Life Cycle Cost Analysis of 2021 WSEC: R406 Code Change Proposal

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The following documentation provides a life cycle cost assessment of the R406 code change proposal. This proposal modifies section R406. It is anticipated that adoption of this code change, along with prescriptive updates sourced from the 2021 IECC, will reduce energy use in typical new homes and low-rise apartments by 10% over a 2018 code-compliant home.

The life cycle cost approach presented builds on the methodology used in previous code development cycles. However, all energy modeling was completed from the 'ground-up' – meaning all modeled energy use, energy savings, and code-to-code comparisons were completely redone for this analysis. No assumptions or previous models were carried over from past years. The life cycle cost analysis was completed using the Office of Financial Management Life Cycle Cost Tool (Version 2020-A).

The analysis was developed by Henry Odum, Paul Kintner, Jenny Haan (all of Ecotope) and David Baylon. Ecotope completed the energy modeling, provided the first cost estimates, and the energy savings analysis. David Baylon completed the carbon equalization credit calculations, backed by Ecotope's energy modeling analysis.

Approach to the development of the R406 energy code proposal:

The following outlines the process used to develop the R406 code change proposal. It is a process with multiple steps.

Change in Scope: For the 2021 WSEC Section R406, this proposal includes credit values specific to homes with varying levels of space heating energy end use. Space heating systems without a coefficient of performance (aka gas furnace and electric resistance) use 2-3x more heating energy than a heat pump system. For this reason, load reduction measures (air tightness, envelope insulation, duct measures) have a greater impact on energy savings for this end use. The revisions to Table R406.3 are intended to capture this difference in energy savings, and reward homes with higher heating energy use with greater credit values.

Table R406.2 (Fuel Normalization credits) have also been updated to match the proposed commercial code carbon content of Washington State's electrical grid (Cambium model from NREL is calculated as 0.44 #CO2e/KWH).

Consider clarifications and implementation changes: To provide clear enforceable code language, several editorial changes have been included. Credit requirements for appliances have been strengthened. Several envelope measures have been removed and/or recalibrated to account for prescriptive code upgrades of the building envelope.

Add New Heating system: To continue to provide a diverse set of options for implementation, a dual fuel heat pump measure has been added to the fuel normalization table. This system assumes a switchover to gas heating at temperatures below ~37F.

Calculate Building Energy Use for the base code and section 406 options: The base code (prescriptive) changes made in 2018 and by the 2021 IECC additions, are first assessed to determine the base energy

use of the prototype buildings. This ultimately impacts the credits awarded by Section R406 options. Baseline envelope options improve the stringency pf the code by roughly 8%.

After the new base code energy use is established, the value of each credit is reassessed and if needed, reassigned. While this analysis is focused on the relative savings and cost of Section R406, the savings attributed to prescriptive 2021 IECC measures are not 'lost' in the analysis however, as the energy savings is now reflected in the 2021 baseline (prescriptive) energy use of the residential sector.

Assess the number of credits required to achieve the objectives of RCW 19.27a.160: This proposal is designed to meet the high-level goal of RCW 19.27a.160. This 2021 Section R406 code change proposal, along with prescriptive updates, is expected to lead a 10% energy reduction over a 2018 WSEC compliant home.

Adjust the targets for systems analysis approach, section 405.3: The last step is to assess the performance-based approach. The targets under this section have been reduced by an additional 9% over the 2018 prescriptive code requirements. This accounts for both the required increase in efficiency and the somewhat lower energy use baseline.

Energy Savings Estimates

Energy savings estimates used in the life cycle cost analysis were developed using SEEM. The SEEM energy simulation program was used to develop the energy savings targets and estimates for the 2009-2018 iterations of the residential portion of Washington State Energy Code. SEEM is used by the Northwest Power and Conservation Council RTF to estimate savings for most of the regional utility conservation programs. The modeling protocol is intended to represent the wide variety of new homes constructed in Washington, to summarize the average savings that can be attributed to each option listed in Table R406.3 and estimate the overall consumption of the residential sector for each code cycle.

The SEEM program is designed to model small scale residential building energy use. The program consists of an hourly thermal simulation and an hourly moisture (humidity) simulation that interacts with duct specifications, equipment, and weather parameters to calculate the annual heating and cooling energy requirements of the home. It is based on algorithms consistent with current American Society of Heating, Refrigeration, and Air-Conditioning Engineers (ASHRAE), American Heating and Refrigeration Institute (AHRI), and International Organization for Standards (ISO) calculation standards. In order for the SEEM model to be used in efficiency measure assessments, it must be calibrated to baseline and efficient-case consumption. Calibration for single family, multi-family, and manufactured homes are separate endeavors that utilize metered data from a sample of homes in the NW to estimate energy consumption. SEEM was recalibrated in response to findings from the 2011 Residential Building Stock Assessment. This provides calibrated results for Pacific NW homes.

For single family construction, the energy model is built using six RTF-approved prototype designs, including: a 1344 sf rambler (both on a slab and over a crawlspace), 2200 sf rambler (both on a slab and over a crawlspace), 2688 with half basement and 5000 sf full basement home. These six prototypes are then modeled with the three primary heating system types ("gas home", "Heat Pump Home" and "Electric Resistance Home") and then simulated in the two major climate zones in the state. Each energy conservation measure (option in Table R406.3) is then modeled independently in each of these scenarios, with the energy savings weighted down to a representative credit value shown in Table R406.3.

For low-rise multifamily construction, the same method was used as for single family 3. The presumed predominant construction-types are a 2-story, garden style (exterior entry) building and a 3-story

'double loaded corridor' building. The annual energy use, utility savings, and incremental cost were then normalized to a per unit basis.

After individual measures were modeled independently and associated savings determined, each prototype summarized in this LCCA analysis was modeled with a selection (package) of R406 options required to be code compliant (both in 2018 and 2021). This important step not only illustrated the code-to-code savings, but it also accounts for interaction between different credit options within the table. As more measures are utilized in a home, more interaction occurs between measures, and the individual savings attributed to that measure are not realized when paired with a host of other options. For instance, higher envelope insulation will de-rate the savings available from increased equipment efficiencies. It is important to capture this interaction through the modeling exercise or else the anticipated savings estimates will be overinflated. It is the annual energy savings obtained from these packages of measures that are used in determining the life cycle cost of the code change proposal.

First Cost method:

First cost and energy savings estimates have been developed using an estimating procedure used by the Northwest Power and Conservation Council (NPCC) and ran through the Office of Financial Management Life Cycle Cost Tool. The first costs were developed using multiple sources of information:

- NPCC, the Regional Technical Forum (RTF), http://rtf.nwcouncil.org/ This is a federally mandated multi-state compact that develops the efficiency resources for the region's electric utilities
- Navigant is a business consulting firm which provides resource planning for both gas and electric utilities, including gas utilities in Washington State. http://www.navigant.com/industries/energy/
- CEE is the Consortium for Energy Efficiency. CEE is the US and Canadian consortium of gas and electric efficiency program administrators. http://www.cee1.org/
- This study also uses cost information provided to the SBCC by Ecotope
- PassiveHouse consultant aided with pricing the higher insulation and envelope detailing
- Inflation has been accounted for all historical cost estimates

All costs shown are incremental costs for each measure, the base cost is related to the prescriptive requirement of the code and the incremental costs are associated with the option requirement of Table R406.2. Keeping this in mind, the incremental cost for a ductless minisplit, in single family, is the added equipment cost associated with purchasing a higher efficiency heat pump (since DHPs are required in the prescriptive code in electric zonal single-family homes); while in multifamily, the incremental cost of a heat pump is higher because it is compared to electric baseboards. Water heating systems in multifamily are assumed to serve more than one unit, therefore their incremental costs are lower than for single family.

The cost analyses provided in this report use a weighted average cost method to represent the wide range of new homes constructed in Washington. Each of the predominant dwellings, as defined in Section R406.2, are shown in the LCCA case studies (large dwelling units represent a minor fraction of the overall building stock, therefore were omitted from the analysis). For each single-family dwelling unit size, the predominant heating system types are shown individually ("Gas Home", "Heat Pump Home" and "Electric Zonal Home") in order to show cost effectiveness for all available heating system types. The cost model is built using the five prototype designs, including a 1344 sf rambler (both on a slab and over a crawlspace), 2200 sf rambler (both on a slab and over a crawlspace), 2688 with half basement. The costs associated with the crawl space and slab prototypes were normalized into each of the dwelling unit sizes per Section R406.2. Multifamily costs were based on an electric zonal heating system. A first cost estimate is developed for each option and for each prototype. Then, the incremental

cost of each prototype is weighted by the expected construction volumes to provide an overall average measure cost. The tables, Incremental Cost of Single Family Options and Incremental Cost of MF Options, provides both prototype and weighted measure cost.

Unlike the energy savings estimates, the first cost numbers are a fixed value for each energy measure and do not change based on the selected package of measures modeled for the LCCA. This assumes that incremental costs of each option do not have the any interdependency – contrary to the associated energy savings, as stated earlier. This will no longer be the case as buildings become more efficient. Higher levels of envelope insulation and tighter construction leads to smaller HVAC systems, and therefore a cost credit should be applied. But as mentioned, this approach was not applied in this analysis.

Energy and Cost Summary Tables:

Table 1: Incremental Cost of Single Family options, by home size Incremental Cost of Single Family Options

					Prototypes Weight % by Floor Area							
						1344		2200	2688		5000	
			ı	/eighted								
			N	/leasure								
Option-Description	Gas Credit Value	HP Credit Value		Cost		15%		72%	11%		2%	
1.1 - U24 Glaze	0.5	0.5	\$	1,730	\$	991	\$	1,790	\$ 1,987	\$	3,688	
1.2 - U20 Glaze	1	1	\$	2,537	\$	1,454	\$	2,625	\$ 2,914	\$	5,409	
1.3 - 5% UA reduc	0.5	0.5	\$	1,261	\$	955	\$	1,270	\$ 1,762	\$	476	
1.4 - 15% UA reduc	1	1	\$	3,263	\$	1,925	\$	3,255	\$ 4,676	\$	5,802	
1.5 - 22.5% UA reduc	2	1.5	\$	4,721	\$	2,938	\$	4,850	\$ 5,735	\$	7,852	
1.6 - 30% UA reduc	3	2.5	\$	11,235	\$	6,819	\$	12,095	\$ 10,587	\$	16,991	
2.1 - 2 ACH, HRV	1	0.5	\$	2,264	\$	1,395	\$	2,284	\$ 2,790	\$	5,190	
2.2 - 1.5 ACH, HRV	1.5	1	\$	5,411	\$	3,334	\$	5,457	\$ 6,667	\$	12,402	
2.3 - 0.6 ACH, HRV	2	1.5	\$	6,988	\$	4,306	\$	7,048	\$ 8,612	\$	16,019	
3.1a - Furnace	1	1	\$	252	\$	252	\$	252	\$ 252	\$	252	
3.2a - 9.5 HSPF HP	0.5	0.5	\$	1,388	\$	1,388	\$	1,388	\$ 1,388	\$	1,388	
3.3a - GSHP	1.5	1.5	\$	11,034	\$	10,900	\$	10,900	\$ 10,900	\$	17,600	
3.4 - DHP	1.5	1.5	\$	1,530	\$	1,530	\$	1,530	\$ 1,530	\$	1,530	
3.5a - 11.0 HSPF HP	1	1	\$	1,530	\$	1,530	\$	1,530	\$ 1,530	\$	1,530	
3.6a - DHP (15% elec)	2	2	\$	5,901	\$	5,901	\$	5,901	\$ 5,901	\$	5,901	
4.1 - Deeply buried	1	0.5	\$	-	\$	-	\$	-	\$ -	\$	-	
4.2 - HVAC inside	1.5	1	\$	328	\$	328	\$	328	\$ 328	\$	328	
5.1 - DWR	0.5	0.5	\$	437	\$	437	\$	437	\$ 437	\$	437	
5.2 - 0.80 gas DHW	0.5	0.5	\$	640	\$	640	\$	640	\$ 640	\$	640	
5.3 - 0.91 gas DHW, GSHP	1	1	\$	1,009	\$	1,009	\$	1,009	\$ 1,009	\$	1,009	
5.4 - Tier III HPWH	2	2	\$	955	\$	955	\$	955	\$ 955	\$	955	
5.5 - CO2 HPWH	2.5	2.5	\$	3,824	\$	3,824	\$	3,824	\$ 3,824	\$	3,824	
6.1 - Solar pV	1	1	\$	5,040	\$	5,040	\$	5,040	\$ 5,040	\$	5,040	
7.1 - ES Appl+ventless Dryer	0.5	0.5	\$	505	\$	505	\$	505	\$ 505	\$	505	

Table 2: Modeled Energy Savings - Single Family, by home size and heating system type

			S				<u></u>		MF
	gfac	gfac	ashp	zonl	gfac	gfac	ashp	zonl	zonl
Options Table 2021	kWh	Therm	kWh	kWh	kWh	Therm	kWh	kWh	kWh
mandatory req's	0	0	0	0	0	0	0	0	0
windows U=0.24	114	5	1143	173	292	5	302	348	132
windows U=0.2	160	12	1192	291	369	18	492	597	263
envelope 3 - 5% UA	18	0	1101	94	-70	-2	59	122	-34
envelope 4 - 15% UA	151	24	1243	406	288	28	528	648	223
envelope 5 - 22.5% UA	303	33	1315	581	577	41	817	1015	420
envelope 6 - 30%UA	348	55	1430	821	887	69	1158	1456	555
air leakage 1 hrv	-116	3	1059	-10	-271	19	105	111	329
air leakage 2 hrv	4	45	283	344	87	67	504	664	642
air leakage 3 hrv	91	54	414	487	530	78	762	997	934
AFUE .95	-84	34	-	-	55	51	-	-	
HSPF 9.5	-	-	248	-	-	-	328	-	
DHP HSPF 10(zonal only)	-	-	-	689	-	-	-	1129	-41
HSPF 11	-	-	371	-	-	-	980	-	
DHP HSPF 10 whole house (zonal only)	-	-	-	1154	-	-	-	2185	740
ducts inside	356	32	385	-	781	38	666	-	
drain water heat recovery	76	23	260	247	-55	33	282	318	182
dwh gas UEF 0.80	18	27	-	-	3	34	-	-	
dwh gas UEF 0.91	-28	39	-	-	12	48	-	-	
hpwh Tier III	-930	121	1407	1395	-1167	153	1761	1790	973
UEF 2.9	-813	121	1536	1512	-1099	156	1916	1941	1055
Energy Star appliances	722		824	784	625		750	776	629

Table 3: Incremental Cost of Multifamily options and Modeled Energy Savings (Zonal Electric only)

		Measure
Option-Description	Credit Value	Cost
1.1 - U24 Glaze	0.5	
1.2 - U20 Glaze	1	\$ 887
1.3 - 5% UA reduc		\$ 173
1.4 - 15% UA reduc	1	\$ 947
1.5 - 22.5% UA reduc	1.5	\$ 1,383
1.6 - 30% UA reduc	2	\$ 3,779
2.1 - 2 ACH, HRV	0.5	\$ 851
2.2 - 1.5 ACH, HRV	1	\$ 2,034
2.3 - 0.6 ACH, HRV	1.5	\$ 2,627
3.1a - Furnace	1	\$ 252
3.2a - 9.5 HSPF HP		
3.3a - GSHP	1	
3.4 - DHP	2	\$ 3,060
3.5a - 11.0 HSPF HP		\$ -
3.6a - DHP (15% elec)	3	\$ 5,245
4.1 - Deeply buried	0.5	\$ -
4.2 - HVAC inside		
5.1 - DWR		\$ 505
5.2 - 0.80 gas DHW	0.5	
5.3 - 0.91 gas DHW, GSHP	1	
5.4 - Tier III HPWH	2.5	\$ 318
5.5 - CO2 HPWH	3	\$ 1,275
6.1 - Solar pV	1	\$ 5,040
7.1 - ES Appl+ventless Dryer	1.5	\$ 505

Life Cycle Cost Analysis

Life Cycle Cost Analysis (LCCA) is an analytical technique capable of comparing the present value of upfront capital cost to future operational costs. LCCA helps decision makers determine which project designs are likely to deliver the lowest total Life Cycle Cost (LCC).

The State Building Code Council has adopted the use of Washington State Department of Financial Managements (OFM) life cycle cost tool for this analysis. The OFM life cycle cost tool used to provide these results is based on the methodology of National Institute of Standards, HANDBOOK 135 Life-Cycle Costing Manual. The OFM model is designed for state projects and commercial construction. This model was modified to support residential construction. This primarily required changing the fuel escalation rates from commercial to a residential standard.

Standard inputs for Life cycle cost on all the submitted documents are included in the table below.

Key Variables	● OFM	O User	Value									
Building Life	50	50	50									
Real Discount Rate	0.70%	70.00%	0.70%									
Standard Maintenance Escalation	1.00%	1.00%	1.00%									
General Inflation	2.42%	2.42%	2.42%									
Study Period (years)	50	50	50									
Fuel Escalation Assumptions Locate	d on Fuel Es	calation Pag	Fuel Escalation Assumptions Located on Fuel Escalation Page									

Timing Variables	Year(s)	
Base Year (Generally Current Year)	2022	
Additional Construction Years beyond 2022	0	1st Operation Year = 2023

Finance 1st Purchases for ->	aseline	Alt. 1	Alt. 2
Down Payment (%)	20%	20%	20%
Term (Years)	25	25	25
Nominal Interest Rate	3.14%	3.14%	3.14%
Real Interest Rate	0.70%	0.70%	0.70%

Life Cycle Cost Reports

Below are the results of life cycle cost calculations for 5 of the 6 single family prototype buildings, each with a central heat pump, gas furnace, and zonal electric as well as the multifamily prototype with zonal electric heat. Each prototype includes 5 pages of report.

Executive report: This page summarizes the total life cycle cost results for three alternatives based on a 50-year life cycle cost assessment.

Baseline: The baseline report describes the life cycle cost impact for a 2018 WSEC compliant structure. Each includes the number of credits that would be required to meet the 2018 WSEC.

Alt 1. This report provides the inputs for the 2021 WSEC proposal. The cost and benefits included reflect the information detailed in this report.

Alt 2. This report is identical to Alt1, except \$0.75 per square foot of floor area is added to the cost. This provides a buffer to cover uncertainty about the first cost assessment.

Expenditure Report. We have included the results of the expenditure report for each project. This allows the reader to view the year over year cash flow for each model.

