENUE SOUTH AND THE EASTERLY RIGHT OF WAY MARGIN OF 75TH AVENUE SOUTH, PER KING COUNTY SUPERIOR COURT CAUSE NO. 87583, SAID POINT BEING THE BEGINNING OF A 303.88 FOOT NON TANGENT CURVE CONCAVE TO SOUTHWEST WHICH RADIUS POINT BEARS S 11° 21' 26" W; THENCE SOUTHEASTERLY ALONG THE ARC OF SAID CURVE, ALSO BEING THE SOUTHERLY RIGHT OF WAY MARGIN OF RAINIER AVENUE SOUTH, THROUGH A CENTRAL ANGLE OF 9° 12' 36" A DISTANCE OF 48.85 FEET; THENCE S 69° 25' 58" E 409.85 FEET TO THE **POINT OF BEGINNING**; THENCE S 69° 25' 58" E 6.90 FEET TO THE BEGINNING OF A 591.27 FOOT RADIUS TANGENT CURVE CONCAVE TO SOUTHWEST; THENCE SOUTHEASTERLY ALONG THE ARC OF SAID CURVE, THROUGH A CENTRAL ANGLE OF 1° 20' 15" A DISTANCE OF 13.80 FEET; THENCE LEAVING SAID RIGHT OF WAY MARGIN S 20° 34' 02" W 5.00 FEET TO THE BEGINNING OF A 586.27 FOOT NON TANGENT CURVE CONCAVE TO SOUTHWEST WHICH RADIUS POINT BEARS S 21° 54' 58" W; THENCE NORTHWESTERLY ALONG THE ARC OF SAID CURVE THROUGH A CENTRAL ANGLE OF 1° 20' 56" A DISTANCE OF 13.80 FEET; THENCE N 69° 25' 58" W 6.90 FEET; THENCE N 20° 34' 02" E 5.00 FEET TO THE **POINT OF BEGINNING.**

SITUATED IN THE CITY OF SEATTLE, COUNTY OF KING, STATE OF WASHINGTON.

CONTAINING 104 SQ. FT., MORE OR LESS

Tax Parcel Number 806900-0170
Project Parcel 9

CATCHMENT WALL EASEMENT



Tax Parcel Number 806900-0170
Project Parcel 9

After recording return document to:

City of Seattle
Department of Transportation
700 5th Avenue – Suite 3800
PO Box 34996
Seattle, WA 98124-4966
Attn: Barret Aldrich

20190404000490
EASEMENT Rec: $104.00
4/4/2019 12:37 PM
KING COUNTY, WA

EXCISE TAX NOT REQUIRED
King Co. Records Division
By _____, Deputy
Amber Lee

Document Title: Catchment Wall Easement
Reference Number of Related Document: N/A
Grantor(s): F.D. STAATS, THE TRUSTEE OF THE F.D. STAATS FAMILY TRUST
Grantee: City of Seattle
Abbreviated Legal Description: Ptn of LOTS 6 & 7 OF BLK 35, RAINIER BEACH, AS PER PLAT REC IN VOL 8, PG 11, King County, WA
Additional Legal Description is on Page(s) 5 of Document.
Assessor's Tax Parcel Number(s): 712930-1765

CATCHMENT WALL EASEMENT

Project: Rainier Avenue South Hazard Mitigation

The Grantor(s), **F.D. STAATS, THE TRUSTEE OF THE F.D. STAATS FAMILY TRUST**, for and in consideration of mutual and offsetting benefits, other valuable consideration and the covenants and promises of the City hereinafter set forth, the receipt and sufficiency of which is hereby acknowledged, conveys and warrants unto the **CITY OF SEATTLE**, a municipal corporation of the State of Washington, and its assigns, an Easement over, under, across and upon the hereinafter described lands ("the Easement area") for the purposes of constructing, repairing, replacing and maintaining a catchment wall and other modifications associated therewith, to the same extent and purpose as if the rights herein granted had been acquired under Eminent Domain statutes of the State of Washington.

