FACILITIES – ENERGY AND RESOURCE CONSERVATION

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Summary

Another challenging school year delivered yet another atypical utility consumption profile across the District. Partial building occupancy coupled with increased ventilation and HVAC run hours presented a 'wait and see' approach. Fortunately, at year's end, net utility costs were much lower than originally estimated and less than our historic average. Considerable savings were realized in electricity, water, and waste/recycling – only natural gas had a higher annual spend than our last 3-year average. All told for the 2020-2021 year, the District saved $647,000 in total utilities.

The commercial building energy health metric we compare to is the *Energy Use Index* or EUI. It is defined kBtu/SF/YR. The Oregon Department of Energy (ODOE) recommends an EUI value range for schools between 47- 61. Our District-wide average is 41.9, 2.8% higher than last year's average of 40.7 due to higher natural gas usage. All but one of our schools are currently within ODOE's range. There will always be room for improvement but our EUI average remains lower than the majority of other school districts. For reference, Portland Public School District's building portfolio averages 55 and the national school building EUI average is 76.

Currently BSD has 31 EPA-recognized Energy Star schools and 13 certified Oregon Green Schools.

BSD solar systems generated 860,000 kWh last year for a lifetime total of 3.6 Gigawatts (million kWh) of electricity, enough to power 340 average-sized homes for a year.

The Energy and Resource Conservation (E&RC) Department's primary mission is continuing work with Facilities Development and the Maintenance Department to help fund and implement energy-efficient HVAC and LED lighting systems for schools through the SB1149 funding and Energy Trust of Oregon incentive programs. These energy investments save electricity and natural gas costs while improving thermal comfort, ventilation, and lighting quality in our schools.

As noted in last year's report, water costs remain high, however we have realized noticeable reductions in water use, especially irrigation, through the end of last year and into the middle of 2021.

Looking ahead, E&RC predicts the biggest challenge for utility usage will be our ability to service and maintain HVAC, plumbing, and lighting systems. Operation and maintenance (O&M) greatly impact utility usage, costs, and equipment life. An adequately staffed HVAC,

plumbing and electrical departments are critical to reducing energy and water usage and maintaining expensive and sophisticated building system infrastructure.

Analysis

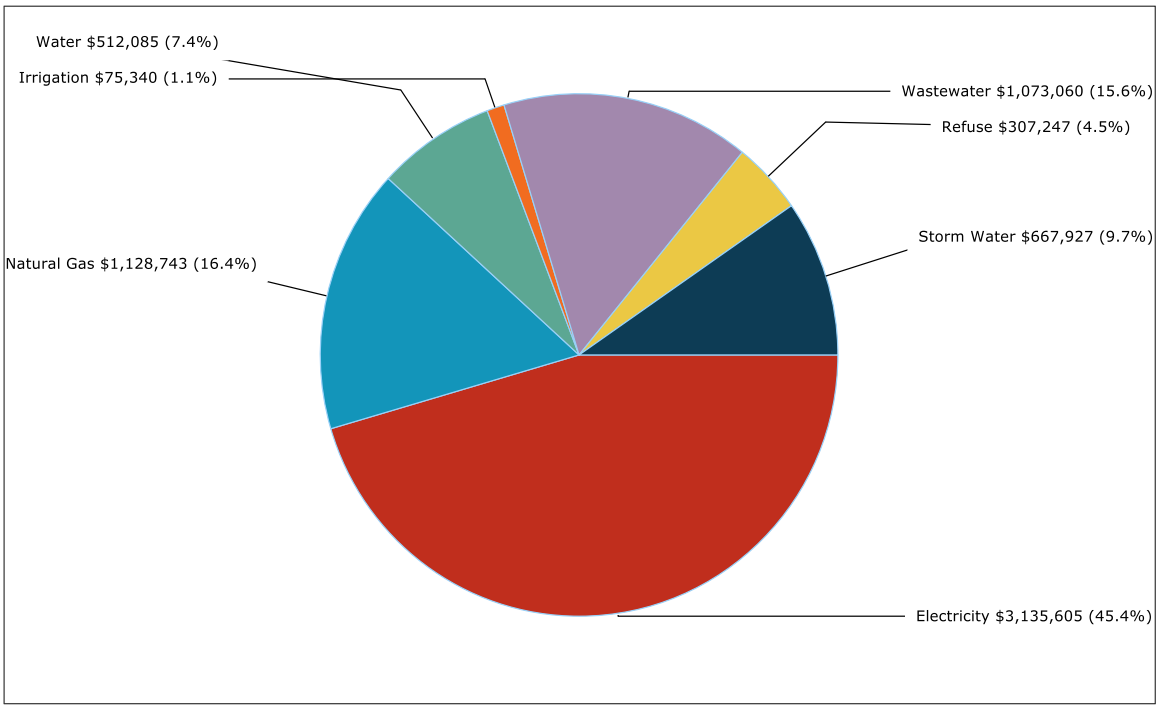
Table 1: 2020-2021 BSD Total Utility Consumption Comparison and Goals

