



Portland Public Schools Decarbonization Roadmap

DECARBONIZATION IMPLEMENTATION PLAN



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TABLE OF CONTENTS

Executive Summary	3	Results and Conclusions	12
Introduction	4	What Does Roadmap Accomplish?	12
Community Engagement	5	Storytelling	12
Additional Engagement	6	Take-aways	12
PPS Internal Engagement	6	Appendix: Roadmap Tool User Guide	14
Decarbonization Roadmap	7	Appendix: Measure Details	16
PPS Decarbonization Measures	8	Appendix: Measure Costing Details	17
Implementation Scenarios	8	Appendix: Combined Baseline Cluster Reports	20
Roadmap Development	9	Cleveland	20
Methodology	11	Franklin	31
Data Compilation	11	Grant-McDaniel	43
Prioritization	11	Lincoln and Ida B Wells	55
Existing Energy End-use Estimations	11	Roosevelt and Jefferson	67
Measure Impact Calculations	11	Appendix: Decarbonization Recap: Online Questionnaire	79
Cost Estimation	11	Appendix: PPS Decarbonization Recap: Combined Results	83
Energy Cost and Carbon Projections	11	Appendix: PPS Decarbonization FAQ	84

Executive Summary

THE DECARBONIZATION ROADMAP

The Decarbonization Roadmap is a living guide that is designed to be updated regularly by Portland Public Schools (PPS) stakeholders to assist with their emission reductions planning efforts. It's a standardized list of improvements that can be made at every PPS facility. Each improvement listed in this roadmap includes an estimated cost and estimated impact on emissions reductions. The district can select the year of implementation for each improvement at each facility and the Roadmap projects out the impact those improvements have on the greenhouse gas emissions of the district.

This project has identified initial paths of implementing defined improvements in a particular order across all PPS buildings to meet the climate policy goals, but PPS will need to refine this roadmap over time as projects are funded and implemented.

TAKE-AWAYS

Through the process of developing the roadmap, four important takeaways became apparent to meet their goals:

-  PPS must electrify its buildings.
-  Utilities must meet the state mandated emissions target of 100% fossil fuel free by 2040.
-  PPS is on track to achieve the 2030 - 50% emissions reductions by modernizing and electrifying the last three high school buildings.
-  Significant continued investment in decarbonization will be required for PPS to meet its 2040 goals.



STAKEHOLDER ENGAGEMENT

Engaging internal stakeholders within the school district, such as administrators, facilities managers, teachers, and students, was crucial for the successful development of the PPS Decarbonization Plan. These stakeholders provided valuable insights into the district's infrastructure challenges and operational needs, ensuring that the plan is both practical and actionable. Their involvement fostered collaboration, secures future buy-in, and will help ensure continuity between teams as these projects are implemented.



COMMUNITY ENGAGEMENT

While subject matter experts (SME) were being consulted about how to achieve decarbonized buildings, PPS also reached out to the community for how they would like to see the improvements implemented into the buildings. PPS held a series of meetings around the district to provide each high school cluster a platform to be heard. The goal of these engagements was to answer the question, "how can PPS most effectively implement GHG emissions reduction measures to give us the best chance of meeting our emissions goals, given financial, industry, and facility constraints, while considering historic inequities in the distribution of resources across PPS?"



PRIORITIZATION TOOL

To help PPS plan what order facilities should receive decarbonization related upgrades, the Decarb Team built a tool that includes 25 characteristics for each facility to calculate a prioritization score for each one. The higher the score, the higher the priority for receiving upgrades related to decarbonization. The school district can use the scores to compare the differing needs of the buildings and make decisions on what order to implement improvements. The tool can be updated at any time to recalculate the prioritization scores and update the rankings to inform new decision-making processes.



MEASURE DEVELOPMENT

By establishing a list of decarbonization measures and existing energy end-use breakdown estimates, the team developed measure specific energy impact estimates for each building in the district. The team also established an Indoor Environmental Quality impact weighting based on industry best practices for all of the measures that impact thermal comfort and indoor air quality. Measure emissions impacts have been applied to projects within the year they are expected to be operational, and each measure builds upon any prior implementation.



COST ESTIMATING

Knowing that budgeting is a critical component for planning future upgrades to facilities, the Decarb Team has provided cost estimates for each improvement measure at each facility. These costs are meant to provide a rough order of magnitude for budgeting purposes and are based on industry averages and costs from recent projects at Portland Public Schools and other similar entities. The intent is not to identify an accurate cost for a specific measure at a specific location, but to provide an average cost that when aggregated with all projects across all facilities will provide a reasonable total cost for high-level budgeting. The estimating is for turnkey projects, so it includes labor and material as well as soft costs such as design and construction management.



STORYTELLING

Originally, the decarbonization team planned an in-person storytelling roadshow to showcase the outcomes of the PPS Decarbonization Roadmap, featuring educational activities and speaker sessions. Due to low attendance at stakeholder events and limited interest in-person engagement, the team shifted strategy. The first pivot was to host a community webinar. Following further feedback from the Climate Crisis Response Committee (CCRC), the team ultimately decided to produce a series of three short informational videos showcasing the roadmap and what it means for the community. The videos will launch in spring 2025 and be promoted across multiple platforms to maximize community outreach.

Introduction

What Is Decarbonization At PPS?

To understand what decarbonization means for PPS, we'll start with the PPS climate policy, which states:

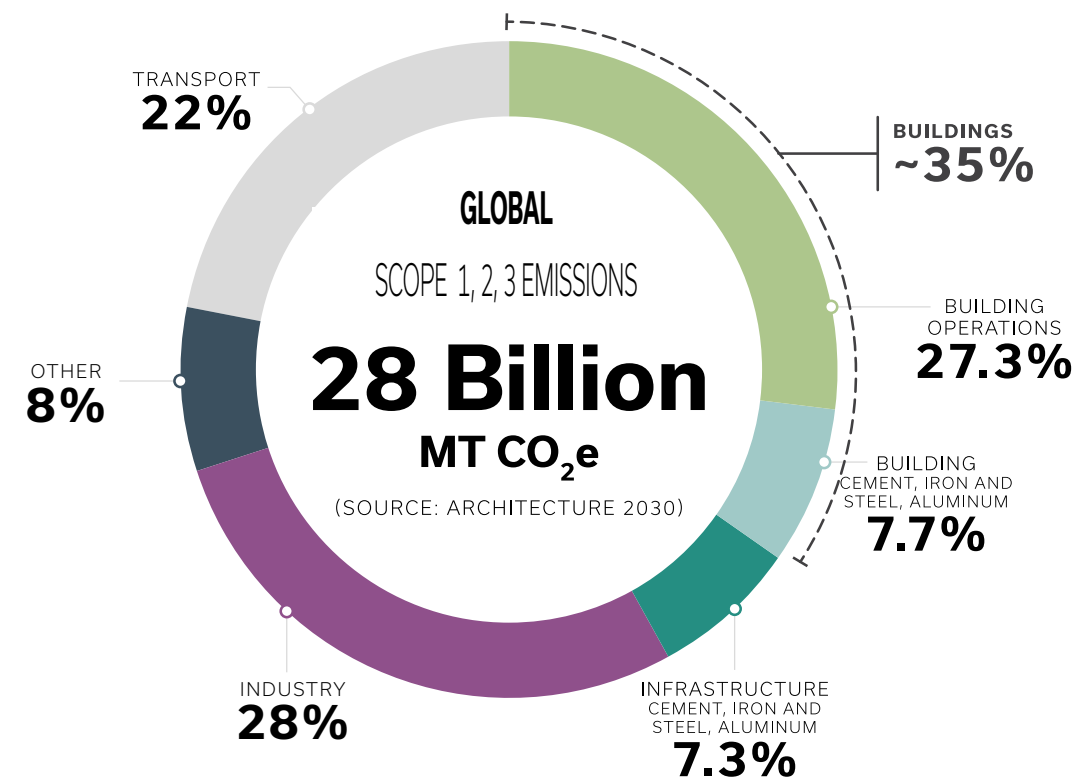
"In response to the human-caused climate crisis currently underway and the direct harm being done to our District, society, and planet, Portland Public Schools (PPS) is committing to immediately mobilize resources for climate action. To this end, the District commits to reducing greenhouse gas (GHG) emissions and minimizing other negative environmental impacts; improving our school communities' health and wellness; and building a culture of learning, responsibility, and sustainability centered on our values of racial equity and climate justice.

Climate change disproportionately impacts the vulnerable members of our community. Implementation of this policy will prioritize serving people with disabilities, communities of color, and other vulnerable populations.

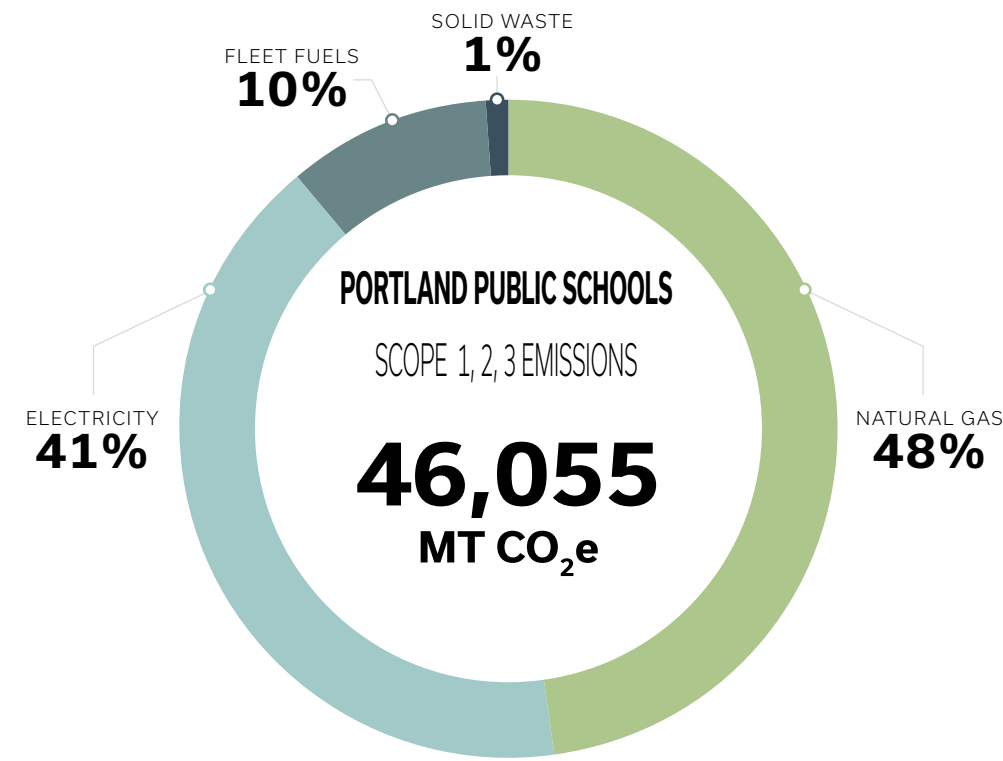
The District aims to educate and empower students as leaders in the just transition to a sustainable city and restorative society. Our goal is for all students to be environmentally literate, and to understand the connections between their daily actions and the natural world by using community-based learning and civic action as a context for meeting academic goals described in the Graduate Portrait.

The District shall prioritize investments that achieve the greatest emissions reduction, while integrating climate action into our curriculum and developing a culture of environmental stewardship and climate justice throughout our organization. Other efforts which have a lower impact on emissions and require major changes in infrastructure can be implemented over the longer term."

As a measurable objective, the climate policy states that PPS will reduce its greenhouse gas emissions by 50 percent by 2030, using the 2018-2019 school year baseline, and reach net zero emissions by 2040.



Building Operations Contribution to Global Emission (Source: Architecture 2030)



PPS Operation Emissions Baseline from the 2019 GHG Inventory

Understanding how to decarbonize buildings starts with an understanding of where carbon emissions are within building. Globally, 35% of all GHG emissions are attributed to buildings with 78% of those coming from operations.

Based on the 2018-2019 school year GHG inventory shown in the lower donut chart, within PPS, almost 90% of current operational emissions come from building electricity and gas use.

Therefore, the decarbonization roadmap focuses on the elimination of these emissions.

This starts with eliminating the majority of onsite emissions by replacing fossil-fuel burning systems with efficient electric alternatives. These systems include:

- Gas fired heating equipment (boiler and furnaces)
- Gas fired hot water heaters
- Gas fired cooking equipment

Note that the impact of these strategies is contingent upon electricity becoming a clean energy resource, with PPS installing onsite renewable energy generation where feasible, and the utility decarbonizing to meet the Oregon HB2021 mandates.

Managing system costs, operating costs, and grid energy demands requires buildings to operate more efficiently.

Therefore, this should be done in conjunction with efforts aimed at reducing and eliminating indirect electricity emission by addressing inefficiencies in the primary building systems:

- Heat loss and gain through building enclosure and windows
- Ventilation systems
- Heating and cooling systems
- Lighting
- Water heating
- Cooking and refrigeration equipment
- Computers and appliances

This can be accomplished by targeting measures that :

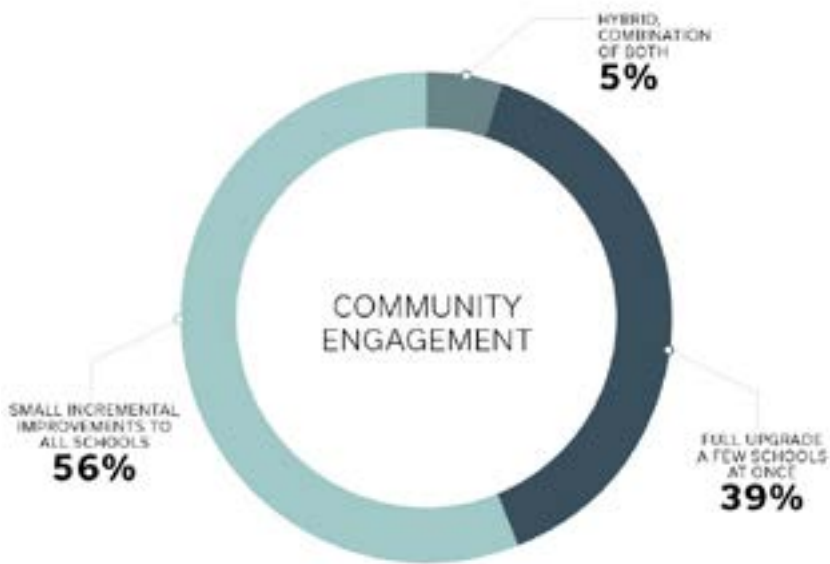
- Reduce building heating and cooling loads
- Utilize energy efficient systems (lighting, HVAC, water heating, and appliances).

Refinement of these measures and identification of the implementation approach all started with the stakeholder engagement discussions outlined in the following sections.

