34,600

That's how many people work for companies in Washington engaged in "metal trades" – a key subsector that includes metal fabricating firms and companies that make machinery. That's up from 19,000 workers in 1998. During that period, these companies posted revenue growth of 134%, compared with 117% for the overall private sector. Not surprisingly, the number of these firms also grew, reaching 2,600 from about 2,000 in 1998.

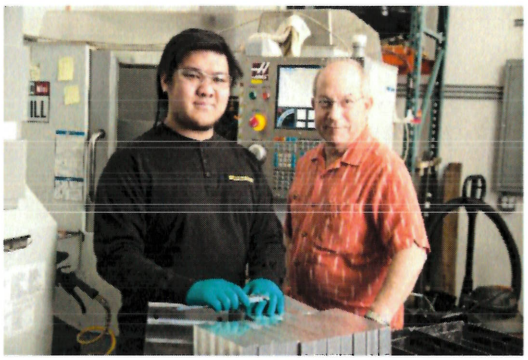
Companies in these subsectors are small – averaging just one dozen workers each. The vast majority of them are family-owned companies and they are located throughout the state, where they make hardware for all of our major industrial sectors – agriculture, forestry, construction, the US military and wholesale-distribution along with maritime companies and other manufacturing firms.

CorePlus

All these companies, big and small, need new workers, both to replace aging baby boomers, and to sustain them through the decades ahead. This need drove creation of ***Core Plus***, a state-wide, high school career learning program developed by the Office of the Superintendent of Public Instruction (OSPI) in partnership with the Manufacturing Industrial Council of Seattle and The Boeing Company.

Core Plus curriculum is based on employer input. It supports 1,000 hours of potential instruction time in highly transferable industrial "core" skills in safety, math, measurement, material science, tool and equipment use, with "plus" skills specific to aircraft manufacturing. The curriculum is now being adapted to support careers in maritime trades and professions.

Teachers trained in the curriculum are now located at more than 50 high schools across the state with ten more being added during the 2018-2019 school year. Below are some of the success stories produced by the program at Seattle's Rainier Beach High School.



Jonathan Ly turned a summer internship into a fulltime job in the machine shop at Oppenheimer Camera. He still works for Marty Oppenheimer and now receives on-the-job training through the Aerospace Joint Apprenticeship Committee (AJAC).

MIC- fyi
43

Mohamed Tandia works at Rainier Flight Services in Renton, while he completes his studies at South Seattle College for FAA certification as an Airframe and Powerplant mechanic. His "A&P" license will enable him to move up at RFS, or move on to work for a major commercial air carrier or work in aerospace manufacturing.

Malcolm Dunstan started as an intern at CSR Marine in Ballard in 2017. He worked one week at minimum wage before getting his first raise. Before his 19th birthday, Malcolm was making a pay rate equal to $40,000 per year, painting boats. His goal is to make six figures and that type of pay can be found in Seattle's maritime community if Malcolm succeeds in further skills training.

Kay Duro was a straight A student and the best performer in the RBHS "machine shop" before she graduated to study engineering at the University of Washington. When she ran out of the money, she secured a job as an aircraft assembler at Boeing, then used the company's education benefit resume her college studies. A member of the original Core Plus Class of 2013, she graduated in 2018 from the UW with her degree in aeronautical engineering.

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3/7

Seattle City Light Review Panel
Questions for Rate Design Stakeholders

1. What opportunities for improvement do you see in the current City Light rate structures?

   Decoupling would help resolve short-term revenue requirement issues if the rate stabilization account no longer meets that purpose.

2. What outcomes do you want rate design to promote?

   Promote EE and DG and lower long-run marginal costs. SCL should be able to buy and sell EE as an actual resource, as they do with the Bullitt Center.

3. How would you prioritize the eight key policy goals identified by City Light (*see* Rate Design Framework and Assessment of Current Rate Structure document) and why?

