

In-Person Workshop

Building the Business Case for Sustainability

📍 Medicine Hat, Alberta

📅 February 24, 2026 | 9:30 – 12 PM



Alberta Ecotrust Foundation

Vision and Mission

→ *Our Vision*

*An Alberta where people
and nature thrive.*

→ *Our Mission*

*We realize our vision by recognizing
gaps, mobilizing resources, investing in
our communities, creating partnerships,
and building capacity across sectors.*

What we offer

*Programs
& Initiatives*



Grants



*Impact
Investing*



*Strategic
Engagement*

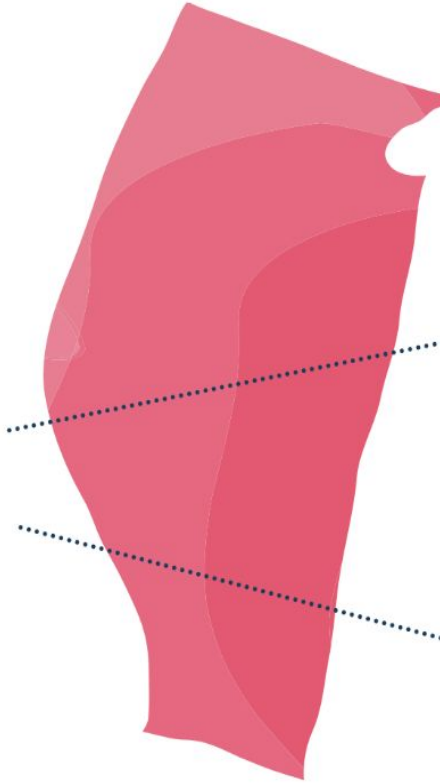


TREATY 8

Signed in 1899

TREATY 7

Signed in 1877



TREATY 6

Signed in 1876

enbix   ALBERTA
ecotrust

Alberta Ecotrust's Buildings Initiatives



enbix

Retrofit
accelerator



Emissions-Neutral Buildings Information Exchange

Bringing the building industry together
to share knowledge, build capacity and
advance building practices across Alberta.



Retrofit accelerator

Free coaching services for building owners & managers to guide them through making sustainable upgrades to their buildings, known as “deep retrofits.”



Shaping the Exchange

Establishing a platform for the exchange of knowledge around emissions neutral buildings in Edmonton, Calgary and Alberta

Developed by Alberta Ecotrust Foundation in partnership with: The Calgary Construction Association, the City of Calgary, the City of Edmonton and their Emission Neutral Buildings Industry Advisory Group, and the Smart Sustainable Resilient Infrastructure Association.

November 2023

Our Funders



Natural Resources
Canada

Ressources naturelles
Canada



FEDERATION
OF CANADIAN
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FÉDÉRATION
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Peter Gilgan
Foundation



RBC Foundation

Today's Speaker



Joseph (Joe) Henke, P. Eng, CEM, REA

Program Specialist – ENBIX, Alberta Ecotrust Foundation,

Joe is Certified Energy Manager, Energy Advisor, and holds a diploma in Sustainable Energy Technology.

Prior to joining Alberta Ecotrust Foundation, he worked as a Residential Energy Advisor, and in the manufacturing industry.

Building the business case for sustainability

AGENDA

- Attendees input (Slido poll)
- Energy Efficiency trends in Canada
- Energy Costs in Alberta
 - GHG Emissions
- Efficiency
- Cash flow diagram
- Pathways to Net-Zero
 - Building Explorer Tool
- Integrated Design Process (IDP)
- Consumer
- Sustainability in your Business
- Supports
- Questions & Discussion

Presentation ~ 2hrs

Questions ~ 45 minutes

Housekeeping

- Emergency – exits
- Washrooms
- Breaks – there is no break scheduled but please feel free to come and go as you need
- Questions – you can use the Slido Q&A feature, or feel free to ask during the session.
- I may answer some questions at the end of the session
- Phones/laptops – kindly silence any ringers. If you need to take a call please step out of the room

Building the Business case resources

EVENT TAKEAWAYS

Building the Business Case – Training Page

Author/Contributor: ENBIX

Summary:

This page is intended to accompany the “Building the Case for Sustainability” training offered by ENBIX | Alberta Ecotrust. This workshop will explore the cost of high-performance builds and how they affect operating costs. Informed by a recent LEEP costing charrette, this workshop examines how to identify the lowest-cost pathways to net-zero. It also reviews the impact of operating costs, and what other value a builder can unlock in a high-performance build.

This session focused mostly on residential applications, but many learnings will be applicable to other applications as well.

Topics will include:

- Energy Costs
- Heat pumps, electrification, and emissions
- Cash flow
- Pathways to net-zero, findings from LEEP Costing Charrette
- Marketing to the buyer

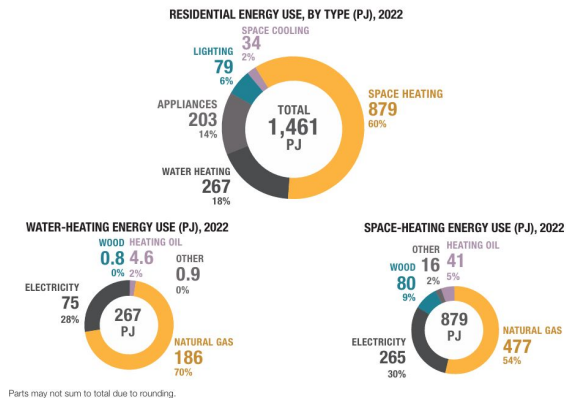
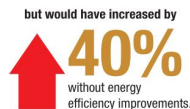
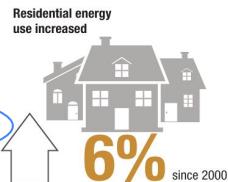


<https://www.enbix.ca/document/building-the-business-case-training-page/>

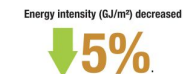
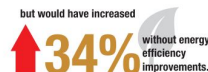
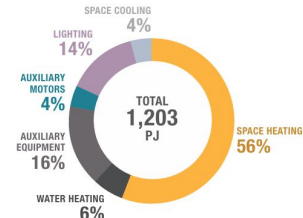
Energy Efficiency Trends

ENERGY IN OUR DAILY LIVES

- Canadian households use energy every day – to power lights and appliances, heat or cool spaces, run personal vehicles, recharge electronics and more.
- 78%** of residential energy consumption is used for space and water heating.
- Residential energy efficiency improved by **35%** between 2000 and 2022, **saving 482 PJ** of energy and **\$11.4 billion** in energy costs.



COMMERCIAL AND INSTITUTIONAL ENERGY USE BY END USE, 2022



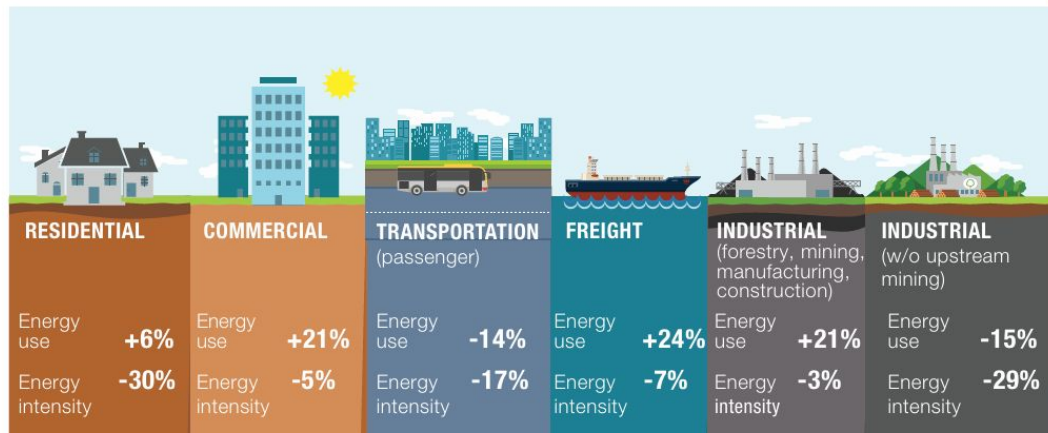
Since 2000, energy efficiency in the commercial and institutional sector has improved 13%, saving 124 PJ of energy and **\$3.3 billion** in energy costs in 2022.

Source : NRCAN Energy Fact Book 2025–2026

Takeaway: Since 2021 there has been a notable improvement in efficiency, but despite this the average consumption has gone up! Space Heating and hot water dominate demand

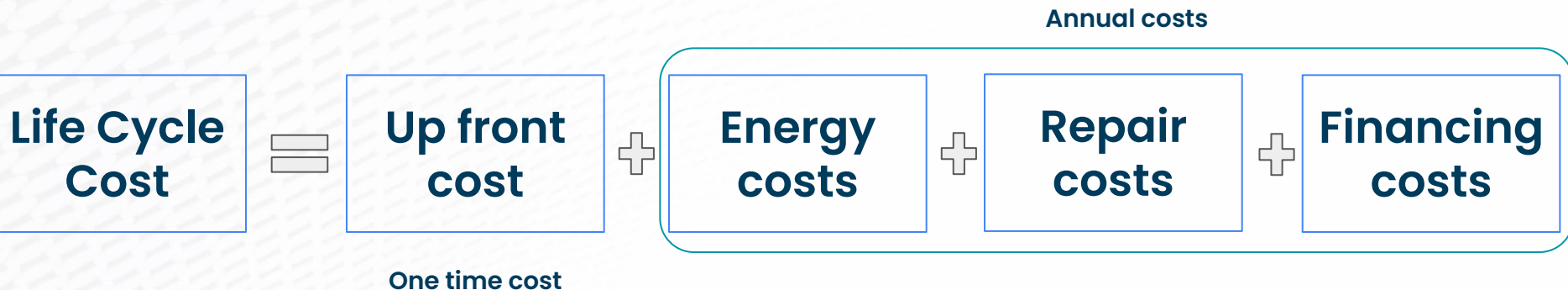
Energy Efficient Trends

TRENDS IN ENERGY USE AND INTENSITY BY SECTOR, 2000–2022



Takeaway: Residential energy use grew. Most sectors saw growth in emissions except transportation and industrial emissions.

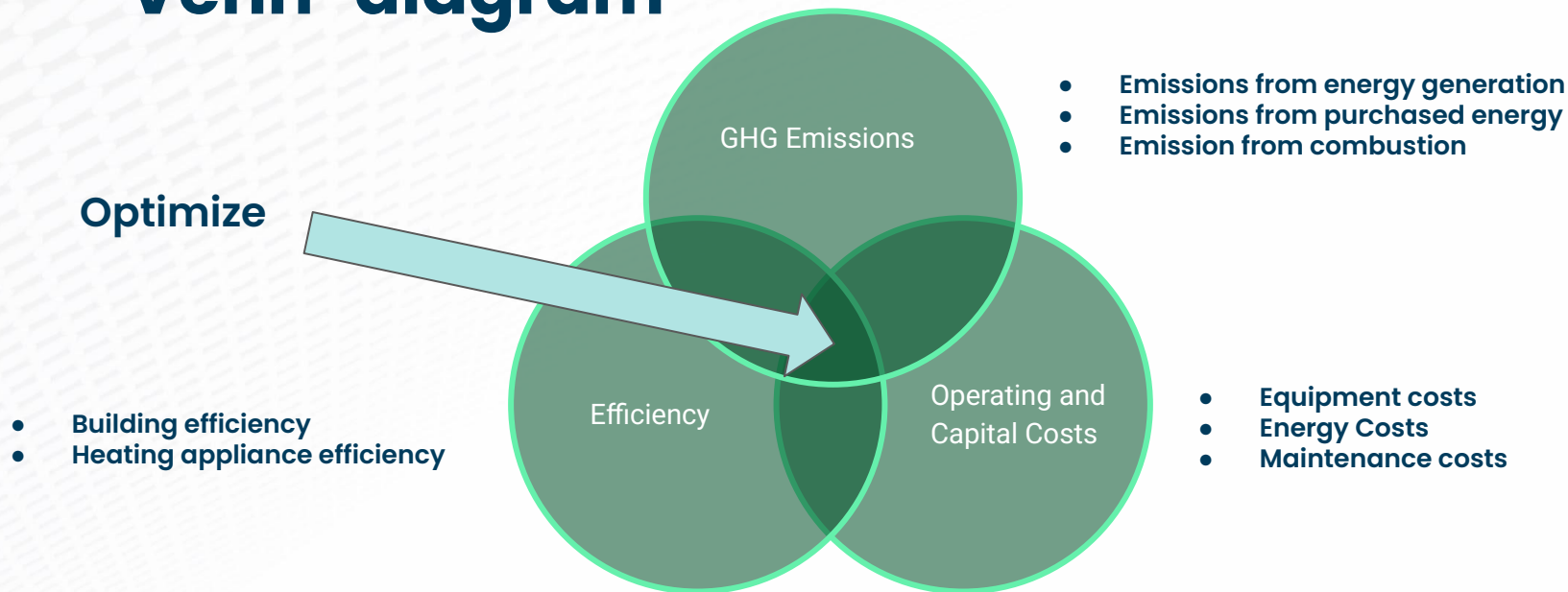
Life Cycle Costing

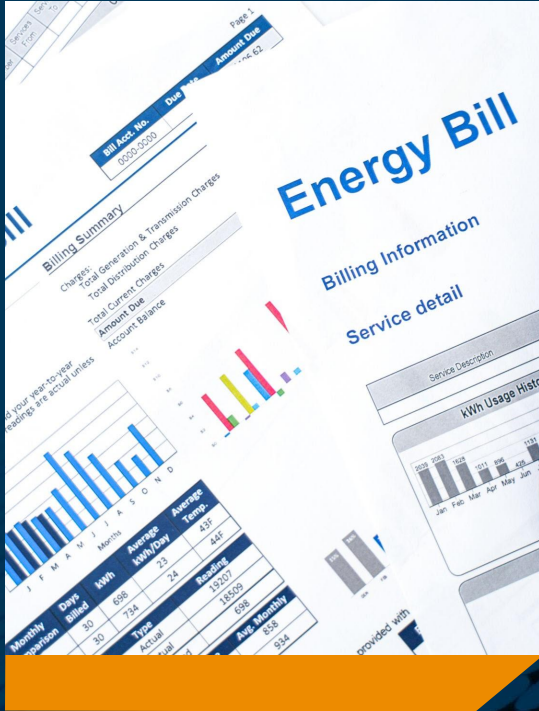


Takeaway:

- Energy costs => where efficiency and renewable energy can impact
- Repairs => long term durability affects costs
- Capital costs => pick the best value
- Financial metrics => how do we communicate this to a buyer
- Life Cycle Cost Analysis => what is the least expensive option

The Sustainability business case Venn-diagram





Energy Costs

Energy Costs

Heating

- Dominated by natural gas (NG)

Hot water

- Primarily NG
- More variety in fuel between Electricity and NG

Plug loads / AC

- Electricity

Takeaway: There are two dominant fuels/energy sources in Alberta – natural gas and electricity. Specifically NG and electricity delivered to the building via pipe or wires. There are many other fuel choices, wood, propane, fuel oil, etc. There are also isolated projects such as off grid cabins. These will change the economics.

We must understand the basics of energy costs

Natural Gas – costs

Alberta market features:

- Open energy market
- regulated transmission
- rate of last resort

Energy costs include:

- Consumption (\$/GJ)
- Transmission and distribution costs
- Administrative costs
- Taxes and municipal access costs

Takeaway: The full costing is highly local!

item	Charge Type	Explanation	Variable or fixed	Regulator
1	Natural Gas Energy Charge (NOTE Rider F is the default regulated rate price)	Cost of energy measured in GJ	Variable	market price or default rate
2	Administration Charge	Fixed and/or variable cost	Fixed and/or variable	Retailer
3	Municipal Franchise fee (Distribution rate rider A)	Fixed cost charged to utility for exclusive access to an area. Charged passed to the consumer	variable based on a percentage	Municipality
4	Municipal Property Tax (Distribution rate rider B)	Covers the cost of property taxes for pipes and ROW	percentage	Municipality
5	Carbon Tax	Price for the emission of GHG causing gases, charged on a per GJ basis.	variable	Federal
6	GST	Tax charged on total amount	variable	Federal
7	Transmission (Rider T is a flow through charge to Nova Gas Transmission)	cost of transmission pipelines variable by GJ	variable	AUC (provincial)
8	Distribution	A mix of variable and fixed charges plus rate riders to cover the costs of moving gas to your door	fixed and variable	AUC (provincial)
9	Rate Riders (Unaccounted for gas Rider D,P, Load Balancing Rider L, Fixed, variable and demand charge Rider S, Weather Deferral account Rider W,	Mix of fixed and variable additional charges that are applied with approval of the AUC	fixed and variable	AUC (provincial)

REF : <https://www.auc.ab.ca/how-rates-are-set/>

Natural Gas – costs

E.g.,

- Edmonton location
- Expected usage 84 GJ
- Energy cost \$3.97 per GJ

Outcomes:

- Total annual costs \$1350.75 or \$16.08 per GJ
- Fixed costs \$681.21 or 50.4%
- Variable costs \$669.51 or \$7.97 per GJ or 49.6%

Takeaways: more than half the costs of NG are fixed costs – i.e., they will NOT be reduced by efficiency measures. The real variable cost is much higher than that contract energy costs.

