

Breaking Down Barriers to Deep Energy Efficiency in King County



Introduction

To achieve significant carbon emissions reduction, local governments must help break down barriers that have prevented widespread, deep building energy efficiency to date. This briefing paper focuses on lessons learned from both the American Recovery and Reinvestment Act (ARRA) and Washington State investments in single family residential retrofits since 2009 to inform a regional retrofit strategy for King County, WA.

King County, WA and thirteen Puget Sound cities jointly committed to reducing electricity and natural gas use in all existing buildings 25 percent below 2012 levels by 2030.

The King County-Cities Climate Collaboration (K4C) — comprised of King County and thirteen constituent Puget Sound cities — has jointly committed to reducing electricity and natural gas use in all existing buildings 25% below 2012 levels by 2030. Achieving this goal requires widespread and deep¹ energy efficiency upgrades to existing residential and commercial buildings.

The technical and programmatic approaches to promoting residential energy efficiency are well-documented, based on work of the US Department of Energy's [Better Buildings Residential](#) programs and national and local building retrofit organizations.²

However, King County cities face a number of barriers to achieving deep energy efficiency in their urban residential building stock. Based on research and interviews of energy efficiency program managers that Climate Solutions' New Energy Cities staff conducted in the fall of 2014, this paper summarizes the top locally-specific obstacles to achieving deep community-wide reductions in single family home energy consumption, as a first step toward overcoming them.



Methodology

In 2014, New Energy Cities researched the existing residential building retrofit work performed to date by [Thurston Energy](#), the [Whatcom County Community Energy Challenge](#), Sustainable Works, [Community Power Works](#), [RePower Kitsap](#), and [Clean Energy Works](#). We interviewed program administrators to identify lessons learned from the beginning of ARRA in 2009 through the end of 2014. Although most of these organizations serve communities outside of King County, their experiences are relevant to the state and regional context in which a King County strategy would operate.

New Energy Cities also reviewed best practice information and data from the following resources: the DOE's [Better Buildings Residential](#) programs; the [Residential Building Stock Assessment \(RBSA\)](#), Northwest Energy Efficiency Alliance's comprehensive study of energy efficiency in Northwest residential buildings; the [American Council on an Energy-Efficient Economy \(ACEEE\)](#); the Washington State Department of Commerce and the [Washington State Energy Strategy](#); and the [Washington State University \(WSU\) Energy Extension Program](#), which oversees [Washington's Community Energy Efficiency Program \(CEEP\)](#).

Barriers

New Energy Cities identified five primary barriers to achieving widespread and deep energy efficiency in King County's residential building sector: limited uptake of deep energy efficiency upgrades; workforce challenges; insufficient public and utility funding; lack of information about the most strategic actions to drive deep home energy performance; and lack of prioritization of carbon reduction and deep energy efficiency in existing policies and programs.

1. Programs have not achieved the volume and depth of retrofits necessary to meet a 25% sector-wide reduction.



photo: AJCE

Most programs report limited uptake of deep energy efficiency upgrades. Nationally, Better Buildings Residential reported that from 2010 to 2013, upgrades to residential single family homes that received federal energy retrofit funding resulted in an average of 22% energy savings, which is less than half the threshold for deep energy efficiency.³ Even nationally pioneering programs, such as Clean Energy Works, have not achieved the volume and depth of retrofits necessary to meet a 25% sector-wide reduction. WSU reports seeing efficiency improvements in some houses in the 25% range, but very few in the 50% range, which would be necessary at a significant market percentage to achieve the 25% goal across the whole residential building segment.⁴

Retrofit program administrators also report that a values/morality frame of carbon reduction is not successful as a primary driver to persuade homeowners to invest in energy efficiency. Moreover, the promise of long-term energy efficiency savings alone is insufficient to persuade homeowners to make significant upfront investment in deep upgrades. Interviewees did not conclusively identify reasons for inaction (e.g., lack of awareness, interest, or resources),

which vary across communities and even within an individual community. However, more than one practitioner commented on the disruptive nature of deep home energy upgrades, and the challenge of finding opportune times or natural cycles for homeowners to make capital-intensive retrofits.