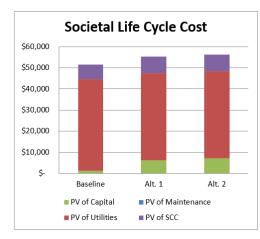
Small Gas Home – Executive Report

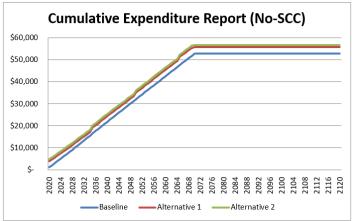
Key Analysis Var	iables	Building Characteristics				
Study Period (years)	50	Gross (Sq.Ft)	1,344			
Nominal Discount Rate	3.14%	Useable (Sq.Ft)	1,344			
Maintenance Escalation	1.00%	Space Efficiency	100.0%			
Zero Year (Current Year)	2020	Project Phase	0			
Construction Years	0	Building Type	0			

Life Cycle Cost Analysis	BEST		
Alternative	Baseline	Alt. 1	Alt. 2
Energy Use Intenstity (kBtu/sq.ft)	35.7	36.5	36.5
1st Construction Costs	\$ 1,207	\$ 3,895	\$ 4,903
PV of Capital Costs	\$ 1,207	\$ 6,156	\$ 7,099
PV of Maintenance Costs	\$ -	\$ -	\$ -
PV of Utility Costs	\$ 43,408	\$ 41,254	\$ 41,254
Total Life Cycle Cost (LCC)	\$ 44,615	\$ 47,410	\$ 48,354
Net Present Savings (NPS)	N/A	\$ (2,796)	\$ (3,739)

Societal LCC takes into consideration the social cost of carbon dioxide emissions caused by operational energy consumption

(GHG) Social Life Cycle Cost	BEST		
GHG Impact from Utility Consumption	Baseline	Alt. 1	Alt. 2
Tons of CO2e over Study Period	83	93	93
% CO2e Reduction vs. Baseline	N/A	-13%	-11%
Present Social Cost of Carbon (SCC)	\$ 6,828	\$ 7,784	\$ 7,784
Total LCC with SCC	\$ 51,442	\$ 55,195	\$ 56,138
NPS with SCC	N/A	\$ (3,753)	\$ (4,696)





Small Gas Home - Baseline Input

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		e Cycle Cost Analysis Tool	Total Building Annual Utility Analysis \$ 957							Water	EL	Natural Gas	
	Da	seline Input Page			Iotal B	uliding Annual Otility An	aiysis	\$	957	(CCF)	Electricity (KWH)	(Inerms)	
						Annual Utility I					\$ 752		
						nual Utility Consumption		1			8,352	195	
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N							Cost (\$) oracj						
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	E	Equipment & Furnishings											
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x	X901		0.5		50	\$991.30					-114	-5	
-	X901		1		50	\$1,453.90					-160	-12	
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x	X902	001 3.1a - Furnace	1		18	\$251.59					84	-34	
x	X902	002 3.2a - 9.5 HSPF HP	0.5		15	\$1,387.73							
x	X902		1.5		20	\$10,900.00							
x	X902		1.5		18	\$1,529.78							
X	X902		1		15	\$1,529.78							
X	X902		2		18	\$5,900.58							
×	X902 X902		1.5		50 50	\$0.00 \$327.81					-356	-32	
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×	X903		0.5		15	\$640.32					-18	-27	
x	X903		1		15	\$1,008.56					28	-39	
x	X903		2		15	\$955.02							
x	X903		2.5		15	\$3,824.45							
x	X904												
X	X904		1		25	\$5,040.00							
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×	X905 X906			1	50 55	\$1,206.61 \$0.75		\$	1,207				
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×	Z Z	Other Project Costs			30	\$1,405.00							
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f	Z30	Re-Occurring Annual Cost (Track Inflation)		1	1								

Small Gas Home – ALT 1

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	(901001	1.2 - U20 Glaze	1		50	\$1,454					-160	-12
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	901004	1.4 - 15% UA reduc	1		50	\$1,925		Ť			-151	-24
	(901005	1.5 - 22.5% UA reduc	2		50						-303	-33
>	(901006	1.6 - 30% UA reduc	3		50	\$6,819					-348	-55
)	(901007	2.1 - 2 ACH, HRV	1		50	\$1,395					116	-3
>	(901008	2.2 - 1.5 ACH, HRV	1.5		50	\$3,334					-4	-45
)	(901009	2.3 - 0.6 ACH, HRV	2		50	\$4,306					-91	-54
		HVAC										
_	(902001	3.1a - Furnace	1	1		\$252		\$	252		84	-34
_	(902002	3.2a - 9.5 HSPF HP	0.5		15	\$1,388						
_	(902003	3.3a - GSHP	1.5		20	\$10,900						
_	902004	3.4 - DHP	1.5		18	\$1,530						
	(902005 (902006	3.5a - 11.0 HSPF HP	2		15	\$1,530						
_	(902006	3.6a - DHP (15% elec) 4.1 - Deeply buried	1		18 50	\$5,901						
_	(902007	4.1 - Deepty buried 4.2 - HVAC inside	1.5	l		\$328		Ś	328		-356	-32
		Hot Water	1.5	1	30	2328		ľ	328		-330	-32
	903001	5.1 - DWR	0.5		50	\$437					-76	-23
	(903002	5.2 - 0.80 gas DHW	0.5		15	\$640					-18	-27
	(903003	5.3 - 0.91 gas DHW, GSHP	1		15	\$1,009					28	-39
_	(903004	5.4 - Tier III HPWH	2	1		\$955		\$	955			
	(903005	5.5 - CO2 HPWH	2.5		15	\$3,824						
)	(9040	Other										
)	(904001	6.1 - Solar pV	1		25	\$5,040						
)	(904002	7.1 - ES Appl+ventless Dryer	0.5		15	\$505					-722	
		2018 Compliant Building Cost			50	\$1,207						
		Added Cost			55	\$0.75						
_		3ACH & Continuous Insulation		1	50	\$1,405		\$	1,405			
2		ner Project Costs										
		e Time - Upfront Costs		1	50							
Z	30 Re -	Occurring Annual Cost (Track Inflation)		1	1							

Small Gas Home – ALT 2

<- P	rimary Fi	lter (Requires Level 1)		Open Prima	ary Filte	r and Click OK to Re-filter		_							
	Office	of Financial Management		Manua	l Special	Selection Only (Requires R	efilter)			I					
		pia, Washington - Version: 2020-A		Show E	Baseline F	ields and Entered Units (R	1								
		cycle Cost Analysis Tool		-		es Between Alternative and	· · · · ·	filtor)							
		rnative 2 Input Page		O SHOW E		Building Annual Utility An	Water (CCF)	Electricity (KWH)	Natural Gas (Therms)						
						Annual Utility E	Sill (¢1			(CCF)	\$ 619				
					^	nnual Utility Consumption		,		_	\$ 7,166				
						Sum of Annual Utility Con			(291)	(66)					
						Total Annual Utility Co				-	6,876	255			
					-	Annual Utility Bill ÷ Total Ut	\$ -	\$ 0.09							
	Note: N	lo Units Assigned to a Component with Entries													
S H O W		Iniformat II Elemental Classification for Buildings (Building Component List)	REF	# of Units	Useful Life (Yrs.)	Installed Cost (\$/Unit)	1st Year Maintenance Cost (\$/Unit)	Instal	omponent led Cost \$'s)	Annual Water (CCF/Unit)	Annual Electricity (KWH/Unit)	Annual Natural Gas (Therm/Unit)			
VV		Primary Entries Below: # of Uni	ts mus	t be > 0 to be	e counte	d; Useful Life must be >= 2				Entries Belo	w for Component	Specific Utility Analy			
		seline: Filter to Select All & Drag Copy O14:S14 & U14:AG14						\$	4,903						
		ıbstructure													
	_	nell													
	_	teriors													
		ervices													
		quipment & Furnishings													
		pecial Construction & Demolition													
		uilding Sitework													
	X9010	Building Envelope	0.5		50	6004					444				
	X90100		0.5		50 50						-114	-5			
	X90100		0.5	1	50			\$	٥٢٢		-160	-12			
	X901003			1	50			\$	955		-18	0			
	X901004		2		50						-151 -303	-24 -33			
	X90100		3		50						-348	-55			
	X90100		1		50						-348 116	-3			
	X90100		1.5		50						-4	-45			
	X901009		2		50						-91	-54			
	X9020	HVAC			30	54,300					-51	-54			
	X90200		1	1	18	\$252		S	252		84	-34			
	X90200		0.5		15				LUL		<u> </u>				
	X90200		1.5		20										
	X902004		1.5		18										
	X902005	3.5a - 11.0 HSPF HP	1		15	\$1,530									
	X90200	5 3.6a - DHP (15% elec)	2		18	\$5,901									
	X90200		1		50										
	X902008		1.5	1	50	\$328		\$	328		-356	-32			
	X9030	Hot Water													
	X90300		0.5		50						-76	-23			
	X903002		0.5		15						-18	-27			
	X903003		1		15						28	-39			
	X903004		2	1				\$	955						
	X90300		2.5		15	\$3,824									
	X9040	Other				A									
	X90400		1		25						722				
	X904002		0.5		15						-722				
	X9050	2018 Compliant Building Cost Added Cost		1344	50 55			_	1.000						
	X9060 X9070	3ACH & Continuous Insulation		1344	55			\$	1,008						
	_	ther Project Costs		1	50	\$1,405		\$	1,405						
		ne Time - Upfront Costs		1	50										
		e-Occurring Annual Cost (Track Inflation)		1	1										
	LOO IV			1	1 1						4				

Small Gas Home – Expenditure Report Expenditure Report Page In Constant 2020 \$'s

	Cumulativ	e Expenditur	e S	ummary		Annual E	xŗ	enditure S	Sui	mmary
Year	Baseline	Alt. 1		Alt. 2		Baseline		Alt. 1		Alt. 2
2020	\$ 1,207	\$ 3,895	\$	4,903	\$	1,207	\$	3,895	\$	4,903
2021	\$ 2,171	\$ 4,788	\$	5,796	\$	965	\$	893	\$	893
2022	\$ 3,136	\$ 5,681	\$	6,689	\$	965	\$	893	\$	893
2023	\$ 4,110	\$ 6,584	\$	7,592	\$	975	\$	902	\$	902
2024	\$ 5,089	\$ 7,491	\$	8,499	\$	979	\$	908	\$	908
2025	\$ 6,089	\$ 8,420	\$	9,428	\$	1,000	\$	929	\$	929
2026	\$ 7,109	\$ 9,367	\$	10,375	\$	1,020	\$	947	\$	947
2027	\$ 8,134	\$ 10,319	\$	11,327	\$	1,024	\$	952	\$	952
2028	\$ 9,160	\$ 11,274	\$	12,282	\$	1,026	\$	955	\$	955
2029	\$ 10,188	\$ 12,231	\$	13,239	\$	1,028	\$	957	\$	957
2030	\$ 11,238		\$	14,225	\$	1,051	\$	987	\$	987
2031	\$ 12,303	\$ 14,218	\$	15,226	\$	1,064	\$	1,001	\$	1,001
2032	\$ 13,359	<u> </u>	\$	16,221	\$	1,057	\$	995	\$	995
2033	\$ 14,420		\$	17,221	\$	1,061	\$	1,000	\$	1,000
2034	\$ 15,485		\$	18,226	\$	1,065	\$	1,005	\$	1,005
2035	\$ 16,550		\$	20,186	\$	1,065	\$	1,960	\$	1,960
2036	\$ 17,609	+ 1	\$	21,188	\$	1,059	\$	1,001	\$	1,001
2037	\$ 18,668		\$	22,189	\$	1,059	\$	1,001	\$	1,001
2038	\$ 19,721		\$	23,438	\$	1,053	\$	1,249	\$	1,249
2039	\$ 20,776		\$	24,438	\$	1,055	\$	1,000	\$	1,000
2040	\$ 21,823	· · · · · · · · · · · · · · · · · · ·	\$	25,432	\$	1,047	\$	994	\$	994
2041	\$ 22,873	<u> </u>	\$	26,429	\$	1,049	\$	996	\$	996
2041	\$ 23,914		\$	27,419	\$	1,042	\$	990	\$	990
2042	\$ 24,958		\$	28,411	\$	1,044	\$	993	\$	993
2044	\$ 25,993	_	\$	29,397	\$	1,036	\$	986	\$	986
2045	\$ 27,031		\$	30,386	\$	1,038	\$	989	\$	989
2046	\$ 28,071		\$	31,378	\$	1,040	\$	992	\$	992
2047	\$ 29,113		\$	32,372	\$	1,042	\$	994	\$	994
2047	\$ 30,147	\$ 32,352	\$	33,360	\$	1,034	\$	988	\$	988
2049	\$ 31,183	+:	\$	34,350	\$	1,034	\$	990	\$	990
2050	\$ 32,213		\$	36,292	\$	1,030	\$	1,942	\$	1,942
2051	\$ 33,244	-	\$	37,279	\$	1,030	\$	987	\$	987
2052	\$ 34,274	-	\$	38,267	\$	1,030	\$	988	\$	988
2052	\$ 35,304		\$	39,256	\$	1,030	\$	989	\$	989
			-				\$		\$	
2054	\$ 36,335 \$ 37,365	<u> </u>	\$	40,246 41,237	\$	1,030 1,031	\$	990 991	\$	990 991
2055				42,480	\$	1,031			\$	1,243
$\overline{}$			-		<u> </u>			1,243	_	
2057	\$ 39,427		-	43,473	\$	1,031	_	992	\$	992 993
2058	\$ 40,457		-	44,466	\$	1,031	_	993	\$	
2059	\$ 41,488		_	45,460	\$	1,031	_	994	\$	994
2060	\$ 42,519	+	\$	46,455	\$	1,031	\$	995	\$	995
2061	\$ 43,550	_		47,451	\$	1,031		996	\$	996
2062	\$ 44,581			48,447	\$	1,031		997	\$	997
2063	\$ 45,612		_	49,445	\$	1,031	_	997	\$	997
2064	\$ 46,643		<u> </u>	50,443	\$	1,031	_	998	\$	998
2065	\$ 47,674			52,397	\$	1,031	\$	1,954	\$	1,954
2066	\$ 48,705		_	53,397	\$	1,031	\$	1,000	\$	1,000
2067	\$ 49,736		_	54,398	\$	1,031	\$	1,001	\$	1,001
2068	\$ 50,768		_	55,399	\$	1,031	_	1,002	\$	1,002
2069	\$ 51,799		-	56,402	\$	1,031	_	1,002	\$	1,002
2070	\$ 52,831	\$ 55,704	\$	56,621	\$	1,031	\$	311	\$	219

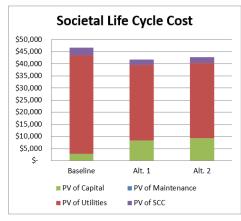
Small Heat Pump Home – Executive Report

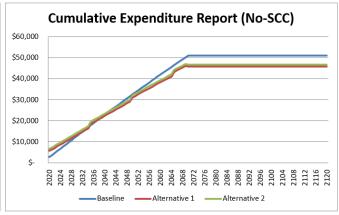
Key Analysis Var	iables	Building Ch	aracteristics
Study Period (years)	50	Gross (Sq.Ft)	1,344
Nominal Discount Rate	3.14%	Useable (Sq.Ft)	1,344
Maintenance Escalation	1.00%	Space Efficiency	100.0%
Zero Year (Current Year)	2020	Project Phase	0
Construction Years	0	Building Type	0

Life Cycle Cost Analysis	BEST									
Alternative	Baseline		Alt. 1		Alt. 2					
Energy Use Intenstity (kBtu/sq.ft)	27.0		20.6		20.6					
1st Construction Costs	\$ 2,783	\$	5,642	\$	6,650					
PV of Capital Costs	\$ 2,783	\$	8,378	\$	9,322					
PV of Maintenance Costs	\$ -	\$	-	\$	-					
PV of Utility Costs	\$ 40,807	\$	31,127	\$	31,127					
Total Life Cycle Cost (LCC)	\$ 43,590	\$	39,506	\$	40,449					
Net Present Savings (NPS)	N/A	\$	4,084	\$	3,140					

Societal LCC takes into consideration the social cost of carbon dioxide emissions caused by operational energy consumption

(GHG) Social Life Cycle Cost	BEST								
GHG Impact from Utility Consumption		Baseline		Alt. 1		Alt. 2			
Tons of CO2e over Study Period		39		30		30			
% CO2e Reduction vs. Baseline		N/A		24%		31%			
Present Social Cost of Carbon (SCC)	\$	2,998	\$	2,287	\$	2,287			
Total LCC with SCC	\$	46,588	\$	41,793	\$	42,736			
NPS with SCC		N/A	\$	4,795	\$	3,852			





<u>Small Heat Pump Home – Baseline Input</u>

	rimanı Eilta	r (Requires Level 1)				and Click OK to Re-filter			,	<u> </u>		
10-1		of Financial Management	١,			Units (Requires Re-Filter)			1 _		
		a, Washington - Version: 2020-A					,			' 		
		cle Cost Analysis Tool										
	-	line Input Page			Total B	uilding Annual Utility An	alysis	\$	959	Water (CCF)	Electricity (KWH)	Natural Gas (Therms)
						Annual Utility	Bill [\$]				\$ 959	
						nual Utility Consumption		ı			10,654	
						Sum of Annual Utility Cor				-	-	-
					۸	Total Annual Utility C nnual Utility Bill ÷ Total U				\$ -	10,654 \$ 0.09	\$ -
				<u> </u>		initial Calley Bill 1 Total C				,	3 0.03	
S	Uni	format II Elemental Classification for	DEE	# -611-34-	Useful	Installed Cost	1st Year	Total Compo		Annual	Annual Electricity	Annual
Н	Bı	uildings (Building Component List)	REF	# of Units	Life (Yrs.)	(\$/Unit)	Maintenance Cost (\$/Unit)	Installed C (\$'s)	ost	Water (CCF/Unit)	(KWH/Unit)	Natural Gas (Therm/Unit)
w					' '		Cost (\$/onit)	,, ,				
	A C. 1	Primary Entries Below: # of Units must	be > 0 t	o be counted	d; Useful I	ife must be >= 2		\$ 2,	783	Entries Belo	ow for Component	Specific Utility Ana
	A Subs	tructure										
	C Inter											
	D Servi											
		pment & Furnishings										
	F Spec	ial Construction & Demolition										
		ding Sitework										
x		uilding Envelope										
X	X901001	1.1 - U24 Glaze	0.5		50	\$991.30					-1,143	
X	X901002	1.2 - U20 Glaze	1		50	\$1,453.90					-1,192	
X	X901003	1.3 - 5% UA reduc	0.5		50 50	\$955.15					-1,101	
X	X901004 X901005	1.4 - 15% UA reduc 1.5 - 22.5% UA reduc	1.5		50	\$1,925.40 \$2,937.75					-1,243 -1,315	
X	X901003	1.6 - 30% UA reduc	2.5		50	\$6,819.02					-1,430	
×	X901007	2.1 - 2 ACH, HRV	0.5		50	\$1,395.16					-1,059	
x	X901008	2.2 - 1.5 ACH, HRV	1		50	\$3,333.70					-283	
x	X901009	2.3 - 0.6 ACH, HRV	1.5		50	\$4,305.90					-414	
x		IVAC										
x	X902001	3.1a - Furnace	1		18	\$251.59						
x	X902002	3.2a - 9.5 HSPF HP	0.5		15	\$1,387.73					-248	
x	X902003 X902004	3.3a - GSHP 3.4 - DHP	1.5		20 18	\$10,900.00						
x	X902004 X902005	3.5a - 11.0 HSPF HP	1.5		18	\$1,529.78 \$1,529.78					-371	
x	X902005 X902006	3.6a - DHP (15% elec)	2		18	\$5,900.58					-3/1	
x	X902007	4.1 - Deeply buried	0.5		50	\$0.00						
х	X902008	4.2 - HVAC inside	1		50	\$327.81					-385	
x	X9030 H	lot Water										
x	X903001	5.1 - DWR	0.5		50	\$437.08					-260	
x	X903002	5.2 - 0.80 gas DHW	0.5		15	\$640.32						
x	X903003	5.3 - 0.91 gas DHW, GSHP	1		15	\$1,008.56					1.107	
x	X903004 X903005	5.4 - Tier III HPWH 5.5 - CO2 HPWH	2.5		15 15	\$955.02 \$3,824.45					-1,407 -1,536	
x		Other	2.5		15	\$3,024.45					-1,536	
x	X904001	6.1 - Solar pV	1		25	\$5,040.00						
×	X904002	7.1 - ES Appl+ventless Dryer	0.5		15	\$504.83					-824	
x		018 Compliant Building Cost		1	50	\$2,782.89		\$ 2,	783			
x		dded Cost			55	\$0.75						
x		ACH & Continuous Insulation			50	\$1,405.00						
		er Project Costs										
		Time - Upfront Costs		1	50							
	Z30 Re-C	Occurring Annual Cost (Track Inflation)		1	1							

