5-13-2013

Growing Washington's Clean Energy Economy

University of Washington Technology Law and Public Policy Clinic

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May 13, 2013

Technology Law & Public Policy Clinic
University of Washington School of Law

ABSTRACT

Clean energy technologies have begun to transform the national economy. Growth in this sector is expected to be as high as four-fold, generating more than $2 trillion per year by 2020. Washington State has historically been a leader in the field by pursuing low-carbon energy policies, such as renewable portfolio standards and green building codes. But as competition increases, Washington needs to continue to improve to stay on top. This report presents a package of proposals that address policy and technical barriers to developing Washington State's clean energy economy.

THE UNIVERSITY OF WASHINGTON TECHNOLOGY LAW & PUBLIC POLICY CLINIC

The University of Washington Tech Law and Public Policy Clinic was convened at the request of Representative John McCoy to provide the Washington Legislature with a set of policies to promote the use of clean energy technologies through distributed generation as well as encourage energy conservation and efficiency. The Clinic operates under the direction of Professor William Covington and is comprised of second and third year law students as well as LL.M candidates at the University of Washington School of Law. The Clinic and its members welcome feedback from interested parties in order to better adapt the recommendations described here to the real-world problems faced by all stakeholders in Washington's clean energy economy.

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EXECUTIVE SUMMARY

Clean energy technologies have begun to transform the national economy. Growth in this sector is expected to be as high as four-fold, generating more than $2 trillion per year by 2020. Washington State has historically been a leader in the field by pursuing low-carbon energy policies, such as renewable portfolio standards and green building codes. But as competition increases, Washington needs to continue to improve to stay on top.

Increasing investment in distributed generation, energy efficiency, and conservation has been identified as the future for Washington State by the Legislature, two Governors (both Gregoire and Inslee), the Washington Department of Commerce, the Northwest Power and Conservation Council, and the people themselves (in passing I-937, the Energy Independence Act).

Installation of Rooftop DG Facility

To this chorus of supporting voices, we add our own. Investments in clean energy technologies promotes energy independence, creates clean tech jobs, safeguards our natural resources, reduces greenhouse gas emissions, protects against environmental degradation, and maintains low energy costs throughout the state. Consequently, the State should consider all manner of policies to support these investments.

We have identified several policy and technical barriers to developing Washington State's clean energy economy. The following is a series of recommendations on eight policy areas that are critical to this issue:

1. Distributed generation
2. Energy efficient buildings
3. Cogeneration
4. Increasing affordability
5. Net Metering
6. Plug-in electric vehicles
7. Amendments to the EIA
8. Decoupling

For more information on any of the issues raised here or to receive a copy of the comprehensive report, *Growing Washington's Clean Energy Economy*, please contact us using the information below.

1. DISTRIBUTED GENERATION

Distributed generation (DG) refers to electrical generating capacity that is located at the source of its use, such as solar panels on the roof of a building or a wind turbine on a farm. DG is thought to have great potential to improve efficiency and reduce greenhouse gas

emissions. While the current regime of incentives in Washington state support a more vibrant clean-energy economy than would otherwise exist, it could nevertheless be optimized with a more scientific approach.

Washington should encourage region-specific life-cycle assessment (LCA) and economic assessment of distributed generation technologies to assist in future policy developments, coordinating with ongoing progress in that arena by the Utilities and Transportation Commission (UTC). To do this, it should commission two reports. The first would be a comprehensive LCA report on distributed generation in Washington State. The second would be on the economic incentives needed to adequately support a sustainable level of distributed generation capacity as determined by LCA.

Projected LCA Results by Technology in WA

Technology	(Simplified) Life-cycle weighted ratings	(Simplified) Incentives ($/KHW)
Biodigesters	A	$0.15
Cogeneration	A-	$0.00
Wind	B	$0.12 - $0.33
Solar	C	$0.15 - $1.08

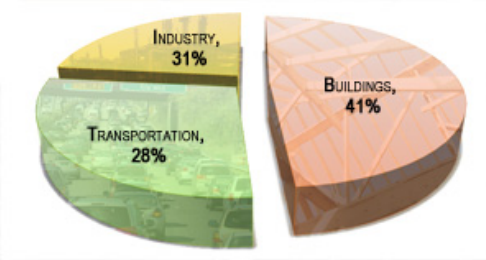
Based on a summary of LCA findings, the following grades are likely to result from a formal study of the DG technologies under consideration, compared to the current range of incentives.

Looking forward, the legislature should revisit the overarching scheme of incentives that apply to DG after a review of such a report, and either delegate authority (*e.g.*, to the UTC) to adjust incentives on a per-technology basis, or adjust the incentive scheme periodically to align the promotion of DG technologies with their relative environmental and economic benefit.

2. ENERGY EFFICIENT BUILDINGS

Buildings consume prodigious amounts of energy, accounting for 31% of total energy consumption in Washington State. Although buildings tend to waste most of their energy through inefficiencies, this can be easily avoided through low technology conservation and efficiency measures. The technologies behind these upgrades are easily achievable, and it is estimated that conservation can meet 85% of the expected energy needs of the Pacific Northwest over the next 20 years.

U.S. GHG Emissions by Sector



Washington can jump to the national forefront in efficiency by: (1) assigning energy performance ratings for buildings, (2) instituting outcome-based building codes, (3) requiring that newly constructed buildings be "renewable ready," (4) creating minimum standards for rental and low-income housing, (5) launching a marketing campaign to raise awareness of basic efficient home operating practices and new developments in efficiency technology that are available today, (6) establishing financial incentives to implementing clean energy upgrades, and (7) leading by example through the construction of green government buildings.

3. COGENERATION (COMBINED HEAD-AND-POWER)

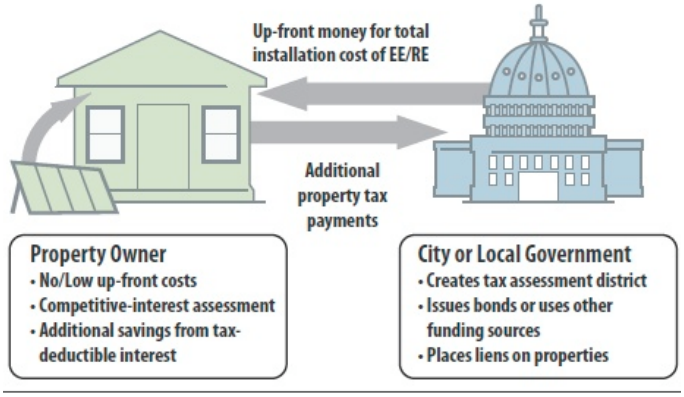
Cogeneration, also known as combined heat and power (CHP), captures waste heat produced by electric generators and puts it to useful work. The recaptured heat is then used to heat buildings or even to generate more electricity by creating steam to run a turbine. In so doing, CHP dramatically increases the efficiency of thermal electric generators by up to 90%, far exceeding that of traditional power plants. And unlike many other technologies that reduce GHGs in the atmosphere (such as reforestation, solar panels, and wind power), CHP delivers a negative marginal cost—meaning that installing a CHP plant actually generates positive economic returns.

Despite CHP's great potential to save energy, it has been slow to gain popularity as it doesn't capture the imagination quite like solar panels or wind turbines. Cogeneration is particularly well suited to Washington State because the power generated coincides with generation needs. In the winter—when hydropower is less plentiful and energy use peaks—CHP can offset heating needs while generating clean and efficiency electricity. The federal government has recognized this, and the U.S. Department of Energy and the Obama administration have launched an aggressive program to ramp up cogeneration plants by 50% by 2020. Washington should follow suit and incentivize this powerful technology.

4. INCREASING AFFORDABILITY

The installation of the clean energy technologies described here has lagged due in part to high up-front capital costs. Various financial incentives currently exist under Washington State law, but these programs have so far proved insufficient to encourage investment in this area. The state should play a leading role in encouraging such investments by enabling low-cost financing options through the creation of a statutory financial mechanism.

PACE Financing Mechanism



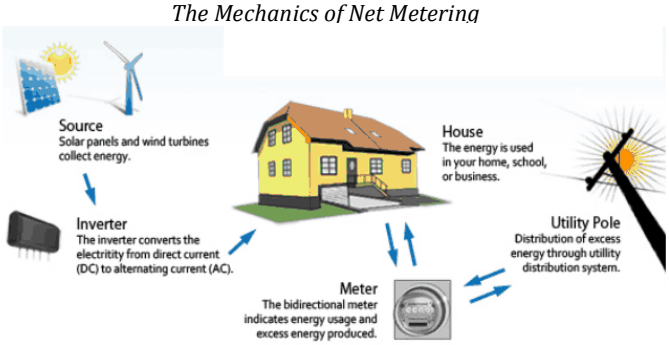
Specifically, the Washington legislature should pass Property Assessed Clean Energy (PACE) program enabling legislation. PACE programs provide property owners with the funds to install renewable distributed energy or perform energy conservation upgrades to their buildings. Those funds would then be paid back through property tax assessments over a period of up to 20 years. Such programs provide an innovative method of financing clean energy upgrades that does not add to the state budget.

So far, 28 states and the District of Columbia have enacted PACE enabling legislation. In fact, Washington stands as the only state on the West Coast to not have such laws in place. Washington should join with these jurisdictions and pass PACE enabling legislation.

5. NET METERING

Net metering enables individuals who generate their own power to feed unused energy back into the power grid. This benefits individuals through increased stability of the energy supply, and benefits the state by increasing possibilities for development of clean and renewable energy sources.

The Mechanics of Net Metering



Current laws limit how individuals in Washington can connect their distributed generation to the power grid, thereby inhibiting the broad adoption of this technology. In response, the Washington net metering statutory scheme should be amended to (1) increase the Cumulative Net Metering Generation Capacity to 1% of a Utility's Peak Load in 1996 by 2020; (2) expand the definition of "customer-generator" to include customers that owns and operates, leases and operates, or contracts with a third-party that owns or operates a net metering system; and (3) increase the net metering system size from 100 kilowatts (kW) to 200 kW. These three proposals involve small and reasonable changes, and so finding consensus on them should not be overly difficult. Once the three policy changes have been implemented, the state should consider innovating in the areas of rollover energy credits and virtual net metering.

6. PLUG-IN ELECTRIC VEHICLES

A "plug-in electric vehicle" (PEV) is any car or truck that can be charged from an external source of electricity, such as a wall socket. These vehicles can be "all-electric" (running on electricity only) or "plug-in hybrids" (running on both electricity and liquid fuels)." By running purely on electricity, PEVs are free from having to rely on gasoline, providing an economic benefit to the owner as well as numerous greater benefits to society. However, PEVs have yet to be accepted in the general marketplace, largely due to consumers' "range anxiety," or the fear that a PEV would be unable to get the driver to her destination.

To address this concern, Washington should ensure that the infrastructure necessary for PEVs gets built-out, particularly new PEV charging stations. This would put Washington at the national forefront of this technology, while also attracting investment dollars to the state and creating new jobs.

7. AMENDMENTS TO THE EIA (I-937)

The Energy Independence Act (EIA) aimed to ensure that new energy growth utilizes clean technologies and that energy costs remain low into the future. In order to best achieve these goals, we recommend that the legislature adopts several amendments to the EIA that will provide greater flexibility and cost-effective implementation of the conservation and renewable energy standards. Many of the suggested amendments will also advance Washington State's goal of promoting distributed energy.

First, the definition of "eligible renewable resource" should be expanded to include facilities utilizing anaerobic digesters that capture and destroy methane by allowing these facilities to "unbundle" their power and non-power attributes into renewable energy credits and carbon reduction credits. This will encourage the development of this technology, which is an important alternative method of energy production because it reduces carbon as well as generating energy.

Renewable Energy Generation in Eastern Washington

Second, the definition of "eligible renewable resource" should also be expanded to include two specific conservation technologies: cogeneration and net metering. To provide greater incentive for these clean technologies, the amendment could allow for double output qualification as a source of "distributed generation."

Finally, the current definition of "cogeneration" is poorly written and should be clarified with more technology-neutral language. Because cogeneration can advance the efforts of both conservation and generation, a clear definition is important.

8. DECOUPLING

Decoupling encourages utilities to invest in energy efficiency and conservation by separating their profits from the amount of energy used by consumers. Once decoupled, a utility's profits are no longer determined by the amount of electricity or natural gas the utility sells. In order to decouple, a utility must receive approval from the Washington Utilities and Transportation Commission (UTC). The UTC has administrative authority to approve decoupling proposals, and even issued a policy statement on decoupling in 2010. Yet, none of Washington's Investor Owned Utilities (IOUs) is currently decoupled and so the state is missing out on the benefits that this policy can bring.

Notably, existing barriers to utility decoupling are administrative, rather than legislative. Given that the UTC already possesses the authority to approve decoupling proposals, the legislature need not address decoupling through legislation at this time.

INTRODUCTION: GROWING WASHINGTON'S CLEAN ENERGY ECONOMY

This report has been produced at the request of Representative John McCoy, former Chair of the Technology & Economic Development Committee. The charge was to craft a set of proposals to build upon Washington's green energy initiatives, specifically state policies as they relate to distributed renewable energy generation as well as energy conservation and efficiency.

Clean energy technologies have begun to transform the national economy. Growth in this sector is expected to be as high as four-fold, generating more than $2 trillion per year by 2020. Washington State has historically been a leader in the field by pursuing low-carbon energy policies such as renewable portfolio standards and green building codes. But as competition increases, Washington needs to continue to improve to stay on top.

Increasing investment in distributed generation, energy efficiency, and conservation has been identified as the future for Washington State by the Legislature, the Governor (both Gregoire and Inslee), the Washington Department of Commerce, the Northwest Power and Conservation Council, and the people themselves (in passing I-937, the Energy Independence Act). To this chorus of supporting voices, we add our own. Investments in clean energy technologies promotes energy independence, creates clean tech jobs, safeguards our natural resources, reduces greenhouse gas emissions, protects against environmental degradation, and maintains low energy costs throughout the state. Consequently, the State should consider all manner of policies to support these investments.

We have identified several policy and technical barriers to developing Washington State's green energy economy. This Summary includes our findings to date as well as recommendations on the following policy areas:

1. Structuring incentives for distributed generation
2. Energy conservation and efficiency in buildings
3. Cogeneration
4. Financial mechanisms to encourage investment
5. Net metering
6. Smart grid technologies & electric vehicles
7. Energy Independence Act amendments
8. Decoupling

We welcome feedback from interested parties in order to better adapt the recommendations described here to the real-world problems faced by all participants in Washington's green energy economy.

1. STRUCTURING INCENTIVES FOR DISTRIBUTED GENERATION

SUMMARY

In the course of investigating Washington State policy relating to distributed generation (DG), we considered the technical advantages and disadvantages of DG technologies with respect to environmental concerns, grid compatibility, and economics. We find that while the current regime of incentives support a more vibrant clean-energy economy than would otherwise exist, it could nevertheless be optimized with a more scientific approach.

The state should encourage region-specific life-cycle assessment (LCA) and economic assessment of distributed generation technologies to assist in future policy developments, coordinating with ongoing progress in that arena by the Washington Utilities and Transportation Commission (UTC). To do this, it should commission two reports. The first would be a comprehensive LCA report on distributed generation in Washington State, particularly aimed at determining (a) the upper bound on the practical distributed generation capacity that can be supported for each technology type and for the mix, and (b) the best-case DG mix. The second would be a comprehensive report on the economic incentives needed to adequately support a sustainable level of distributed generation capacity as determined by LCA.

Looking forward, we suggest that the legislature revisit the overarching scheme of incentives that apply to DG after a review of such a report, and either delegate authority (*e.g.* to the UTC) to adjust incentives on a per-technology basis, or adjust the incentive scheme periodically to align the promotion of DG technologies with their relative environmental and economic benefit.

BACKGROUND

This section will define the relevant concepts to the discussion of how best to structure incentives for distributed generation. Then, it will explain the current legislative scheme in Washington for DG incentives.

DEFINING SCIENTIFIC TERMS

To best analyze the current DG incentive scheme in Washington State, it will be helpful to have some understanding of the scientific terms used in this discussion.

