

---

# Carbon reduction partnership with the City of Bellingham



---

August 2019

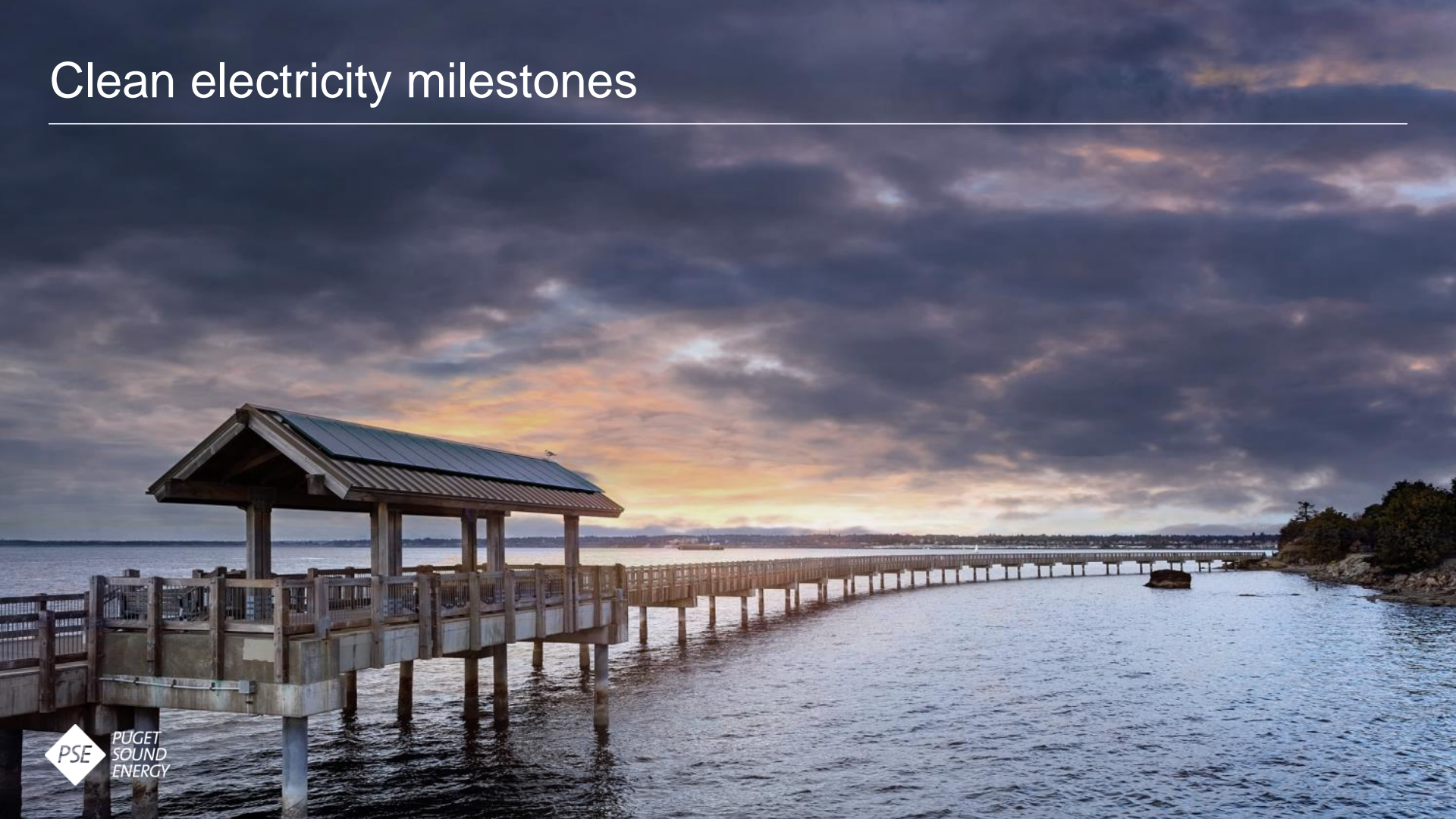
# Agenda

---

- Clean electricity milestones
- Creating a better energy future
- PSE's current partnership with Bellingham
- Future carbon reduction partnership options

# Clean electricity milestones

---



# Timelines for clean electricity

## Washington State

Contained in Clean Energy Transformation Act (CETA)

### Coal-free electricity:

No coal-fired resources contributing to electric generation

### Carbon-neutral electricity:

All retail sales GHG neutral; or 2% cost cap triggered. Up to 20% can be alternate compliance (e.g. unbundled RECs)

### 100% clean electricity:

100% of retail load met with non-emitting and renewable resources\*



## Bellingham City Council's Goals

Contained in Resolution 2018-06

100% renewable energy for municipal facilities

100% renewable energy for Bellingham community's electricity supply

100% renewable energy for community heating and transportation



\* Clean electricity refers to both non-emitting (e.g. nuclear) and renewables (e.g. solar).