Small Heat Pump Home – ALT 1

Primary Filter (Requires Level 1)				r and Click OK to Re-filter								
Office of Financial Management				Selection Only (Requires R	efilter)			1				
Olympia, Washington - Version: 2020-A		_		Fields and Entered Units (R								
, , ,		-		•								
Life Cycle Cost Analysis Tool		O Show I	Differenc	es Between Alternative and	d Baseline (Req. Re	efilter)						
Alternative 1 Input Page			Total E	Building Annual Utility An	alysis	\$	731	Water (CCF)	Electricity (KWH)	Natural Gas (Therms)		
		Annual Utility Bill [\$] Annual Utility Consumption Not Entered Below							\$ 731			
									10,626			
				Sum of Annual Utility Con				-	(2,499)			
				Total Annual Utility Co				-	8,127			
Notes the Helica Academy days a Communication of the Foots			/	Annual Utility Bill ÷ Total Ut	ility Consumption	l		\$ -	\$ 0.09	\$		
Note: No Units Assigned to a Component with Entries												
Uniformat II Elemental Classification for			Useful	Installed Cost	1st Year		component	Annual	Annual Electricity	Annual		
Divilation and (Divilation at Common and Link)	REF	# of Units	Life	(\$/Unit)	Maintenance		alled Cost	Water (CCF/Unit)		Natural Gas		
Buildings (Building Component List)			(Yrs.)	(\$701lld)	Cost (\$/Unit)		(\$'s)	Water (ceryonit)	(KWII) OIIIC)	(Therm/Unit)		
Primary Entries Below: # of U	nits mus	t be > 0 to b	e counte	d; Useful Life must be >= 2				Entries Belo	w for Component	Specific Utility A		
Match Baseline: Filter to Select All & Drag Copy O14:S14 & U14:AG14						\$	5,642					
A Substructure												
B Shell												
C Interiors												
D Services												
E Equipment & Furnishings												
F Special Construction & Demolition												
G Building Sitework												
X9010 Building Envelope												
X901001 1.1 - U24 Glaze	0.5		50						-1143			
X901002 1.2 - U20 Glaze	1	1				\$	1,454		-1192			
X901003 1.3 - 5% UA reduc	0.5		50	· · · · · · · · · · · · · · · · · · ·					-1101			
X901004 1.4 - 15% UA reduc	1		50						-1243			
X901005 1.5 - 22.5% UA reduc	2		50						-1315			
X901006 1.6 - 30% UA reduc X901007 2.1 - 2 ACH, HRV	3	1	50 50			\$	1,395		-1430 -1059			
X901007 2.1 - 2 ACH, HRV X901008 2.2 - 1.5 ACH, HRV	1.5	1	50			\$	1,395		-1059			
X901008 2.2 - 1.5 ACH, HRV X901009 2.3 - 0.6 ACH, HRV	1.5		50						-285			
X9020 HVAC			50	\$4,505.90					-414			
X902001 3.1a - Furnace	1		18	\$251.59								
X902002 3.2a - 9.5 HSPF HP	0.5	1	15			Ś	1,388		-248			
X902003 3.3a - GSHP	1.5	1	20			1	1,500		-240			
X902004 3.4 - DHP	1.5		18									
X902005 3.5a - 11.0 HSPF HP	1.3		15						-371			
X902006 3.6a - DHP (15% elec)	2		18									
X902007 4.1 - Deeply buried	1		50									
X902008 4.2 - HVAC inside	1.5		50						-385			
X9030 Hot Water												
X903001 5.1 - DWR	0.5		50	\$437.08					-260			
X903002 5.2 - 0.80 gas DHW	0.5		15	\$640.32								
X903003 5.3 - 0.91 gas DHW, GSHP	1		15									
X903004 5.4 - Tier III HPWH	2		15						-1407			
X903005 5.5 - CO2 HPWH	2.5		15	\$3,824.45					-1536			
X9040 Other												
X904001 6.1 - Solar pV	1		25									
X904002 7.1 - ES Appl+ventless Dryer	0.5		15						-824			
X9050 2018 Compliant Building Cost			50									
X9060 Added Cost			55			l						
X9070 3ACH & Continuous Insulation		1	50	\$1,405.00		\$	1,405					
Z Other Project Costs												
Z10 One Time - Upfront Costs		1	50									
Z30 Re-Occurring Annual Cost (Track Inflation)		1	1									

Small Heat Pump Home – ALT 2

<- P	rimary	/ Filter	(Requires Level 1)		Open Prima	ary Filter	and Click OK to Re-filter						
	Offi	ce of	Financial Management		Manua	Special S	Selection Only (Requires R	efilter)					
	Oly	mpia	, Washington - Version: 2020-A		Show B	aseline F	ields and Entered Units (R	equires Refilter)					
			le Cost Analysis Tool		○ Show D	ifference	s Between Alternative an	d Baseline (Reg. Re	efilter)				
		-	ative 2 Input Page		0		uilding Annual Utility An		\$	731	Water	Electricity (KWH)	Natural Gas
			aaro 2 mpari ago				A	SIL FÉ1			(CCF)	\$ 731	(Therms)
						Δ-	Annual Utility E Inual Utility Consumption					\$ 10,626	
							Sum of Annual Utility Con		v			(2,499)	Ş -
							Total Annual Utility C					8,127	
						Α	nnual Utility Bill ÷ Total Ut				\$ -	\$ 0.09	\$ -
	Note	: No U	nits Assigned to a Component with Entries										
S H		Unif	ormat II Elemental Classification for	REF	# of Units	Useful Life	Installed Cost	1st Year Maintenance	1	Component alled Cost	Annual	Annual Electricity	Annual Natural Gas
o W		Bu	ildings (Building Component List)	KEF	# Of Office	(Yrs.)	(\$/Unit)	Cost (\$/Unit)		(\$'s)	Water (CCF/Unit)	(KWH/Unit)	(Therm/Unit)
W			Primary Entries Below: # of Ur	nits mus	t be > 0 to be	e counted	; Useful Life must be >= 2				Entries Belo	ow for Compo <u>nent</u>	Specific Utility Ana
	Match	n Baselin	ne: Filter to Select All & Drag Copy 014:S14 & U14:AG14						\$	6,650			
	Α	Substi	ructure										
	В	Shell											
	С	Interio	ors										
	D	Servic	es										
	E	Equip	ment & Furnishings										
	F	Specia	al Construction & Demolition										
	G	Buildi	ng Sitework										
	X901		ilding Envelope										
	X901		1.1 - U24 Glaze	0.5		50	\$991.30					-1143	
	X901	002	1.2 - U20 Glaze	1	1	50	\$1,453.90		\$	1,454		-1192	
	X901	003	1.3 - 5% UA reduc	0.5		50	\$955.15					-1101	
	X901		1.4 - 15% UA reduc	1		50	\$1,925.40					-1243	
	X901	005	1.5 - 22.5% UA reduc	1.5		50	\$2,937.75					-1315	
	X901		1.6 - 30% UA reduc	2.5		50	\$6,819.02					-1430	
	X901		2.1 - 2 ACH, HRV	0.5	1	50	\$1,395.16		\$	1,395		-1059	
	X901		2.2 - 1.5 ACH, HRV	1		50	\$3,333.70					-283	
	X901		2.3 - 0.6 ACH, HRV	1.5		50	\$4,305.90					-414	
	X902	_											
	X902		3.1a - Furnace	1		18	\$251.59						
	X902		3.2a - 9.5 HSPF HP	0.5	1	15	\$1,387.73		\$	1,388		-248	
	X902		3.3a - GSHP	1.5		20	\$10,900.00						
	X902		3.4 - DHP	1.5		18	\$1,529.78						
	X902		3.5a - 11.0 HSPF HP	1		15	\$1,529.78		-			-371	
	X902		3.6a - DHP (15% elec)	2		18	\$5,900.58		-				
	X902		4.1 - Deeply buried	0.5		50	A227.04		-			205	
	X902		4.2 - HVAC inside	1		50	\$327.81		-			-385	
	X903	_	ot Water	0.5		50	Ć427.00		-			200	
	X903		5.1 - DWR	0.5		15	\$437.08 \$640.32		-			-260	
	X903		5.2 - 0.80 gas DHW	0.5		15	\$1,008.56		-				
	X903 X903		5.3 - 0.91 gas DHW, GSHP 5.4 - Tier III HPWH	2		15	\$1,008.56		-			-1407	
	X903		5.5 - CO2 HPWH	2.5		15	\$3,824.45					-1407	
	X903			2.5		15	\$3,824.45					-1556	
	X904 X904		6.1 - Solar pV	1		25	\$5,040.00						
	X904 X904		7.1 - ES Appl+ventless Dryer	0.5		15	\$5,040.00					-824	
	X904 X905		7.1 - ES Appi+ventiess Dryer 18 Compliant Building Cost	0.5		50	\$2,782.89					-024	
	X905	_	Ided Cost		1344	55	\$2,782.89		\$	1,008			
	X907		ICH & Continuous Insulation		1544	50	\$1,405.00		\$	1,405			
	Z		Project Costs		1	50	\$1,405.00		Ş	1,405			
\vdash	Z10	_	ime - Upfront Costs		1	50							
		Olie I	curring Annual Cost (Track Inflation)		1	30							

<u>Small Heat Pump Home – Expenditure Report</u> Expenditure Report Page In Constant 2020 \$'s

	С	umulative	е Ехр	enditur	e :	Summary	Annual E	Ξxμ	oenditure :	Sui	mmary
Year		Baseline		Alt. 1		Alt. 2	Baseline		Alt. 1		Alt. 2
2020	\$	2,783	\$	5,642	\$	6,650	\$ 2,783	\$	5,642	\$	6,650
2021	\$	3,752	\$	6,381	\$	7,389	\$ 969	\$	739	\$	739
2022	\$	4,721	\$	7,120	\$	8,128	\$ 969	\$	739	\$	739
2023	\$	5,699	\$	7,866	\$	8,874	\$ 979	\$	747	\$	747
2024	\$	6,678	\$	8,613	\$	9,621	\$ 979	\$	747	\$	747
2025	\$	7,677	\$	9,375	\$	10,383	\$ 999	\$	762	\$	762
2026	\$	8,696	\$	10,152	\$	11,160	\$ 1,019	\$	777	\$	777
2027	\$	9,714	\$	10,929	\$	11,937	\$ 1,019	\$	777	\$	777
2028	\$	10,733	\$	11,706	\$	12,714	\$ 1,019	\$	777	\$	777
2029	\$	11,752	\$	12,483	\$	13,491	\$ 1,019	\$	777	\$	777
2030	\$	12,771	\$	13,260	\$	14,268	\$ 1,019	\$	777	\$	777
2031	\$	13,799	\$	14,045	\$	15,053	\$ 1,029	\$	785	\$	785
2032	\$	14,818	\$	14,822	\$	15,830	\$ 1,019	\$	777	\$	777
2033	\$	15,837	\$	15,599	\$	16,607	\$ 1,019	\$	777	\$	777
2034	\$	16,856	\$	16,376	\$	17,384	\$ 1,019	\$	777	\$	777
2035	\$	17,874	\$	18,541	\$	19,549	\$ 1,019	\$	2,165	\$	2,165
2036	\$	18,883	\$	19,311	\$	20,319	\$ 1,009	\$	769	\$	769
2037	\$	19,892	\$	20,080	\$	21,088	\$ 1,009	\$	769	\$	769
2038	\$	20,891	\$	20,842	\$	21,850	\$ 999	\$	762	\$	762
2039	\$	21,890	\$	21,604	\$	22,612	\$ 999	\$	762	\$	762
2040	\$	22,878	\$	22,358	\$	23,366	\$ 989	\$	754	\$	754
2041	\$	23,867	\$	23,113	\$	24,121	\$ 989	\$	754	\$	754
2042	\$	24,846	\$	23,859	\$	24,867	\$ 979	\$	747	\$	747
2043	\$	25,825	\$	24,606	\$	25,614	\$ 979	\$	747	\$	747
2044	\$	26,794	\$	25,345	\$	26,353	\$ 969	\$	739	\$	739
2045	\$	27,762	\$	26,084	\$	27,092	\$ 969	\$	739	\$	739
2046	\$	28,731	\$	26,823	\$	27,831	\$ 969	\$	739	\$	739
2047	\$	29,700	\$	27,562	\$	28,570	\$ 969	\$	739	\$	739
2048	\$	30,659	\$	28,293	\$	29,301	\$ 959	\$	731	\$	731
2049	\$	31,618	\$	29,025	\$	30,033	\$ 959	\$	731	\$	731
2050	\$	32,566	\$	31,136	\$	32,144	\$ 949	\$	2,112	\$	2,112
2051	\$	33,513	\$	31,858	\$	32,866	\$ 947	\$	722	\$	722
2052	\$	34,458	\$	32,579	\$	33,587	\$ 945	\$	721	\$	721
2053	\$	35,401	\$	33,298	\$	34,306	\$ 943	\$	719	\$	719
2054	\$	36,342	\$	34,016	\$	35,024	\$ 941	\$	718	\$	718
2055	\$	37,281	\$	34,732	\$	35,740	\$ 939	\$	716	\$	716
2056	\$	38,218	\$	35,447	\$	36,455	\$ 937	\$	715	\$	715
2057	\$	39,152	\$	36,160	\$	37,168	\$ 935	\$	713	\$	713
2058	\$	40,085	\$	36,871	\$	37,879	\$ 933	\$	712	\$	712
2059	\$	41,016	\$	37,582	\$	38,590	\$ 931	\$	710	\$	710
2060	\$	41,945	\$	38,290	\$	39,298	\$ 929	\$	709	\$	709
2061	\$	42,872	\$	38,997	\$	40,005	\$ 927	\$	707	\$	707
2062	\$	43,797	\$	39,703	\$	40,711	\$ 925	\$	705	\$	705
2063	\$	44,720	\$	40,407	\$	41,415	\$ 923	\$	704	\$	704
2064	\$	45,640	\$	41,109	\$	42,117	\$ 921	\$	702	\$	702
2065	\$	46,559	\$	43,198	\$	44,206	\$ 919	\$	2,089	\$	2,089
2066	\$	47,476	\$	43,897	\$	44,905	\$ 917	\$	699	\$	699
2067	\$	48,391	\$	44,595	\$	45,603	\$ 915	\$	698	\$	698
2068	\$	49,304	\$	45,291	\$	46,299	\$ 913	\$	696	\$	696
2069	\$	50,215	\$	45,986	\$	46,994	\$ 911	\$	695	\$	695
2070	\$	51,124	\$	45,754	\$	46,671	\$ 909	\$	(232)	\$	(323)

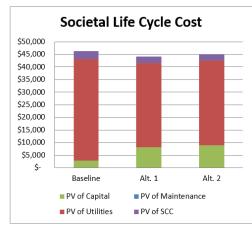
Small Zonal Electric Home – Executive Report

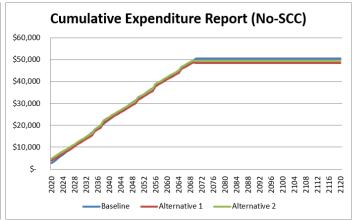
Key Analysis Var	iables	Building Cha	aracteristics
Study Period (years)	50	Gross (Sq.Ft)	1,344
Nominal Discount Rate	3.14%	Useable (Sq.Ft)	1,344
Maintenance Escalation	1.00%	Space Efficiency	100.0%
Zero Year (Current Year)	2020	Project Phase	0
Construction Years	0	Building Type	0

Life Cycle Cost Analysis	BEST								
Alternative	Baseline		Alt. 1		Alt. 2				
Energy Use Intenstity (kBtu/sq.ft)	26.8		22.2		22.2				
1st Construction Costs	\$ 2,783	\$	3,890	\$	4,898				
PV of Capital Costs	\$ 2,783	\$	8,073	\$	9,016				
PV of Maintenance Costs	\$ -	\$	-	\$	-				
PV of Utility Costs	\$ 40,425	\$	33,490	\$	33,490				
Total Life Cycle Cost (LCC)	\$ 43,208	\$	41,563	\$	42,506				
Net Present Savings (NPS)	N/A	\$	1,645	\$	702				

Societal LCC takes into consideration the social cost of carbon dioxide emissions caused by operational energy consumption

(GHG) Social Life Cycle Cost	BEST								
GHG Impact from Utility Consumption	Baseline		Alt. 1		Alt. 2				
Tons of CO2e over Study Period	39		32		32				
% CO2e Reduction vs. Baseline	N/A		17%		21%				
Present Social Cost of Carbon (SCC)	\$ 2,970	\$	2,461	\$	2,461				
Total LCC with SCC	\$ 46,178	\$	44,023	\$	44,967				
NPS with SCC	N/A	\$	2,155	\$	1,212				





<u>Small Zonal Electric Home – Baseline Input</u>

<- Primary Filter (Requires Level 1)		Open Prim	ary Filter	and Click OK to Re-filter			,			
Office of Financial Manag		Show /	All Entered	Units (Requires Re-Filter)			1		
Olympia, Washington - V Life Cycle Cost Analysis						1				
Baseline Input Pa			Total B	uilding Annual Utility Ar	alysis	\$	950	Water (CCF)	Electricity (KWH)	Natural Gas (Therms)
				Annual Utility	` '	\$ 950	\$.			
				nual Utility Consumption		10,554				
				Sum of Annual Utility Cor				-	_	
				Total Annual Utility (nnual Utility Bill ÷ Total U		-	10,554			
		•	•	nnual Otility Bill + Total O				\$ -	\$ 0.09	\$
s Uniformat II Elemental	l Classification for		Useful	Installed Cost	1st Year	Total Con		Annual	Annual Electricity	Annual
Buildings (Building (Component List)	# of Units	Life	(\$/Unit)	Maintenance	Installe		Water (CCF/Unit)		Natural Gas
w	Semperiorit Liet)		(Yrs.)	,,,,,	Cost (\$/Unit)	(\$'\$	5)	, , ,	` ' ' '	(Therm/Unit)
	Entries Below: # of Units must be > 0	to be counte	d; Useful L	ife must be >= 2		\$	2,783	Entries Belo	w for Component	Specific Utility An
A Substructure										
B Shell						-				
C Interiors										
D Services F Fauinment & Furnishings						-				
a administration and annual mage	liai									
F Special Construction & Demol G Building Sitework	ition					_				
x X9010 Building Envelope										
x X901001 1.1 - U24 Glaze	0.5		50	\$991.30					-173	
x X901001 1.1 - 0 - 24 Glaze x X901002 1.2 - U20 Glaze	1		50	\$1,453.90					-291	
x X901003 1.3 - 5% UA reduc	0.5		50	\$955.15					-94	
× X901004 1.4 - 15% UA reduc	1		50	\$1,925.40					-406	
x X901005 1.5 - 22.5% UA reduc	1.5		50	\$2,937.75					-581	
x X901006 1.6 - 30% UA reduc	2.5		50	\$6,819.02					-821	
x X901007 2.1 - 2 ACH, HRV	0.5		50	\$1,395.16					10	
x X901008 2.2 - 1.5 ACH, HRV	1		50	\$3,333.70					-344	
x X901009 2.3 - 0.6 ACH, HRV	1.5		50	\$4,305.90					-487	
x X9020 HVAC										
x X902001 3.1a - Furnace	1		18	\$251.59						
x X902002 3.2a - 9.5 HSPF HP	0.5		15	\$1,387.73						
x X902003 3.3a - GSHP x X902004 3.4 - DHP	1.5 1.5		20	\$10,900.00					600	
	1.5		18 15	\$1,529.78		-			-689	
x X902005 3.5a - 11.0 HSPF HP x X902006 3.6a - DHP (15% elec)	2		18	\$1,529.78 \$5,900.58					-1,154	
x X902006 3.6a - DHP (15% elec) x X902007 4.1 - Deeply buried	0.5		50	\$0.00					-1,134	
x X902008 4.2 - HVAC inside	1		50	\$327.81						
x X9030 Hot Water	1			, / · _ / · · · · · · · · · · · · · ·						
x X903001 5.1 - DWR	0.5		50	\$437.08					-247	
x X903002 5.2 - 0.80 gas DHW	0.5		15	\$640.32						
x X903003 5.3 - 0.91 gas DHW, GSI			15	\$1,008.56						
x X903004 5.4 - Tier III HPWH	2		15	\$955.02					-1,395	
x X903005 5.5 - CO2 HPWH	2.5		15	\$3,824.45					-1,512	
x X9040 Other										
x X904001 6.1 - Solar pV	1		25	\$5,040.00					704	
x X904002 7.1 - ES Appl+ventless D			15	\$504.83		_	2.702		-784	
x X9050 2018 Compliant Building Co x X9060 Added Cost	JSL	1	50 55	\$2,782.89 \$0.75		\$	2,783			
	ion		50	\$1,405.00						
x X9070 3ACH & Continuous Insulat Z Other Project Costs	ion		30	\$1,405.00						
Z10 One Time - Upfront Costs		1	50							
Z30 Re-Occurring Annual Cost (Tra	ack Inflation)	1	1							