	Description	Calculation	value	unit	NOTE s	Fixed Charge (yr/m)
1	Days in Calendar year	n/a	365.24	days		n/a
2	GST	n/a	5.00%	%		n/a
3	Location	n/a	Edmonton	n/a	record city	n/a
4	Gas Distribution provider	n/a	ATCO North	n/a	e.g. ATCO South, APEX etc.	n/a
5	Annual gas usage	n/a	84	GJ	Total annual GJ usage	n/a
6	Natural Gas Energy Rate	n/a	\$3.97	\$/GJ	Pull from HIS base case (heat and hot water)	n/a
7	Natural Gas Energy Charge	Rate (6)*Gas Usage(5)	\$333.48	\$	Weighted average NG costs or contract cost per GJ based on a 2 year contract observed price	n
8	Administration Charge per day	n/a	0.28	\$/day		n/a
9	Administration Charge	charge per day(8)*days(1)	\$87.60		Alternately sum one year of actuals	\$7.30 per month * 12 months, median value
10	Municipal Franchise Fee (rate)	n/a	35.00%	%	"All charges under the Rates, including any charges under other Riders, to Customers situated within the communities listed on this Rider "X" Municipal Franchise Fee are subject to the addition of the percentage shown. The percentage shown is to be applied as an addition to the billings calculated under the Rates including charges as allowed under other Riders in effect."	Taken from AUC / ATCO north documentation
11	Municipal Property Tax (rate)	n/a	3.70%	%	The percentage is to be applied as an addition to the billings calculated under the Rates including charges as allowed under other Riders in effect with respect to the following municipalities.	Taken from AUC / ATCO north documentation
12	Carbon Tax (rate)	n/a	\$0.00	\$/GJ		n/a
13	Carbon Tax Charge Annual	carbon tax rate(12)*annual gas usage(5)	\$0.00	\$		n
14	Transmission Rate (Rider T)	n/a	\$1.36	\$/GJ		Taken from AUC/ATCO north
15	Transmission annual costs	annual gas usage(5)*Transmission(14)	\$115.84	\$		n
16	Distribution Fixed charge Rate	n/a	\$0.99	\$/day	ATCO GAS AND PIPELINES LTD. - NORTH LOW USE DELIVERY SERVICE	n/a
17	Distribution Fixed charge annual	days(1)*rate(16)	\$982.68	\$		y
18	Distribution Variable Charge Rate	n/a	\$1.04	\$/GJ	ATCO GAS AND PIPELINES LTD. - NORTH LOW USE DELIVERY SERVICE	n/a
19	Distribution Variable Charge annual	annual gas usage(5)*rate(18)	\$87.61	\$		n
20	Rate Riders (Unaccounted for gas Rider O) rate	n/a	1.40%	%	ATCO GAS AND PIPELINES LTD. ATCO GAS RIDER 'O' TO DISTRIBUTION ACCESS SERVICE CUSTOMERS FOR THE RECOVERY OF UNACCOUNTED FOR GAS (UFG)	n/a
21	Rate Riders (Unaccounted for gas Rider O) charge	rate rider(20)*(9+17)	\$6.89	\$	This is mixed variable and fixed charge	n
21.1	Rate Riders (Unaccounted for gas Rider O) charge - only fixed	rate rider (20)*(17)	\$5.39	\$		y
21.2	Rate Riders (Unaccounted for gas Rider O) charge - only variable	rate rider (20)*(9)	\$1.30	\$		n
22	Rate Riders (Load balancing Rider L) rate	n/a	-\$0.05	\$/GJ	ATCO GAS AND PIPELINES LTD. - NORTH RIDER 'L' TO ALL RATES FOR CREDITING OR DEBITING LOAD BALANCING DEFERRAL ACCOUNT (LEDA) BALANCES	n/a
23	Rate Riders (Load balancing Rider L) Charge	(22)*(5)	-\$4.20	\$		n
24	Rate Riders (Fixed Variable Demand Charge rider S) - fixed rate	n/a	\$5.10	\$/day	ATCO GAS AND PIPELINES LTD. - NORTH RIDER 'S'	n/a
25	Rate Riders (Fixed Variable Demand Charge rider S) - fixed charge	(24)*(1)	\$36.52	\$		y
26	Rate Riders (Fixed Variable Demand Charge rider S) - variable rate	n/a	\$5.09	\$/GJ	ATCO GAS AND PIPELINES LTD. - NORTH RIDER 'S'	n/a
27	Rate Riders (Fixed Variable Demand Charge rider S) - variable charge	(26)*(5)	\$2.22	\$		n
28	Rate Riders (weather deferral account rider W) - rate	n/a	\$0.26	\$/GJ	ATCO GAS AND PIPELINES LTD. - NORTH RIDER 'W' WEATHER DEFERRAL ACCOUNT RIDER	n/a
29	Rate Riders (weather deferral account rider W) - charge	(28)*(5)	\$21.50	\$		n
30	Rate sub-total (Delivery+Rate)	(15)+(19)+(17)+(21)+(23)+(25)+(27)+(29)	\$623.88	\$		n/a
31	Municipal Franchise Fee (charge)	(30)*(10)	\$218.36	\$		n
31.1	Municipal Franchise Fee (charge) - fixed only	(10)*(17)+(21)+(25)	\$141.61	\$		y
31.2	Municipal Franchise Fee (charge) - variable only	(10)*(15)+(19)+(23)+(27)+(29)	\$76.75	\$		n
32	Municipal Property Tax (charge)	(30)*(11)	\$23.08	\$		n
32.1	Municipal Property Tax (charge) - fixed only	(11)*(17)+(21)+(25)	\$14.97	\$		y
32.2	Municipal Property Tax (charge) - variable	(11)*(15)+(19)+(23)+(27)+(29)	\$8.11	\$		n
33	sub total	(7)+(9)+(13)+(15)+(19)+(17)+(21)+(23)+(25)+(27)+(29)+(31)+(32)	\$1,286.40			n/a
33.1	sub-total - fixed only	(9)+(17)+(21)+(25)+(31)+(32.1)	\$648.78			y
33.2	sub-total - variable only	(7)+(13)+(15)+(19)+(21)+(23)+(27)+(29)+(31.2)+(32.2)	\$637.62			n
34	GST annually	(33)*(2)	\$64.32	\$		n
34.1	GST annually - fixed only	(33.1)*(2)	\$32.44			y
34.2	GST annually - variable only	(33.2)*(2)	\$31.88			n
35	Total	(7)+(9)+(13)+(15)+(19)+(17)+(21)+(23)+(25)+(27)+(29)+(31)+(32)+(34)	\$1,350.72			n/a
				per GJ		
	Fixed Costs	(9)+(17)+(25)	\$486.81	\$5.80	36.04%	
	Mixed	(34)+(32)+(31)+(21)	\$312.45	\$3.72	23.13%	
	Variable	(7)+(13)+(15)+(19)+(23)+(29)+(29)	\$551.46	\$6.57	40.83%	
			\$1,350.72	\$16.08		

Common units

1 GJ	277.78 KWh
	27 m3
	26 L of fuel oil
	39 L of propane
	947 817 BTU's



Power v. Energy

Energy	Power
How <i>much</i> we use. E.g., how much heat we need per year, How many tanks of gas	How <i>fast</i> we use it. E.g., I need 40 watts to power this light bulb
Units GJ, KWh, BTU	Units KW, BTU/hr, RT
Affects operating costs	Affects capital costs, i.e., equipment sizing

Takeaway: it is important to not confuse energy and power. The common usage of units and terms makes this more difficult. The two concepts affect cost differently

Electricity – costs

Alberta Market Features:

- Open energy market, regulated transmission
- energy costs per KWh
- rate of last resort

Energy Costs include:

- Transmission and distribution costs
- Administrative costs
- Taxes and municipal access costs

Takeaway: The full costing is highly local

item	Charge Type	Explanation	Variable or fixed	Regulator
1	Energy Charge	Consumption based charge on the energy (KWh) used	Variable	retail market or regulated
2	Delivery Charge (Transmission)	Variable charge based on the energy (KWh) consumption	Variable	AUC
3	Delivery Charge (Distribution)	Variable and fixed charge	mixed	AUC
4	Retail Administration Fee (for energy)	Fixed cost from the energy retailer	fixed	retail market
5	Local Access Fee (Municipal assessment rider A)	Fixed cost for the wire service provided paid to the city	fixed	Municipalities
6	Municipal Franchise fee riders Rider A	Fixed cost for the wire service provided paid to the city	fixed	Municipalities
7	Riders (Base Transmission Adjustment Rider, Quarterly Transmission adjustment rider)	Variable Cost on energy consumption	variable	AUC
8	Rider (Balancing Pool Allocation)	Fixed Cost	fixed	AUC
9	GST	mixed cost applied to all charges	mixed	AUC

	description	Calculation	value	unit	NOTES	Reference values	Fixed Charge (y/n)
1	Days in Calendar year	n/a	365.24	days			n/a
2	GST	n/a	5.00%	%			n/a
3	Location	n/a	Edmonton		record city		n/a
4	Electric Distribution provider	n/a	EPCOR D&T	n/a	record company, e.g. ATCO Electric, EPCOR D&T		n/a
5	Electric Distribution rate type	n/a	SAS-R	n/a	e.g. E1, SAS, residential	R11 Residential service	n/a
6	Electric Retail provider	n/a	EPCOR	n/a	e.g. EPCOR	Residential Service	n/a
7	Annual Electricity usage	n/a	7600	KWh	total annual KWh hours.		n/a
7a	Annual Electric usage off-peak	n/a		KWh	only used when an off-peak rate is an option Only applicable to ATCO Electric D13		n/a
7b	Annual Electric usage peak	n/a		KWh	only used when an off-peak rate is an option		n/a
8	Electrical Energy rate	n/a	\$0.09	\$/KWh	Weighted average electric costs or contract cost per KWh The ROLE is 0.1206 and is fixed for 2 years. \$0.091 is common 3 year price.	based on 3 year contract median price.	n/a
8a	Electrical Energy off peak rate	n/a		\$/KWh	only used when an off-peak rate is an option		n/a
8b	Electrical Energy peak rate	n/a		\$/KWh	only used when an off-peak rate is an option		n/a
9	Electrical Energy Charge	(7)*(8)	\$703.00	\$	Annual Energy costs		n
9a	Electrical energy charge (peak)	(7a)*(8a)-(7b)*(8b)	\$0.00	\$	energy costs - use when there is a peak rate		n
10	Administration Charge per day	n/a	0.27	\$/day	https://www.epcor.com/clients/residential/your-rates/homeowner-residential.html		n/a
11	Administration Charge	(10)*(11)	\$89.40	\$	based on \$7.45 monthly median charge		y
12	Delivery Charge - Transmission rate	n/a	\$0.04	\$/KWh	Residential Transmission rate	RESIDENTIAL SERVICE (2025 INTERIM RATE)	n/a
13	Delivery Charge - Transmission charge	(12)*(7)	\$293.70	\$	Transmission charge		n
14	Delivery Charge - Distribution rate	n/a	\$0.02	\$/KWh	Residential Distribution rate per KWh	RESIDENTIAL SERVICE (2025 INTERIM RATE) per DAS-R	n/a
15	Delivery Charge - Distribution charge variable	(14)*(7)	\$130.11	\$	Distribution charge		n
16	Delivery Charge - distribution fixed	n/a	\$0.70	\$/day	daily charge	RESIDENTIAL SERVICE (2025 INTERIM RATE) per DAS-R	n/a
17	Delivery Charge - distribution fixed charge	(16)*(11)	\$255.50	\$	annual charge		y
18	Municipal Franchise Fee / Local Access Fee (Rider A) - rate	n/a	\$7.56	\$/month	applied to transmission and Distribution charges	From UCAhelps website	n/a
19	Municipal Franchise Fee / Local Access Fee (Rider A) - charge	(18)*(12)	\$90.72	\$		assumed to be capture above in rider A.	y
20	Municipal Assessment Fee (Rider A-1) - rate	n/a	0.00%	%			n/a
21	Municipal Assessment Fee (Rider A-1) - charge	(13)*(15)+(17)*(20)	\$0.00	\$			m
21.1	Municipal Assessment Fee (Rider A-1) - charge - fixed	(17)*(20)	\$0.00				y
21.2	Municipal Assessment Fee (Rider A-1) - charge - variable	((13)*(15))*(20)	\$0.00				n
22	Balancing Pool Allocation Rider - rate	n/a	\$0.00	\$/kwh		TEMPORARY ADJUSTMENT SAS-R	n/a
23	Balancing Pool Allocation Rider - charge	(22)*(7)	\$10.26	\$			n
24	Base Transmission Adjustment Rider	n/a	\$0.00	\$/kWh		SHORT-TERM ADJUSTMENT Rider K SAS-R	n/a
25	Base Transmission Adjustment Rider - charge	(7)*(24)	\$7.14	\$			n
26	Quarterly Transmission Adjustment Rider	n/a	\$0.00	\$/kWh		SHORT-TERM ADJUSTMENT Rider K SAS-R	n/a
27	Quarterly Transmission Adjustment Rider - charge	(7)*(26)	\$34.81	\$			n
28	Sub-total of usage (retail) charge	(9 or 9a)*(11)	\$792.40	\$			n/a
28.1	Sub-total of usage (retail) charge - fixed	11	\$89.40				y
28.2	Sub-total of usage (retail) charge - variable	9 or 9a	\$703.00				n
29	sub-total of delivery (regulated) charges	(13)*(15)+(17)*(19)+(21)+(23)+(25)+(27)	\$819.24	\$			n/a
29.1	sub-total of delivery (regulated) charges - fixed	(17)*(19)+(21.1)	\$348.22				
29.2	sub-total of delivery (regulated) charges - variable	(13)*(15)+(21.2)+(23)+(25)+(27)	\$473.02				
30	GST						m
30.1	GST - fixed costs	[(28.1)+(29.1)]*(2)	\$21.78				
30.2	GST - variable costs	[(28.2)+(29.2)]*(2)	\$58.80				
31	Total	(28)+(29)+(30)	\$1,692.22				

Electricity - costs

E.g.,

- Edmonton location
- Expected usage 7600 KWh per year
- Energy cost \$0.09 per KWh

Outcomes:

- Total annual costs \$1692.22 or \$0.22 per KWh
- Fixed costs \$457.40 or 27%
- Variable costs \$1234.83 or \$0.16 per KWh or 73%

Takeaways: Variable costs are more impactful, i.e., the cost of energy than fixed costs

Comparing fuel costs

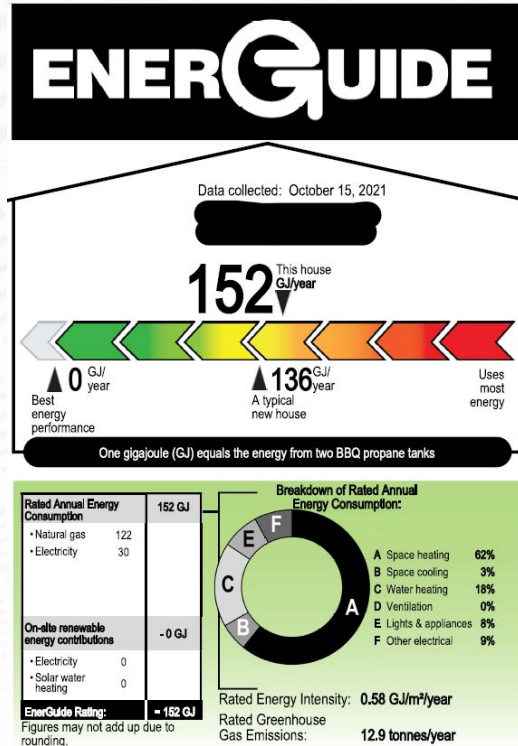
Natural Gas	Electricity
1 GJ	277.78 KWh
\$7.87 per GJ	\$0.16 per KWh
\$7.87 per GJ	\$44.44 per GJ
1	5.6

Takeaway: two significant challenges with electrification in Alberta:

- The high cost of electricity
- The large ratio between gas and electricity costs

When comparing energy costs we must convert to a common energy unit!

Energy Usage in the home



Energy Usage

Electricity	20%
Gas	80%

Energy Cost

Gas	122 GJ	\$7.87 / GJ	\$960.14	42%
Electricity	30 GJ	\$44.44 / GJ	\$1333.2	62%

Takeway: NG for heating is the vast majority of energy use, but less than half the cost!

How to calculate the cost

Utilities Consumer Advocate
Call us at 310-8822

Cost Comparison Tool About the UCA Residential Small business Farm Learning hub Resources on handpicks Contact Us

Cost Comparison Tool

HOME # COST COMPARISON TOOL

Start > Customer Type > Location > City / Town or Postal Code

Enter your city/town or postal code and select a plan type

Edmonton or Enter Postal Code

Use these filters for better results

Energy Type: Natural Gas Sort by: Lowest estimated bill Retailer: All Plan Type: Fixed Rate Contract or term: 2 Year

Features: All Eligibility: All

OK 16,563

Your Electricity and Gas options

City: Edmonton
Customer Type: Residential
Electricity Usage: Alberta Average
Gas Usage: Alberta Average

Electricity **Natural Gas** Bundled

We found options that meet your criteria, based on the Alberta Average for electricity and/or natural gas usage and the data voluntarily entered into our database by Alberta retailers. Use the Filter button to narrow your search and the Compare button to select 3 plans and compare their details.

Note: Variable rates in the Cost Comparison Tool are updated monthly when received by utility providers in the province. This means the variable rate shown in the cost comparison tool will reflect the previous month. Please be aware, that when looking at fixed or regulated rate plans, they show the prices for the current month.

If you live outside of the city limits for Edmonton, you may be served by FORTIS ALBERTA and not EPCOR. Please enter your postal code for more accurate results.

COMPARE PLANS **SHOW FILTERS**

Show 10 entries

Search: [Retailer/Plan details]

Showing 1 to 10 of 15 entries (filtered from 269 total entries)

Retailer	Plan Details	Rates and	Admin Fee	Estimated bill	Other Fees	Details
XOOM Energy Canada	SureLock 24 Fixed Rate Plan	\$4.199	\$6.85	\$172.60	No	View details

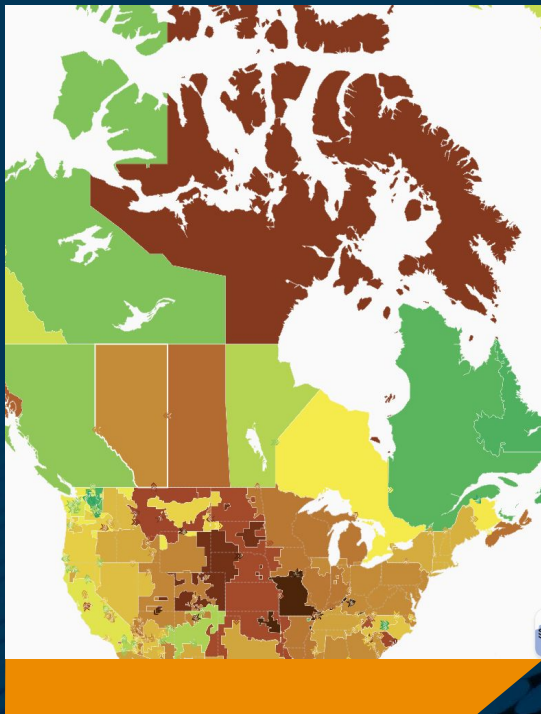
Overview	Features	Estimated bill Estimated Usage for January 16.54 GJ 172.60
Customer type: Home Pricing type: Fixed rate Contract length: 2 years	Incentives and Bonuses No Exit Fees	
Cooling off period	10 days to cancel without cost or penalty.	January
Eligibility Criteria	This offer is available to new customers only. XOOM Energy offers each applicant the option to pay a deposit or agree to a credit check.	Breakdown: Unit Prices
Terms and Conditions	Two year service agreement required. Guaranteed rate for 24 months. For full Terms and Conditions visit us online at https://xoomenergy.ca/	Retail Retail Charge \$4.190/GJ Admin Fee \$6.850/month
Pricing Changes	Not Applicable	Natural Gas Distributor Fees ATCO Gas North Variable Distribution \$1.03/GJ Fixed Distribution \$1.00/day Per GJ Rate Rider \$1.26/GJ Per GJ Rate Rider \$0.05/GJ Per GJ Rate Rider \$0.26/GJ Municipal Franchise Fee 18.04\$/month
Green Plan Description	Not Applicable	Taxes GST 5.00%
Incentives and Bonuses	Not Applicable	
Early Exit Fee	No	
SHARE PRINT		

Open the UCA helps Cost Comparison tool

<https://ucahelps.alberta.ca/cost-comparison-tool/>

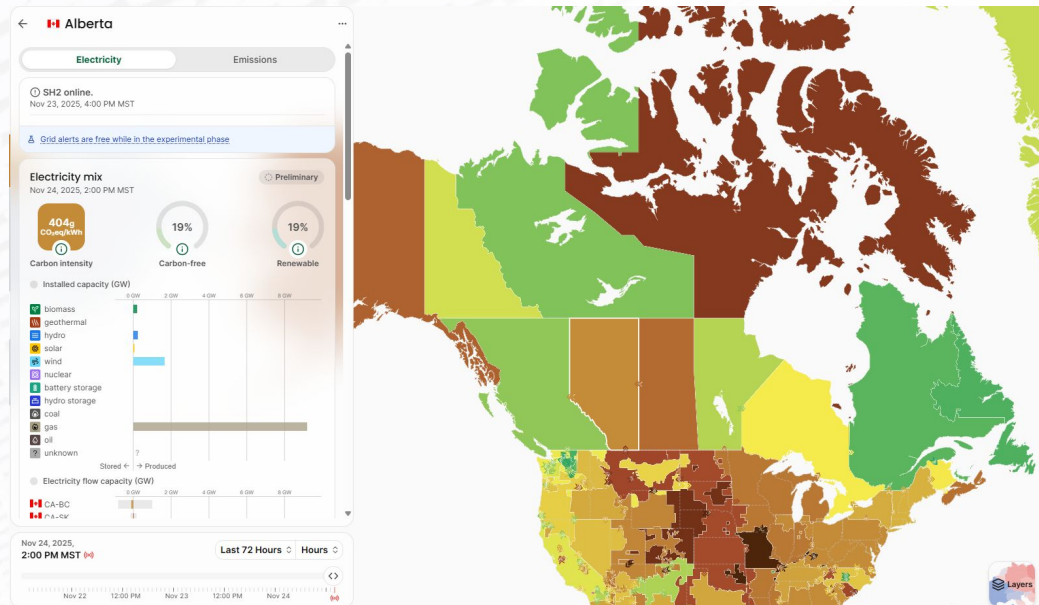
- Look at the options, focus on the 'estimated bill' column.
- This is the estimated monthly bill – NOT the average monthly bill
- Pick a reasonable (lowest) cost
- Select 'view details'

- Under the view tab, the table on the right calculates the monthly costs
- It separates costs that are variable v. fixed
- Add up the variable costs to determine the total.