# Creating a better energy future

---



# Our vision

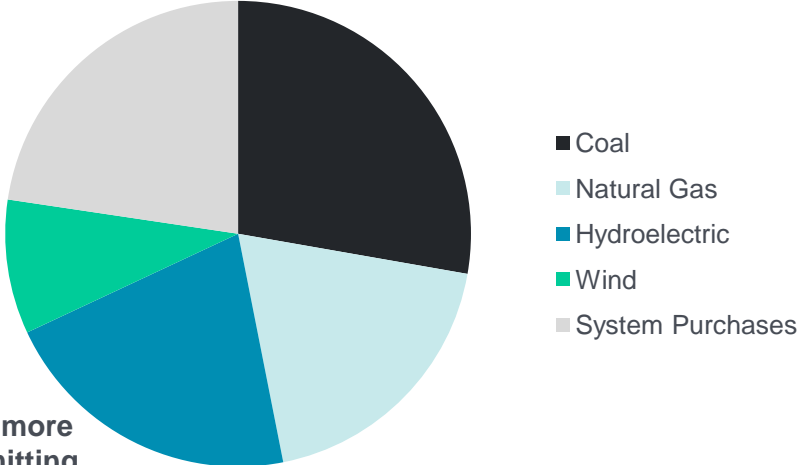
---



To create a **better energy future** together with our customers  
and the communities we serve,  
to protect the environment for future generations.

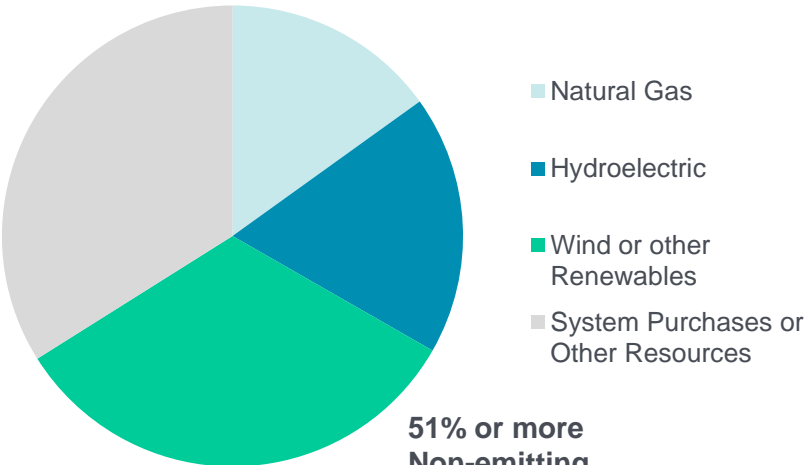
# PSE portfolio transformation: 2018 - 2026

2018 PSE Fuel Mix



30% or more Non-emitting

2026 Potential PSE Fuel Mix



51% or more Non-emitting

- Notes:**
- 1) Resources shown are not committed, but are estimates of pathways under SB 5116.
  - 2) Carbon content of purchased power is projected to reduce over time.
  - 3) System resources or other purchases may include non-emitting resources



# Current PSE products & services

---



**Customer Renewable Energy offerings** like Green Power, Green Direct, and net metering allow customers to directly contribute to creating a clean energy future



**Up & Go Electric Cars pilot programs** focus on market education and access to charging infrastructure to promote transportation electrification in WA



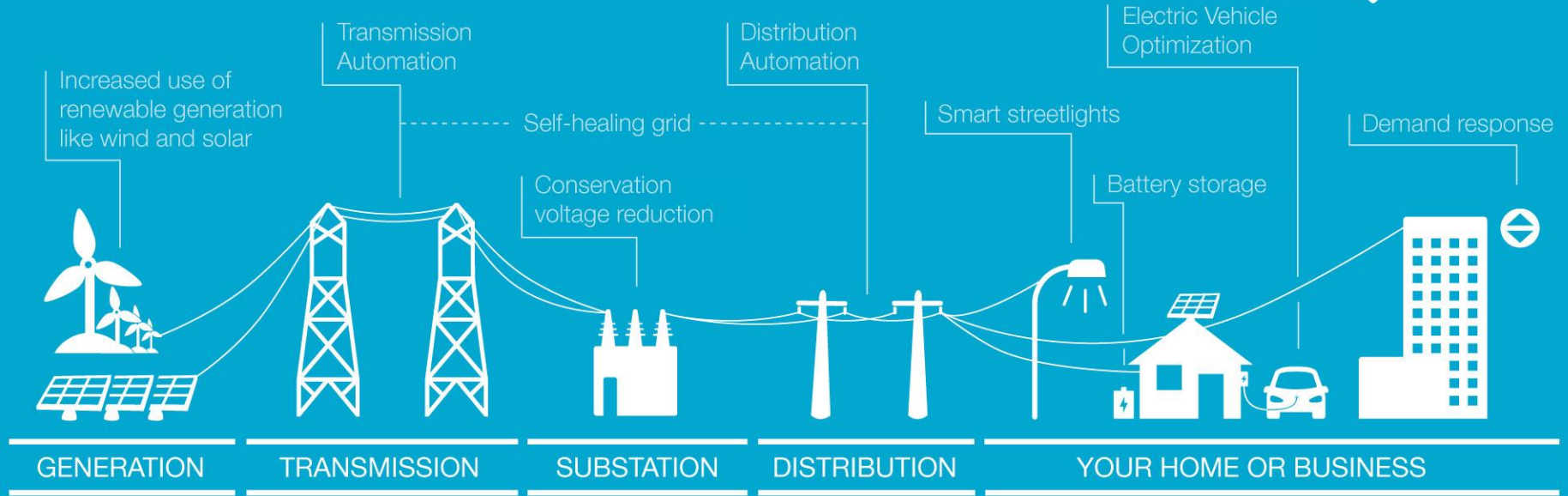
**Customer-Sited Energy Storage demonstrations** allows PSE to test use cases associated with battery storage in a range of settings