<u>Small Zonal Electric Home – ALT 1</u>

	Requires Level 1)			_	r and Click OK to Re-filter							
Office of	Financial Management		O Manua	l Special	Selection Only (Requires R	efilter)			I			
Olympia,	Washington - Version: 2020-A		Show E	Baseline F	ields and Entered Units (R	equires Refilter)						
	e Cost Analysis Tool		O Show E	Differenc	es Between Alternative and	d Baseline (Req. Re	efilter)					
-	ative 1 Input Page			Total E	Building Annual Utility Ana	alysis	\$	787	Water (CCF)	Electricity (KWH)	Natural Gas (Therms)	
					Annual Utility E	ill (\$1			(66.)	\$ 787	(mems)	
				Α	nnual Utility Consumption		v			10,827		
					Sum of Annual Utility Con		•		_	(2,083)		
					Total Annual Utility Co					8,743		
				1	Annual Utility Bill ÷ Total Ut				\$ -	\$ 0.09	\$	
Note: No Ur	nits Assigned to a Component with Entries											
Unifo				Useful		1st Year	Total Com	nonent			Annual	
Unifo	rmat II Elemental Classification for	REF	# of Units	Life	Installed Cost	Maintenance	Installed	•	Annual	Annual Electricity	Natural Ga	
Bui	Idings (Building Component List)	I I	# Of Office	(Yrs.)	(\$/Unit)	Cost (\$/Unit)	(\$'s		Water (CCF/Unit)	(KWH/Unit)	(Therm/Uni	
						cost (\$) onit	(5.3	<u> </u>				
	Primary Entries Below: # of U	nits mus	t be > 0 to be	e counte	d; Useful Life must be >= 2		_		Entries Belo	w for Component	Specific Utility	
	e: Filter to Select All & Drag Copy 014:S14 & U14:AG14	_					\$	3,890				
A Substru	ucture											
B Shell												
C Interio												
D Service												
	nent & Furnishings											
	Construction & Demolition											
	ng Sitework											
	lding Envelope											
	1.1 - U24 Glaze	0.5		50	\$991					-173		
X901002	1.2 - U20 Glaze	1		50	\$1,454					-291		
X901003	1.3 - 5% UA reduc	0.5		50	\$955					-94		
X901004	1.4 - 15% UA reduc	1		50	\$1,925					-406		
X901005	1.5 - 22.5% UA reduc	2		50	\$2,938					-581		
X901006	1.6 - 30% UA reduc	3		50	\$6,819					-821		
X901007	2.1 - 2 ACH, HRV	1		50	\$1,395					10		
X901008	2.2 - 1.5 ACH, HRV	1.5		50	\$3,334					-344		
X901009	2.3 - 0.6 ACH, HRV	2		50	\$4,306					-487		
X9020 HV	AC											
X902001	3.1a - Furnace	1		18	\$252							
X902002	3.2a - 9.5 HSPF HP	0.5		15	\$1,388							
	3.3a - GSHP	1.5		20	\$10,900							
	3.4 - DHP	1.5	1	_	\$1,530		\$	1,530		-689		
	3.5a - 11.0 HSPF HP	1		15	\$1,530		T .					
	3.6a - DHP (15% elec)	2		18	\$5,901					-1154		
	4.1 - Deeply buried	1		50								
	4.2 - HVAC inside	1.5		50	\$328							
	Water											
	5.1 - DWR	0.5		50	\$437					-247		
	5.2 - 0.80 gas DHW	0.5		15	\$640							
	5.3 - 0.91 gas DHW, GSHP	1		15	\$1,009							
	5.4 - Tier III HPWH	2	1		\$955		\$	955		-1395		
	5.5 - CO2 HPWH	2.5		15	\$3,824					-1512		
X9040 Oth					,							
	6.1 - Solar pV	1		25	\$5,040							
	7.1 - ES Appl+ventless Dryer	0.5		15	\$505					-784		
	L8 Compliant Building Cost	0.5		50	\$2,783					70.		
	ded Cost			55	\$2,783							
	CH & Continuous Insulation		1	_	\$1,405		\$	1,405				
	Project Costs		1	30	\$1,405		,	1,403				
	me - Upfront Costs		1	50								
TETO ONE III	curring Annual Costs		1	30								

<u>Small Zonal Electric Home – ALT 2</u>

<- Pri	marv	/ Filter	(Requires Level 1)		Open Prima	arv Filter	and Click OK to Re-filter						
4			Financial Management				Selection Only (Requires R	efilter)			1 .		
			, Washington - Version: 2020-A				ields and Entered Units (R						
	-								Ch				
		-	le Cost Analysis Tool		O Show L		es Between Alternative and		Water		Natural Gas		
	Alt	ern	ative 2 Input Page			Total B	uilding Annual Utility An	alysis	\$	787	(CCF)	Electricity (KWH)	(Therms)
							Annual Utility E	Bill [\$]				\$ 787	
						Aı	nnual Utility Consumption		v		-	\$ 10,827	
							Sum of Annual Utility Con				-	(2,083)	-
						,	Total Annual Utility C				-	8,743	-
	Note	· No II	nits Assigned to a Component with Entries				nnual Utility Bill ÷ Total Ut	ility Consumption			\$ -	\$ 0.09	\$ -
П	1010	. 140 0	into Assigned to a Component with Entires						Ι.				
S		Unifo	ormat II Elemental Classification for			Useful	Installed Cost	1st Year		omponent	Annual	Annual Electricity	Annual
Н		Bu	ildings (Building Component List)	REF	# of Units	Life	(\$/Unit)	Maintenance		lled Cost	Water (CCF/Unit)		Natural Gas
w						(Yrs.)		Cost (\$/Unit)	1	(\$'s)			(Therm/Unit)
			Primary Entries Below: # of Uni	its mus	t be > 0 to be	counte	d; Useful Life must be >= 2				Entries Belo	ow for Component	Specific Utility Anal
			e: Filter to Select All & Drag Copy O14:S14 & U14:AG14	_					\$	4,898			
	٩		ructure						_				
-	3 C	Shell											
-	<u> </u>	Servic							-				
-	, :	_	ment & Furnishings										
			al Construction & Demolition										
	3	· ·	ng Sitework										
-	(901		ilding Envelope										
	(901		1.1 - U24 Glaze	0.5		50	\$991					-173	
	(901		1.2 - U20 Glaze	1		50	\$1,454					-291	
-	(901		1.3 - 5% UA reduc	0.5		50	\$955					-94	
-	(901		1.4 - 15% UA reduc	1		50	\$1,925					-406	
	(901		1.5 - 22.5% UA reduc	1.5		50	\$2,938					-581	
	(901		1.6 - 30% UA reduc	2.5		50	\$6,819					-821	
-	(901		2.1 - 2 ACH, HRV	0.5		50	\$1,395					10	
)	(901		2.2 - 1.5 ACH, HRV	1		50	\$3,334					-344	
)	(901	009	2.3 - 0.6 ACH, HRV	1.5		50	\$4,306					-487	
)	(902	0 HV	'AC										
	(902	001	3.1a - Furnace	1		18	\$252						
	(902)	002	3.2a - 9.5 HSPF HP	0.5		15	\$1,388						
	(902		3.3a - GSHP	1.5		20	\$10,900						
-	(902)		3.4 - DHP	1.5	1	18	\$1,530		\$	1,530		-689	
	(902)		3.5a - 11.0 HSPF HP	1		15	\$1,530						
-	(902		3.6a - DHP (15% elec)	2		18	\$5,901					-1154	
-	(902)		4.1 - Deeply buried	0.5		50							
-	(902)		4.2 - HVAC inside	1		50	\$328						
-	(903)		t Water 5.1 - DWR	0.5		50	\$437					247	
-	(903) (903)		5.1 - DWR 5.2 - 0.80 gas DHW	0.5		15	\$437 \$640					-247	
	(903)		5.3 - 0.91 gas DHW, GSHP	0.5		15	\$1,009						
-	(903)		5.4 - Tier III HPWH	2	1	15	\$1,009		s	955		-1395	
	(903)		5.5 - CO2 HPWH	2.5	1	15	\$3,824		ľ	,,,,		-1512	
	(904)			2.5		13	\$3,024					1312	
	(904)		6.1 - Solar pV	1		25	\$5,040						
	(904)		7.1 - ES Appl+ventless Dryer	0.5		15	\$505					-784	
-	(905)		18 Compliant Building Cost			50	\$2,783						
-	(906	-	ded Cost		1344	55	\$1		\$	1,008			
	(907		CH & Continuous Insulation		1	50	\$1,405		\$	1,405			
	<u> </u>	Other	Project Costs										
7	210	One T	ime - Upfront Costs		1	50							
7	230	Re-Oc	curring Annual Cost (Track Inflation)		1	1							

Small Zonal Electric Home—Expenditure Report Expenditure Report Page In Constant 2020 \$'s

	Cumulative	e Expenditur	e S	ummary		Annual E	xp	oenditure S	Sui	mmary
Year	Baseline	Alt. 1		Alt. 2		Baseline		Alt. 1		Alt. 2
2020	\$ 2,783	\$ 3,890	\$	4,898	\$	2,783	\$	3,890	\$	4,898
2021	\$ 3,743	\$ 4,685	\$	5,693	\$	960	\$	795	\$	795
2022	\$ 4,702	\$ 5,480	\$	6,488	\$	960	\$	795	\$	795
2023	\$ 5,672	\$ 6,283	\$	7,291	\$	970	\$	803	\$	803
2024	\$ 6,642	\$ 7,087	\$	8,095	\$	970	\$	803	\$	803
2025	\$ 7,631	\$ 7,906	\$	8,914	\$	989	\$	820	\$	820
2026	\$ 8,640	\$ 8,742	\$	9,750	\$	1,009	\$	836	\$	836
2027	\$ 9,650	\$ 9,579	\$	10,587	\$	1,009	\$	836	\$	836
2028	\$ 10,659	\$ 10,415	\$	11,423	\$	1,009	\$	836	\$	836
2029	\$ 11,668	\$ 11,251	\$	12,259	\$	1,009	\$	836	\$	836
2030	\$ 12,677	\$ 12,087	\$	13,095	\$	1,009	\$	836	\$	836
2031	\$ 13,696	\$ 12,931	\$	13,939	\$	1,019	\$	844	\$	844
2032	\$ 14,706	\$ 13,767	\$	14,775	\$	1,009	\$	836	\$	836
2033	\$ 15,715	\$ 14,603	\$	15,611	\$	1,009	\$	836	\$	836
2034	\$ 16,724	\$ 15,439	\$	16,447	\$	1,009	\$	836	\$	836
2035	\$ 17,733	\$ 17,230	\$	18,238	\$	1,009	\$	1,791	\$	1,791
2036	\$ 18,733	\$ 18,058	\$	19,066	\$	999	\$	828	\$	828
2037	\$ 19,732	\$ 18,886	\$	19,894	\$	999	\$	828	\$	828
2038	\$ 20,721	\$ 21,236	\$	22,244	\$	989	\$	2,349	\$	2,349
2039	\$ 21,711	\$ 22,055	\$	23,063	\$	989	\$	820	\$	820
2040	\$ 22,690	\$ 22,867	\$	23,875	\$	980	\$	812	\$	812
2041	\$ 23,670	\$ 23,678	\$	24,686	\$	980	\$	812	\$	812
2042	\$ 24,640	\$ 24,482	\$	25,490	\$	970	\$	803	\$	803
2043	\$ 25,609	\$ 25,285	\$	26,293	\$	970	\$	803	\$	803
2044	\$ 26,569	\$ 26,080	\$	27,088	\$	960	\$	795	\$	795
2045	\$ 27,529	\$ 26,875	\$	27,883	\$	960	\$	795	\$	795
2046	\$ 28,489	\$ 27,670	\$	28,678	\$	960	\$	795	\$	795
2047	\$ 29,448	\$ 28,465	\$	29,473	\$	960	\$	795	\$	795
2048	\$ 30,398	\$ 29,252	\$	30,260	\$	950	\$	787	\$	787
2049	\$ 31,348	\$ 30,039	\$	31,047	\$	950	\$	787	Ś	787
2050	\$ 32,288	\$ 31,773	\$	32,781	\$	940	\$	1,734	\$	1,734
2051	\$ 33,226	\$ 32,550	\$	33,558	\$	938	\$	777	\$	777
2052	\$ 34,162	\$ 33,326	\$	34,334	\$	936	\$	775	\$	775
2053	\$ 35,096	\$ 34,099	\$	35,107	\$	934	\$	774	\$	774
2054	\$ 36,028	\$ 34,872	\$	35,880	\$	932	\$	772	Ś	772
2055	\$ 36,958	\$ 35,642	\$	36,650	\$	930	\$	771	\$	771
2056	\$ 37,886		\$	38,949	\$	928	\$	2,299	\$	2,299
2057	\$ 38,812	\$ 38,708	\$	39,716	\$	926	\$	767	\$	767
2058	\$ 39,737	\$ 39,474	\$	40,482	\$	924	\$	766	\$	766
2059	\$ 40,659	\$ 40,237	\$	41,245	\$	922	\$	764	\$	764
2060	\$ 41,579	\$ 41,000	\$	42,008	\$	920	\$	762	\$	762
2061	\$ 42,497	\$ 41,760	\$	42,768	\$	918	\$	761	\$	761
2062	\$ 43,413	\$ 42,520	\$	43,528	\$	916	\$	759	\$	759
2063	\$ 44,328	\$ 43,277	\$	44,285	\$	914	\$	757	\$	757
2064	\$ 45,240	\$ 44,033	\$	45,041	\$	912	\$	756	\$	756
2065	\$ 46,150	\$ 45,742	\$	46,750	\$	910	\$	1,709	\$	1,709
2066	\$ 47,059	\$ 46,494	\$	47,502	\$	908	\$	752	\$	752
2067	\$ 47,965	\$ 47,245	\$	48,253	\$	906	\$	751	\$	751
2068	\$ 48,869	\$ 47,994	\$	49,002	\$	904	\$	749	\$	749
2069	\$ 49,772	\$ 48,742	\$	49,750	\$	902	\$	748	\$	749
2070	\$ 50,672	\$ 48,511	\$	49,428	\$	900	\$	(231)		(322)
2070	y 30,072	7 40,311	Y	+3,420	ب	500	ب	(231)	ب	(322)

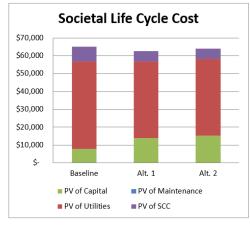
Medium Gas Home – Executive Report

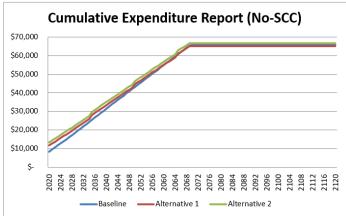
Key Analysis Var	iables	Building Characteristics				
Study Period (years)	50	Gross (Sq.Ft)	2,200			
Nominal Discount Rate	3.14%	Useable (Sq.Ft)	2,200			
Maintenance Escalation	1.00%	Space Efficiency	100.0%			
Zero Year (Current Year)	2020	Project Phase	0			
Construction Years	0	Building Type	0			

Life Cycle Cost Analysis		BEST					
Alternative	Baseline	Alt. 1		Alt. 2			
Energy Use Intenstity (kBtu/sq.ft)	25.3	20.5		20.5			
1st Construction Costs	\$ 8,340	\$ 11,666	\$	13,316			
PV of Capital Costs	\$ 7,805	\$ 13,763	\$	15,308			
PV of Maintenance Costs	\$ -	\$ -	\$	-			
PV of Utility Costs	\$ 48,921	\$ 42,905	\$	42,905			
Total Life Cycle Cost (LCC)	\$ 56,726	\$ 56,668	\$	58,213			
Net Present Savings (NPS)	N/A	\$ 58	\$	(1,486)			

Societal LCC takes into consideration the social cost of carbon dioxide emissions caused by operational energy consumption

(GHG) Social Life Cycle Cost		BEST					
GHG Impact from Utility Consumption	Baseline		Alt. 1		Alt. 2		
Tons of CO2e over Study Period	100		72		72		
% CO2e Reduction vs. Baseline	N/A		28%		39%		
Present Social Cost of Carbon (SCC)	\$ 8,249	\$	5,859	\$	5,859		
Total LCC with SCC	\$ 64,976	\$	62,527	\$	64,072		
NPS with SCC	N/A	\$	2,448	\$	904		





Medium Gas Home - Baseline Input <- Primary Filter (Requires Level 1) en Primary Filter and Click OK to Re-filte Office of Financial Management Show All Entered Units (Requires Re-Filter) Olympia, Washington - Version: 2020-A Life Cycle Cost Analysis Tool Water **Baseline Input Page** Total Building Annual Utility Analysis 1,069 Electricity (KWH) (CCF) (Therms) 806 Annual Utility Bill [\$] 263 8,958 Annual Utility Consumption Not Entered Below 250 Sum of Annual Utility Consumption Below Total Annual Utility Consumption 250 8,958 Annual Utility Bill + Total Utility Consumption 1.05 Total Useful 1st Year Annual Annual Annual Uniformat II Elemental Classification for Installed Cost Component # of Units Natural Gas Life Maintenance Electricity H O W Water **Buildings (Building Component List)** (\$/Unit) Installed Cost Cost (\$/Unit) (CCF/Unit) (KWH/Unit) (Therm/Unit) (\$'s) Primary Entries Below: # of Units must be > 0 to be cou 8,340 Α Substructure Interiors D Services **Equipment & Furnishings** Special Construction & Demolition Building Sitework G x X9010 Building Envelope 50 x X901001 1.1 - U-.24 Glaze 0.5 \$1,789,84 -292 x X901002 1.2 - U-.20 Glaze 50 \$2,625.10 -369 -18 x X901003 1.3 - 5% UA reduc 0.5 50 \$1,270.23 70 x X901004 1.4 - 15% UA reduc 1 50 \$3,255.06 -288 -28 x X901005 1.5 - 22.5% UA reduc \$4,849.92 50 -577 -41 x X901006 1.6 - 30% UA reduc 3 50 \$12,094.52 -887 -69 2.1 - 2 ACH, HRV 2.2 - 1.5 ACH, HRV x X901007 1 50 \$2,283.74 271 -19 x X901008 1.5 50 \$5,456.94 x X901009 2.3 - 0.6 ACH, HRV 2 50 \$7,048.35 -530 -78 x X9020 HVAC x X902001 18 \$251.59 -55 -51 3.1a - Furna x X902002 3.2a - 9.5 HSPF HP 0.5 15 \$1,387.73 x X902003 3.3a - GSHP 1.5 20 \$10,900.00 x X902004 1.5 18 \$1,529.78 x X902005 3.5a - 11.0 HSPF HP 15 \$1,529.78 x X902006 3.6a - DHP (15% elec) 2 18 \$5,900.58 x X902007 4.1 - Deeply buried x X902008 4.2 - HVAC inside 1.5 50 \$327.81 -781 -38 x X9030 Hot Water 5.1 - DWR 5.2 - 0.80 gas DHW 5.3 - 0.91 gas DHW, GSHP 5.4 - Tier III HPWH 5.5 - CO2 HPWH x X903001 0.5 50 \$437.08 x X903002 0.5 15 \$640.32 -34 x X903003 \$1,008.56 1 15 -12 -48 x X903004 2.5 15 -1,761 x X903005 15 \$3,824,45 -1,916 x X9040 Other x X904001 6.1 - Solar pV 7.1 - ES Appl+ventless Dryer 25 \$5,040.00 0.5 -625 x X904002 15 \$504.83 x X9050 2018 Compliant Building Cost 55 \$8,340.00 x X9060 Added Cost 55 \$0.75 x X906001 X906001 3ACH, continuous ins Z Other Project Costs 55 \$2,561,00