Tax Parcel Number 712930-1765
Project Parcel 8

CATCHMENT WALL EASEMENT

The Grantor reserves the right to use the Easement area for purposes that will not unreasonably interfere with the Grantee's full enjoyment of the rights granted by this Easement. Neither the Grantor nor their successors and assigns may erect or construct any building or structure, or excavate, within the Easement area without the prior written consent of the Seattle Department of Transportation ("SDOT"). Further, planting trees or any other vegetation, except for grass, shall not be allowed within the Easement area. Grantor will submit a proposed work plan to SDOT at least 120 days before any work is commenced in the Easement area. As used in this Easement, "building or structure" means anything constructed or erected on the ground or any improvement built up or composed of parts joined together in some definite manner and affixed to the ground, including fences, walls and signs.

To the extent allowed by law, Grantor(s), their successors and assigns agree to indemnify Grantee from and against any and all claims, demands, suits, damages, loss or liability of any kind arising out of, or resulting from, erosion and/or landslides. The foregoing indemnity shall run with the land and bind Grantor(s) successors and assigns.

Said lands being situated in King County, State of Washington, and described as follows:

See Exhibit A attached hereto and made a part hereof.

Grantors:

By _____

Kim Patrick Staats
THE TRUSTEE OF THE F.D. STAATS FAMILY TRUST

Date: 5/16, 2018

Tax Parcel Number 712930-1765
Project Parcel 8

CATCHMENT WALL EASEMENT

STATE OF WASHINGTON)
: §
County of King)

On this 16th day of May, 2018, before me personally appeared KIM PATRICK STAATS, known to be the Trustee of THE FD STAATS FAMILY TRUST, as the individual described in and who executed the foregoing instrument, and acknowledged that they signed the same as their free and voluntary act and deed, for the uses and purposes therein mentioned.

WITNESS MY HAND AND OFFICIAL SEAL hereto affixed the day and year first above written.

Notary Seal
BARRET ALDRICH
Commission Expires
NOTARY PUBLIC
12-01-2021
STATE OF WASHINGTON
Please stay within block.

Notary (print name) Barret Aldrich
Notary Public in and for the State of Washington,
residing at Kenmore WA
My Appointment expires 12-1-21

Tax Parcel Number 712930-1765
Project Parcel 8

CATCHMENT WALL EASEMENT

Approved and Accepted By:
CITY OF SEATTLE

By: _____
Goran Sparrman, Interim Director
Seattle Department of Transportation

Date: 5/30, 2018

STATE OF WASHINGTON)
: §
County of King)

On this 30 day of May, 2018, before me personally appeared GORAN SPARRMAN, to me known to be the Interim Director of the Seattle Department of Transportation of the City of Seattle, a Washington Municipal Corporation, the municipal corporation that executed the within and foregoing instrument, and acknowledged the said instrument to be the free and voluntary act and deed of said municipal corporation for the uses and purposes therein mentioned, and on oath stated that he was authorized to execute said instrument.

WITNESS MY HAND AND OFFICIAL SEAL hereto affixed the day and year first above written.

Notary Seal
BARRET ALDRICH Commission Expires NOTARY PUBLIC 12-01-2021 STATE OF WASHINGTON
Please stay within block.

_____
Notary (print name) Barret Aldrich
Notary Public in and for the State of Washington,
residing at Kenmore WA
My Appointment expires 12-1-21

Tax Parcel Number 712930-1765
Project Parcel 8

CATCHMENT WALL EASEMENT

EXHIBIT A

PERMANENT EASEMENT DESCRIPTION

FOR LOTS 6 AND 7, BLOCK 35

RAINIER BEACH

THAT PORTION OF LOTS 6 AND 7 BLOCK 35, OF RAINIER BEACH, AS RECORDED IN VOLUME 8 OF PLATS, PAGE 11, RECORDS OF KING COUNTY, WASHINGTON, SITUATED IN THE NORTHEAST QUARTER OF THE NORTHEAST QUARTER OF SECTION 2, TOWNSHIP 23 NORTH, RANGE 4 EAST, W.M., DESCRIBED AS FOLLOWS;