**Energy Efficiency programs** help residential, commercial and industrial customers save energy and money



# GRID MODERNIZATION



# PSE products & services in development

---



**Community Solar** will allow customers who face barriers to rooftop solar to share in the costs and benefits of a solar project by buying into a community project and receiving credits associated with its production.



**Advanced Metering Infrastructure (AMI)** is expected to be deployed in Bellingham in 2022. The new meters are the current standard for metering technology and send meter data through a secured wireless network.

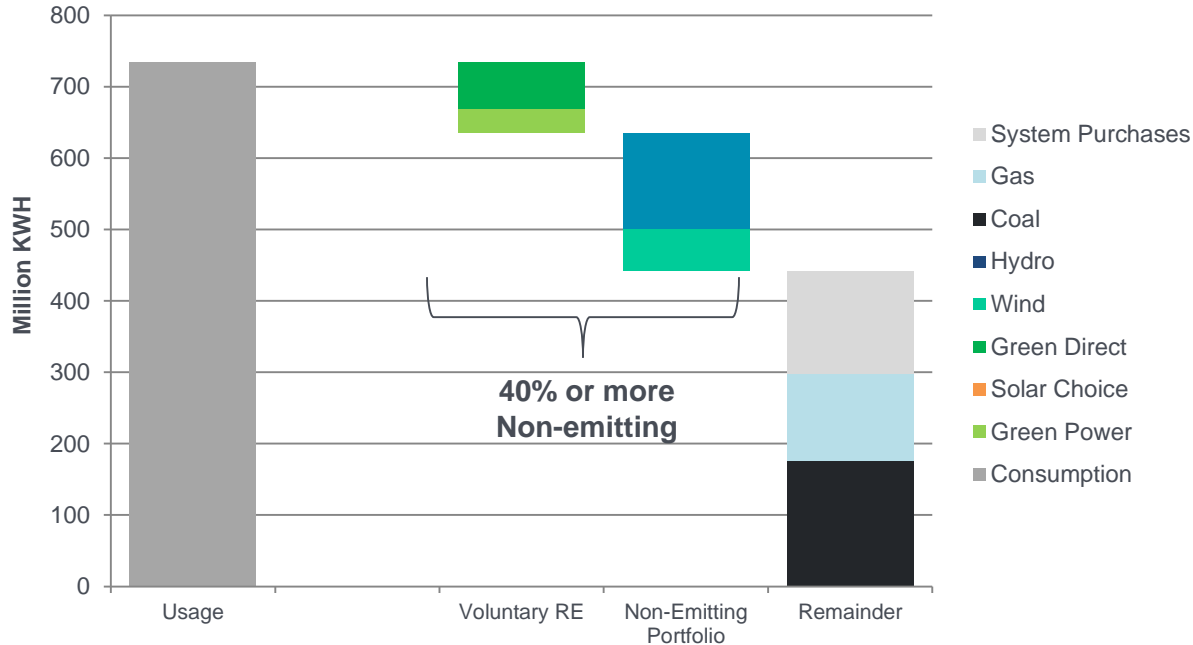
# PSE's current partnership with Bellingham

---



# Bellingham's electricity mix today

PSE Electricity Sources for Bellingham - 2018



**Notes:**

- 1) Usage: Based on 2018 consumption data for Bellingham tax code area
- 2) Voluntary Renewable Energy:
  - Green Power and Solar Choice based on kWh purchases in 2018 for Bellingham tax code area
  - Green Direct based on 2017 kWh consumption for customers enrolled in the program for participation beginning in 2020 and 2021 for 10-20 years
- 3) Non-Emitting Portfolio and Remainder: Based on system wide data from PSE Draft 2018 GHG Inventory reporting to Washington Department of Ecology.

# Bellingham's current engagement with PSE product & services

---



**1,273 solar systems** installed in Bellingham homes and businesses, for a combined capacity of **9.1 MW DC**. **6,456 participants** in Green Power and Solar Choice. Residents alone purchased green power in an amount equivalent to **3.6%** of Bellingham consumption.



**854 EVs** on the road in the City of Bellingham. **39 Level 2 or 3 public charging station ports** within a 9 mi radius of Bellingham.\* Under consideration to host a PSE Up & Go Electric public charging site.



