

Accelerating Residential Decarbonization in Washington State

Executive Summary

The Climate Solutions Summit was created with a three-part vision: showcase the strength of the sustainability industry, highlight the ingenuity of student teams, and build a space for students to connect with climate-focused organizations. This case will challenge your team to develop an idea that increases the adoption of clean energy technology in Washington state. We designed the case to be full of the information needed to develop a wide range of potential ideas. This executive summary highlights the main deliverables, and the table of contents can be used to focus in on the details that are the most relevant to your team.

As you dive into the case, it will be helpful for you to have a primer on what causes Climate Change and why the issue is so urgent and multifaceted. These two videos are engaging and provide a solid foundation:

- [Can You Fix Climate Change?](#)
- [We Will Fix Climate Change!](#)

There is zero expectation that you use all the information presented in this case. Determine what part of the residential decarbonization market your team plans on tackling, define a clear scope, locate relevant material in the case, and conduct additional research.

There are two pieces of legislation that are referenced throughout the case: the federal Inflation Reduction Act (IRA) and the state Climate Commitment Act (CCA). Understanding these laws and implementing them in your solution is crucial. Washington just launched the CCA, it's a seminal piece of legislation that caps state carbon emissions and creates a new bucket of clean energy capital funded by the largest polluters. This money must be channeled into local climate initiatives.

The audience for your proposal is a panel of state legislators who want to deploy \$30 million dollars to support disruptive ideas that align with the following prompt -

Design scalable funnels and pipelines that increase the throughput of single-family (SF) and multi-family (MF) residential decarbonization projects in WA State. Your idea can leverage a new or existing organization, but focus on existing buildings and operational emissions.

Funnels are communication and engagement strategies that encourage owners to initiate projects and start the decarbonization process.

Pipelines are marketplace resources – software platforms, programs, educational tools, etc. – that property owners and stakeholder groups interact with to reduce transaction costs incurred throughout the decarbonization process.

There are five core elements of residential decarbonization:

1. Improving Energy Efficiency
2. Electrification
3. EV Chargers and Adoptions
4. Smart Energy Technology
5. Onsite Renewable Energy Generation

Your final solution should motivate communities in Washington to voluntarily implement some or all of these decarbonization steps while overcoming the barriers of costs and complexity. Good luck!

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Background

Last year on August 16th, President Biden signed into law the Inflation Reduction Act (IRA) – a landmark piece of climate legislation that will have a profoundly positive impact on the US economy, the global economy, and the stability of our shared environment.

Because of no realistic pathway to 60 senate votes, the minimum tally for circumventing filibusters, the IRA was proposed as a budget reconciliation bill. These bills can be converted to statute with a simple majority – 51 votes, which is all the IRA mustered. But the tradeoff for a lower political hurdle is a tighter scope. As the name suggests, budget reconciliations are limited to budget adjustments, or changes in spending and revenue.

It is crucial to grasp the fundamentals of this legislation, the most consequential driving force toward a future society that has liberated itself from emissions. Our federal government is crafting clean energy industrial policy with all carrots and no sticks. National regulations and punitive taxes will not be imposed on carbon industries. Instead, the US is pulling clean energy technology into the present with incentives (waived taxes) and subsidies (direct spending).

Over the next ten years, experts estimate the IRA will raise \$740B thanks to a new 15% minimum corporate tax rate and prescription drug pricing reform. In theory, the ledger should be balanced by comparable outflows supporting climate change, healthcare, and deficit reduction.

It's been hard to avoid IRA headlines that reference \$369B in clean energy stimulus. However, this is a best guess, and it is comprised of two parts - direct subsidies and incentives. The former is a known quantity. Over the next decade, \$136B will flow from the US Treasury to federal departments and state energy offices, where it then enters communities. But economic impacts attributable to tax incentives, the second part, cannot be determined until after the fact, ten plus years from now. **Incentives are boundless.** They represent tax collections the federal government has agreed to forego. If we embrace change with greater conviction and exceed expectations for clean energy technology deployment, then documented incentives will land well north of the originally inferred \$233B.

To help envision how the IRA will catalyze the transformation of our economy, let's quickly paint two broad strokes:

- 1) Domestic manufacturing of clean energy technology is being stimulated to increase production capacity while lowering the wholesale price of hardware.
- 2) The federal government has promised to offset a portion of investment costs once individuals and organizations purchase newly manufactured technology that either generates, stores, or consumes renewable energy.

Incentives and subsidies target the “green premium” of clean energy technology. Picture a soccer pitch. On one side of the field is a team with brown jerseys. These are the incumbents. They are faster, taller, and stronger than the team wearing green jerseys. Absent interventions, the incumbents will win. Thankfully, the federal government has chosen to put a thumb on the scale, not by hobbling the establishment, but by making new entrants more competitive and mitigating the premium associated with their team color. Now when individuals and organizations look to invest in energy equipment, the lifetime cost of clean alternatives should ideally be equal to or less than carbon-based options.

The goal of any economic stimulus is to temporarily amplify the rate at which industries and technology travel along learning curves. As more units are manufactured and sold, as economies of scale take hold, the hard cost of equipment production and the soft cost of business practices will continue to descend. Once IRA incentives and subsidies phase out in the early 2030’s, green jerseys will be running circles around brown jerseys without the need for interventions. Game. Set. Match.

However, this outcome only occurs if clean energy technology is deployed at scale rapidly. And on a per capita basis, Washington may experience more clean energy investments than any other state due to our progressive culture and uniquely bold regulations that confront emissions from every economic sector. Although carrots are only being wielded at the national level with the IRA, states can act independently and institute comprehensive mandates that reinforce regional climate goals. There is no better example of this than WA. The market potential for clean energy technology in our corner of the country is incredibly high due to an enviable blend of federal carrots, state sticks, and progressive culture.