Notably, the energy efficiency community does not have consensus about how to get the most persuasive information to homeowners on energy efficiency opportunities, and how to drive demand for a high volume of quality upgrades in a cost-effective way. Some prefer the more in-depth and staff-intensive [assessments/concierge model](#), which provides more information at significant cost to the program, utility, or homeowner, while others want to skip assessments or have [lighter-touch electronic assessments](#) to screen homes with higher upgrade potential and move more quickly to upgrade completion. A challenge for providers is thus: how much information do you need, and how much money can and should you spend to drive demand?⁵

2. Programs have struggled to retain a strong contractor base.

No retrofit program is currently operating on market basis alone. After ARRA ended, a number of programs have not been able to retain a strong contractor base and keep the numerous, complicated pieces of successful residential efficiency programs intact.

Contractors also reportedly struggle with complicated utility paperwork and incentive programs that vary across communities.

3. Current public and utility funding levels are insufficient to support a residential energy efficiency market at a meaningful scale.

Energy utilities are required to invest in energy efficiency, and they provide the lion's share of funding, but their approaches are not bold enough to achieve 25% reduction community-wide by 2030.

Without significant public funding, such as at ARRA levels or with dedicated carbon pricing revenue (e.g., California and Regional Greenhouse Gas Initiative participant states),⁶ the residential energy efficiency market is unlikely to reach a meaningful scale.

Energy utilities are required to invest in energy efficiency, and they provide the lion's share of funding for energy efficiency, but their approaches are not bold enough to achieve 25% reduction community-wide by 2030.⁷ Their investments in energy efficiency incentives also have to meet a strict regulatory test of cost-effectiveness, which

limits the type of programs they can fund, and are typically focused on single energy conservation measures rather than holistic whole-home upgrades.

4. Local policymakers and real estate market actors lack information about the most strategic actions to drive deep home energy efficiency.

Local government officials lack visibility into their communities' progress toward overall energy efficiency and carbon reduction goals in the residential sector, and the most strategic opportunities they have to drive home energy performance. Motivated and data-savvy city staff can use estimates of home energy consumption (e.g., approximate energy models using assessor data on home vintage and other features, or extrapolations of utility conservation potential assessments) to understand the energy improvement opportunities in their residential building stock, but few cities have the capacity to do this type of analysis.

Also, local decision-makers do not have easy access to analyses, such as local [building stock profiles](#) or [geographic maps of building energy use](#), that are important to guide strategies on deep energy efficiency. Utilities face a number of practical and regulatory challenges to sharing data on home energy consumption at the individual household level, and cannot or do not readily provide aggregate home energy information (e.g., at the neighborhood level, where customer data is masked for privacy reasons). Utilities do provide data when commissioning broad, complex studies such as conservation potential assessments or the Residential Building Stock Assessment. However, the data are not typically in formats that are easily applied to local analyses.

Moreover, energy efficiency program administrators are primarily focused on the number of retrofits they generate in a month, and rarely track how their program activities add up to community-wide targets for energy use and carbon reduction, or how savings persist over time.

Real estate transactions are significant opportunities to inform potential buyers about energy performance and to create demand for energy efficient homes, but most realtors have historically been resistant to requiring energy efficiency information in home listings, or do not perceive the value of doing so.⁸ Rental agreements are also missed opportunities to show tenants their projected energy consumption in potential rental units, which leaves low-income residents vulnerable to unknown energy costs.

5. Existing policies and programs in the building sector do not prioritize carbon reduction or deep energy efficiency.

Many local governments currently do not have programs and policies to promote voluntary adoption of building energy efficiency aggressively and cohesively.

Regional energy conservation objectives, which guide utility activities, are based on avoided costs, not carbon reduction or deep energy efficiency. This framework fails to prioritize different types of energy savings (e.g., conservation of energy used for heating versus conservation of electricity, which have different carbon intensities) based on their carbon bang for the buck.

Without a carbon-based hierarchy to rank types of energy savings, energy efficiency programs are not well-aligned with community-wide carbon reduction goals.

This observation is especially important in King County, where: Seattle City Light customers use nearly carbon-neutral electricity (thereby making reduction of natural gas heating a higher carbon priority); Puget Sound Energy customers have more carbon-intensive electricity and/or natural gas for heating; and non-utility customers use carbon-intensive heating oil or wood/pellet fuels.

Without a carbon-based hierarchy to rank types of energy savings, utility and non-utility energy efficiency programs are not well aligned with community-wide carbon reduction goals.

A clear example is that Puget Sound Energy frequently hails natural gas as a clean fuel, and utility incentives for natural gas efficiency are declining, without regard to the carbon impact of the expanded use of natural gas.