Community Engagement

While subject matter experts were being consulted about how to achieve decarbonized buildings, PPS also reached out to the community for how they would like to see the improvements implemented into the buildings. PPS held a series of meetings around the district to provide each high school cluster a platform to be heard. The goal of these engagements was to answer the question, “how can PPS most effectively implement GHG emissions reduction measures to give us the best chance of meeting our emissions goals, given financial, industry, and facility constraints, while considering historic inequities in the distribution of resources across PPS?”. The final approach to engagement was refined through conversations with PPS staff and community organizations.

The team wanted to ensure that a range of opportunities was provided for community members to provide feedback. Three main opportunities were provided: an online survey, in-person meetings, and a virtual meeting. Additionally, classroom engagement and a presentation at the All-City PTA meeting were conducted. This approach was chosen to ensure as much diverse participation as possible – extending to all corners of the district. To inform community members, a flyer was developed and translated into five different languages in addition to English (Spanish, Somali, Vietnamese, Russian, and Chinese). Communications were sent out to the community via community-based organizations, industry professionals, and schools. Communication platforms utilized include email, community forums, social media, and list serves. A version of this flyer can be found in Appendix: Community Outreach Assets.



RANKING RESULTS

1 HIGHEST PRIORITY	Improve Thermal Comfort
2	Reduce Energy and Carbon Emissions
3	Improve Indoor Air Quality
4	Add Energy Resilience
5	Reduce Operating Cost and Maintenance
6	Improve outdoor environment
7 LOWEST PRIORITY	Improve visual comfort

SURVEY

The survey included only four questions to ensure that those responding did not feel as if the survey was a burden and could provide thoughtful answers. A summary of the survey and the responses can be found in Appendix: Decarb Recap – Online Questionnaire.

MEETINGS

There were four in-person meetings for the different high school clusters: Roosevelt/Jefferson, McDaniel/Grant, Franklin/Cleveland, and Lincoln/Wells. These meetings were held in the evenings at these schools to offer flexibility for working families. An online presentation was also offered during the day to provide additional flexibility on timing and attendance. The attendance for these meetings is listed on the following page.

Each meeting had the same planned agenda where PPS and the subject matter experts discussed decarbonization and its effects on the schools and community as well as climate justice. Two main activities were implemented to best understand priorities. A dot polling activity to prompt discussion so that the team could best understand how to implement these decarbonization improvements in the school buildings:

The first question asked whether the community would prefer small incremental projects simultaneously on all the buildings or holistic building upgrades for a group of buildings until all the buildings have been completed.

- The general consensus across multiple meetings was that the community was split on the approach to implementing improvements, with a small majority preferring the small incremental improvement approach.

The other question asked participants to rank their priorities to be addressed by the decarbonization work, from thermal comfort, to improved indoor air quality, and cost reduction.

- The highest priority identified by participants was improving thermal comfort, followed by reducing energy and carbon emissions.



Community Engagement

Building performance and emissions comparison data was provided for each cluster and each individual school in each cluster. Participants reviewed these reports and discussed the trends and concerns identified. Each meeting had great discussion around how PPS will use this data to prioritize upgrades and aired any additional concerns.

Some of the additional outgoing comments from participants included that it is important to provide a viable and implementable plan for future generations, reducing greenhouse gas emissions in PPS provides an example for other school districts, and that deferred maintenance should be addressed simultaneously. A final thought from a participant highlighted that, “equity should inform all choices.”

A summary of the slides, polling activity responses, and cluster emissions data can be found in Appendix: Decarb Recap – Combined Results. A list of the frequently asked questions from the engagement sessions can be found in Appendix: PPS Decarbonization FAQ. Attendance at each meeting can be found below:

EVENT	NUMBER OF PARTICIPANTS	DATE	LOCATION
Online Survey	45	Open during duration of engagement	Online at pps.net/energy
Roosevelt/ Jefferson Cluster Meeting	8	January 31, 2024	Jefferson High School
Franklin/ Cleveland Cluster Meeting	8	February 7, 2024	Franklin High School
McDaniel/Grant Cluster Meeting	6	February 1, 2024	McDaniel High School
Lincoln/Wells Cluster Meeting	3	February 15, 2024	Lincoln High School

Virtual Meeting	18	February 21, 2024	Zoom
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ADDITIONAL ENGAGEMENTS

Classroom engagement: PPS staff also engaged several of the Climate Justice High School classrooms to get their feedback on their priorities for decarbonization. This process was less formal and more anecdotal, but general feedback from students was excitement for this plan and implementation of the policy. Equity was a prime concern for them as was indoor air quality.

All-City PTA engagement: An opportunity arose for the team to speak at the All-City PTA meeting in October. This was a unique opportunity to speak to those passionate about PPS schools and who can be strong advocates for future bonds and implementing the work. The discussion was lively and addressed technical approaches, indoor air quality, prioritization of projects, and how to advocate for success. Twenty-four PTA representatives from across the city attended this meeting.

PPS INTERNAL ENGAGEMENT

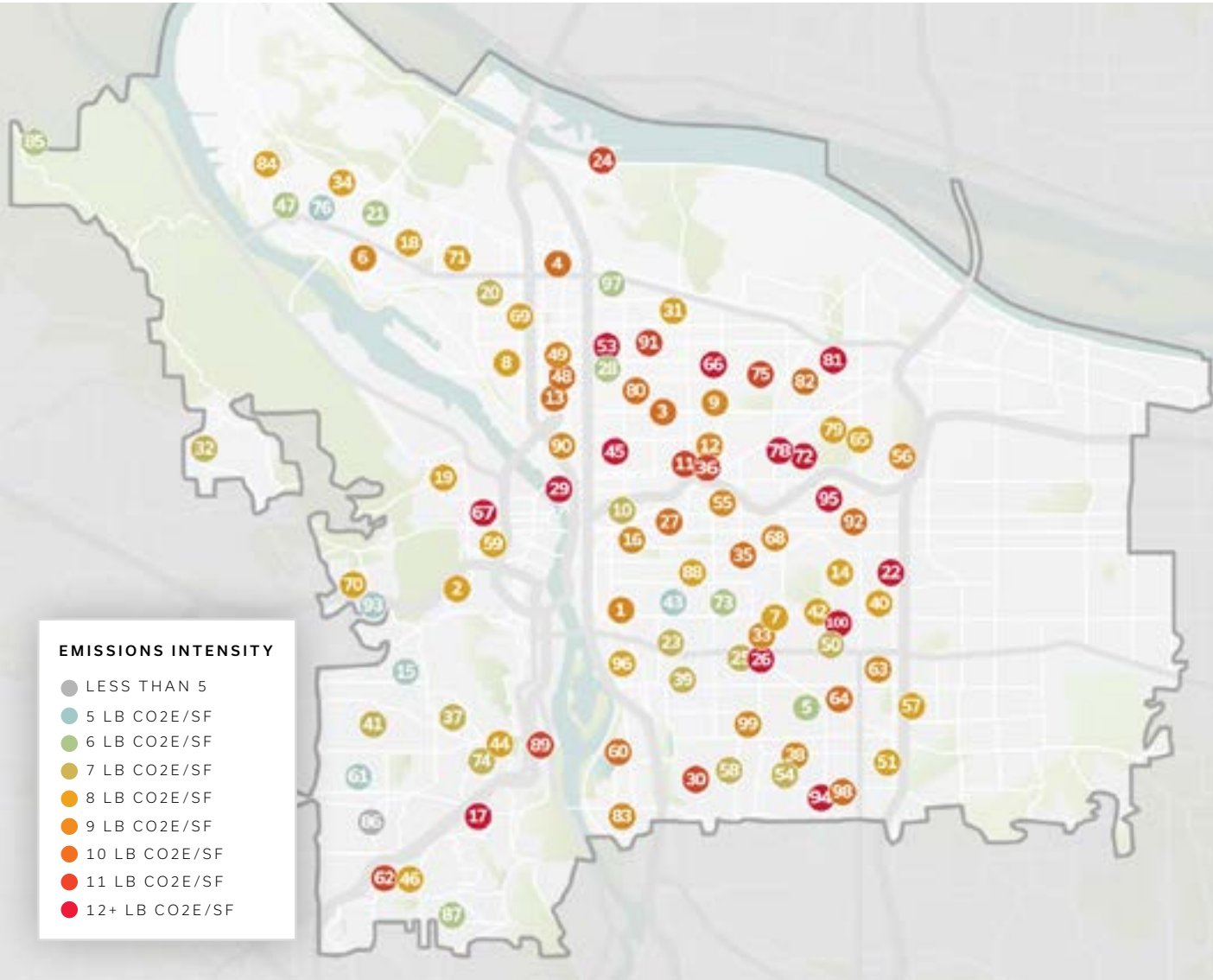
Engaging internal stakeholders within a school district, such as administrators, facilities managers, teachers, and students, was crucial for the successful development of the PPS Decarbonization Plan. These stakeholders provided valuable insights into the district’s infrastructure challenges and operational needs, ensuring that the plan is both practical and actionable. Their involvement fostered collaboration, secures future buy-in, and will help ensure continuity between teams as these projects begin to be implemented.

The decarbonization team met regularly with the PPS Energy & Sustainability Team to ensure the plan took shape in a way the district envisioned. Several additional group meetings at key points in the development process took place that included cross functional teams at PPS. Those in attendance at these meetings or other small group meetings included:

- Chief Operating Officer
- Office of School Modernization
- Planning and Real Estate Management
- Maintenance Services
- Climate Justice
- Energy and Sustainability
- Design & Planning

Finally, the decarbonization team met twice with the Climate Crisis Response Committee (CCRC). Once at the beginning of the process to discuss any initial thoughts to incorporate into the stakeholder engagement and planning process. Once more in February 2025 to share results and gather more feedback on the storytelling aspect of the process ([CCRC Recording](#)). The CCRC received the plan well and seemed excited to be able to share out once the storytelling process is complete.





Decarbonization Roadmap

In a previous project, PPS identified their greenhouse gas emission baseline, but the decarbonization roadmap project estimates greenhouse gas emissions going forward based on those numbers. The challenge is identifying how and when to upgrade all of the 100+ facilities that PPS manages, particularly when so many of the facilities are on the high end of the emissions intensity spectrum, as highlighted in the map above.

To help PPS answer the question in what order should the improvements be made, the decarbonization team created a Prioritization Matrix that takes into account 25 characteristics in 4 categories: General Building Information, Facility Condition Assessment, Indoor Environmental Quality,

and Equity. This provides a data-driven method to sort the numerous locations by priority.

The Decarbonization Roadmap is a standardized list of improvements that can be made at every PPS facility in which, for each improvement, the associated energy and greenhouse gas impact is identified and the associated cost is estimated. A year is selected for each improvement to be implemented at each facility and the Roadmap projects out the impact those improvements have on the greenhouse gas emissions of the district.

It also accounts for improvements that have been recently completed or are planned to be completed soon.

FACILITY					
1	Abernethy	35	Glencoe	69	Ockley Green
2	Ainsworth	36	Grant	70	Odyssey Program at East Sylvan
3	Alameda	37	Gray	71	Peninsula
4	Applegate	38	Green Thumb	72	Rice
5	Arleta	39	Grout	73	Richmond
6	Astor	40	Harrison Park	74	Rieke
7	Atkinson	41	Hayhurst	75	Rigler
8	Beach	42	Holladay Annex	76	Roosevelt
9	Beaumont	43	Hosford	77	Rosa Parks
10	Benson	44	Ida B. Wells	78	Rose City Park
11	Fernwood	45	Irvington	79	Roseway Heights
12	Hollyrood	46	Jackson	80	Sabin
13	Boise-Eliot	47	James John	81	Sacajawea
14	Bridger	48	Jefferson	82	Scott
15	Bridlemile	49	KairosPDX at Humboldt	83	Sellwood
16	Buckman	50	Kellogg	84	Sitton
17	Capitol Hill	51	Kelly	85	Skyline
18	Cesar Chavez	52	Kenton	86	Smith
19	Chapman	53	King Neighborhood Facility	87	Stephenson
20	Chief Joseph	54	Lane	88	Sunnyside
21	Clarendon	55	Laurelhurst	89	Terwilliger
22	Clark	56	Lee	90	Tubman
23	Cleveland	57	Lent	91	Vernon
24	Columbia	58	Lewis	92	Vestal
25	Creston	59	Lincoln	93	West Sylvan
26	Creston Annex	60	Llewellyn	94	Whitman
27	da Vinci	61	Maplewood	95	Wilcox
28	Dr. Martin Luther King, Jr.	62	Markham	96	Winterhaven
29	Dr. Matthew Prophet Education Center	63	Marshall	97	Woodlawn
30	Duniway	64	Marysville	98	Woodmere
31	Faubion	65	McDaniel	99	Woodstock
32	Forest Park	66	Meek	100	Youngson/Holladay Center
33	Franklin	67	Metropolitan Learning Center		
34	George	68	Mt. Tabor		

PPS Decarbonization Measures

To determine a path to decarbonizing all of the PPS buildings, the team, in collaboration with PPS, developed a set of 17 decarbonization measures that can be applied to any of the buildings as part of a decarbonization project. The measures address a broad range of improvement opportunities that are representative of PPS sustainability standards.

The associated electricity and natural gas impacts of each measure are calculated based on existing conditions and estimated impact factors. The associated emissions reductions are then assessed based on the estimated grid emissions at the time of implementation.

Certain measures also have Indoor Environmental Quality benefits which are tracked in parallel with the emissions reductions.