   1) Environmental stewardship is not explicitly identified in rate design policies. It should be. Without a sustainable environment, there is nothing for the utility to serve.

   2) Fully enroll all qualified households in the utility discount program.

   3) Rates must meet the revenue requirement. Decoupling the utility and better forecasting is the best path to ensure that outcome. There are many ways to collect revenue. Significantly increasing fixed charges should not be one of them.

   4) I worry about how different people define "economic efficiency." What I don't hear from SCL is acknowledgement that EE and DG reduce long run marginal costs. I fear that discussions of "economic efficiency" are a way of getting what many past leaders of SCL have wanted – higher fixed charges. Higher fixed charges make the job of utility staff easier, but they are precisely contrary to society's needs and the goal of lowering long run marginal costs.

      I agree that it is essential to regularly update our understanding of what it costs to serve customers. However, that is about understanding both short- and long-term costs.

   5) The problem with "Fairly apportion(ing) cost of service" is that one person's "fair" is not the same as another person's "fair." Customer distance from a transformer is but one example. I fear this is also an attempt to simply raise fixed costs to make managing the utility easier, in lieu of properly decoupling the utility. As RAPP has

so eloquently stated, when one connects to the food grid, one only has to pay the cost of getting to the point of interconnection. There is no fixed charge for entering the grocery story. There is no fixed change for walking down the aisle. There is fixed charge for the trucks that deliver the food. There is fixed charge for the grocery store's debt. All of that is paid in the marginal cost of the food one buys.

6) The best way to achieve stable rates is to decouple the utility and pursue aggressive EE implementation. Education is another essential element if one wishes to help folks understand that when the weather changes, so will their energy bills.

7) Stable revenue for the utility sounds like a very good idea. It can be achieved by decoupling the utility, aggressively pursuing EE to minimize wholesale power exposure, electrifying transportation and better forecasting. Stabilizing revenue by increasing fixed charges is precisely the wrong approach.

8) "Simple, understandable rates" is a fine goal. But it is less essential than the items above.

4. What alternative rate structure options would be of interest to you and why? (for example, time of use rates or premium green power options, decoupling, higher fixed charges, etc.) What data can you share that indicates the option(s) you advocate would support the outcomes that are important to you?

- I don't know if time of use rates are appropriate for SCL.
- All customers should have the option of buying a premium green power product that changes the mix toward more new renewables and EE.
- Decoupling is a good idea and will help stabilize rate volatility in the short run. It does not solve the "lost unit" issue with EE and DG. MEETS (EEaas) does solve those issues and should be expanded significantly and soon.
- Higher fixed charges are a huge mistake. They may solve a short-term management problem, but they *increase* long run marginal costs because they reduce EE and DG. EE and DG *lower* long run marginal costs because they decrease the amount of infrastructure SCL must build to meet load. SCL is a monopoly. It is not facing competition from competitors. It does not need to increase fixed charges to protect itself from competition.

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Seattle City Light Review Panel
Questions for Rate Design Stakeholders

1. What opportunities for improvement do you see in the current City Light rate structures?

   There is an opportunity with the new modern metering and billing system to provide customers with choices on their rate structures. Different customers can and should be given the opportunity to have different levels of complexity and risk in how they buy energy from City Light. One size fits all rate structures for each class of customer is no longer necessary.

   For example, Portland General Electric currently has two different options residential customers can choose from and then four different energy source mixes. They have a traditional inclining block rate and an optional time of use rate. In commercial they have a plethora of options include a standard flat kwh rate with demand charges, time of use rates, market-based pricing, and demand response rates. This gives customers control over their bills and allows different needs for different customers to be met.

   I think there is also the ability to improve the alignment of the City Light rate structure with the cities Climate Action Plan goal of Zero Net Emissions by 2050. This would require rate structures that incentivize the electrification of natural gas heating, and transportation. This would have dual benefits, growing load to spread fixed electricity infrastructure costs and reducing the regions carbon footprint.