GHG emissions

Alberta Emissions from Electricity



- Alberta has dramatically reduced emissions with the phase out of coal
- Still a high emitting grid
- Moved from worst to 8th.

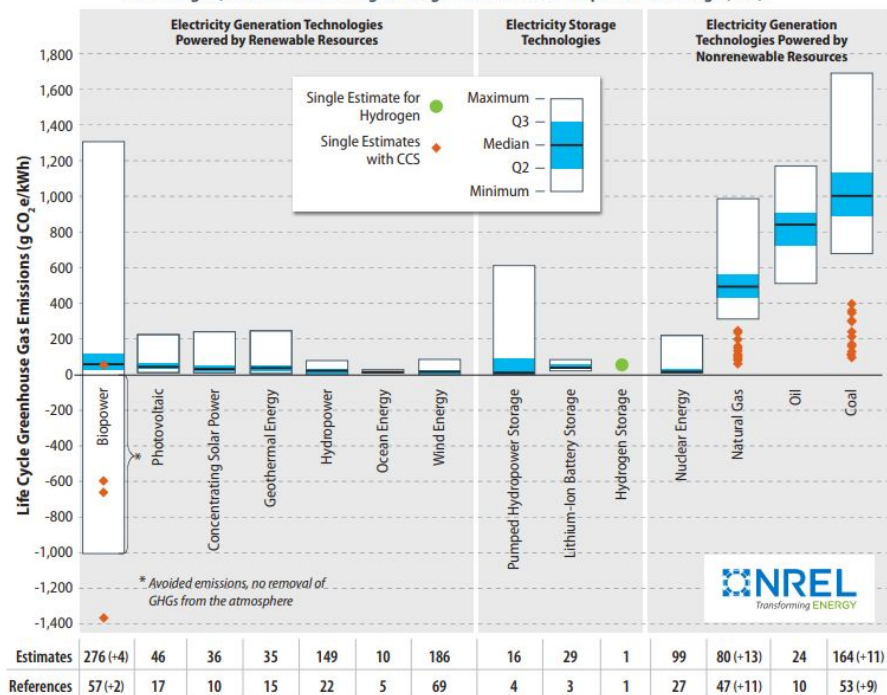
What does that mean?

- An ASHP modeled on a single family home compared to a high efficiency furnace emits almost the same amount of emissions. (at higher capital and operating costs)

<https://app.electricitymaps.com/map/72h/hourly>

Emissions by generation type

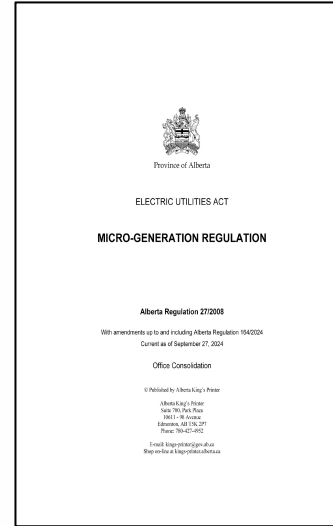
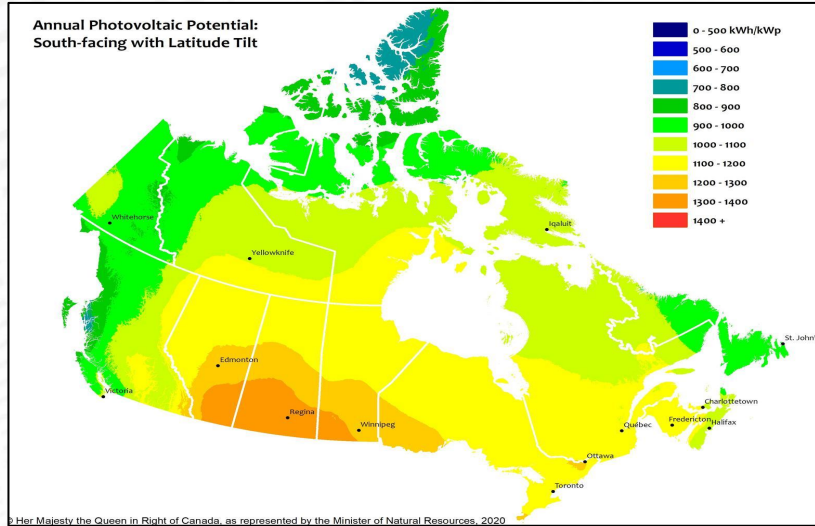
Figure 2. Life cycle greenhouse gas emission estimates for selected electricity generation and storage technologies, and some technologies integrated with carbon capture and storage (CCS).



Takeaways: Solar PV presents a great opportunity to reduce emissions.

Source: Life Cycle Greenhouse Gas Emission from Electricity Generation :
Update <https://docs.nrel.gov/docs/fy21osti/80580.pdf>

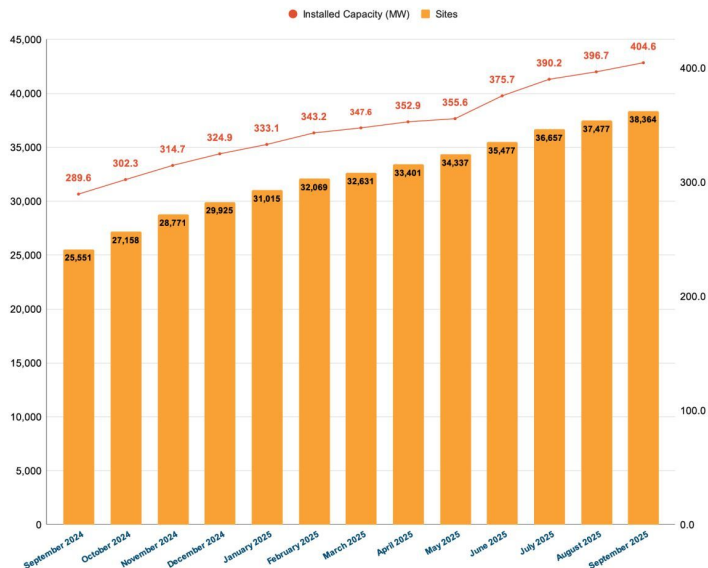
Solar PV Opportunity



- 2nd only to Saskatchewan in PV Potential
- Electricity market enabling Power Purchase Agreements
- Favorable Microgeneration Regulation allowing for net-billing

Solar PV in Alberta – an Alberta super power?

Micro- and Small Distributed Solar Generation Capacity in Alberta



Data Source: AESO (<https://www.aeso.ca/market/market-and-system-reporting/micro-and-small-distributed-generation-reporting/>)

Ref:

<https://www.aeso.ca/market/market-and-system-reporting/micro-and-small-distributed-generation-reporting/>

Important Stats:

- 12813 solar installs added in 12 months
- >1000 new sites per month
- 115.2 MW added
- 9.6 MW per month



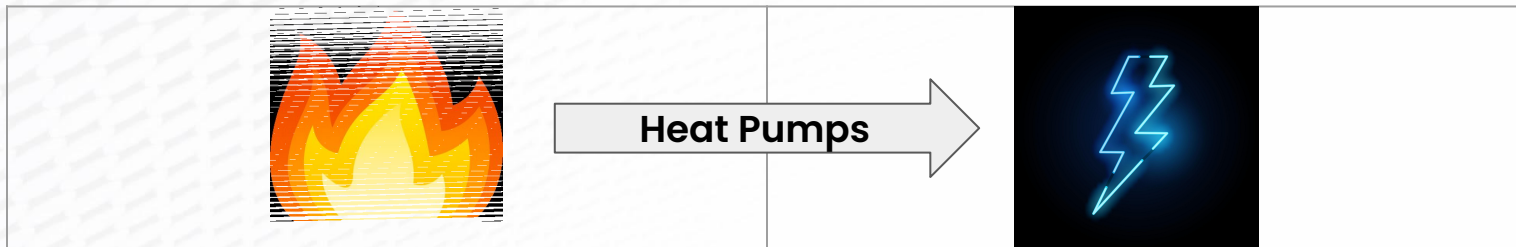
Takeaway: Solar can address both barriers to electrification, cost and emissions.



Efficiency

Heat pumps and building envelope

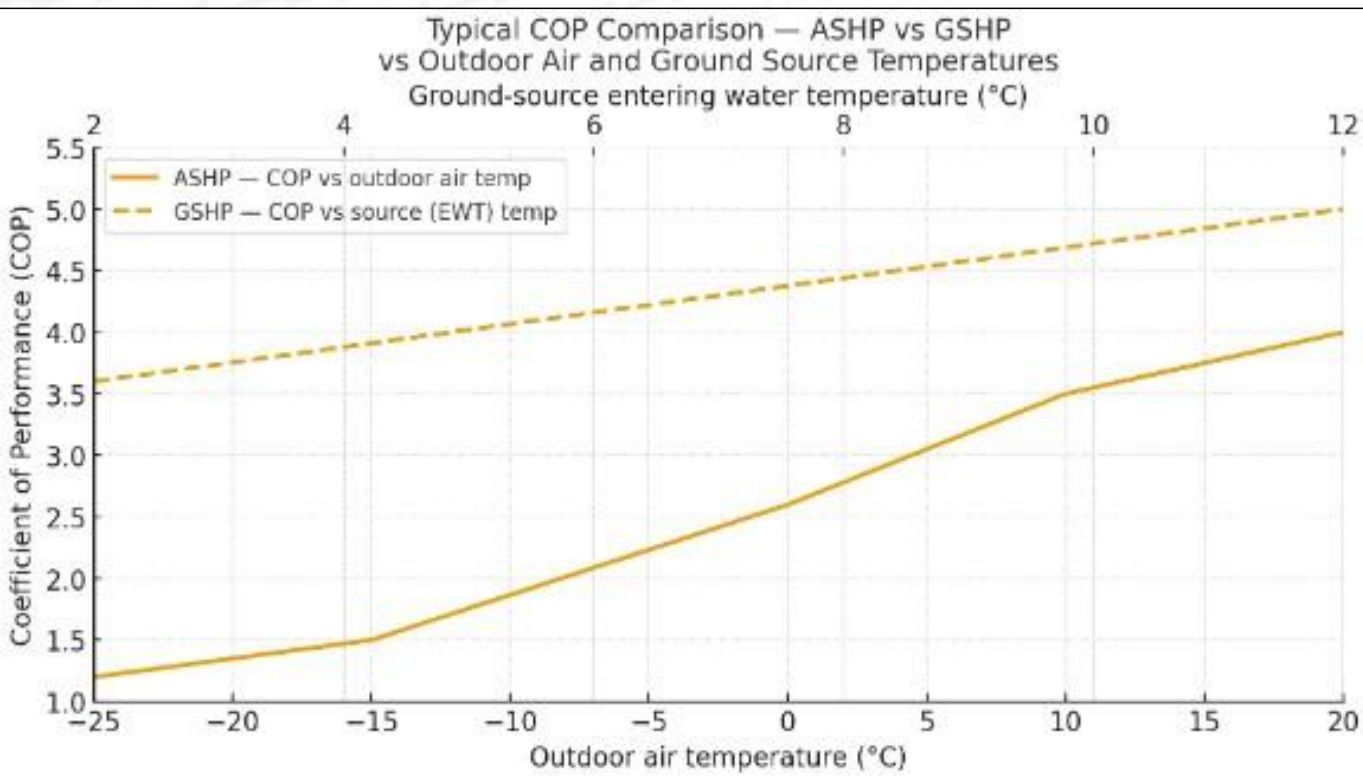
Heat Pumps and Fuel Switching



To reduce emissions and achieve reduce emissions you must eliminate combustion of fossil fuels. The most obvious route is electrification through the use of heat pumps.

Take away: We have to understand heat pump performance!

Outside Air Temperature versus COP

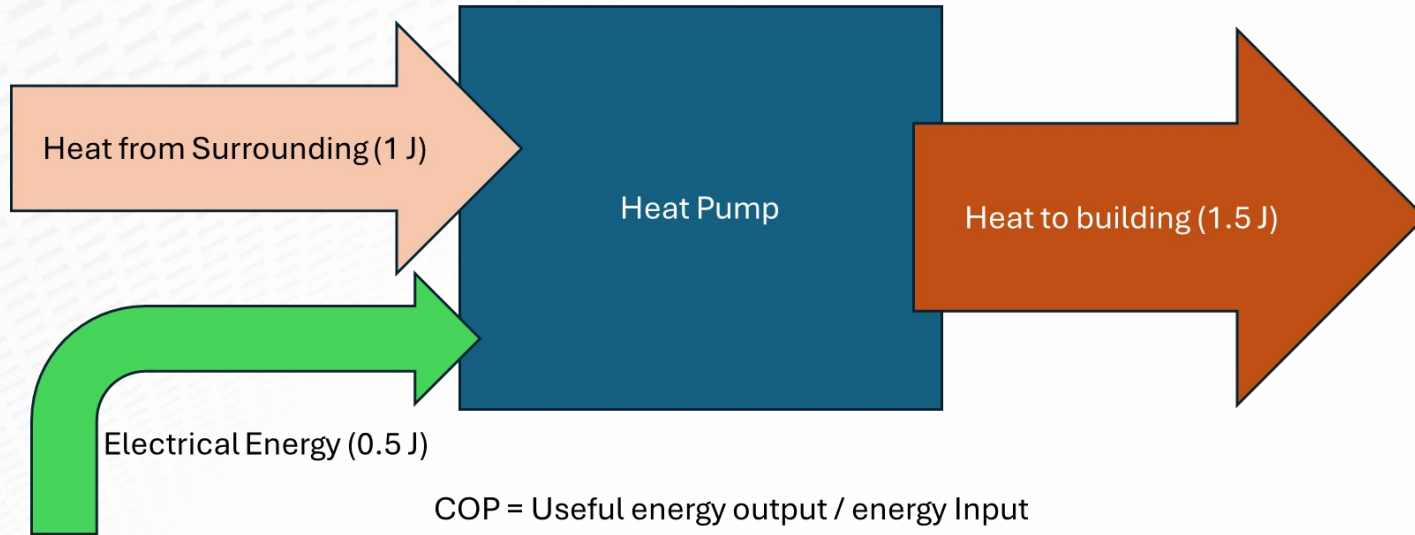


Takeaway: the performance of an ASHP (solid line) is worse as the difference between the outside temperature and the inside temperature increases.

The performance of GSHP is more stable as it draws heat from the ground and higher temperatures on the coldest days.

Coefficient of Performance (COP)

Heat Pump COP Heating Example

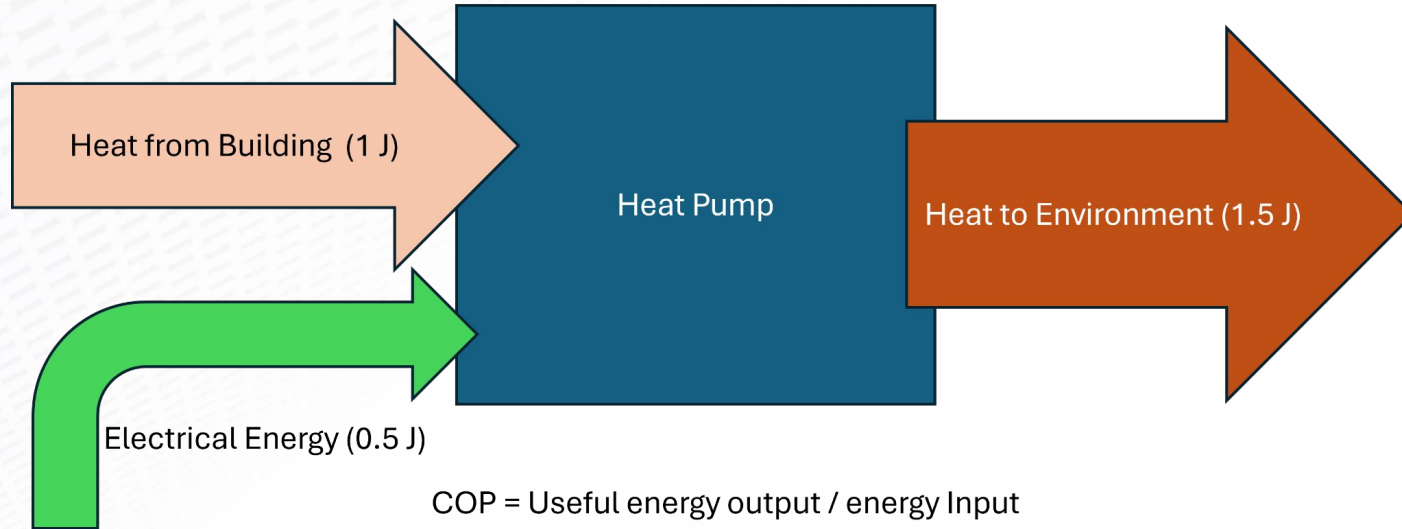


$\text{COP} = \text{Useful energy output} / \text{energy Input}$

e.g. $\text{COP} = 1.5 \text{ J} / 0.5 \text{ J} = 3$ or 300%

Coefficient of Performance (COP)

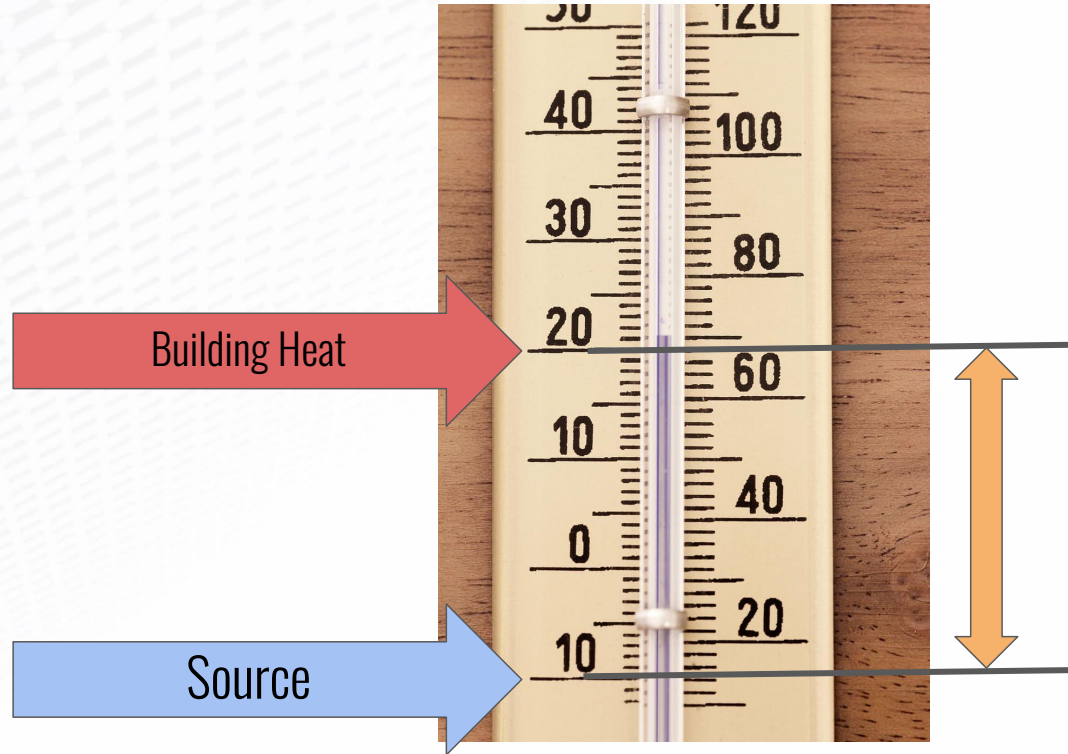
Heat Pump COP Cooling Example



$\text{COP} = \text{Useful energy output} / \text{energy input}$

e.g. $\text{COP} = 1.0 \text{ J} / 0.5 \text{ J} = 2$ or 200%

Temperature Difference

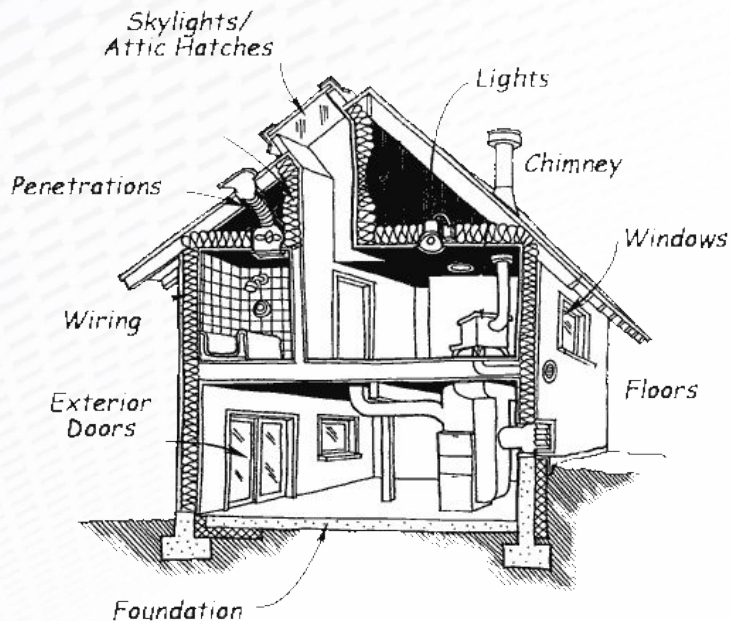


The greater the temperature rise, the lower the COP of the system.