Distributed Generation

Distributed generation (DG) is colloquially defined as a catch-all term encompassing electrical generating capacity that is co-located with demand, in particular generating capacity owned and operated by an entity that is typically an end-user or customer rather than an electric utility. Similarly, the state of Washington has

adopted for purposes of the Energy Independence Act a slightly narrower definition: an eligible renewable resource where the generation facility or any integrated cluster of such facilities has a generating capacity of not more than five megawatts.[1]

For purposes of this section we adopt the colloquial definition except where specified, in order to encompass non-utility, decentralized power generation that may exceed the generating capacity and "eligible renewable resource" limitations stated above.

Life-Cycle Assessment

For purposes of our primary investigation, we performed a survey of life-cycle assessment (LCA) research on the topic of distributed generation technologies, seeking to estimate the efficacy of the above technologies through the particular lens of the Pacific Northwest.

LCA is a form of analysis applied by engineers that looks at global inputs and outputs of products or systems. These inputs and outputs are broken down into simplest terms: raw materials consumed and energy consumed, total pollutants and waste emitted, and even "disability-adjusted life years", or the estimated human cost of the emitted pollutants. An LCA is non-economic in nature, and fundamentally different from a return on investment (ROI).

LCA is formally defined by the United States Environmental Protection Agency as a technique to assess the environmental aspects and potential impacts associated with a product, process, or service, by:

- Compiling an inventory of relevant energy and material inputs and environmental releases
- Evaluating the potential environmental impacts associated with identified inputs and releases
- Interpreting the results to help you make a more informed decision[2]

Energy Pay-Back Time (EPT)

Sources of renewable energy often result in irrecoverable costs in non-renewable resources during their construction, operation and disposal. These costs are considered in LCA. One measure of the efficacy of a renewable energy device or technology is the period of time during which a renewable energy system must operate in order to compensate for the environmental impacts associated with its life cycle, or "energy pay-back time" (EPT). EPT is approximate, and calculations can vary depending on how various environmental impacts are weighted (e.g., greenhouse-gas emissions, impact on human health). If the energy pay-back period

is close to or exceeds the likely useful life of the renewable energy system, then the system has no positive impact.

Note that EPT for the same renewable energy system will vary depending on where it is used for two reasons: (1) the renewable energy resource density will vary, and (2) part of the EPT depends on the energy mix that it replaces – this can be thought of as a problem of "diminishing returns".

Lifetime Energy Production (LEP)

The lifetime energy production (LEP) of a renewable energy system is the ratio of EPT to the projected useful life of the device or system. For example, if a solar panel has an EPT of 5 years, and a useful life of 20 years, its LEP is 4 (or less, if the energy produced degrades over time).

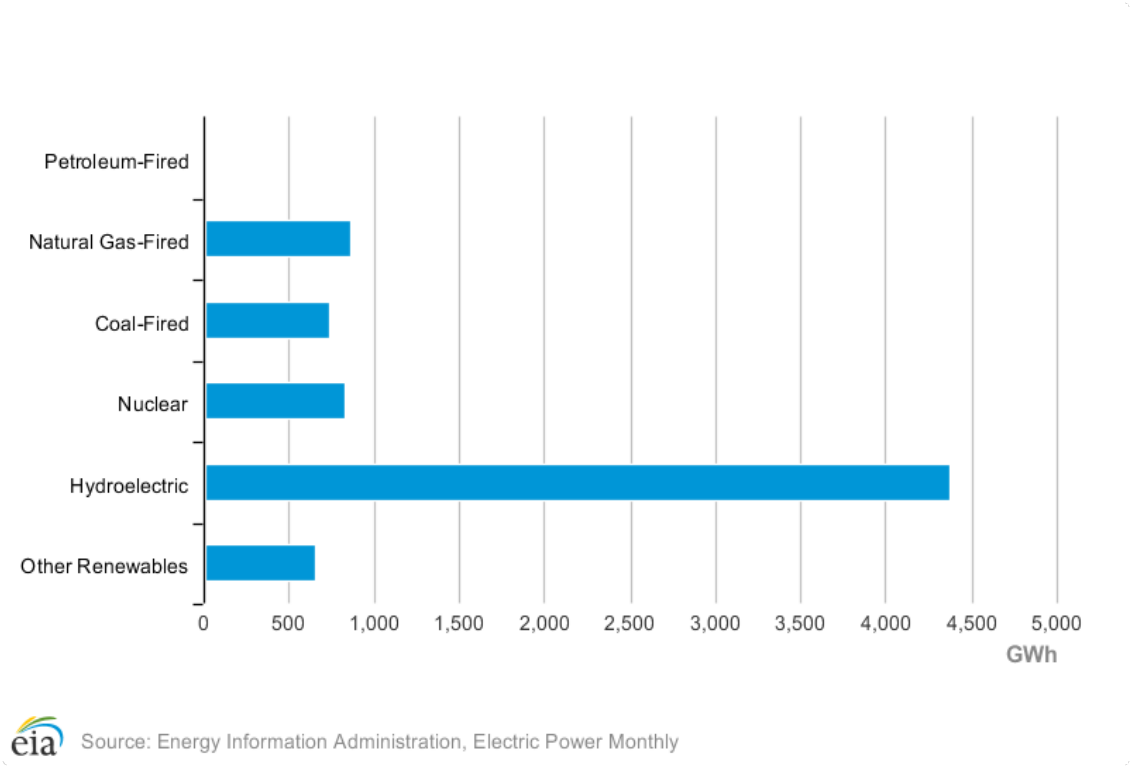
THE WASHINGTON STATE DG INCENTIVE SCHEME

We considered the following four types of distributed generation:

1. Solar (photovoltaic and similar)
2. Wind turbines
3. Bio-digesters
4. Cogeneration (combined heat and power)

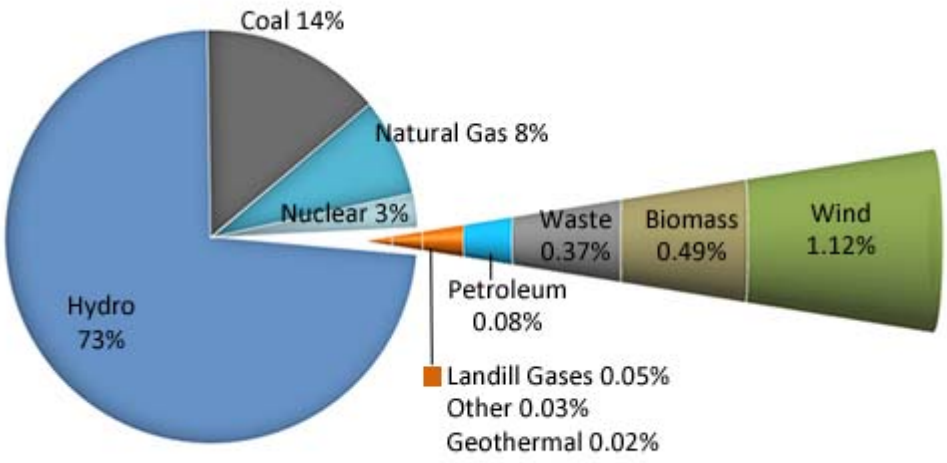
We discovered that no life-cycle assessment papers exist which specifically address the particular ecology or economy of the Pacific Northwest. Our extensive hydroelectric infrastructure introduces unique facets to the problem.

Washington Net Electricity Generation by Source



Although data available from the Energy Information Administration (EIA) is not as current for other states as it is for Washington at this time, a comparison outside of the Pacific Northwest is telling. Washington generated 5,759 thousand megawatt-hours of hydro-based electricity in 2011, more than that produced by the two next largest producers combined (Oregon and New York). Hydroelectric power contributed approximately 8% of electrical power resources nationwide in 2011, but 73% in Washington State.

Energy Mix in Washington State



Source: Washington State Department of Commerce

However, we note that Washington State has already taken strides to implement a robust portfolio of renewable resources, in line with the recently approved initiative I-937[3]. These efforts have resulted in an extensive investment in renewable energy, particularly in wind power, which contributes the majority of non-hydroelectric renewable power to the grid in Washington.

The problem, in summary, is that Washington State's incentive scheme to promote the adoption of non-hydroelectric renewable energy, although highly productive, has been implemented without access to appropriate LCA data. Thus, there is a risk that Washington's growing "clean economy" is based on conventions that may be inappropriate for the region.

RENEWABLE ENERGY IS AGGRESSIVELY PROMOTED IN WASHINGTON STATE

A survey of the incentive scheme was conducted by this Clinic in 2011-2012 by Bruce Johnson (student), culminating in the following data set, which has been updated. Incentives are provided by a combination of a base incentive rate (or tax credit), increased by an incentive multiplier, accumulating in the following effective incentive rates, sorted by technology.[4,5]

Renewable Energy Incentives in Washington State

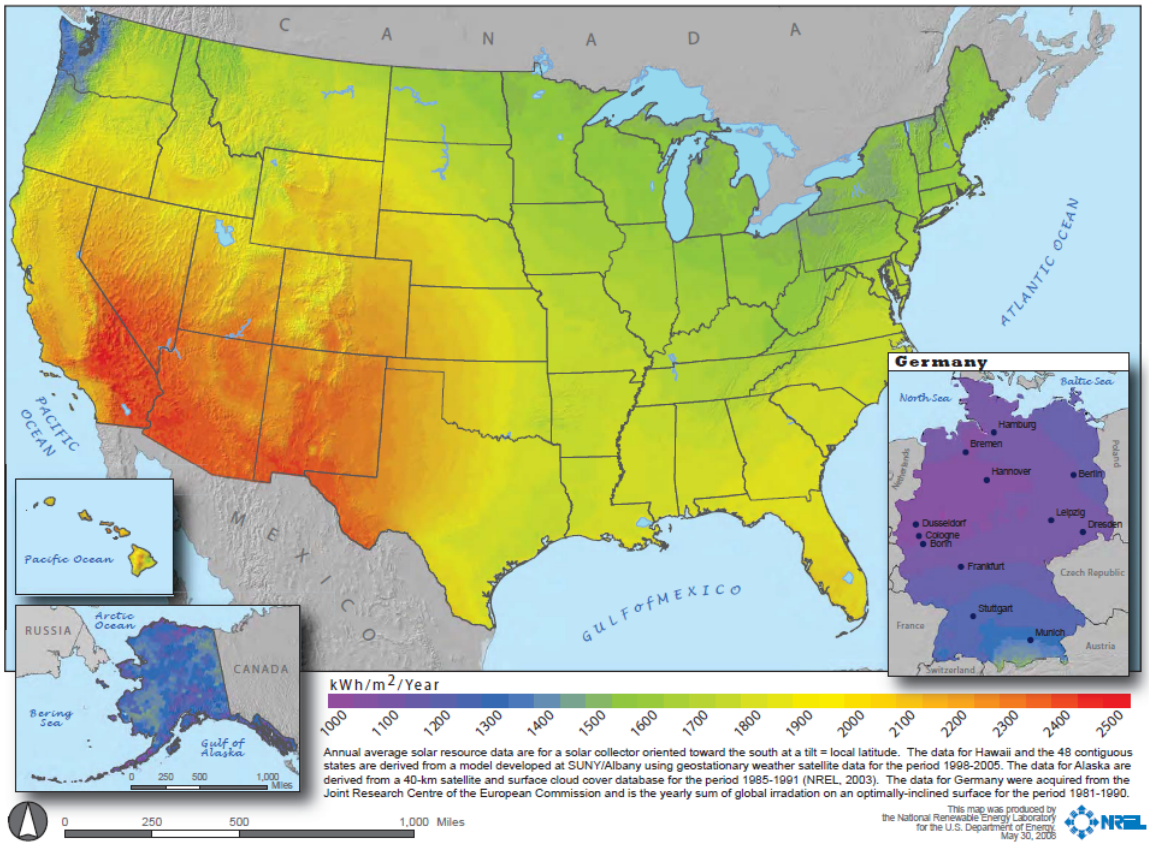
Technology	Incentive Multiplier	Total Incentive per KWH
Biodigesters	1.0	$0.15
Wind	0.8	$0.12
- Washington-made blades	1.0	$0.15
- Washington-made generator	1.2	$0.18
- both Washington-made generator and blades	2.2	$0.33
Solar	1.0	$0.15
- Washington-made panels	2.4	$0.36
- Washington-made power inverter	1.2	$0.18
- both Washington-made panels and inverter	3.6	$0.54
Community Solar (Base rate $0.30)	1.0	$0.30
- Washington-made panels	2.4	$0.72
- Washington-made power inverter	1.2	$0.36
- both Washington-made panels and inverter	3.6	$1.08

In summary, photovoltaic systems are heavily subsidized compared to wind power, waste (biodigesters), and combined heat/power recovery (CHP), which is not currently incentivized. In addition, the total levels of incentive are very high,

Solar Power is Not Guaranteed Positive in the PNW

A survey of LCA results in similar climatic zones in Europe, particularly in Germany where distributed wind power is heavily used, paints a mixed picture of the appropriate place for solar generation in our regional energy mix.

Photovoltaic Solar Resource: United State and Germany

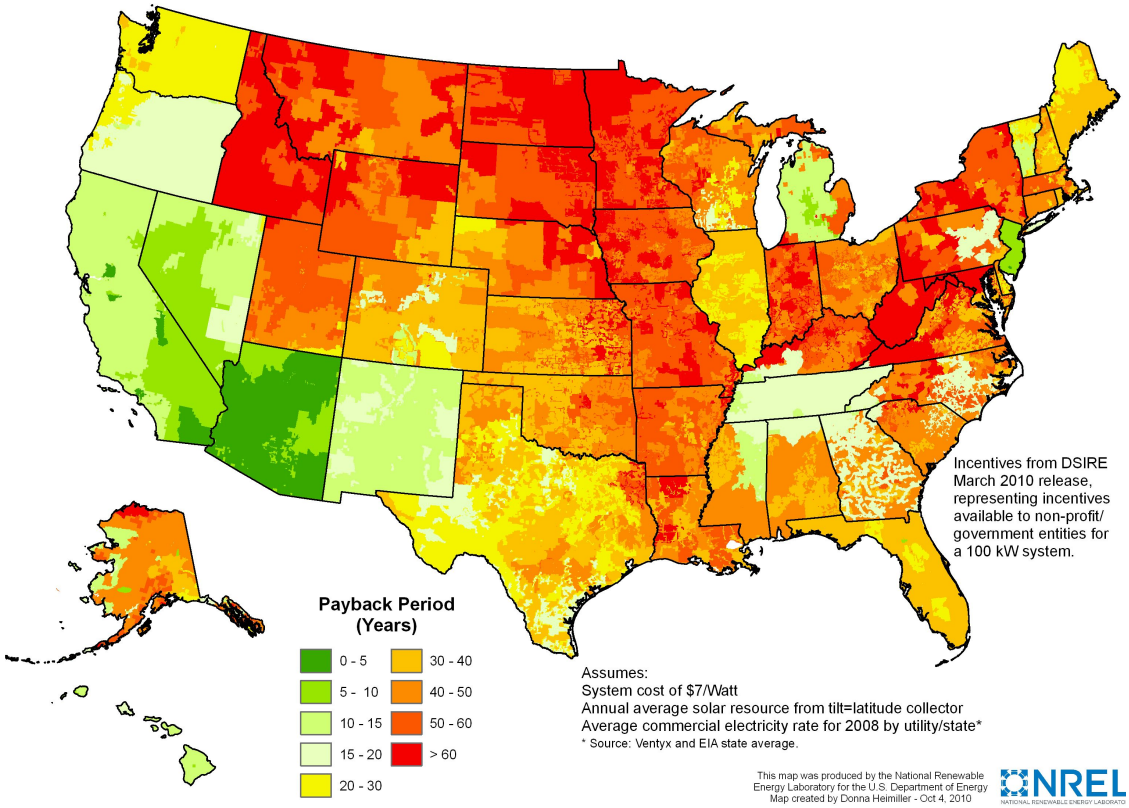


Source: National Renewable Energy Laboratories

The Pacific Northwest and particularly western Washington State receive substantially lower levels of solar irradiance than most of the contiguous United States. Photovoltaic solar power is concomitantly less efficient. However, based on LCA results on solar power systems in comparable climates (Belgium, the U.K., Germany, and Sweden), solar power may still present a positive energy return against its materials cost. The survey results in considering European LCA data from regions with similar climate and irradiance as western Washington State may still result in an energy pay-back period of five years for regions of low solar irradiation[6,7]. While a 5-year EPT still compares positively with a projected 20-year life of solar PV equipment, a shorter (2-3 year) EPT is more ideal.