2. What outcomes do you want rate design to promote?

   I think there is the opportunity to provide rate structures that provide strong incentives to grow total consumption, reduce peak loads and lower carbon footprints. Optional rates can provide an economic incentive for customers to adopt the new rates but allow slow adopters a transition path. Specifically, the residential inclining block rate structure disincentivizes the electrification of residential heating and transportation by charging high electricity consumption, low carbon footprint households a higher rate. It also provides no incentive for those high electricity consumption households to shift their use to periods of low load.

   I think clear, easy to understand rate structures will be beneficial for every rate class. The commercial monthly, highest 15-minute, demand charge is one of the least understood and hardest to manage rate structures there is. Most commercial customers I've worked with think it's an instantaneous peak demand, so they're very worried about inrush current on their motors. I can't think of a single commercial customer that truly knew when their monthly peak demands were occurring. For most of them the meter interval data was unavailable or extremely hard to access and parse. A demand charge is in effect a variable charge that they have little to no control over.

   I also think it should be a goal to change fixed basic service charges into minimum charges. A minimum charge would be the monthly minimum charge for service, but that covers a certain dollar amount of consumption. This is beneficial for apportioning costs of net metered customers and lowers bills for the super low consumption customer.

   This rate design also needs to provide a tariff for Electric Vehicles that sets the stage for them to be used as a resource, instead of just as a load. I personally have helped friends install two home electric car charges in their garage in the last year and expect that to increase. The electric vehicle growth will outpace any pilot project you can hope to try to implement and analyze.

3. How would you prioritize the eight key policy goals and why?

I don't think you can prioritize any of the policy goals, they all are important. I have a few thoughts on some of them though.

Simple and understandable can include opt-in rates that are simple to understand. Rate choice does not by itself increase customer complexity. Access to interval data, meaningful customer dashboards showing when energy was consumed, and shadow bill pricing can make the decision making and transition smoother.

I think stable revenue for the utility is a goal that will be harder to achieve as the energy transition and climate change accelerate. I think the utility should aim to increase flexibility in its rate structures, embrace using customers as energy resources to manage costs and revenue opportunities and maximize the value of its hydro resources in the energy imbalance market.

Stable, predicable bills are very important for some customers, and they should be given the option to transition in a gradual manner, but other customers should be given the opportunity to be early adopters on modern rate structures that reward them for flexibility.

Economic efficiency and environmental stewardship can work in conjunction to align consumption with system costs, including future avoided capital costs, and promoting low carbon electricity consumption.

4. What Alternative rate structure options would be of interest to you and why?

I think every rate class: residential, commercial, and industrial, should have multiple options for rates to choose from. All rate structures should have a monthly minimum charge, instead of a fixed metering fee.

I would propose a new default rate structure based on a time of use rate for all classes. It needs to have large differences between on and off-peak rates, at least 15 cents per kwh difference. On peak period(s) need to be short, two hours or less. Off peak rates should be low enough to encourage electrification. I also would be in favor of critical peak pricing implemented to reduce extreme system peak loads to reduce future capital costs.

The off-peak rate needs to be low enough that it is more cost effective for a heat pump to heat a home than a gas furnace. As an example, at $0.80 per Therm, with an 85% efficient gas furnace, a home owner is paying $9.41 per million BTU for heat. City light needs to charge a home owner with a heat pump, COP 2.5, less than the 8 cents per kWh to make electricity a lower cost heating source. I would argue an off-peak rate of 4 cents per kWh, equivalent to $4.70 per million BTU from a heat pump, would be necessary to provide a strong economic incentive to provide a return on investment of the higher initial cost of the heat pump over a furnace.

Customers should have the option of choosing a traditional rate structure with high flat per kwh rates to allow the slow adopters a comfortable option to choose.

I would also be in favor of giving customers access to market rates settled at the energy imbalance market 15-minute rate. This is probably too ambitious for your timeline, but split the volumetric charge into a distribution component, with time of use, critical peak, etc. and then the wholesale rate City Light would have otherwise received having sold that electricity on the EIM.