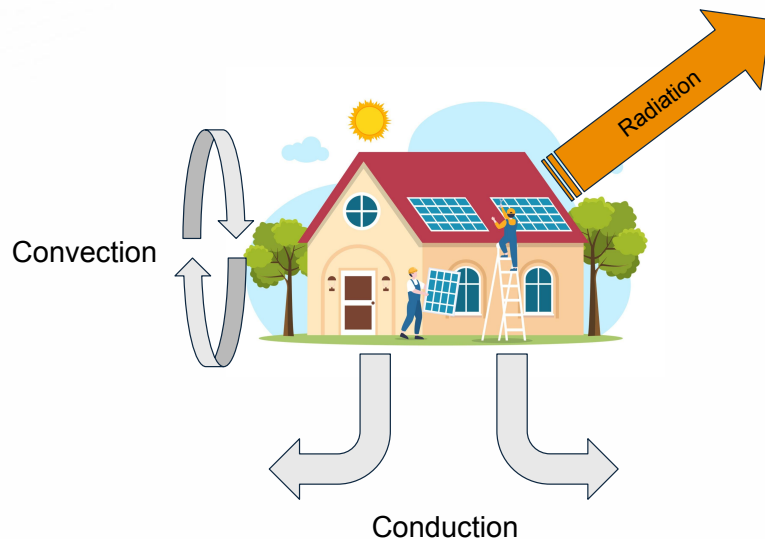
Heat Pump – Summary

- Heat pumps are key to transition heating from NG to electricity
- The performance of HP varies throughout the year
 - i.e., COP of 0.95 versus 3 = 1:3
 - This ratio has to be greater than ratio in fuel costs to be economical.
- Capital cost of HP are higher (for now)
 - Strategies to reduce capital costs
 - HP also provides air conditioning
 - Building envelope improvements (next section)
 - Controls to reduce electrical service sizing
 - Combi-systems – one heat pump providing heat and DHW
- Solar PV combined with a heat pump (electrification) to really reduce emissions

Building Performance



Reference: Keeping the Heat In, Natural Resources Canada



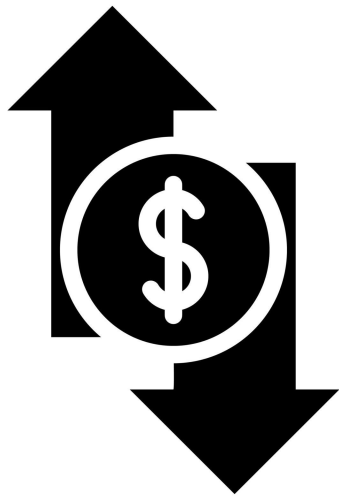
- Building performance is about reducing energy consumption
- Improving building performance can lead to increased capital costs ***

Solar Heat Gains / Shading

Glazing - high solar heat gain	High solar heat gain windows can help passively heat spaces. Care needs to be taken to not over heat in summer
Shading	Overhangs, shutters or other shading devices can passively cool spaces
Low-E coatings	Reflect infrared, lower the SHGC, better insulation, and lower heating potential

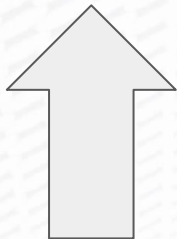
Waste Heat Recovery

Drain Water Heat Recovery (DWHR)	Heat from waste water is used to preheat incoming cold water feed. This is mostly to recover heat from showers.
Heat Recovery Ventilator (HRV)	Exhaust air is passed through a heat exchanger to preheat incoming fresh air
Energy Recovery Ventilator (ERV)	Similar to an HRV but in addition to heat moisture can be recovered.

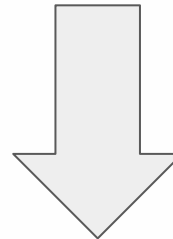


Cash flow Diagram

Capital Costs v. Operating Costs

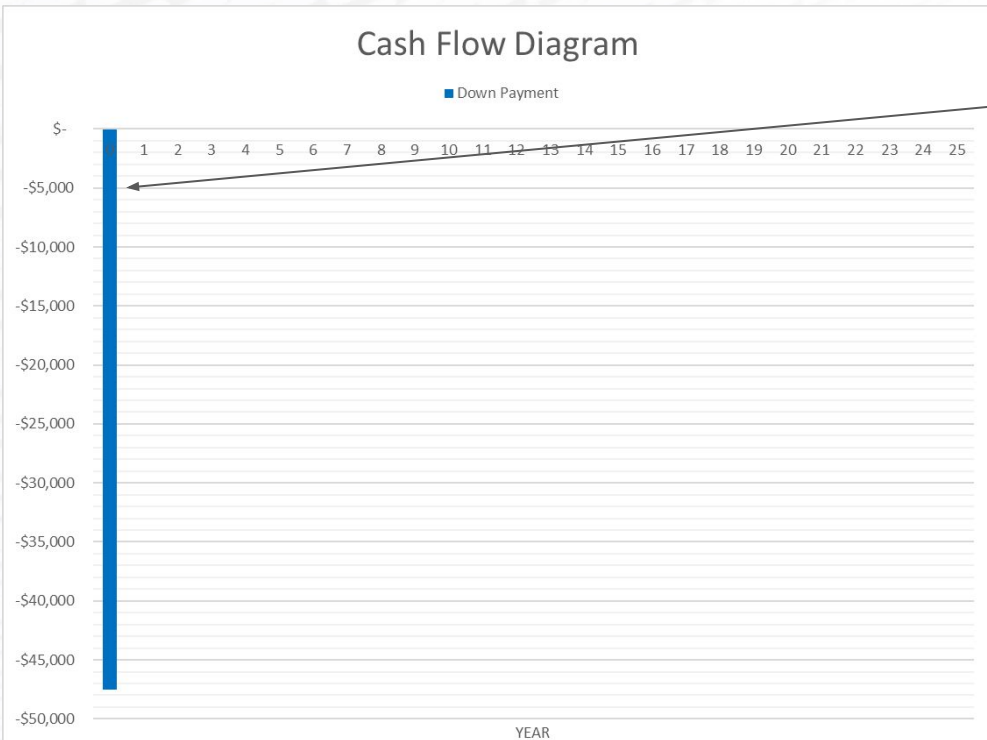


Increasing Capital Costs



Decreasing Operating Costs

Cash Flow diagram : Introduction

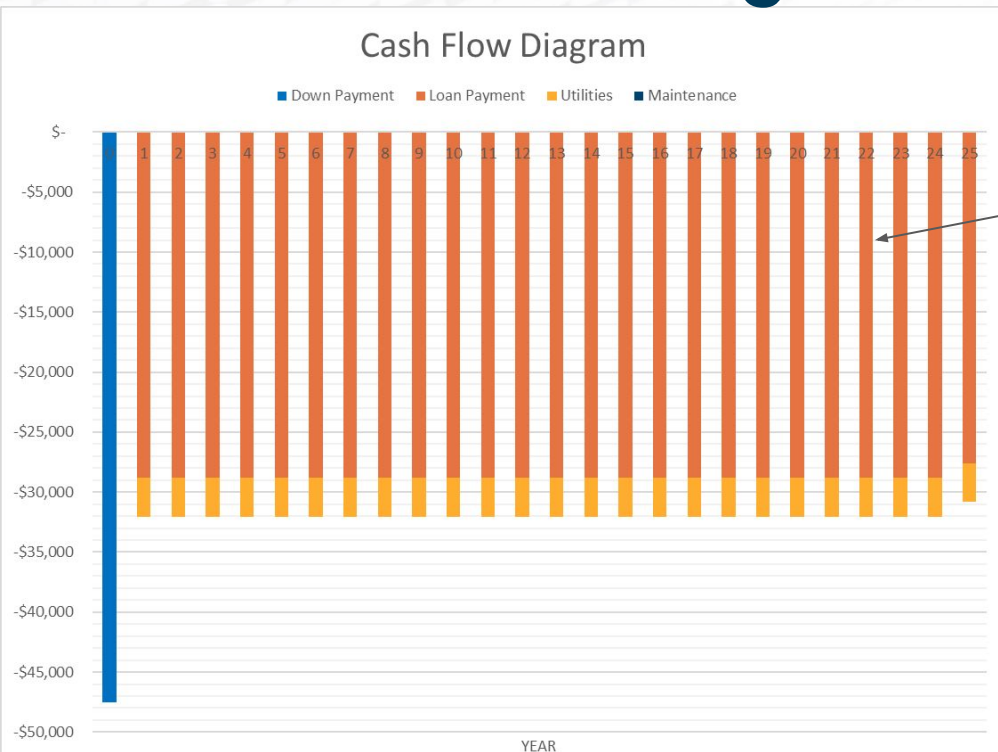


Down payment in
year 'zero'

Total Cost of Ownership	-\$ 847,403
Discount Rate	5%
Annual Average cost	-\$ 31,996.13
Present Worth Factor	14.094
Present Value	-\$ 498,453.52
Solar offset %	0%
Electrical Consumption (KWh)	8000
Gas Consumption (GJ)	100

Total Capital Costs	\$475,000.00
Purchase Price	\$475,000.00
Capital cost for energy efficiency upgrades	\$ -
Capital costs for solar PV	\$ -
Percent down payment	
Down Payment @ 10% down	\$ 47,500.00
Loan Amount	\$427,500.00
Interest Rate	4.50%
Amortization period	25

Cash Flow diagram : Introduction

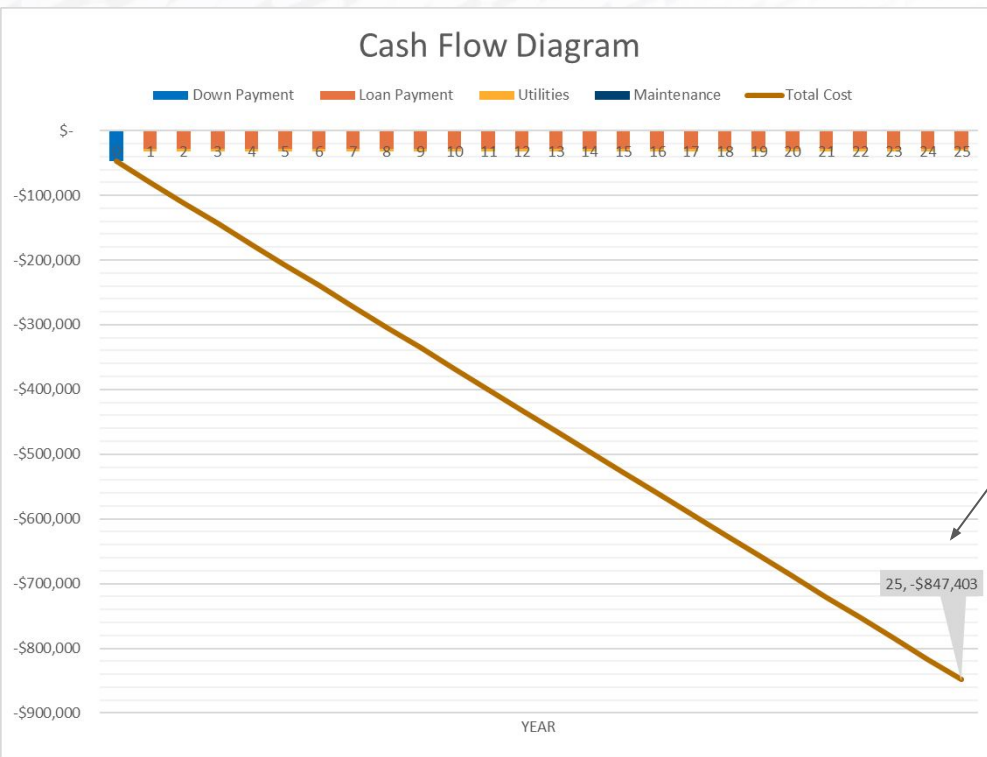


Add the annual costs, loan payments, utilities, etc.

Total Cost of Ownership	-\$ 847,403
Discount Rate	5%
Annual Average cost	-\$ 31,996.13
Present Worth Factor	14.094
Present Value	-\$ 498,453.52
Solar offset %	0%
Electrical Consumption (KWh)	8000
Gas Consumption (GJ)	100

Total Capital Costs	\$475,000.00
Purchase Price	\$475,000.00
Capital cost for energy efficiency upgrades	\$ -
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Percent down payment	
Down Payment @ 10% down	\$ 47,500.00
Loan Amount	\$427,500.00
Interest Rate	4.50%
Ammortization period	25

Cash Flow diagram : Introduction



Time value of money

<u>Simple</u>	<u>Time value of money</u>
Sum up the initial cost plus the annual value	Convert the annual value to present Value and sum the total $PV = A * ((1-(1+i)^{-n})/i)$ PV = Present Value A = annual value i = discount rate (interest rate) n = period (years) Or $PV = \text{Initial cost} + A * (P/A, i, n)$
e.g., $\$47,500 + \$31,996 \times 25 \text{ years} = \$847,403$	e.g., (i=5%) $\$47,500 + \$33,996 \times 14.094 = \$498,453$



Financial metrics

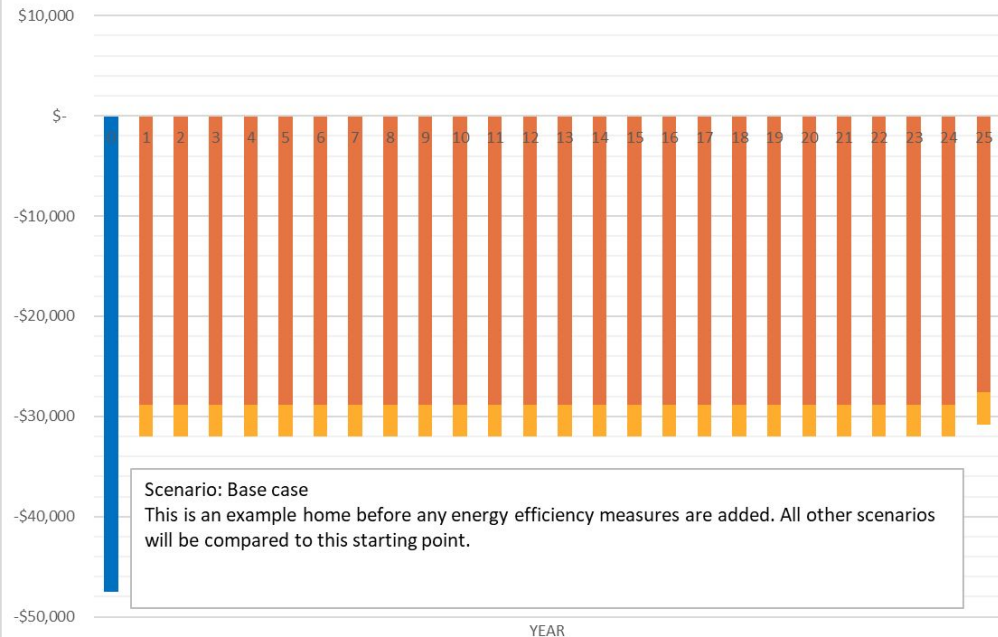
<u>No Time value of money</u>	<u>Time Value of Money</u>
Simple Payback	Internal Rate of Return (IRR)
Cash Flow Diagram	Saving to Investment Ratio (SIR)
Total Cost of Ownership	Net Present Value (NPV)

Takeaways: There are many many metrics we can use to compare projects. Those that consider the time value of money are better but are harder to determine and explain.

Base Case

Cash Flow Diagram

■ Down Payment ■ Loan Payment ■ Utilities ■ Maintenance ■ Solar

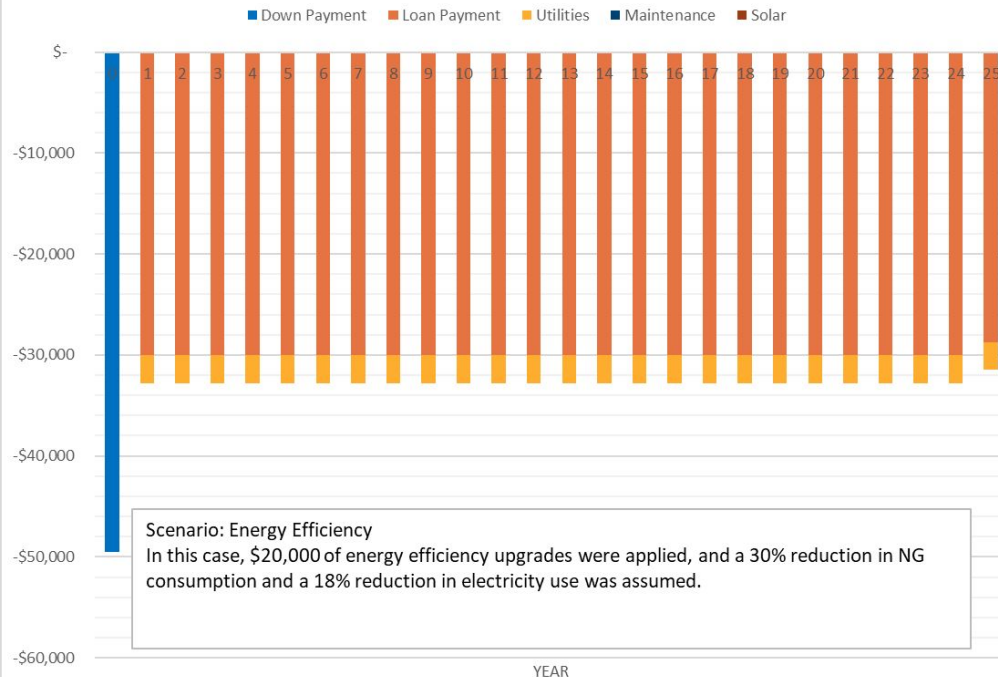


Takeaway: The cash flow diagram for our base case i.e., the upfront cost + the cost of operation becomes the basis for all of our cost comparison.