As the University of Washington likes to say, *“Be Boundless.”* This same mentality should be applied to clean energy technology adoption. After all, the federal government is offering a boundless amount of tax incentives for the next decade! It is in the interest of every state to monetize as many tax incentives as possible (and deploy all the federal dollars they can). Slow movers will end up subsidizing the infrastructure and workforce of jurisdictions that embrace clean energy with greater fervor. WA has both inward economic interests and a responsibility to the rest of the world. Models of success for the mass implementation of climate solutions should propagate out of our state, serving as a guide for other communities who would rather watch someone else charge up the learning curve first.

We are on the cusp of a clean energy industrial revolution, the most significant investment boom of the 21st century. Take a second to appreciate this inflection point and this setting, then scroll down and think about how to help accelerate the decarbonization of residential properties.

Introduction

PROMPT – Design scalable funnels and pipelines that increase the throughput of single-family (SF) and multi-family (MF) residential decarbonization projects in WA State. Your idea can either be grounded in a new or existing organization, but focus on existing buildings and operational emissions.

Funnels are communication and engagement strategies that encourage owners to initiate projects and start the decarbonization process.

Pipelines are marketplace resources – software platforms, programs, educational tools, etc. – that property owners and stakeholder groups interact with to reduce transaction costs incurred throughout the decarbonization process.

According to the US Census Bureau, there are approximately **1.8M** Single Family (SF) homes throughout WA and nearly 175,000 Multi Family (MF) structures that contain a combined **1.2M units**. These figures constitute the residential sector of our state’s built environment. This residential sector is responsible for about 13% of WA’s greenhouse gas emissions.

You may be asking – just 13%, aren’t there bigger fish to fry? But this figure is misleading because it only refers to onsite emissions – the fuel burnt by furnaces, boilers, stoves and ovens to generate heat. Not included in this statistic are emissions from electricity generation and distribution, which make up 21% of WA’s pollution pie. Homeowners and tenants don’t consume all this electricity. Much of it flows into commercial properties and industrial processes. Although, it’s safe to say the percent of statewide emissions associated with housing Washingtonians is closer to 20% than 10% after folding in electricity.

And keep in mind – the Evergreen State has an ever-increasing obligation to create models of climate success that can be emulated by other parts of the country. Residential decarbonization approaches that prove successful here can be exported to markets where they would likely have a greater impact, markets with less hydro and more carbon-intensive electric grids. Finally, residential decarbonization should be interpreted as a “gateway” action. While communities eliminate emissions from their living quarters, a greater appreciation for climate action will hopefully spill into other spheres of the economy.

The case study is concerned with **owners** and **tenants** of SF and MF properties. For simplicity’s sake, we assume that in SF homes owners are also occupants. For MF, it is assumed that owners are 3rd-party investors or nonprofits, and occupants are tenants. SF rentals and MF condominiums are omitted from our assumed universe.

Owners and tenants are able to reduce **operational emissions** from **existing residential properties**, but they need help. Sophisticated developers that manage energy decisions during construction need less help. However, it is worth mentioning that WA passed the country's strictest energy codes last year. And starting this summer, gas-powered furnaces and boilers will be prohibited in new homes and MF buildings. Heat pumps and passive designs will take their place, a sea change all developers are monitoring.

Some distinct dynamics exist between owner-occupied properties (SF) and rental properties (MF), a bifurcation that will be highlighted throughout this text.

What Does Decarbonization Look Like?

1. **The places people live need improved energy efficiency.** Weatherization is the best example of energy efficiency, which involves sealing air leaks and improving insulation so less energy is required to generate heat that maintains comfortable air and water temperatures. But energy efficiency is also pursued with lights and appliances that consume less electricity.

2. **Everything should be electrified** (fuel switching). Furnaces and boilers that burn natural gas must be replaced by heat pumps that run off electricity. Heat pumps may not receive as much press as EVs, but they are just as important. Powered by electrons, this efficient technology moves air between outdoor and indoor climates while extracting heat with refrigerants. When cold outside, heat scrubbed from outdoor air is pumped indoors, rendering furnaces obsolete. This engineering breakthrough can also apply to water heating, rendering boilers obsolete. Finally, during warmer months, hot indoor air can be expelled, leaving spaces cooler and rendering ACs obsolete (refrigerators and freezers are heat pumps). **The logical time to replace furnaces and boilers is when units fail.** Although some people may install heat pumps prior to the point of failure for any number of financial or moral aims.

The other main targets for electrification are conventional ovens and stoves that have been using natural gas to cook food for Americans since the 1850's, on the tail end of the First Industrial Revolution! We now have electric ovens and induction stoves that produce safe heat far more quickly.

Most residential emissions in WA can be traced back to furnaces and boilers. These gas torches have a disproportionately large footprint since 66% of off-site electricity generation in WA comes from non-emitting dams. When furnaces and boilers get supplanted by heat pumps, the electric grid will likely double or triple (after accounting for EV proliferation).

3. **More properties should be fitted with EV chargers.** Tailpipe pollution is sensibly filed under the transportation sector, which is responsible for 40% of emissions in WA. But cars are also an extension of one's home. After chatting with property owners about residential decarbonization, it makes sense to pass through "the gate" and ask about electrifying adjacent vehicles. As EVs grow in market share, gas stations will be relegated by charging stations installed at SF and MF residences. This will put immense stress on the grid and alter the load profiles of individual properties. With more electricity being pulled down to power heat pumps and charge EVs, owners may have to upgrade their electrical panel, which is costly.

