

Solar on the Slough

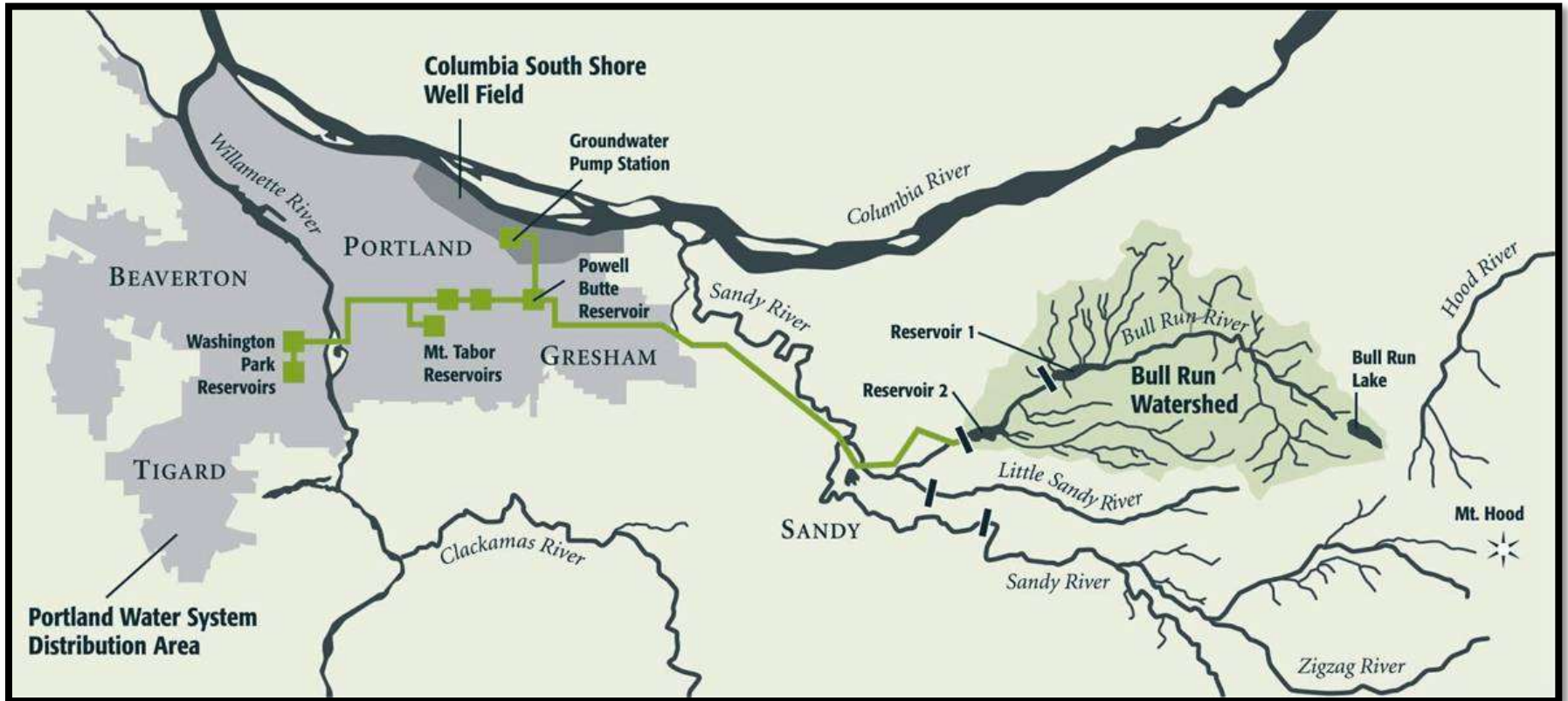
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City of Portland Water Bureau

May 1, 2015



Portland Water Bureau

Portland, Oregon



Sustainable Energy

Why am I here talking about alternative energy?