However, and problematically, the power mix in Europe differs from that in the U.S., much as the power mix in the Pacific Northwest differs from that in the rest of the country. Specifically, the energy mix in the PNW is substantially cleaner than average, as it is rooted in a predominantly hydroelectric power base. Also, the energy mix in the PNW is significantly cheaper than the national average as well, resulting in projected *economic* pay-back times that are much longer.[8]

Simple Payback Period for Photovoltaic Systems



Source: National Renewable Energy Laboratories

Thus, solar power has significant potential disadvantages in the PNW based on both its high probable EPT based on LCA, and its high nominal economic pay-back period.

RECOMMENDATIONS

Other forms of DG such as wind[9], micro-hydro, biodigesters, and cogeneration (combined heat and power)[10] carry more favorable life-cycle returns. We propose that an incentive scheme to encourage investment in DG should have adequate LCA support, in agreement with the LCA community[11] and the state Department of Commerce.[12] Publications on this

topic are pending from the LCA community, but not necessarily targeting the unique energy mix of Washington State.

The UTC in collaboration with stakeholder groups has requested that the legislature develop or delegate to establish a sophisticated system to properly assign incentives to DG on a per-technology basis, based on the complex of costs and benefits associated with each.[13] Our preliminary analysis concludes that the current incentive levels assigned to DG systems are not wholly commensurate with the economic and ecological benefits of the technologies. We agree with the UTC's conclusion that a formal study of distributed generation should be enacted, and propose that it contain both life-cycle and economic analysis.

Based on a summary of LCA findings, we project that the following grades are likely to result from a formal study of the DG technologies under consideration, compared to the current range of incentives currently offered.

Rough Projection of Possible LCA Results related to Various DG Technologies in the PNW

Technology	(Simplified) Life-cycle weighted ratings	(Simplified) Incentives ($/KHW)
Biodigesters	A	$0.15
Cogeneration	A-	$0.00
Wind	B	$0.12 - $0.33
Solar	C	$0.15 - $1.08

2. ENERGY EFFICIENT BUILDINGS

SUMMARY

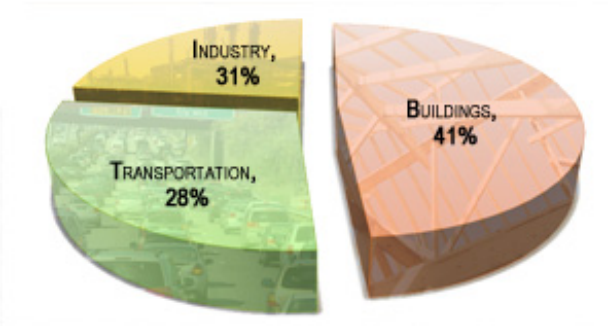
Buildings consume prodigious amounts of energy, however much of the building energy is wasted through inefficiencies. Indeed, most of the building sector's energy waste is easily avoidable through low technology conservation and efficiency policies. The technologies behind these upgrades are easily achievable, and it is estimated that conservation can meet 85% of the expected energy needs of the Pacific Northwest over the next 20 years.[14]

Washington can jump to the national forefront in efficiency by: (1) assigning energy performance ratings for buildings, (2) instituting outcome-based building codes, (3) requiring that newly constructed buildings be "renewable ready," (3) creating minimum standards for rental and low-income housing, and (4) launching a marketing campaign to raise awareness of basic efficient home operating practices and new developments in efficiency technology that are available today.

BACKGROUND

Buildings consume prodigious amounts of energy, the United States buildings sector alone accounts for 7% of the entire global energy consumption. Within the country, America's buildings consume 72% of the nation's electricity and are responsible for 40% of all greenhouse gas emissions. In Washington, residential and commercial buildings account for a whopping 31% of our energy consumption. However, most of the building energy is wasted through avoidable inefficiencies such as heat escaping out of improperly insulated buildings, outdated water heating technology, and uninformed operating practices like leaving the heater on when not at home. Because of this, much of the wasted energy can be easily saved through simple conservation measures.

U.S. Energy Consumption by Sector



Source: U.S. Energy Information Administration Annual Energy Review 2011

BUILDING EFFICIENCY UPGRADES

Building efficiency deals with how a building can use less energy to operate the same services. There are a wide range of measures which contribute to a building's use of energy, they fall into the following categories:

Bioclimatic Architecture

Bioclimatic architecture takes into account climate and environmental conditions when constructing a building in order to maximize energy use. Examples of this approach include purposefully designing the shape of the building to reduce the surface area that contacts the exterior and orienting the building towards the sun to make the best use of sunlight, solar energy, and heat.

Thermal Insulation

Thermal insulation consists of insulating a building envelope to reduce thermal energy loss. Examples of this approach include utilizing insulation with high thermal resistance (R Value) in walls, roofs, and floors, and examining the thermal conductivity of materials like windows that pass light but retain heat.

Air Tightness (Infiltration & Exfiltration)

Air tightness refers to reducing the flow of air leakage through gaps and cracks in the building envelope. Examples of this approach include sealing gaps in a drafty attic and weather stripping windows.

Percentage of Residential Heat Loss

Source: StormDry

Ventilation

Ventilation systems design the controlled and intentional flow of air through a building to maintain fresh air, minimize humidity, and capture the thermal energy from the air

before leaving the building. Examples of improvements to ventilation include having a proper heating, ventilation, and air conditioning system (HVAC) and utilizing a heat exchanger to capture the thermal energy from the exiting air.

Fixtures

Fixtures installed in buildings consume significant energy, rendering the incorporation of efficient fixtures all the more important. Examples of this approach include replacing a conventional hot water heater with a tankless water heater, heat pump, or solar hot water heater, as well as choosing super-efficient LED lighting instead of incandescent light bulbs.

Monitoring

Monitoring devices that provide immediate feedback on a home's energy consumption allow consumers to become aware of their energy use and take steps to curtail it. Examples of this approach include Lowe's Iris, Kill-A-Watt, or OPower monitoring devices, which make real-time energy consumption visible to consumers.

Behavior

Behavior refers to how individuals or organizations operate the buildings they reside in.[15,16] Examples of improved behavior include turning the lights and the heater off when not at home and using home energy scorecards to compete against your neighbors on energy efficiency.

SIMPLE TECHNOLOGIES CARRY GREAT POTENTIAL

The technologies behind conservation and energy efficiency upgrades are hardly cutting edge, but have huge potential. The simplicity of energy efficiency has proven to be a low-cost, low-risk investment over the last 30 years, saving an average of three Seattle-sized cities worth of power since 1978.[17] Conservation is so effective that the average cost of energy efficiency is estimated to be $36 per megawatt-hour, compared to $92 per megawatt-hour for new natural gas combustion turbines and $104 per megawatt-hour for Columbia Basin wind power.[18] In the future, these cost effective efficiency gains are expected to save 7,000 megawatts of energy, the equivalent to the output of seven nuclear power plants.[19]

There is a consensus among energy experts that energy efficiency is the most cost-effective measure to meet our energy needs. The Northwest Power and Conservation Council conducts a comprehensive review of our region's energy profile every five years, and has concluded that 85% of our region's growing energy needs over the next 20 years can be met through using energy more efficiently.[20] Energy efficiency in buildings is also considered the "least expensive carbon abatement," says Jim Edelson, a senior project manager for the New Buildings Institute. Energy experts agree; and every stakeholder over the last two years who talked with the University of Washington's Technology, Law and Public Policy Clinic said that conservation was the single most impactful measure. The Washington State Legislature recognizes this as well, and in a 2009 senate bill stated that:

> *"The legislature finds that energy efficiency is the* ***cheapest, quickest, and cleanest*** *way to meet rising energy needs, confront climate change, and boost our economy. More than thirty percent of Washington's greenhouse gas emissions*

come from energy use in buildings. Making homes, businesses, and public institutions more energy efficient will save money, create good local jobs, enhance energy security, reduce pollution that causes global warming, and speed economic recovery while reducing the need to invest in costly new generation." [21]

RECOMMENDATIONS

ENERGY PERFORMANCE RATINGS

Energy performance ratings are labels that score a building's energy consumption. They operate in the same way that miles-per-gallon (MPG) ratings track a car's fuel economy. Although MPG ratings have been around since the 1970's, no rating system has yet been implemented for buildings.

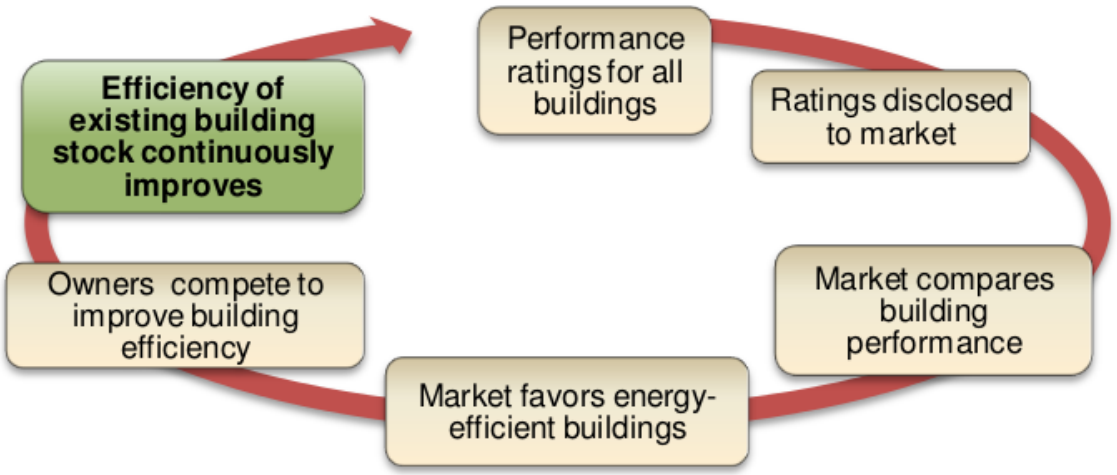
An energy performance rating is determined from a comprehensive energy audit of the building's features, from the windows to the insulation. All the design features are factored into a score and displayed as an easy-to-read number that represents the building's efficiency compared to a benchmark.

When the property goes on sale, the energy label is disclosed to potential buyers, tenants or lenders. With this information, potential buyers can compare the energy efficiency of the building as another factor along with location and price. Efficient buildings will become more desirable, the market will begin to favor efficiency, and the state's entire building stock will be driven towards higher standards.

There are a variety of systems used to rate a home's energy use. The Technology Law and Public Policy Clinic recommends the Energy Performance Score by Earth Advantage. The Energy Performance Score is the preferred rating system by the City of Seattle and Oregon state. In fact, Washington currently operates the vast majority of Energy Performance Score pilot projects in the nation, with seven out of the total thirteen pilot projects in existence.[22]

In addition, Washington already has energy disclosure laws for commercial buildings over 10,000 square feet and multifamily buildings. The Clinic recommends simply extending these requirements to all commercial, industrial, and residential buildings.

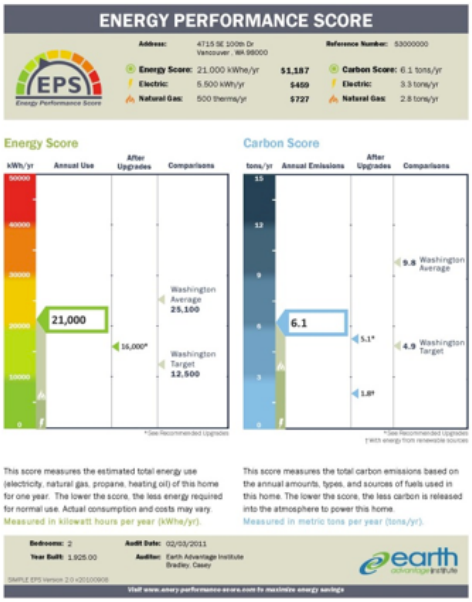
Cycle of Improvement from Energy Ratings



Source: Institute for Market Transformation

Energy performance ratings create a very effective market-based mechanism to drive building efficiency. Along the way, customers and the state will both benefit. Consumers will be able to assign a value to efficiency, live in healthier conditions, be more comfortable, and save money. Washington will be able to become the seat for efficient building innovation, create clean energy jobs, reduce the need to find new power sources, decrease the dependence on foreign oil, balance the strain on the energy grid, and enjoy a cleaner environment.

Example Energy Rating Label from Earth Advantage



Source: Earth Advantage

INTERACTIVE NEIGHBORHOOD SCORING MAP

Energy Performance Scores should be displayed in a public, easily-searchable, interactive website. Much like a car's MPG ratings can be found online, a property's energy ratings should be similarly accessible. The ideal online layout would be an "energy rating" overlay much like the traffic layer in Google Maps. Another map-based option would be similar to Zillow.com or Redfin.com, in which the sell price of every building can be found. In this way, consumers would be able to compare their energy performance rating the houses around them, and zoom out for a greater neighborhood-wide score.

Studies show that peer competition is one of the strongest motivators.[23] This map-based approach allows customers to compare their property against their neighbors, and harnesses the power of peer competition as an unconscious motivator to improve energy efficiency.

OUTCOME-BASED BUILDING CODES

Outcome-based building codes measure a building's compliance by its' actual energy consumption. Instead of dictating the exact design and materials, builders have flexibility in designing their structures as long as the building meets safety requirements and consumes less than a certain amount energy.[24] The building compliance will be measured with an objective energy audit. A second audit will be conducted one year into the building's operation in order to ensure that the structure continues to operate as intended.

Policy makers should also consider another audit within the five to thirty year range of the building. As the years pass, a building's systems such as the ventilation and heating begin to malfunction without the owner's knowledge. Older buildings with years of malfunctioning equipment are responsible for much of the needlessly wasted energy. By administering functional testing at periodic intervals throughout a building's life, we can confirm that our

buildings continue to function. This will accrue huge savings to Washington's energy grid and building owners' utility bills.

Outcome-based codes can begin as a voluntary code, and eventually phase in to replace conventional codes. At the beginning, financial incentives can be used to motivate early adopters in to following the new code. These years of a voluntary code will allow Washington State to refine the process and let builders experiment with new designs. Once the policy has been tested, Washington can transition from the old prescriptive code model to new, flexible outcome-based codes.

Current Outcome-Based Codes in Washington

It turns out that outcome-based codes already exist in Washington's State Energy Code. For years the code has included three methods for demonstrating code compliance: 1) prescriptive, 2) building envelope component trade off, and 3) a building design by systems (outcome-based).[25] Residential home builders usually use the first method, non-residential builders use the second method, and few ever use the third option. Building permit applicants have not seen a value to using outcome-based codes in Washington's current code scheme. With the code provision already present, policy makers can easily revamp the third option to create a viable and super-efficient outcome-based code.

Leading the Nation in Energy Efficient Building Codes

If Washington successfully creates an outcome-based code, they will be the first state in the country to do so. Many forward-thinking jurisdictions have been considering the policy, realizing that this flexible approach is ideal to spur a 'green' building market. Seattle has actually gone the farthest with this policy, leading the nation with an outcome-based pilot project from 2009 to 2011. The City of Seattle teamed up with the Preservation Green Lab, National Trust for Historic Preservation, and the New Buildings Institute to examine holistic outcome-based metrics for retrofits to historic buildings.[26] The study showed success for the concept, and revealed that many factors contributed to energy efficiency that would not have been considered in a conventional prescriptive model.

With the perfect alignment in our state of the outcome-based pilot project's demonstrated success, the relevant provision already in Washington's building code, and the local interest in the policy, Washington has all the factors in place to become the nation's leader in outcome-based codes.

RENEWABLE READY BUILDINGS

Building regulations should require newly constructed buildings to come "renewable-ready", or pre-wired for elements like solar panels and solar hot water heaters, in case an owner opts into installing such devices. When a building is being constructed, it is relatively easy and inexpensive to install the wiring for these systems along with the conventional electrical system. When a homeowner wishes to install a solar panel on their house, they will find the process easier and cheaper because their house is already outfitted for the upgrade.

Oregon is promoting renewable ready buildings as part of their Oregon Reach Code, a voluntary building code that is based on the efficient International Green Construction Code (IgCC). Wisconsin also promotes renewable ready buildings as part of their Focus on Energy program, a partnership between the state and local utility companies. Washington should include itself among these states at the forefront of renewable-ready building policy.