4. **Energy and technology controls need to be more ubiquitous.** Hot water for showers and sinks should not be scalding. Lights should be off when rooms are unoccupied. Thermostats should not be set too high, and temps should be turned down during sleeping hours and when properties are empty. These simple controls represent the lowest hanging fruit for residential decarbonization since they can be implemented with modest behavior changes and small investments in technology interfaces, like smart thermostats.

Additionally, there is the concept of load shifting, which means the curtailment of electricity consumption during hours of peak demand (morning and early evening). Responsive generation assets must be brought online to supplement base loads as people flip on TVs and do laundry after work. These marginal electrons are more expensive and carbon-intensive, so lessening consumption spikes is essential. This can be accomplished in two ways:

- 1) Shifting EV charging and appliance use to off-peak hours with requests or subsidies broadcasted by utilities.
- 2) Batteries can be installed at residential properties, charged during off-peak hours, and discharged during peak hours. That way, owners and tenants do not have to alter usage and charging patterns.

Virtual power plants, a 3rd party aggregation of consumer practices that contribute to electrical load shifts, are a hot topic in energy circles. Utilities can avoid building power plants specifically for demand spikes, or retire existing plants early, if they can summon virtual power plants. And the best way for utilities to encourage growth in VPPs is by adopting time of use rates where electricity costs more during peak hours.

5. **Onsite renewable energy generation should be expanded.** New modular technologies like nuclear and geothermal are under development. But at present, this goal is being advanced through rooftop solar. Ideally, onsite production matches the property's electricity demand over a 12-month period (in seasonally sunny markets like WA, net-metering is relied upon to reconcile differences in annual production and consumption). This matching principle underscores the significance of energy efficiency and

weatherization. If properties are inefficient when heat pumps are installed, larger units are needed. To meet this inflated consumption, more solar capacity must be budgeted, a scenario that results in higher investment costs borne by owners. When properties are made highly efficient and heat pumps are right-sized, owners can procure smaller solar arrays.

Not every homeowner will want to pay for solar. Maybe they don't like how solar looks, they find it unaffordable, or they live somewhere that is heavily shaded. The barriers for solar on MF properties are even higher due to technical complications that surface when many meters share a single roof owned by a separate property owner.

If residents want their electricity consumption to be matched by solar energy, but cannot or will not mount a rooftop array, then they could sign up for a community solar program that allows for shared ownership of an asset that does not need to be located onsite. Regrettably, WA legislators recently chose not to advance a bill that would have enabled virtual net metering (VNM), a requisite for any scalable community solar effort. One non-profit and some local utilities manage community solar programs, but there are few participants due to the limited number of projects (VNM would invite 3rd party developers to WA). As a fallback, utility customers can sign up for [programs](#) that collect a surcharge to cover the “green premium” for renewable generation that occurs in front of the meter.

Selling it to the Community

Decarbonization will be attained if residential property owners can be sold on energy efficiency, electrification, EV infrastructure, controls integration, and distributed energy generation. Will every residential property in every market experience these five upgrades? No. How can we rush progress across all five fronts in WA and beyond?

Last year, the 2050 Project partnered with UW business students to organize the Clean Buildings Case Competition, and Huskies were asked to design strategies that could help commercial property owners comply with the Clean Buildings Performance Standard (CBPS).

Although residential and commercial properties are traveling along a similar path toward decarbonization, the forces propelling them forward are very different. The CBPS is a regulation that obliges commercial properties to consume less energy and emit fewer emissions every five years, until net-zero is reached in 2050. The owners of commercial real estate in WA are not being asked to make incremental energy performance improvements, they are being told. **They are being mandated.**

At this point, regulating operational emissions from individual homeowners is far-fetched. Performance standards are handled better by commercial property owners because this group

is more concentrated and sophisticated. Also, fewer commercial properties exist, making it easier for WA's Commerce Department to administer the regulation. These same factors enable the building codes that govern developers and the energy specs of real estate that is under construction.

Commerce believes about 100,000 buildings may have to comply with the statewide performance standard since they exceed 20,000 sf in size. Many of these commercial buildings are held in portfolios with similar assets, which means the number of owners is less than the number of properties. Now consider the scale of the statewide SF residential market – 1.8M homes owned primarily by individuals or couples. Any attempt to enforce energy performance regulations on the general population of WA would be immediately rebuffed by residents and regulators. We have not developed the tools and knowledge base to pull off a mandate this comprehensive. In time, things could change. Once the CBPS refines market resources, business plans, and administrative capabilities, it may be possible to drill performance standards deeper into the built environment triangle. Small commercial properties and even SF residential properties could be required by law to lessen operational emissions and save money on energy.

But we can't wait around for performance standards that are adapted to residential markets. Instead, **community** must be leveraged so millions of Washingtonians are motivated to **voluntarily implement** the five decarbonization steps described earlier. Our society desperately needs new and innovative ideas that help foster a sense of community to accelerate climate actions, especially actions people have agency over, like decarbonizing the places they call home. Young problem solvers bring valuable perspective to this challenge given their proximity to prevailing culture, the secret sauce needed to galvanize action-oriented communities, and a comparative advantage enjoyed by the progressive population of WA. **The most important building decarbonization stakeholder groups struggle to engender feelings of community due to their profit motive or bureaucratic nature – they don't have the secret sauce!**

Framing is important. Reducing emissions from residential properties must be billed as an opportunity. Not a cost. Not an imposition. Not a way to avoid catastrophe. But as an opportunity to do something good, save money, and connect more closely with community. Let's put a pin in this by looking at the MF sector.