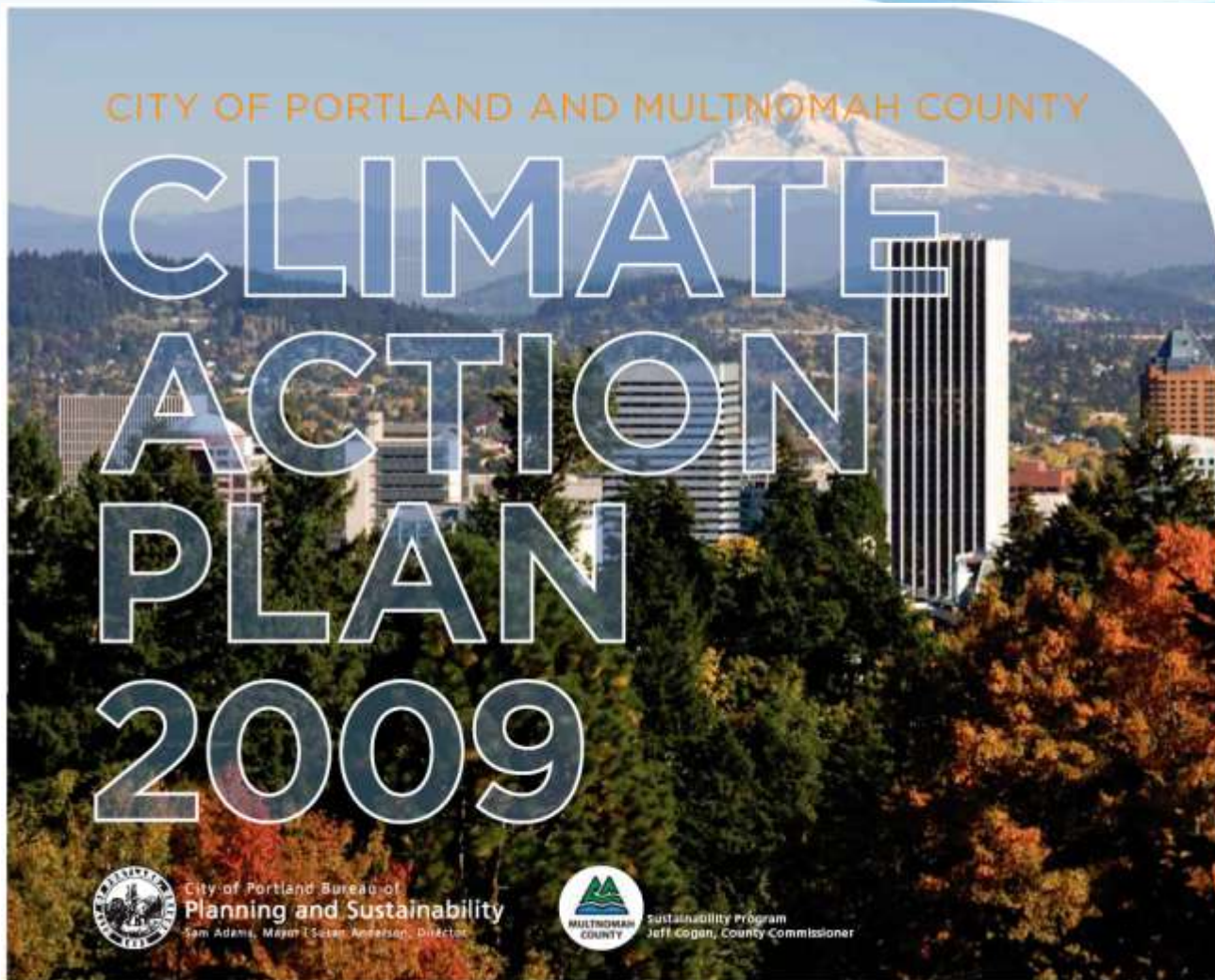
There are many facets of reducing carbon emissions and I am just going to focus on the goals related to development of alternative energy generation.

State of Oregon

- 25% of all electricity sold by PGE and PP&L in Oregon shall be generated from new renewable energy resources.
- 1.5% of total construction value towards solar energy



Climate Action Plan



City Energy Goals

- Reduce carbon emissions by 80% below 1990 levels by 2050.
- 2030 OBJECTIVE 3.
 - Supply 50% of all energy used in buildings from renewable resources.
 - Produce 10 percent of the total energy used within Multnomah County from on-site renewable sources, such as solar.

Water Bureau Sustainability Action Plan

- Achieve and maintain a capacity of over 400 kW of renewable energy, particularly solar arrays and micro-hydro facilities.

Water Bureau Status

- Enabled a capacity of 450 kW of renewable energy through both bureau-owned and third-party owned installations that are currently operating.

Hydroelectric

- Two high head dams
- 35.0 MW of generating capacity
- Approximately 100 million kWh produced each year
- 4 times more than Water Bureau use
- Nearly half of the City's use



Micro Hydro

- 25 kW Microhydro NE Portland
 - Bureau owned
- 50 kW Microhydro SE Portland
 - 3rd party installation



Focus on Solar

- 5 Solar Installations
 - 267 kW ground mounted GW Pump Station
 - 9.8 kW roof mounted GW Pump Station
 - 12.0 kW roof mounted Meter Shop
 - 7.9 kW roof mounted PB Interpretive Center
 - 78.0 kW roof mounted Interstate Warehouse