Total Cost of Ownership	-\$ 844,278	Total Capital Costs	\$ 475,000.00
Discount Rate	5%	Purchase Price	\$ 475,000.00
Annual Average cost	-\$ 31,871.13	Capital cost for energy efficiency upgrades	\$ -
Present Worth Factor	14.094	Capital costs for solar PV	\$ -
Present Value	-\$ 496,691.77	Percent down payment	
		Down Payment @ 10% down	\$ 47,500.00
Solar offset %	0%	Loan Amount	\$ 427,500.00
Electrical Consumption (KWh)	8000	Interest Rate	4.50%
Gas Consumption (GJ)	100	Ammortization period	25

Energy Efficiency

Cash Flow Diagram

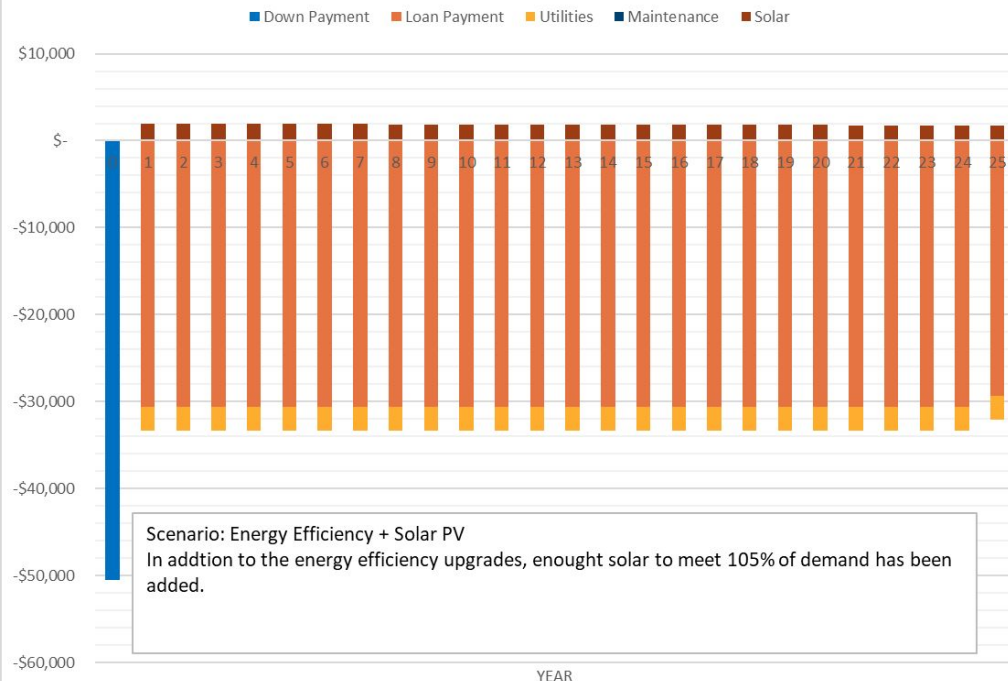


Takeaway: Now we add additional cost of energy efficiency measures. The impact is to reduce our operating (energy) costs.

Total Cost of Ownership	-\$ 867,721	Total Capital Costs	\$ 495,000.00
Discount Rate	5%	Purchase Price	\$ 475,000.00
Annual Average cost	-\$ 32,728.85	Capital cost for energy efficiency upgrades	\$ 20,000.00
Present Worth Factor	14.094	Capital costs for solar PV	\$ -
Present Value	-\$ 510,780.36	Percent down payment	
		Down Payment @ 10% down	\$ 49,500.00
Solar offset %	0%	Loan Amount	\$ 445,500.00
Electrical Consumption (KWh)	6500	Interest Rate	4.50%
Gas Consumption (GJ)	70	Amortization period	25

Solar PV

Cash Flow Diagram



Takeaway: Now add Solar PV.
Generation further increases the capital costs and reduce operating costs.

Notice the total cost of ownership has gone down

Total Cost of Ownership	-\$ 837,174	Total Capital Costs	\$ 504,750.00
Discount Rate	5%	Purchase Price	\$ 475,000.00
Annual Average cost	-\$ 31,467.94	Capital cost for energy efficiency upgrades	\$ 20,000.00
Present Worth Factor	14.094	Capital costs for solar PV	\$ 9,750.00
Present Value	-\$ 493,984.17	Percent down payment	
		Down Payment @ 10% down	\$ 50,475.00
Solar offset %	105%	Loan Amount	\$ 454,275.00
Electrical Consumption (KWh)	6500	Interest Rate	4.50%
Gas Consumption (GJ)	70	Amortization period	25

Base Case	Energy Efficiency	Energy Efficiency + Solar PV
\$475 000 purchase price 10% down or \$47,500	\$475,000 + \$20,000 (~5%) 10% down or \$49,500	\$475,000 + \$20,000 + \$9,750 10% down or \$50,475
Total Cost of Ownership \$844, 278	Total Cost of Ownership \$867,721  (+\$23,000)	Total Cost of Ownership \$837,174  (-\$7,104)
Annual Costs \$31,871	Annual Costs \$32,729 	Annual Costs \$31,468 
Total cost @5% discount rate \$496,692	Total cost @5% discount rate \$510780  (+\$14,000)	Total cost @5% discount rate \$493,984  (-\$2,708)
	This upgrade had the impact of increasing cost regardless of the metric.	This scenario reduced costs everywhere. \$30000 in upgrades paid over the life of the home

Base Case	Energy Efficiency	Energy Efficiency + Solar PV
\$475 000 purchase price 10% down or \$47,500	\$475,000 + \$20,000 (~5%) 10% down or \$49,500	\$475,000 + \$20,000 + \$9,750 10% down or \$50,475
Total Cost of Ownership \$844, 278	Total Cost of Ownership \$867,721 ↑	Total Cost of Ownership \$837,174 ↓
Monthly Costs \$31,871	Monthly Costs \$32,729 ↑	Monthly Costs \$31,468 ↓
Total cost @5% discount rate \$496,692	Total cost @5% discount rate \$510780 ↑	Total cost @5% discount rate \$493,984 ↓
	This upgrade had the impact of increasing cost regardless of the metric.	This scenario reduced costs everywhere. \$30000 in upgrades paid over the life of the home

Life Cycle Cost Assessment

Garage Solar

FINANCIAL



Detached garage are often convenient:

- Lower height
- Few roof penetrations
- Easy access for wiring
- Convenient work area
- Must have electrical service either service entrance or subpanel



Garage Solar

Project	Garage Solar Array
City	Calgary
Elec Usage (kWh/yr)	4,789 1

Investment	12,688
Savings /yr	1,439 2
GHG T/yr	2.8

Equipment	Make	Model	Watts	Qty	Total
Modules (DC)	Thornova	TSGBT54-G11	500	10	5,000
Inverters (AC)	HoyMiles	HMS quad, dual	1440, 720	2, 1	3,600
Mounting	Kinetic	Rapid Rail	Roof Tech anchors	black clamps	rodent screen
Solar Amps (max AC)					15.0 3
Overbuild					1.39

Interconnection	service entrance	sub panel
Location	House	Garage
Manufacturer	Siemens	Federal Pion
Model no	SEQ32100SM	104-8
bus bar rating	125	70
supply amps	100	40
Solar Breaker		20
max solar	56.25	47.5 4

Roof Type	asphalt shingle 5
Slope	4:12
Height	8' - 10'

Forecast (kwh)		2025
Jan	227	
Feb	302	
Mar	501	320
Apr	565	540
May	652	663 6
Jun	661	672
Jul	731	609
Aug	643	626
Sep	483	
Oct	437	
Nov	248	
Dec	185	
Total	5,635	
kWh/kW	1,127 7	



Multi-Res BIPV



INVESTMENT

Multi-residential new construction with BIPV roof

Four units, each with secondary suite.

Designed for all-electric, net-zero energy (no gas).

Four meters = four microgen sites = four solar interconnections

Garage has four subpanels, one for each unit, with solar and EV.



Multi-Res BIPV

Project	Mult-Res, BIPV, EV
City	Calgary
Elec Usage (kWh/yr)	52,645 1

Investment	198,147
Savings /yr	17,587 2
GHG T/yr	32.5

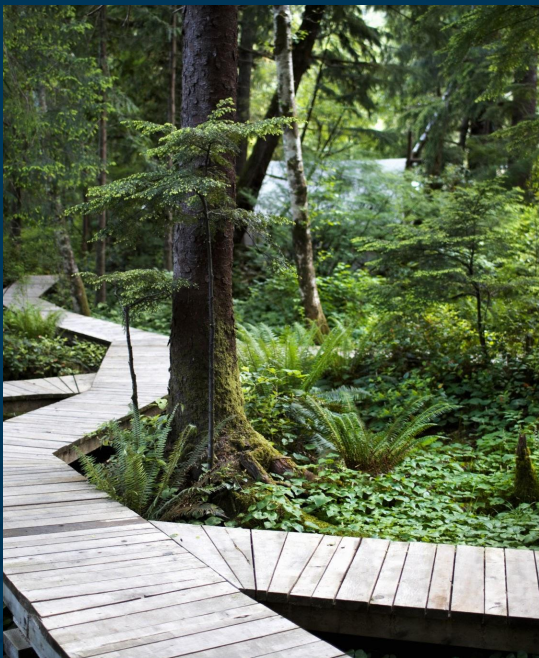
Equipment	Make	Model	Watts	Qty	Total
Modules (DC)	Thornova	TS-BGT54-G11	500	144	72,000
Inverters (AC)	Hoymiles	HMS-1600-4T	1440	36	51,840
Mounting	120 BIPV frames	24 Kinetic	rapid rail	roof tech anchors	3
Solar Amps (max AC)					216.0
Overbuild					1.39

Interconnection	service entrance	sub panel
Location	in each unit (4)	garage (4)
Manufacturer		
Model no		
bus bar rating	225	100
supply amps	200	50
Solar Breaker	2 x 30	20 4
max solar	81.25	75

Roof Type	CHE, asphalt
Slope	2:12, 6:12
Height	10, 30

Forecast (kwh)		2025
Jan	1,809	
Feb	3,060	
Mar	5,464	
Apr	7,001	
May	8,798	
Jun	9,097	6,047 6
Jul	9,966	9,087
Aug	8,026	9,099
Sep	5,500	
Oct	3,901	
Nov	2,080	
Dec	1,496	
Total	66,198	
kWh/kW	919	7





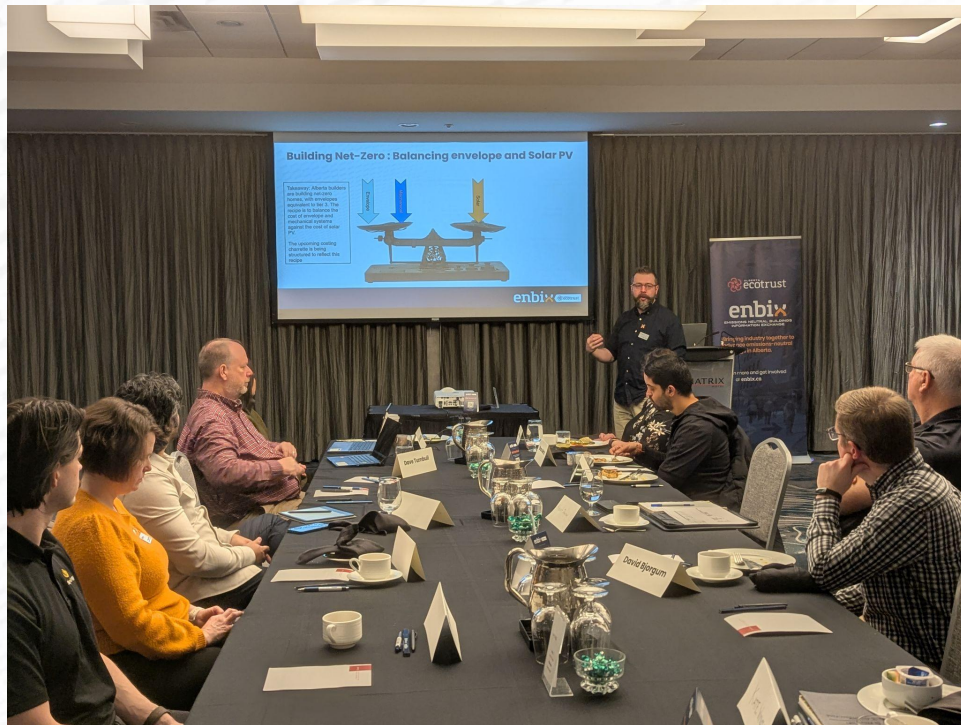
Pathways

LEEP Costing Charrette

Methodology

Archetype	Costing	Scenarios and costing packages
Single Family home located in Climate zone 7a Based on real two storey housing design 	Collect cost data on over 60 individual building materials/solutions	7 above grade walls 2 roofs 2 window 4 below grade walls 2 air tightness levels 7 mechanical packages 4 solar options Result - thousands of scenarios

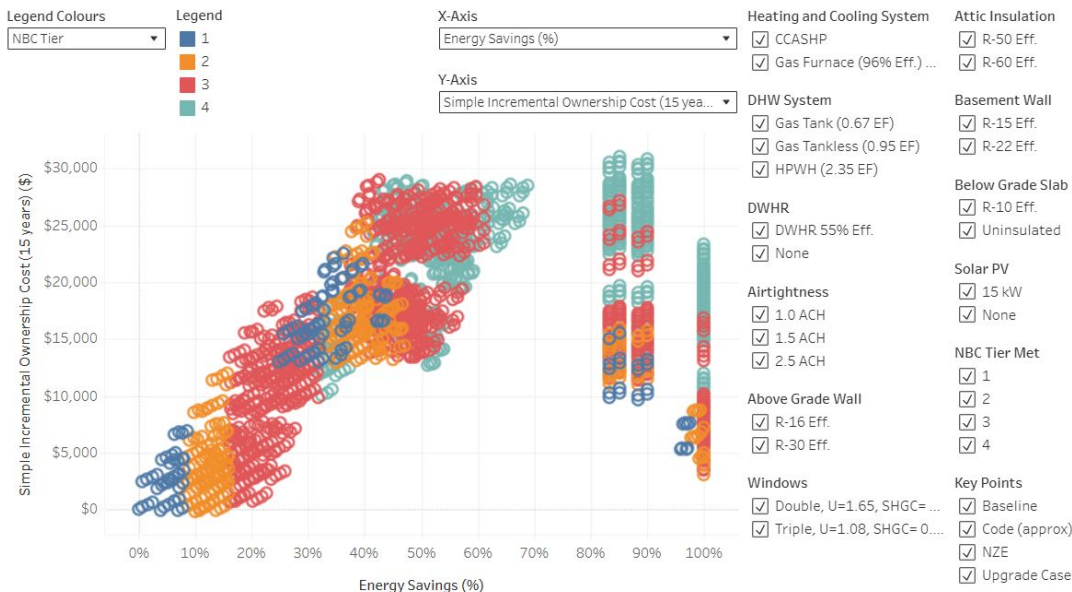
LEEP Costing Charrette



- Brought together a group of 7 builders from the Edmonton area
- Held a detailed discussions to establish reasonable cost ranges
- Part of an ongoing to develop accurate cost analysis across Canada

Output- point cloud

Calgary New Construction Dashboard by [LEEP Team](#)



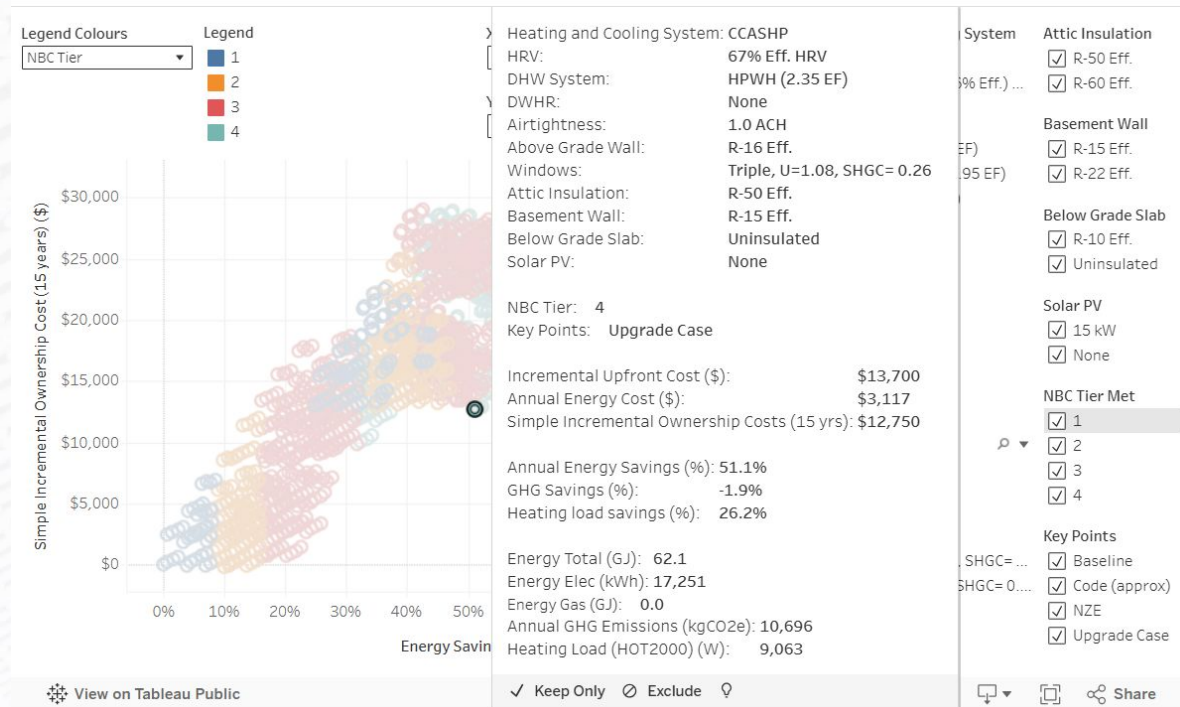
Takeaway: Every point represents a different scenario.

The vertical axis is the total cost of ownership over 15 years.

The horizontal axis is the energy savings as a percentage (NBC reference house)

Notice how much variability there is in the cost!