Z10 One Time - Upfront Costs
Z30 Re-Occurring Annual Cost (Track Inflation)

Medium Gas Home - ALT 1

- P	rimar	y Filter	(Requires Level 1)		Open Prim	ary Filter	and Click OK to Re-filter					
			Financial Management		Manu	al Special	Selection Only (Requires	Refilter)		l I		
			Washington - Version: 2020-A		♠ Show	Raseline	Fields and Entered Units	(Requires Refilter	1			
	•		, ,				es Between Alternative a		·	-		
		•	le Cost Analysis Tool		Snow	Differenc	es Between Alternative a	nd Baseline (Red	. Kefliter)	147	1	N . 16
	Alt	tern	ative 1 Input Page			Total B	uilding Annual Utility And	Water (CCF)	Electricity (KWH)	Natural Gas (Therms)		
							Annual Utility E	3ill [\$]			\$ 809	\$ 153
							ual Utility Consumption		w		8,903	48
						5	um of Annual Utility Con				- 81	(336
							Total Annual Utility C				8,984	14
	Note	v No II	Inits Assigned to a Component with Entries			An	nual Utility Bill ÷ Total U	tility Consumptio	n	\$	- \$ 0.09	\$ 1.0
	Note	: NO U	mits Assigned to a Component with Entries						Total			
5		Unif	ormat II Elemental Classification for			Useful	Installed Cost	1st Year	Component	Annual	Annual	Annual
Н				REF	# of Units	Life	(\$/Unit)	Maintenance	Installed Cost	Water	Electricity	Natural Gas
C N		В	uildings (Building Component List)			(Yrs.)	(\$/01111)	Cost (\$/Unit)	(\$'s)	(CCF/Unit)	(KWH/Unit)	(Therm/Unit)
v			Primary Entries Below: # of Ur	nits must	be > 0 to b	e counte	d: Useful Life must be >=	7	(3.5)	Entries Below	v for Component S	necific Utility An
	Mate	ch Baseli	ne: Filter to Select All & Drag Copy O14:S14 & U14:AG14				a, assidi Elle Masebe >=		\$ 11,666	Entries Below	- component 3	Source Othicy All
	Α		ructure						12,000			
	В	Shell										
	c	Interio	ors									
	D	Servic										
	E		ment & Furnishings									
	F		al Construction & Demolition									
	G		ng Sitework									
	X901		ilding Envelope									
_	X901		1.1 - U24 Glaze	0.5		50	\$1,789.84				-292	-5
_	X901		1.2 - U20 Glaze	1		50	\$2,625.10				-369	-18
	X901		1.3 - 5% UA reduc	0.5		50	\$1,270.23				70	2
	X901		1.4 - 15% UA reduc	0.3		50	\$3,255.06				-288	-28
-	X901		1.5 - 22.5% UA reduc	2	1		\$4,849.92		\$ 4,850		-577	-41
_	X901		1.6 - 30% UA reduc	3	1	50	\$12,094.52		3 4,630		-887	-69
_	X901		2.1 - 2 ACH, HRV	1	1		\$2,283.74		\$ 2,284		271	-19
_	X901		2.2 - 1.5 ACH, HRV	1.5	1	50	\$5,456.94		3 2,284		-87	-67
-	X901		2.3 - 0.6 ACH, HRV	1.3		50	\$7,048.35				-530	-78
_	X902		/AC			30	\$7,046.33				-550	-70
	X902		3.1a - Furnace	1	1	18	\$251.59		\$ 252		-55	-51
_	X902		3.2a - 9.5 HSPF HP	0.5	1	15	\$1,387.73		3 232		-55	-31
	X902		3.3a - GSHP	1.5		20	\$10,900.00					
_	X902		3.4 - DHP	1.5		18	\$1,529.78					
	X902		3.5a - 11.0 HSPF HP	1.3		15	\$1,529.78					
	X902		3.6a - DHP (15% elec)	2		18	\$5,900.58					
	X902		4.1 - Deeply buried	1		50	٥٤.٥٥٠,٠٥٥					
	X902		4.2 - HVAC inside	1.5	1		\$327.81		\$ 328		-781	-38
	X903		ot Water	1.3	1	30	JJ27.81		328		-701	-30
	X903	_	5.1 - DWR	0.5	1	50	\$437.08		S 437		55	-33
	X903		5.2 - 0.80 gas DHW	0.5	1	15	\$640.32		437		-3	-34
	X903		5.3 - 0.91 gas DHW, GSHP	1		15	\$1,008.56				-12	-48
	X903		5.4 - Tier III HPWH	2	1		\$955.02		\$ 955		1167	-153
	X903		5.5 - CO2 HPWH	2.5	1	15	\$3,824.45		955		1099	-156
	X904		5.5 - CO2 HFWH	2.3		13	23,024.43				1033	150
	X904		6.1 - Solar pV	1		25	\$5,040.00					
	X904		7.1 - ES Appl+ventless Dryer	0.5		15	\$5,040.00				-625	
	X905		18 Compliant Building Cost	0.3		55	\$8,340.00				-023	
	X905		Ided Cost		1		\$2,561.00		\$ 2,561			
	Z Z		Project Costs		1	55	\$2,561.00		<i>2</i> ,561			
	Z10		ime - Upfront Costs		4	50						
	ZIU		curring Annual Cost (Track Inflation)		1	50						

Medium Gas Home – ALT 2

- D : File (D ! 4)		O D :	File	- Lett Low - n. etc					
<- Primary Filter (Requires Level 1)				r and Click OK to Re-filter	D Cl. A		1		
Office of Financial Management				I Selection Only (Requires			I		
Olympia, Washington - Version: 2020-A		_		Fields and Entered Units	•				
Life Cycle Cost Analysis Tool		O Show	Differen	ces Between Alternative a					
Alternative 2 Input Page			Total E	Building Annual Utility An	alysis	\$ 961	Water (CCF)	Electricity (KWH)	Natural Gas (Therms)
				Annual Utility	` ′	\$ 809			
			An	nual Utility Consumption	Not Entered Belo	ow	-	8,903	481
				Sum of Annual Utility Cor			-	81	
				Total Annual Utility C			-	8,984	
Note: No Units Assigned to a Component with Entries			Ar	nnual Utility Bill ÷ Total U	tility Consumptio	n	\$ -	\$ 0.09	\$ 1.05
Note: No Units Assigned to a Component with Entries						Total			
Uniformat II Elemental Classification for			Useful	Installed Cost	1st Year	Component	Annual	Annual	Annual
Buildings (Building Component List)	REF	# of Units	Life	(\$/Unit)	Maintenance	Installed Cost	Water	Electricity	Natural Gas
w			(Yrs.)	, , ,	Cost (\$/Unit)	(\$'s)	(CCF/Unit)	(KWH/Unit)	(Therm/Unit)
Primary Entries Below: # of Un	iits must	be > 0 to b	e counte	ed; Useful Life must be >=	2		Entries Below	for Component S	pecific Utility Analy
Match Baseline: Filter to Select All & Drag Copy O14:S14 & U14:AG14						\$ 13,316			
. A Substructure									
B Shell C Interiors									
C Interiors D Services									
E Equipment & Furnishings									
F Special Construction & Demolition									
G Building Sitework									
X9010 Building Envelope									
X901001 1.1 - U24 Glaze	0.5		50	\$1,789.84				-292	-5
X901002 1.2 - U20 Glaze	1		50	\$2,625.10				-369	-18
X901003 1.3 - 5% UA reduc	0.5		50	\$1,270.23				70	2
X901004 1.4 - 15% UA reduc	1		50	\$3,255.06				-288	-28
X901005 1.5 - 22.5% UA reduc	2	1	50	\$4,849.92		\$ 4,850		-577	-41
X901006 1.6 - 30% UA reduc	3		50	\$12,094.52				-887	-69
X901007 2.1 - 2 ACH, HRV	1	1				\$ 2,284		271	-19
X901008 2.2 - 1.5 ACH, HRV	1.5		50	\$5,456.94				-87	-67
X901009 2.3 - 0.6 ACH, HRV	2		50	\$7,048.35				-530	-78
X9020 HVAC									
X902001 3.1a - Furnace	1	1				\$ 252		-55	-51
X902002 3.2a - 9.5 HSPF HP	0.5		15	\$1,387.73					
X902003 3.3a - GSHP	1.5		20						
X902004 3.4 - DHP	1.5		18						
X902005 3.5a - 11.0 HSPF HP X902006 3.6a - DHP (15% elec)	1		15 18						
X902007 4.1 - Deeply buried	1		50	\$3,900.36					
X902008 4.2 - HVAC inside	1.5	1		\$327.81		\$ 328		-781	-38
X9030 Hot Water	1.3	1	50	\$327.81		328		,01	55
X903001 5.1 - DWR	0.5	1	50	\$437.08		\$ 437		55	-33
X903002 5.2 - 0.80 gas DHW	0.5		15	\$640.32				-3	-34
X903003 5.3 - 0.91 gas DHW, GSHP	1		15	\$1,008.56				-12	-48
X903004 5.4 - Tier III HPWH	2	1	15	\$955.02		\$ 955		1167	-153
X903005 5.5 - CO2 HPWH	2.5		15	\$3,824.45				1099	-156
X9040 Other									
X904001 6.1 - Solar pV	1		25						
X904002 7.1 - ES Appl+ventless Dryer	0.5		15	\$504.83				-625.255731	
X9050 2018 Compliant Building Cost			55	\$8,340.00					
X9060 Added Cost		2200	55	\$0.75		\$ 1,650			
X906001 3ACH, continuous ins		1	55	\$2,561.00		\$ 2,561			
Z Other Project Costs									
Z10 One Time - Upfront Costs		1	50						
Z30 Re-Occurring Annual Cost (Track Inflation)		1	1						

Medium Gas Home – Expenditure Report Expenditure Report Page In Constant 2020 \$'s

	Cumulative	e Expenditur	e Sı	ummary	ry Annual Expenditure Summar						
Year	Baseline	Alt. 1		Alt. 2		Baseline		Alt. 1		Alt. 2	
2020	\$ 8,340	\$ 11,666	\$	13,316	\$	8,340	\$	11,666	\$	13,316	
2021	\$ 9,417	\$ 12,636	\$	14,286	\$	1,077	\$	970	\$	970	
2022	\$ 10,494	\$ 13,605	\$	15,255	\$	1,077	\$	970	\$	970	
2023	\$ 11,582	\$ 14,585	\$	16,235	\$	1,088	\$	980	\$	980	
2024	\$ 12,676	\$ 15,567	\$	17,217	\$	1,093	\$	983	\$	983	
2025	\$ 13,794	\$ 16,571	\$	18,221	\$	1,118	\$	1,004	\$	1,004	
2026	\$ 14,933	\$ 17,595	\$	19,245	\$	1,140	\$	1,024	\$	1,024	
2027	\$ 16,079	\$ 18,622	\$	20,272	\$	1,145	\$	1,027	\$	1,027	
2028	\$ 17,226	\$ 19,650	\$	21,300	\$	1,148	\$	1,028	\$	1,028	
2029	\$ 18,377	\$ 20,680	\$	22,330	\$	1,150	\$	1,030	\$	1,030	
2030	\$ 19,555	\$ 21,727	\$	23,377	\$	1,179	\$	1,046	\$	1,046	
2031	\$ 20,751	\$ 22,786	\$	24,436	\$	1,195	\$	1,059	\$	1,059	
2032	\$ 21,937	\$ 23,837	\$	25,487	\$	1,187	\$	1,051	\$	1,051	
2033	\$ 23,129	\$ 24,891	\$	26,541	\$	1,192	\$	1,054	\$	1,054	
2034	\$ 24,326	\$ 25,948	\$	27,598	\$	1,197	\$	1,057	\$	1,057	
2035	\$ 25,523	\$ 27,960	\$	29,610	\$	1,197	\$	2,012	\$	2,012	
2036	\$ 26,715	\$ 29,010	\$	30,660	\$	1,191	\$	1,050	\$	1,050	
2037	\$ 27,906	\$ 30,060	\$	31,710	\$	1,191	\$	1,050	\$	1,050	
2038	\$ 29,091	\$ 31,355	\$	33,005	\$	1,185	\$	1,295	\$	1,295	
2039	\$ 30,279	\$ 32,400	\$	34,050	\$	1,188	\$	1,045	\$	1,045	
2040	\$ 31,459	\$ 33,436	\$	35,086	\$	1,180	\$	1,036	\$	1,036	
2041	\$ 32,641	\$ 34,474	\$	36,124	\$	1,182	\$	1,038	\$	1,038	
2042	\$ 33,815	\$ 35,503	\$	37,153	\$	1,174	\$	1,029	\$	1,029	
2043	\$ 34,992	\$ 36,534	\$	38,184	\$	1,176	\$	1,031	\$	1,031	
2044	\$ 36,160	\$ 37,557	\$	39,207	\$	1,168	\$	1,022	\$	1,022	
2045	\$ 37,330	\$ 38,581	\$	40,231	\$	1,171	\$	1,024	\$	1,024	
2046	\$ 38,504	\$ 39,606	\$	41,256	\$	1,173	\$	1,026	\$	1,026	
2047	\$ 39,680	\$ 40,633	\$	42,283	\$	1,176	\$	1,027	\$	1,027	
2048	\$ 40,847	\$ 41,652	\$	43,302	\$	1,167	\$	1,019	\$	1,019	
2049	\$ 42,017	\$ 42,672	\$	44,322	\$	1,170	\$	1,020	\$	1,020	
2050	\$ 43,181	\$ 44,640	\$	46,290	\$	1,164	\$	1,968	\$	1,968	
2051	\$ 44,346	\$ 45,653	\$	47,303	\$	1,165	\$	1,013	\$	1,013	
2052	\$ 45,511	\$ 46,665	\$	48,315	\$	1,165	\$	1,012	\$	1,012	
2053	\$ 46,677	\$ 47,677	\$	49,327	\$	1,165	\$	1,012	\$	1,012	
2054	\$ 47,843	\$ 48,688	\$	50,338	\$	1,166	\$	1,011	\$	1,011	
2055	\$ 49,009	\$ 49,699	\$	51,349	\$	1,166	\$	1,011	\$	1,011	
2056	\$ 50,176		\$	52,611	\$	1,167		1,262	\$	1,262	
		\$ 51,971	\$	53,621	\$	1,167	\$	1,010	\$	1,010	
2058	\$ 52,510	\$ 52,980	\$	54,630	\$	1,167	_	1,009	\$	1,009	
2059	\$ 53,678	\$ 53,989	\$	55,639	\$	1,168	_	1,009	\$	1,009	
2060		\$ 54,998	\$	56,648	\$	1,168	_	1,008	\$	1,008	
2061	\$ 56,015	\$ 56,006	\$	57,656	\$	1,169	\$	1,008	\$	1,008	
2062	\$ 57,184	\$ 57,013	\$	58,663	\$	1,169	_	1,007	\$	1,007	
2063	\$ 58,354	\$ 58,020	\$	59,670	\$	1,169		1,007	\$	1,007	
2064	\$ 59,523	\$ 59,027	\$	60,677	\$	1,170	_	1,007	\$	1,007	
2065	\$ 60,694	\$ 60,988	\$	62,638	\$	1,170	_	1,961	\$	1,961	
2066	\$ 61,864	\$ 61,993	\$	63,643	\$	1,171	\$	1,006	\$	1,006	
2067	\$ 63,035	\$ 62,998	\$	64,648	\$	1,171	_	1,005	\$	1,005	
2068	\$ 64,207	\$ 64,003	\$	65,653	\$	1,171	_	1,005	\$	1,005	
2069	\$ 65,379	\$ 65,007	\$	66,657	\$	1,172		1,004	\$	1,004	
2070	\$ 65,793	\$ 65,085	\$	66,585	\$	414	\$	78	\$	(72)	

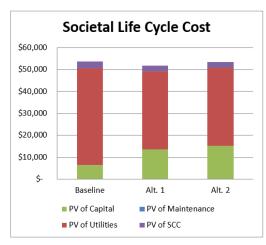
Medium Heat Pump Home – Executive Report

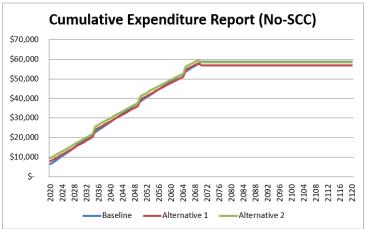
Key Analysis Var	iables	Building Characteristics				
Study Period (years)	50	Gross (Sq.Ft)	2,200			
Nominal Discount Rate	3.14%	Useable (Sq.Ft)	2,200			
Maintenance Escalation	1.00%	Space Efficiency	100.0%			
Zero Year (Current Year)	2020	Project Phase	0			
Construction Years	0	Building Type	0			

Life Cycle Cost Analysis	BEST									
Alternative	Baseline		Alt. 1		Alt. 2					
Energy Use Intenstity (kBtu/sq.ft)	17.9		14.4		14.4					
1st Construction Costs	\$ 6,416	\$	7,963	\$	9,613					
PV of Capital Costs	\$ 6,416	\$	13,579	\$	15,123					
PV of Maintenance Costs	\$ -	\$	-	\$	-					
PV of Utility Costs	\$ 44,098	\$	35,652	\$	35,652					
Total Life Cycle Cost (LCC)	\$ 50,515	\$	49,231	\$	50,775					
Net Present Savings (NPS)	N/A	\$	1,283	\$	(261)					

 $Societal\ LCC\ takes\ into\ consideration\ the\ social\ cost\ of\ carbon\ dioxide\ emissions\ caused\ by\ operational\ energy\ consumption$

(GHG) Social Life Cycle Cost					
GHG Impact from Utility Consumption		Baseline	Alt. 1		Alt. 2
Tons of CO2e over Study Period		43	35		35
% CO2e Reduction vs. Baseline		N/A	19%		24%
Present Social Cost of Carbon (SCC)	\$	3,240	\$ 2,619	\$	2,619
Total LCC with SCC	\$	53,755	\$ 51,851	\$	53,395
NPS with SCC		N/A	\$ 1,904	\$	360