MINIMUM STANDARDS FOR RENTAL AND LOW INCOME HOUSING

Rental and low income housing has been identified as one of the least efficient building sectors in Washington. Coincidentally, low income and rental buildings are some of the easiest areas for improving energy efficiency. The problem arises when landlords do not have direct incentives to make their buildings energy efficient because utilities are paid by the tenant. In addition, low income homeowners cannot prioritize energy efficiency upgrades due to a tight budget.

Consequently, minimum standard building codes for rental housing should be tightened. Regulations must be complemented with enforcement, we advise that stakeholders identify a policy in which rental properties undergo a compliance inspection when the tenancy shifts, and again every ten years. If an auditor finds a property does not comply, then the landlord must undertake an energy-efficient retrofit.

An energy-efficient retrofit does not have to be a large project. Simple improvements to homes such as weatherization will make a big difference over time. Some examples include sealing up drafty leaks, enhancing insulation, applying weather stripping, installing high efficiency heating, upgrading toilets, replacing appliances, and upgrading windows. Washington has almost 1 million rental housing units, many of which serve low income families. More than half of these homes were built in the 1970s or earlier, and can benefit from simple efficiency upgrades.

Additional Benefits to Low-Income Families

The benefits from these simple improvements ripple through the community and the economy. Efficient homes improve the health of its occupants by creating an environment with fresh air and free of mold. At the same time, energy efficiency upgrades save needy households millions a year in energy costs and water bills. The U.S. Department of Energy says that "Families receiving weatherization services see their annual energy bills reduced by an average of about $437, depending on fuel prices. Because the energy improvements that make up weatherization services are long lived, the savings add up over time to substantial benefits for weatherization clients and their communities, and the nation as a whole."[27]

Washington State has long been involved in weatherizing homes, having upgraded 125,000 low-income properties over the past 25 years through the state's Department of Commerce Weatherization Assistance Program.[28] However, it has not been enough. The Northwest Power & Conservation Council found that "after an examination of home retrofit activity conducted by Pacific Northwest utilities, it is estimated that less than 5,000 homes per year are weatherized in Washington." If we increase the amount from 5,000 homes to 10,000 homes per year, "the resulting work adds over $16.8 million of construction activity to the state economy while generating over $1.4 million in consumer energy savings per year."[29]

CREATE A MARKETING CAMPAIGN

No movement is successful without a marketing campaign. Washington's new energy policies should be accompanied by a comprehensive marketing campaign. The goal of the public service marketing is to increase consumers' awareness of the program and educate them on the broad range of benefits they receive.

The ideal marketing campaign should have three prongs: 1) Basic Operating Practices, 2) Awareness of New Efficient Technologies, and 3) Washington's New Energy Policies.

Basic Operating Practices

The Basic Operating Practices campaign will focus on the easiest efficiency gains to capture: everyday operating habits. This campaign will focus on proper ventilating, heating, and lighting practices. For example, the campaign would remind people to turn off lights in unoccupied rooms, close doors to the outside when the heater is running, and turn exhaust fans on in the bathroom to reduce mold.

While techniques are very simple, many people are not aware of the correct operating practices to save energy in their home. Much of the population does not have time or resources to research these techniques on their own. For this reason, the campaign should target the entire population, with an emphasis on low income households. The main message will be that "it will save you money". An example of a successful energy-habit-based campaign was Brazil's 'Pee in the Shower' advertisement, which quickly went viral.[30]

Awareness of New Efficient Technologies

The Awareness of New Efficient Technologies segment will educate consumers on the new, highly efficient equipment available on the market. Compared to their conventional counterparts, these new technologies are drastically more efficient. A few examples include LED lights (75% more efficient than incandescents[31]), tankless hot water heaters (30% more efficient than tank hot water heaters[32]), and air-source heat pumps (40% more efficient than furnaces[33]). These technologies are available today, but the ordinary consumer has not been educated on the options. A high profile endorsement by Washington State will bring awareness to the public, and spur confidence in the viability of these new technologies.

Washington's New Energy Policies

The Washington's New Energy Policies campaign will inform consumers on the State's new energy efficient building regulations. It will acquaint customers on the new energy performance ratings, output-based codes, renewable-ready construction, and tax incentives. Rather than secondhand rumors and speculations trickling down, a statewide marketing campaign will ensure that everybody receives accurate information regarding the new energy policies.

To be successful, Washington's marketing strategy must appeal to the consumers' interests. For example, studies show that consumers respond best to energy efficiency retrofit programs when they find out that upgrades make *their* home more comfortable or that *they* will save money.[34] All of the proposed energy programs accomplish both of

these needs beautifully, and Washington only needs to highlight these key points when crafting a message to consumers.

The marketing campaign should also be modern and tech savvy, incorporating an interactive website with online videos in addition to conventional approaches. The campaign should incorporate a catchy slogan, and make building efficiency look exciting and powerful. A successful marketing campaign will not only reach local customers, but showcase Washington's innovative energy policies to the world.

ESTABLISH FINANCIAL INCENTIVES

Washington should establish incentives for high performing Energy Performance Score buildings. When a home attains a certain level of efficiency, the owner should be duly rewarded. Financial incentives make efficient building an attractive option for builders who might be cautious about undertaking a new techniques. Incentives will provide the nudge needed to spur the market towards uptaking efficient building designs.

For policy ideas, Oregon and California can act as models.

Preferred Mortgage & Insurance Rates:

Oregon already has incentives established for their voluntary Energy Performance Score program. For houses that perform well on the audit, Oregon offers preferred mortgage rates (0.375% credit on closing up to $1,500 - $2,500), and discounted homeowner insurance through Liberty Mutual. [35]

Expedited Permitting (San Diego, CA):

In order to qualify for expedited permitting as a sustainable building, a project must either achieve Leadership in Energy and Environmental Design (LEED) Silver certification or utilize photovoltaics to generate a certain percentage of the project's energy needs.

Waived Permit Fees (San Bernadino, CA):

New efficient technologies are incentivized by waiving up to $5,000 in permit fees for the installation of solar energy systems, wind-generated electrical systems, tankless water heaters, and highly efficient heating, ventilation and air conditioning systems.

Accelerated Approval (San Bernadino, CA):

Builders who participate in San Bernardino County's Green Building program will receive accelerated plan review, priority inspections, and design assistance. Builders can earn their green building designation by following any one of three County-approved green rating systems: California Green Builder, Leadership in Energy and Environmental Design (LEED), or the County's Green Building Basics Checklist.

Increased Building Density (Ashland, OR):

Developers in Ashland are allowed to increase the base density of units in residential developments by incorporating energy efficiency, architectural creativity and innovation, and the use of natural features of the landscape. Density may be increased up to a maximum of 15% based on bonus points earned for meeting the minimum requirements

for certification as an Earth Advantage home, which includes an evaluation of energy usage, water usage, and air quality guidelines.[36]

BUILD GREEN GOVERNMENT BUILDINGS

Washington State government buildings are the logical starting point to setting a role model for building efficiency. This can be accomplished through the following three measures.

LEED Efficiency

Washington's new government buildings, buildings larger than 7,500 square feet, and old buildings constructed before 1978 should be built and retrofitted to meet LEED silver certifications AND be at least 15% more efficient than Washington's current building code.

Distributed Generation

All new government buildings must incorporate a minimum of 15% self-generated energy on site using renewable sources.

Efficient Equipment

All equipment that Washington State purchases must be classify as in the top 25% of energy efficiency for the product, as determined by the U.S. Department of Energy. This approach is currently required by all U.S. federal agencies.[37]

These policies already exist, they are derived from current programs in the U.S. government and the cities of Los Angeles[38] and San Diego.[39] If they are viable at both the sweeping federal level and at the local city level, then it can reasonably be extended to the intermediate statewide level in Washington State.

For example, Los Angeles enacted a Green Building Retrofit Ordinance in 2009. The law requires all city-owned buildings that are either larger than 7,500 square feet or built before 1978 to be retrofitted. The goal of the retrofits will be to achieve LEED for Existing Buildings Silver certification or higher. Additionally, the Ordinance requires that at least half of the buildings retrofitted are located in high-poverty and high-unemployment areas, and that, to the extent feasible, all construction be performed by local residents.

Los Angeles's policy is a great example of combining energy efficiency with holistic implementation. The idea that the retrofitted buildings be located in poor areas to spur work in the community is excellent. This brings both construction work and modern efficiency aesthetics to communities that are usually shut out of these developments.

ASSIGN A LEAD AGENCY FOR IMPLEMENTATION

In order to orchestrate a cohesive energy score system, Washington should assign a lead agency to take charge. This centralized agency would be responsible for marketing, training, forming the rules, and coordinating enforcement. This role can be added as a new unit in an existing office such as the Department of Commerce, the Washington State Energy Office, or Washington State University's Extension Energy program. The legislature can also create a brand new agency,

much like Oregon did when creating Energy Trust of Oregon. The Energy Trust of Oregon is a nonprofit created in 1999 to deliver "stable, consistent funding to help Oregonians invest in energy efficiency and renewable resources".[40] This organization is responsible for orchestrating the Energy Performance Score rating program in Oregon.

CREATE A FUNDING PLAN

As with all programs, we will need to invest in order to realize the benefits. And the return on investments in efficiency is large; for every $1 we invest in conservation, we will save $4 in the next 40 years[41]. In order to make the first step in a statewide energy performance score program, all stakeholders will need to come together to develop a funding plan.

Washington's building efficiency funding plan will have two parts. The first part derives funding from all the relevant stakeholders: the utilities, realtors, lenders, and energy audit contractors.

The second part generates supplemental funding from an "inefficiency fee", fees charged to homes that opt into installing older, vastly less efficient technologies compared to newer alternatives.[42] Case law in Washington has concluded that it is legal for utilities to charge a fee to reflect the extra cost of providing energy to an inefficient building throughout its lifetime.[43]

Between stakeholders and inefficiency fees, Washington should be able to generate sufficient funding to support a comprehensive energy efficiency program.

3. COGENERATION (COMBINED HEAT-AND-POWER)

SUMMARY

Cogeneration, also known as combined heat and power (CHP), captures waste heat produced by electric generators puts it to useful work. The recaptured heat is used to heat buildings or in turn generate more electricity by using the steam to turn a turbine. In so doing, CHP dramatically increases the efficiency of thermal electric generators by up to 90%.[44] Because of this double utilization, the resulting fuel use efficiency far exceeds that of traditional power plants.

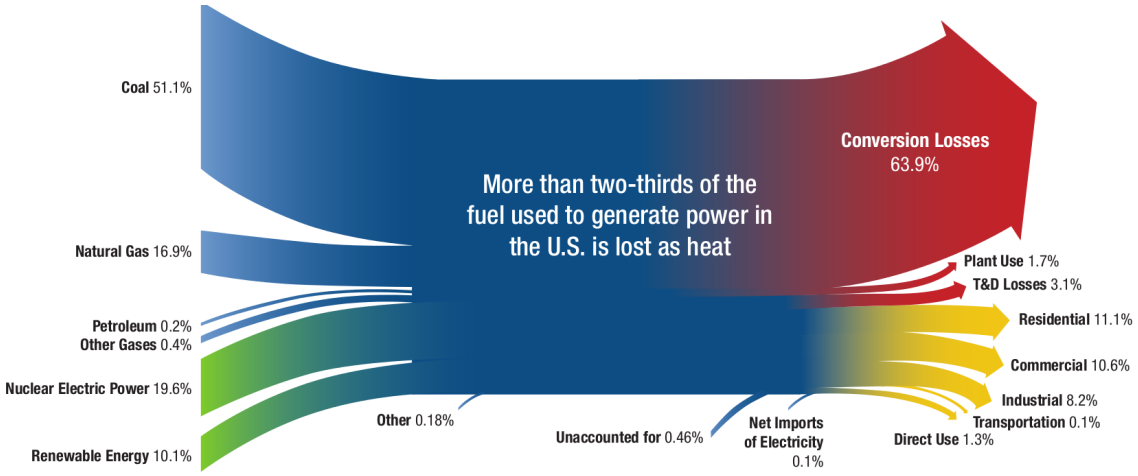
Cogeneration has a far greater potential to save energy than other green technologies, but has slow to gain popularity because it is not as attractive as solar panels. Out of all the technologies to reduce CO_2 in the atmosphere (such as reforestation, solar panels, wind power), CHP delivers a negative marginal cost—meaning that installing a CHP plant actually generates positive economic returns. Cogeneration is particularly well suited to Washington State because the power generated coincides with generation needs. In the winter—when hydro is less available and energy use peaks—combined heat and power can offset heating needs while generating clean and efficiency electricity. The federal government has recognized this, and the U.S. Department of Energy and the Obama administration have issued new aggressive executive order to ramp up cogeneration plants by 50% by 2020.

BACKGROUND

Generating electricity using basic fossil fuel turbines is a wasteful and inefficient process. Roughly 2/3 of the energy is lost in the form of heat, and only 1/3 is converted into electricity. The wasted exhaust gasses reach temperatures of over 500 degrees Celsius, and contain significant amounts of thermal energy. In cogeneration plants, these gasses are captured and re-used to generate steam.

Cogeneration delivers vastly more cost-effective energy than the majority of other green technologies, but is slow to gain popularity because it is not as flashy as technologies such as solar panels. Solar panels look exciting, and a homeowner who installs a solar panel on their roof can show the entire community their environmental consciousness. On the other hand, when a homeowner installs a cogeneration turbine in their basement, there is no community exposure.

Energy Flow and Thermal Losses in the U.S.



Source: Department of Energy Annual Energy Review 2007

In addition, consumers are simply not familiar with cogeneration. While the technology has seen wide success in Asia and Europe, uninformed consumers in the United States have yet to hear about its benefits. This is why the government must take steps to increase the awareness of cogeneration. For that very reason, in 2012 the Department of Energy released aggressive new measures to promote cogeneration backed by an executive order from President Obama entitled "Accelerating Investment in Industrial Energy Efficiency".[45,46,47] These new measures are aimed at accelerating investments of cogeneration throughout the nation.

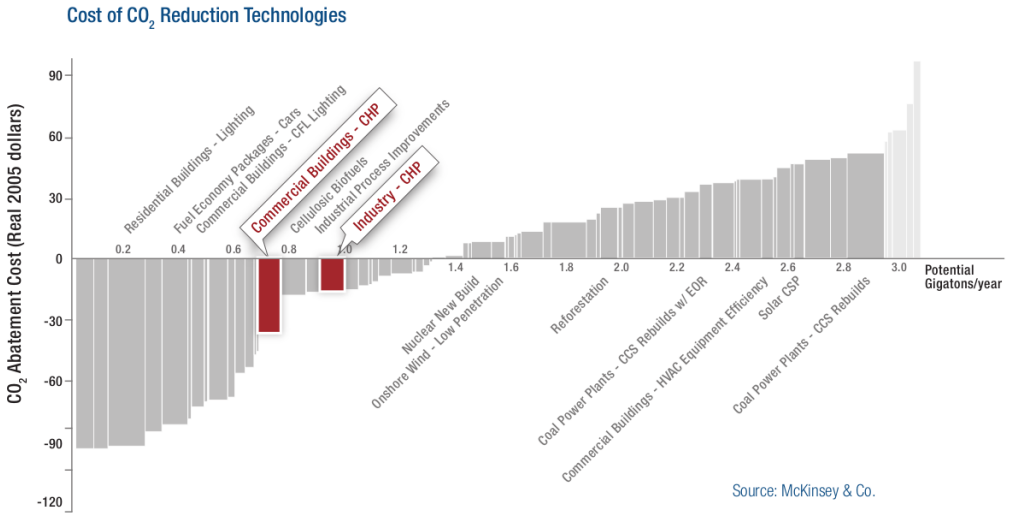
BENEFITS OF COGENERATION

Advances in cogeneration technology have given the technology undeniable benefits across the board. CHP has the advantage of being incredibly flexible and versatile. Cogeneration is flexible in its fuel input, and a system can run on any fuel that legacy systems use, as well as renewable fuels. It can use natural gas, petroleum, landfill gas, industrial waste, wood, and biomass. A CHP system can be used in any application as well, they are used in hotels, hospitals, stores, campuses, and industrial plants of all types. Cogeneration systems can even be used inside a residential house, these so called mini CHP systems are sold pre-built from Honda and Toyota. [48]

In addition to its versatility, cogeneration is one of the least expensive carbon reduction technologies. Out of all the 'green' technologies (such as reforestation, solar panels, and wind

power), CHP delivers a negative marginal cost – meaning that installing a CHP plant actually generates positive economic returns! actually generates positive economic returns.

