

A Tale of Two Buildings

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This study compared power usage from January 2014 through December 2015 for two senior-living facilities that are located 0.1 miles apart in Tacoma, Washington. International Place was built in 2007 under the 2002 WA State Energy Code and Salishan Gardens was constructed in 2011 using the 2006 WA State Energy Code. Both buildings are very similar in terms of square footage, number of units and number of tenants (Table 1).

Table 1: International Place and Salishan Gardens building characteristics.

| | International Place | Salishan Gardens |
|--------------------------------|--------------------------|------------------|
| Building Area, ft ² | 43,013 | 42,123 |
| Number of Units | 55 | 55 |
| Number of Residents | 64 | 63 |
| Cost per Square Foot, USD | \$125 (adjusted to 2011) | \$195 |

The primary difference between the two buildings is that the mechanical systems design for Salishan Gardens included electric heat pumps in the units, heat recovery ventilation systems in the corridors and solar preheat of the domestic hot water. Building envelopes were virtually identical except Salishan Gardens has a rainscreen and additional measures were taken during construction to reduce infiltration. Salishan Gardens lighting is primarily LED.

These design differences led to dramatic decreases in power consumption. During the two-year study period, Salishan Gardens used 64 percent less electricity (Figure 1) and 57 percent less natural gas (Figure 2). Overall, Salishan Gardens used 62 percent less power than International Place (Figure 3, Table 3).

Table 2: International Place and Salishan Gardens mechanical systems comparison.

| | International Place | Salishan Gardens |
|---------------------|--------------------------|---------------------------------------|
| Heating | Electricity - Base Board | Electric – Heat pump |
| Hot Water | Natural Gas | Natural Gas – Solar preheat |
| Insulation | Meets Code | Meets Code |
| Waste Heat Recovery | None | Heat recovery common area ventilation |

Figure 1: Electricity consumption was approximately 64 percent higher for International Place compared to Salishan Gardens between January 2014 and December 2015.

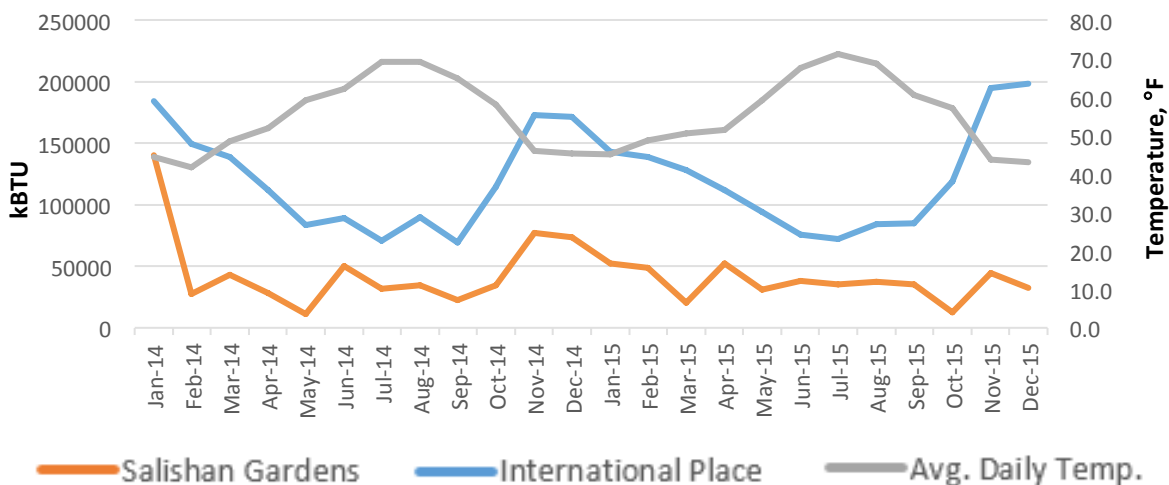


Figure 2: Natural gas consumption was approximately 57 percent higher for International Place compared to Salishan Gardens between January 2014 and December 2015.