Medium Heat Pump Home – Baseline Input

<- Prima	ry Filter (Requires Level 1)		Open Prima	ary Filter	and Click OK to Re-filter							
	fice of Financial Management	1			Units (Requires Re-Filter			1 .				
Oly	ympia, Washington - Version: 2020-A							" I				
Lif	e Cycle Cost Analysis Tool											
	aseline Input Page			Total B	uilding Annual Utility An	alysis	\$ 1,036	Water (CCF)	Electricity (KWH)	Natural Gas (Therms)		
					Annual Utility	` ′	\$ 1,036	\$ -				
				An	nual Utility Consumption	Not Entered Below	,		11,513			
					Sum of Annual Utility Cor			-	-	-		
					Total Annual Utility (11,513	-		
				A	nnual Utility Bill ÷ Total U	tility Consumption	I	\$ -	\$ 0.09	\$ -		
S H O	Uniformat II Elemental Classification for Buildings (Building Component List)	REF	# of Units	Useful Life (Yrs.)	Installed Cost (\$/Unit)	1st Year Maintenance Cost (\$/Unit)	Total Componen Installed Cost (\$'s)	Annual Water (CCF/Unit)	Annual Electricity (KWH/Unit)	Annual Natural Gas (Therm/Unit)		
w	Primary Entries Below: # of Units must b	e > 0 to	he counter	l·Useful I	ife must he >= 2		\$ 6,558	Entries Relo	w for Component '	Specific Utility Analy		
Α	Substructure						0,556	2.10100-2010	2 22 Apportant			
В	Shell											
С	Interiors											
D	Services											
E	Equipment & Furnishings											
F	Special Construction & Demolition											
G	Building Sitework											
x X90					*							
	1001 1.1 - U24 Glaze	0.5		50	\$1,789.84				-302			
	1002 1.2 - U20 Glaze	1		50	\$2,625.10				-492			
	1003 1.3 - 5% UA reduc 1004 1.4 - 15% UA reduc	0.5		50 50	\$1,270.23 \$3,255.06				-59 -528			
	1004 1.4 - 15% OA reduc 1005 1.5 - 22.5% UA reduc	1.5		50	\$4,849.92				-528 -817			
	1005 1.5 - 22.5% GA reduc 1006 1.6 - 30% UA reduc	2.5		50	\$12,094.52				-1,158			
	1007 2.1 - 2 ACH, HRV	0.5		50	\$2,283.74				-105			
	1008 2.2 - 1.5 ACH, HRV	1		50	\$5,456.94				-504			
	1009 2.3 - 0.6 ACH, HRV	1.5		50	\$7,048.35				-762			
x X90					. ,							
	2001 3.1a - Furnace	1		18	\$251.59							
x X90	2002 3.2a - 9.5 HSPF HP	0.5		15	\$1,387.73				-328			
	2003 3.3a - GSHP	1.5		20	\$10,900.00							
	2004 3.4 - DHP	1.5		18	\$1,529.78							
	2005 3.5a - 11.0 HSPF HP	1		15	\$1,529.78				-980			
	2006 3.6a - DHP (15% elec)	2		18	\$5,900.58							
	2007 4.1 - Deeply buried	0.5		50	\$0.00				666			
	2008 4.2 - HVAC inside 30 Hot Water	1		50	\$327.81				-666			
	300 Hot Water 3001 5.1 - DWR	0.5		50	\$437.08				-282			
	3001 5.1 - DWK 3002 5.2 - 0.80 gas DHW	0.5		15	\$640.32				-202			
	3003 5.3 - 0.91 gas DHW, GSHP	1		15	\$1,008.56							
	3004 5.4 - Tier III HPWH	2		15	\$955.02				-1,761			
	3005 5.5 - CO2 HPWH	2.5		15	\$3,824.45				-1,916			
x X90												
	4001 6.1 - Solar pV	1		25	\$5,040.00							
x X90	4002 7.1 - ES Appl+ventless Dryer	0.5		15	\$504.83				-750			
x X90			1	50	\$6,558.39		\$ 6,558					
x X90				55	\$0.75							
Z	Other Project Costs											
Z10	· · · · · · · · · · · · · · · · · · ·		1	50								
Z30	Re-Occurring Annual Cost (Track Inflation)		1	1								

Medium Heat Pump Home – ALT 1

Primary Filter (Red	quires Level 1)		Open Prima	ary Filter	and Click OK to Re-filter								
Office of Fi	nancial Management		Manua	Special S	Selection Only (Requires R	efilter)							
	/ashington - Version: 2020-A		Show F	Raseline E	ields and Entered Units (R	-							
	-		- C1+ \		_								
Life Cycle (Cost Analysis Tool		O Show L	Jimerence	es Between Alternative and	i Baseline (Req. Re	eriiter)						
Alternat	ive 1 Input Page			Total B	uilding Annual Utility And	llysis	\$	896	Water (CCF)	Electricity (KWH)	Natural Gas (Therms)		
					Annual Utility E	ill [\$]				\$ 896			
				Ar	nual Utility Consumption	Not Entered Belov	v			13,396			
					Sum of Annual Utility Con	sumption Below			-	(3,443)			
					Total Annual Utility Co	nsumption			-	9,953			
				Δ	nnual Utility Bill ÷ Total Ut	ility Consumption			\$ -	\$ 0.09	\$		
Note: No Units	Assigned to a Component with Entries												
				Useful		1st Year	Total Co	mponent			Annual		
Uniform	nat II Elemental Classification for	REF	# of Units	Life	Installed Cost	Maintenance		ed Cost	Annual	Annual Electricity	Natural Ga		
Buildi	ngs (Building Component List)	KEF	# OI Units		(\$/Unit)				Water (CCF/Unit)	(KWH/Unit)			
	9- (9)			(Yrs.)		Cost (\$/Unit)	(\$	5's)			(Therm/Uni		
	Primary Entries Below: # of Un		t be > 0 to be		l; Useful Life must be >= 2				Entries Belo	ow for Component	Specific Utility		
Match Baseline: Fi	ilter to Select All & Drag Copy O14:S14 & U14:AG14						\$	7,181					
A Substruct	ure												
B Shell													
C Interiors													
D Services													
	t & Furnishings												
	onstruction & Demolition												
G Building S													
	ig Envelope												
	- U24 Glaze	0.5	1	50	\$1,789.84		\$	1,790		-301.5926795			
	- U24 Glaze	0.5	1	50	\$2,625.10		3	1,790		-492.3861265			
		0.5		50									
	- 5% UA reduc				\$1,270.23					-59.11484922			
	- 15% UA reduc	1		50	\$3,255.06					-528.041402			
	- 22.5% UA reduc	2		50	\$4,849.92					-817.1943594			
	- 30% UA reduc	3		50	\$12,094.52					-1157.67213			
	- 2 ACH, HRV	1	. 1	50	\$2,283.74		\$	2,284		-104.5804845			
	- 1.5 ACH, HRV	1.5		50	\$5,456.94					-504.2060427			
	- 0.6 ACH, HRV	2		50	\$7,048.35					-761.9789856			
X9020 HVAC													
X902001 3.1	a - Furnace	1		18	\$251.59								
X902002 3.2	a - 9.5 HSPF HP	0.5	1	15	\$1,387.73		\$	1,388		-328.0623131			
X902003 3.3	a - GSHP	1.5		20	\$10,900.00								
X902004 3.4	- DHP	1.5		18	\$1,529.78								
	a - 11.0 HSPF HP	1		15	\$1,529.78					-979.6948553			
X902006 3.6	a - DHP (15% elec)	2		18	\$5,900.58								
X902007 4.1	- Deeply buried	1		50									
X902008 4.2	- HVAC inside	1.5	1	50	\$327.81		\$	328		-665.8185187			
X9030 Hot W	ater												
X903001 5.1	- DWR	0.5	1	50	\$437.08		\$	437		-281.5676614			
X903002 5.2	- 0.80 gas DHW	0.5		15	\$640.32								
	- 0.91 gas DHW, GSHP	1		15	\$1,008.56								
	- Tier III HPWH	2	1		\$955.02		\$	955		-1760.941903			
	- CO2 HPWH	2.5		15	\$3,824.45					-1916.158669			
X9040 Other	·				+-,-E 11 10								
	- Solar pV	1		25	\$5,040.00								
	- ES Appl+ventless Dryer	0.5		15	\$504.83					-750.0634586			
	Compliant Building Cost	0.5		50	\$6,558.39					730.0034360			
X9060 Added				55	\$0,558.59								
	viect Costs			55	\$0.75								
	- Upfront Costs		1	50									

Medium Heat Pump Home – ALT 2

rimary Filter (Requires Level 1)		Open Prim	ary Filter	and Click OK to Re-filter						
Office of Financial Management										
Olympia, Washington - Version: 2020-A		Show E	aseline F	ields and Entered Units (R						
Life Cycle Cost Analysis Tool		O Show [ifference	es Between Alternative an	d Baseline (Req. Re	efilter)				
Alternative 2 Input Page			Total B	uilding Annual Utility An	alysis	\$	896	Water	Electricity (KWH)	Natural Ga
=pg -				Annual Utility I	ill (¢1			(CCF)	\$ 896	(Therms)
			Δr	nnual Utility Consumption		v			13,396	7
				Sum of Annual Utility Con		•			(3,443)	
				Total Annual Utility C				-	9,953	
			Д	nnual Utility Bill ÷ Total Ut	ility Consumption			\$ -	\$ 0.09	\$
Note: No Units Assigned to a Component with Entries		1								
Uniformat II Elemental Classification for			Useful	Installed Cont	1st Year	Total (Component		A Fla seni sie .	Annual
	REF	# of Units	Life	Installed Cost (\$/Unit)	Maintenance	Inst	alled Cost	Annual Water (CCF/Unit)	Annual Electricity (KWH/Unit)	Natural Ga
Buildings (Building Component List)			(Yrs.)	(\$/Unit)	Cost (\$/Unit)		(\$'s)	water (CCF/Unit)	(KWH/Unit)	(Therm/Un
Primary Entries Below: # of Uni	ts mus	t be > 0 to b	e counted	l: Useful Life must be >= 2				Entries Belo	ow for Component	Specific Utility
Match Baseline: Filter to Select All & Drag Copy 014:S14 & U14:AG14						\$	8,831			
A Substructure										
B Shell										
C Interiors										
D Services										
E Equipment & Furnishings										
F Special Construction & Demolition										
G Building Sitework X9010 Building Envelope										
X90100 Building Envelope X901001 1.1 - U24 Glaze	0.5	1	50	\$1,790		\$	1,790		-302	
X901002 1.2 - U20 Glaze	1		50	\$2,625		1	1,750		-492	
X901003 1.3 - 5% UA reduc	0.5		50	\$1,270					-59	
X901004 1.4 - 15% UA reduc	1		50	\$3,255					-528	
X901005 1.5 - 22.5% UA reduc	1.5		50	\$4,850					-817	
X901006 1.6 - 30% UA reduc	2.5		50	\$12,095					-1158	
X901007 2.1 - 2 ACH, HRV	0.5	1	50	\$2,284		\$	2,284		-105	
X901008 2.2 - 1.5 ACH, HRV	1		50	\$5,457					-504	
X901009 2.3 - 0.6 ACH, HRV	1.5		50	\$7,048					-762	
X9020 HVAC										
X902001 3.1a - Furnace	1		18	\$252			4.000			
X902002 3.2a - 9.5 HSPF HP X902003 3.3a - GSHP	0.5	1	15 20	\$1,388 \$10,900		\$	1,388		-328	
X902003 3.3a - GSHP X902004 3.4 - DHP	1.5		18	\$10,900						
X902005 3.5a - 11.0 HSPF HP	1.3		15	\$1,530					-980	
X902006 3.6a - DHP (15% elec)	2		18	\$5,901					300	
X902007 4.1 - Deeply buried	0.5		50	/						
X902008 4.2 - HVAC inside	1	1	50	\$328		\$	328		-666	
X9030 Hot Water										
X903001 5.1 - DWR	0.5	1		\$437		\$	437		-282	
X903002 5.2 - 0.80 gas DHW	0.5		15	\$640						
X903003 5.3 - 0.91 gas DHW, GSHP	1		15	\$1,009			0.55		4754	
X903004 5.4 - Tier III HPWH	2	1	15	\$955		\$	955		-1761	
X903005 5.5 - CO2 HPWH X9040 Other	2.5		15	\$3,824					-1916	
X90400 Other X904001 6.1 - Solar pV	1		25	\$5,040						
X904001 6.1 - Solar pv X904002 7.1 - ES Appl+ventless Dryer	0.5		15	\$5,040 \$505					-750	
X9050 2018 Compliant Building Cost	0.5		50	\$6,558					-730	
X9060 Added Cost		2200	55	\$1		\$	1,650			
Z Other Project Costs							_,			
Z10 One Time - Upfront Costs		1	50							

Medium Heat Pump Home – Expenditure Report Expenditure Report Page In Constant 2020 \$'s

	Cumulativ	e Expenditur	e Summary	Annual E	xpenditure S	Summary
Year	Baseline	Alt. 1	Alt. 2	Baseline	Alt. 1	Alt. 2
2020	\$ 6,558	\$ 7,181	\$ 8,831		\$ 7,181	\$ 8,831
2021	\$ 7,605	\$ 8,086	\$ 9,736		\$ 905	\$ 905
2022	\$ 8,652	\$ 8,992	\$ 10,642		\$ 905	\$ 905
2023	\$ 9,710	\$ 9,906	\$ 11,556		\$ 914	\$ 914
2024	\$ 10,768	\$ 10,820	\$ 12,470		\$ 914	\$ 914
2025	\$ 11,847	\$ 11,754	\$ 13,404		\$ 933	\$ 933
2026	\$ 12,948	\$ 12,705	\$ 14,355		\$ 952	\$ 952
2027	\$ 14,049	\$ 13,657	\$ 15,307		\$ 952	\$ 952
2028	\$ 15,150	\$ 14,609	\$ 16,259		\$ 952	\$ 952
2029	\$ 16,251	\$ 15,561	\$ 17,211		\$ 952	\$ 952
2030	\$ 17,352	\$ 16,513	\$ 18,163		\$ 952	\$ 952
2031	\$ 18,464	\$ 17,474	\$ 19,124		\$ 961	\$ 961
2032	\$ 19,564	\$ 18,425	\$ 20,075		\$ 952	\$ 952
2033	\$ 20,665	\$ 19,377	\$ 21,027		\$ 952	\$ 952
2034	\$ 21,766 \$ 22,867	\$ 20,329	\$ 21,979 \$ 25,274		\$ 952 \$ 3,295	\$ 952 \$ 3,295
		\$ 23,624 \$ 24,566	-			
2036	\$ 23,957 \$ 25,048	\$ 24,566 \$ 25,509	\$ 26,216 \$ 27,159		\$ 942 \$ 942	\$ 942 \$ 942
2037	\$ 26,127	\$ 25,309	\$ 28,092	 . 	\$ 933	\$ 933
2039	\$ 27,206	\$ 27,375	\$ 29,025		\$ 933	\$ 933
2040	\$ 28,275	\$ 28,299	\$ 29,949		\$ 924	\$ 924
2040	\$ 29,343	\$ 29,222	\$ 30,872		\$ 924	\$ 924
2041	\$ 30,401	\$ 30,137	\$ 31,787	 	\$ 914	\$ 914
2042	\$ 31,459	\$ 31,051	\$ 32,701		\$ 914	\$ 914
2044	\$ 32,506	\$ 31,957	\$ 33,607	 	\$ 905	\$ 905
2045	\$ 33,553	\$ 32,862	\$ 34,512	-	\$ 905	\$ 905
2046	\$ 34,600	\$ 33,767	\$ 35,417		\$ 905	\$ 905
2047	\$ 35,647	\$ 34,672	\$ 36,322	 	\$ 905	\$ 905
2048	\$ 36,683	\$ 35,568	\$ 37,218	-	\$ 896	\$ 896
2049	\$ 37,719	\$ 36,464	\$ 38,114		\$ 896	\$ 896
2050	\$ 38,744	\$ 39,693	\$ 41,343		\$ 3,229	\$ 3,229
2051	\$ 39,768	\$ 40,577	\$ 42,227	\$ 1,023	\$ 885	\$ 885
2052	\$ 40,789	\$ 41,460	\$ 43,110	 	\$ 883	\$ 883
2053	\$ 41,808	\$ 42,341	\$ 43,991	. \$ 1,019	\$ 881	\$ 881
2054	\$ 42,824	\$ 43,220	\$ 44,870	\$ 1,017	\$ 879	\$ 879
2055	\$ 43,839	\$ 44,097	\$ 45,747	\$ 1,015	\$ 877	\$ 877
2056	\$ 44,851	\$ 44,972	\$ 46,622		\$ 875	\$ 875
2057	\$ 45,862	\$ 45,846	\$ 47,496		\$ 873	\$ 873
2058	\$ 46,870	\$ 46,717	\$ 48,367		\$ 872	\$ 872
2059	\$ 47,876	\$ 47,587	\$ 49,237		\$ 870	\$ 870
2060	\$ 48,879		\$ 50,105		\$ 868	\$ 868
2061	\$ 49,881	\$ 49,321	\$ 50,971		\$ 866	\$ 866
2062	\$ 50,881	\$ 50,185	\$ 51,835		\$ 864	\$ 864
2063	\$ 51,878	\$ 51,047	\$ 52,697		\$ 862	\$ 862
2064	\$ 52,873	\$ 51,908			\$ 860	\$ 860
2065	\$ 53,866	\$ 55,109			\$ 3,201	\$ 3,201
2066	\$ 54,857				\$ 857	\$ 857
2067	\$ 55,846	\$ 56,820	\$ 58,470		\$ 855	\$ 855
2068	\$ 56,832	\$ 57,673	\$ 59,323		\$ 853	\$ 853
2069	\$ 57,816				\$ 851	\$ 851
2070	\$ 58,799	\$ 57,811	\$ 59,311	. \$ 982	\$ (713)	\$ (863)

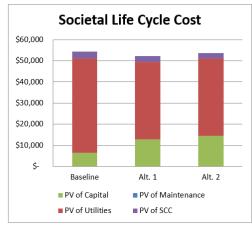
Medium Zonal Electric Home – Executive Report

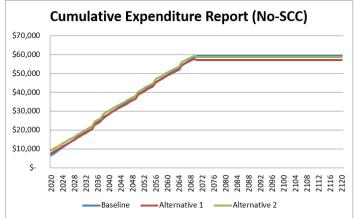
Key Analysis Var	iables	Building Characteristics					
Study Period (years)	50	Gross (Sq.Ft)	2,200				
Nominal Discount Rate	3.14%	Useable (Sq.Ft)	2,200				
Maintenance Escalation	1.00%	Space Efficiency	100.0%				
Zero Year (Current Year)	2020	Project Phase	0				
Construction Years	0	Building Type	0				

Life Cycle Cost Analysis		BEST	
Alternative	Baseline	Alt. 1	Alt. 2
Energy Use Intenstity (kBtu/sq.ft)	18.0	14.8	14.8
1st Construction Costs	\$ 6,558	\$ 7,778	\$ 9,428
PV of Capital Costs	\$ 6,558	\$ 12,956	\$ 14,500
PV of Maintenance Costs	\$ -	\$ -	\$ -
PV of Utility Costs	\$ 44,513	\$ 36,544	\$ 36,544
Total Life Cycle Cost (LCC)	\$ 51,072	\$ 49,500	\$ 51,044
Net Present Savings (NPS)	N/A	\$ 1,572	\$ 27

Societal LCC takes into consideration the social cost of carbon dioxide emissions caused by operational energy consumption