In the past, ARRA funding requirements prompted cities, utilities, and community groups to collaborate across typical siloes, but that type of funding was a one-time opportunity, and has ended. As a result, community energy efficiency programs now have to work harder to persuade other institutions to collaborate.

Promising Practices

Retrofit leaders have demonstrated innovation in working to overcome the above barriers. Based on national best practice review and interviews of retrofit program administrators in the Northwest, New Energy Cities developed the following non-exhaustive list of examples of innovation for: driving demand; strengthening the workforce; increasing funding; making building energy information more available and useful; and putting a priority on carbon reduction and deep energy efficiency. (Note that the individual programs and innovations described below have not necessarily resulted in deep energy savings to date, but represent possible approaches to overcome specific barriers.)

1. Driving Demand

Mandates

In 2011, Boulder, CO required landlords of single family and multifamily residential rental housing to meet [minimum energy performance standards](#) by January 2019 “to help the city achieve its ambitious carbon emissions reduction goals and to improve the quality, safety, and marketability of Boulder’s rental housing stock.”



photo: Simon Williams

In 2014, a Washington, DC [mayoral task force](#) recommended that the District “establish minimum energy performance standards for new and existing buildings,” and “explore the feasibility of a revenue-neutral carbon pricing system... that would give building owners greater incentive to reduce their energy use.”

When homeowners make significant remodels or replace key equipment (e.g., furnaces), they must comply with the Washington State Residential Energy Code, which presents an opportunity for making energy efficiency upgrades beyond business as usual. Local governments

already enforce aspects of the energy code related to new construction, but do not consistently enforce the energy code provisions pertaining to existing homes.

Marketing, Education, and Incentives

In customer messaging, RePower Kitsap and Thurston Energy specifically highlight quality, comfort, financial savings, resiliency, practicality, and self-sufficiency, and do not try to sell retrofits in terms of carbon reduction. Clean Energy Works similarly creates and markets additional value in terms of safety (e.g., by pairing energy retrofit services with seismic retrofits) and market appeal (e.g., offering a free Nest thermostat as part of enrollment in home assessments).

Clean Energy Works has also focused on creating a lighter-touch home assessment, with the intention of higher conversion rates (i.e., from assessment to contracted work), while also giving customers increased attention from knowledgeable phone staff. (WSU notes that

using lighter touch assessments to screen homes with higher upgrade potential has worked well in some areas, but a light-touch assessment does not necessarily yield deep energy savings when used exclusively, and has not yet resulted in higher conversion rates.)



photo: Portland General Electric

The Whatcom County Community Energy Challenge partners with contractors in other areas of home repair (e.g., heating, ventilation, and air conditioning) to piggyback on work that customers are already planning to do. Thurston Energy similarly focuses its marketing on “four critical times in the life cycle of a house when energy efficiency makes sense: 1) during heating system replacement, 2) during purchase/sale of a home, 3) during leasing/rental, and 4) during other significant renovation.”

Thurston Energy offered a limited-time [Cold Cash for a Warm Home](#) program that provided cash incentives above and beyond utility incentives, and

Community Power Works has run similar seasonal bonus programs. WSU notes that this type of program specifically addresses pent-up demand and that long-term program results require sustained presence of energy efficiency programs.

Sustainable Works generated business by working with trusted membership organizations, such as churches.

2. Workforce

Several programs have worked to strengthen the retrofit workforce and improve contractors' experience of participating in energy efficiency programs:

- Sustainable Works partnered with local unions to train contractors, required their contractors to pay prevailing wages, and encouraged contractors to pay prevailing wages on non-Sustainable Works jobs, as required under the terms of their Community Energy Efficiency Program funding.
- Consistent with ARRA goals, Community Power Works requires its contractors to uphold the City of Seattle's [High-Road Agreement](#) and related contracting standards, including “paying a living wage to employees and hiring from a diverse pool of skilled workers.”
- The Whatcom Community Energy Challenge helps busy contractors by processing complicated utility paperwork. RePower similarly helped contractors, although that practice ended with the sunset of ARRA funding.

3. Funding

As noted previously, California and the Northeastern RGGI states have directed billions in carbon pricing revenue for energy efficiency and clean energy programs.

Locally, the residents of Boulder, CO have twice passed a [carbon tax](#), the revenue from which is directed to clean energy programs, including energy efficiency.

Clean Energy Works secures as much utility funding as possible (although currently representing less than five percent of total program income), as well as public incentives that can be deployed for home retrofits (e.g., funding for seismic retrofits and radon testing).