Comparison of CO_2 Reduction Technologies



Source: McKinsey & Co.

Furthermore, cogeneration is particularly well suited to Washington State because the power generated coincides with the region's generation needs. In the winter the water levels in streams and reservoirs run low, making hydropower less available. Low water levels in the winter are combined with a yearly peak in demand for power to heat Washington's buildings. To make up for the lower hydroelectric power output, the state must meet this heightened winter demand by burning fossil fuels such as coal, oil, and natural gas. Using cogeneration offsets these heating needs while generating the needed electricity efficiently. Because of its ability to meet multiple energy needs, cogeneration becomes the perfect power source.

Combined heat and power can benefit the entire state, and reward all stakeholders. If we ramp up combined heat and power in the United States to the Department of Energy's proposed goal of 20% of our energy by 2030, we would save 5,300 trillion Btu's of energy, and reduce our emissions by an equivalent of 1.5 times the entire emissions produced by India.

Washington will see proportional benefits to our environment and economy. An example of some stakeholders that would benefit include:

- Energy consumers save on energy costs
- Business and industry benefit from reliable energy independent of the grid
- Governments will see improved energy and environmental performance of urban zones as well as improved system efficiency

- Utilities will find a reduced need for transmission and distribution networks as well as extra power during the peak seasons

RECOMMENDATIONS

CREATE MARKETING CAMPAIGN

One of the easiest methods of accelerating a technology is by promoting it. A public service marketing campaign will realize more results than undertaking any complex legislative policies. The Technology, Law, and Public Policy Clinic recommends informing Washingtonians about the benefits of cogeneration through a website, publications, newsletters, and public service advertisements. The city of Berlin produced free publications such as "CHP: The Double Use of Resources", and has since become a role model for cogeneration. Washington can see similar uptake by creating a comprehensive public marketing campaign.

Washington should also engage in the US EPA Combined Heat and Power Partnership. The partnership program has successfully engaged CHP users with the wider public since 2001 through workshops, publications, and awards such as the Energy Star CHP award. By 2007, the program had contributed to installing 335 CHP projects with a total capacity of 4,550 MW.

ENSURE INCLUSION IN RENEWABLE PORTFOLIO STANDARDS

Washington should ensure that cogeneration plants using renewable fuels are included in the state's Initiative 937 Renewable Portfolio Standards. By properly including renewably-fueled CHP as an option in the purchase obligation for energy suppliers, we can guarantee that cogeneration gets incentivized along with wind and solar.

ESTABLISH FINANCIAL SUPPORT

Positive fiscal treatment will encourage the installation of new cogeneration projects and provide greater certainty for investors. We recommend accelerated depreciation to incentivize investment in CHP and fuel tax exemptions to support CHP plant operations. A CHP installer should also benefit from positive general tax treatment, and feed-in tariffs. In addition, Washington should provide capacity grants to help capital-constrained organizations invest in CHP to improve their energy performance. The state should regularly evaluate the level of subsidy to reflect changing technological and market conditions.

States that provide good examples of financial incentives to support CHP include New York, New Jersey, New Hampshire, Vermont, and North Carolina. North Carolina, for example, recently adopted a personal tax credit for renewable energy systems that offers a credit

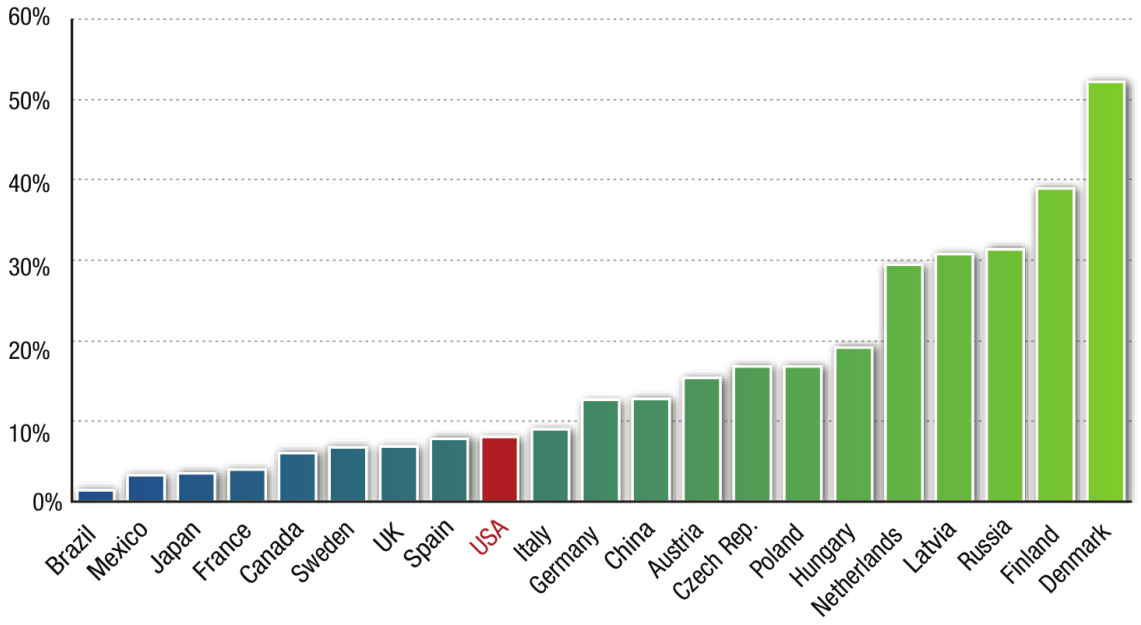
equal to 35% of the cost of eligible energy property, specifically including CHP systems. The incentive maximum is $2.5 million and there is no cap on the maximum system size. There is also no restriction on system fuel. This incentive is by far the largest state-level tax incentive available for CHP systems.

IMPLEMENT FAVORABLE INTERCONNECITON POLICIES

Interconnection is the physical linking of an energy generator into the electricity grid. Utilities usually own the grid infrastructure, and a series of technical requirements and legal procedures dictate the relationships between utilities and outside entities seeking connection. With the advent of small local distributed energy producers, jurisdictions have modified these interconnection policies to remove the barriers for new energy generators to connect to the grid.

The federal Energy Policy Act of 2005 urges all states to implement interconnection standards for CHP, which many have done. However, Washington State has not enacted any interconnection standards. The State should implement standard interconnection policies that explicitly establish parameters and procedures for interconnecting CHP systems. To make the grid connection process predictable the state should establish fixed interconnection fees, including standard engineering fees and surveying costs. Some model jurisdictions have even created free interconnection for renewable energy generators. In addition, CHP electricity lines should be allowed to cross public thoroughfares and utility rights-of-way. These interconnection standards are considered by many to be the best standard currently in place today. Such favorable CHP policies will ensure that the cost of interconnection is controlled, and provide a predictable landscape for developers.

CHP Share of Total National Power Production



ource: International Energy Agency, Cogeneration and District Energy Report

When looking for model legislation, Massachusetts, Ohio and Connecticut rank the highest on interconnection policies. Model laws can also be found in the European countries of Denmark, Finland, and the Netherlands.

Finally, net metering laws should be amended to remove limits on individual and aggregate system capacities. Under net metering rules, distributed generation system owners are compensated for some or all excess generation either at the utility's avoided cost, or, less often, at higher retail rates. Current barriers to the deployment of CHP and other distributed generation systems are mainly due to fees levied on net-metered systems, along with rules that set overly strict limits on individual system and aggregate capacity size. Washington can do away with these barriers by allowing more flexibility in CHP system capacities, lowering net-metering fees, and standardizing interconnection policies.

IMPLEMENT OUTPUT-BASED EMISSIONS REGULATIONS

For CHP systems, electricity and useful thermal outputs are generated from a single fuel input. Therefore, calculating emissions based solely on input ignores the additional power created by the system, which uses little or no additional fuel. Output-based emissions acknowledge that the additional useful energy output was created in a manner generally cleaner than the separate generation of electricity and thermal energy.

Implementing output-based emissions more accurately reflects the benefits in cogeneration systems. States with model output-based regulations include Maine and Massachusetts.

REQUIRE NEW BUILDINGS TO USE 15% RENEWABLE TECHNOLOGIES

Cogeneration proves that energy efficient technologies save money and make business sense. The clinic recommends Washington implement a bold policy requiring all new buildings being built today to use at least 15% renewable energy. Incorporating 15% renewable generation at the site of the building is quite achievable today; all the technology and federal support are present. This policy will ensure that electricity from renewable cogeneration will be among the eligible energy sources.

This policy has been proven, and is modeled after Germany's Heat from Renewable Energy Sources Act (Erneuerbare-Energien-Wärmegesetz – EEWärmeG), which obliges new buildings to derive 15% to 50 % of their heat from renewable energy sources. The policy has been in effect since January of 2009, and according to the German Federal Association of Energy, has saved an astonishing 4.3% of Germany's total CO2 emissions.

4. FINANCIAL MECHANISMS TO INCREASE AFFORDABILITY

SUMMARY

Installation of the clean energy technologies described above has lagged due in part to the high up-front capital costs. Various financial incentives currently exist under Washington State law, but these programs have so far proved insufficient to encourage investment in this area. The state should play a leading role in encouraging such investments by enabling low-cost financing options through the creation of a statutory financial mechanism.

States That Have Passed PACE Enabling Legislation

'Source: PACENow

Specifically, the Washington legislature should pass Property Assessed Clean Energy (PACE) program enabling legislation. PACE programs provide property owners with the funds to install renewable distributed energy or perform energy conservation upgrades to their buildings. Those funds would then be paid back through property tax assessments over a period of up to 20 years. Such programs provide an innovative method of financing clean energy upgrades that does not add to the state budget.

So far, 28 states and the District of Columbia have enacted PACE enabling legislation. In fact, Washington stands as the only state on the West Coast to not have such laws in place. This map shows all those states that have done so in green. Washington should follow suit and pass PACE enabling legislation.

BACKGROUND

As buildings represent a full 30% of Washington State's energy use, reducing their carbon emissions through upgrading energy efficiency and conservation or installing distributed generation would be a particularly fruitful area for policymakers. Moreover, clean energy upgrades are usually a very smart investment – paying for themselves and then some over the life of the technologies. One study even shows that public universities saw a median annual return on investment in these upgrades of 32%.

Various financial incentives currently exist under Washington State law, including the Evergreen Sustainable Development Standard for Affordable Housing, a tax abatement for solar manufacturers, and renewable energy sales and use tax exemptions. These programs, however, have so far proved insufficient to properly incentivize investment in new clean energy upgrades as they do not overcome the significant barriers to installation, including:

- High up front costs
- Long payback periods
- Uncertainty over Length of Ownership and perceptions of risk
- Illiquidity of the investment[49]

This section will examine the particular challenges posed by these barriers.

HIGH UP-FRONT COSTS

One of the major barriers to increased installation of these clean energy upgrades is the high upfront costs of such investments. Energy efficient equipment, fixtures, and building materials tend to be more expensive than their conventional counterparts. Moreover, retrofitting a large commercial or industrial facility can be a major project. For businesses, it may be difficult to justify such expenses when internal investments are expected to be profitable within a very short time frame: approximately half of the respondents of a recent

survey reported that energy efficiency projects have to show a payback period of three years or less to be considered feasible.[50]

LONG PAYBACK PERIODS

While cost-savings associated with clean energy upgrades are substantial and often sufficient to recover a healthy return on investment, the payback period is often longer than is generally thought to be feasible for many businesses. Publicly traded corporations are under constant pressure from shareholders to increase profits, leading to a reduced likelihood that a company will make long-term investments, no matter how beneficial they may eventually be.

UNCERTAINTY OVER LENGTH OF OWNERSHIP AND PERCEPTIONS OF RISK

Businesses may be dissuaded by the prospect of investing in properties that they may not intend to hold for the long-term. Investments in immobile capital such as property tend to limit flexibility and so can be seen as inherently risky. Generally speaking, clean energy upgrades are fixtures on the property and will not be transported if the owner decides to sell and move its facilities into a different building.

ILLIQUIDITY OF THE INVESTMENT AND PERCEPTIONS OF RISK

Adding to the perception of risk associated with uncertainty over length of ownership, a lack of secondary markets for clean energy upgrades makes such investments highly illiquid. While investors may hope that such upgrades will increase property values, the truth is that they can never be sure how the market will react. Longer-term deals will carry an even greater risk in this regard, providing an additional deterrent to investors.

RECOMMENDATIONS

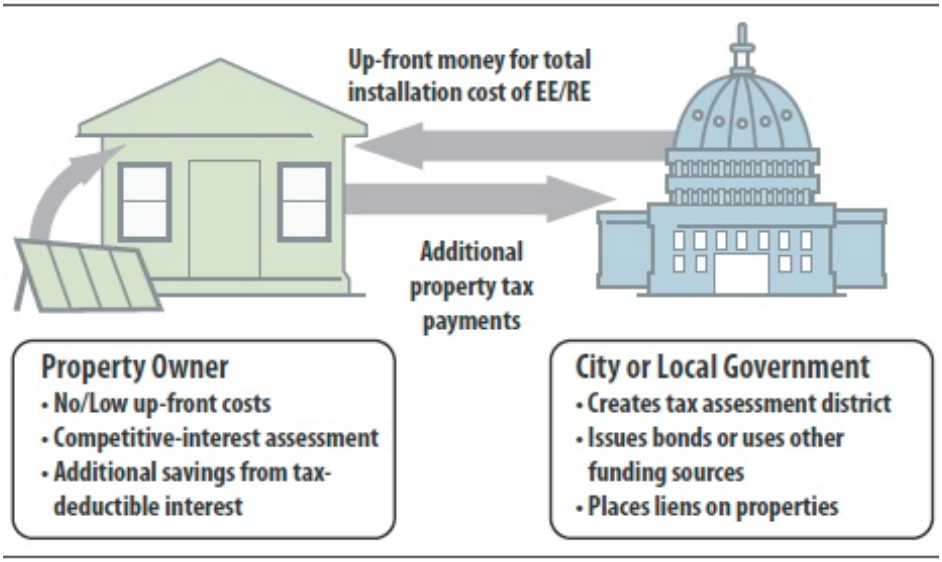
When considering the four barriers discussed above, it becomes clear that in order to encourage the installation of clean energy upgrades, we must: (1) reduce up-front capital costs, (2) reduce payback periods, (3) eliminate risk associated with uncertainty over intended length of ownership, and (4) eliminate the deterrent of the lack of secondary markets for clean energy upgrades. All of these goals could be met through an appropriate financial mechanism, but so far, private financial institutions have failed to meet the needs of potential investors in these technologies. It stands to reason, then, there is a market failure here: existing financial mechanisms are not meeting the needs of building owners who wish to upgrade their properties. The state has the capability to step in and meet this need through the creation of statutory financial mechanisms

In response, the Washington legislature should pass Property Assessed Clean Energy (PACE) program enabling legislation.

MECHANICS OF THE PACE FINANCING MODEL

PACE programs represent an innovative way to incentivize investments in clean energy upgrades for buildings, including the installation of distributed generation or energy conservation/efficiency measures. They operate by tying debt incurred to make the upgrades to the property rather than the property owner. Generally speaking, the debt becomes a senior lien on the property so that the repayment obligation passes from owner to owner. Repayment is made via assessments and included in the owner's property tax bill for a period of up to 20 years, significantly longer than normal loan term.

PACE Financing Mechanism



Source: National Renewable Energy Laboratory

Broadly speaking, there are three variations of PACE programs. The first, or "warehoused," has the local government take out a dedicated line of credit to fund applications on as-needed basis. The second, or "pooled bond," has the local government collect applications and then issue a bond to cover the pooled cost. And the third, "owner arranged," has owners go out into the marketplace and locate third-party project lenders. Due to ongoing questions over the legitimacy of the first two models with respect to Article 8 Section 7 of the Washington State Constitution, the third would likely lend itself best to implementation in our state.[51]

BENEFITS OF PACE PROGRAMS[52]

A PACE program would address each of the four barriers described above. First, it reduces up-front capital costs by providing for a longer loan term with lower interest rates, thereby reducing monthly payments. In addition, the secure payment stream of property tax

assessments allows for the lender to require a low or even no down payment without incurring unreasonable risk.