COMMENCING AT THE INTERSECTION OF THE SOUTHERLY MARGIN OF RAINIER AVENUE SOUTH AND SOUTHERLY MARGIN OF SOUTH PERRY STREET, ALSO KNOWN AS THE NORTHWESTERLY CORNER OF LOT 1, OF SAID BLOCK 35, TOGETHER WITH THAT PORTION OF SOUTH PERRY STREET AS VACATED BY COUNTY COMMISSION UNDER VOLUME 14-247 AND WHICH ATTACHED BY OPERATION OF LAW; THENCE ALONG SAID MARGIN OF RAINIER AVENUE SOUTH, S 40° 18' 47" E A DISTANCE OF 258.00 FEET TO THE NORTHWESTERLY PROPERTY CORNER OF LOT 6 AND THE **POINT OF BEGINNING;**

THENCE CONTINUING ALONG SAID RIGHT OF WAY MARGIN S 40° 18' 47" E A DISTANCE OF 79.40 FEET;
THENCE LEAVING SAID RIGHT OF WAY MARGIN S 49° 42' 00" W 5.00 FEET;
THENCE N 40° 18' 47" W 79.40 FEET TO THE NORTHWESTERLY PROPERTY LINE OF LOT 6; THENCE ALONG SAID PROPERTY LINE N 49° 42' 00" E A DISTANCE OF 5.00 FEET TO THE **POINT OF BEGINNING.**

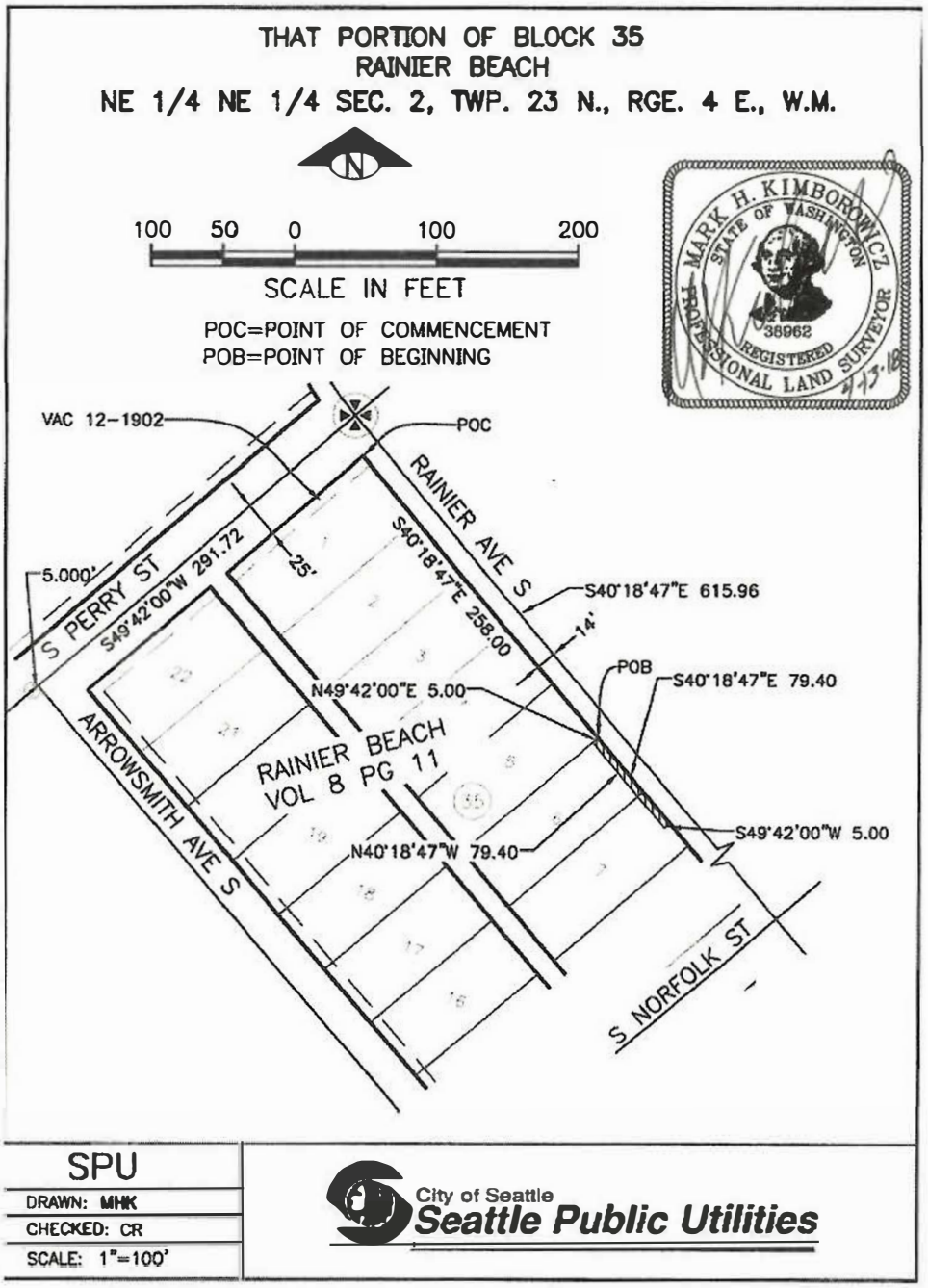
SITUATED IN THE CITY OF SEATTLE, COUNTY OF KING, STATE OF WASHINGTON.