4. Home Energy Information

Nationally, the [Green Multiple Listing Service \(MLS\) Tool Kit](#) provides resources to support regional real estate communities to include information about green home features in their home listings, and the Appraisal Institute (AI) has developed a [Residential Green and Energy Efficient Addendum](#) to support home appraisers in valuation of property energy efficiency.

In May 2015, US DOE announced a new initiative, the [Better Buildings Home Energy Information Accelerator](#), which will “expand the availability and use of home energy information at relevant points in residential real estate transactions.” Importantly, the initiative includes high-profile partners from the real estate industry, such as the Appraisal Institute, the Council of Multiple Listing Services, the National Association of Realtors’ Center for Realtor Technology, PicketFence.com, and the Real Estate Standards Organization, among others.⁹

In Virginia, the [Local Energy Alliance Program](#) works directly with real estate agents to increase their expertise on energy efficiency and become supporters of energy performance

reporting, and offers a \$250 package to homeowners who are selling their properties that includes a home energy check-up, home energy score, completion of the AI’s Addendum, and a promotional flyer to share with prospective buyers.

Green building leaders in the Northwest have been working to add new green features to the Northwest MLS database, including the [Home Energy Rating System](#) (HERS) index and the [Energy Performance Score](#) (EPS), as a result of several years of collaboration with real estate agents and appraisers. Energy Trust of Oregon research¹⁰ indicates that home energy certifications increase

home value, which can increase real estate commissions; however, more work is necessary to demonstrate this value to the real estate industry and to incorporate energy scores into sale listings.¹¹

The National Association of State Energy Officials offers [resources](#) for states on residential energy labeling policies and programs, and highlights [Energy Trust of Oregon](#) and the [State of Vermont](#) as leaders in voluntary residential energy labeling.

A handful of US cities and states require homeowner or utility disclosure of energy information, as detailed in an [April 2013 report](#) from ACEEE and a [February 2013 report](#) from Northeast Energy Efficiency Partnerships:¹²

- [Austin, TX](#) requires energy audits prior to the sale of all residences with four or fewer units, including all single family homes; [Santa Fe, NM](#), [Fayetteville, AK](#), and other jurisdictions require home energy ratings in new homes; and [Boulder, CO](#) requires that rental properties achieve a specific home energy rating or pursue a prescriptive efficiency checklist as part of a pathway to compliance with a rental upgrade ordinance.



photo: Bryn Pinzgauer

- Washington, Kansas, and South Dakota require disclosure of energy efficiency features in new single-family homes and low-rise multifamily homes.¹³
- Montgomery County, MD, New York State, Hawaii, Alaska, and Chicago require disclosure of utility bills to potential homebuyers and tenants.
- Washington, DC, New York City, and Seattle require multifamily buildings over a certain square footage to report energy use data annually.¹⁴
- Portland General Electric [provides](#) cities and other governmental entities with energy use data in formats that are useful to greenhouse gas inventories and climate action planning.

5. Prioritizing Carbon Reduction and Deep Energy Efficiency

The City of Seattle and Ecotope are developing a tool to calibrate energy savings potential in different building types, which other King County cities may want to adapt for their local building stocks.

Community Power Works has targeted outreach to non-utility customers, such as those who use oil or wood/pellet fuels for heating, which are carbon-intensive energy sources. These customers would not get other offers for energy efficiency upgrades.

The [City Energy Project](#), a collaboration of the Natural Resources Defense Council and the Institute for Market Transformation, works with Atlanta, Boston, Chicago, Denver, Houston, Kansas City, MO, Los Angeles, Orlando, Philadelphia, and Salt Lake City to develop cohesive programs and policies that work hand-in-hand to drive measurable building energy reduction.

Cities and counties will likely not be able to meet deep energy efficiency goals in the residential sector through purely voluntary programs, under current circumstances.

The [Georgetown University Energy Prize](#) is a competition that will award \$5 million to the small or medium-sized US city that can “bring together local governments, residents, and utilities to demonstrate success in reducing energy consumption over a two-year period.” Competing communities must develop long-term energy efficiency plans for continued reductions in per capita consumption of electricity and natural gas in residential and municipal buildings.