Annual Solar Production

Renewable Energy Capacity	Power Capacity (kW)	Energy Generation by Calendar Year (kWh)					Total Energy Generation ³ (kWh)
		2010	2011	2012	2013	2014	
Groundwater Solar on the Slough Array ¹	268	285,734	276,705	293,843	274,968	284,661	1,418,529
Groundwater Treatment Building Solar Array	10			6,576	10,697	11,075	28,348
Meter Shop Solar Array	12	5,885	12,840	13,541	13,576	13,942	59,784
Powell Butte Solar Array ²	8					7,739	7,739
Vernon Micro-Hydro Turbine	25			48,926	136,762	126,548	312,236
Total	323	291,619	289,545	362,886	436,003	443,965	1,826,636

1. Generating since December 2009 - This array is owned by a third-party.

2. Annual production estimated from Energy Trust of Oregon

3. As of December 31st, 2014

Energy = Power x Time (KWh = kW x h), where kWh = kilowatt-hours, kW = kilowatt, h = hours

Bureau Owned

- All roof mounted installations are owned by the Bureau.
 - GW Pump Station, feed-in tariff,
 - \$.468/kWh for 15 years
 - Meter Shop, net metering
 - PB Interpretive Center, net metering
 - Interstate Warehouse, net metering



Third Party Owned

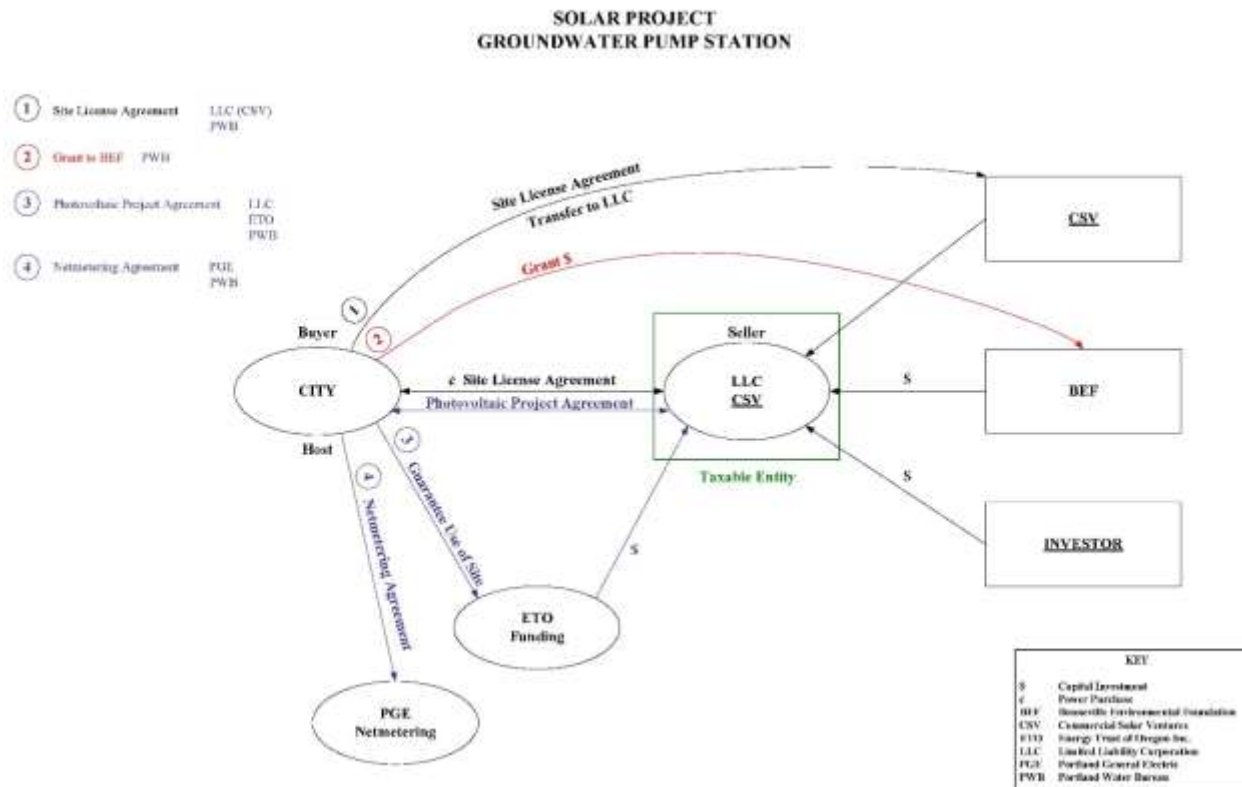
- Groundwater Solar is owned and operated by a third party.
 - Site Lease
 - Power Purchase Agreement
 - Owner Option to purchase

Solar on the Slough



Third Party Agreements

- 7 parties, multiple agreements
- “Spaghetti” diagram



Financial Resources

- Federal Solar Investment Tax Credit
- Oregon Business Energy Tax Credit
- Grants
- Power Sales Agreements

Federal ITC

- Federal Solar Investment Tax Credit
 - Offset Federal Tax Liability
 - 30% of the invested value
 - Taxable Entity
- Accelerated Depreciation
 - 5 years instead of a more typical 20 years.