Second, it reduces the payback period by reducing up-front capital costs and monthly payments. This makes such investments often immediately cash-flow positive. Third, it eliminates risk of uncertainty over the intended length of ownership by assigning the obligation to the next buyer upon sale. The seller is only responsible for payments due up to the point of sale during the tenure of the seller. Finally, it eliminates the risk of an illiquid market for clean energy upgrades by ensuring the investment will be profitable during the term of ownership.

DRAWBACKS OF PACE PROGRAMS

Despite the considerable benefits of PACE programs, several drawbacks require attention. Some mortgage lenders oppose PACE lending because it often created a first-priority lien on the property. This means that in the event foreclosure, the PACE lender would get paid before the mortgage lender. Moreover, recent guidelines issued by the Federal Housing Finance Agency (FHFA) prohibit Fannie Mae and Freddie Mac from purchasing residential mortgages of properties encumbered by PACE liens.[53] In so doing it voiced similar concerns to those of the mortgage lenders, citing in particular excessive risk caused by the PACE lender's first position as a secured party.

Nevertheless, some commentators and policymakers feel that mortgage lenders are overreacting as the typical value of a PACE loan would be a minute fraction of the total value of the mortgage, leading to only minimal risk exposure. While this may placate mortgage lenders, the restrictions on Fannie and Freddie can only be lifted through federal policy action. This means that the market for residential PACE loans has effectively been suspended until further notice. Therefore, any PACE program created by Washington should focus on commercial and industrial borrowers.

In addition, specific barriers toward implementing a PACE program exist as to Washington State. Specifically with respect to Article 8 Section 7 of the Washington State Constitution, which prohibits the state lending its credit to private entities. This issue will be considered in the following section.

CONSTITUTIONAL AMENDMENT

The best path to pursue is another amendment to the Constitution, must like the one passed in 1979. Such an amendment would provide for a second exception to the blanket ban on lending the State's credit to private entities in the realm of clean energy upgrades, except that it would apply to all levels of local government rather than be limited to PUDs. With this amendment, the Legislature would be free to implement a commercial PACE program based on best practices as developed by other states and the U.S. Department of Energy,

thereby providing Washington companies with the financial incentives they need to start investing in our clean energy economy.

ALTERNATIVE SCHEMES

The PACE model is not by any means the only financial mechanism worth studying. The Washington Department of Commerce has recently identified several other options such as on-bill financing and energy efficiency tariffs, which rely on publicly owned utilities to provide financing for clean energy upgrades. These programs would also run afoul of Article 8 Section 7 if not for Amendment 70 (1979), which was passed to allow PUDs to extend loans for clean energy upgrades to individuals or companies in their district. Plans centered on PUDs, however, are only half-measures at best as they will not aid those Washington residents served by investor owned utilities.

5. NET METERING

SUMMARY

Net metering enables individuals who generate their own power to feed unused energy back into the power grid. This benefits individuals through increased stability of the energy supply, and benefits the state by increasing possibilities for development of clean and renewable energy sources.

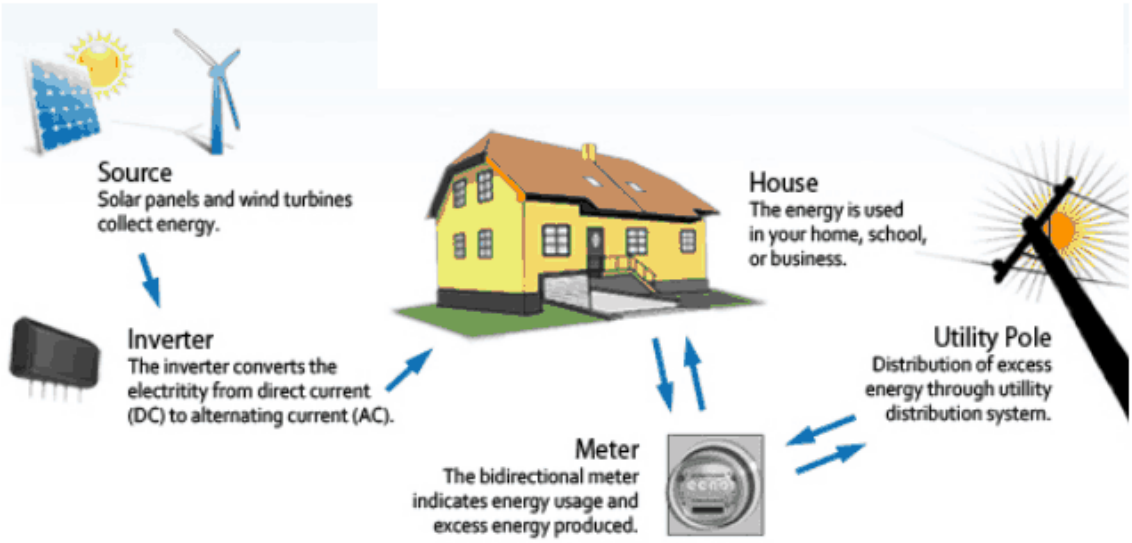
Current laws limit how individuals in Washington can connect their distributed generation to the power grid, thereby inhibiting the broad adoption of this technology. In response, the Washington net metering statutory scheme should be amended to (1) increase the Cumulative Net Metering Generation Capacity to 1% of a Utility's Peak Load in 1996 by 2020; (2) expand the definition of "customer-generator" to include customers that own and operate, lease and operate, or contract with a third-party that owns or operates a net metering system; and (3) increase the net metering system size from 100 kilowatts (kW) to 200 kW. These three proposals involve small and reasonable changes, and thus should be passable. Once the three changes have been written as a bill and passed, the state should consider changes in the area of rollover energy credits and virtual net metering.

BACKGROUND

Net metering enables customers to use their own generation systems to offset their consumption when they generate electricity in excess of their demand.[54] Net metering customers are connected to a utility by a bi-directional meter that allows for the flow of electricity produced or needed by customers.[55] If a customer generates more electricity than the customer uses, the excess electricity is supplied to the utility and causes the meter to "spin backwards." When the customer requires more energy than the customer generates,

energy flows from the utility and the purchase price is offset by the energy the customer previously supplied. The prices a customer can expect for the electricity supplied, as well as the regulations surrounding net metering, are principally determined by individual states and will be discussed below.

Net Metering for Small Generators



Source: American Photon

BENEFITS TO INDIVIDUALS

Net metering was designed to encourage individuals to produce energy from alternate sources, and therefore provides several benefits to individuals. Net metering programs allow customers to receive financial credit for excess energy produced, install a renewable energy system with fewer associated costs, store electricity without the need of a battery system, and operate their systems without a backup generator.[56]

First, customers can recuperate the cost of installation of their renewable energy systems through the financial credit net metering legislation requires utilities pay for excess energy generated. This also incentivizes customers to send off their excess energy, reducing potential waste if they are unable to store it. Second, by connecting to the grid, customers save money by not having to install additional meters or a battery backup system.[57]

Beyond financial incentives, an important benefit to net metering customers is the increased stability connection to a utility provides. The utility company "stores" electricity for the customer, thus eliminating the need for a battery storage system, by paying the customer for excess power provided at other times. At times when the customer's electricity needs exceeds its ability to produce, the customer has assurance of sufficient

electricity without the need for a backup generator. Overall, through financial incentives, reducing the costs of setting up a system to produce power, and adding stability to the customer's power supply, net metering provides several benefits to the customers.

BENEFITS TO STATES

States accrue several benefits from net metering programs, principally through using them to promote their renewable energy goals. By promoting net metering, states raise consciousness of energy consumption and encourage customers to use renewable energy. Where customers are more conscientious of the amount of energy they use, they may use less and make a greater effort to assist with the achievement of renewable energy goals. Finally, the ease of renewable energy systems makes production of energy more attractive and feasible for individuals. Investment by individual customers in alternative energy production helps to promote the development of clean and renewable energy sources.

IMPACT ON ELECTRICITY UTILITIES

The greatest barrier to development stems from the perception that net metering has a negative impact on utilities and non-participating customers. The primary concern of utility companies when considering net metering programs is their inability to recover fixed costs.[58] Throughout the year, utility companies incur costs for grid maintenance, transmission infrastructure, and electricity production.[59] These costs are typically covered as a portion of the utility bill, but as more customers produce their own electricity, the less they purchase from the utility company and thus the less they contribute to recuperating these fixed costs.

Furthermore, current law requires utilities to pay customers for excess energy they feed back into the grid, further increasing the potential deficit.[60] Arguably, utility companies could benefit from net metering programs because they reduce the amount of electricity the utility must produce and save money on meter installation, reading and billing costs. However, these costs are minimal and do not contribute to the recovery of fixed costs.

The actual impact of net metering programs on utility companies remains unclear, which has added to the difficulty in crafting fair legislation that would be responsive to their concerns. As one author explained, "relatively little information has been published regarding the costs and benefits of net metering to utilities, to net-metered customers, to non-net-metered customers, and to the general public."[61]

Some recent studies have, however, contributed to the knowledge in this area. In May 2012, California, a pioneer in the area of renewable energy, introduced legislation to study the costs and benefits of its policy to double the amount of solar capacity eligible for net metering.[62] Recently, a paper was published to address claims by Californian utility companies that the state's net metering policy caused cost shifts between net-metering

customers and non-net-metering customers. The authors concluded that the "concerns with the impacts of [net metering] policy on non-participating rate payers [i.e. the cost shifts] are unfounded." [63] The study explained that recent changes in rate design and updated models of the avoided costs when accepting net metering energy showed a small net benefit on average to the residential markets and an even greater benefit to commercial, industrial, and institutional markets, rather than a shift in costs to non-participating customers.[64]

Additional studies will likely be necessary to fully determine the impact on utility companies and develop net metering policies that accommodate energy-producing customers while minimizing the detriment to utilities.

THE INTERSTATE RENEWABLE ENERGY COUNCIL'S MODEL NET METERING RULES AND THE EXPERIENCES OF OTHER STATES

The Public Utility Regulatory Policies Act (PURPA)[65] of 1978 was the first federal legislation supporting net metering. It was created to encourage the use of domestic renewable energy and to improve the efficiency and conservation of energy supplied by utilities. The act requires state-regulated public utilities to buy power from more efficient customers if the cost is less than the utility's "avoided cost rate" to the customer. Utility customers who generated excess on-site electricity could usually qualify to receive payment from a utility at the utility's avoided-cost rate for energy exports. The avoided-cost payment is often less than half the retail rate provided by the customer, and therefore often did not provide much of an economic rationale encouraging customers to create a system that produced more energy than minimum on-site demand.[66] Recognizing that the PURPA policies might not provide customers with a sufficient incentive to invest in distributive generation, states began to develop net metering policies in the 1980s to encourage investment in this area.[67]

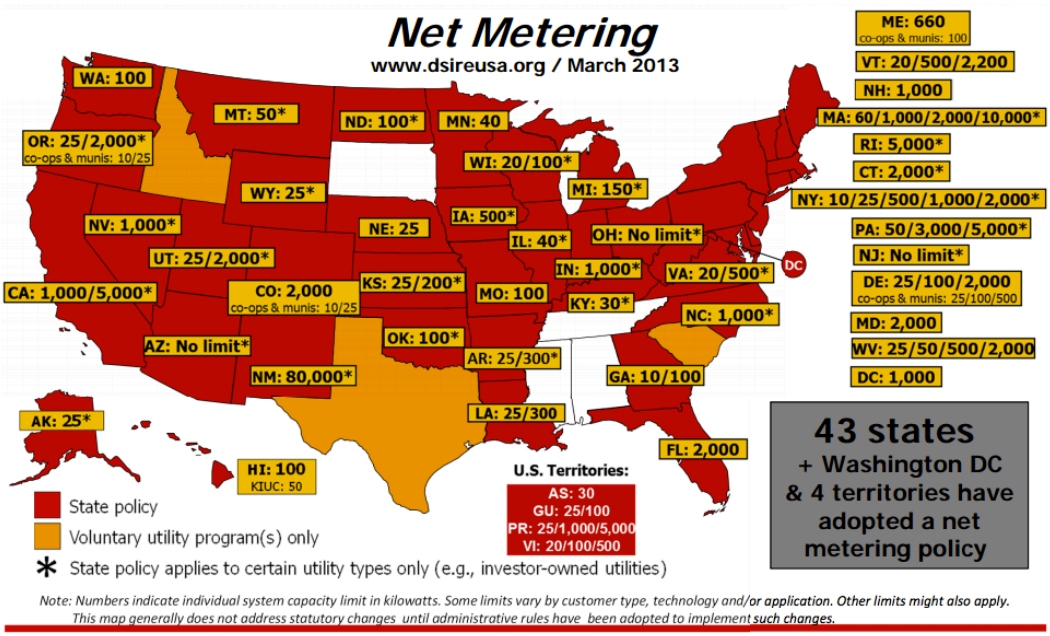
The popularity of these programs grew, and as of November 2010, 43 states have adopted net metering policies.[68] Many states formulated their policies based off of model standards developed by the Interstate Renewable Energy Council (IREC),[69] the Federal Energy Regulatory Commission (FERC),[70] the Mid-Atlantic Distributed Resources Initiatives (MADRI),[71] or other states with well-developed rules such as California.[72] IREC rules, developed in 2003, are particularly widely used and were developed to incorporate the

FERC and MADRI rules along with the best practices in state net metering policies.[73] These rules include provisions requiring (1) all renewable energy systems are eligible; (2) all customer classes are eligible; (3) no limit exists on aggregate capacity of net metered systems; (4) excess kilowatt hours are carried over to the customer's next monthly bill indefinitely; (5) all utilities are included; (6) customers retain ownership of RECs; (7) utilities may not treat net metering customers differently than those who are not net-metered, including charging customers special fees for net metering; (8) third-party

ownership of net metering systems is allowed; 9) customers with multiple meters on adjacent property may offset their load on those meters with a single generation system.[74]

Variations in-state net metering policies still exist despite their basis on similar models. These include the types of technologies eligible for net metering, the size of a system that can be net metered, the total aggregate generation capacity of systems that may enroll, the treatment of monthly and annual net excess generation, the types of utilities covered by state policy, and the ownership of Renewable Energy Credits (RECs).[75]

Net Metering Capacities Across the Nation



Source: Database of State Incentives for Renewables & Efficiency

THE CURRENT STATUS OF NET METERING LEGISLATION IN WASHINGTON STATE

Net metering is governed in Washington State by Revised Code of Washington (RCW) 80.60.[76] The statute applies to systems up to one hundred kilowatts (kW) in capacity that generate electricity using water, wind, solar energy, or biogas from animal waste as fuel. The statute requires that net metering is available on a first-come, first-served basis until the cumulative generating capacity of net-metered systems equals 0.25% of the utility's peak demand of 1996.[77] The limit for cumulative generating capacity will increase to 0.5% on January 1, 2014.[78] At least one-half of the utility's 1996 peak demand available for net-metered systems is reserved for systems that generate electricity using renewable energy.

Additionally, the electric utility must provide the customer-generator a bi-directional meter. The customer must provide the current transformer enclosure (if required), the meter

socket or sockets, and junction box.[79] Net excess generation (NEG) is credited to the customer's next bill at the utility's retail rate.[80] However, on April 30 of each calendar year, any remaining NEG is surrendered to the utility without compensation to the customer.[81]

The net metering statute also sets forth several safety and performance requirements. It requires that net-metered systems must include all equipment necessary to meet applicable safety, power quality and interconnection requirements established by the National Electric Code, the National Electric Safety Code, the Institute of Electrical and Electronic Engineers (IEEE) and Underwriters Laboratories (UL). Utilities may not require net-metered customers to comply with additional safety or performance standards, or to purchase additional liability insurance. Utilities also may not charge customers any additional standby, capacity, interconnection, or other fee or charge without approval from the Washington Utilities and Transportation Commission (UTC).[82]

STAKEHOLDERS AND PREFERENCES

On July 26, 2012, the Utilities and Transportation Commission (UTC) issued a Notice of Opportunity to Submit Comments regarding model interconnection rules for generating facilities up to 20 megawatts. Members of the working group that developed the model rules include the state's three Investor Owned Utilities, the Washington PUD Association, and the Interstate Renewable Energy Council, Inc. ("IREC").[83] The various responses to the comments provide an understanding of the various stakeholders in Washington State and their preferences.