(GHG) Social Life Cycle Cost	BEST									
GHG Impact from Utility Consumption		Baseline		Alt. 1		Alt. 2				
Tons of CO2e over Study Period		43		35		35				
% CO2e Reduction vs. Baseline		N/A		18%		22%				
Present Social Cost of Carbon (SCC)	\$	3,271	\$	2,685	\$	2,685				
Total LCC with SCC	\$	54,342	\$	52,185	\$	53,729				
NPS with SCC		N/A	\$	2,157	\$	613				





Medium Zonal Electric Home – Baseline Input

<- Primary Filter	(Requires Level 1)		Open Prima	ary Filter	and Click OK to Re-filter					
Office of	Financial Management	'	Show A	II Entered	l Units (Requires Re-Filter)				
	, Washington - Version: 2020-A le Cost Analysis Tool							l		
Baseli	ne Input Page			Total B	uilding Annual Utility An	alysis	\$ 1,046	Water (CCF)	Electricity (KWH)	Natural Gas (Therms)
					Annual Utility			\$ 1,046	\$ -	
					nual Utility Consumption		1		11,621	
					Sum of Annual Utility Cor				-	-
					Total Annual Utility C Innual Utility Bill ÷ Total U			\$ -	11,621 \$ 0.09	\$ -
S I Inife	ormat II Elemental Classification for	,		Useful		1st Year	Total Component			Annual
. 011110	ildings (Building Component List)	REF	# of Units	Life (Yrs.)	Installed Cost (\$/Unit)	Maintenance Cost (\$/Unit)	Installed Cost (\$'s)	Annual Water (CCF/Unit)	Annual Electricity (KWH/Unit)	Natural Gas (Therm/Unit)
V	Primary Entries Below: # of Units must	be > 0 t	o be counted	d; Useful I	Life must be >= 2		\$ 6,558	Entries Beld	ow for Component	Specific Utility An
A Substr										
B Shell										
C Interio	ors									
D Service	es									
E Equipr	ment & Furnishings									
F Specia	l Construction & Demolition									
G Buildir	ng Sitework									
x X9010 Bui	ilding Envelope									
x X901001	1.1 - U24 Glaze	0.5		50	\$1,789.84				-348	
x X901002	1.2 - U20 Glaze	1		50	\$2,625.10				-597	
× X901003	1.3 - 5% UA reduc	0.5		50	\$1,270.23				-122	
× X901004	1.4 - 15% UA reduc	1		50	\$3,255.06				-648	
	1.5 - 22.5% UA reduc	1.5		50	\$4,849.92				-1,015	
	1.6 - 30% UA reduc	2.5		50	\$12,094.52				-1,456	
x X901007	2.1 - 2 ACH, HRV	0.5		50	\$2,283.74				-111	
x X901008	2.2 - 1.5 ACH, HRV	1		50	\$5,456.94				-664	
x X901009	2.3 - 0.6 ACH, HRV	1.5		50	\$7,048.35				-997	
x X9020 HV	AC									
x X902001	3.1a - Furnace	1		18	\$251.59					
x X902002	3.2a - 9.5 HSPF HP	0.5		15	\$1,387.73					
x X902003	3.3a - GSHP	1.5		20	\$10,900.00					
x X902004	3.4 - DHP	1.5		18	\$1,529.78				-1,129	
x X902005	3.5a - 11.0 HSPF HP	1		15	\$1,529.78					
	3.6a - DHP (15% elec)	2		18	\$5,900.58				-2,185	
x X902007	4.1 - Deeply buried	0.5		50	\$0.00					
	4.2 - HVAC inside	1		50	\$327.81					
	t Water									
	5.1 - DWR	0.5		50	\$437.08				-318	
x X903002	5.2 - 0.80 gas DHW	0.5		15	\$640.32					
x X903003	5.3 - 0.91 gas DHW, GSHP	1		15	\$1,008.56					
	5.4 - Tier III HPWH	2		15	\$955.02				-1,790	
	5.5 - CO2 HPWH	2.5		15	\$3,824.45				-1,941	
x X9040 Oth	her									
	6.1 - Solar pV	1		25	\$5,040.00					
	7.1 - ES Appl+ventless Dryer	0.5		15	\$504.83				-776	
	18 Compliant Building Cost		1	50	\$6,558.39		\$ 6,558			
	ded Cost			55	\$0.75					
	CH & Continuous Insulation			50	\$2,561.00					
	Project Costs									
Z10 One Ti	ime - Upfront Costs		1	50						
Z30 Re-Oc	curring Annual Cost (Track Inflation)		1	1						

Medium Zonal Electric Home – ALT 1

100	rimary Filter (Requires Level 1)		Onen Prim	ary Filter	and Click OK to Re-filter							
1	Office of Financial Management				Selection Only (Requires R	efilter)						
	Olympia, Washington - Version: 2020-A				ields and Entered Units (R							
	• • •						Ch. V					
	Life Cycle Cost Analysis Tool		O Show L	ofference	es Between Alternative and	d Baseline (Req. Re	efilter)					
	Alternative 1 Input Page			Total B	uilding Annual Utility And	alysis	\$	859	Water (CCF)	Electricity (KWH)	Natural Gas (Therms)	
					Annual Utility E	Bill [\$]				\$ 859		
					nnual Utility Consumption		v			13,901		
					Sum of Annual Utility Con				-	(4,360)	-	
					Total Annual Utility Co				-	9,541	-	
	Note: No Units Assigned to a Component with Entries			P	nnual Utility Bill ÷ Total Ut	ility Consumption			\$ -	\$ 0.09	\$ -	
	Note: No offits Assigned to a component with Entires											
s	Uniformat II Elemental Classification for			Useful	Installed Cost	1st Year		component	Annual	Annual Electricity	Annual	
Н	Buildings (Building Component List)	REF	# of Units	Life	(\$/Unit)	Maintenance	1	alled Cost	Water (CCF/Unit)	(KWH/Unit)	Natural Gas	
w	Danamge (Danamg Compension List)			(Yrs.)	.,,,,	Cost (\$/Unit)		(\$'s)	, , ,		(Therm/Unit)	
\perp	Primary Entries Below: # of Uni	ts mus	t be > 0 to be	counted	l; Useful Life must be >= 2				Entries Belo	w for Component	Specific Utility Anal	
	Match Baseline: Filter to Select All & Drag Copy 014:S14 & U14:AG14						\$	7,778				
	A Substructure						-					
	B Shell											
	C Interiors						-					
_	D Services E Equipment & Furnishings						-					
	F Special Construction & Demolition						-					
	G Building Sitework						-					
	X9010 Building Envelope											
	X901001 1.1 - U24 Glaze	0.5	1	50	\$1,790		S	1.790		-348		
	X901001 1.1 - U24 Glaze X901002 1.2 - U20 Glaze	0.3	1	50	\$2,625		3	1,750		-597		
	X901003 1.3 - 5% UA reduc	0.5		50	\$1,270		_			-122		
	X901004 1.4 - 15% UA reduc	0.3		50	\$3,255		_			-648		
	X901005 1.5 - 22.5% UA reduc	2		50	\$4,850					-1015		
	X901006 1.6 - 30% UA reduc	3		50	\$12,095					-1456		
	X901007 2.1 - 2 ACH, HRV	1		50	\$2,284					-111		
	X901008 2.2 - 1.5 ACH, HRV	1.5		50	\$5,457					-664		
	X901009 2.3 - 0.6 ACH, HRV	2		50	\$7,048					-997		
	X9020 HVAC				. ,							
	X902001 3.1a - Furnace	1		18	\$252							
	X902002 3.2a - 9.5 HSPF HP	0.5		15	\$1,388							
	X902003 3.3a - GSHP	1.5		20	\$10,900							
	X902004 3.4 - DHP	1.5	1	18	\$1,530		\$	1,530		-1129		
	X902005 3.5a - 11.0 HSPF HP	1		15	\$1,530							
	X902006 3.6a - DHP (15% elec)	2		18	\$5,901					-2185		
	X902007 4.1 - Deeply buried	1		50								
	X902008 4.2 - HVAC inside	1.5		50	\$328							
	X9030 Hot Water											
	X903001 5.1 - DWR	0.5	1	50	\$437		\$	437		-318		
	X903002 5.2 - 0.80 gas DHW	0.5		15	\$640							
	X903003 5.3 - 0.91 gas DHW, GSHP	1		15	\$1,009			05-		4700		
	X903004 5.4 - Tier III HPWH X903005 5.5 - CO2 HPWH	2.5	1	15 15	\$955		\$	955		-1790		
	- '	2.5		15	\$3,824					-1941		
	X9040 Other X904001 6.1 - Solar pV	- 1		25	\$5,040							
	X904001 6.1 - Solar pV X904002 7.1 - ES Appl+ventless Dryer	0.5	1	15	\$5,040 \$505		\$	505		-776		
	X904002 7.1 - ES Appi+ventiess Dryer X9050 2018 Compliant Building Cost	0.5	1	50	\$6,558		,	505		-//6		
	X9060 Added Cost			55	\$6,558							
	X9070 3ACH & Continuous Insulation		1	50	\$2,561		Ś	2,561				
	Z Other Project Costs		1	30	\$2,361		,	2,301				
	Z10 One Time - Upfront Costs		1	50								
	Z30 Re-Occurring Annual Cost (Track Inflation)			50								

Medium Zonal Electric Home – ALT 2

<- P	Primary Filter (Requires Level 1)		Open Prima	rv Filter	and Click OK to Re-filter						
1	Office of Financial Management				Selection Only (Requires R	efilter)			1 .		
	Olympia, Washington - Version: 2020-A		_	•	ields and Entered Units (R						
	Life Cycle Cost Analysis Tool		_		es Between Alternative and						
	Alternative 2 Input Page		O SHOW D		uilding Annual Utility An		s	859	Water	Electricity (KWH)	Natural Gas
	Alternative 2 iliput Page			TOTAL			ļ ,	633	(CCF)		(Therms)
					Annual Utility E					\$ 859	
					nual Utility Consumption		/		-	13,901	
					Sum of Annual Utility Con				-	(4,360)	-
					Total Annual Utility Co nnual Utility Bill ÷ Total Ut				\$ -	9,541 \$ 0.09	\$ -
	Note: No Units Assigned to a Component with Entries				initial othicy bill . Total of	inty consumption			, -	3 0.09	3 -
				116-1		4-4-1/	T-1-1				A
S	Uniformat II Elemental Classification for	REF	# of Units	Useful Life	Installed Cost	1st Year Maintenance		Component alled Cost	Annual	Annual Electricity	Annual Natural Gas
Н	Buildings (Building Component List)	KEF	# OI Units	(Yrs.)	(\$/Unit)	Cost (\$/Unit)		(\$'s)	Water (CCF/Unit)	(KWH/Unit)	(Therm/Unit)
w						cost (5) onit)		(23)			
	Primary Entries Below: # of Units	musi	t be > 0 to be	counted	l; Useful Life must be >= 2			0.400	Entries Belo	w for Component	Specific Utility Anal
	Match Baseline: Filter to Select All & Drag Copy 014:S14 & U14:AG14 A Substructure						\$	9,428			
	B Shell						-				
	C Interiors										
	D Services						_				
	E Equipment & Furnishings										
	F Special Construction & Demolition										
	G Building Sitework										
	X9010 Building Envelope										
	X901001 1.1 - U24 Glaze	0.5	1	50	\$1,790		\$	1,790		-348	
	X901002 1.2 - U20 Glaze	1		50	\$2,625		Ť	1,750		-597	
	X901003 1.3 - 5% UA reduc	0.5		50	\$1,270					-122	
	X901004 1.4 - 15% UA reduc	1		50	\$3,255					-648	
	X901005 1.5 - 22.5% UA reduc	1.5		50	\$4,850					-1015	
	X901006 1.6 - 30% UA reduc	2.5		50	\$12,095					-1456	
	X901007 2.1 - 2 ACH, HRV	0.5		50	\$2,284					-111	
	X901008 2.2 - 1.5 ACH, HRV	1		50	\$5,457					-664	
	X901009 2.3 - 0.6 ACH, HRV	1.5		50	\$7,048					-997	
	X9020 HVAC				+.,						
	X902001 3.1a - Furnace	1		18	\$252						
	X902002 3.2a - 9.5 HSPF HP	0.5		15	\$1,388						
	X902003 3.3a - GSHP	1.5		20	\$10,900						
	X902004 3.4 - DHP	1.5	1	18	\$1,530		\$	1,530		-1129	
	X902005 3.5a - 11.0 HSPF HP	1		15	\$1,530						
	X902006 3.6a - DHP (15% elec)	2		18	\$5,901					-2185	
	X902007 4.1 - Deeply buried	0.5		50							
	X902008 4.2 - HVAC inside	1		50	\$328						
	X9030 Hot Water										
	X903001 5.1 - DWR	0.5	1	50	\$437		\$	437		-318	
	X903002 5.2 - 0.80 gas DHW	0.5		15	\$640						
	X903003 5.3 - 0.91 gas DHW, GSHP	1		15	\$1,009		L.				
	X903004 5.4 - Tier III HPWH	2	1	15	\$955		\$	955		-1790	
	X903005 5.5 - CO2 HPWH	2.5		15	\$3,824		-			-1941	
	X9040 Other				4		-				
	X904001 6.1 - Solar pV	1		25	\$5,040		_				
	X904002 7.1 - ES Appl+ventless Dryer	0.5	1	15	\$505		\$	505		-776	
	X9050 2018 Compliant Building Cost			50	\$6,558						
	X9060 Added Cost		2200	55	\$0.75		\$	1,650			
	X9070 3ACH & Continuous Insulation		1	50	\$2,561		\$	2,561			
	Z Other Project Costs										
	Z10 One Time - Upfront Costs		1	50							
	Z30 Re-Occurring Annual Cost (Track Inflation)		1	1							

Medium Zonal Electric Home- Expenditure Report Expenditure Report Page In Constant 2020 \$'s

	Cun	nulativ	e Ex	(penditur	e S	ummary	Annual E	Exp	penditure S	Su	mmary
Year	Bas	eline		Alt. 1		Alt. 2	Baseline		Alt. 1		Alt. 2
2020	\$	6,558	\$	7,778	\$	9,428	\$ 6,558	\$	7,778	\$	9,428
2021	\$	7,615	\$	8,645	\$	10,295	\$ 1,057	\$	868	\$	868
2022	\$	8,672	\$	9,513	\$	11,163	\$ 1,057	\$	868	\$	868
2023	\$	9,740	\$	10,389	\$	12,039	\$ 1,068	\$	877	\$	877
2024	\$	10,807	\$	11,266	\$	12,916	\$ 1,068	\$	877	\$	877
2025	\$	11,897	\$	12,160	\$	13,810	\$ 1,090	\$	894	\$	894
2026	\$	13,008	\$	13,073	\$	14,723	\$ 1,111	\$	912	\$	912
2027	\$	14,120	\$	13,985	\$	15,635	\$ 1,111	\$	912	\$	912
2028	\$	15,231	\$	14,897	\$	16,547	\$ 1,111	\$	912	\$	912
2029	\$	16,342	\$	15,810	\$	17,460	\$ 1,111	\$	912	\$	912
2030	\$	17,453	\$	16,722	\$	18,372	\$ 1,111	\$	912	\$	912
2031	\$	18,576	\$	17,643	\$	19,293	\$ 1,122	\$	921	\$	921
2032	\$	19,687	\$	18,556	\$	20,206	\$ 1,111	\$	912	\$	912
2033	\$	20,798	\$	19,468	\$	21,118	\$ 1,111	\$	912	\$	912
2034	\$	21,909	\$	20,380	\$	22,030	\$ 1,111	\$	912	\$	912
2035	\$	23,021	\$	22,753	\$	24,403	\$ 1,111	\$	2,372	\$	2,372
2036	\$	24,121	\$	23,656	\$	25,306	\$ 1,100	\$	903	\$	903
2037	\$	25,222	\$	24,559	\$	26,209	\$ 1,100	\$	903	\$	903
2038	\$	26,311	\$	26,984	\$	28,634	\$ 1,090	\$	2,424	\$	2,424
2039	\$	27,401	\$	27,878	\$	29,528	\$ 1,090	\$	894	\$	894
2040	\$	28,479	\$	28,764	\$	30,414	\$ 1,079	\$	886	\$	886
2041	\$	29,558	\$	29,649	\$	31,299	\$ 1,079	\$	886	\$	886
2042	\$	30,625	\$	30,526	\$	32,176	\$ 1,068	\$	877	\$	877
2043	\$	31,693	\$	31,402	\$	33,052	\$ 1,068	\$	877	\$	877
2044	\$	32,750	\$	32,270	\$	33,920	\$ 1,057	\$	868	\$	868
2045	\$	33,807	\$	33,137	\$	34,787	\$ 1,057	\$	868	\$	868
2046	\$	34,864	\$	34,005	\$	35,655	\$ 1,057	\$	868	\$	868
2047	\$	35,920	\$	34,873	\$	36,523	\$ 1,057	\$	868	\$	868
2048	\$	36,966	\$	35,731	\$	37,381	\$ 1,046	\$	859	\$	859
2049	\$	38,012	\$	36,590	\$	38,240	\$ 1,046	\$	859	\$	859
2050	\$	39,047	\$	38,900	\$	40,550	\$ 1,035	\$	2,310	\$	2,310
2051	\$	40,080	\$	39,747	\$	41,397	\$ 1,033	\$	848	\$	848
2052	\$	41,111	\$	40,594	\$	42,244	\$ 1,031	\$	846	\$	846
2053	\$	42,139	\$	41,438	\$	43,088	\$ 1,028	\$	844	\$	844
2054	\$	43,166	\$	42,281	\$	43,931	\$ 1,026	\$	843	\$	843
2055	\$	44,190	\$	43,121	\$	44,771	\$ 1,024	\$	841	\$	841
2056	\$	45,212	\$	45,490	\$	47,140	\$ 1,022	\$	2,369	\$	2,369
2057	\$	46,231	\$	46,327	\$	47,977	\$ 1,020	<u> </u>	837	\$	837
2058	\$	47,249	\$	47,163	\$	48,813	\$ 1,018		835	\$	835
2059	\$	48,264	\$	47,996	\$	49,646	\$ 1,015	\$	834	\$	834
2060	\$	49,278	\$	48,828	\$	50,478	\$ 1,013	\$	832	\$	832
2061	\$	50,289	\$	49,658	\$	51,308	\$ 1,011		830	\$	830
2062	\$	51,298	\$	50,486	\$	52,136	\$ 1,009		828	\$	828
2063	\$	52,304	\$	51,313	\$	52,963	\$ 1,007	-	826	\$	826
2064	\$	53,309	\$	52,138	\$	53,788	\$ 1,005	_	825	\$	825
2065	\$	54,311	\$	54,420	\$	56,070	\$ 1,002	<u> </u>	2,283	\$	2,283
2066	\$	55,311	\$	55,241	\$	56,891	\$ 1,000		821	\$	821
2067	\$	56,309	\$	56,061	\$	57,711	\$ 998	\$	819	\$	819
2068	\$	57,305	\$	56,878	\$	58,528	\$ 996	\$	818	\$	818
2069	\$	58,299	\$	57,694	\$	59,344	\$ 994	\$	816	\$	816
2070	\$	59,290	\$	57,195	\$	58,695	\$ 991	\$	(499)	\$	(649)

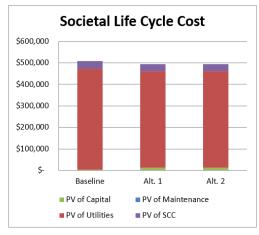
<u>Multifamily Zonal Electric Home – Executive Report</u>