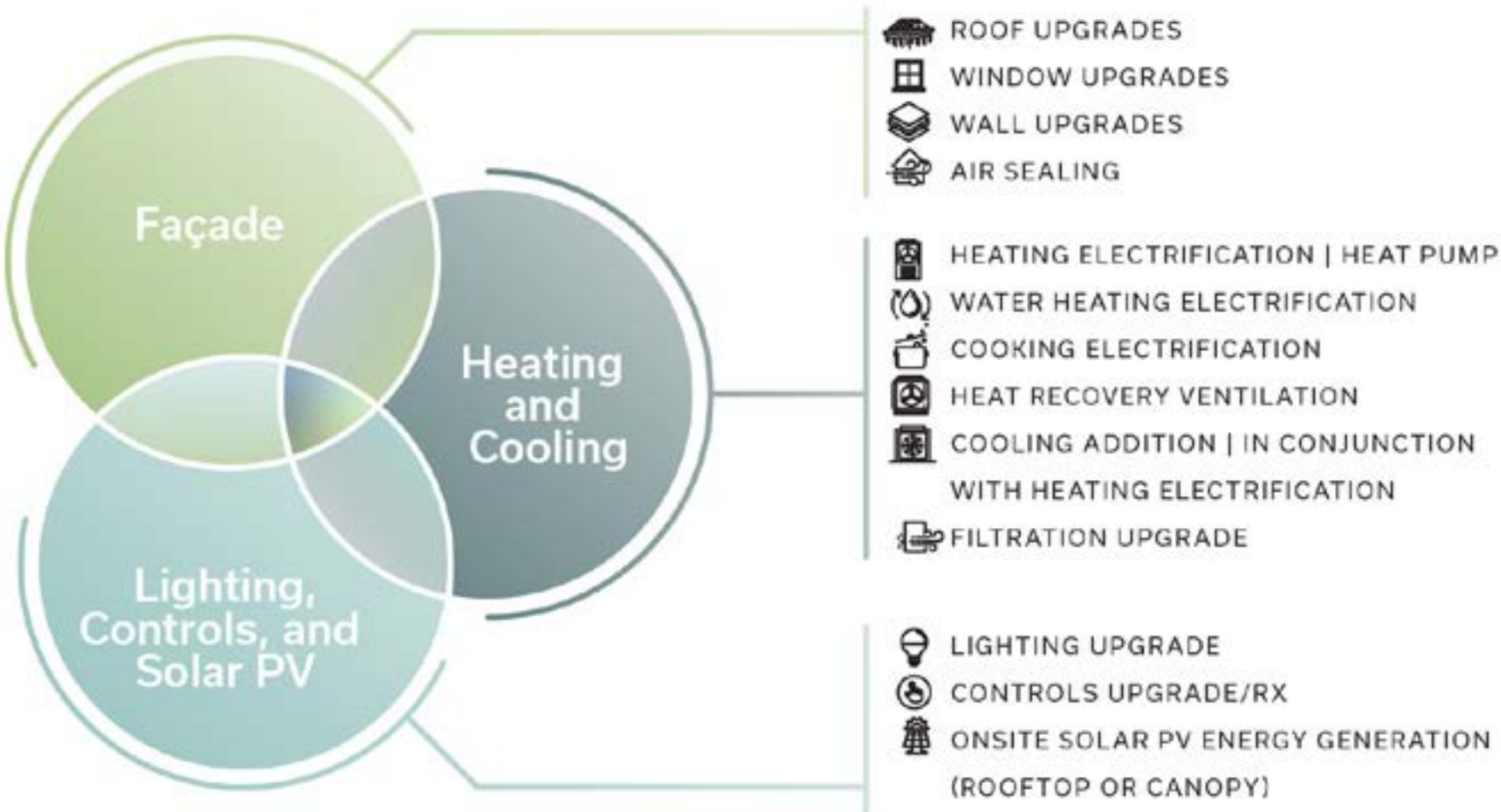
Implementation Scenarios

The project includes a flexible tool to build different scenarios to compare different approaches to the improvements.

As a demonstration of some of the potential pathways available to PPS in getting to the 2040 decarbonization goals, a set of scenarios were developed around the two implementation pathways discussed in the stakeholder engagement (by School or by Measure). Projects were lined out based on currently planned implementations followed by staged implementations in other facilities. The prioritization scoring was used to inform the sequencing of these scenarios and provides an example of how PPS can use this process moving forward.

The following two sections show the details of these scenarios and the path to zero carbon for PPS. However, it is not the expectation that either of these show the set path for PPS. The project planning teams can build off these scenarios or build new scenarios to map out the actual implementation of projects over time.

As with past efforts at PPS, the likely approach to implementation will be a blend of both measure level and full decarbonization/modernization projects.



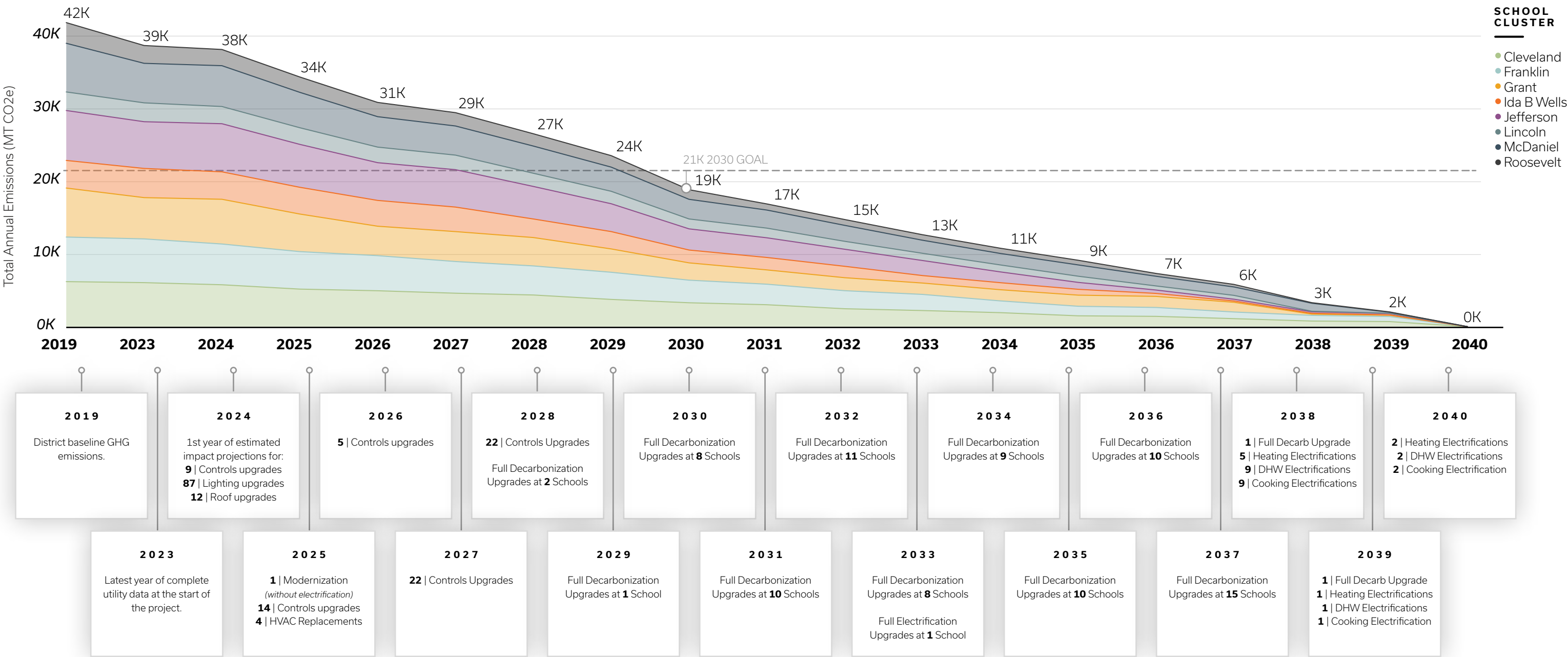
Roadmap Development

SCENARIO 1 (BY SCHOOL)

SCENARIO APPROACH

In this scenario, projects were lined out based on currently planned implementations followed by staged implementations of Full Decarbonization Upgrades in all the middle schools, elementary schools, and admin facilities. This was followed by heating electrification projects at recently modernized high schools. The prioritization scoring was used to inform the sequencing of Full Decarbonization Upgrades and provides an example of how PPS can use this process moving forward.

Projected emissions are displayed as the total of all buildings in each district cluster.



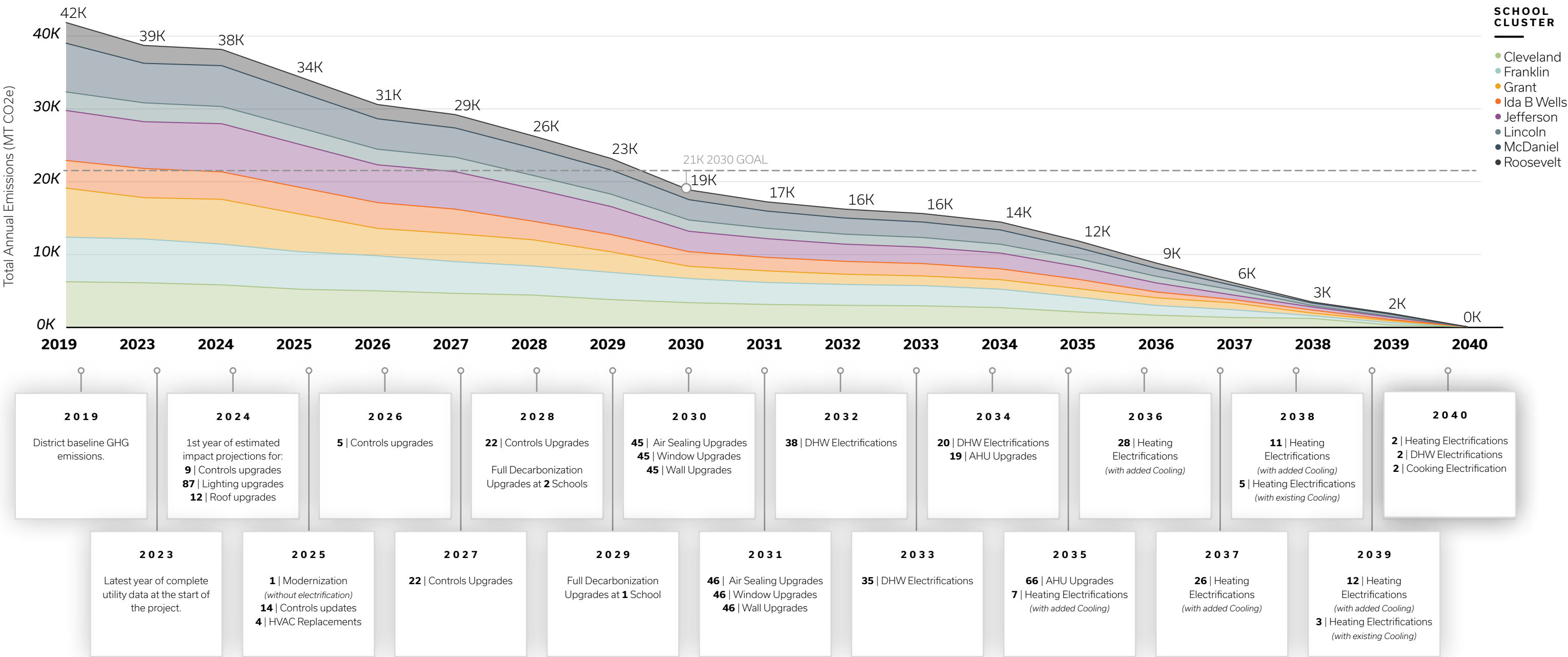
Roadmap Development

SCENARIO 2 (BY MEASURE)

SCENARIO APPROACH

In this scenario, projects were lined out based on currently planned implementations followed by staged implementations of district wide Measure Level Upgrades in all the middle schools, elementary schools, and admin facilities. This was followed by heating electrification projects at recently modernized high schools. The sequencing of the measures in this scenario was based on stakeholder feedback that thermal comfort improvements should be a high priority for PPS. The prioritization scoring was used to inform the sequencing of Measure Level Upgrades and provides an example of how PPS can use this process moving forward.

Projected emissions are displayed as the total of all buildings in each district cluster.



Methodology

The following sections outline the data sources used and calculation methodologies employed in developing the decarbonization calculation and implementation prioritization tools.

DATA COMPILATION

The team reviewed and organized district provided data from the following sources to establish the various benchmarks needed for the prioritization development.

- Monthly utility data for 2018, 2019, 2022, 2023 and 2024
- Facility Conditions Assessments (FCA) data
- Priority school (Title 1, CSI, TSI) designations, and other equity related metrics
- Indoor air quality data from the district wide study
- GHG baseline data and background data that went into the GHG Baseline report (list of sites and their baseline electricity and natural gas use)
- The list of which sites are served by PGE and which by Pacific Power
- A list of projects that impact GHG emissions that have occurred since the baseline was calculated
- A list of projects that are already planned/funded and impact GHG emissions
- Age of roofs for each site and all planned roof replacements
- Details on all the Solar PV arrays and their production numbers

During this process the team identified minor gaps in data and worked with relevant stakeholder to collect additional quantitative and qualitative information.

PRIORITIZATION

The prioritization tool provides a way to score sites and rank their need for projects related to decarbonization. Sites are scored on 25 characteristics in 4 categories based on data from a variety of sources, including enrollment reports, Tririga work order records, facility condition assessment data, utility bills, construction records, airflow testing reports, Justice 40 information, and Multnomah County’s heat vulnerability data. The higher the score, the higher the priority for receiving upgrades related to decarbonization.

EXISTING ENERGY END-USE ESTIMATIONS

PPS has monthly building level utility tracking for all the properties throughout the district, which was the basis for establishing operational energy and carbon benchmarks as well as current utility cost estimates. However, the process of identifying energy and carbon impact estimates from future projects requires a more detailed understanding of how the building is using energy and this is generally accomplished through an accounting of major end-use energy categories, such as heating, ventilation, lighting, water heating, receptacles, etc.

Most PPS properties do not currently have any energy end-use submetering in place and the establishment of direct submetering data for the roadmap development was beyond the scope of this effort.

Therefore, the team used proxy data from national and regional energy end-use surveys (CBECS and CBSA) to establish the approximate end-use breakdown for the different building types within the district. This was then calibrated against facility conditions data to come up with property specific estimates for all the buildings within the district.

MEASURE IMPACT CALCULATIONS

Building off the established list of decarbonization measures and the existing energy end-use breakdown estimates, the team developed measure specific end-use energy impact estimates for each building in the district. These estimates used a combination of prototypical energy modeling, recent project modeling data, and engineering judgment. The team also established a Indoor Environmental Quality impact weighting based on industry best practices for all of the measures that impact thermal comfort and indoor air quality. Measure impacts have been applied to projects within the year they are expected to be operational, and each measure builds upon any prior implementation.

COST ESTIMATION

To estimate the total cost of each scenario, the team utilized a combination of database construction estimates (from RS Means) and recently completed construction costs from PPS or similar K-12 environments. RS Means is a web-based service that provides cost data on construction materials, equipment and labor for various building types and locations nationwide. Primarily, hard cost estimates were derived from recently completed construction data, if feasible.

All measures were then adjusted using a soft cost multiplier of 1.4 to represent a fully loaded measure estimate in current year dollars. This soft cost includes architecture and engineering design and legal fees (e.g., new drawings, schedules, permits, contingency, etc.). Additionally, the scenario model applies an annual escalation rate of 3% to account for inflation.