In 2018, Bellingham commercial customers completed **over 200 efficiency projects** for **nearly 10,000 MWh** of energy savings and residential customers completed **over 2,000 projects** saving around **1,500 MWh**.

# Current Partnership: Jointly promote existing programs

City is partnering with PSE and community groups to **promote energy efficiency, Green Power, and electric vehicle adoption** by residents and local businesses. As 100% clean legislation is implemented, Bellingham's carbon intensity of electricity consumption declines.

This strategy **requires little change in how parties operate** today and focuses costs and benefits on those who opt-in. **Carbon reductions remain steady from past years.**

<b>Incremental annual carbon reduction*</b>	17m lb CO2 / ~2.5% of 2018 electric emissions
<b>Costs paid by participants</b>	Green Power purchase, purchase of energy efficient equipment
<b>Financial benefits</b>	Operational savings from energy efficiency and electric vehicles
<b>Participation Levels</b>	~15% of residents
<b>Social impacts</b>	Costs and benefits concentrated on those who opt in

\* Initial estimate based on 2018 emissions and participation data; EV component includes carbon reduction from annual VMT not bounded to Bellingham city limits

## Roles / Actions



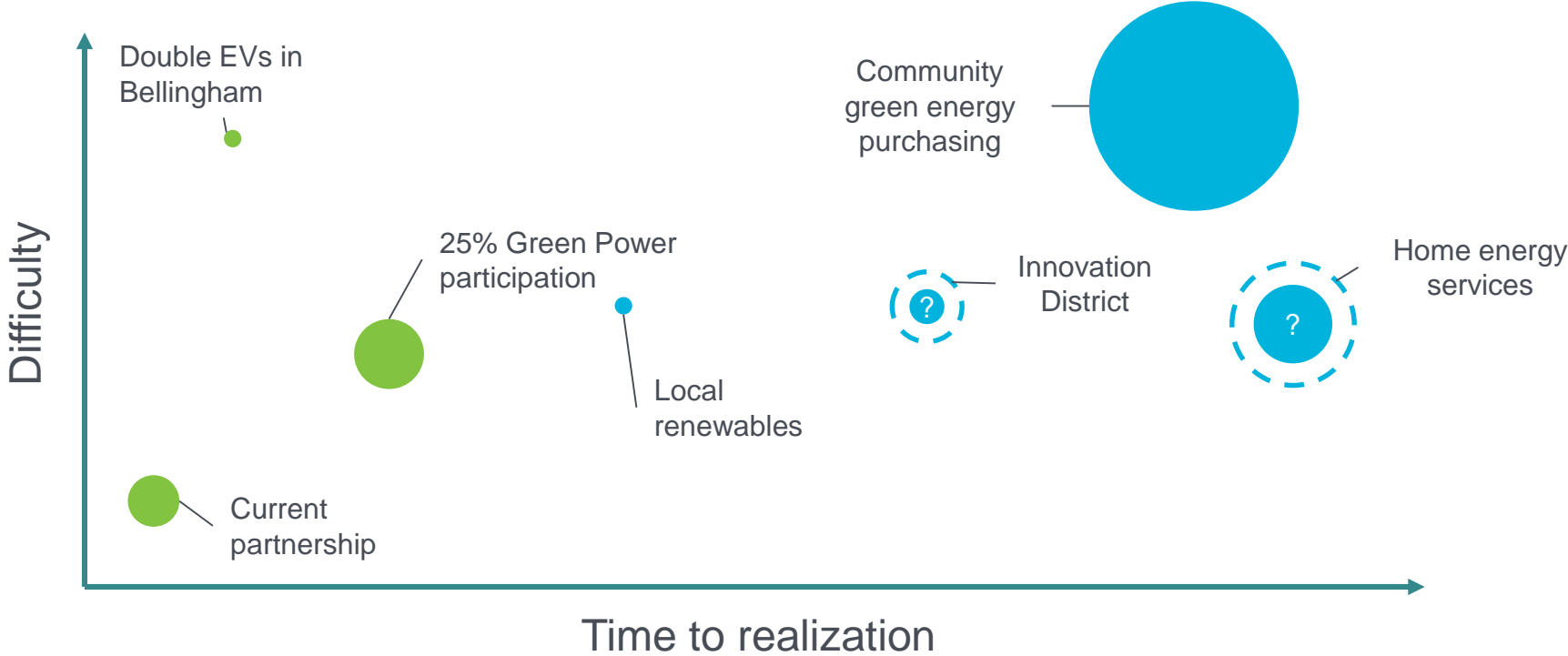
City	PSE	Residents
<ul style="list-style-type: none"> <li>• Provide support (marketing, staff time) for education and outreach activities promoting sustainable behavior</li> <li>• Facilitate collaboration among local stakeholders</li> <li>• Assist in siting EV charging</li> </ul>	<ul style="list-style-type: none"> <li>• Offer programs that allow residents to purchase renewable energy</li> <li>• Provide incentives for cost-effective energy efficiency</li> <li>• Encourage adoption of electric cars through pilot program</li> <li>• Partner on local marketing and outreach efforts</li> </ul>	<ul style="list-style-type: none"> <li>• Opt into available programs</li> <li>• Pay the cost of participating and benefit financially from energy savings</li> </ul>

# Future carbon reduction partnership options

---



# Overview of carbon reduction options (conceptual)



Size of bubble represents carbon reduction potential. Sizing is illustrative, not to scale.