CONTAINING 396 SQ. FT., MORE OR LESS

Tax Parcel Number 712930-1765
Project Parcel 8

EXHIBIT B

CATCHMENT WALL EASEMENT



Tax Parcel Number 712930-1765
Project Parcel 8

SUMMARY and FISCAL NOTE*

Department:	Dept. Contact/Phone:	CBO Contact/Phone:
Seattle Department of Transportation	Gretchen Haydel/206 233-5140	Christie Parker/206 684-5211

** Note that the Summary and Fiscal Note describes the version of the bill or resolution as introduced; final legislation including amendments may not be fully described.*

1. BILL SUMMARY

Legislation Title: AN ORDINANCE relating to the Department of Transportation's Hazard Mitigation Program; authorizing the Director of the Department of Transportation to acquire, accept, and record on behalf of the City of Seattle, 11 catchment wall easements (From Daniel Bayeh, located in a portion of Lots 10 and 11, Block 3, Sturtevant's Rainier Beach Lake Front Tracts; a catchment wall easement from Blue Bird Rentals, LLC, a Washington limited liability company, located in a portion of Lots 14 through 17, Block 46, Rainier Beach; a catchment wall easement from Margaret Brown, located in a portion of Lots 17 and 18, Block 46, Rainier Beach; a catchment wall easement from Dan J. Del Duca and Mary F. Del Duca, located in a portion of Lots 1 and 2, Block 35, Rainier Beach; a catchment wall easement from Paul J. Farrington and Ronald F. Minter, located in Lots 5 and 6, Block 2, Mayes' Addition to the City of Seattle; a catchment wall easement from Mark Duane Lewis, located in a portion of Lots 2 and 3, Block 2, Mayes' Addition to the City of Seattle; a catchment wall easement from Gene Louie and Lena T. Louie, located in a portion of Lots 3 through 5, Block 2, Mayes' Addition to the City of Seattle; a catchment wall easement from Lincoln A. Louie and Ann Marie D. Louie, located in a portion of Lots 3 through 5, Block 35, Rainier Beach; a catchment wall easement from Robert Miller and Ana Miller, located in a portion of Lots 11 and 12, Block 3, Sturtevant's Rainier Beach Lake Front Tracts; a catchment wall easement from Ngoc Nguyen and My Chau Tran, located in a portion of Lots 9 and 10, Block 3, Sturtevant's Rainier Beach Lake Front Tracts; a catchment wall easement from F. D. Staats, the Trustee of the F. D. Staats Family Trust, located in a portion of Lots 6 and 7, Block 35, Rainier Beach), for the purpose of protecting the adjacent roadway of superficial surface erosion of the adjacent slopes along a portion of Rainier Avenue South; placing the real property rights under the jurisdiction of the Seattle Department of Transportation; and ratifying and confirming certain prior acts.

