

Seattle City Light

An aerial photograph of Seattle, Washington, taken at sunset. The city's skyline is visible, including the Space Needle and various skyscrapers. The city is surrounded by water, with the Puget Sound to the west and the Duwamish River to the east. In the background, the snow-capped Mount Rainier is visible against a colorful sky transitioning from purple to orange.

Promoting Energy Efficiency in New Construction

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Program Goals

- ◆ Design buildings that beat Energy Code or standard practice
- ◆ Encourage innovative energy efficient technologies.
- ◆ Support LEED and sustainable building practices.



Savings and Funding

Since January 1, 2003

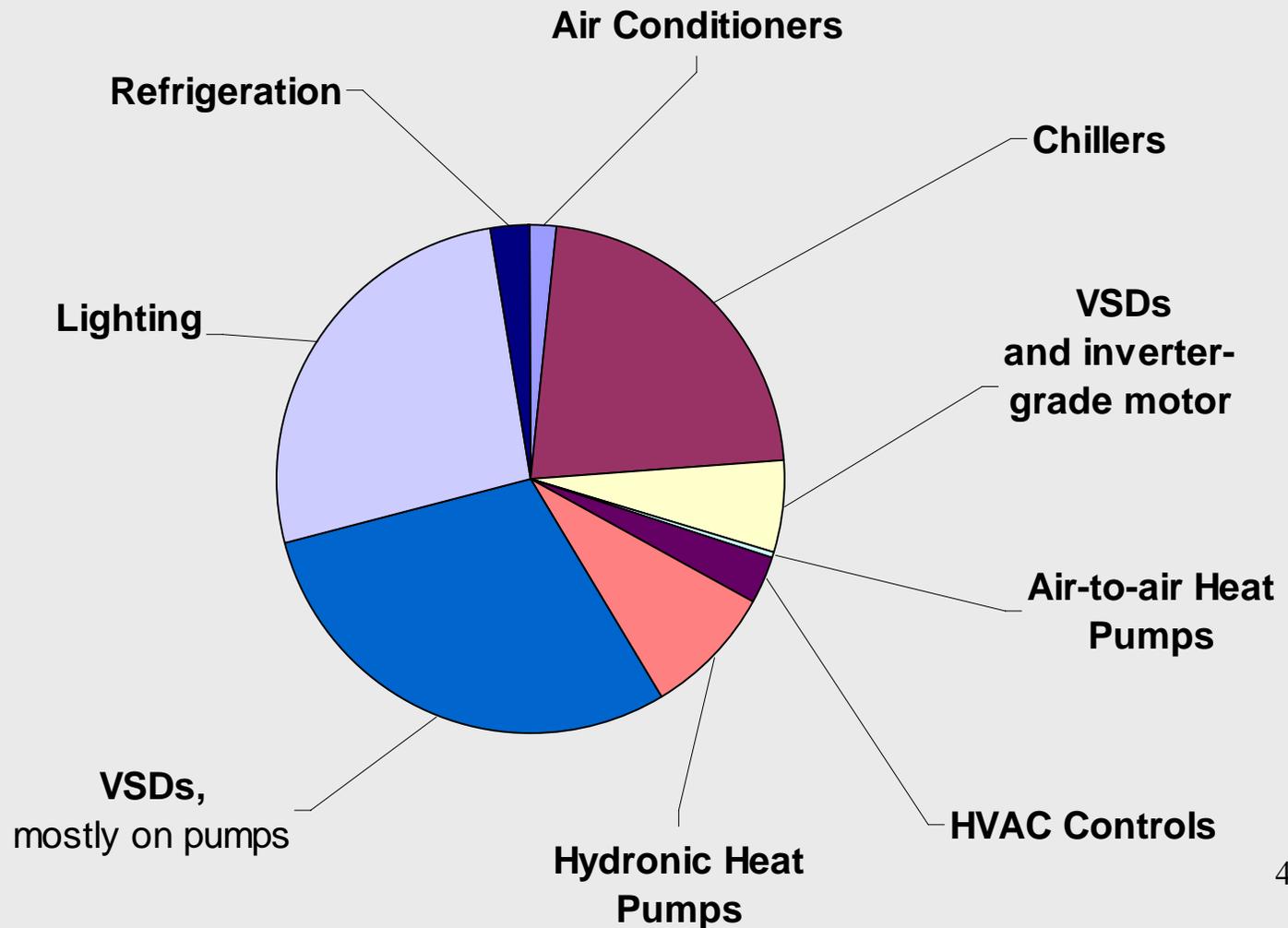
- 30 million kwh annual savings
- 5 million dollars at 16 cents/kwh

2006

- 5 million kWh annual saving
- one million dollars at 20 cents/kwh
- Roughly 10% of program savings



New Construction: Sources of Savings (2006)





Other Technologies

Ongoing

- ◆ Under-floor Air Distribution
- ◆ Added Glazing and Daylighting Controls
- ◆ Natural Ventilation

Some Goals

- ◆ State-of-the-art data center EE and ME
- ◆ Heat recovery by load co-locations
- ◆ VRV heat pumps



Challenges

- ◆ Popularity creates **multiple baselines**
- ◆ Multiple baselines create **high analytical costs** and decisionmaker confusion
.... SEC, LEED, 2030 Challenge
- ◆ Vision of the future...shifting from politics to engineering/architecture
- ◆ Is the **amount of funding** worth the trouble?
- ◆ Free ridership and actual/estimated.