Imagine a simple Venn diagram representing the built environment. One circle is labeled residential. The other says commercial. And in the overlapping region is multi-family. WA's Commerce Department decided there were enough commercial elements of large MF real estate, 20,000+ sf, to qualify for the CBPS. Owners, not tenants, assume this regulation. Only they have reason to make property investments, including energy upgrades. When broaching the subject of decarbonization with MF owners, performance standards, fines, and profligate energy consumption should not be the first talking points. Instead,

community should be invoked. Appealing to owners through the lens of community will do more to move our state's MF market in the next five years than regulations that won't be enforced for another eight years. We need bold messages that project what is expected from tenants and the community – sensible energy upgrades that lower emissions and utility bills, investments that bolster a diverse workforce, and intentional actions that redress inequitable health & climate outcomes.

If more MF and SF property owners are being pulled into the clean energy industrial revolution by communities, then two sources of friction must be eliminated that will undoubtedly test the grip of their commitment – **costs** and **complexity**.

Costs

Each of the five decarbonization steps are investments that require upfront capital. Historically, few property owners have elected to invest in energy performance. These are the early adopters; the mass market has yet to embrace residential energy upgrades. Mike Tyson said – *everyone has a plan until they get punched in the face*. The climate version might go something like this – *everyone wants to do more for the planet until they see the bill*. This is why the Inflation Reduction Act is so consequential. It is a large bundle of carrots, a bag filled with ice that can reduce the swelling from the punch of manufacturing and investment costs. This funding will bring clean energy technology into view for the average consumer.

With a strong base of federal subsidies and incentives, the goal is to layer on extra support from states, local governments, and utilities until a material portion of retrofit costs are transferred to entities other than property owners. Stackable incentives and subsidies that apply to SF and MF properties are explained below, as are the financing options property owners will likely use to pay for upgrades and monetize incentives and subsidies.

Single Family: Incentives and Subsidies

Energy Efficiency & Electrification:

25C Tax Credits (IRA / FEDERAL) – These energy efficiency and electrification tax credits can only be monetized by SF property owners with a sufficiently large federal income tax liability. That's because credits are a 1-for-1 reduction in taxes sent to the IRS. About 45% of US adults pay no income taxes; property owners that fall into this category gain nothing from this incentive.

Home audits, weatherization upgrades, fuel switching, and control systems qualify for 25C credits, which reset every 12 months. The maximum annual credit is \$3,200, which cannot be greater than 30% of total project costs in any given year. A \$2,000 credit can be

claimed for new heat pumps. And up to \$1,200 in credits can be claimed for all other types of qualifying upgrades. Being waived taxes, this incentive is boundless.

Efficient & Electric Home Rebate (IRA / FEDERAL) – Rebates are not boundless. Unlike waived taxes, rebates are funds flowing out of federal coffers to approved property owners, even if that owner has no tax appetite. The IRA contains \$136B in direct spending. From this pool, \$4.5B is earmarked for the Efficient & Electric Home Rebate, and \$83M is coming WA's way.

WA's Commerce Department will deploy these rebates through a competitive process. It is competitive because there are not enough discounts to go around. Lower-income property owners are the intended beneficiaries of these finite subsidies, which can be used against the same set of investments noted alongside 25C. Up to 100% of qualifying costs may be covered for households that earn less than 80% of the area median income (AMI) and up to 50% for households that earn between 80% and 150% of AMI, with a cap of \$14,000 in both cases.

To put things into perspective, \$83M would support 5,928 SF retrofits if each project bundle reached the \$14,000 maximum. That is 0.03% of the SF market in WA! Also worth mentioning, the AMI in King County for a 2-person household is \$120,000. AMIs are measured at the local level.

Whole Home Rebate (IRA / FEDERAL) – In the IRA, another \$4.3B is being sent to states for a rebate program that awards property owners who can verify energy savings. If a SF homeowner makes investments and achieves at least a 20% reduction in gas and electricity consumption, they can receive either \$4,000 or \$2,000 in rebates. The larger number is reserved for households with earnings less than 80% of AMI, and the smaller number is for everyone else. If the owner accomplishes energy savings of at least 35%, then the maximum rebate doubles to \$8,000 and \$4,000. Of the \$4.3 billion in this rebate bucket, WA will see \$82M. If \$4,000 is the average dispersed rebate, 20,750 homeowners will get competitive funds, or 0.12% of WA's SF market.

Weatherization & More (STATE): Every state has a Weatherization program that pays for energy efficiency improvements in residential properties that house occupants earning below 80% AMI. Commerce will deploy funds, \$100M over five years, to 27 community-based organizations throughout the state that connect eligible projects with contractors who bid for the work. According to a recent report, "only a fraction of approximately 750,000 income-eligible households receive weatherization services each year due in part to funding, regulatory and system capacity constraints."

It is often the case that under resourced property owners discover weatherization by way of the *Low-Income Home Energy Assistance Program (LIHEAP)*. Local Community Action

Agencies administer LIHEAP, and they are contacted by property owners that want to lessen the portion of their modest income claimed by energy bills. LIHEAP allocates rebates that meaningfully offset utility payments for qualifying individuals with earnings under 80% AMI. **Like Weatherization, Commerce has set aside millions of dollars for LIHEAP, but much of that money is not deployed by Community Action Agencies.**

Commerce hopes another \$100M from WA's Climate Commitment Act will capitalize a program that fills gaps between Weatherization, Whole Home Rebates, and Efficient & Electric Home Rebates. State dollars will be blended with IRA dollars. And similar to other rebates that pass through Commerce, the few thousand property owners granted competitive funds will have much to gain, but a negligible impact will be created relative to the size of WA's residential market.