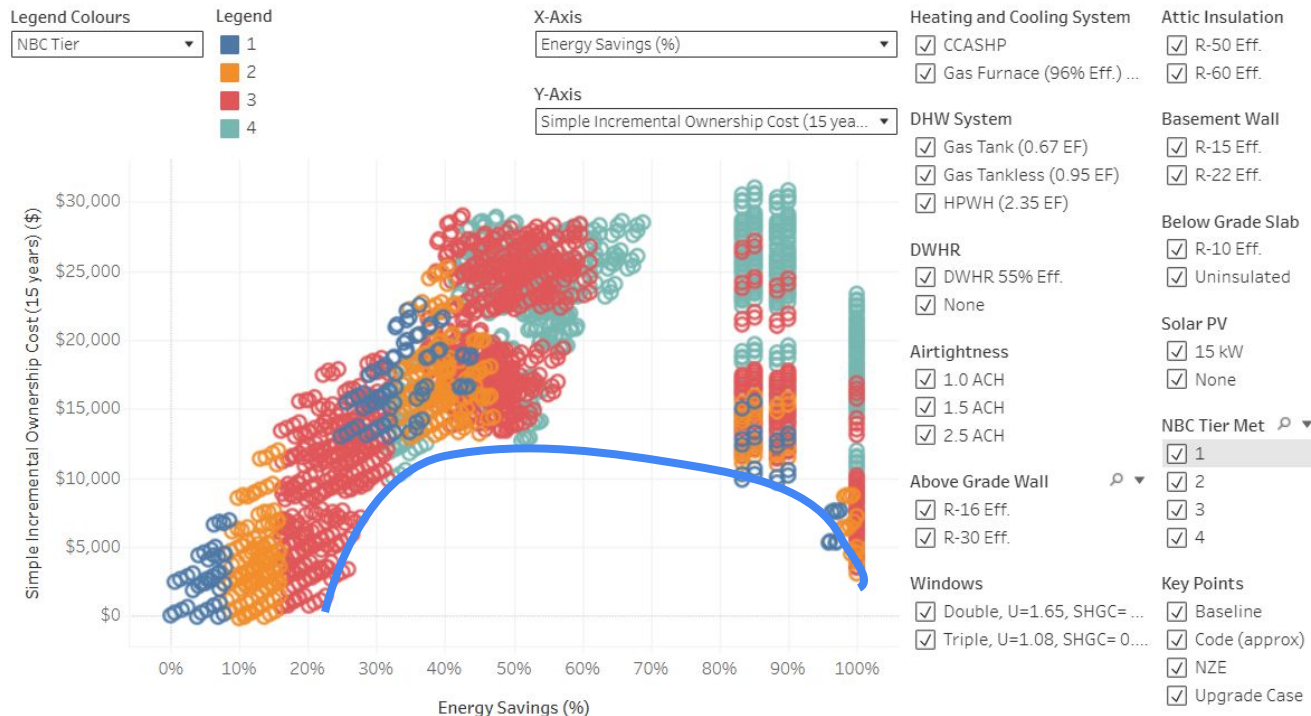
Lowest cost pathway features



Takeaway:

Every point shows a specific combination of upgrades.

Lowest cost pathway features



Takeaway:

The scenarios along the bottom of the line represent the lowest cost options.

E.g., cost range at 60% reduction from \$35K to \$145K!

Lowest cost pathway features

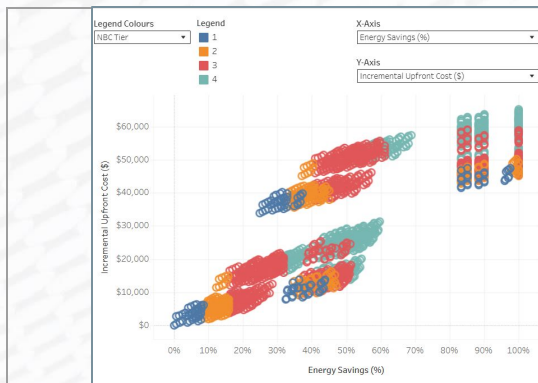


Takeaway:

Notice the range of costs.

E.g., for a 50% energy reduction the cost ranges from \$12,000 to \$30,000.

Comparing Cost Metrics



Up Front Incremental Cost

- Does not show the benefits of lowering operating costs



Annual Energy Cost

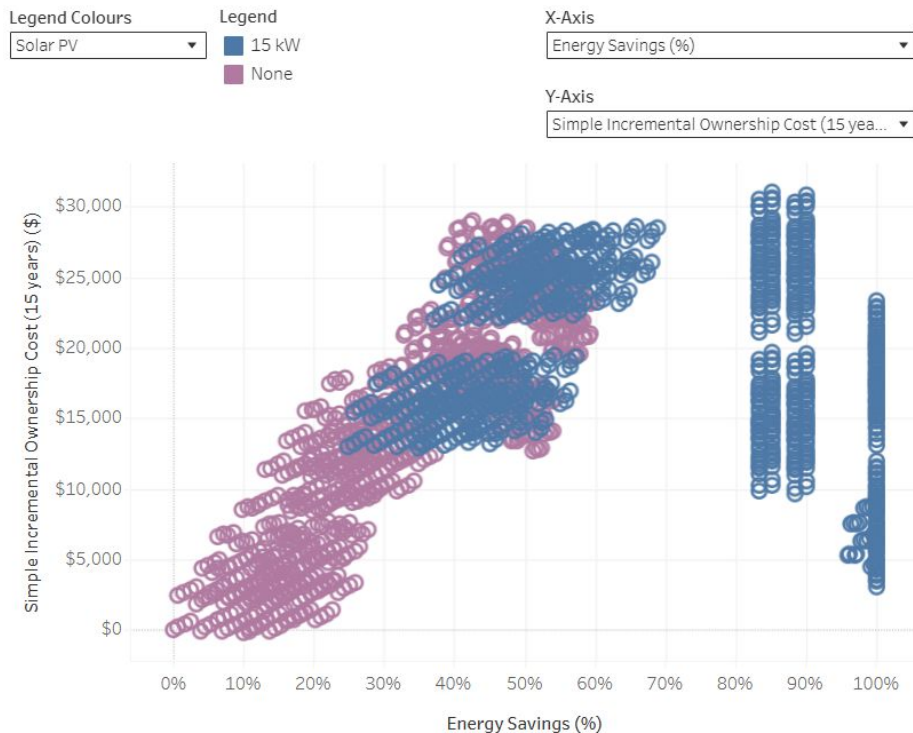
- Only show the annual savings



Simple Incremental Cost of Ownership (15 years)

- Does not consider borrowing costs
- Combines first two metrics

Impact of Solar



Takeaway:

Solar has a dramatic impact on the cost of ownership.

Lowest Incremental Costs

Heating and Cooling System: **CCASHP**

HRV: **67% Eff. HRV**
 DHW System: **HPWH (2.35 EF)**
 DWHR: **None**
 Airtightness: **1.5 ACH**
 Above Grade Wall: **R-16 Eff.**
 Windows: **Double, U=1.65, SHGC= 0.26**
 Attic Insulation: **R-50 Eff.**
 Basement Wall: **R-15 Eff.**
 Below Grade Slab: **Uninsulated**
 Solar PV: **15 kW**

NBC Tier: **2**
 Key Points: **NZE**

Incremental Upfront Cost (\$): **\$45,100**
 Annual Energy Cost (\$): **\$381**
 Simple Incremental Ownership Costs (15 yrs): **\$3,110**

Annual Energy Savings (%): **100.0%**
 GHG Savings (%): **100.0%**
 Heating load savings (%): **14.2%**

Energy Total (GJ): **0.00**
 Energy Elec (kWh): **0.0**
 Energy Gas (GJ): **0.0**
 Annual GHG Emissions (kgCO₂e): **0**
 Heating Load (HOT2000) (W): **10,540**

Heating and Cooling System: **CCASHP**

HRV: **67% Eff. HRV**
 DHW System: **HPWH (2.35 EF)**
 DWHR: **None**
 Airtightness: **1.5 ACH**
 Above Grade Wall: **R-16 Eff.**
 Windows: **Double, U=1.65, SHGC= 0.26**
 Attic Insulation: **R-60 Eff.**
 Basement Wall: **R-15 Eff.**
 Below Grade Slab: **Uninsulated**
 Solar PV: **15 kW**

NBC Tier: **3**
 Key Points: **NZE**

Incremental Upfront Cost (\$): **\$45,500**
 Annual Energy Cost (\$): **\$381**
 Simple Incremental Ownership Costs (15 yrs): **\$3,510**

Annual Energy Savings (%): **100.0%**
 GHG Savings (%): **100.0%**
 Heating load savings (%): **15.1%**

Energy Total (GJ): **0.00**
 Energy Elec (kWh): **0.00**
 Energy Gas (GJ): **0.0**
 Annual GHG Emissions (kgCO₂e): **0**
 Heating Load (HOT2000) (W): **10,426**

Heating and Cooling System: **CCASHP**

HRV: **67% Eff. HRV**
 DHW System: **HPWH (2.35 EF)**
 DWHR: **None**
 Airtightness: **1.0 ACH**
 Above Grade Wall: **R-16 Eff.**
 Windows: **Triple, U=1.08, SHGC= 0.26**
 Attic Insulation: **R-50 Eff.**
 Basement Wall: **R-15 Eff.**
 Below Grade Slab: **Uninsulated**
 Solar PV: **15 kW**

NBC Tier: **4**
 Key Points: **NZE**

Incremental Upfront Cost (\$): **\$47,600**
 Annual Energy Cost (\$): **\$381**
 Simple Incremental Ownership Costs (15 yrs): **\$5,610**

Annual Energy Savings (%): **100.0%**
 GHG Savings (%): **100.0%**
 Heating load savings (%): **26.2%**

Energy Total (GJ): **0.00**
 Energy Elec (kWh): **0**
 Energy Gas (GJ): **0.0**
 Annual GHG Emissions (kgCO₂e): **0**
 Heating Load (HOT2000) (W): **9,063**

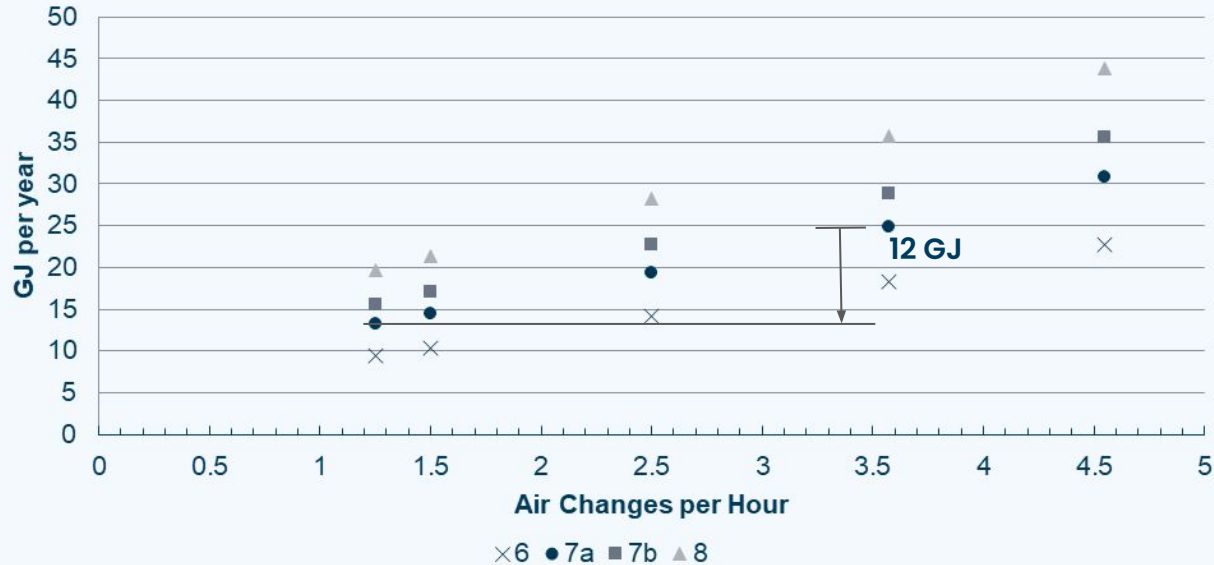
Common Cost Trade-offs

Thermal performance (insulation and air sealing)		Reduce heating equipment size
Passive cooling (shading, insulation)		Reduced cooling equipment size
Exterior insulation (outboard of framing)		Reduce framing from 2x6' to 2x4' + framing optimization, change the need for vapour barriers
Window optimization (location, SHGC, window-to-wall ratio, orientation)		Increased effective insulation with no additional material
Centrally ducted - simplified duct returns		Reduce HVAC run lengths, simplify layouts

Common Options

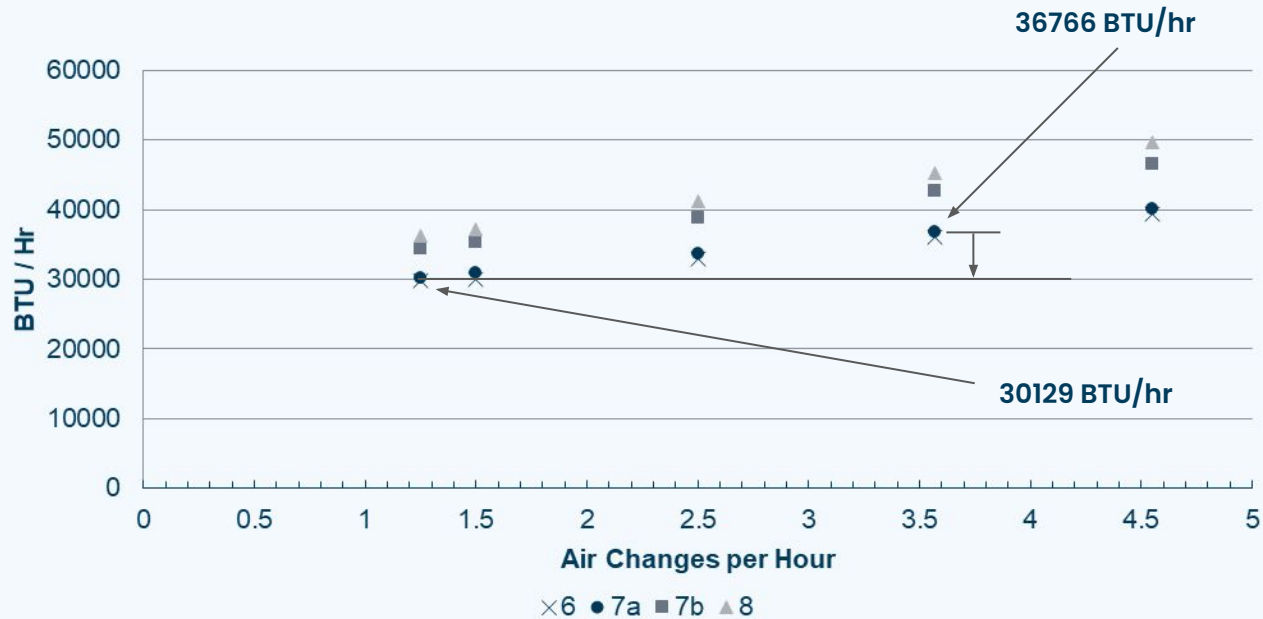
Attic Insulation	Raised roof heel + excellent air sealing + blown insulation	Add 20% material cost for additional insulation, no additional labor, some costs for high heel trusses
Above Grade walls (2x6 16" o/c => 2x6 24" o/c)	Framing optimization + air sealing	Reduce framing from 23% to 19%, increase insulation from R15 to R16 and lower framing cost
Rim joist	Insulation + air sealing	
Below grade walls (R12 => R19)	Optimized frame + cavity insulation + improve moisture management	
Below slab (no below grade => R7.5 sub slab)	EPS/XPS below slab	Combine with radon mitigation systems, substitute below slab gravel with EPS
Roof design optimized for solar	Orientation, venting location, conduit	No additional costs, reduce cost to instal solar
Air sealing!	No additional material costs	BEST Returns!
Solar	Affects the most expensive energy cost	

Heat Loss from Ventilation and Air Infiltration (GJ/y)



The warmer climate zones see the greatest percentage improvement (59% in CZ6 versus 55% in CZ 8), but the absolute improvement in GJ/Y is better in colder climate zones (24 GJ/y in CZ 8 v 13 GJ/Y in CZ 6)

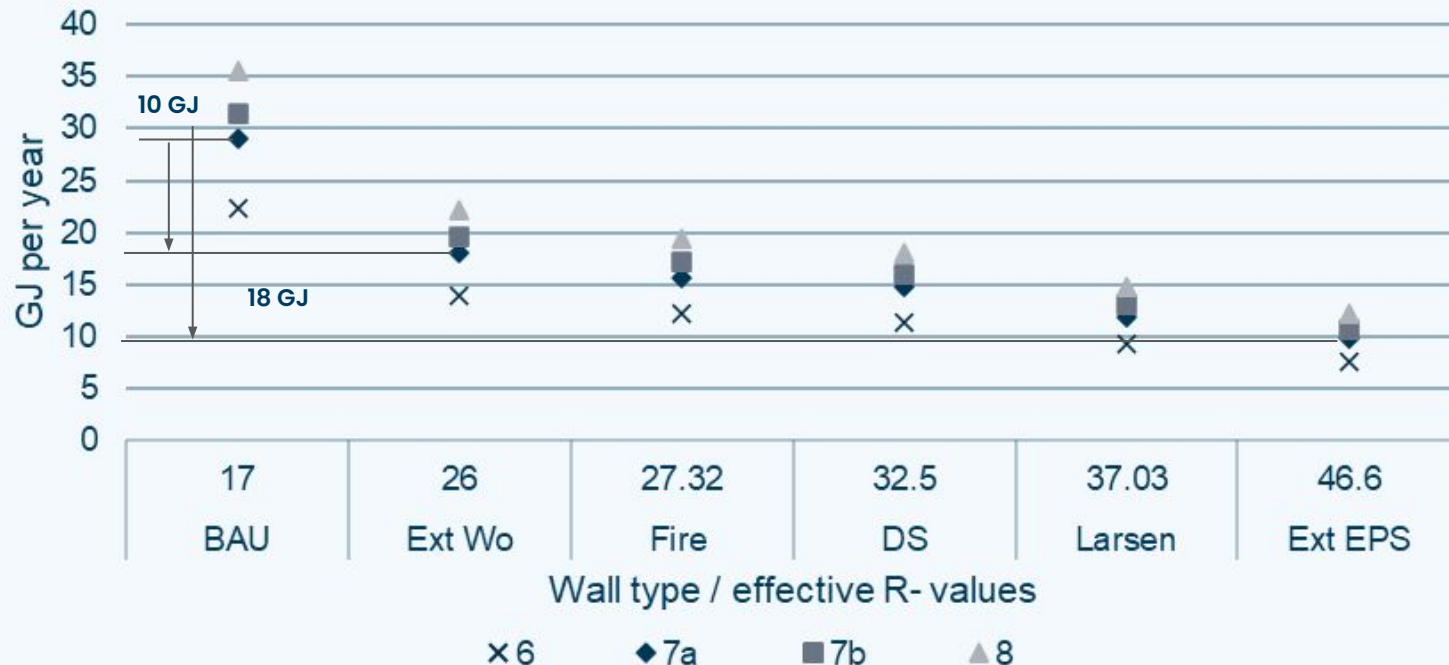
Design Heat Loss (BTU/hr)



6644 BTU/hr or 18% reduction

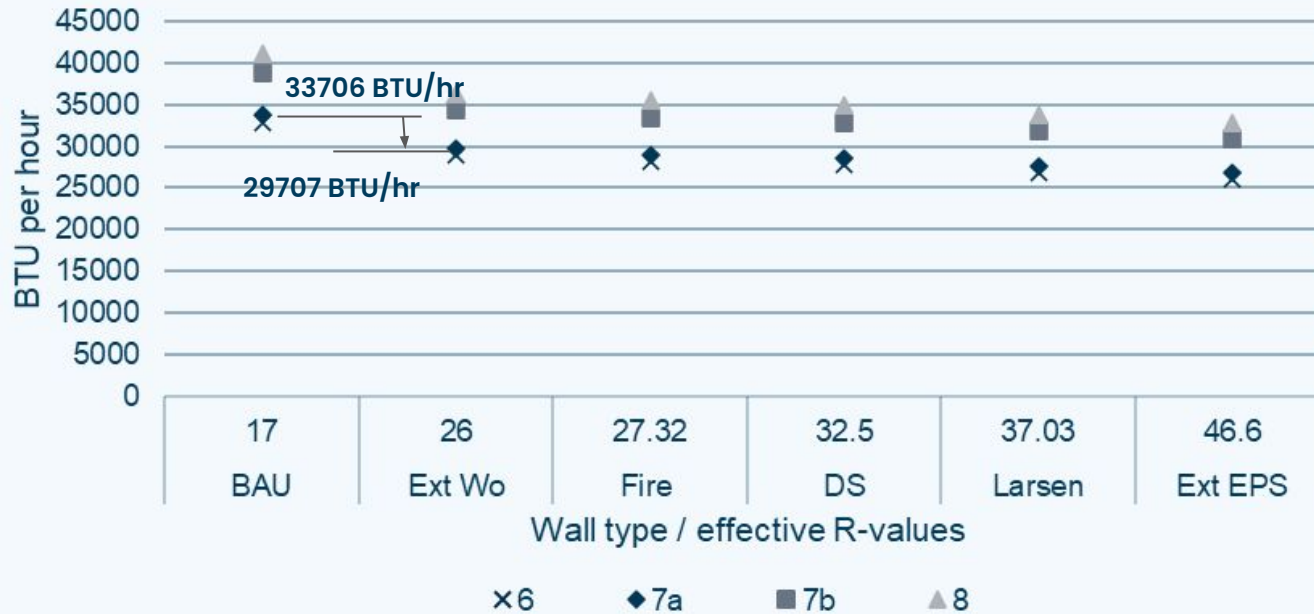
Improving ACH reduced design heat loss (i.e., heating sizing) 24% to 27%

Main Wall Heat Loss (GJ/y)



Main wall heat loss shows the impact of improving the insulation alone.