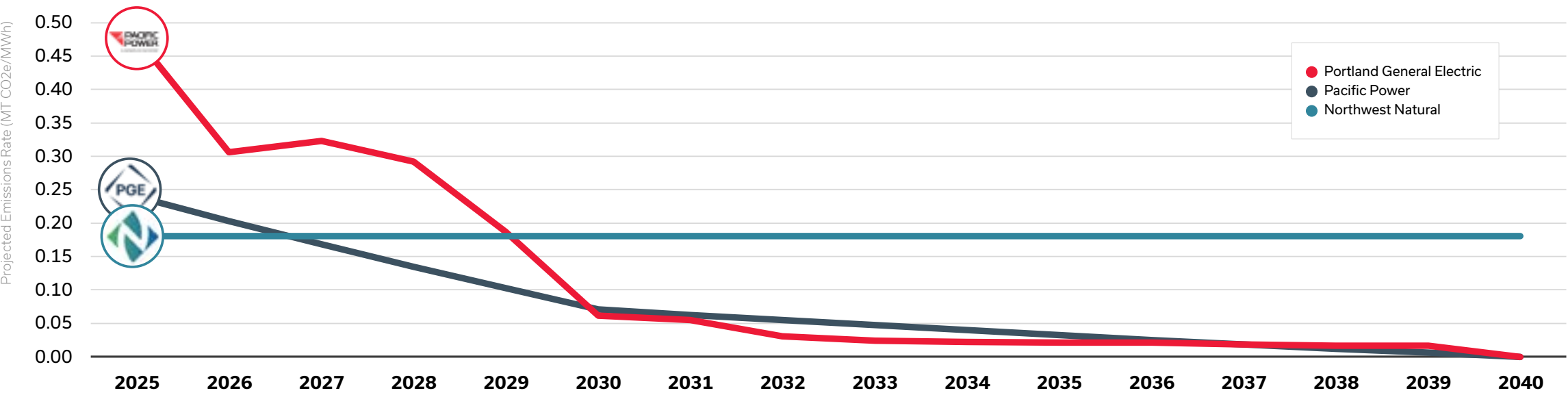
See Appendix B for measure level costing details.

ENERGY COST AND CARBON PROJECTIONS

Energy cost escalations have been accounted for based on the 2024 Annual Supplement to NIST Handbook 135 -Table Ca-4 Commercial Projected Fuel Price Indices (excluding general inflation).

Carbon emissions projections associated with the electrical utilities have been included based on the latest Clean Energy Plans from Portland General Electric and PacifiCorp, which show their path reducing greenhouse gas emissions from the electricity they provide. Below is the 2023 projections currently included in the tool.

PROJECTED EMISSIONS OF UTILITY ENERGY



Results and Conclusions

WHAT DOES THE ROADMAP ACCOMPLISH?

The Decarbonization Roadmap and tool establish process with which PPS can use real data and strategic planning to guide decarbonization upgrades across the district. This roadmap ensures each step is intentional and maximizes impact. The roadmap is an actionable tool that realizes the policy commitment set forth as opposed to a policy sitting on a shelf.

This is a tool to achieve the Climate Crisis Response Policy GHG reduction goals:

“PPS will reduce its greenhouse gas emissions by 50 percent by 2030, using the 2018-2019 school year baseline, and reach net zero emissions by 2040.”

The roadmap benefits the community by offering a verification of this Climate Crisis Response policy’s progress.

This initiative is more than just upgrades to our facilities: it’s a commitment to a sustainable, comfortable, and forward-thinking future for our students, staff, and community. Together, we’re building smarter, healthier schools—one step at a time.

DECARBONIZATION UPGRADES HELP PROVIDE:

- Better indoor air quality (HVAC)
- Added cooling and envelope improvements for better thermal comfort
- Better lighting from use of upgraded lighting systems
- Reduced air pollution by eliminating fossil fuel emissions from the air
- Allow for simultaneous work to address deferred maintenance
- Uphold values of equity and climate justice at PPS by giving priority to schools that serve low-income families and communities that have been historically underserved.

A healthier, more efficient future for PPS is within reach. The roadmap provides attainable goals for PPS to provide a healthier learning environment for students, teachers and the community. Our district is taking a holistic, data-driven approach to decarbonization—ensuring our buildings are not only reducing greenhouse gas emissions but also improving the learning environment for students and staff.

PPS assembled subject matter experts, stakeholders, and engaged community members to shape this plan. Not until after listening to these participants did the roadmap take shape. Incorporating community comments builds trust that PPS is after a goal that benefits the whole community. The roadmap then can be used to verify comments are included.

STORYTELLING

In the original proposal for the decarb plan, the decarbonization team had proposed to do a storytelling roadshow that moved around the district and showcased the outcomes of the plan. This included hands-on educational opportunities and short speaking engagements. However, with the low turnout of the in-person stakeholder engagement sessions, the team decided to pivot. The first pivot was to hold a webinar to show the community the outcomes and benefits of the plan. However, after that second meeting with the CCRC, it was recommended that the team develop a series of short informational videos instead. These videos show the three main parts of the roadmap process:

- What is decarbonization at PPS?
- What is the PPS Decarbonization Roadmap?
- What does the Decarbonization Roadmap mean for the PPS community?

The videos are meant to be watched consecutively but also can stand alone to explain the single concept highlighted in each video. These videos will be released in spring 2025 and promotion will be done across several platforms to disseminate them into the community.

TAKE-AWAYS

Through the process of developing the roadmap, four important takeaways became apparent:



PPS must electrify its building



Utilities must meet the state mandated emissions target of 100% fossil fuel free by 2040 for PPS to meet their targets.



PPS is on track to achieve the 2030 50% emissions reductions by modernizing the last three high school buildings.



Significant continued investment in decarbonization will be required for PPS to meet its 2040 goals.

By addressing these school sites, we can have a positive impact on the environment by reducing the emissions equivalent to annual operation of 6000 homes.

Schools are built to last for decades in communities – they are the pillars of our communities. These decarbonization approaches help maintain the unique historic school structures that are part of Portland’s culture while bringing them up to a modern standard that will last decades.

Upgrades of these schools provide tangible examples of how decarbonized spaces can positively impact communities, making these spaces accessible to all.

This approach showcases the leadership of the district to help lead the charge to decarbonize an entire community, city, or state. This roadmap also shows leadership in other school districts how they can improve their school buildings for better learning environments.



Appendix



Appendix: Roadmap Tool User Manual

Prioritization Tool Guide

OVERVIEW

The prioritization tool provides a way to score sites and rank their need for projects related to decarbonization. Sites are scored on 25 characteristics in 4 categories based on data from a variety of sources, including enrollment reports, Tririga work order records, facility condition assessment data, utility bills, construction records, airflow testing reports, Justice 40 information, and Multnomah County’s heat vulnerability data. The higher the score, the higher the priority for receiving upgrades related to decarbonization.

CHARACTERISTIC SCORING

The following is a list of all the characteristics that are included in the prioritization scoring and how they are scored.

Facility Type: The score is based on what type of facility each site is.

- Closed = 0
- Leased = 1
- Admin = 3
- Alternative = 4
- School = 5

Building Area: The score is based on the area of the building(s) at the site.

- 0 to 65,248 square feet = 3
- 65,249 square feet and up = 5

of Students: The score is based on enrollment data from the ‘23-’24 school year.

- 0 = 0
- 1 to 300 = 2
- 301 to 350 = 4
- 351 to 500 = 6

- 501 to 900 = 8
- 901 and up = 10

Active Work Orders: The score is based on the number of active work orders in the Tririga system on 6/14/2024.

- 0 to 6 = 0
- 7 to 13 = 1
- 14 to 19 = 2
- 20 to 24 = 3
- 25 to 30 = 4
- 31 and up = 5

Cumulative Work Orders: The score is based on the number of cumulative work orders in the Tririga system from 1/1/22 to 6/14/2024.

- 0 to 150 = 1
- 151 to 240 = 3
- 241 to 320 = 5
- 321 to 375 = 7
- 376 to 425 = 8
- 426 to 550 = 9
- 551 and up = 10

Facility Condition Characteristics – Air Handler Condition, Central Plant Condition, Domestic Hot Water Condition, HVAC Controls Condition, Lighting Condition, Roof Condition, Window Condition, Other Envelope Condition: These 8 characteristics were all scored the same way. A baseline ranking was set from the most recent Facility Condition Assessment report and then modifications were made by staff and contractor knowledgeable of the current state of the facilities. The rankings were set from 0 to 5 with the following logic:

- 0 = modernized (or is planned for modernization soon)
- 2 = not modernized and not beyond its useful life
- 3 = a mix of some components being beyond and some not beyond their useful lives and in good condition
- 4 = beyond its useful life and in okay condition
- 5 = beyond its useful life and in bad condition

These rankings were converted to scores based on the maximum points for each characteristic. Air Handlers and Central Plants both have a maximum score of 10 points, so their ranking is multiplied by 2 to get the score. The rest have a maximum score of 5, so their ranking is the score.

Fiscal Year ‘22-’23 Greenhouse Gas Emissions: The score is based on the site’s tons of CO2 equivalent emissions calculated from the FY ‘22-’23 annual electrical and natural gas use at the site. Emission coefficients from the site’s utilities were used to convert from kWh and therms to CO2 equivalent.

- 0 to 115 = 2
- 116 to 190 = 6
- 191 to 250 = 10
- 251 to 300 = 14
- 301 to 400 = 16
- 401 to 600 = 18
- 601 and up = 20

Change in Emissions: The score is based on the change in emissions from Fiscal Year ‘21-’22 to Fiscal Year ‘22-’23 (as calculated per the above process).

- -100% to -25% = 2
- -25% to -10% = 4
- -10% to 10% = 6
- 10% to 50% = 8
- 50% and up = 10

Infiltration Factor: The score is based on a Low, Mid, to High ranking of how tight the building envelope is. If the site has been modernized, it is Low. If the site was constructed after 1965, it is Mid. All other sites are High.

- Low = 0
- Mid = 3
- High = 5

Airflow: The score is based on data from the 2021 airflow reports. It uses the percentage of zones that were measured and received an Equivalent Air Changes per Hour greater than 0 but less than 3.

- 0% to 20% = 1
- 20% to 40% = 2
- 40% to 60% = 3
- 60% to 80% = 4
- 80% to 100% = 5

HVAC Filtration Level: The score is based on known information about the HVAC equipment and the installed air filters. If the HVAC system has been modernized, it is identified as New Equipment. If it is not new but the filters have been replaced with MERV

13 filters, it is identified as Retrofitted. All other equipment is identified as having less than MERV 13 filtration.

- New Equipment = 0
- Retrofitted = 3
- Less than MERV 13 = 5

Has Mechanical Cooling: The score is based on known information about which sites have mechanical cooling systems. A site is considered to have mechanical cooling only if a majority of the facility has it. Localized cooling for server rooms or other individual spaces does not count as the site having cooling.

Yes = 0 | No = 5

Has Gas Cooking: The score is based on known information about which sites have a kitchen that has been fully electrified.

Yes = 0 | No = 5

CSI, TSI, Title 1: The score for each of these characteristics is based on whether the site meets the criteria to be classified as a CSI, TSI, or Title 1 school.

No = 0 | Yes = 10

Justice 40: The score is based on whether or not the site is located within a Disadvantaged Community census tract. This is identified by entering the address for each site into the Climate and Economic Justice Screening Tool located at: <https://screeningtool.geoplatform.gov/en/#3/33.47/-97.5>. Disadvantaged communities are those that “...are economically disadvantaged and overburdened by pollution and underinvestment in housing, transportation, water and wastewater infrastructure, and health care. A community qualifies as ‘disadvantaged’ if the census tract is above the threshold for one or more environmental or climate indicators and the tract is above the threshold for the socioeconomic indicators.”

No = 0 | Yes = 5

Heat Island Impact: The score is based on whether or not the site is located within a heat vulnerable area according to the Multnomah County Heat Index assessment:

<https://multco.us/news/heat-vulnerability-index-released-multnomah-county-health-department>

- 0 to 20% = 2
- 20% to 40% = 4
- 40% to 60% = 6
- 60% to 80% = 8
- 80% to 100% = 10

CATEGORY SCORING

The individual characteristics are combined into the categories of General, Facility Condition Assessment (FCA), Health, and Equity. The following table shows the characteristics, the categories, and the maximum score for each characteristic.

CHARACTERISTIC	CATEGORY	MAX SCORE
Facility Type	General	5
Building Area	General	5
Number of Students	General	5
Active Work Orders	General	10
Cumulative Work Orders	General	10
AHU Conditions	FCA	10
General Plant Condition	FCA	10
DHW Condition	FCA	5
HVAC Control Condition	FCA	5
Lighting Condition	FCA	5
Roof Condition	FCA	5
Window Condition	FCA	5
Other Envelope Condition	FCA	5
FY'22-'23 Emissions	FCA	10
Change in Emissions	FCA	5
Infiltration Factor	IEQ	10
Airflow	IEQ	5
HVAC Filtration Level	IEQ	5
Has Mechanical Cooling	IEQ	10
Has Gas Cooking	IEQ	5
CSI	Equity	5
TSI	Equity	5
Title 1	Equity	5
Justice 40	Equity	5
Heat Island Impact	Equity	5

The raw score of the characteristics in each category are totaled and then a weighting factor is applied to produce each site's category score, so that the maximum score of all the categories together is 100. The weighting factors for each category are:

- General = 10
- FCA = 45
- Health = 30
- Equity = 15

The following is an example for the General category given the following characteristic scores:

- Facility Type = 5
- Building Area = 3
- # of Students = 6
- Active Work Orders = 4
- Cumulative Work Orders = 5
- Unweighted General Score: $5 + 3 + 6 + 4 + 5 = 23$
- Weighted General Score: $23 \div 35 \times 10 = 6.6$

OVERALL SCORING

All the weighted category scores for each site are added together to get the site's overall score.