Utility Rebates – State regulations are prompting utilities to help customers consume less energy. The Climate Commitment Act (CCA) says the largest polluters in WA, including utilities, must subscribe to emission allowances that contract every year. And the Clean Energy Transformation Act requires electric utilities to generate 80% of electrons from non-emitting assets by 2030, and 100% by 2045. Utility rebate programs that help lower aggregate demand are often cheaper than renewable generation developments, and they are mandated by some nuanced CCA stipulations. Look into the SF rebates offered by Seattle City Light and Puget Sound Energy. **Looking specifically at heat pump rebates, SCL may contribute \$1,500 and PSE will go up to \$2,400.**

Electric Vehicles

30D & 25E Tax Credits (IRA / FEDERAL) – Individuals who purchase a new EV can claim a maximum tax credit of \$7,500, conditional on the location of battery manufacturing and critical resource mining (30D). Used EVs under \$25,000 bought from dealers come with a \$4,000 credit, so long as the credit is less than 30% of the purchase price (25E). These can only be claimed in the year title transfers by individuals who earn less than \$150,000 and couples who earn less than \$300,000. If qualified buyers do not have a large enough federal tax liability to absorb all eligible credits, they unfortunately cannot apply credits to future tax liabilities, and they cannot redeem any unused credits in the form of rebates (nonrefundable). That said, they can transfer credits to dealerships in exchange for a down payment.

30C Tax Credits – Homeowners living in rural tracts or low-income urban zones can use 30C tax credits to shave 30% off the installation costs of an EV charger, or other stations for non-emitting fuels like hydrogen.

Rooftop Solar + Battery

25D Tax Credits (IRA / FEDERAL) – This incentive is specific to individuals, and it covers 30% of the investment cost for solar arrays and battery storage. Furthermore, it can be preserved for future filings if the full value of the credit is not monetized in year one.

Sales Tax Exemption (STATE) – Solar systems under 100 kilowatts are exempt from state and local sales taxes. If the unit is between 101 and 500 kilowatts, the exemption drops to 50%. WA’s tax rate is 6.5%, King County’s rate is 0.9%, and Seattle’s rate is 2.7%. For a solar project in Seattle, this exemption will save the property owner a combined 10.1% of costs.

Single Family: Financing

A lender specializing in SF decarbonization said the average project they finance is about \$20,000 (including sales tax). But unless the home has strong energy performance to begin with, this level of investment will not usually result in net-zero. It’s a first step, bankrolling whatever upgrades make sense at that juncture.

SF Property owners must pay contractors for the full cost of the project (\$20,000 on average) before they can collect most incentives and rebates. Credits are realized when less money gets transferred to the IRS after tax returns are processed, at which point the work has been completed. Most rebates are also received post-project. The Efficient & Electric Home Rebate and the Weatherization program are exceptions to this rule because they are monetized at the point of sale (POS). Everyone left out of these competitive POS programs must either part with savings that equal total project costs, or take out a loan. Many homeowners do not have this cash on hand. Alternatively, they may want to spend their money on something else or invest it. This makes financing indispensable as communities attempt to scale residential decarbonization. If people can avoid prohibitive front-end payments by amortizing upgrade costs over the average useful life of assets, coinciding with utility savings, far more will invest in clean energy technology. These comments in no way minimize the influence incentives and rebates have on ROI, **everyone just needs to be cognizant of certain cash flow realities, and how time gaps between paying for work and monetizing incentives or subsidies is harder to bridge for lower-income property owners.**

A range of return profiles exist for different property owners. Someone with enough income and sufficient tax liability can take advantage of credits that yield up to 30% in returns, and they may collect another 15% or 20% in utility rebates. All refunds in this scenario are monetized after payments are made to contractors. Now consider one of the few thousand low-income property owners admitted to the Efficient and Electric Home program. If they hear a \$20,000 quote, \$14,000 can be taken off the top with a POS rebate. However, they still need to pay the remaining 30% of project costs from savings, debt, or additional state and local POS subsidies. Utility rebates will be forthcoming, but only once upgrades are finalized. And if the project size doubles to \$40,000, then POS rebates drop to 35% of costs. Incentives are flexible and boundless. Rebates are rigid and bounded. And financing is more essential than both.

Puget Sound Cooperative Credit Union and Craft3 are local lenders with core competencies in the PNW residential energy market. Borrowers with stronger credit can secure financing from PSCCU, while Craft3, a community development financial institution (CDFI), extends financing to those that may be characterized as “high-risk” by other lenders. Look up the the loan products managed by PSCCU and C3; compare their rates and terms.

These loans can finance solar and battery installations as well. The 25D credit is simple and impactful, but it is monetized on the backend of projects. Without loans, far fewer people will invest upfront in solar arrays that typically range between \$15,000 and \$35,000, even if they can fully monetize the 30% tax credit.

Multi Family: Incentives and Subsidies

Energy Efficiency & Electrification:

179D Tax Deduction (IRA / FEDERAL) – Credits and deductions are not the same. Everyone prefers credits since they are recognized after annual income is multiplied by the appropriate tax rate. Deductions occur ahead of this calculation; consequently, they do not confer a 1-for-1 reduction in federal taxes. Cash flow benefits from deductions are reduced by multiplying the deduction amount by the applicable tax rate.

With 179D, the deduction amount is quantified by measuring energy performance. If a MF property owner invests in upgrades that lower energy consumption by 25%, they can claim a \$2.50 deduction for each square foot of the building. If consumption can be lowered by 50%, then a deduction of \$5.00 per square foot can be claimed. A sliding scale exists between these two boundaries.