Current PSE offering

Concept under consideration



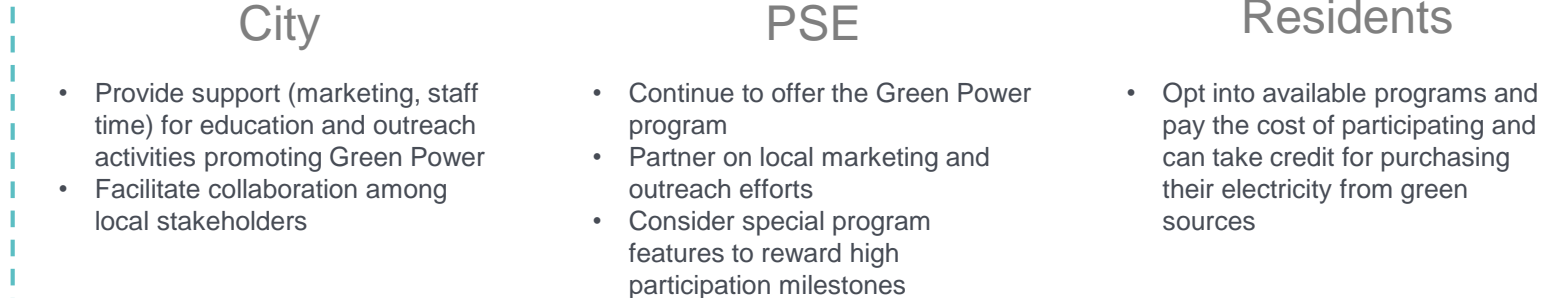
# Strategy 1: Target 25% Green Power participation

City continues to partner with PSE and community groups to **promote Green Power** to residents and local businesses, setting a target of **25% of households participating in the program.**

This strategy **takes advantage of a program that is already successful in Bellingham**, yet requires substantial marketing and engagement from local stakeholders to expand participation. **Costs and benefits shared by participants.**

<b>Incremental annual carbon reduction</b>	~30 million lbs CO2 / 4.5% of 2018 electric emissions
<b>Cost paid by participants</b>	Green Power purchase - ~\$300,000 additional paid annually by customers who opt in
<b>Participation Levels</b>	25% of residents
<b>Social impacts</b>	Costs and benefits are shared by participants; added cost creates barriers to participation for some community members

## Roles / Actions



# Strategy 2: Double EV penetration in Bellingham

PSE **deploys public charging infrastructure and offers workplace, multifamily, and residential programs** as part of its Up & Go Electric pilot program. The city **promotes EV driving**, points citizens to available infrastructure, and may fund additional infrastructure. Residents decide to drive electric cars.

This strategy **leverages existing plans for charging infrastructure** and meets customer demand. However, this strategy might require **high investment by individual customers**.

<b>Incremental annual carbon reduction</b>	~5 million lbs CO2 / <0.5% of 2018 electric emissions
<b>Costs paid by participants</b>	Purchase of electric car (\$5-50k) and electricity for fuel (\$500/yr)
<b>Financial benefits</b>	Lower fuel costs than gas vehicles; maintenance savings.
<b>Participation Levels</b>	~900 residents
<b>Social impacts</b>	Community benefits from reduced local air pollution. Higher upfront cost of EVs is barrier to purchase.

## Roles / Actions



City	PSE	Residents
<ul style="list-style-type: none"> <li>Provide support (marketing, staff time) for education and outreach activities promoting PSE's electric vehicle programs and EV driving in general</li> </ul>	<ul style="list-style-type: none"> <li>Evaluate Up &amp; Go public charging infrastructure in Bellingham</li> <li>Offer Up &amp; Go workplace, multifamily, and residential programs</li> <li>Provide program support to the city and its electric car drivers</li> </ul>	<ul style="list-style-type: none"> <li>Opt into driving electric car and pay the costs associated with ownership</li> <li>Drivers benefit from cost and carbon reductions associated with their EV</li> <li>All residents benefit from local air quality improvements</li> </ul>

# Strategy 3: Drive decarbonization through local renewables

City residents facilitate the transition to clean electricity **through group purchase of clean energy via Community Solar**. In this option, the City would propose suitable solar site(s) and PSE would develop 1-5 local community solar projects.

This strategy provides a mechanism for customers to facilitate the **development of new, carbon-free renewables**, avoids cost to all taxpayers, and minimizes administrative burden.

<b>Incremental annual carbon reduction</b>	0.2 m lb CO2 for 200 kW / <0.1% of 2018 electric emissions
<b>Costs paid by participants</b>	\$20/month for 1 block
<b>Financial benefits</b>	Energy credit based on solar production (varies by month)
<b>Participation Levels</b>	~100 customers
<b>Social impacts</b>	Benefits those who opt in most. Exploring models to enable low income participation.