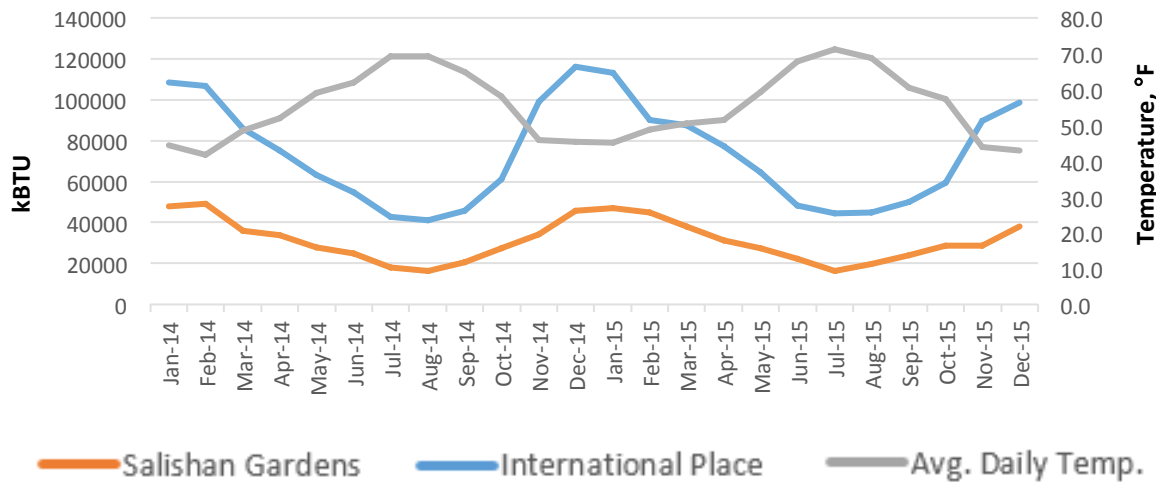


Figure 3: Total power consumption was approximately 62 percent higher for International Place compared to Salishan Gardens between January 2014 and December 2015.

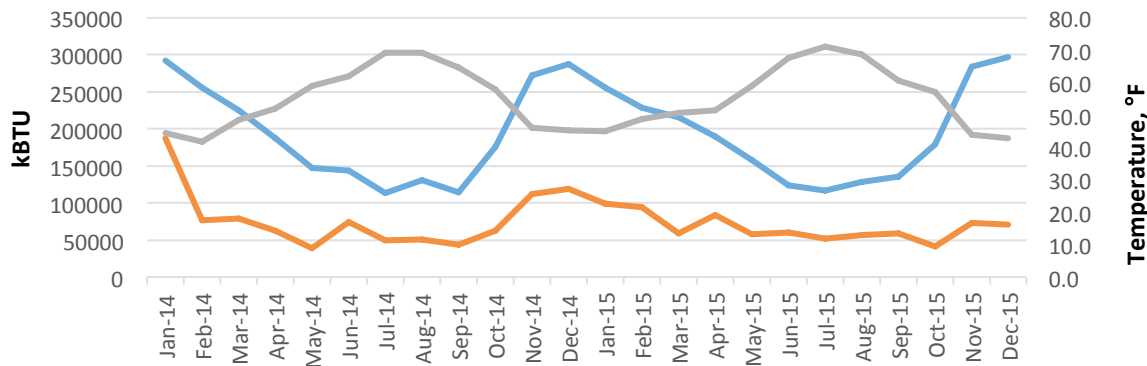


Table 3: Between January 2014 and December 2015 Salishan Gardens used 62 percent less power than International Place.

| | International Place | Salishan Gardens | Percent Difference |
|--------------------------|---------------------|------------------|--------------------|
| Electricity, kBTU | 2890462 | 1015419 | -64.9 |
| Natural Gas, kBTU | 1767176 | 748781 | -57.6 |
| Total Power Demand, kBTU | 4657638 | 1764200 | -62.1 |

Conclusions

Salishan Gardens and International Place offer a unique case study comparison. The two buildings are nearly identical in terms of location, square footage, number of units and number of tenants. By controlling for these factors, we can attribute the 62 percent difference in power demand for the two buildings directly to the differences in their mechanical systems.

Assuming rates of \$0.0234 and \$0.00975 per kBTU for electricity and gas respectively, the present value for costs savings for building operations over a 30-year period assuming a three percent rate of inflation is approximately \$784,573.

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