Now imagine a 50,000 sf MF property that consumes 30% less annual energy after undergoing a retrofit. The owner would be able to claim a \$150,000 deduction. If this owner is an individual or a partner who falls into the 24% tax bracket, then that deduction translates to a monetary gain of \$36,000. But this number is lowered further since the depreciable value of assets must subtract any deduction amount being claimed, transforming 179D into an accelerated depreciation incentive. If the \$150,000 was a credit, an equal sum could be saved in taxes. With 179D's structure, though, only 10% of the credit value may be realized.

Governments and nonprofits who own affordable MF properties don't pay federal taxes, but 179D allows tax-exempt entities to transfer the deduction to for-profit engineering or energy service groups that likely have an appetite.

IRA Rebates (FEDERAL) – The two rebate programs explained in the SF section are also open to MF properties. Remember those small percentages? Well, they just got smaller because now 1.2M MF units are being added to the denominator.

Early Adopter Incentive (STATE) – MF properties in WA greater than 20,000 must satisfy with performance standards starting in 2031. Properties in this category that make energy upgrades and shift from noncompliance to compliance before 2031 can monetize this incentive. MF buildings greater than 50,000 sf can collect \$0.85 per square foot, and those between 20,000 and 50,000 sf can collect \$0.30 per square foot. The tax liability of property owners does not matter for this incentive thanks to utility participation. Utilities extend rebates to customers and cut their state taxes by an equivalent amount.

Weatherization & LIHEAP (STATE) – Weatherization funds can go toward MF projects, and LIHEAP funds can go toward MF tenants.

Utility Rebates – Here are links to the MF rebates administered by [SCL](#) and [PSE](#). Utility rebates are complicated, more so than state rebates, which is also true for SF. In the MF sector, utility rebates may be the largest return since 179D does not move the needle much.

Electric Vehicles

Tax Credits (IRA / FEDERAL) – Tenants who purchase a new or used EV can capitalize on the 30D and 25E credits. MF property owners can also install EV chargers and sustainable fueling stations that qualify for 30C credits, so long as buildings are in a rural part of the state or a low-income urban neighborhood. Furthermore, tax-exempt property owners – governments, school districts, nonprofits, and religious organizations – can monetize this incentive in the form of direct payments (essentially rebates); an accommodation in response to the credit's emphasis on under-resourced demographics.

Rooftop Solar + Battery

Section 48 and 45 Tax Credits (IRA / FEDERAL) – These are the biggest carrots in the IRA – credits for renewable energy generation and battery storage projects at the utility, commercial, and MF scale. They differ from 25D consumer credits in a few ways. First, assuming labor requirements are satisfied, the minimum credit is 30% of construction costs. This minimum can be augmented by 10% for each of the following criteria: domestic manufacturing, siting of projects in communities with oil & gas activity, siting of projects on tribal lands, and other low-income factors. Organizations that struggle to monetize these incentives for whatever reason can either garner direct payments or transfer credits to investors with adequate tax liability.

Most renewable energy that rides the coattails of these tax credits will be developed behind the meter at the utility scale. Yet, investment and production tax credits can also be claimed for onsite commercial solar & battery projects, which extend to MF properties. Only markets with robust community solar programs that employ virtual net metering can easily scale MF solar. WA has not enabled virtual net-metering. Common areas can be

powered by onsite generation, but delivering that electricity to the tenants of our state is far more confounding.

Tax Exemption (STATE) – The SF tax exemption language also applies to MF.

Multi Family: Financing

As college students know well, MF units are smaller than SF homes, so the previous average is being adjusted down to \$15,000. A 20-unit MF building taking that first real step toward decarbonization would need \$300,000. Some lower-income MF properties will get upgrades paid for by POS rebates facilitated by the state. Everyone else will need to locate up-front capital, which may be tens of thousands, hundreds of thousands, or millions of dollars depending on the property size. Lenders will supply most of this advanced capital. Here is a point of reference – in 2022, nearly 85% of new cars were financed. A similar ratio can be expected for energy retrofits in MF and SF properties.

The “split incentive” is a big reason why few MF energy retrofits have been financed so far. This is when MF owners take on debt or use available cash to invest in building performance, while tenants benefit from smaller utility bills. In most leases, owners have no way to charge their tenants and earn a return on their investment. No incentive exists. Few upgrades are made.

Luckily, a new financing tool was approved in WA that overcomes the split incentive: C-PACER (*commercial property assessed clean energy and resiliency*). C-PACER is a special instrument for two reasons: 1) loan repayments are collected much like property tax *assessment*, allowing loans to stay with the property if ownership changes, and 2) terms can reach up to 30 years, corresponding with the life of durable clean energy technologies while lowering individual payments, because C-PACER obligations have a priority lien over mortgages (PACE lenders have a very secure claim to collateral, the building). By classifying loan repayments as assessments, property owners can align incentives and pass the cost of investments to tenants, the ones who pay less to utilities after financed upgrades are operational. The types of improvements eligible for C-PACER include everything in the “*What Does Decarbonization Look Like?*” section. And so long as the property has at least five units and is not government-owned, it can take out a C-PACER loan. Kitsap Bank is a leading local provider of C-PACER capital.

C-PACER works well with market-rate MF properties and for-profit affordable MF properties. But local nonprofits that own affordable MF properties would turn to the WA State Housing Financing Commission (WSHFC) for retrofit loans. The WSHFC borrows money from the market at suppressed rates. It then turns around and lends this money to projects that serve lower-income community members. A slight spread differential keeps the boat afloat. Within their Sustainable Energy Trust program, retrofit projects up to \$1M

can be financed so long as energy consumption is expected to fall by at least 10%. For projects over \$1M, WSHFC can help the nonprofit property owner with tax-exempt 501(c)(3) bond issuances.