Design Heat Loss (BTU/hr)



3999 BTU/hr or 12%
reduction

Increasing the wall insulation results in a reduction of design heat loss , i.e., smaller HVAC systems. These walls were all modelled at 2.5 ACH50

Examples

Energy

Air Insulation
12 GJ + 10 GJ = 22 GJ reduction (~20% of total energy)

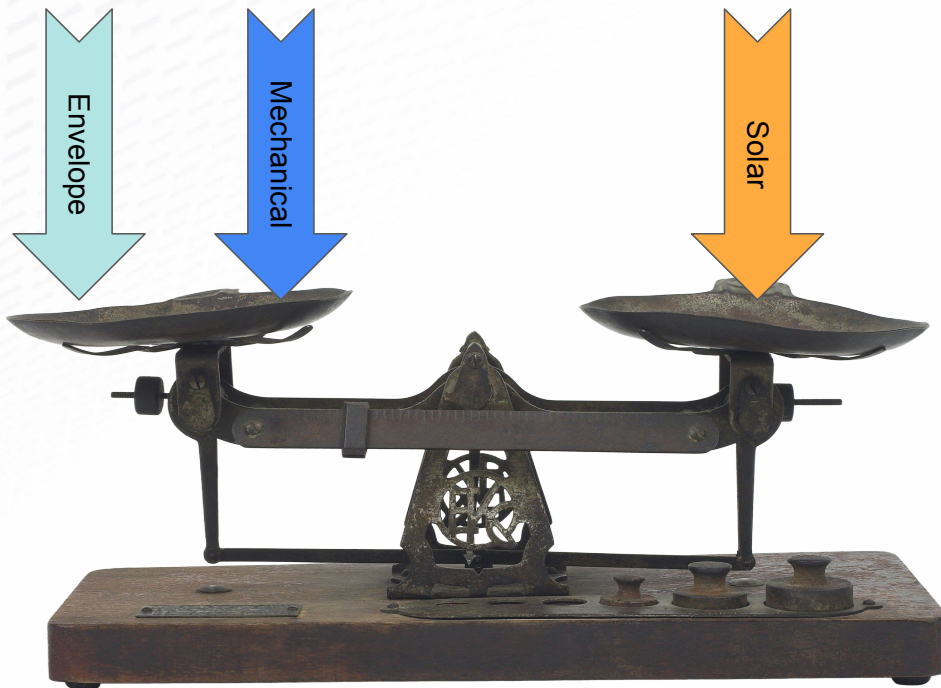
22 GJ = 6111 KWh
Equivalent of 8-9
500W solar panels

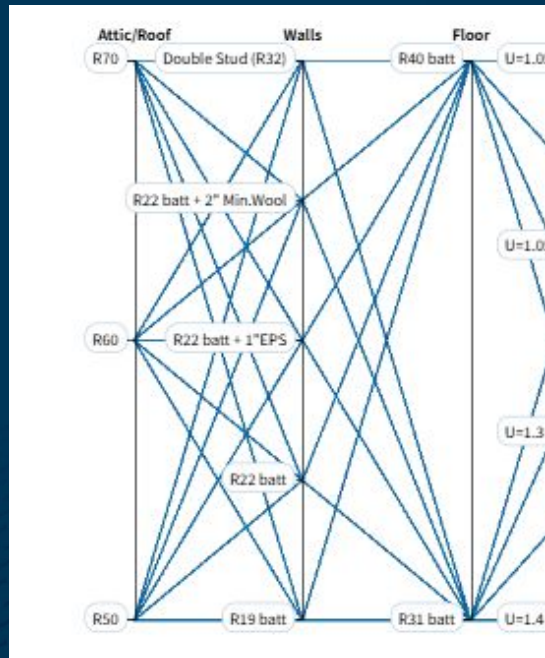
Heat Loss (power)

Air Insulation
6644 BTU/hr + 3999 BTU/hr = 10 643 BTU/hr (~30% reduction)

Building Net-Zero : Balancing envelope and Solar PV

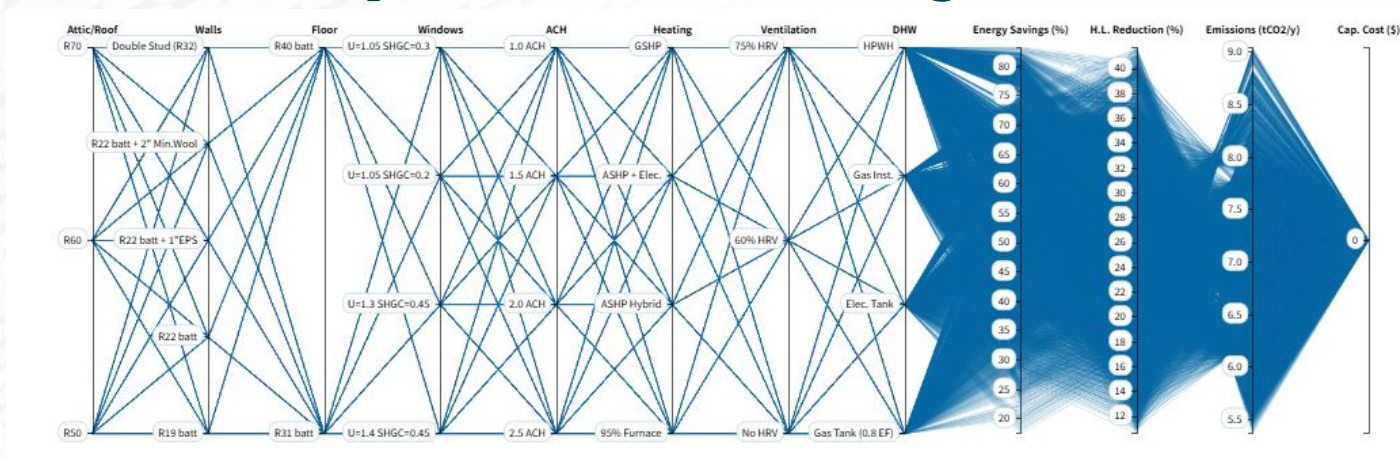
Takeaway: Alberta builders are building net-zero homes, with envelopes equivalent to tier 3. The recipe is to balance the cost of envelope and mechanical systems against the cost of solar PV.





Building Explorer Tool

Builder Explorer Modelling Tool



The Builder Explorer Modelling Tool aims to address : compliance complexity and housing affordability

1. De-risking compliance & achieve higher tiers
2. Custom cost analysis for Alberta Market
3. Design collaboration

Builder Explorer Modeling Tool

Builder Explorer Modelling Tool

This energy modelling tool was created for designers and builders who are looking for high-level results on how their designs can be made more energy efficient. Volta Research and ENBIX worked together to create it to help the building industry improve energy efficiency and reduce carbon emissions from buildings across Alberta.

Get started by defining the high-level characteristics of your home. Click next to mix and match different envelope and mechanical system options to explore low-cost pathways to building beyond code.

House type

Specify the type of home and whether or not it has an attached garage. Square footages are approximate, and actual values will depend on whether or not the home has a basement.

Single detached

A single detached home, approximately 2000 ft². The home may or may not have a detached garage, which does not contribute to its energy performance.

Single detached + attached garage

A single detached home, approximately 2000 ft². The home has an attached garage with adjacent walls and a floor above.

Duplex/Row

An attached home (end unit), approximately 1600 ft². The home may or may not have a detached garage, which does not contribute to its energy performance.

Duplex/Row + attached garage

An attached home (end unit), approximately 1600 ft². The home has an attached garage with adjacent walls and a floor above.

Four different house archetypes

Basement

Specify the foundation type of the home.

Yes

The home has a below grade level with a ceiling height of at least 6 ft.

No

The home has a slab-on-grade foundation.

With or without basement

Climate zone

Specify the climate zone, which will impact both the climate conditions and the minimum code requirements for the region.

6

4000 to 4999 HDD (Lethbridge, Medicine Hat)

7a

5000 to 5999 HDD (Calgary, Edmonton, Grande Prairie)

7b

6000 to 6999 HDD (Fort McMurray, Fort Vermilion)

8

Over 7000 HDD (Fort Chipewyan, Ft. Resolution)

Select a climate zone, all AB are reflected

Window-to-wall ratio: Front face

Specify whether the front face of the home has a higher window to wall ratio than average.

Average

An average window to wall ratio (approximately 15%).

High

Increases the glazing area on the front face of the home by 30%.

Two options for window to wall ratio at the front and rear of the house

Window-to-wall ratio: Rear face

Specify whether the rear face of the home has a higher window to wall ratio than average.

Average

An average window to wall ratio (approximately 15%).

High

Increases the glazing area on the rear face of the home by 30%.

Results Page

Results Page

Investigate the estimated energy savings, heat loss reduction, and emissions associated with different combinations of measures. Click edit costs to enter capital costs and find the lowest cost pathways to your goals.

House type:
Single detached

Basement:
Yes

Climate zone:
7a

Window-to-wall ratio (Front face):
High

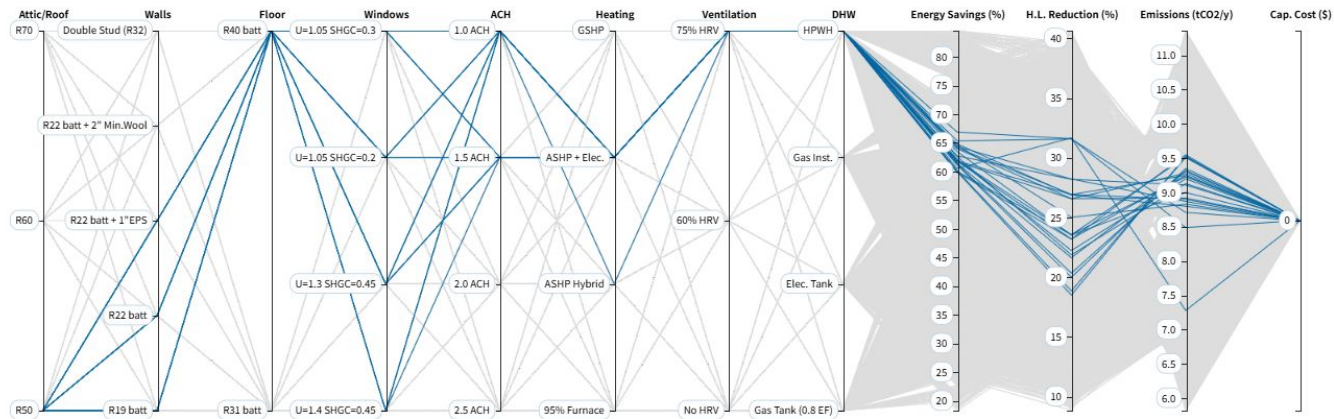
Window-to-wall ratio (Rear face):
High

Export CSV

Save and connect

Edit costs

Clear all selections



Takeaway: Here is an example where the results are narrowed down by the selection of a combination of goals and input selections

What about costs?

Results Page

Investigate the estimated energy savings, heat loss reduction, and emissions associated with different combinations of measures. Click edit costs to enter capital costs and find the lowest cost pathways to your goals.

House type:
Single detached

Basement:
Yes

Climate zone:
7a

Window-to-wall ratio (Front face):
High

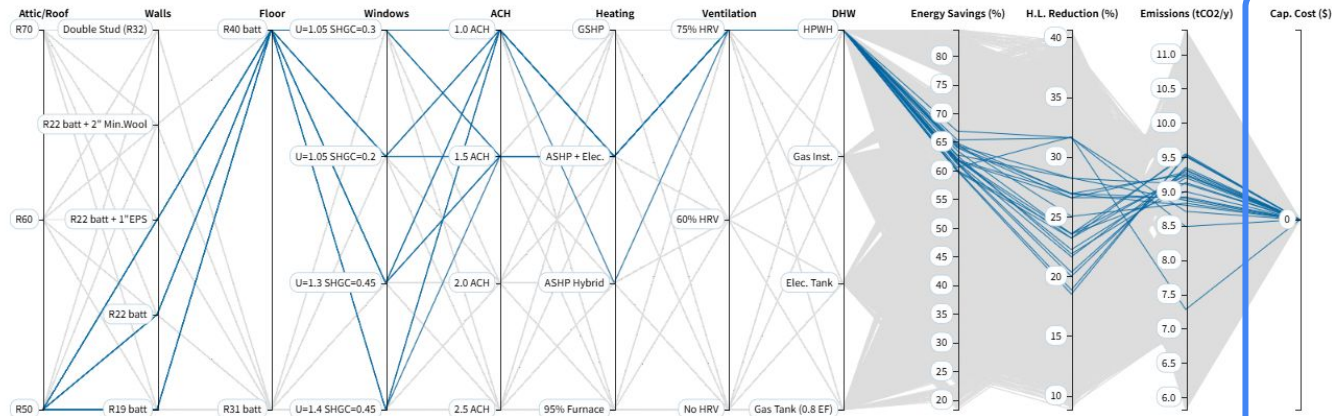
Window-to-wall ratio (Rear face):
High

Export CSV

Save and connect

Edit costs

Clear all selections



Edit Costs Capital Costs

Wall (\$/ft)

R19 batt	\$ Enter cost
R22 batt	\$ Enter cost
R22 batt + 1"EPS	\$ Enter cost
R22 batt + 2" Min.Wool	\$ Enter cost
Double Stud (R32)	\$ Enter cost

Roof (\$/ft²)

R50	\$ Enter cost
R60	\$ Enter cost
R70	\$ Enter cost

Window

U=1.4 SHGC=0.45	\$ Enter cost
U=1.3 SHGC=0.45	\$ Enter cost
U=1.05 SHGC=0.2	\$ Enter cost
U=1.05 SHGC=0.3	\$ Enter cost

Cancel

Apply

Other Tools

Save and connect

Save your data to review it later, or send it to an energy advisor (EA) via Volta SNAP.

User email address

EA email address (optional)

Enter email

Enter Email

Save with a favourite upgrade package (optional)

☐ Selected upgrade package

Wall

Roof

Windows

Floor

ACH

Heating

Ventilation

DHW

☐ Selected upgrade package

Wall

Roof

Windows

Floor

ACH

Heating

Ventilation

DHW

Select

▼

Select

▼

Select

▼

Select

▼

Select

▼

Select

▼

Select

▼

Select

▼

Share anonymized costing data (optional)

☐ Opt in

Choose whether you would like to share your anonymized costing data. This data will be used for research purposes only, and is not connected to any personally identifiable information.

Rate the costing data:

1

2

3

4

5

High-level estimate

Detailed quote

Cancel

Send

The explorer tool allows for export of models, selecting specific options, sharing with builder and builder Energy Advisor.

It also has an option to rank and share data with ENBIX.

Other Tools

Tools/Resources	People
Objective	Energy Advisors
VoltaSnap	HVAC Designers
Hot2000	Building Desingers / Estimators
Open Studio/Energy Plus	Suppliers
RetScreen	Solar Designer/Installer

Strategies to address costs

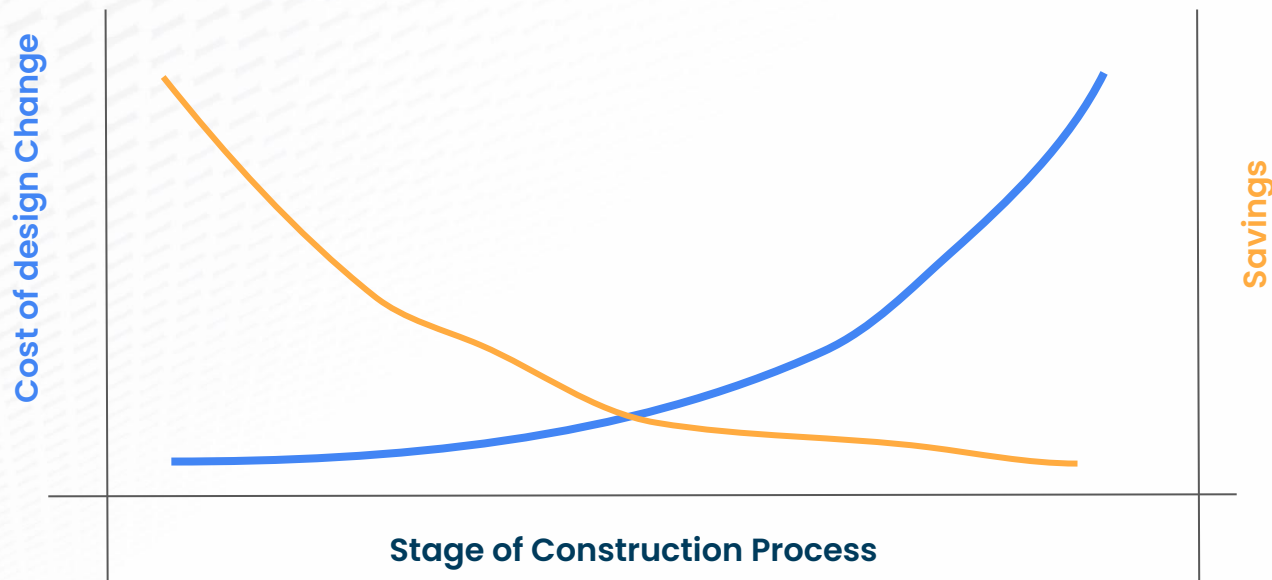
<u>Strategy</u>	<u>Why it matters</u>
Standardization of design components	Building customization around blocks allows for greater repeatability
Trades relations	Building a relationship to engage partners
Training trades	Material costs will be easy to manage and predict. Labour costs are more difficult with trades pricing uncertainty in to jobs.
Measure Performance	Air tightness testing offers a tool to measure trades performance and provide feedback



IDP

Integrated Design Process

Make change early



Takeaway: The earlier energy is considered the more cost effective the choices will be. Energy savings measures can not be 'bolt' options after the fact.