UTILITY	2018-19	2019-20	2020-21	2020-21 Comparison to 2018-19	*2021-22 Usage Goals **
Electricity (kWh x 1,000) ($ x 1,000)	33,629 ($3,670)	28,314 ($3,259)	26,863 ($3,135)	Usage (-20%) Cost (-14.6%)	*33,500 kWh (+20%)*
Natural Gas (Therms x 1,000) ($ x 1,000)	1,307 ($992)	1,323 ($920)	1,465 ($1,128)	Usage (+9%)* Cost (+12%)*	*1,900 Therms (+25%)*
Water (CCF x 100) ($ x 1,000)	155 ($2,645)	107 ($2,476)	70 ($2,328)	Usage (-108%)* Cost (-12%)*	*120 CCF (+42%)*
Garbage and Recycling ($ x 1,000)	(788)	($637)	($307)	Cost (-61%)	*NA*
Solar PV Production (1,000 x kWh)	710 ($77,484)	771 ($88,688)	860 ($98,925)	Production (+10.3%) Cost Benefit (+10.3%)	*925 kWh*

*Comparison to average of last 3 years - 2016- 2019 - due to weather volatility.

**Electricity and natural gas usage estimations are based on modified-COVID HVAC run-times coupled with normal building occupancy.

Graph 1: 2020-21 BSD Total Utility Cost Distribution



- **Electricity**. Historically electricity usage has held steady per square foot but rates have ticked up 7.2% per year the last 5 years. PGE has filed for an average rate increase of 4.0% beginning January.

  Electricity usage over the last year was less than predicted primarily due to lower occupancy hours. Cost savings compared to 2019, our last 'typical' year, was 14.6% resulting in $466,000 savings. At the end of the year BSD averaged a 20% kWh total reduction and 11.2% cost savings. Continued investment in energy efficiency along with lower HVAC, light operation, and plug load reductions contributed to this savings. Electricity made up 45.4% of our total utility cost.

  Looking ahead, PGE is signaling higher electricity costs as rates are projected to increase due to increased investments in protecting the grid from extreme weather events. We expect these investments and rate increases for the foreseeable future. Additionally, current school environmental conditions require increased HVAC run times and ventilation in our buildings which will drive up electricity usage. We are conservatively projecting a 20% increase in electricity use this year. We can track usage in real-time and will proactively report usage and make budgetary adjustments trends develop into the school year.

- **Natural gas**. Natural gas usage is directly proportional to the weather. The colder the outdoor air the more Therms consumed. Usage varies year to year as a result.

Fortunately, we've had milder winters over the last several years which has kept usage relatively low. That coupled with low rates have kept overall costs at near historic lows.

Recently however, our modified HVAC schedule increases fresh air ventilation which requires more natural gas to heat thus consuming more Therms. Our yearly usage was 9.0% greater than our typical 3-year average. Cost was 12% higher with $92,000 more spent but only 16.3% of our annual utility spend.

Looking ahead, Northwest Natural will be raising rates between 4-8% over the next 3 years. As noted above, the need to increase ventilation into our buildings will increase usage. It is to early to know but we are conservatively projecting a 25% increase over the course of this next year.

- **Water**. Over the last several years rising water costs due to increase usage and double-digit rate increases have been cause for concern. One of the utility highlights from last year was drastic water usage reduction by over 108% from our 3-year average. We saved an astonishing 46 million gallons of water. This was achieved through both a sizable building use reduction and much lower irrigation use.

  Unfortunately, water rates continue to rise. And cost saving are not as significant as the percentage of water saved due to high water bill fixed fees. Total water cost last year was $2,328,000 and made up 33.8% of our annual utility spend.

  Looking ahead, water providers point to double-digit rate increases coupled with a return to typical occupied site usage. It is our aim to track water usage very closely and conserve water in our buildings and irrigate as efficiently as possible.

- **Garbage and Recycling**. Garbage and recycling realized a 61% reduction due to service levels falling in line with waste generation. The franchised garbage companies serving BSD maintained flexibility in responding to changing service needs at all facilities throughout the 2020-21 year.

- **Renewable Energy**. Photovoltaic (PV) solar electricity production reached a record setting 860,000 kWh for the 2020-2021 school year – a 10.3% increase from the year prior. The total cost benefit to the District for this production was over $95,000. With contributions now from all new schools, solar generation is expected produce between 900,000 and 1,000,000 kwh (1 gigawatt!) with a cost benefit well over $100,000 per year.