Summary and background of the Legislation:

This legislation authorizes the acquisition, acceptance, and recording of eleven catchment wall easements to the City of Seattle by various property owners in connection with the landslide mitigation work planned between South Fletcher Street and the South City Limits near South Ryan Street along Rainier Avenue South (the "Rainier Corridor") under the Hazard Mitigation Program - Landslide Mitigation Project.

In 1998, the City closed 1,000 linear feet of sidewalk in response to public safety concerns along a portion of the Rainer Corridor, and in 2000 a geotechnical survey was conducted which identified the steep slopes in the area as a moderate to high risk hazard.

On the evening of April 7, 2013, a segment of Rainer Avenue South was closed between 57th Avenue South and Cornell Avenue South as a result of a landslide that blocked a portion of the street. In response, Ordinance 124374 was subsequently passed to acquire, accept, and record an easement to construct and maintain a retaining wall in the area. Permanent measures were then taken to stabilize this slope area above Rainier Avenue South.

In early 2016, SDOT completed the installation of 60' segment of catchment wall. In the Fall of 2016, SDOT crews cleared and recovered some sidewalks along the Rainier Corridor so that the sidewalk could be used by pedestrians.

In February of 2017, after 4 days of rain and snow, 6 landslides closed a 3 1/2 mile stretch of Rainier Avenue South. Five of the landslides were small while one was significant.

According to City records, there have been many more landslides over the years along the Rainier Corridor indicating that there is a high probability of reoccurrence. The reoccurring land slide activity and investigations demonstrate that more permanent measures are necessary to reduce the risk of future landslide activity.

Due to the limited amount of funding previously available for the Seattle Department of Transportation ("SDOT") to address the potential landslide vulnerabilities that exist along the Rainier Corridor, the project team prioritized the problem areas into segments and smaller projects were implemented. The project team has since conducted a final site evaluation which identified 5 areas proposed for new catchment walls or gravity wall construction. SDOT's Hazard Mitigation Program-Landslide Mitigation Projects recently received funding and is now able to make additional improvements in the area.

Eleven catchment wall easements are required to complete construction of the catchment and gravity walls to minimize surface debris from sliding into the street right-of-way in these 5 areas along Rainier Avenue South. Completion of this project work will immediately reduce landslide hazards, reduce annual maintenance cost, protect the roadway for bicycle and vehicular use, and protect the sidewalks for pedestrian use.

2. CAPITAL IMPROVEMENT PROGRAM

Does this legislation create, fund, or amend a CIP Project? ___ Yes _√_ No

3. SUMMARY OF FINANCIAL IMPLICATIONS

Does this legislation amend the Adopted Budget? ___ Yes _√_ No

4. OTHER IMPLICATIONS

a. Does this legislation affect any departments besides the originating department?
No.

b. Is a public hearing required for this legislation?
No.

c. Does this legislation require landlords or sellers of real property to provide information regarding the property to a buyer or tenant?
No.

d. Is publication of notice with *The Daily Journal of Commerce* and/or *The Seattle Times* required for this legislation?
No.

e. Does this legislation affect a piece of property?
Yes, private property owners are granting easements to the City to complete and maintain the Project. A map of the properties is attached to this document.

f. Please describe any perceived implication for the principles of the Race and Social Justice Initiative. Does this legislation impact vulnerable or historically disadvantaged communities? What is the Language Access plan for any communications to the public?
There are no known impacts to vulnerable or historically disadvantaged communities.

g. If this legislation includes a new initiative or a major programmatic expansion: What are the specific long-term and measurable goal(s) of the program? How will this legislation help achieve the program's desired goal(s).
This legislation does not include a new initiative or a major programmatic expansion.