Roadmap Tool Guide

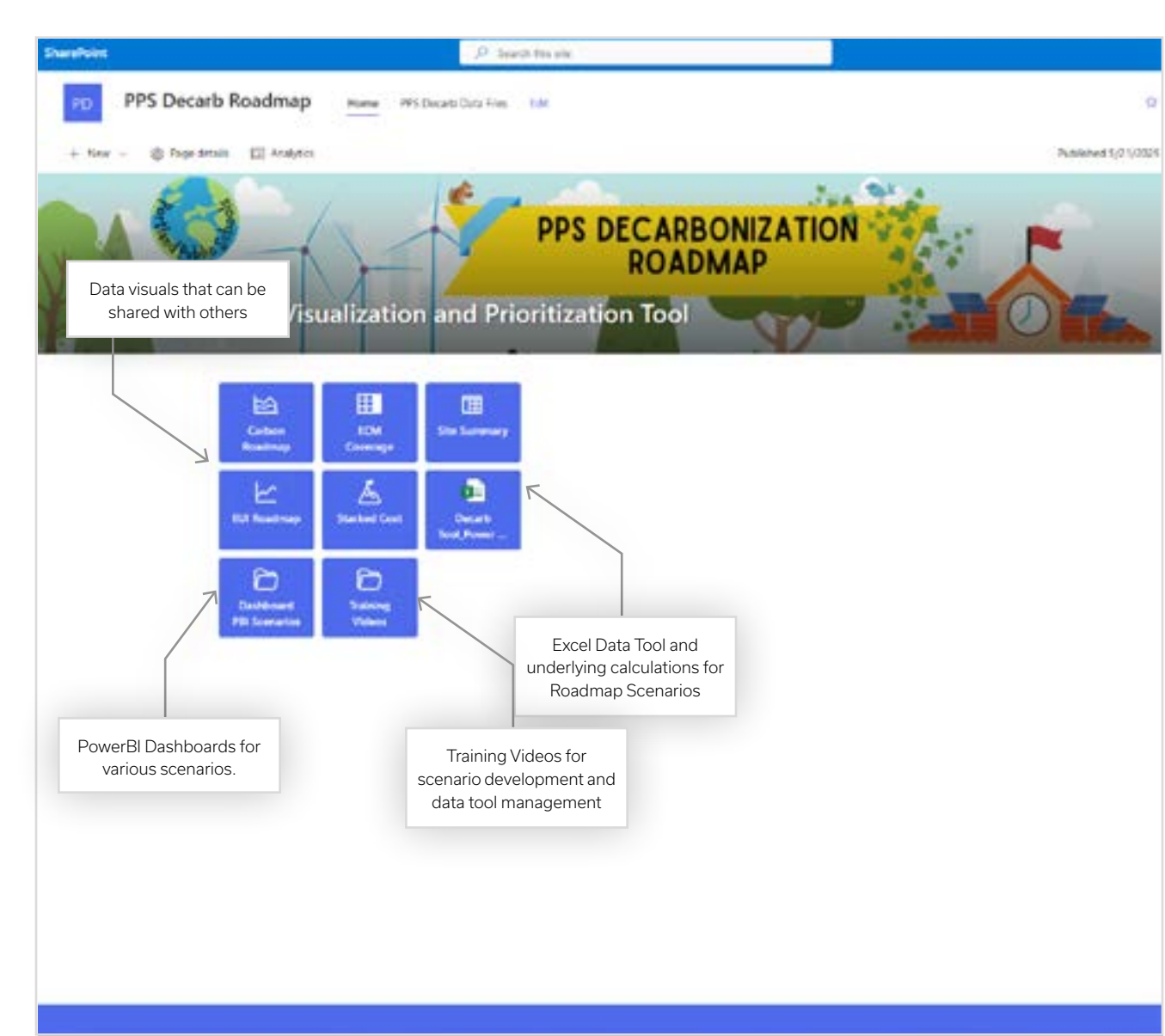
The Roadmap Tool is currently housed on a PPS SharePoint with access provided to key stakeholders.

[PPS Decarb Roadmap](#)

Training for the basic tool functions and routine update processes have been conducted via teams calls with the design team and PPS.

Recordings of these training have been saved to the PPS SharePoint site for future reference.

The following infographic provides a reference to the key SharePoint site links.



Appendix: Measure Details

ROOF UPGRADE

- Insulating existing roof to current code minimum (R-30 c.i. above deck or R-49 batt in attic)
- Emissions impact estimate based on level of existing insulation
- Does not apply to modernized buildings

WINDOW UPGRADE

- Upgrading windows to current code minimum (U-0.36 | SHGC-0.33)
- Emissions impact estimate based on existing window conditions
- Does not apply to modernized buildings

WALL UPGRADE

- Upgrading walls to current code minimum (U-0.064)
- Emissions impact estimate based on existing wall conditions
- Does not apply to modernized buildings

AIR SEALING

- Air pressurization testing and smoke tracing to identify problem areas. Likely remediation includes new weatherstripping for windows and doors. Caulking and sealing joints and penetrations (where feasible)
- Emissions impact estimate based on level of existing infiltration
- Does not apply to modernized buildings

LIGHTING UPGRADE

- Base measure is retrofitting existing fixture with LED bulbs (already complete for most schools). Advanced measure is for modernizations with new lighting fixtures and controls.
- Emissions impact estimate depends on retrofit versus replacement (currently planned measures are for retrofit, holistic decarb implementations will include replacement)
- Does not apply to modernized buildings

HEATING ELECTRIFICATION - HYBRID HP-ER

- New air-source VAV AHUs with electric reheat terminal units
- Emissions impact estimate based on average estimated efficiency of 2 COP
- Inclusive of Cooling addition and filtration
- Can be applied with heat recovery ventilation

HEATING ELECTRIFICATION - AIR-SOURCE

- New hydronic air-source heating and cooling plant and VAV distribution system
- Emissions impact estimate based on average estimated efficiency of 3 COP
- Inclusive of Cooling addition and filtration
- Can be applied with heat recovery ventilation

HEATING ELECTRIFICATION - WATER-SOURCE

- New hydronic ground-source heating and cooling plant and VAV distribution system
- Emissions impact estimate based on average estimated efficiency of 4 COP
- Inclusive of Cooling addition and filtration
- Can be applied with heat recovery ventilation

WATER HEATING ELECTRIFICATION - ER

- New electric tank water heating system
- Emissions impact estimate based on (1) COP efficiency

WATER HEATING ELECTRIFICATION - HP

- New remote condenser central heat pump water heating
- Emissions impact estimate based on (3) COP efficiency

COOKING ELECTRIFICATION

- Replacing all existing gas cooking equipment with all electric alternatives
- Emissions impact estimate based on efficiency difference between standard gas and standard electric cooking equipment (measure does not assume induction cooktops)

CONTROLS UPGRADE/RCX

- Existing Ameresco scope for upgrading pneumatic controls to DDC and commissioning of control systems.
- Emissions impact estimate based on typical heating and fan system reductions associated with this type of upgrade.

HEAT RECOVERY VENTILATION

- Heat recovery added-on for new AHUs
- Emissions impact estimate based on typical heating load reduction in a school building
- Does not apply to modernized buildings

COOLING ADDITION

- Addition of air-cooled (DX) cooling equipment
- Emissions impact estimate based on typical cooling EUI for schools with AC
- Zero cost when applied with heating electrification (inclusive of those costs)

FILTRATION UPGRADE

- Increased filtration level up to MERV-13
- Emissions impact estimate based on additional fan energy estimate

NEW ROOFTOP PV

- New rooftop PV system sized to meet 1.5% Green Energy Technology allocation for any project estimated at \$5M or greater.
- Array sized based on \$3.5/W cost
- Emissions impact estimate based on average Portland area solar energy production rate of 1050 kWh/kW.

NEW PV CANOPY

- New parking or covered play PV canopy system
- Array sized based on \$6/W cost (inclusive of canopy structure)
- Emissions impact estimate based on average Portland area solar energy production rate of 1050 kWh/kW.

Appendix: Measure Costing Details

COST ASSUMPTIONS BY MEASURE

ROOF UPGRADE:

- The ROM cost estimate was prepared leaning on recent construction experience at PPS (Lent Elementary School), where \$/SF values were broken out in the detailed pricing estimates for the VRF upgrade project.
- The basis of this measure assumes insulating the existing roof to the current code minimum (R-30 c.i. above deck or R-49 in attic).
- We carried an estimated hard cost of \$6.55/SF and a soft cost multiplier of 1.4 to arrive at a \$9.17/SF cost estimate for scenario modeling.

WINDOW UPGRADE:

- The ROM cost estimate was prepared leaning on recent construction experience at PPS (Lent Elementary School), where the window replacement costs were broken out in detail as part of the VRF upgrade project.
- The basis of this measure assumes upgrading windows to current code minimum (U-0.36 | SHGC-0.33).
- We carried an estimated hard cost of \$11.58/SF and a soft cost multiplier of 1.4 to arrive at a \$16.21/SF cost estimate for scenario modeling.

WALL UPGRADE:

- The ROM cost estimate was prepared using RS Means.
- The basis of this measure assumes installing additional insulation throughout to ensure walls are upgraded to the current code minimum (R-21).
- We carried an estimated hard cost of \$25.50/SF and a soft cost multiplier of 1.4 to arrive at a \$35.70/SF cost estimate for scenario modeling.

AIR SEALING:

- The ROM cost estimate was prepared using RS Means.
- The basis of this measure assumes remediation of any identified problem areas including weatherstripping for windows and doors, as well as caulking and sealing joints and penetrations where feasible. Studies suggest that most air leaks in K-12 schools are from roofs, walls, and doors (84%). While there may be some small efficiencies gained from upgrades to each of those items, we produced pricing as a standalone measure at this time.
- We carried an estimated hard cost of \$2.29/SF and a soft cost multiplier of 1.4 to arrive at a \$3.21/SF cost estimate for scenario modeling.

LIGHTING UPGRADE (BASE):

- The ROM cost estimate was prepared leaning on recent Ameresco construction experience across the PPS School District, where audits or construction has taken place accounting for over 60% of all gross floor area.
- The basis of this measure is to retrofit existing fixtures with T-LED bulbs (or similar). For all sites audited or upgraded, the average cost has been \$1.32/SF. Whereas, the most recent 15-20 sites have come in closer to \$1.58/SF.
- We carried an estimated hard cost of \$1.50/SF and a soft cost multiplier of 1.4 to arrive at a \$2.10/SF cost estimate for scenario modeling.

LIGHTING UPGRADE (ADVANCED):

- The ROM cost estimate was prepared leaning on Ameresco’s significant construction experience with LED Lighting Replacements in other K-12 School Districts, both locally and nationally.
- The basis of this measure is to replace fixtures with new LED fixtures and controls.
- We carried an estimated hard cost of \$3.50/SF and a soft cost multiplier of 1.4 to arrive at a \$4.90/SF cost estimate for scenario modeling.

HEATING ELECTRIFICATION - HYBRID HP-ER:

- The ROM cost estimate was prepared leaning on Ameresco’s significant construction experience with HVAC equipment upgrades in other K-12 School Districts, both locally and nationally. For reference, Ameresco also received budgetary pricing from Trane regarding air source heat pump RTUs (10 Ton Budget: \$18,000 and 3 Ton Budget: \$8,520) for PPS’s recent Harrison Park project.
- The basis for this measure is to install air-source VAV AHUs with electric reheat terminal units, inclusive of cooling addition and filtration.
- We carried an estimated hard cost of \$42.00/SF and a soft cost multiplier of 1.4 to arrive at a \$58.80/SF cost estimate for scenario modeling.

HEATING ELECTRIFICATION - AIR-SOURCE:

- The ROM cost estimate was prepared leaning on recent Ameresco construction experience at PPS, where \$/SF values were broken out in line-item detail for Bridger and Kelly HVAC equipment upgrade projects. Additionally, the estimates were further refined using the ‘Pay App’ submittals.
- The basis for this measure is to install new air-to-water heat pumps and a heat recovery chiller to supply heated and cooled water to new DOAS units and/or AHUs, as well as the new fan coil units (FCUs) or variable air volume (VAV) systems installed throughout the schools.
- We carried an estimated hard cost of \$51.14/SF and a soft cost multiplier of 1.4 to arrive at a \$71.60/SF cost estimate for scenario modeling.

HEATING ELECTRIFICATION - WATER-SOURCE:

- The ROM cost estimate was prepared leaning on Ameresco’s and PAE’s collective experience where \$/SF values were estimated to account for the additional complexity of installing ground-source, water-to-water, systems.
- The basis for this measure is to install a new hydronic ground-source heating and cooling plant with a VAV distribution system, inclusive of cooling and filtration.
- We carried an estimated hard cost of \$61.37/SF and a soft cost multiplier of 1.4 to arrive at a \$85.92/SF cost estimate for scenario modeling.

WATER HEATING ELECTRIFICATION - ER:

- The ROM cost estimate was prepared using RS Means and Industry Sources including Energy Star and the Advanced Water Heating Initiative (AWHI).
- The basis for this measure is to install new electric resistance water heaters with tanks to satisfy domestic hot water requirements within schools and decouple from the air-side heating systems. Estimates were prepared based on a high school assuming 3-4 gallons per occupant per day (source: engineering toolbox).
- We carried an estimated hard cost of \$2.06/SF and a soft cost multiplier of 1.4 to arrive at a \$2.88/SF cost estimate for scenario modeling.

WATER HEATING ELECTRIFICATION - HP:

- The ROM cost estimate was prepared using RS Means and Industry Sources including Energy Star and the Advanced Water Heating Initiative (AWHI).
- The basis for this measure is to install new heat pump water heaters with tanks to satisfy domestic hot water requirements within schools and decouple from the air-side heating systems. Estimates were prepared based on a high school assuming 3-4 gallons per occupant per day (source: engineering toolbox).
- We carried an estimated hard cost of \$5.14/SF and a soft cost multiplier of 1.4 to arrive at a \$7.20/SF cost estimate for scenario modeling.

COOKING ELECTRIFICATION:

- The ROM cost estimate was prepared leaning on Ameresco’s and PAE’s collective experience, including recent design work at PPS Benson Polytechnic High School, and extensive research online of equipment.
- The basis for this measure is to replace all existing gas cooking, heating, and storage equipment with all electric alternatives. This included costs for hot plates, combo ovens with steamers, an electric range, steam kettle with full jacket, tilt skillet, convection ovens, insulated proofing cabinets, drop-in food wells and warming shelves, and a rapid cook oven. For more details, see Benson Design.

Appendix: Measure Costing Details

- Cost estimates for labor assume the installation of new electrical equipment and branch wiring estimated at a 1:1 ratio with material costs.
- We carried an estimated hard cost of \$2.19/SF and a soft cost multiplier of 1.4 to arrive at a \$3.06/SF cost estimate for scenario modeling.

CONTROLS UPGRADE/RCX:

- The ROM cost estimate was prepared leaning on Ameresco’s significant construction experience in upgrading pneumatic controls to DDC and performing retro-commissioning in several PPS schools. Fees have ranged from \$6-15 per SF based on school size and complexity of the upgrade.
- We carried an estimated hard cost of \$10.64/SF and a soft cost multiplier of 1.4 to arrive at a \$14.90/SF cost estimate for scenario modeling.

HEAT RECOVERY VENTILATION: HEAT RECOVERY ADDED ON FOR NEW AHUS

- The ROM cost estimate was prepared leaning on recent construction experience at PPS (Lent Elementary School), where \$/SF values were broken out in the detailed pricing estimates for the VRF upgrade project.
- The basis of this measure is to install new AHUs with heat recovery systems.
- We carried an estimated hard cost of \$3.17/SF and a soft cost multiplier of 1.4 to arrive at a \$4.44/SF cost estimate for scenario modeling.