Accomplishments

1. In July 2021, Oregon HB3141 extended Public Purpose Charge to fund SB1149 ten (10) additional years through January 01, 2036. BSD will receive equivalent revenues.

2. E&RC continued to work closely with Facilities Development and the Maintenance Departments investing $1,275,000 SB1149 program dollars into energy-efficient capital projects this year for a bond cycle total of nearly $4.1 million. An estimated 615,000 kWh and 25,000 Therms of savings were realized from these projects resulting in a combined annual cost savings of over $85,000.

   Total utility savings through the bond is estimated at nearly 4.0 million kWh and 150,000 Therms per year for a total cost savings of over $550,000. The cost savings does not include the added net benefit O&M savings.

3. E&RC has secured a total of $145,500 incentives this year for a total of nearly $750,000 in incentives through the Energy Trust of Oregon's (ETO) Existing Building Program since 2017 when the program was permitted to serve our existing schools. ETO's New Building Program has contributed 1.2 million dollars in incentives toward energy efficient equipment in our new and large remodeling projects through this bond cycle. These incentive dollars offset bond and SB1149 project expenditures.

4. BSD solar systems have now generated a system life total of 4.4 Gigawatts (million kWh) of electricity, enough to power 400 average-sized homes for a year.

5. For the 2nd year in a row, BSD was awarded a PGE Electric Bus Grant of $333,000 for two additional fully electric buses. The total 2-year award totals $895,060 for 4 electric buses and charging infrastructure for up to 8 EV buses. Two buses are currently in service and 2 more are expected in late 2022. Additionally, the SB1149 program now allows investment in District electric vehicle fleet adoption. An EV bus and Maintenance department vehicle audit was completed and submitted to the Oregon Department of Energy this year and are evaluating funding additional EV buses and select District vehicles in the coming years as more options enter the marketplace.

6. As mentioned, BSD has seen significant reductions in water usage across the board. We will be looking to maintain these reductions as much as possible and assist in supporting the Grounds department in evaluating investment into smart irrigation system technology.

7. The food waste collection program was suspended for the year due to changes in meal preparation and service procedures. The program was reinstated with the return of students in September 2021.

Areas of Concern and Program Risk

1. Operations and maintenance (O&M) have a direct and immediate impact to sustaining building energy and performance. Moreover, there is currently a high risk of reduced equipment life and premature damage to expensive HVAC systems if the support is not provided to manage these technically advanced and complex systems. Maintenance staff that support building HVAC and electric infrastructure are critically low. Energy and utility cost savings will only be realized by re-investing in appropriate staffing levels of qualified maintenance personnel. Beyond maintaining a favorable indoor air environment, premature failure of millions of dollars of HVAC equipment and control systems are at stake.

2. Utility rates are projected to increase across the board into the foreseeable future. Water costs pose the highest level of concern. More concerning is E&RC has no budget mechanism to investment in water conserving equipment. Adequately staffed and funded Plumbing and Grounds departments are critical to adequately repair building and HVAC system water leaks and updating and investing in irrigation leak sensing equipment.

3. With increasing climate change impacts, E&RC would like to foster the discussion of establishing proactive carbon reduction goals and committing to a more aggressive renewable energy and sustainability policy.

Short Term Goals

1. E&RC usually has annual energy consumption targets for electricity and natural gas usage. However, this year projected to be similarly unpredictable as last, utility usage is difficult to estimate. Our department will be monitoring usage closely, reduce consumption where we can, and provide monthly updates.

2. Continue to deliver cost-effective energy-efficient HVAC and lighting systems that align with the bond renovation effort and maintenance needs. This will be achieved by contracting additional energy audits as needed, offer cost-effective SB1149 program measures, pursue ETO incentives, and collaborate to ensure continued success of all capital projects.
3. Expand BSD's Energy Star Certification Portfolio where possible once normal occupancy resumes.

4. E&RC will work to integrate water reduction successes realized in 2021 to finalize a district-wide water conservation policy by the end of first quarter of 2022.

5. Pursue Energy Star certification of new schools and newly renovated schools once normal occupancy as resumed.

6. Track and report District-wide CO2 emission levels.

7. Continue to manage garbage service levels for each facility to meet generation needs.

Long Range Goals

1. Pursue Energy Management Information System (EMIS) software enhancements coupled with energy submeters that will tie together HVAC Building Management Systems, fault detection, and building analytics to further improve energy and building performance while driving operations and maintenance away from a preventative to a more predictive model.

2. Work with Maintenance to support investment in low-cost, high-return water conserving measures such as smart irrigation flow meters.

3. Evaluate district electric vehicle possibilities that may be funded with SB1149 dollars.

4. Explore and discuss potential outlets for surplus equipment, furniture, and other salvageable materials with Maintenance Services.

5. Promote energy and resource conservation practices and larger sustainability themes into our STEM curriculum.