I recognize I make lots of suggestions above and you asked for data to support it, which I don't have readily available. I would defer to the Regulatory Assistance Project and their fantastic data and analysis, I believe a lot of my recommendations are in line with their recommendations, and if any aren't, RAP I'm sure is correct.

Sincerely,

Jeremy Keller, P.E.
Senior Project Development Engineer

Rankings of Residential and Commercial Bills
Rates in Effect January 1, 2018
Arranged by State and City

M - Municipal or Public Power District
I - Investor-owned utility

STATE	CITY	75 kW 15,000 kWh	75 kW 30,000 kWh	75 kW 50,000 kWh	1,000 kW 200,000 kWh	1,000 kW 400,000 kWh	1,000 kW 650,000 kWh
Texas	Austin (M)	40	29	32	32	10	4
	El Paso (I)	55	47	39	69	46	34
	Amarillo (I)	14	1	1	16	3	1
Utah	Salt Lake City (I)	48	22	15	54	38	32
Vermont	Burlington (M)	88	86	85	94	86	86
Virginia	Richmond (I)	41	17	6	52	20	6
	Roanoke (I)	23	23	18	21	23	17
Washington	Seattle (M)	5	20	41	37	70	80
	Spokane (I)	38	44	54	28	43	53
	Tacoma (M)	6	2	4	9	8	9
West Virginia	Charleston (I)	35	31	13	24	25	18
	Wheeling (I)	35	31	13	24	25	18
Wisconsin	Madison (I)	71	68	73	75	76	75
	Milwaukee (I)	59	59	57	67	64	66
Wyoming	Cheyenne (I)	82	72	65	80	77	73

Rankings of Industrial Bills
Rates in Effect January 1, 2018
Arranged by State and City

M - Municipal or Public Power District
I - Investor-owned utility

STATE	CITY	500 kWh	1,000 kWh	40 kW 10,000 kWh	40 kW 14,000 kWh	500 kW 150,000 kWh	500 kW 180,000 kWh
Texas	Austin (M)	2	9	36	27	42	35
	El Paso (I)	44	54	56	44	57	57
	Amarillo (I)	64	65	11	6	14	10
Utah	Salt Lake City (I)	9	28	51	26	33	29
Vermont	Burlington (M)	81	85	87	86	86	86
Virginia	Richmond (I)	28	34	28	21	27	16
	Roanoke (I)	26	32	30	23	35	32
Washington	Seattle (M)	5	35	15	36	16	24
	Spokane (I)	1	2	58	53	30	36
	Tacoma (M)	13	5	4	9	3	4
West Virginia	Charleston (I)	48	48	34	32	40	41
	Wheeling (I)	48	48	34	32	40	41
Wisconsin	Madison (I)	82	77	77	72	70	70
	Milwaukee (I)	73	70	67	69	67	66
Wyoming	Cheyenne (I)	71	72	84	81	75	71

Rates effective Jan 1, 2018

HDC

		Rate	Charge	Notes
Energy	650,000			
Demand	1000	3.12	$3,120	
On-Peak	371,429	0.0777	$28,860	6am-10pm, Mon-Sat
Off-Peak	278,571	0.0513	$14,291	All other hours
		Total	$46,271	

HDT

		Rate	Charge	
Energy	650,000			
Demand	1000	3.37	$3,370	
On-Peak	371,429	0.0841	$31,237	6am-10pm, Mon-Sat
Off-Peak	278,571	0.0555	$15,461	All other hours
		Total	$50,068	

Total Bill Differential	8.21%	
Energy Portion Differential	8.24%	**Exceeds allowable 8% differential in franchise agreement**
Distribution Portion Differential	8.01%	No specific differential stated, but it must be justified
Energy Portion as % of total bill	93.27%	**Franchise fee states this shall be approximately 60%**