MEASURE	ESTIMATE	SOURCE	COST SUMMARY
Roof Upgrade	\$9.17	AMRC_K12	ROM estimate using recent Ameresco construction experience at PPS (Lent)
Window Upgrade	\$16.21	AMRC_K12	ROM estimate using recent Ameresco construction experience at PPS (Lent)
Wall Upgrade	\$38.50	RS Means	ROM estimate using RS Means
Air Sealing	\$3.21	RS Means	ROM estimate using RS Means
Lighting Upgrade (Base)	\$2.10	AMRC_K12	ROM estimate using recent Ameresco construction experience at PPS (Multiple)
Lighting Upgrade (Advanced)	\$4.90	AMRC_K12	ROM estimate using recent construction experience in K-12 (local, national)
Heating Electrification Opt. 1 Hybrid HP-ER	\$58.80	RS Means	ROM estimate using recent construction experience in K-12 (local, national)
Heating Electrification Opt. 2 Air-Source HP	\$71.60	AMRC_K12	ROM estimate using recent Ameresco construction experience at PPS (Bridger, Kelly)
Heating Electrification Opt. 3 Water-Source HP	\$85.92		ROM estimate using recent construction experience in K-12 (local, national)
HW Electrification - ER	\$2.88	RS Means	ROM estimate using RS Means, Energy Star, and the AWHI
HW Electrification - HP	\$7.20	RS Means	ROM estimate using RS Means, Energy Star, and the AWHI
Cooking Electrification	\$3.06	Internet	ROM estimate utilizing Benson Polytechnic High School for reference (Benson)
Controls Upgrade / RCx	\$14.90	AMRC_K12	ROM estimate using recent Ameresco construction experience at PPS (Multiple)
Heat Recovery Ventilation	\$4.44	AMRC_K12	ROM estimate using recent Ameresco construction experience at PPS (Lent)



PPS DECARBONIZATION ROADMAP

Be a part of PPS's decarbonization roadmap planning meetings!

During these sessions, attendees will be asked to provide their insights into how PPS can best reduce carbon emissions across the district.

We'll tackle questions together like:

- What does decarbonization at the district and these sites mean to you?
- How should PPS balance things like equity, cost, and efficiency?
- What parts of schools should we prioritize for upgrades first?

These questions will help PPS create a decarbonization plan that meets the needs of the community.



Energy
Efficiency



Building
Electrification



Renewable
Energy

Building our future together



Scan the QR code or go
to [PPS.net/energy](https://pps.net/energy) for
more information

*Translation available with virtual meeting,
please RSVP for service.*

Roosevelt and Jefferson Cluster

*Jefferson HS Cafeteria: 5210 N Kerby Ave
January 31, 5:30 - 6:30 PM*

Grant and McDaniel Cluster

*McDaniel HS: 2735 NE 82nd Ave
February 1, 5:30 - 6:30 PM*

Franklin Cluster

*Franklin HS Cafeteria: 5405 SE Woodward St
February 7, 5:30 - 6:30 PM*

Cleveland Cluster

*Cleveland HS Auditorium: 3400 SE 26th Ave
February 8, 5:30 - 6:30 PM*

Lincoln and Wells Cluster

*Lincoln HS Cafeteria: 1750 SW Salmon St
February 15, 5:30 - 6:30 PM*

Virtual Event

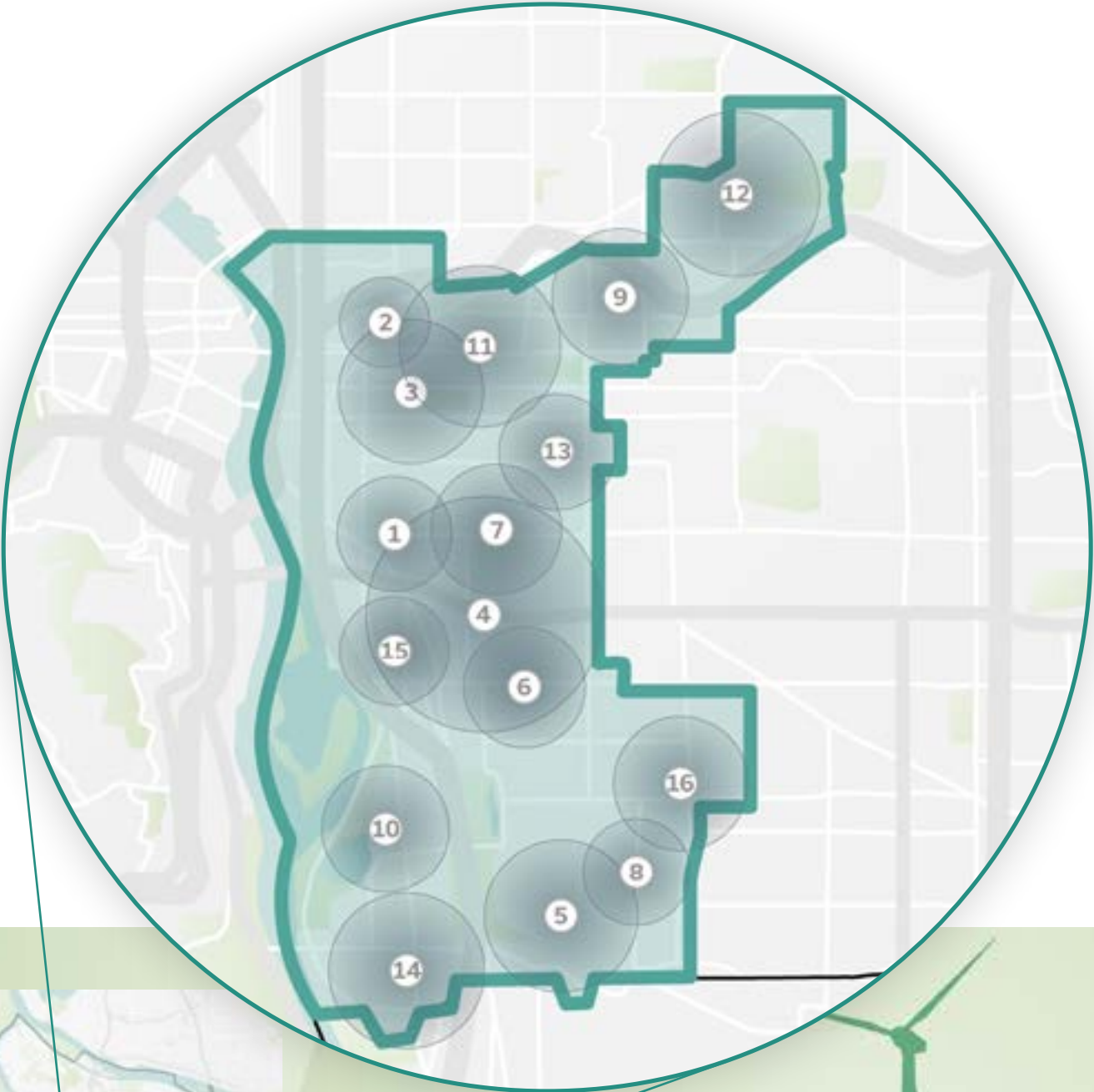
February 21, 12:00 - 1:00 PM

For more information, feedback,
or questions please email:
decarbonization@pps.net



Building Performance for Cleveland Cluster

PORTLAND PUBLIC SCHOOLS | 2022



FACILITY	AREA (SF)	EUI (kBtu/SF/YR)	ENERGY COST (\$)	GAS EMISSIONS (MTCO ₂ E)	ELECTRIC EMISSIONS (MTCO ₂ E)	TOTAL EMISSIONS (MTCO ₂ E)	EMISSIONS INTENSITY (LBS CO ₂ E/SF)	WATER USE INTENSITY (GAL/SF)
1 Abernethy	48,246	73	\$86,065	148	61	209	9.6	11.5
2 Benson (incl. KBPS)*	445,656	60	\$417,117	1,139	459	1,598	7.9	8.4
3 Buckman	74,161	79	\$96,680	278	55	333	9.9	5.4
4 Cleveland	256,984	57	\$295,847	586	300	886	7.6	5.2
5 Duniway	68,775	96	\$113,819	315	56	372	11.9	8.8
6 Grout	73,066	56	\$86,357	183	53	235	7.1	9.8
7 Hosford**	88,532	53	\$89,347	216	53	269	6.7	3.8
8 Lewis	47,389	66	\$73,209	138	44	182	8.5	6.4
9 Laurelhurst**	59,239	86	\$103,096	235	58	293	10.9	14.3
10 Llewellyn	52,204	86	\$86,309	204	53	258	10.9	9.2
11 da Vinci/Monroe	88,659	83	\$120,770	352	61	413	10.3	7.8
12 Rose City Park	73,719	73	\$91,052	238	198	437	13.1	3.8
13 Sunnyside	56,245	66	\$72,812	163	53	216	8.5	6.2
14 Sellwood	87,364	75	\$134,260	279	106	385	9.7	7.9
15 Winterhaven/Brooklyn	41,345	80	\$66,345	149	41	190	10.1	7.1
16 Woodstock	65,221	77	\$89,627	238	48	286	9.7	6.1
Cluster Total	1,626,805		\$2,022,712	4,861	1,701	6,561	N/A	N/A
District Total	9,065,846		\$12,197,485	22,581	18,113	40,694	N/A	N/A
Cluster Average	101,675	68	\$107,040	248	83	331	9.3	7.0
District Average	88,018	62	\$118,422	219	176	395	9.9	8.4

MAP KEY

- City of Portland Boundary
- Cluster Boundary
- Total Emissions
MTCO₂E

* Energy and emissions calculated using 2018 AY data
** Electric emissions include offset from on-site PV

16
TOTAL
BUILDINGS

6,561
MTCO₂E
TOTAL
EMISSIONS

9.3
LBS CO₂E/SF
AVERAGE EMISSIONS
INTENSITY

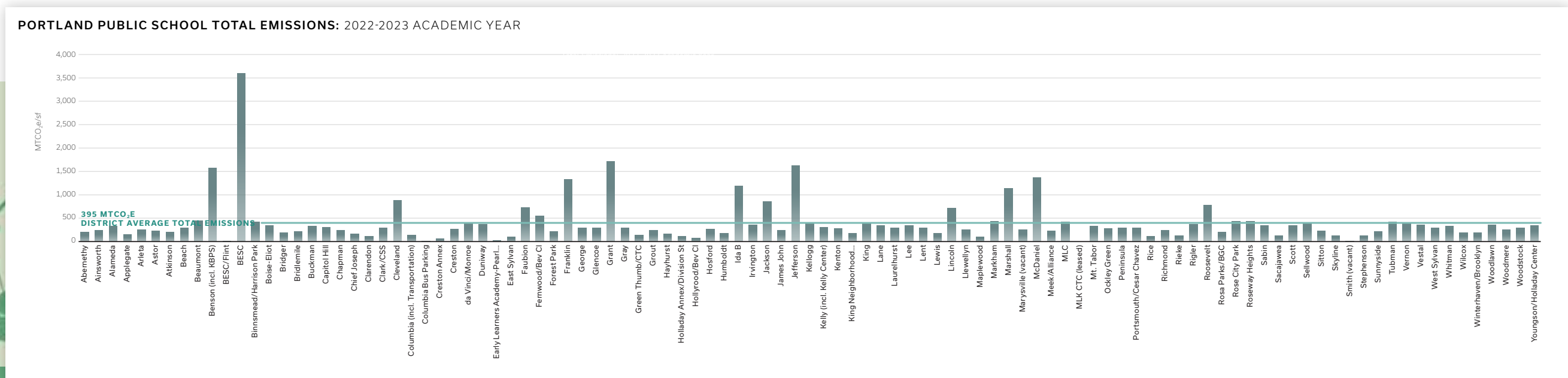
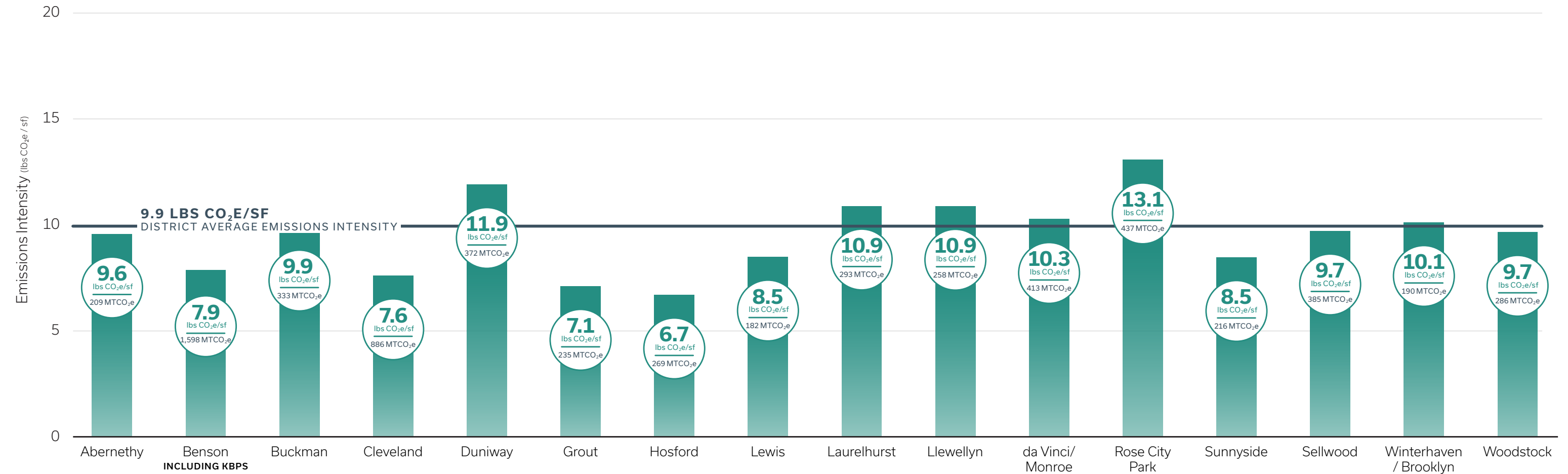
7.0
GAL/SF
AVERAGE WATER
USE INTENSITY

- The total emissions from these clusters account for roughly 16% of the total emissions for the district, with the average emissions intensities being roughly 10% lower than the district average.
- The school with the highest total emissions (Cleveland High School) is currently in the planning phase of a modernization project.
- Gas emissions account for the majority of emissions in 16/16 schools and electrifying gas equipment will have a significant impact in reducing these emissions, particularly as the electrical grid decarbonizes

KEY ABBREVIATIONS
EUI | Energy Use Intensity
KBTU | Thousand British thermal units
SF | square feet
CO₂E | CO₂ equivalent
MT | Metric Ton
LBS | Pounds

Emissions Comparison for Cleveland Cluster

PORTLAND PUBLIC SCHOOLS



Cleveland Cluster

PORTLAND PUBLIC SCHOOLS



RANKING (OUT OF 16)		
AREA	48,246 SQUARE FEET	14
EUI	73 kBTU/SF	10
ENERGY COSTS	\$86,065	13
EMISSIONS	209 MTCO ₂ e	14
EMISSIONS INTENSITY	9.6 LBS-CO ₂ e/SF	10
WATER-USE INTENSITY	11.5 GAL/SF	2