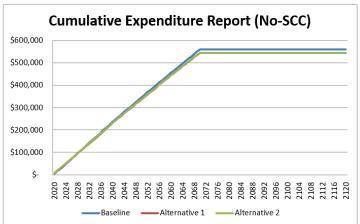
Key Analysis Var	Building Ch	Building Characteristics					
Study Period (years)	50	Gross (Sq.Ft)	820				
Nominal Discount Rate	3.14%	Useable (Sq.Ft)	820				
Maintenance Escalation	1.00%	Space Efficiency	100.0%				
Zero Year (Current Year)	2020	Project Phase	0				
Construction Years	0	Building Type	0				

Life Cycle Cost Analysis	BEST									
Alternative	Baseline		Alt. 1		Alt. 2					
Energy Use Intenstity (kBtu/sq.ft)	510.6		487.2		487.2					
1st Construction Costs	\$ 3,911	\$	7,224	\$	7,839					
PV of Capital Costs	\$ 3,911	\$	12,450	\$	13,026					
PV of Maintenance Costs	\$ -	\$	-	\$	-					
PV of Utility Costs	\$ 469,980	\$	448,485	\$	448,485					
Total Life Cycle Cost (LCC)	\$ 473,890	\$	460,935	\$	461,511					
Net Present Savings (NPS)	N/A	\$	12,955	\$	12,379					

Societal LCC takes into consideration the social cost of carbon dioxide emissions caused by operational energy consumption

(GHG) Social Life Cycle Cost	BEST									
GHG Impact from Utility Consumption	Baseline		Alt. 1		Alt. 2					
Tons of CO2e over Study Period	455		434		434					
% CO2e Reduction vs. Baseline	N/A		5%		5%					
Present Social Cost of Carbon (SCC)	\$ 34,531	\$	32,951	\$	32,951					
Total LCC with SCC	\$ 508,421	\$	493,887	\$	494,462					
NPS with SCC	N/A	\$	14,534	\$	13,959					





Multifamily Zonal Electric Home – Baseline Input

- Primary Filter (Requires Level 1)		Open Prima	ary Filter	and Click OK to Re-filter					
Office of Financial Management	`	Show A	All Entered	l Units (Requires Re-Filter)		11111111111		
Olympia, Washington - Version: 2020-A Life Cycle Cost Analysis Tool							11111111111111		
Baseline Input Page			Total B	uilding Annual Utility An	\$ 11,043	Water	Electricity (KWH)	Natural Gas	
,.				Annual Utility	(CCF)	\$ 11,043	(Therms)		
			Ar	nual Utility Consumption		122,700			
				Sum of Annual Utility Cor	sumption Below		-	-	
				Total Annual Utility C			-	122,700	
	-		Α	nnual Utility Bill ÷ Total U	tility Consumption		\$ -	\$ 0.09	\$
Uniformat II Elemental Classification for			Useful	Installed Cost	1st Year	Total Component	Annual	Annual Electricity	Annual
1 B 3 F (B 3 F 6 11:0)	REF	# of Units	Life	(\$/Unit)	Maintenance	Installed Cost	Water (CCF/Unit)		Natural Gas
Buildings (Building Component List)			(Yrs.)	(+//	Cost (\$/Unit)	(\$'s)	,	(,,	(Therm/Unit)
Primary Entries Below: # of Units must b	oe > 0 t	o be counted	d; Useful I	ife must be >= 2		\$ 3,911	Entries Belo	w for Component	Specific Utility A
A Substructure									
B Shell									
C Interiors D Services									
E Equipment & Furnishings									
F Special Construction & Demolition									
G Building Sitework									
X9010 Building Envelope									
X901001 1.1 - U24 Glaze	0.5		50	\$0.00				-132	
X901002 1.2 - U20 Glaze	1		50	\$887.05				-263	
X901003 1.3 - 5% UA reduc			50	\$173.23				34	
X901004 1.4 - 15% UA reduc	1		50	\$946.79				-223	
X901005 1.5 - 22.5% UA reduc	1.5		50	\$1,382.85				-420	
X901006 1.6 - 30% UA reduc	2		50	\$3,779.14				-555	
X901007 2.1 - 2 ACH, HRV X901008 2.2 - 1.5 ACH, HRV	0.5		50 50	\$851.21 \$2,033.95				-329 -642	
X901008 2.2 - 1.5 ACH, HRV X901009 2.3 - 0.6 ACH, HRV	1.5		50	\$2,627.11				-934	
X9020 HVAC	1.3		30	\$2,027.11				-554	
X902001 3.1a - Furnace	1		18	\$251.59					
X902002 3.2a - 9.5 HSPF HP			15	\$0.00					
X902003 3.3a - GSHP	1		20	\$0.00					
X902004 3.4 - DHP	2		18	\$3,059.56				41	
X902005 3.5a - 11.0 HSPF HP			15	\$0.00					
X902006 3.6a - DHP (15% elec)	3		18	\$5,244.96				-740	
X902007 4.1 - Deeply buried	0.5		50	\$0.00					
X902008			50	\$0.00					
X903001 5.1 - DWR			50	\$504.83				-182	
X903002 5.2 - 0.80 gas DHW	0.5		15	\$0.00				-102	
X903003 5.3 - 0.91 gas DHW, GSHP	1		15	\$0.00					
X903004 5.4 - Tier III HPWH	2.5		15	\$318.34				-973	
X903005 5.5 - CO2 HPWH	3		15	\$1,274.82				-1,055	
X9040 Other									
X904001 6.1 - Solar pV	1		25	\$5,040.00					
X904002 7.1 - ES Appl+ventless Dryer	1.5		15	\$504.83				-629	
X9050 2018 Compliant Building Cost		1	50	\$3,910.77		\$ 3,911			
x X9060 Added Cost x X9070 3ACH & Continuous Insulation			55 50	\$0.75 \$865.00					
Z Other Project Costs			50	3005.00					
Z10 One Time - Upfront Costs		1	50						
Z30 Re-Occurring Annual Cost (Track Inflation)		1	1		•				

Multifamily Zonal Electric Home – ALT 1

	Office of Olympia	(Requires Level 1) Financial Management , Washington - Version: 2020-A				and Click OK to Re-filter Selection Only (Requires Re	ofiltor)					4.0	
SH	Olympia	•											
S H				Show B		ields and Entered Units (Re				1			
S H		le Cost Analysis Tool				<u>.</u>		filtor)					
S	-	ative 1 Input Page		Show Differences Between Alternative and Baseline (Req. Refilter) Total Building Annual Utility Analysis \$ 10,538						Water	Electricity (KWH)	Natural Gas	
S H	Aiteili	alive i ilipul Page			Total D		<u> </u>	١,	10,556	(CCF)		(Therms)	
S H						Annual Utility B					\$ 10,538		
S H						nual Utility Consumption		1			118,885		
S H						Sum of Annual Utility Con: Total Annual Utility Co				-	(1,797) 117,088	-	
S H					A	nnual Utility Bill ÷ Total Ut				\$ -	\$ 0.09	\$ -	
н	Note: No U	nits Assigned to a Component with Entries				,				•			
н					Useful		1st Year	Total C	omponent			Annual	
		ormat II Elemental Classification for	REF	# of Units	Life	Installed Cost	Maintenance	1	lled Cost	Annual	Annual Electricity	Natural Gas	
	Bu	ildings (Building Component List)			(Yrs.)	(\$/Unit)	Cost (\$/Unit)		(\$'s)	Water (CCF/Unit)	(KWH/Unit)	(Therm/Unit)	
w		Primary Entries Below: # of Uni	ts mus	t he > 0 to he	counted	l· Useful Life must be >= 2				Entries Belo	w for Component	Specific Utility Apaly	
	Match Baselin	ie: Filter to Select All & Drag Copy O14:S14 & U14:AG14				, osorar Eiro mast bo : E		\$	7,224	Entries Boile	l tor component	positio o tility r ilidi	
		ructure											
	B Shell												
	C Interi	ors											
	D Service												
		ment & Furnishings											
		al Construction & Demolition											
		ng Sitework											
		ilding Envelope 1.1 - U24 Glaze	0.5		50						122		
	X901001 X901002	1.2 - U20 Glaze	0.5		50	\$887.05					-132 -263		
		1.3 - 5% UA reduc			50	\$173.23					-263		
		1.4 - 15% UA reduc	1	1	50	\$946.79		Ś	947		-223		
		1.5 - 22.5% UA reduc	1.5	1	50	\$1,382.85		,	347		-420		
		1.6 - 30% UA reduc	2.0		50	\$3,779.14					-555		
		2.1 - 2 ACH, HRV	0.5		50	\$851.21					-329		
		2.2 - 1.5 ACH, HRV	1	1	50	\$2,033.95		\$	2,034		-642		
	X901009	2.3 - 0.6 ACH, HRV	1.5		50	\$2,627.11					-934		
	X9020 HV	/AC											
		3.1a - Furnace	1		18	\$251.59							
		3.2a - 9.5 HSPF HP			15								
	X902003	3.3a - GSHP	1		20	4							
		3.4 - DHP	2	1	18 15	\$3,059.56		\$	3,060		41		
	X902005 X902006	3.5a - 11.0 HSPF HP 3.6a - DHP (15% elec)	2		18	\$5,244.96					-740		
-	X902006 X902007	4.1 - Deeply buried	0.5		50	\$3,244.90					-740		
		4.2 - HVAC inside			50								
		t Water											
	X903001	5.1 - DWR			50	\$504.83					-182		
		5.2 - 0.80 gas DHW	0.5		15								
		5.3 - 0.91 gas DHW, GSHP	1		15								
		5.4 - Tier III HPWH	2.5	1	15	\$318.34		\$	318		-973		
		5.5 - CO2 HPWH	3		15	\$1,274.82					-1055		
		her			0-	45.0							
		6.1 - Solar pV	1		25	\$5,040.00		-			630		
		7.1 - ES Appl+ventless Dryer 18 Compliant Building Cost	1.5		15 50	\$504.83 \$3,910.77					-629		
		ded Cost			55	\$3,910.77							
		CH & Continuous Insulation		1	50	\$865.00		Ś	865				
		Project Costs		1	30	J00J.00		Ÿ	503				
		ime - Upfront Costs		1	50								
	Z30 Re-Oc	curring Annual Cost (Track Inflation)		1	1								

Multifamily Zonal Electric Home – ALT 2

		1	_								
<- P	rimary Filter (Requires Level 1)		Open Prim	ary Filte	r and Click OK to Re-filter						
	Office of Financial Management		Manua	l Special	Selection Only (Requires R	-111111111111					
	Olympia, Washington - Version: 2020-A				Fields and Entered Units (R						
	• • •				· · · · · · · · · · · · · · · · · · ·						
	Life Cycle Cost Analysis Tool		O Show L	offerenc	es Between Alternative an	d Baseline (Req. Re	efilter)				
	Alternative 2 Input Page		Total Building Annual Utility Analysis \$ 10,538						Water (CCF)	Electricity (KWH)	Natural Gas (Therms)
		Annual Utility Bill [\$]								\$ 10,538	
				А	nnual Utility Consumption	-	118,885				
					Sum of Annual Utility Con	-	(1,797)	-			
		Total Annual Utility Consumption								117,088	-
				Į.	Annual Utility Bill ÷ Total Ut	\$ -	\$ 0.09	\$ -			
	Note: No Units Assigned to a Component with Entries										
s	Uniformat II Flamontal Classification for			Useful		1st Year	Total	Component			Annual
Н	Uniformat II Elemental Classification for	REF	# of Units	Life	Installed Cost	Maintenance		alled Cost	Annual	Annual Electricity	Natural Gas
0	Buildings (Building Component List)			(Yrs.)	(\$/Unit)	Cost (\$/Unit)		(\$'s)	Water (CCF/Unit)	(KWH/Unit)	(Therm/Unit)
w										(0 .	
	Primary Entries Below: # of Unit Match Baseline: Filter to Select All & Drag Copy O14:S14 & U14:AG14	is mus	t be > 0 to b	e counte	a; Oseful Life must be >= 2		Ś	7,839	Entries Beid	w for Component	Specific Utility Ana
	A Substructure						3	1,039			
	B Shell						1				
	C Interiors						1				
	D Services						_				
	E Equipment & Furnishings						_				
	F Special Construction & Demolition						_				
	G Building Sitework						-				
	X9010 Building Envelope										
	X901001 1.1 - U24 Glaze	0.5		50						-132	
	X901002 1.2 - U20 Glaze	1		50						-263	
	X901003 1.3 - 5% UA reduc			50						34	
	X901004 1.4 - 15% UA reduc	1	1	50			Ś	947		-223	
	X901005 1.5 - 22.5% UA reduc	1.5		50			, ,	317		-420	
	X901006 1.6 - 30% UA reduc	2		50						-555	
	X901007 2.1 - 2 ACH, HRV	0.5		50						-329	
	X901008 2.2 - 1.5 ACH, HRV	1	1	50			\$	2,034		-642	
	X901009 2.3 - 0.6 ACH, HRV	1.5	_	50			Ť	_,		-934	
	X9020 HVAC				¥=/==::==						
	X902001 3.1a - Furnace	1		18	\$251.59						
	X902002 3.2a - 9.5 HSPF HP			15	·						
	X902003 3.3a - GSHP	1		20							
	X902004 3.4 - DHP	2	1	18	\$3,059.56		\$	3,060		41	
	X902005 3.5a - 11.0 HSPF HP			15							
	X902006 3.6a - DHP (15% elec)	3		18	\$5,244.96					-740	
	X902007 4.1 - Deeply buried	0.5		50							
	X902008 4.2 - HVAC inside			50							
	X9030 Hot Water										
	X903001 5.1 - DWR			50						-182	
	X903002 5.2 - 0.80 gas DHW	0.5		15							
	X903003 5.3 - 0.91 gas DHW, GSHP	1		15							
	X903004 5.4 - Tier III HPWH	2.5	1				\$	318		-973	
	X903005 5.5 - CO2 HPWH	3		15	\$1,274.82					-1055	
	X9040 Other										
	X904001 6.1 - Solar pV	1		25							
	X904002 7.1 - ES Appl+ventless Dryer	1.5		15						-629	
	X9050 2018 Compliant Building Cost			50							
	X9060 Added Cost		820				\$	615			
	X9070 3ACH & Continuous Insulation		1	50	\$865.00		\$	865			
	Z Other Project Costs										
	Z10 One Time - Upfront Costs		1	50							
	Z30 Re-Occurring Annual Cost (Track Inflation)		1	1							

Multifamily Zonal Electric Home- Expenditure Report Expenditure Report Page In Constant 2020 \$'s

	Cumulativ	ummary								
Year	Baseline	Alt. 1		Alt. 2		Baseline		Alt. 1		Alt. 2
2020	\$ 3,911	\$ 7,224	\$	7,839	\$	3,911	\$	7,224	\$	7,839
2021	\$ 15,069	\$ 17,871	\$	18,486	\$	11,158	\$	10,648	\$	10,648
2022	\$ 26,227	\$ 28,519	\$	29,134	\$	11,158	\$	10,648	\$	10,648
2023	\$ 37,500	\$ 39,277	\$	39,892	\$	11,273	\$	10,757	\$	10,757
2024	\$ 48,773	\$ 50,034	\$	50,649	\$	11,273	\$	10,757	\$	10,757
2025	\$ 60,276	\$ 61,011	\$	61,626	\$	11,503	\$	10,977	\$	10,977
2026	\$ 72,009		\$	72,823	\$	11,733	\$	11,197	\$	11,197
2027	\$ 83,742		+ -	84,019	\$	11,733	\$	11,197	\$	11,197
2028	\$ 95,476		\$	95,216	\$	11,733	\$	11,197	\$	11,197
2029	\$ 107,209		\$	106,412	\$	11,733	\$	11,197	\$	11,197
2030	\$ 118,942		_	117,609	\$	11,733	\$	11,197	\$	11,197
2031	\$ 130,790		\$	128,915	\$	11,848	\$	11,306	\$	11,306
2032	\$ 142,523		\$	140,112	\$	11,733	\$	11,197	\$	11,197
2033	\$ 154,257		+ -	151,308	\$	11,733	\$	11,197	\$	11,197
2034	\$ 165,990		_	162,505	\$	11,733	\$	11,197	\$	11,197
2035	\$ 177,723	+ .	 	174,020	\$	11,733	\$	11,515	\$	11,515
2036	\$ 189,341	<u> </u>	_	185,107	\$	11,618	\$	11,087	\$	11,087
2037	\$ 200,959		-	196,194	\$	11,618	\$	11,087	\$	11,087
2038	\$ 212,462			210,230	\$	11,503	\$	14,037	\$	14,037
2039	\$ 223,966	+	_	221,207	\$	11,503	\$	10,977	\$	10,977
2040	\$ 235,354		_	232,074	\$	11,388	\$	10,867	\$	10,867
2041	\$ 246,742		\$	242,942	\$	11,388	\$	10,867	\$	10,867
2042	\$ 258,015			253,699	\$	11,273	\$	10,757	\$	10,757
2043	\$ 269,288		-	264,457	\$	11,273	\$	10,757	\$	10,757
2044	\$ 280,446 \$ 291,604	+ :	\$	275,104	\$	11,158 11,158	\$	10,648	\$	10,648
2045	\$ 291,604 \$ 302,762	+ ' ' '		285,752 296,400	\$	11,158	\$	10,648 10,648	\$	10,648 10,648
2040	\$ 302,702	+ 1	 	307,048	\$	11,158	\$	10,648	\$	10,648
2047	\$ 324,963	 ' 	+ -	317,585	\$	11,138	\$	10,538	\$	10,538
2049	\$ 336,006			328,123	\$	11,043	\$	10,538	\$	10,538
2050	\$ 346,934			338,870	\$	10,928	\$	10,747	\$	10,747
2051	\$ 357,839	+	\$	349,276	\$	10,905	\$	10,406	\$	10,406
2052	\$ 368,721	1	\$	359,660	\$	10,882	\$	10,384	\$	10,384
2053	\$ 379,580	<u> </u>	\$	370,023	\$	10,859	\$	10,362	\$	10,362
2054	\$ 390,416		<u> </u>	380,363	\$	10,836	\$	10,340	\$	10,340
2055	\$ 401,229		\$	390,682	\$	10,813	\$	10,318	\$	10,318
2056	\$ 412,019		\$	404,038	\$	10,790	\$	13,356	\$	13,356
2057	\$ 422,786		_	414,312	\$	10,767	\$	10,275	\$	10,275
2058	\$ 433,529		_	424,565	\$	10,744		10,253	\$	10,253
2059	\$ 444,250		_	434,795	\$	10,721	_	10,231	\$	10,231
2060	\$ 454,948		_	445,004	\$	10,698	\$	10,209	\$	10,209
2061	\$ 465,623			455,190	\$	10,675	_	10,187	\$	10,187
2062	\$ 476,275	\$ 464,740	\$	465,355	\$	10,652	_	10,165	\$	10,165
2063	\$ 486,904		_	475,498	\$	10,629	\$	10,143	\$	10,143
2064	\$ 497,510	\$ 485,004	\$	485,619	\$	10,606	\$	10,121	\$	10,121
2065	\$ 508,093	\$ 495,421	\$	496,036	\$	10,583	\$	10,417	\$	10,417
2066	\$ 518,653	\$ 505,498	\$	506,113	\$	10,560	\$	10,077	\$	10,077
2067	\$ 529,189	\$ 515,553	\$	516,168	\$	10,537	\$	10,055	\$	10,055
2068	\$ 539,703	\$ 525,586	\$	526,201	\$	10,514	\$	10,033	\$	10,033
2069	\$ 550,194	\$ 535,597	\$	536,212	\$	10,491	\$	10,011	\$	10,011
2070	\$ 560,662	\$ 544,694	\$	545,253	\$	10,468	\$	9,097	\$	9,041