Solutions

- ◆ Publicly recognize and build on private sector expertise.
- ◆ Use familiar vocabulary, baselines, and target definitions. Know the players.
- ◆ Offer free, fast analyses for familiar technologies, funding for analysis of unfamiliar. Link to LEED.
- ◆ Create an ECM matrix early in project.
- ◆ Impact evaluations.



LEED and Energy Efficiency

It is possible to get a high LEED rating without having a major impact on energy efficiency.

However, energy efficiency does earn LEED points.

These *Optimize Energy Performance* points are more expensive...but reduce operating costs, and may earn SCL grant monies.



LEED and Energy Efficiency

Energy and Atmosphere Credit 1: *“Optimize Energy Performance”*

- ◆ 10 points requires 42% energy cost savings compared to ASHRAE 90.1 2004
- ◆ That is a **significant level of energy savings.**



Energy Conservation Measure Matrix

Measure Description	Needed for Analysis	Who is Doing the Analysis?	Analysis method	Action Item(s) & Status
Occupancy-sensor supply air etc HVAC controls	proposed sequence of ops, cfm	SCL could pay for analysis	custom calc	mech design consultant to review with client
Chillers	rated capacity and NPLV	SCL	simple SCL spreadsheet	submit for several options
Occupancy sensor control of garage lighting	Connected kW, sequence of ops	SCL	simple spreadsheet	

Sample Spreadsheet



[Building Name] Energy Savings Calculations

ECM [#]. Condenser Water Pump VSDs

Instructions: Fill in the yellow cells.

Baseline assumes staged constant speed (and constant flow) pumps, with one baseline pump per chiller, staged on and off with the chillers..

Assumptions and Inputs:

Total condenser pump rated hp:	1.0
Motor full load efficiency:	90%
Motor sizing factor ¹ :	70%
Number of chillers ² :	3
Average pump hp per chiller:	0.3
Calculated total "base kW":	0.58
Minimum % kW:	10%

Operating Hours

	7 AM - 7 PM, Mon. - Fri., May - Oct.
	7 AM - 7 PM, Mon. - Fri., Year round
	7 AM - 7 PM, Mon. - Sat., May - Oct.
X	7 AM - 7 PM, Mon. - Sat., Year round
	24/7 - Year round

outside air temps, °F		Estimated % Bldg Cooling Load	Baseline			Proposed					Savings
Temp Range	hrs/year		% flow	pump kW	kWh/yr.	% Flow	VSD Eff. ³	% Full Load Power	pump kW	kWh/yr.	kWh/yr.
a	b	c	d	e	f = b x e	g	h	i = g ^{2.5} /h	j = i x base kW	k = b x j	l = f - k
90 - 94	7	100%	100%	0.58	4	100%	96%	104%	0.60	4.2	(0.2)
85 - 89	26	100%	100%	0.58	15	100%	96%	104%	0.60	16	(0.6)
80 - 84	76	90%	100%	0.58	44	90%	95%	81%	0.47	36	8
75 - 79	139	80%	100%	0.58	81	80%	93%	62%	0.36	50	31
70 - 74	248	70%	100%	0.58	144	70%	92%	45%	0.26	64	80
65 - 69	395	60%	67%	0.39	153	60%	90%	31%	0.18	71	82
60 - 64	726	50%	67%	0.39	281	50%	84%	21%	0.12	89	192
55 - 59	902	40%	67%	0.39	349	40%	75%	13%	0.08	71	278
50 - 54	955	30%	33%	0.19	185	30%	62%	10%	0.06	55	129
3,475					1,256					455	800

Annual Dollar Savings @ 6¢/kWh: **\$ 48**
 SCL Value Savings: **\$ 160**

VSD Cost: **\$ 300**
 Cost-based cap: **\$ 300**

SCL Incentive: **\$ 160**
 % SCL Incentive: **53%**

Cost capped? **No**
 Simple Payback: **2.9 Yrs.**

(uses 20 cents/kwh, since savings depend on controls)

Seattle Police Support Facility

2004, LEED Gold

- ◆ renovated 160,000 ft.² from warehouse
- ◆ training, evidence storage, SWAT





Seattle City Light Funding

- ◆ **Energy Analysis Assistance:** **\$13,700**
- ◆ **Commissioning Assistance:** **\$10,000**
- ◆ **Energy Incentives:** **\$84,000**
 - ◆ UFAD
 - ◆ Demand control ventilation
 - ◆ High efficiency air conditioning equipment
 - ◆ High-bay lighting with occupancy and daylight sensors.