Oregon BETC

- Business Energy Tax Credits
 - Offset tax liability in Oregon
 - Buy credits to apply towards future tax liability
 - 50%/33%
 - Offset above market costs

Grant Funding

- City of Portland Water Bureau
 - \$350,000, 15% of total
- Energy Trust of Oregon
 - \$333,583, 14% of total
 - Cover the portion of cost above market
 - \$8.50 per installed Watt
- Portland General Electric



Power Sales Agreements

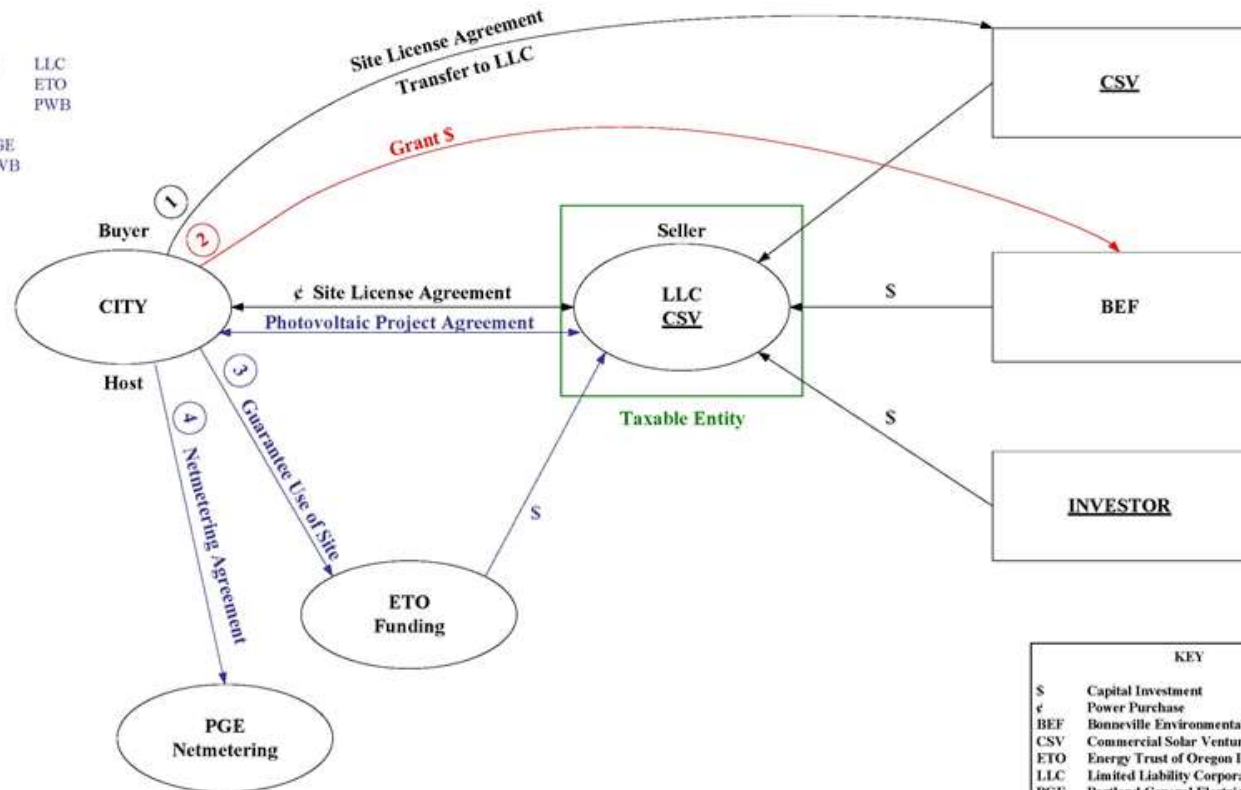
- Power Sales through LLC
 - Start at \$0.07/kWh
 - Escalate 3% per year
- Net Metering Agreement with PGE



How it all worked

SOLAR PROJECT GROUNDWATER PUMP STATION

- ① Site License Agreement LLC (CSV)
 PWB
- ② Grant to BEF PWB
- ③ Photovoltaic Project Agreement LLC
 ETO
 PWB
- ④ Netmetering Agreement PGE
 PWB



KEY	
S	Capital Investment
€	Power Purchase
BEF	Bonneville Environmental Foundation
CSV	Commercial Solar Ventures
ETO	Energy Trust of Oregon Inc.
LLC	Limited Liability Corporation
PGE	Portland General Electric
PWB	Portland Water Bureau

Today

- Much more streamlined.
- Funding programs, tax credits, and power agreements are standardized and documented.



Thank You Questions?

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