RECOMMENDATIONS

This paper proposes three legislative changes to the current net metering statutes in Washington State. The first change is to increase of the cumulative net metering generation capacity from 0.25 percent of a utility's peak load in 1996 to one percent in the year 2020. Second, change the definition of "customer-generator" to include customers that lease or contract with a third party that owns or operates a net metering system. Finally, increase the net metering system size from 100 kilowatts (kW) to 200 kW.

These three changes will facilitate the implementation of net metering and will bring Washington more in alignment with other states. Other changes to net metering legislation in Washington state may be worth considering and will be introduced in Section VI of this paper, but these should be investigated after the three proposed changes have been passed. A bill focusing on these three reasonable, incremental changes will have a much greater possibility of passing than one that advocates sweeping and contentious changes. The remaining portion of this section discusses the rationale behind each proposal.

INCREASE THE CUMULATIVE NET METERING GENERATION CAPACITY TO 1% OF A UTILITY'S PEAK LOAD IN 1996 BY 2020.

Washington State's current net metering statute limits the cumulative net metering generation capacity to 0.25% of the utilities peak load in 1996.[84] The statute provides for an increase in 2014 to 0.5% utility's peak load in 1996.[85] This paper proposes the modest additional increase from 0.5% in 2014 to 1% by 2020. Utility companies are generally opposed to such increases because they hinder their ability to recover their fixed costs. However, Washington State's limit on aggregate capacity is relatively low compared to other states.[86] Many states do not specify a limit, and for those that do, only three states specify a limit lower than that of Washington State.[87] By proposing a modest increase to 1%, which remains on the low end, a bill advocating this change is much more likely to pass.[88]

EXPAND THE DEFINITION OF A CUSTOMER-GENERATOR

A second change is to expand the definition of "customer-generator" to include customers that owns and operates, leases and operates, or contracts with a third-party that owns or operates a net metering system.[89] Currently, the statute defines "customer-generator" as a user of a net metering system.[90] However, the IREC Model Rules recommend that a customer-generator does not need to be the owner of the Renewable Generation System, but could include "any customer of an Electricity Provider that generates electricity on the customer's side of the billing meter with Renewable Energy Generation."

Expanding the definition of customer-generator could encourage renewable energy generation by providing incentives and investment capital for systems, but has also raised concerns regarding disproportionate purchasing by third party companies. Third-party financing is both beneficial to entities lacking initial investment capital to purchase a system desiring, as well as to entities desiring to invest in renewable energy but not interested in owning or maintaining a system.[91] Third party financing would also allow investors to take advantage of economic incentives, such as depreciation deductions, rebates, and tax credits.[92] This would prove particularly beneficial for entities unable to claim tax credits (i.e. governments, schools, and non-profits) by allowing them to host a renewable system owned by a separate investor.[93] IREC, in responding the Washington State Utility and Transportation Commission's (UTC) Notice of Opportunity to Comment Issued July 26, 2012, stated that "Third party ownership has become the dominant model across the nation for new solar energy facilities"[94] IREC suggests that Washington would likely follow the experience of the California market, and therefore allowing third party ownership could potentially quadruple the number of renewable energy generating facilities interconnected in Washington.[95]

However, one concern associated with third-party financing is the possibility that one person or company could purchase all the individual customer-generating systems and

essentially create another power company. This concern will have to be addressed if the proposed expansion to the definition of a customer-generator is to be successful. One method would be to place a limit on the percentage of individual systems one person or company could purchase. Alternatively, the bill could define "third-party" or introduce some regulations specifically related to the third party measures.

INCREASE THE NET METERING SYSTEM SIZE FROM 100 KILOWATTS (KW) TO 200 KW.

Finally, this paper proposes increasing the net metering system size from 100 kW to 200 kW. The IREC model rules do not propose a size limit, but only require that the rated capacity of the Renewable Energy Generation does not exceed the Customer-generator's service entrance capacity.[96] The model rules note that some states do not impose limitations on the size of the Renewable Energy System that may be net metered.[97] Of the states that impose limitations, the "limits vary from 25 kilowatts to as high as 80 megawatts; however most states appear to be coalescing around the 2-megawatt cap."[98] At 100 kW, Washington State is on the low end, and a modest increase would likely be passable and would still advance net metering policies.

FURTHER PROPOSALS TO CONSIDER

This paper has recommended the above three proposals as a starting point for making changes to the net metering legislation, but Washington State could benefit from considering changes or developments in two other areas: excess energy generated and virtual net metering.

Flexibility for the Use of Energy Credit

First, allowing for more flexible use of generated credits would align Washington State legislation with the recommendations of the IREC Model Rules and the practices of several other states. Currently, RCW 80.60.030 restricts credit rollover by requiring that "On April 30th of each calendar year, any remaining unused kilowatt-hour credit accumulated during the previous year shall be granted to the electric utility, without any compensation to the customer-generator." This provision departs from the IREC Model Rules' provision of perpetual rollover of excess generated credits. The approach allowing indefinite rollover of surplus power credits has also been adopted in a number of states.[99]

Virtual net metering

Developing a policy to promote virtual net metering could advance the possibilities for using net metering systems. Virtual net metering is a tariff arrangement that allows a customer to assign the net production of an electricity generator to other metered accounts that are not physically connected to that generator.[100] Essentially, virtual net metering is a method of creating one net metering system that is connected to the grid, and when excess energy is produced, the electricity costs of

the buildings connected to this system are offset. For example, if a property owner has one renewable energy system on her property but maintains multiple separate buildings with their own meters (such as an apartment building with multiple units), she could allocate energy credits to each building from the electricity her system generated. Permitting virtual net metering would allow customers or businesses to buy or lease part of a wind or solar energy farm and benefit financially, regardless of their location or ownership of the property.[101]

Virtual net metering improves the use of renewable energy in multi-tenant settings because it eliminates the additional costs and complexity of installing separate net metering systems behind each tenant's meter and allows for a larger system to be built using less space.[102] Additionally, it allows the property owner to invest in a net metering system rather than requiring the investment to be made by the tenants, who may not stay in the apartment long enough to recuperate the costs of their initial investment. California introduced the first virtual net metering program in 2008, although several other states, including Colorado, Delaware, Maine, Massachusetts, Rhode Island, and Vermont also currently allow net metering.[103]

6. PLUG-IN ELECTRIC VEHICLE INFRASTRUCTURE

SUMMARY

A "plug-in electric vehicle" (PEV) is any car or truck that can be charged from an external source of electricity, such as a wall socket. These vehicles can be "all-electric" (running on electricity only) or "plug-in hybrids" (running on both electricity and liquid fuels)."[104] By running purely on electricity, PEVs free the consumer from having to rely on gasoline, providing an economic benefit to the consumer as well as numerous environmental and security benefits to society. However, PEVs have yet to be accepted in the general marketplace, with a large factor being consumers' "range anxiety," or the fear that a PEV would be unable to get the driver to her destination. This section explains these benefits and barriers, and recommends the Washington State Legislature adopt policies to promote the use of PEVs.

BACKGROUND

Gasoline prices have risen within the United States substantially in the last ten years, and with prices in Seattle currently hovering near $4.00 per gallon, they are as high as they were before the Great Recession.[105] This has placed undue hardship on many Americans, as they have no recourse but to spend more at the pump. Demand for energy will continue to rise in the coming years, and it is reasonable to expect gasoline prices to continue to climb. In addition to individual hardship, these problems have national ramifications as well. Every

U.S. president in the last 35 years has named reliance on foreign oil (especially from unfriendly or autocratic nations) as a prime security concern. There are environmental concerns with reliance on fossil fuels as well. President Obama has made it a priority to reduce our reliance on foreign oil, and part of his strategy has been to explore alternative forms of transportation, such as PEVs.[106]

The troubles of the PEV market are a classic "chicken-and-the-egg" problem. People choose not to buy PEVs because there is a perception that existing infrastructure is insufficient to make them work for everyday vehicle trips. Meanwhile, infrastructure does not get built because there is not sufficient consumer demand. A major issue hampering commercial success of PEVs is the difficulty they have in driving long distances, even though the average number of miles people travel per day is under 30 miles.[107]

Easily accessible charging stations, which can recharge a PEV much like a gas station would a regular car, would address this problem, but as it currently stands, our state lacks the necessary charging station infrastructure. The cost of building a charging station varies by the type of station. Generally speaking, there are three levels of charging stations: Level 1, Level 2, and Level 3, or Direct Current "Fast Charge" (DCFC). Level 1, being a 120-volt charger, can be installed at a consumer's home and is not included in this proposed solution. Level 2 are at 220-240 volts, which allows for a full charge in a number of hours. Level 3 chargers are at 480 volts, and are expected to be able to recharge a battery to 80% capacity in 20-30 minutes. Given the amount of power they can supply, the DCFCs hold the most promise in influencing the PEV market, but are also the most expensive. Costs for commercial-grade, public access Level 2 chargers are $16,000-$25,000, while costs for DCFCs are $80,000-$110,000.[108]

Much of President Obama's interest in alternative forms of transportation came to fruition in the American Reinvestment and Recovery Act of 2009, commonly known as the Stimulus Bill. The Stimulus Bill provided numerous grants and tax breaks to promoting PEVs, including rebates for consumer purchases[109] and funding within Washington State to build charging stations for PEVs.[110] But these funds have already been distributed, and soon they will expire. Without further funding, there is concern that the construction of these stations will slow or stop entirely.

RECOMMENDATION

PROMOTE GROWTH OF ELECTRIC VEHICLE CHARGING STATION INFRASTRUCTURE

We recommend Washington State ensure that construction of charging stations continues, and that will require funding. By jumpstarting the construction of a backbone support system for PEVs, Washington could be at the national forefront of this technology. This could bring financial investment into the state from the rest of the country and abroad. It

could bring jobs as well. For example, BMW recently opened a carbon-fiber manufacturing plant in Moses Lake, Washington, with the specific intent of building parts for PEVs.[111] The BMW plant is a $100 million investment and is expected to employ 200 people permanently, along with 200 construction jobs.[112]

As part of the Stimulus Bill, the U.S. Department of Energy awarded a number of grants to companies to promote the implementation of PEV charging stations and PEV sales. For example, in 2009 San Francisco-based company ECOtality, Inc., launched The EV Project with funding from the U.S. Department of Energy and partners such as Chevrolet and Nissan, for a total of $230 million project.[113] The mission of the project is to build charging stations around the country, and the Northwest has seen a number of these built within its borders. A number of other companies are installing stations as well, but construction has slowed with the reduction of stimulus dollars.

7. AMENDMENTS TO THE ENERGY INDEPENDENCE ACT (I-937)

SUMMARY

The goal of the Energy Independence Act (EIA) was to ensure that new energy growth utilizes clean technologies and that these costs stay low into the future.[114] In order to best achieve these goals, we recommend that the legislature adopts several amendments to the EIA that will provide greater flexibility and cost-effective implementation of the conservation and renewable energy standards. Many of the suggested amendments will also advance Washington State's goal of promoting distributed energy.

First, the definition of "eligible renewable resource" should be expanded to include facilities utilizing anaerobic digesters that capture and destroy methane by allowing these facilities to "unbundle" their power and non-power attributes into renewable energy credits and carbon reduction credits. This will encourage the development of this technology, which is an important alternative method of energy production because it reduces carbon as well as generating energy.

Second, the definition of "eligible renewable resource" should also be expanded to include two specific conservation technologies: cogeneration and net-metering. To provide greater incentive for these clean technologies, the amendment could allow for double output qualification as a source of "distributed generation."

Finally, the current definition of "cogeneration" is poorly written and should be clarified with more technology-neutral language. Because cogeneration can advance the efforts of both conservation and generation, a clear definition is important.

BACKGROUND

In November 2006, Washington successfully passed a clean energy initiative (I-937)[115] with 52% of the vote. The initiative established two distinct requirements under RCW 19.285, also known as the Energy Independence Act (EIA): (1) a renewable energy standard requiring electric utilities with more than 25,000 customers to increase their use of new renewable sources in their electric supply to 15% (excluding hydro) by 2020, with incremental steps of 3% by 2012 and 9% by 2016; and (2) a conservation standard requiring these electric utilities to pursue all available conservation opportunities that are cost-effective, reliable, and feasible based on biennial targets that begin in 2010.[116]

HIGHLIGHTS OF HIGHLIGHTS OF THE CURRENT ACT

Renewable Resources

Renewable resources are defined as: water; wind; solar energy; geothermal energy; landfill gas; wave, ocean, or tidal power; gas from sewage treatment facilities; certain biodiesel fuel; or biomass energy.[117] Generation from renewable resources must come from facilities that have commenced operation after March 31, 1999 (with exception to certain biomass facilities), that are located in the Pacific Northwest or delivered into Washington on a real-time basis.[118] Hydropower eligibility is limited to the incremental generation that results from efficiency improvements (completed after March 1999) at facilities owned by qualifying utilities and located in the Pacific Northwest, or at irrigation pipes and canals in the Pacific Northwest.[119]

Conservation

Conservation is defined as any reduction in electric power consumption resulting from the increases in the efficiency of energy use, production, or distribution.[120] In meeting its conservation targets, a utility may also count high-efficiency cogeneration owned and used by an industrial customer to meet its own needs.[121] *Distributed renewable energy generation* from facilities up to five MW in size receives additional support under the EIA.[122] A qualifying utility may count distributed generation at double its output toward the annual renewable energy requirements.[123]

Renewable Energy Credit Trading System

To provide greater flexibility in meeting the annual renewable energy requirements, the EIA requires the Washington State Department of Community, Trade, and Economic Development (CTED) to select a renewable energy credit (REC) trading system.[124] A REC trading program is a common compliance mechanism for state renewable energy standards.[125] Under this mechanism, a renewable energy facility earns one REC for each megawatt-hour (MWh) of electricity that is generated in a

given year.[126] These RECs can then be bought and sold by utilities with annual renewable energy requirements,[127] much like the Clean Air Act credit-trading system, which enables lower-cost, market-based compliance with air pollution regulations.[128]

Cost Cap Provision

A cost cap is included as part of the EIA's renewable energy standard to protect electricity customers against higher-than-expected compliance costs.[129] Under the EIA, a qualifying utility would be in compliance with the renewable requirements as long as it has met the percentage benchmarks or invested 4% of its total annual revenue on the incremental costs of eligible renewable resources, the cost of RECs, or a combination of both.[130] Of course, a utility need not reach this level of investment in order to comply with the requirement.

Penalties

Qualifying utilities that do not comply with the energy conservation and renewable energy requirements are be subject to penalties.[131] For each MWh of shortfall, a utility will be levied a penalty of fifty dollars (adjusted annually for inflation beginning in 2007).[132] Any penalties collected through this mechanism would be placed in a special fund, which could only be used to purchase RECs from or invest in energy conservation projects at public facilities, local government facilities, community colleges, or state universities.[133]

RECOMMENDATIONS

EXPAND THE DEFINITION OF "QUALIFYING RENEWABLE ENERGY"

Many utilities already have more than enough energy to provide its customers until 2020, and it is unfair to have customers cover the costs for more expensive energy production that they will never receive. This has been described as taking customer money to subsidize the renewable energy technologies, or "buy-before-need." The argument is that it is better to focus on conservation efforts rather than buying more energy that is not needed.

This problem could be addressed in one of three ways:

1. Definition modification. Expand the definition of "qualifying renewable energy" to include certain conservation technologies such as cogeneration and net-metering.

2. Conservation banking. Allow conservation acquired in excess of targets to be carried forward to the next two-year compliance period (and therefore lead to a current lower level of renewable investment from a generally lower percentage of total energy consumption).

3. Blending the standards. Allow conservation acquired in excess of targets to be applied directly towards renewable energy standard.

We recommend the first option—expanding the definition. It is a specific and restrictive solution to the current problem and allows for continued investments in clean technology. This amendment would give the utilities facing the buy-before-need problem the necessary flexibility to fulfill their EIA requirements, but still keep the intent of I-937 intact.

On the other hand, conservation banking will lead environmentalists to ask for a higher standard in 2020, known as a "bump up," due to the leniency created by conservation banking. In response, the utilities originally asking for the change will push back and compromise will be difficult to achieve. It is also unlikely that option three of blending the two standards will be feasible because a formal separation of the two standards was consciously chosen when I-937 was passed.