List attachments/exhibits below:

Summary Exhibit 1 – Vicinity Map

Soldier Pile Wall and
Ecology Block Wall
Area 1

Soldier Pile Wall a
Area 2

Soldier Pile Wall

N

Sidewalk maintenance work

Ecology Block Wall

Soldier Pile Wall and
Ecology Block Wall
Area 3

Ecology
Block Wall
Area 4

Soldier
Pile Wall
Area 5

58TH AVE S
S CARVER ST
S REDWING ST
S ROXBURY ST
S KEPPLER ST
S PILGRIM ST
S PERRY ST
S PILGRIM ST
60TH AVE S
61ST AVE S
S NORFOLK ST
S NORFOLK ST
S WATERS AVE S
ARROWSMITH AVE S
RAINIER AVE S
59TH AVE S
S COOPER ST
62ND AVE S
63RD AVE S
64TH AVE S
65TH AVE S
66TH AVE S
S RYAN ST
68TH AVE S
CORNELL AVE S
72ND AVE S
S TAFT ST
S RYAN ST
75TH AVE S

Summary Ex 1 - Vicinity Map

Rainier Avenue South Hazard Mitigation Project

Property Acquisition Acceptance Ordinance

Transportation and Utilities Committee
Julius Rwamashongye, Kit Loo, and Gretchen Haydel
2/19/20 Department of Transportation

City of Seattle

Our vision, mission, and core values

Vision: Seattle is a thriving equitable community powered by dependable transportation

Mission: to deliver a transportation system that provides safe and affordable access to places and opportunities

Committed to **6 core values**:

- Equity
- Safety
- Mobility
- Sustainability
- Livability
- Excellence

Presentation overview

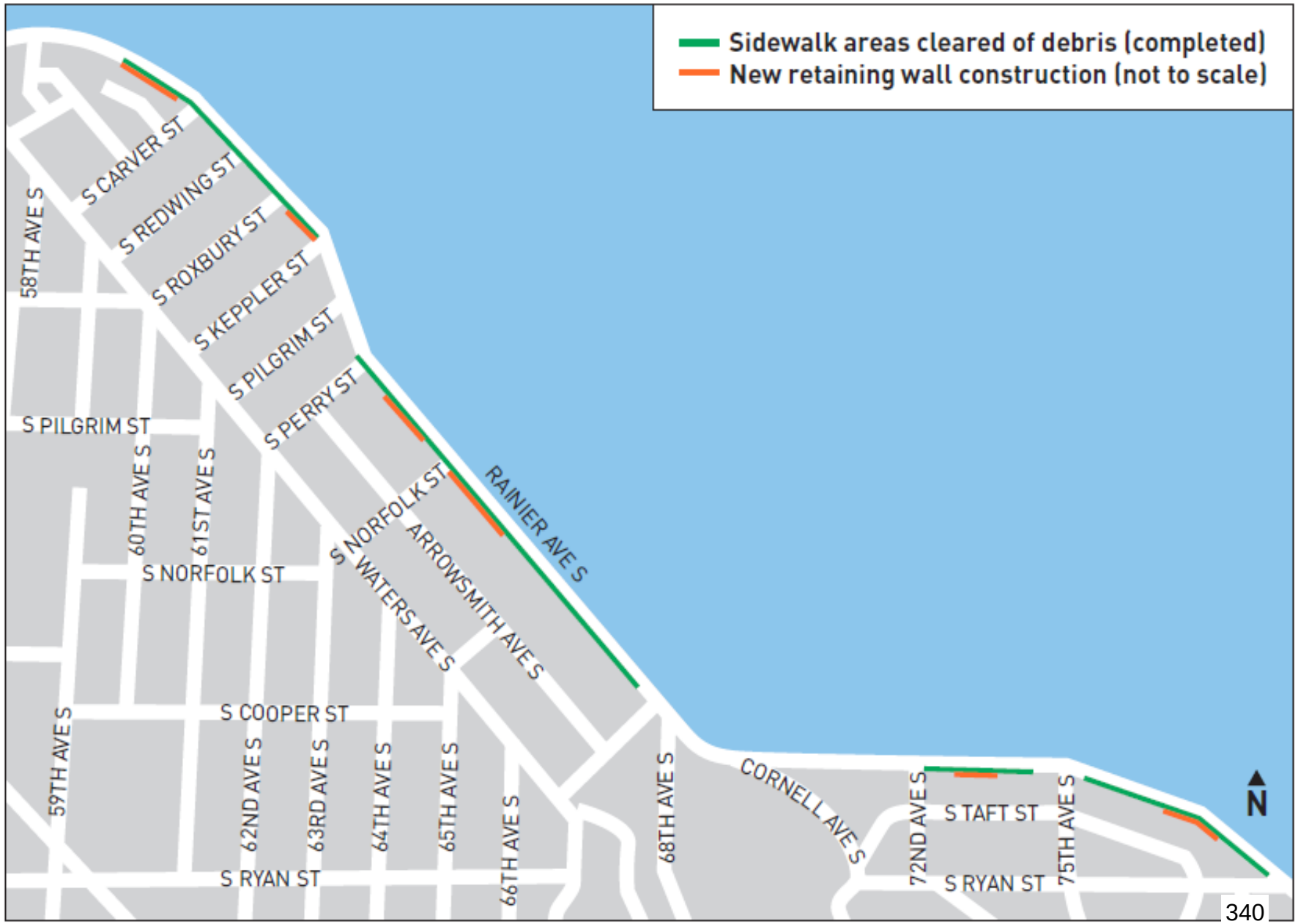
- Background
- Project area
- Existing conditions
- Proposal
- Project Costs
- Project Duration
- Update

Background

- History of landslides along Rainer Avenue South from South Carver Street to the South City Limits near South Ryan Street
- Geotechnical survey identified steep slope to be a moderate to high risk landslide hazard
- High probability of future recurrence
- Landslides block sidewalk and create hazardous conditions for all modes of transportation along this corridor
- Ongoing clean up and debris detention efforts have been implemented by SDOT through the years
- Funding now available for a more comprehensive effort to keep debris from impacting the public right of way at locations with high probability of occurrence

Project Area

- This legislation accepts 11 catchment wall easements obtained from private property owners and places them under SDOT's jurisdiction
- Easements acquired for the purpose of protecting this Rainier Avenue South corridor from superficial surface erosion of the adjacent slopes
- Consideration for the property rights were for mutual benefit



Existing Conditions

Debris flow from adjacent slope on sidewalk

Unstable slope areas

Proposal

Soldier Pile Catchment Wall:

- Retains larger volume of debris
- Suitable for steeper sloped areas
- More expensive

Gravity Walls:

- More cost effective than soldier pile walls
- Good for moderate slope area
- Modular and simpler to construct

Project Costs

Capital Improvement Project (CIP) – Hazard Mitigation Program – Landslide Mitigation Projects

Total Project budget is $3.527 M

Funding Sources:

- REET2 Capital Fund
- Street Use Cost Center
- Gas Tax

Project Duration

Project Schedule

- Gravity walls – 5-week construction duration
- Soldier pile containment wall – 15-week construction duration

Update

- Project construction has started

- Project completion anticipated by mid-summer 2020

Questions?

Kit.Loo@seattle.gov | (206) 684-3669

http://www.seattle.gov/transportation/rainierhazardmitigation

www.seattle.gov/transportation