Recommendations

New Energy Cities offers the following recommendations for King County and other local governments throughout the Northwest to get on a path to achieving 25% building energy use reduction:

Enforce energy code provisions regarding existing homes, and plan to phase in home energy performance requirements. Cities and counties will likely not be able to meet deep energy efficiency goals in the residential sector through purely voluntary programs, under current circumstances. Home energy codes not only set the bar for new construction, but also have provisions regarding energy efficiency in existing homes, which local governments need to enforce more aggressively. In conjunction with technical assistance, energy performance standards can require that existing buildings achieve a specific level of energy efficiency, with significant energy savings for homeowners and renters.

Secure dedicated revenue for energy efficiency investments, such as through federal, state, or local carbon pricing. Dedicated funding is important to help keep successful residential energy efficiency programs functioning. Only with an aggressive increase in funding will the residential energy efficiency market reach a scale at which the 25% goal is feasible. Carbon pricing is an important potential revenue source, as other states and communities have demonstrated.

Develop a community-wide picture of home energy efficiency opportunities. Tracking and analyzing residential energy consumption data, with appropriate privacy protections and in user-friendly formats (e.g., a building stock profile), will be foundational to targeting policy/program investments and tracking progress toward achieving energy and climate goals. This analysis will require significantly deeper data sharing and collaboration with utilities.



Mission Zero House - Net Zero Energy Home pursuing certification under the Living Building Challenge. photo: Matt Grocoff

Work with real estate stakeholders to report and market energy efficiency in home sales. Successful initiatives to account for energy consumption in the real estate market can spur greater demand for energy efficient homes, and will require significant partnership with realtors and home inspectors to raise awareness about the value of home energy performance.

Design programs and policies that work hand-in-hand, and partner with utility programs and experienced community organizations that have had proven success. To achieve significant carbon and energy reduction in the building stock will require a coordinated suite of program and policy actions, not one-off interventions. Utilities and existing community retrofit programs have important operational knowledge, market savvy, and contractor networks necessary to launch or expand multi-faceted initiatives. In exchange for influence over program design, local governments should expect to contribute matching funds and other tangible value, such as marketing resources, to potential partnerships.

Advocate for utility regulation and regional energy efficiency goals to place a high priority on carbon reduction, on par with other metrics. Local governments can and should press

for utilities and utility regulators to include carbon reduction in how they measure the value of energy savings investments. This shift would encourage reduction of dirty electricity and fossil fuels for heating (e.g., heating oil and natural gas).

Conclusion

Upgrading the residential building sector is an essential component of the King County-Cities Climate Collaboration's long-term carbon reduction work program, but the road to achieve deep energy efficiency is challenging. Only with a bold commitment to the range of strategies outlined above, from voluntary initiatives to mandates, and a reliable funding source, will King County jurisdictions have a chance of achieving their ambitious 25% building energy use reduction goal.

Endnotes

Photo credits for page 1: U.S. Navy (left), Climate Solutions (right)

¹ For the purpose of this paper, New Energy Cities uses the American Council on an Energy-Efficient Economy's definition of deep energy retrofits: "[those that] save 50 percent or more of the energy used on site in a home as compared to actual pre-retrofit usage or an estimate of energy use based on housing and climate characteristics." Rachel Cluett and Jennifer Amann, "Residential Deep Energy Retrofits," ACEEE, March 11, 2014, <http://aceee.org/research-report/a1401>.

² The U.S. Department of Energy State and Local Solution Center offers detailed guidance on how to design and implement a community energy efficiency program. "State and Local Solution Center | Department of Energy," Energy.gov | Office of Energy Efficiency & Renewable Energy, accessed August 13, 2015, <http://energy.gov/eere/slsc/state-and-local-solution-center>.

³ This data comes from a Better Buildings Residential summary report. "Better Buildings Neighborhood Program Summary," September 2014, http://energy.gov/sites/prod/files/2014/09/f18/bbnp_summary_reported_data_9-15-2014.pdf.

⁴ This observation is based on a phone interview with WSU Extension Energy Program managers, who also noted that upgrades to newer homes are not likely to achieve 25% reduction, so deeper reductions in older homes would be necessary to meet an overall 25% reduction.

⁵ Policymakers have some key indicators already available to them. For example, Chuck Murray at the Washington State Department of Commerce recently made an estimate of residential energy efficiency upgrade potential based on the RBSA, and drew the following conclusions: 1) many older homes have poor insulation and single-pane windows; 2) duct leakage and air leakage remained a major issue for new homes until 2001; and 3) new homes are still constructed with electric resistance heating, even though heat pumps are preferable from an energy efficiency standpoint. Because this analysis is at the aggregate level, the question still remains how to identify and approach these households, but such information can help guide high-level policy and program decisions.