CLARIFY THE DEFINITION OF COGENERATION

The definition of cogeneration is unclear and technical.[134] The legislature should modify the definition of high-efficiency cogeneration to reflect a facility that is designed to have a projected overall thermal conversion efficiency of at least 70 percent, with "overall thermal conversion efficiency" defined as the output of electricity plus usable heat divided by fuel input.

A clearer and less technical definition will allow flexibility as technology advances with new inventions and methods. Not only is waste heat an abundant source of energy that should be utilized through cogeneration, but cogeneration forwards the efforts of both conservation and generation. Revising the definition of this technology is therefore highly recommended. Current bills[135] have included this amendment.

ADD ANAEROBIC DIGESTERS AS A QUALIFYING SOURCE OF RENEWABLE ENERGY

Anaerobic digestion, or methane recovery, is a common technology used to convert organic waste to electricity or heat. In anaerobic digestion, organic matter is decomposed by bacteria in the absence of oxygen to produce methane and other byproducts that form a renewable natural gas.

Currently, anaerobic digesters are not a qualifying source of renewable energy. The legislature should amend the EIA to allow facilities that capture and destroy methane through a digester system, landfill gas collection system, or other mechanisms to separate their power and non-power attributes into distinct RECs and carbon reduction credits.

The expansion of "eligible renewable resources" to include these facilities is highly recommended because this alternative method of energy production reduces carbon as well as generates energy. Allowing these facilities to unbundle their greenhouse gas emissions

reduction credits (methane reduction) from their renewable energy credits will improve the economic viability of such systems.

8. DECOUPLING

SUMMARY

Decoupling encourages utilities to invest in energy efficiency and conservation by separating their profits from the amount of energy used by consumers. Once decoupled, a utility's profits are no longer determined by the amount of electricity or natural gas the utility sells. In order to decouple, a utility must receive approval from the Washington Utilities and Transportation Commission (UTC). The UTC has administrative authority to approve decoupling proposals, and even issued a policy statement on decoupling in 2010. Yet, none of Washington's Investor Owned Utilities (IOUs) is currently decoupled and so the state is missing out on the benefits that this policy can bring.

In part to address the slow uptake of decoupling policies in Washington, a stakeholder group convened in 2012 to discuss, among other things, administrative and legislative measures that would encourage utility decoupling. In January 2012, Governor Gregoire issued a letter with the findings of this stakeholder group. While the letter applied to ratemaking in general, it contained useful information about the status and future of utility decoupling in Washington. Notably, existing barriers to utility decoupling are administrative, rather than legislative.

Given that the UTC already possesses the authority to approve decoupling proposals, the legislature need not address decoupling through legislation at this time. Placing more restrictive legislative boundaries in a highly technical and contentious area could provide additional structure and certainty for stakeholders, but we recommend that the UTC should remain flexible to adopt creative solutions.

BACKGROUND

WHAT IS DECOUPLING?

Revenue decoupling separates a utility's fixed cost recovery from the amount of energy it sells.[136] Rates are based on revenue targets and estimated sales, and trued up (or down) to ensure that the utility meets these revenue targets. Because utilities are guaranteed to recover their allowed revenue, rate decoupling desensitizes a utility to the amount of energy it sells, and aligns the incentives of a utility with those of conservation and efficiency initiatives.

The Washington Utilities and Transportation Commission (UTC) regulates investor owned utilities (IOUs).[137] Rates charged to consumers are among the aspects of a utility's business that are within the UTC's purview. Traditionally, rates are based on the amount of electricity used by a consumer.[138] However, rates based on the amount of electricity used by a consumer can create a disincentive for utilities to encourage consumers to conserve energy and make energy efficiency improvements. The traditional cost recovery mechanism incentivizes utilities to sell high volumes of electricity because doing so increases their revenues.[139] The current rate structure puts utilities at odds with plans to encourage conservation and distributed generation because conservation and distributed generation reduce the number of kilowatt-hours for which utilities can bill customers.

Decoupling breaks this link between sales and revenue, allowing a utility to facilitate both conservation and distributed energy initiatives while at the same time meeting revenue targets. It stands as an increasingly popular method of incentivizing utilities to encourage conservation and efficiency.

DESCRIPTION OF THE PROBLEM

The UTC has administrative authority to allow utilities to implement revenue decoupling.[140] Yet, none of Washington's investor owned utilities is presently decoupled. Though utilities are already required to implement energy conservation programs through the Energy Independence Act (I-937), decoupling proponents argue that decoupling will encourage IOUs to make additional investments in conservation and efficiency programs that will further reduce energy use.

DECOUPLING ACTIVITY IN WASHINGTON STATE

Decoupling Proposals Were First Introduced in Washington in the 1990s

Decoupling to date in Washington has consisted of a series of short-duration experiments and the UTC's rejection of numerous decoupling proposals. Decoupling has been implemented by utilities in Washington on a piecemeal basis since the 1990s, when Puget Sound Energy first decoupled.[141] In 1990, Puget Sound Energy, then Puget Sound Power and Light, proposed a periodic rate adjustment mechanism (PRAM), which would disassociate the amount of electricity sold from revenue, and instead relay rates calculated on a per customer charge.[142] The proposal was approved in 1991, but the decoupling scheme was discontinued in 1995.[143]

In 2004, the UTC "invited PacifiCorp and other stakeholders to begin discussions regarding the design of a decoupling mechanism in its order approving a settlement proposal by NRDC, the Commission staff, and PacifiCorp."[144] The Commission rejected a proposal by PacifiCorp in 2006,[145] and in 2007, the Commission declined to implement PSE's proposed natural gas decoupling mechanism it put forward in a rate case, reasoning that PSE did not need any further incentive to undertake

conservation.[146] However, in 2007 the Commission authorized a three-year pilot decoupling mechanism for Cascade Natural Gas Corporation[147] and in 2009 the Commission approved Avista's proposed natural gas decoupling mechanism.[148]

The UTC Adopted a Decoupling Policy In 2010

In 2010, the Washington Utilities and Transportation Commission issued a policy position addressing decoupling.[149] The UTC undertook the process of developing a policy position in response to legislative proposals introduced during the 2010 legislative session. Among the proposals introduced were some that would require the Commission to approve a rate adjustment mechanism to allow electrical and natural gas utilities to recover investments in conservation.[150]

The UTC's policy position does not grant blanket approval for decoupling. Instead it set forth what a utility must do in order to make a case for decoupling.[151] The Commission specifically endorsed limited decoupling mechanism for natural gas utilities[152] and a full decoupling mechanism for electric and natural gas utilities.[153]

Making Progress: The Most Recent Decoupling Proposals

Most recently, the Commission reviewed the Northwest Energy Coalition's (NWEC) proposal for full electricity decoupling as part of PSE's 2011 general rate case. In this rate case, the Commission Staff "examine[d] full decoupling as an option for PSE" and invited other stakeholders to respond. The Commission staff filed a lengthy response with multiple appendices, in addition to filing testimony in response to the Coalition's decoupling proposal and PSE's proposed alternative to address the negative financial effects that conservation has on its ability to recover certain of its fixed costs. Several other stakeholders presented testimony in response to the proposals.[154]

In particular, PSE opposed the Coalition's decoupling proposal because it maintained that the proposal did not adequately address the financial consequences of PSE's energy efficiency programs—specifically PSE's inability to recover its fixed costs through volumetric rates due to conservation.[155] In its final order in that case, the UTC determined that the Coalition's proposal was consistent with the purpose of the UTC's November 2010 Decoupling Policy Statement.[156] However, the Commission declined to require PSE to implement full decoupling in the face of its opposition.[157]

Puget Sound Energy proposed another decoupling mechanism in 2012.[158] The 2012 PSE decoupling proposal was presented to the Commission as a joint petition from Puget Sound Energy and the Northwest Energy Coalition to implement electric and natural gas decoupling mechanisms.[159] Puget Sound Energy's 2012 decoupling

proposal remains pending before the Commission but sources indicate that this proposal is expected to gain approval from the Commission.

Governor Gregoire Convenes a Stakeholder Group

In 2012, Governor Gregoire convened an informal discussion group to discuss ratemaking in Washington, including how to advance decoupling in the state. The group—comprised of representatives from the UTC, the Public Counsel's office, the Northwest Power Coalition, major utilities, and the Governor's office—issued its findings in late 2012.[160]

Notably, few of the recommendations that the group is likely to make would involve legislative action; rather the recommendations were characterized as "administrative actions to improve the UTC energy ratemaking process." The group is of the opinion that the UTC has all of the legislative authority it needs to allow utilities in the state to decouple. The real barriers to decoupling are institutional and procedural. Of the findings that are applicable to decoupling, the group recommended that the UTC:[161]

- "Establish by rule a mechanism by which investor-owned utilities may seek expedited treatment of a request for a rate increase that updates test period information on investment, revenues, and expenses since the last formal rate proceeding."
- "Establish, and adopt by rule or initially by policy statement, 'ratemaking principles'—to reduce repetitive litigation, and to increase predictability and consistency of rate decisions, with an initial focus on…[s]eparate accounting of energy conservation costs."

RECOMMENDATIONS

Full decoupling mechanisms remove the throughput incentive and help align the incentives of utilities with those of conservation and efficiency initiatives. In recent years stakeholders and the Commission have taken great strides to develop a better understanding of how decoupling can best be implemented in Washington, as evidenced by the Commission's 2010 policy statement, the stakeholder group convened by Governor Gregoire, and PSE and NWEC's 2012 joint petition for a full natural gas and electricity decoupling mechanism.

Of particular import to the legislature is that, although decoupling is not yet widespread in Washington, the recent activity suggests that this could change in the near future and could do so without the involvement of the legislature. As the UTC noted in its 2010 policy position, decoupling mechanisms are highly fact specific and should be implemented on a case-by-case basis.[162] Given that the Commission already has administrative authority to implement revenue decoupling through rate cases and fact specific nature of each case,

legislative action is not warranted at this time. The legislature does not need to take action to confer authority on the Commission and decoupling is best address on a case-by-case basis, rather than through a mandatory requirement imposed by the legislature.

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[94] *See infra* note 87; *See also The Database of State Incentives for Renewable Energy (DSIRE) website*, http://www.dsireusa.org/documents/summarymaps/3rd_Party_PPA_map.pdf (showing a summary map of state policies regarding third-party ownership).
[95] Id; *see infra* note 87.
[96] IREC Model Rules (b)(1).
[97] IREC Model Rules at 2-3 n. 2.
[98] *Id.*
[99] *See* Interstate Renewable Energy Council, State and Utility Net Metering Rules for Distributive Generation (April 9, 2013), http://www.irecusa.org/irec-programs/connecting-to-the-grid/net-metering/.
[100] *See*, *e.g.*, Connecticut Energy Efficiency Fund, *Virtual Net Metering*, (April 9, 2013) http://www.ctenergyinfo.com/virtual_net_metering.htm (Virtual net metering can be categorized into two broad types: Grid-tied virtual aggregation, whereby multiple customers share the net metered credits from a single system without being physically connected the that system, and behind-the meter aggregation, whereby multiple customers receive net metering benefits form a single system on the same property without being connected to the system); *See also,* Alex Anich, *Virtual Net Metering Programs in the U.S.*, Karbone Renewables Research, (April 9, 2013), http://www.karbone.com/wp-content/uploads/2012/02/Karbone-VNM-Research.pdf.
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Institute, *Emerging Solar Metering Policies*, (April 9, 2013), http://pdf.wri.org/bottom_line_emerging_solar_metering_policies.pdf. See *also* States with Virtual Net Metering Policies (Exhibit C).
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[118] RCW 19.285.030(11)(a); 19.285.030(17)
[119] RCW 19.285.030(11)(b)
[120] RCW 19.285.030(5)
[121] RCW 19.285.040(1)(c)
[122] RCW 19.285.030(10)
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[136] The National Association of Regulatory Utility Commissioners, *Decoupling for Electric & Gas Utilities: Frequently Asked Questions* 2 (2007).
[137] Municipal utilities and utility cooperatives are not regulated by the UTC and not within the scope of the present discussion.
[138] The current fixed cost recovery mechanism creates a financial incentive that encourages utilities to sell energy. Presently in Washington State, an electric utility recovers its costs and earns a fair rate of return through fees collected from its customers. Customer fees are based on the amount of energy they consume.[138] The result

is that utilities receive additional profit if they sell more energy than projected ("found margin"), and lose profits if they sell less electricity than projected ("lost margin").[138] When conservation and distributed generation policies are successful, utilities' lost margin increases. Lost margin translates into decreased profits and hurts the financial position of the utility. Consequently utilities have a financial disincentive to facilitate conservation and distributed generation initiatives.

[139] Referred to in the literature as a "throughput incentive."

[140]

[141] Wash. Utilities and Transp. Comm'n v. Puget Sound Power and Light Co., Dkt. Nos. UE-901184-T et al., Nov. 7, 1995 (Wash. U.T.C.).

[142] Phillip S. Cross, *Decoupling Charge to Expire*, PUBLIC UTILITIES FORTNIGHTLY (Mar. 1, 1996), http://www.fortnightly.com/fortnightly/1996/03/decoupling-charge-expire. *See also* Prefiled Direct Testimony of Ralph C. Cavangh, NW Energy Coalition (December 2011) Dkt. NO UE-111048/UG-111049.

[143] *Id.*

[144] Wash. Utilities and Transp. Comm'n v. Puget Sound Energy, Inc., Dkt. Nos. UE-111048/UG-111049, Prefiled Direct Testimony of Ralph C. Cavanaugh, NW Energy Coalition (Dec. 2011), 4.

[145] *Id.*

[146] *Wash. Utilities and Transp. Comm'n v. Puget Sound Energy, Inc.*, Dkt. Nos. UE-060266 & UG-060267, Order 08 (January 5, 2007), ¶¶65-66.

[147] *Wash. Utilities and Transp. Comm'n v. Cascade Natural Gas Corp.*, Dkt. UG-060256, Order 05 (January 12, 2007). Cascade's pilot program has been discontinued. *Conservation Incentives Inquiry*, Dkt. U-100522 (Nov. 2010), 10.

[148] In the Matter of the Washington Utilities and Transportation Commission's Investigation into Energy Conservation Incentives, Dkt. U-100522, Report and Policy Statement on Regulatory Mechanisms, Including Decoupling, to Encourage Utilities to Meet or Exceed Their Conservation Targets (Nov. 2010), 9.

[149] In the Matter of the Washington Utilities and Transportation Commission's Investigation into Energy Conservation Incentives, Dkt. U-100522, Report and Policy Statement on Regulatory Mechanisms, Including Decoupling, to Encourage Utilities to Meet or Exceed Their Conservation Targets (Nov. 2010).

[150] *Id.* at 4–5.

[151] *See, e.g., id.* at 10–11 (describing what a natural gas utility must include in a general rate case in order to properly proposed a limited decoupling mechanism for natural gas).

[152] *Id.* at 9–15.

[153] *Id.* at 15–19.

[154] *See generally Wash. Utilities and Transp. Comm'n v. Puget Sound Energy, Inc.,* Dkt. Nos. UE-111048/UG-111049 (Dec. 2011) [hereinafter PSE 2011 GRC Final Order].

[155] *Wash. Utilities and Transp. Comm'n v. Puget Sound Energy, Inc.,* Dkt. Nos. UE-111048/UG-111049 (Dec. 2011), *Order 08 Rejecting Tariff Sheets; Authorizing and Requiring Compliance Filing* ¶¶453–54.

[156] *Id.* ¶¶453, 455.

[157] *Id.* ¶453.

[158] *Wash. Utilities and Transp. Comm'n v. Puget Sound Energy, Inc.*, Dkt. No UE-121697 (Oct. 25, 2012).

[159] *See Wash. Utilities and Transp. Comm'n v. Puget Sound Energy, Inc.*, Dkt. No UE-121697, Puget Sound Energy, Inc. and NW Energy Coalition's Petition for an Order Authorizing PSE To Implement Electric and Natural Gas Decoupling Mechanisms and To Record Accounting Entries Associated with the Mechanisms (Oct. 25, 2012).

[160] Letter from Governor Christine O. Gregoire to Chairman Goltz and Commissioners Oshie and Jones, January 4, 2012.

[161] *Id.* at 3–4.

[162] *Id.* at ¶ 35.