What about green banks? WA State does not have a green bank. A local green bank, ideally structured as a nonprofit, could be chartered. But it might be two years before loans are available. We could also import green bank loan products already active in markets outside of WA. Inclusive Prosperity Capital is a green bank that can operate anywhere in the country, and their Catalyst Loan is molded to affordable MF properties (they have SF financing options as well). Around \$20B in IRA subsidies is earmarked for green bank loan loss reserves, which could crowd-in over \$100B of private capital. Another \$7B, also administered by the EPA, will support the development of soft infrastructure that connects energy projects, especially low-income projects, to financing, especially green bank financing. If green bank products remain unavailable to property owners in WA, our residents will end up subsidizing the cost of capital elsewhere.

Complexity

Community sentiments and cost reductions may prove impotent if property owners find the process of decarbonization too complex. The customer journey for residential retrofits is circuitous, and it intersects with a litany of poorly coordinated stakeholder groups - WA State departments, contractors, utilities, capital providers, permitting offices, and more. Synthesized communications and implementation resources will unleash large sums of public capital and incomprehensible sums of private capital.

Some well-resourced real estate companies can hire people to manage this journey as it currently exists. But almost 3/4^{ths} of MF units are owned by either individuals, partnerships, small companies, or nonprofits who may not have the budget to onboard specialists. This group will struggle to cross the river without simpler resources that can scale. And it goes without saying, SF owners are juggling 20 things at once; outside of early adopters, they cannot reasonably be expected to map things out on their own. Some free handholding services are now coming online, sponsored by governments and utilities. They will assist a few hundred property owners, maybe even a few thousand, though not millions. And they run the risk of preempting market solutions that can scale.

Time is money. If individuals and small organizations don't want to navigate this process, they must pay consultants and contractors to shoulder the burden, leading to steep transaction costs that can quickly outweigh investment returns from utility savings, incentives, and rebates.

As it stands, residential decarbonization is not a major financial windfall for the general population. This could change as we scramble up learning curves. But free or heavily

subsidized low-income projects are the only exception to this rule at present. For everyone not collecting rebates from the state, most of the population, the goal is to try and break even. Financial gains will not drive most participants into this market. Financial costs, however, could keep many sidelined. And since time is money, we must cut through complexity and soft costs with scalable tools that help property owners get off the starting block, implement projects, monetize different types of refunds, and, most importantly – secure financing.

The best and easiest to understand yardstick for climate action is deployed capital, the stuff contractors accept as payment. A small portion of this capital will appear as rebates. Some will be paid out of pocket. But most will come from financing, for both amortization and cash flow reasons. **Streamlined resources and sweeping messages are needed that ultimately put more residential properties in a position to acquire loans.** This does not mean incentives and rebates are trivial. Many people will not approach lenders without inducements on the back end of projects. Although in most cases, nothing will be monetized until loans are issued. If we want to maximize the boundless potential of tax incentives, then we must first dig deep channels to private capital markets that dwarf all public subsidies.

Here is a high-level sketch of the customer journey that needs to be simplified and streamlined:

1. Property owner reaches out to contractors after doing some online research, **usually when equipment fails.**
2. Contractors or engineers visit the property and conduct an audit.
 - SF: audits tend to be free, then quotes are submitted to the owner, who typically fields three quotes from three contractors who each perform an audit.
 - MF: audits are more complicated and tend not to be free. Usually only one contractor or engineer visits the property for an audit.
3. Capital is secured to pay for energy upgrade installations.
 - SF: loans from capital providers like PSCCU or Craft 3, some POS rebates, and some out-of-pocket.
 - MF: loans from capital providers like Kitsap Bank or WSHFC, some POS rebates, and some out-of-pocket.
4. Necessary permits are filed with the appropriate permitting office, usually at city governments.
5. Decarbonization upgrades are made, and payment for this work either happens at the front end of projects, at completion, or with installments throughout if the project takes more time.
 - SF: contractors who conduct the audit and submit the quote execute the project.

- MF: sometimes engineering groups only perform audits and then a contractor is brought in to do the work, and sometimes a contractor does the audit and the work.
- 6. Tax incentives, state rebates, and utility rebates are monetized sometime after project completion. This paperwork is managed by contractors, consultants, or the property owner.
- 7. Loan payments are made to the lender, and the property owner sees a reduction in utility bills.

Movements along this complex customer journey can be measured in transaction costs. And when these transaction costs are added to the cost of hardware, a total project cost is submitted to property owners that may dissuade many from pursuing decarbonization. New automated tools must be fashioned that simplify this process and lower transaction costs. And if there is a stubborn perception of complexity, then not enough property owners will even start this customer journey. New communication and engagement strategies that emphasize community must be fashioned that initiate a far larger volume of decarbonization projects.

Conclusion

To meet the challenge of climate change, we are forced to think at scale. WA has approximately 1.8M SF homes and 1.2M MF units. Continuing with the same average project costs – \$20,000 per home and \$15,000 per unit – the capital that must move into local residential properties to achieve decarbonization is astronomical – **\$54B** if only one round of investments is needed, or **\$108B** if two rounds are needed!