## Roles / Actions



### City

- Researches and proposes suitable sites for solar resource
- Encourages residential and commercial customer to subscribe to a Bellingham-specific Community Solar offering

### PSE

- PSE facilitates project development and brings the solar resource online
- PSE handles program administration, including marketing, enrollment, and billing
- May own the renewable projects or purchase through PPA

### Residents

- Residents can choose to opt into a Community Solar subscription at a level of their choosing
- Subscribers benefit from avoided costs credits

# Strategy 4: Provide tailored services to increase adoption

PSE builds on its residential energy efficiency offerings to provide a **suite of clean energy products** to customers via **tailored in-home or digital consultation** and the City promotes the program to residents.

This strategy is demonstrates **innovation around carbon reduction** and makes clean energy upgrades easy for residents by decreasing the hassle factor.

<b>Incremental annual carbon reduction</b>	TBD based on promoted programs and adoption rate
<b>Costs paid by participants</b>	Purchase of equipment (solar panels, efficient appliances, etc.).
<b>Financial benefits</b>	Lower energy costs from efficiency upgrades
<b>Participation Levels</b>	TBD
<b>Social impacts</b>	Helps expand participation by making deep EE and onsite renewables easier to install.

## Roles / Actions

### City

- Provide support (marketing, staff time) for education and outreach activities promoting participation in the new offering
- Facilitate collaboration among local stakeholders
- May provide incentives for landlords to participate

### PSE

- Collaboratively design a new offering for carbon-conscious customers that provides end-to-end energy products
- May include an audit, on-site direct installs, and detailed recommendations
- Secure UTC approval for offering

### Residents

- Participants in the program may pay for certain upgrades, and enjoy the benefits of energy savings and new technology
- Landlords encouraged to upgrade rental properties



# Strategy 5: Create energy innovation district at the waterfront

City of Bellingham **collaborates with PSE and community partners** to make the waterfront redevelopment area a testbed for **innovative carbon reduction strategies**. Potential actions include demonstration zone for high DER penetration, smart charging, deep energy efficiency, and educational opportunities.

This strategy is demonstrates **innovation around carbon reduction** and may have a **higher cost for relatively low carbon reduction**.

<b>Incremental annual carbon reduction</b>	Unknown – varies based on technologies used.
<b>Costs paid by city</b>	May include matching grants or revolving fund to support exploration
<b>Financial benefits</b>	Varies based on innovative concepts
<b>Participation Levels</b>	Requires city, community groups, and educational institutions to engage
<b>Social impacts</b>	Varies based on innovative concepts, but creates local pride

## Roles / Actions

### City

- Create culture of innovation
- Facilitate siting of demonstration projects
- Provide matching funding / support for testing
- Convenes key stakeholders to participate in ideation / concept incubation

### PSE

- Provides insight to challenges / areas requiring innovation
- Integrates demonstration projects with the grid
- May provide matching funding for grant programs
- Provides technical expertise on engineering

### Local Stakeholders

- Higher education institutions and community groups participate in ideation / incubation
- Generate ideas, pursue grant funding, host demonstrations, analyze outcomes



# Strategy 6: Explore city-led green energy purchasing

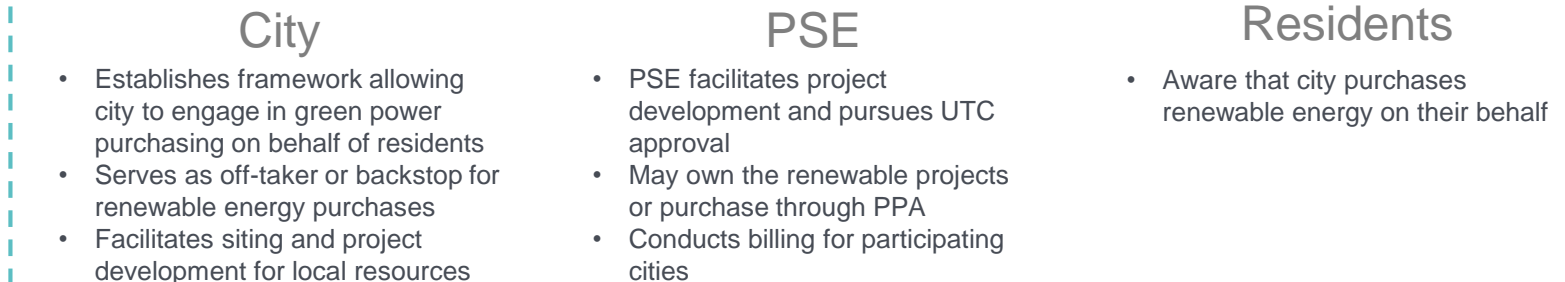
City **directly implements community-wide green energy purchasing** in conjunction with PSE. The City of Bellingham and PSE work together to determine how to procure green energy to meet the community's needs.