Abernethy Elementary School

BUILDING CONSTRUCTED: 1925

SUMMARY OF EXISTING CONDITIONS

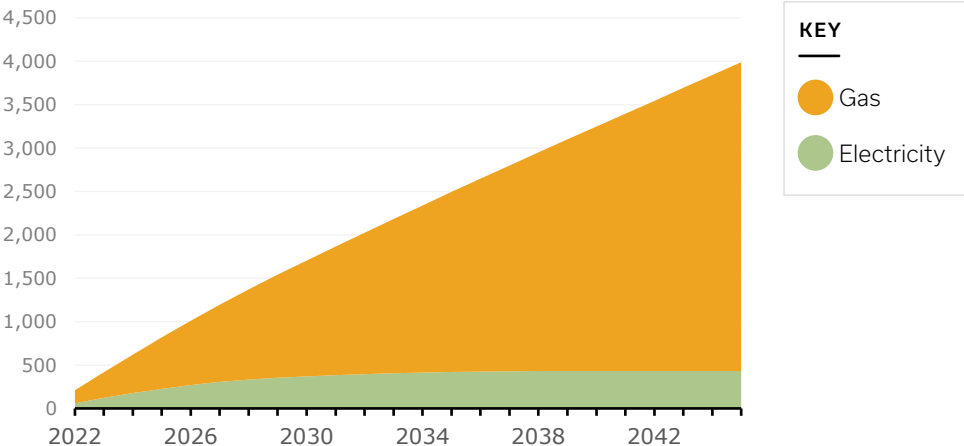
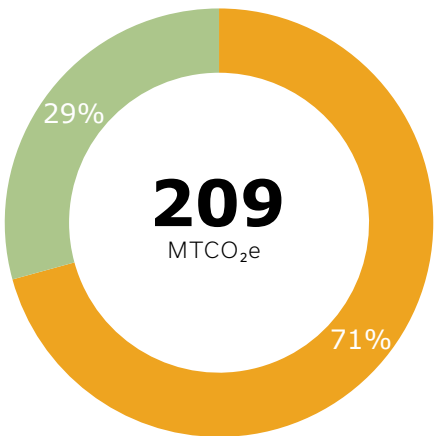
- Aging HVAC equipment
- Space and domestic water heating provided by gas boiler systems
- Limited existing cooling in building
- Limited insulation in existing envelope
- Aging and inefficient lighting technology

CURRENTLY PLANNED IMPROVEMENTS

- Upgrades to HVAC controls to improve efficiency and performance

POTENTIAL OPPORTUNITIES

- ☐ Electrification of all heating systems within the building
- ☐ Incorporation of heat pump systems for heating and cooling
- ☐ Improved ventilation systems to provide enhanced filtration and maintain healthy indoor air quality
- ☐ Envelope enhancement to reduce conditioning loads and improve thermal comfort
- ☐ Upgrading lighting systems to high-efficiency LED fixtures
- ☐ Incorporation of renewable energy systems to offset operational emissions
- ☐ Increased tree canopy and green space
- ☐
- ☐
- ☐



*Electric emissions projection based on 2023 emissions outlook from PGE



RANKING* (OUT OF 16)		
AREA	445,656 SQUARE FEET	1
EUI	60 kBTU/SF	13
ENERGY COSTS	\$417,117	1
EMISSIONS	1,598 MTCO ₂ e	1
EMISSIONS INTENSITY	7.9 LBS-CO ₂ e/SF	13
WATER-USE INTENSITY	8.4 GAL/SF	6

Benson Polytechnic High School

INCLUDING KBPS

BUILDING CONSTRUCTED: 1916 | MODERNIZATION CURRENTLY UNDERWAY

SUMMARY OF EXISTING CONDITIONS

- Large historic building with significantly aged equipment
- Space and DHW heating provided by gas boiler systems
- Limited existing cooling in building
- Limited insulation in existing envelope
- Aging and inefficient lighting technology

CURRENTLY PLANNED IMPROVEMENTS

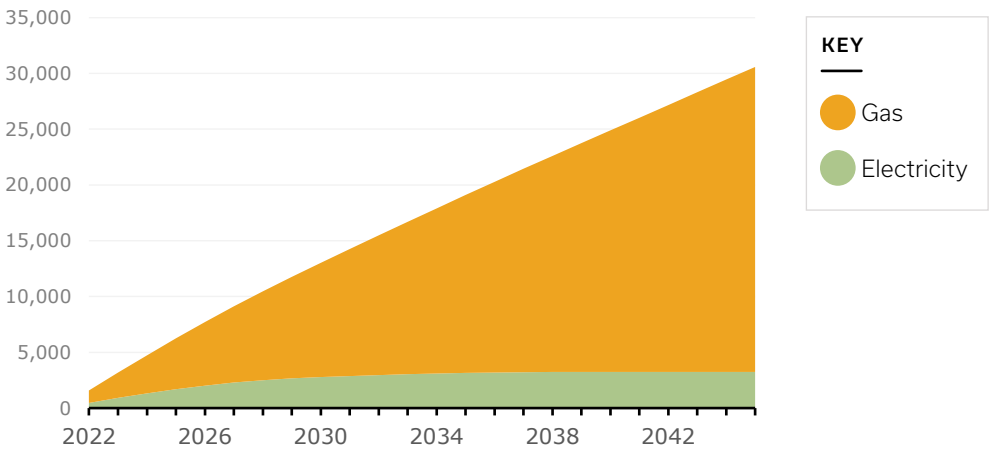
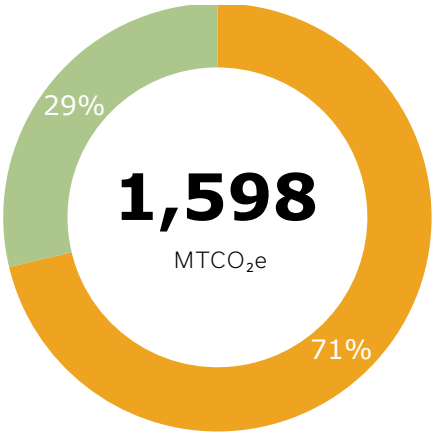
- Improved ventilation systems to provide enhanced filtration and maintain healthy indoor air quality
- Envelope enhancement to reduce conditioning loads and improve thermal comfort
- Upgrading lighting systems to high-efficiency LED fixtures

POTENTIAL OPPORTUNITIES

- ☐ Electrify all heating systems within the building
- ☐ Incorporation of renewable energy systems to offset operational emissions
- ☐ Increased tree canopy and green space
- ☐
- ☐
- ☐

*Energy and emissions calculated using 2018 AY data

PROJECTED EMISSIONS FOR 2022



*Electric emissions projection based on 2023 emissions outlook from PGE

Cleveland Cluster

PORTLAND PUBLIC SCHOOLS



RANKING (OUT OF 16)		
AREA	74,161 SQUARE FEET	6
EUI	79 kBtu/SF	6
ENERGY COSTS	\$96,680	7
EMISSIONS	333 MTCO ₂ e	7
EMISSIONS INTENSITY	9.9 LBS-CO ₂ e/SF	7
WATER-USE INTENSITY	5.4 GAL/SF	13

Buckman Elementary School

BUILDING CONSTRUCTED: 1922

SUMMARY OF EXISTING CONDITIONS

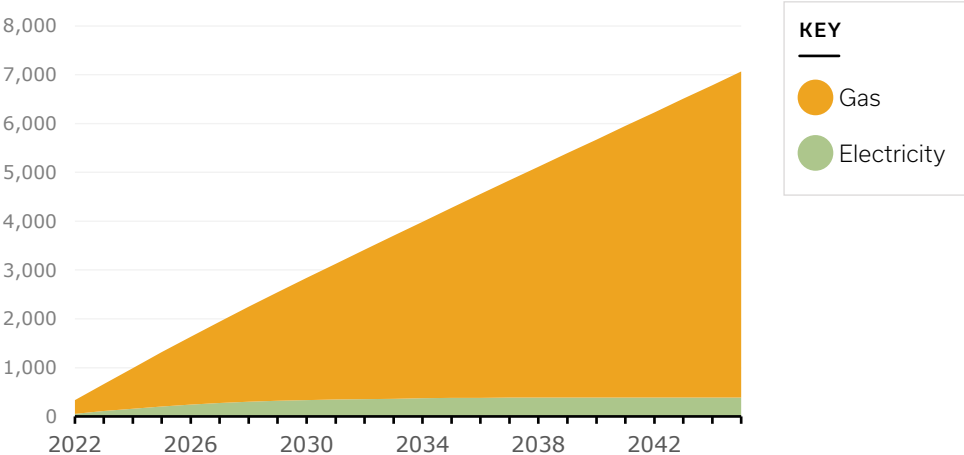
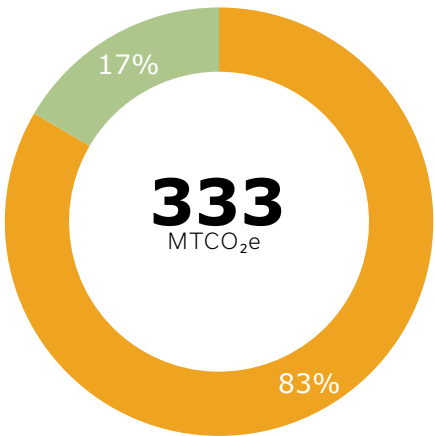
- Aging HVAC equipment
- Space and domestic water heating provided by gas boiler systems
- Limited existing cooling in building
- Limited insulation in existing envelope
- Lighting systems recently upgraded

CURRENTLY PLANNED IMPROVEMENTS

- Upgrades to HVAC controls to improve efficiency and performance

POTENTIAL OPPORTUNITIES

- ☐ Electrification of all heating systems within the building
- ☐ Incorporation of heat pump systems for heating and cooling
- ☐ Improved ventilation systems to provide enhanced filtration and maintain healthy indoor air quality
- ☐ Envelope enhancement to reduce conditioning loads and improve thermal comfort
- ☐ Incorporation of renewable energy systems to offset operational emissions
- ☐ Increased tree canopy and green space
- ☐
- ☐
- ☐



*Electric emissions projection based on 2023 emissions outlook from PGE



RANKING (OUT OF 16)		
AREA	256,984 SQUARE FEET	2
EUI	57 kBtu/SF	14
ENERGY COSTS	\$295,847	2
EMISSIONS	886 MTCO ₂ e	2
EMISSIONS INTENSITY	7.6 LBS-CO ₂ e/SF	14
WATER-USE INTENSITY	5.2 GAL/SF	14

Cleveland High School

BUILDING CONSTRUCTED: 1957

SUMMARY OF EXISTING CONDITIONS

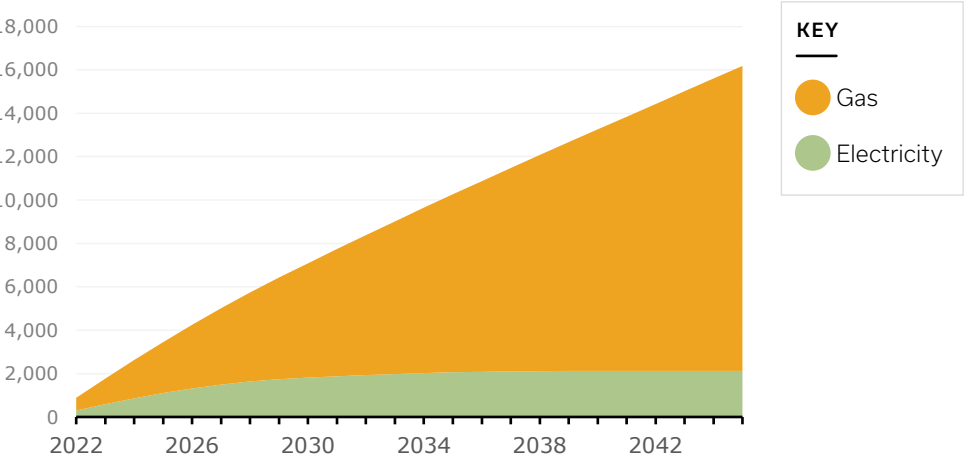
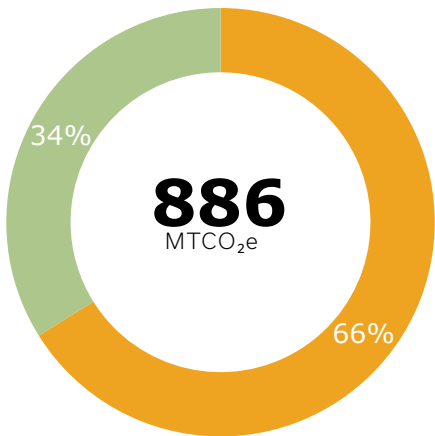
- Aging HVAC equipment
- Space and domestic water heating provided by gas boiler systems
- Limited existing cooling in building
- Aging envelope with limited insulation
- Lighting systems recently upgraded

CURRENTLY PLANNED IMPROVEMENTS

- Modernization design currently underway

POTENTIAL OPPORTUNITIES

- ☐ Electrification of all heating systems within the building
- ☐ Incorporation of heat pump systems for heating and cooling
- ☐ Improved ventilation systems to provide enhanced filtration and maintain healthy indoor air quality
- ☐ Envelope enhancement to reduce conditioning loads and improve thermal comfort
- ☐ Incorporation of renewable energy systems to offset operational emissions
- ☐ Increased tree canopy and green space
- ☐
- ☐
- ☐



*Electric emissions projection based on 2023 emissions outlook from PGE

Cleveland Cluster

PORTLAND PUBLIC SCHOOLS



RANKING (OUT OF 16)		
AREA	68,775 SQUARE FEET	9
EUI	96 kBTU/SF	1
ENERGY COSTS	\$113,819	5
EMISSIONS	372 MTCO ₂ e	6
EMISSIONS INTENSITY	11.9 LBS-CO ₂ e/SF	2
WATER-USE INTENSITY	8.8 GAL/SF	5

Duniway Elementary School

BUILDING CONSTRUCTED: 1926

SUMMARY OF EXISTING CONDITIONS

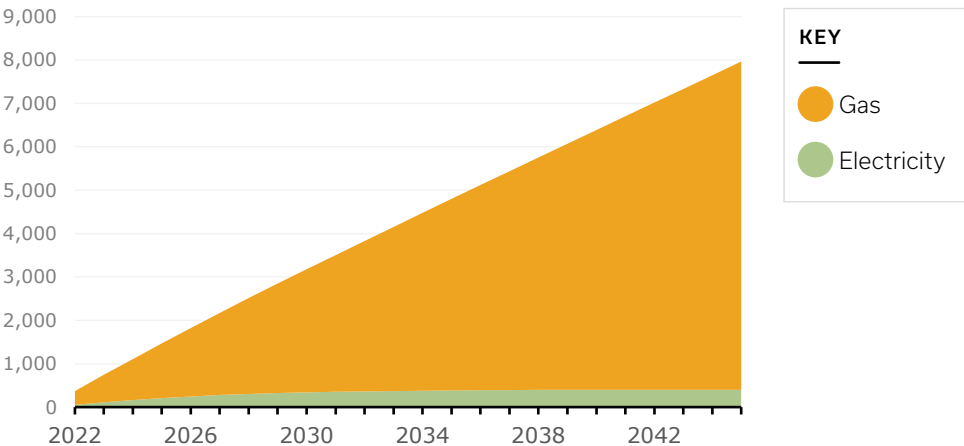
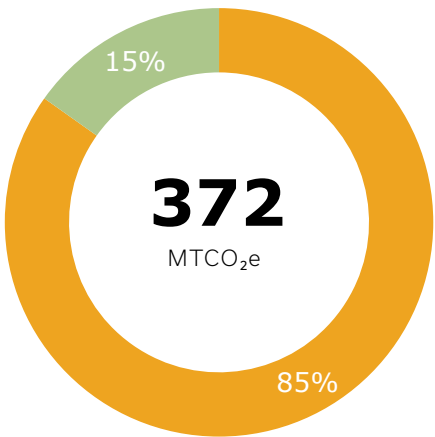
- Aging HVAC equipment
- Space and domestic water heating provided by gas boiler systems
- Limited existing cooling in building
- Aging envelope with limited insulation
- Lighting systems recently upgraded