The Clean Energy Industrial Revolution may very well be the defining force of the 21st century. Now that the IRA has passed, this revolution will quickly pick up steam, and every effort must be made to ensure that no one is left behind. Acknowledging this, the IRA offers subsidies, mainly rebates, for lower-income residents, and tax incentives for mid-to-high-income residents. Large grants from the federal government will be combined with money from the state and deposited with WA Commerce for the purposes of accelerating residential decarbonization. Commerce has a big job before it – several hundred million dollars of rebates must now be dispatched. Creative solutions are in high demand that connect **thousands** of low-income retrofits to public capital, so more Washingtonians can share in the clean energy technology that marks this revolution.

We should celebrate the new opportunities that will spring from beefed up rebate programs, yet we must never lose sight of scale. Upwards of \$54B will be paid to WA contractors over the next decade for **millions** of residential decarbonization projects. The true cost figure could drop as technology becomes cheaper and the customer journey is

streamlined. But what we know for sure is that rebates will account for a small fraction of this upfront capital. More state and utility rebates can be monetized after project completion. In the foreseeable future, however, Commerce may only have a few hundred million in POS rebates for residential retrofits. Don't hold your breath for another IRA and more federal dollars. Additional state funds will be appropriated. But even under a best case scenario, POS programs for retrofits in WA, fed by state and federal budgets, will never exceed a few percent of the total capital required in this first round of residential decarbonization.

We can only tackle climate change, deploy clean energy technology at scale, monetize boundless incentives and abundant rebates, develop an equitable energy workforce, and generate broad prosperity by increasing access to credit, by crafting scalable resources and communications that ultimately connect millions of people with lenders, purveyors of private capital. **The IRA is not a force, but a force multiplier. Private capital is the force.**

Additional Info on The Climate Commitment Act

The Climate Commitment Act has been referenced a few times already, but more words are warranted because it is a big deal! Four times each year until 2050, the top polluters in WA must purchase allowances from the Department of Ecology. The first auction was held last month, and it raised \$300M in revenue. On average, 3.5% fewer allowances will be sold each year until a 95% drop is reached in 2050. Increasing scarcity should inflate the cost of each allowance. Although it cannot be said with any precision what future spot prices will be and, therefore, what future revenue will be. In the coming few years, we want prices and revenue to be high. But shortly thereafter, we want revenue to drop because this would imply that the all-in cost of clean energy technology is diminishing faster than allowances.

The more technology we deploy, the cheaper it gets. Which begs the question, how should CCA dollars be deployed? The CCA is a "cap and invest" program. All allowance proceeds must be invested in climate initiatives peppered across the state. If annual income averages \$1B for the remainder of this decade, what's the best way to pledge this \$7B? There are many discussions underway about expanding rebate programs. And justifiably so, since rebates will supply energy upgrades to more low-income residents in WA. But they also have severe limitations with the perspective of scale. Suppose 15% of annual CCA funds - \$150M - are earmarked for residential decarbonization and parked in a single program that administers \$14,000 rebates to qualifying residential retrofits. This would have an additive effect of 10,700 decarbonization projects annually. Which sounds like a lot until scale is called back on stage. Against 1.8M SF homes and 1.2M MF units, 10,700 is merely 0.35% of the market.

No case study is complete without invoking the 80/20 rule. Imagine State legislators, the ones who decide how CCA dollars are invested, declare that 80% of auction proceeds must be recycled back into communities as rebates, while 20% must back disruptive ideas that help deploy, borrowing a phrase from earlier, large sums of public capital and incomprehensible sums of private capital, precipitating an additive effect in terms of new decarbonization projects that is many multiples greater than the influence of rebates alone.

Student Charge

*You are presenting before a panel of state legislators. They need to spend \$30M this year on creative solutions that accelerate the velocity of clean energy investments for SF and MF properties. They want **two things that can scale: funnels and pipelines**. Funnels are communication and engagement strategies that encourage owners to initiate projects and start the customer journey. Pipelines are marketplace resources – software platforms, programs, educational tools, etc. – that property owners and stakeholder groups interact with to reduce transaction costs incurred throughout the customer journey.*

A lot of information was presented in this case study, and there is zero expectation that all of it ends up in your pitch deck. Your team's goal is to put a clear scope around either a scalable funnel, a scalable pipeline, or some scalable hybrid of the two. Determine what part of the residential decarbonization market interests you the most, locate any relevant sections in this document, jump online for deeper research, then organize your thoughts into a practical solution that can help our state decarbonize residential properties. Who knows, maybe your idea will serve as a model of success that diffuses across the county.

Here are ten scoping guidelines to help get your team going:

- 1. Funnel, pipeline, or hybrid?**
- 2. SF, MF, affordable MF, or all three?**
- 3. One of the decarbonization steps, multiple steps, or all steps?**
- 4. Public capital, private capital, or both?**
- 5. What income bracket?**
- 6. Urban or rural?**
- 7. How do you propose to scale? With communication strategies or engagement methods that grow organically through community? With software/platform**

tools that can simplify the complex customer journey at a low marginal cost?
With a hybrid, or something altogether different?

8. Will your idea be executed by a new organization? Or will it be adopted by an existing organization?

9. How much money are you asking for? If your idea is a startup, you cannot ask for millions in seed funding. Several million could be a more realistic request for something like a community/industry program that carries less risk, or a mass media campaign. Also, how will your idea generate revenue so that it can be sustained?

10. Who are your partners? WA Commerce? Local governments? Utilities? Contractors? Capital Providers? Schools? Other? More public-private partnerships are needed in this space.

Here are the criteria judges will use to evaluate your proposal:

Can the funnel/pipeline scale?

Is the idea feasible?

Is the funding request reasonable?

Is the idea financially sustainable?

How is community leveraged?

How are incentives, subsidies, financing, and other cost drivers addressed?

How is complexity addressed?

KEEP IT COOL