This strategy provides **carbon reduction certainty** and minimizes the number of transactions needed, but could require a new framework and substantial **direct financial commitment** by the City.

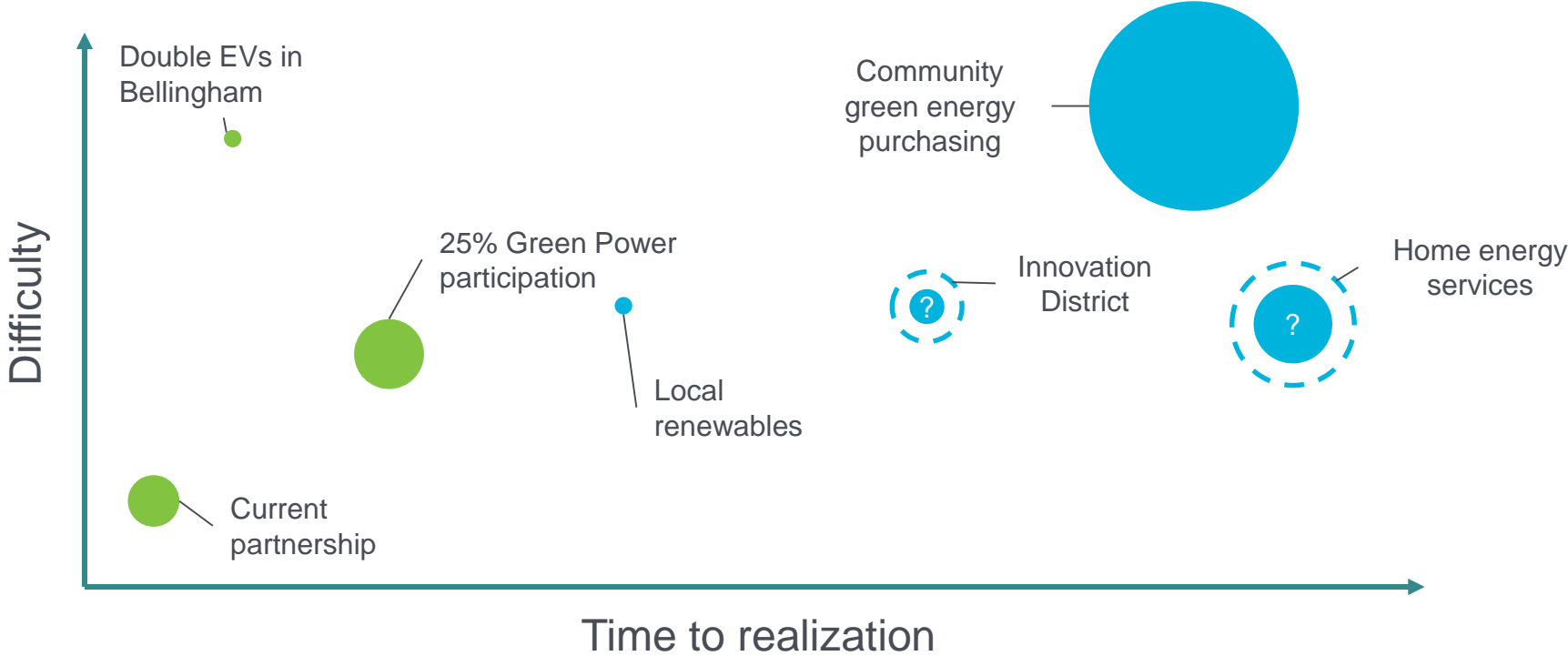
<b>Incremental annual carbon reduction</b>	200m – 590m lb CO2 / 30-90% of 2018 electric emissions
<b>Costs paid by city</b>	\$0.6-8.6M* per year. Equivalent to \$18-95 per residential customer per year
<b>Participation Levels</b>	All customers covered through single city contract
<b>Social impacts</b>	Paid for as city expense

\* Green Direct energy credit is variable and would adjust with UTC filings, causing cost to city and incremental cost per meter to vary. Credit may go up or down over time, resulting in prices above or below retail rates. Price range is based on current resource pricing and hypothetical credit scenarios, but may not encompass all possibilities.

## Roles / Actions



# Overview of carbon reduction options (conceptual)



Size of bubble represents carbon reduction potential. Sizing is illustrative, not to scale.

Current PSE offering

Concept under consideration

# Appendix

---





# Approaches to carbon reduction

---



## City-led Actions

PSE and City take direct actions and institute policies that drive carbon reduction city-wide and result in keystone local projects



## Individual Engagement

PSE and City encourage residents, businesses and local organizations to participate in programs that reduce their individual carbon footprint and engage community in decision making



## Innovation Hub

PSE and City develop or test innovative energy solutions that have potential to drive future carbon reduction, including local demonstration projects and collaborative problem solving

Decarbonize Electricity

Consume Efficiently

Electrify Transportation

# Customer renewable energy offerings

## Green Options



### GREEN POWER SCH 135, 136

- PNW REC purchases
- 50,000+ customers
- Residential, commercial, municipal



### SOLAR CHOICE SCH 135

- Solar RECs WA and ID
- Launched 2017
- 5,300+ Customers
- Residential and small commercial



### NET METERING SCH 150

- Up to 100 kW
- Retail value of energy produced.
- ~7,000 customers
- Residential, commercial, municipal, community solar



### CARBON BALANCE SCH 137

- NW Carbon Offsets
- Reduce emissions related to natural gas usage
- Residential, commercial, municipal.