IDP Team

Core Management & Facilitation	Design and Engineering Experts	Specialized Sustainability Consultants	Implementation and Operations
IDP Facilitator	Architect	Sustainability Specialist	General contractor
Owner	Energy Consultant	Commissioning agent	Facility managers
Green Building steward	MEP Engineer	Bio-climatic Engineer	AHJ
	Structural Engineer		

Takeaway: Teams will look different, and have varying groups present – but they need to be comprehensive. With expertise from all areas brought together.

Early Stakeholder & Community Engagement

About Green Line

Project Status

Phase 1 of the Green Line LRT, from Shepard in the southeast to the Downtown has been approved with \$6.248 billion in funding commitments from the City of Calgary, Province of Alberta, and Government of Canada.

The City of Calgary is responsible for delivering the project, with construction of the SE Segment now underway. Contracts are already being awarded to local construction companies, and more than \$3 billion in additional tenders will be released to the market in 2025 and 2026.

Read on to learn more about:

- [Phase 1](#)
- [SE Segment](#)
- [Downtown Segment](#)



Example: Green Line LRT Transit-Oriented Development (TOD) – Calgary, AB

A prominent example in Alberta is the use of multi-day design charrettes for the Green Line LRT stations, such as the 64 Ave North and Crescent Heights workshops. Local residents, business owners, and community associations joined a technical team of architects, City staff, and sustainability consultants. During the early stages, community members were asked to identify what they valued about their neighborhood and what challenges they faced. This ensured the green development addressed specific local issues, such as pedestrian safety or lack of green space, rather than just generic sustainability metrics. "Design stations" were set up where technical experts drew community members' ideas for the station area in real-time. This allowed for immediate feedback on the feasibility of features like integrated stormwater management or multimodal transit links. This early input informed the Owner's Project Requirements (OPR), ensuring that the resulting concept plan for the "community of communities" reflected both high-performance environmental standards and local social equity.

Takeaway : IDP is used in projects of all sizes.

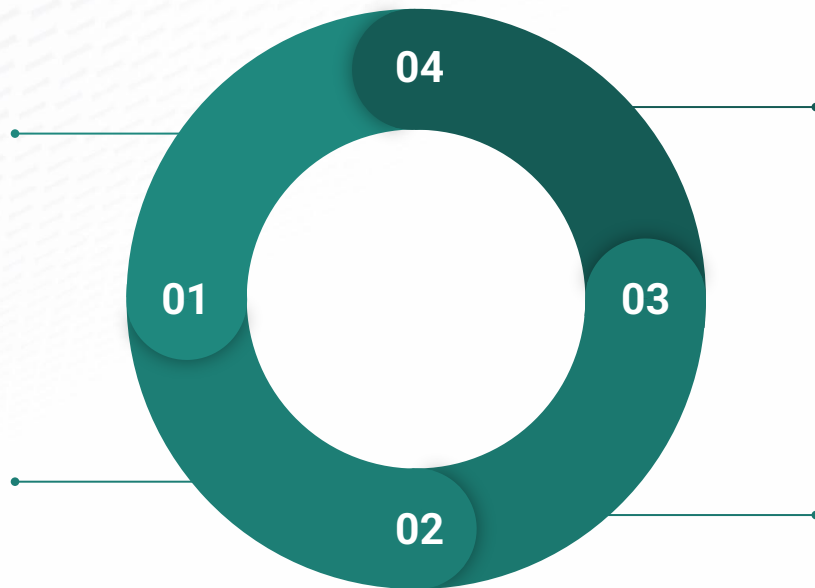
IDP solar example

Pre-Design & Goal Setting

A specific goal is set, e.g., getting to net-zero. The design team would include an Energy Advisor and Solar Designer

Implementation and Commissioning

Early collaboration with electrical system operator and the AHJ ensure net-metering from day one. System performance is monitored.



The Integrated Design Workshop (Charrette)

The team uses iterative modeling to find savings, e.g., removing a decorative dormer on south facing roofs.

Systems Integration

The team would look how the initial design integrates with the building proposal.

IDP resources and training



CACEA

Canadian Association of
Consulting Energy Advisors

- Offers IDP training programs
- Maintains a directory of qualified IDP facilitators



Consumer

Marketing Net-Zero

Financial motivation

What financially motivates customers?

- Return on investment
- ROI
- Cash flow (carrying cost)
- Net-present value
- Total Cost of ownership



Takeaway: The feedback from builders marketing net-zero and high performance homes is that carrying cost is the most important factor. I.e., cash-flow neutral or cash-flow positive.

Create Value

Add square footage		Use attic space - closed insulation roofs Basements
Resilience		Building assemblies that weather severe weather, minimize maintenance costs, air tight
Create a refugee		Create homes and buildings that are safe place, passive survivability, air tight,
Indoor Air Quality + Health		Mechanical ventilation with filtering + air tightness + material selection
Comfort		Thermal comfort (increase useful space)

'Valuing Deep Energy Retrofits' <https://www.enbix.ca/document/valuing-deep-retrofits-report/>

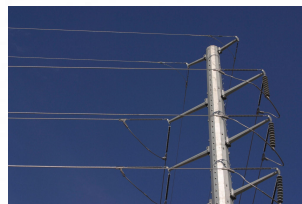
'Preparing Alberta Buildings for Severe Weather' <https://www.enbix.ca/document/preparing-albertas-buildings-severe-weather/>

Value proposition of high performance

**Greenhouse Gases
Energy Efficiency**



Energy Security



Durability



Health



**Passive Survivability
Climate Resilience**



Comfort



Air Infiltration is a Big Deal



This is air leakage



This is air leakage



This is air leakage

Air tightness requirements were put in the building code in the 1990's to avoid interstitial condensation

Testing is underrated

- Energy
- Quality
- Durability
- Resilience



Health & Wellness

Indoor Air Quality

- Radon
- VOC's
- Fresh air
- Smoke & particulate

Takeaway: Health and wellness are deeply personal issues. Upgrades like airtightness, and balanced ventilation improve efficiency and improve air quality.

It has never been easier to monitor indoor air quality.



Greenhouse Gases

Environmental goals

- Aspirational
- Contributing to a solution



Energy Security

- Investment in renewables and efficiency leads to price stability

Takeaway: some consumers will be motivated by security of energy pricing.



Comfort

The most marketable feature?

Also part of health and wellness



Climate Resilience

Sanctuary spaces

Protection from:

- Smoke
- Extreme heat/cold
- Hail
- Wildfire

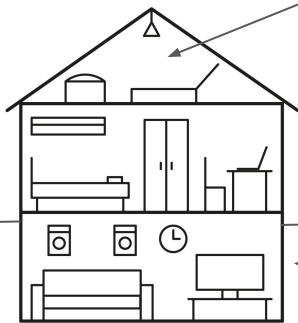
Takeaway: personal security is a powerful motivator. These are climate adaptation strategies. Do not be afraid to talk about changing climate and how a home is future proofed.



Adding Value => adding volume?

Attics: Livable attic spaces

Cold/Overheated spaces



Basements are cold, dark, and damp...we need to make them warm, bright, and dry**

How?

- Warm : below slab insulation, exterior rigid insulation, interior insulation, air tight
- Dry: better location of vapor barriers, capillary breaks, HRV's
- Bright: lighting and windows.

**credit Dave Turnbull - Enerspec Energy Consulting

Opportunities in marketing

Keep the messaging simple	Identify aspirational goals e.g., 'Improve quality life'
Topics like health, wellness, and security are deeply personal	Evidence based
Provide a range of buildings to meet a range of buyers	Cash flow vs. up front costs

Takeaway: There is a range of values created by high performance housing. Ideally, all of these benefits are being paid for by the energy savings. I.e., we want these benefits for FREE

Challenges in marketing

Consumer knowledge

- Do not really understand what they are buying
 - e.g., car buyers know the difference between a Ford and a Ferrari, but every house is a Ferrari
 - Homes are built to code, i.e., homes are built to the MINIMUM standard

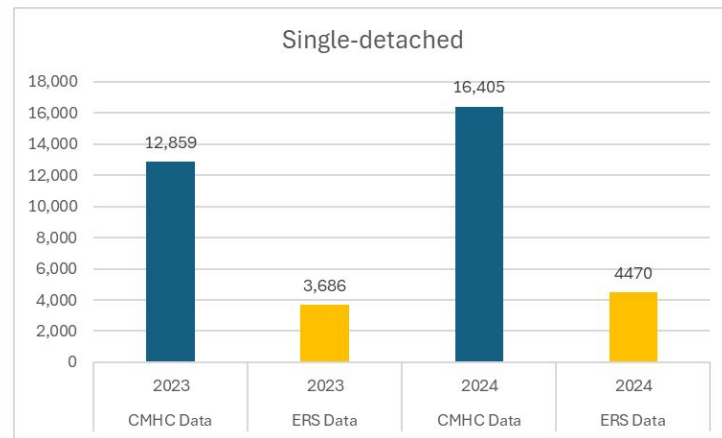
Trust

- How do you offer all these features without sounding like sales jargon?

Takeaways: Consumer education, trusted 3rd parties, measurement, and do not inflate claims

Third party Certifications

Residential	Commercial
Energuide	LEED
Built Green Canada	Energy Star
CHBA Net-Zero	
Energy Star / R-2000	
LEED-Homes	
Living Building Challenge	
Passive House	



ERS rated new homes 2023 and 2024

This chart compares CMHC new housing starts with ERS open data for new homes in Alberta. ~ 25% of builds used a voluntary rating system.

Takeaway: many Alberta homes have voluntary labeling.

Consumer Behavior

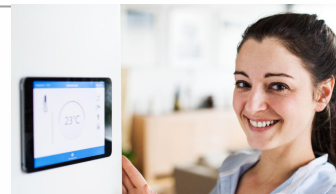
- Why do we install granite countertops?
- Why do buy luxury cars?



- Consumers perceived value
- Social influences

- Most energy efficiency upgrades are invisible

- Solar
- IAQ monitor
- Energy Monitor
- Make it seen



- Why make it optional?



- Create standard product offerings that include high performance and renewables.

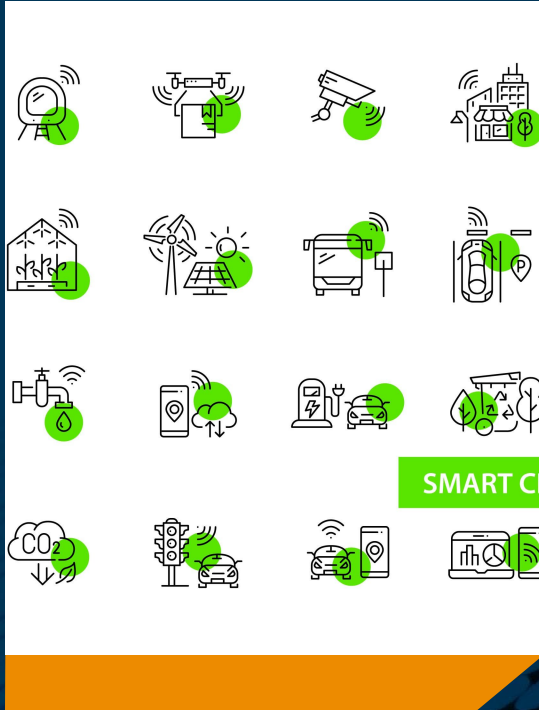
- High performance should not be reserved for luxury homes.

- Provide a range of product to match a range of consumers

Other benefits and opportunities

Other business benefits to builder

- Fewer warranty calls
 - Dry-wall pops
 - Fan noise
 - Moisture problems
- Higher rates of customer referral rates for net-zero product
 - Nothing like living in a truly incredible space



Sustainability

Make it part of your business

What is Sustainability (management)

Sustainability

Meeting present needs without compromising future generations ability to meet their needs.

Sustainability Management

Structure approach to balance environmental social and economic goals.

It integrates environmental stewardship, social responsibility, and economic viability into decision making.

Flavors

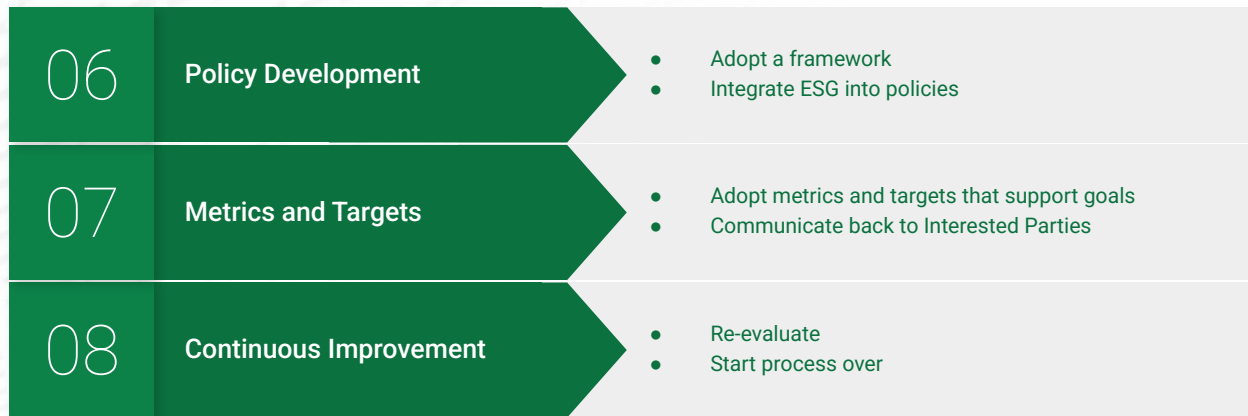
ESG: Environment, Social, Governance

Triple Bottom Line : People, Planet, Profit

Sustainability Adoption Roadmap



Sustainability Adoption Roadmap (cont)



Standards and Guides

Third Party Certification

- B-Corp Certification

Guidance on Reporting

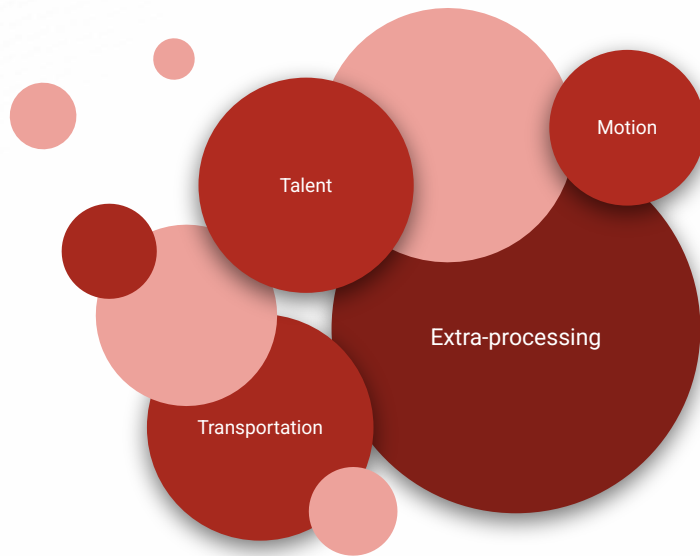
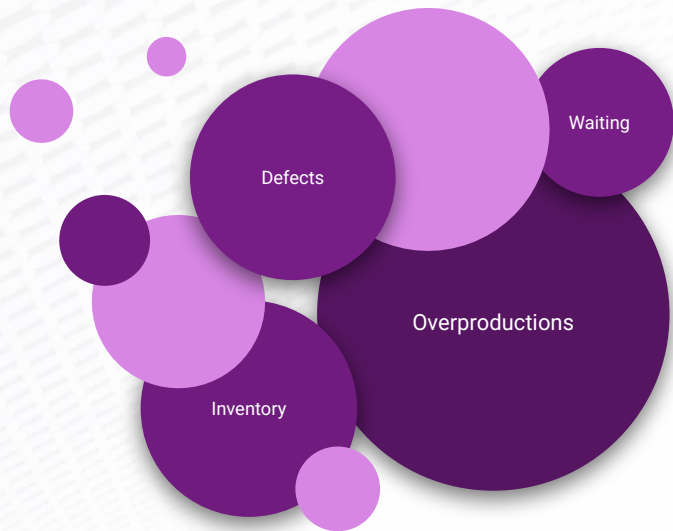
- Global Reporting Initiative (GRI)

Targets

- United Nations Sustainable Development Goals
- Science Based Targets Initiative (SBTI)

Sustainability makes cents

8 categories of waste from 'Lean Manufacturing'



Takeaway: Addressing waste make better businesses and reduces environmental impact



Supports

CMHC financing programs

CMHC Funding Programs

<https://www.cmhc-schl.gc.ca/professionals/project-funding-and-mortgage-financing/funding-programs>

CMHC Eco Plus

CMHC Eco Improvement

MLI Select

- Complete listing of all CMHC's current programs
- Borrowers who buy 'newly built climate-friendly housing using CMHC-insured financing can apply for a 25% partial premium refund.
- Eco Improvement offers a 25% partial premium refund to borrowers who buy existing homes and make energy efficient improvements.
- An innovative new multi-unit mortgage loan insurance product focused on affordability, accessibility, and climate compatibility.

Takeaway: the Eco Plus and Improvement are for home buyers and reduce Mortgage insurance costs. MLI Select is for developers.

Other Supports

City of Calgary Green Priority Stream	• Providing a full-service, streamlined process for Development and Building permit approvals
Clean Technology Investment Tax credit	• Rapid depreciation tax credit for renewable energy and other investments

Mortgage example

Enter values

Loan amount	\$40,000.00
Annual interest rate	4.50%
Loan period in years	25
Number of payments per year	1
Start date of loan	2026-01-13
Optional extra payments	\$0.00

Loan summary

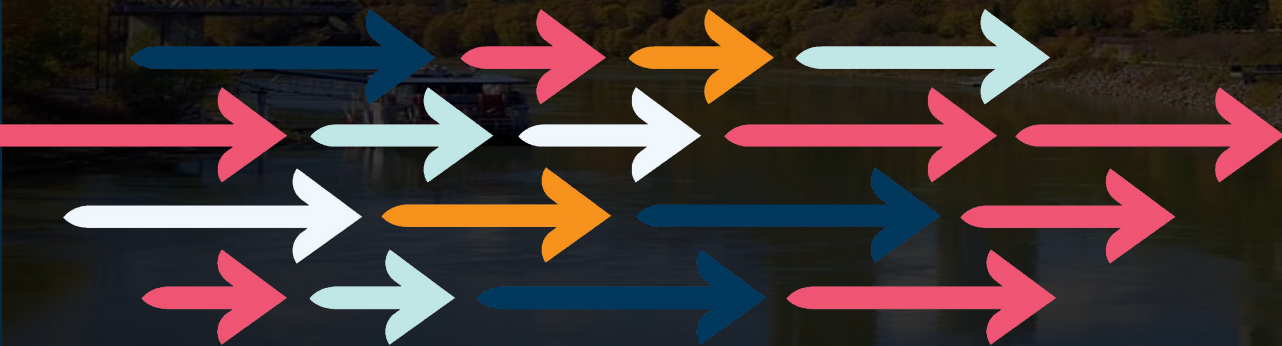
Scheduled payment	\$2,697.56
Scheduled number of payments	25
Actual number of payments	
Total early payments	\$0.00
Total interest	\$27,439.03
Lender name	example

Take away : if the upgrade is being finance we need to consider the borrowing cost.

If you want to learn more check out 'Financing Solutions for High-Efficient New Homes' on the ENBIX resources

Call to Action

- Be an active participant
- Pick easy wins (Air Sealing!)
- Pick an upgrade and try it
- Engage your trades
- Offer solar on new builds



Get Involved



- Visit us at enbix.ca
- Subscribe to our newsletter: enbix.ca/subscribe
- Follow us on social media (LinkedIn, YouTube)
- or reach out to us at info@enbix.ca

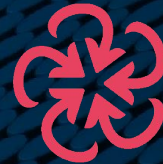
enbix



ALBERTA

ecotrust

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ALBERTA

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