⁶ As of March 2015, Clean Technica reported that the California carbon market generated over \$1 billion for "clean energy and emissions reduction projects, consumer bill relief, and government operations." Silvio Maracci, "California Carbon Market Nets \$1 Billion For Clean Energy," Clean Technica, March 12, 2015, <http://cleantechnica.com/2015/03/12/california-carbon-market-nets-1-billion-clean-energy/>. The *Investment of RGGI Proceeds through 2013* report indicates that "more than \$1 billion in RGGI auction proceeds were invested in programs including energy efficiency, clean and renewable energy, greenhouse gas abatement, and direct bill assistance. Energy efficiency [received] the largest share of investments, and has been widely proven to be one of the most cost-effective ways to reduce pollution while driving economic growth." "Home," Regional Greenhouse Gas Initiative (RGGI) CO2 Budget Trading Program, accessed August 13, 2015, <http://www.rggi.org/>.

⁷ Some utilities will reportedly reduce their weatherization incentives in the fall due to a [revision of estimated energy savings](#) by the Northwest Power Planning Council. Jennifer Anziano, "Is EE Residential Dating the Grim Reaper And, If So, How Come and What Now," accessed August 13, 2015, <https://vimeo.com/126318695>.

⁸ In a 2012 paper, "Valuing Energy Efficiency in the Real Estate Community," ACEEE described barriers and opportunities to engaging the numerous and diverse players in local real estate markets on the benefits of home energy performance. Cynthia Adams, "Valuing Energy Efficiency in the Real Estate Community," ACEEE Summer Study on Energy Efficiency in Buildings, 2012, <http://aceee.org/files/proceedings/2012/data/papers/0193-000209.pdf>.

⁹ Chris Mooney, "How to Get the Real Estate Market to Properly Value Green Homes," *The Washington Post*, May 28, 2015, <http://www.washingtonpost.com/news/energy-environment/wp/2015/05/28/how-to-make-the-real-estate-market-value-green-homes-for-what-theyre-really-worth/>.

¹⁰ Energy Trust of Oregon. "EPS and Solar Valuation Study." Conservation Advisory Council meeting notes. March 11, 2015, http://assets.energytrust.org/api/assets/meetings-cac/CAC_Notes_150311.pdf.

¹¹ The national Council of Multiple Listing Services (MLS) has recently joined the US DOE's Better Buildings Residential network, a positive sign that MLSes nationwide may be likelier to include energy efficiency information in the future.

¹² Examples are current as of 2013; in the past two years, more cities and states have passed building energy benchmarking laws, especially in the commercial sector. See the Institute for Market Transformation website for more information on commercial and multifamily building energy benchmarking. "Building Energy Performance Policy," accessed August 13, 2015, <http://www.imt.org/policy/building-energy-performance-policy>.

¹³ The Washington State Energy Code requires new residential construction to disclose the energy efficiency of building components and systems on an energy certificate affixed to the home electrical panel. "2012 WSEC Residential Energy Compliance Certificate," accessed August 14, 2015, http://www.energy.wsu.edu/Documents/WSEC-2012-Avery-6573_2_Per_Sheet.pdf.

¹⁴ Seattle requires that commercial and multifamily building owners report annual energy use, but does not have a single-family residential requirement. "Energy Benchmarking - Environment," Seattle.gov, accessed August 13, 2015, <http://www.seattle.gov/environment/buildings-and-energy/energy-benchmarking-and-reporting>.

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- Dulcey Simpkins, City of Seattle
- Derek Smith, formerly Clean Energy Works
- Ramsey Zimmerman, Thurston Energy

Strategic Innovation

ClimateSolutions.org/programs

1402 Third Avenue, Suite 1305
Seattle, WA 98105

Eileen V. Quigley

Director of Strategic Innovation

eileen@climatesolutions.org

206.443.9570 x209 (direct)

206.454.3176

Elizabeth Willmott

New Energy Cities Program Manager

elizabeth@climatesolutions.org

206.443.9570 x210 (direct)

206.454.3177

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PRACTICAL SOLUTIONS TO GLOBAL WARMING

SEATTLE
1402 Third Avenue, Suite 1305
Seattle, WA 98101
Phone: 206.443.9570

OLYMPIA
219 Legion Way SW, Suite 201
Olympia, WA 98501
Phone: 360.352.1763

PORTLAND
610 SW Broadway, Suite 306
Portland, OR 97205
Phone: 503.206.4837

www.climatesolutions.org