### GREEN DIRECT SCH 139

- Long-term partnership with PSE for dedicated energy resources
- Launched 2017
- Large commercial, municipal, other Gov't



### SMALL POWER PRODUCERS SCH 91, 152

- 100 kW – 5 MW
- 15 year pricing based on avoided cost
- Small developers

# Electric car pilot program offerings

Education & Outreach	Residential Charging	Multifamily Charging	Workplace Charging	Public Charging	Low Income
<ul style="list-style-type: none"> <li>• Raise awareness of benefits of electric car ownership &amp; charging options</li> <li>• Interactive website with info &amp; tools to inform purchase decisions</li> <li>• Test drive opportunities</li> <li>• Ongoing in 2019</li> </ul>	<ul style="list-style-type: none"> <li>• Smart charger + install for up to 500 resi customers</li> <li>• Launch for enrollment July 2019</li> </ul>	<ul style="list-style-type: none"> <li>• Smart chargers + install for 25 MF property owners/mgrs</li> <li>• Launch for enrollment September 2019</li> </ul>	<ul style="list-style-type: none"> <li>• Smart chargers + install for 50 workplaces</li> <li>• Launch for enrollment September 2019</li> </ul>	<ul style="list-style-type: none"> <li>• Well-sited, PSE-owned / branded charging locations (3 operational by end of 2019)</li> <li>• Support all EV types / customers</li> <li>• Customer engagement begins June 2019</li> </ul>	<ul style="list-style-type: none"> <li>• Pilot programs for low-income customers to promote equity in transportation electrification</li> <li>• In development in 2019</li> </ul>

# Customer-sited battery energy storage demonstration

---

## Project

**Residential Project  
at  
Bainbridge Island**

**Commercial Project  
at  
Poulsbo**

**Community Project  
at  
TBD**

## Use Case

Backup power  
during grid outage

Demand charge  
(kW) management

Balance solar PV  
backfeed to the  
grid

## Details

- Behind-the-Meter (5-units)
- Consumer-scale (6kW/15.5kWh)
- Install & commission summer 2019

- Behind-the-Meter (1-unit)
- C&I Building-scale (30kW/183kWh)
- Install & commission summer 2019

- Front-of-Meter (1-unit)
- Distribution-scale (~75kW/160kWh)
- Install & commission summer 2020

# Energy efficiency program offerings

## Business Energy Management

### Energy Management:

- Commercial Strategic Energy Management (SEM)
- Comprehensive Building Tune-Up (CBTU)
- Industrial System Optimization Program (ISOP)
- Data Center Program

### Business Lighting Program: (Custom Grants)

- Business Lighting
- Street Lighting

### New Construction Program: (Custom Grants)

- Commercial New Construction
- Multifamily New Construction

### Commercial Retrofit Grants Program:

- Custom Grants
- Advanced Rooftop Unit Controller (ARC Joint Utility Rebate)
- Major HVAC Controls Upgrades

## Rebates & Renewables

### Commercial Rebates:

- Commercial HVAC Incentives
- Commercial Direct Install Programs
- Lodging-Specific Direct Install Program
- Commercial Kitchen Equipment Incentives
- Commercial Laundry Equipment Incentives
- Commercial Lighting Program: Lighting To Go

### Residential Single Family Programs:

- Home Energy Assessment Program
- Single-Family Existing Weatherization
- Single-Family Existing Window Rebates
- Electric & Gas Space Heat Rebate Programs
- Electric & Gas Water Heat Rebate Programs
- Residential Lighting Showerhead & Aerator Rebates
- Upgrades Marketing & Outreach
- Residential Appliances: Refrigerators & Clothes Washers
- Residential Appliances: Heat Pump Dryer, Gas Dryer, Gas Range
- Residential Appliance Decommissioning
- Web Enabled Thermostat
- Single Family New Construction

### Multi-Family Existing Programs:

- PSE Weatherization Assistance
- Multifamily Retrofit

### Renewables:

- Green Power, Net Metering, Solar Direct

# Carbon reduction estimate methodology

---

- Made assumptions based off PSE's *current* electricity mix (2018 data), which is expected to become less carbon intensive over time
- Reductions are based on the *incremental* reduction associated with the action (e.g. for Green Power, the reduction associated with increasing participation to 25% from current levels rather than the gross reduction achieved through 25% participation)
- Conservation (EE) reductions assume marginal carbon intensity, while renewable and EV reductions assume portfolio carbon intensity, consistent with PSE's GHG inventory reporting methodology
- For specific scenarios, either used average (e.g. typical car before conversion to electric car) or provided ranges (e.g. low-cost and high-cost Community Solar estimates)