CURRENTLY PLANNED IMPROVEMENTS

- Upgrades to HVAC controls to improve efficiency and performance

POTENTIAL OPPORTUNITIES

- ☐ Electrification of all heating systems within the building
- ☐ Incorporation of heat pump systems for heating and cooling
- ☐ Improved ventilation systems to provide enhanced filtration and maintain healthy indoor air quality
- ☐ Envelope enhancement to reduce conditioning loads and improve thermal comfort
- ☐ Incorporation of renewable energy systems to offset operational emissions
- ☐ Increased tree canopy and green space
- ☐
- ☐
- ☐



*Electric emissions projection based on 2023 emissions outlook from PGE



RANKING (OUT OF 16)		
AREA	73,066 SQUARE FEET	8
EUI	56 kBTU/SF	15
ENERGY COSTS	\$86,357	11
EMISSIONS	235 MTCO ₂ e	12
EMISSIONS INTENSITY	7.1 LBS-CO ₂ e/SF	15
WATER-USE INTENSITY	9.8 GAL/SF	3

Grout Elementary School

BUILDING CONSTRUCTED: 1927

SUMMARY OF EXISTING CONDITIONS

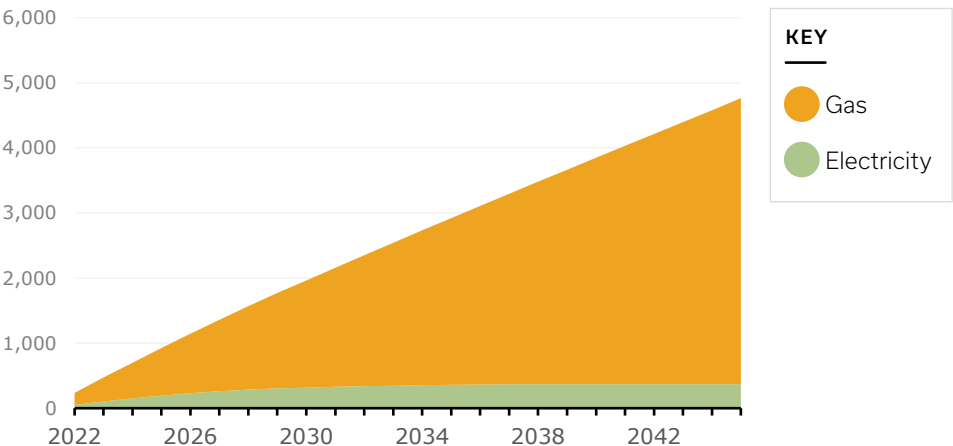
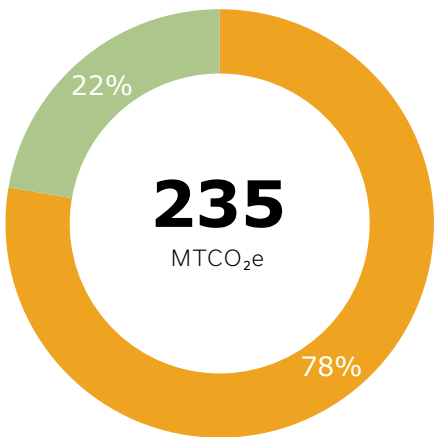
- Aging HVAC equipment
- Space and domestic water heating provided by gas boiler systems
- Limited existing cooling in building
- Aging envelope with limited insulation
- Lighting systems recently upgraded

CURRENTLY PLANNED IMPROVEMENTS

- Upgrades to HVAC controls to improve efficiency and performance

POTENTIAL OPPORTUNITIES

- ☐ Electrification of all heating systems within the building
- ☐ Incorporation of heat pump systems for heating and cooling
- ☐ Improved ventilation systems to provide enhanced filtration and maintain healthy indoor air quality
- ☐ Envelope enhancement to reduce conditioning loads and improve thermal comfort
- ☐ Incorporation of renewable energy systems to offset operational emissions
- ☐ Increased tree canopy and green space
- ☐
- ☐
- ☐



*Electric emissions projection based on 2023 emissions outlook from PGE

Cleveland Cluster

PORTLAND PUBLIC SCHOOLS



RANKING (OUT OF 16)		
AREA	88,532 SQUARE FEET	4
EUI	53 kBtu/SF	16
ENERGY COSTS	\$89,347	10
EMISSIONS	269 MTCO ₂ e	10
EMISSIONS INTENSITY	6.7 LBS-CO ₂ e/SF	16
WATER-USE INTENSITY	3.8 GAL/SF	16

Hosford Middle School

BUILDING CONSTRUCTED: 1925

SUMMARY OF EXISTING CONDITIONS

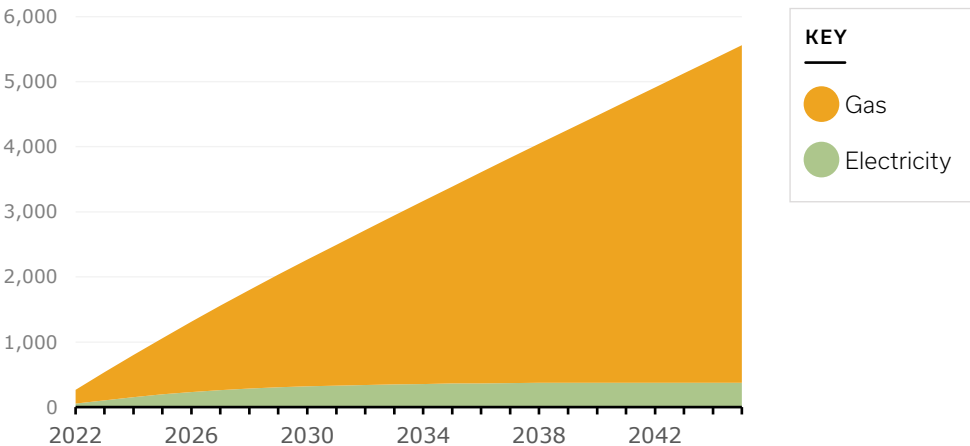
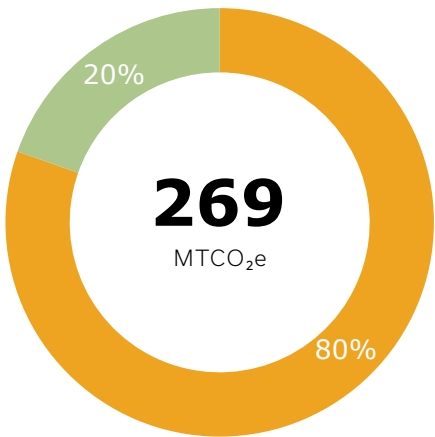
- Aging HVAC equipment
- Space and domestic water heating provided by gas boiler systems
- Limited existing cooling in building
- Limited insulation in existing envelope
- Lighting systems recently upgraded
- On-site PV offsets electricity consumption

CURRENTLY PLANNED IMPROVEMENTS

- Upgrades to HVAC controls to improve efficiency and performance

POTENTIAL OPPORTUNITIES

- ☐ Electrification of all heating systems within the building
- ☐ Incorporation of heat pump systems for heating and cooling
- ☐ Improved ventilation systems to provide enhanced filtration and maintain healthy indoor air quality
- ☐ Envelope enhancement to reduce conditioning loads and improve thermal comfort
- ☐ Increased tree canopy and green space
- ☐
- ☐
- ☐



*Electric emissions projection based on 2023 emissions outlook from PGE



RANKING (OUT OF 16)		
AREA	47,389 SQUARE FEET	15
EUI	66 kBtu/SF	11
ENERGY COSTS	\$73,209	14
EMISSIONS	182 MTCO ₂ e	16
EMISSIONS INTENSITY	8.5 LBS-CO ₂ e/SF	11
WATER-USE INTENSITY	6.4 GAL/SF	10

Lewis Elementary School

BUILDING CONSTRUCTED: 1952

SUMMARY OF EXISTING CONDITIONS

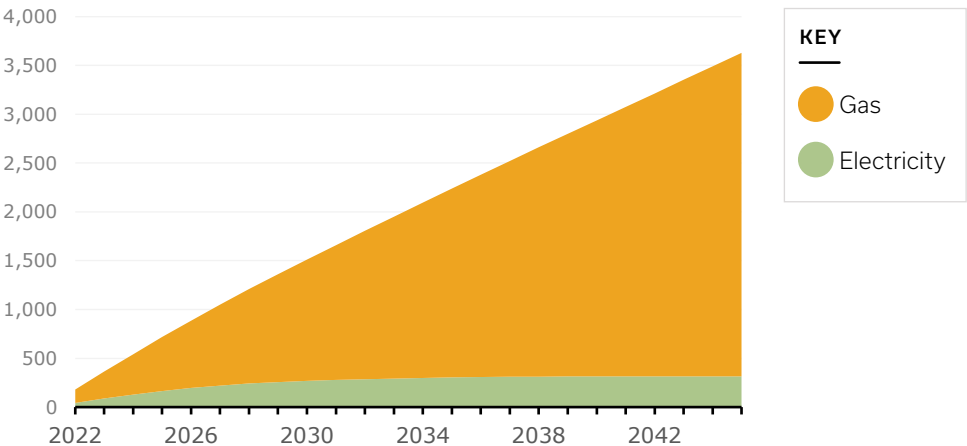
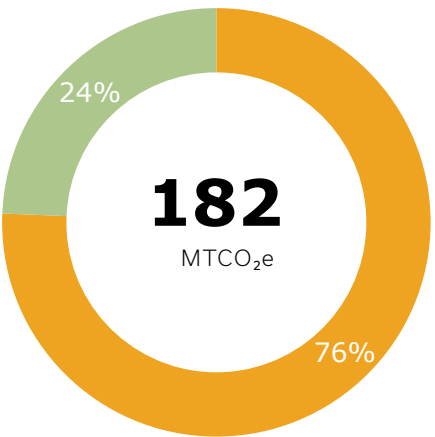
- Aging HVAC equipment
- Space and domestic water heating provided by gas boiler systems
- Limited existing cooling in building
- Aging envelope with limited insulation
- Aging and inefficient lighting technology

CURRENTLY PLANNED IMPROVEMENTS

- Upgrades to HVAC controls to improve efficiency and performance

POTENTIAL OPPORTUNITIES

- ☐ Electrification of all heating systems within the building
- ☐ Incorporation of heat pump systems for heating and cooling
- ☐ Improved ventilation systems to provide enhanced filtration and maintain healthy indoor air quality
- ☐ Envelope enhancement to reduce conditioning loads and improve thermal comfort
- ☐ Upgrading lighting systems to high-efficiency LED fixtures
- ☐ Incorporation of renewable energy systems to offset operational emissions
- ☐ Increased tree canopy and green space
- ☐
- ☐
- ☐



*Electric emissions projection based on 2023 emissions outlook from PGE

Cleveland Cluster

PORTLAND PUBLIC SCHOOLS



RANKING (OUT OF 16)		
AREA	59,239 SQUARE FEET	11
EUI	86 kBTU/SF	2
ENERGY COSTS	\$103,096	6
EMISSIONS	293 MTCO ₂ e	8
EMISSIONS INTENSITY	10.9 LBS-CO ₂ e/SF	3
WATER-USE INTENSITY	14.3 GAL/SF	1

Laurelhurst Elementary School

BUILDING CONSTRUCTED: 1951

SUMMARY OF EXISTING CONDITIONS

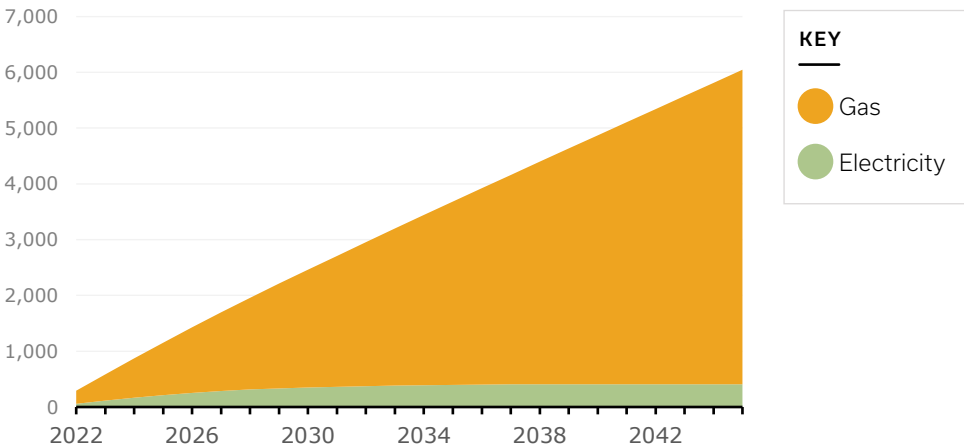
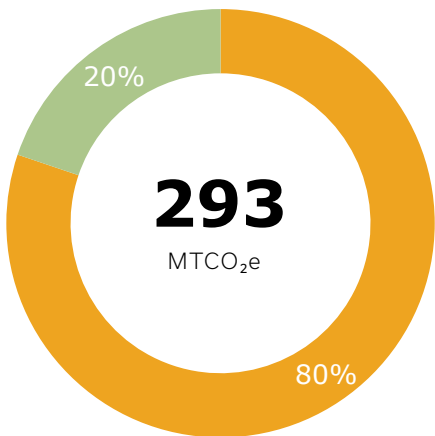
- Aging HVAC equipment
- Space and domestic water heating provided by gas boiler systems
- Limited existing cooling in building
- Limited insulation in existing envelope
- Lighting systems recently upgraded
- On-site PV offsets electricity consumption

CURRENTLY PLANNED IMPROVEMENTS

- Upgrades to HVAC controls to improve efficiency and performance

POTENTIAL OPPORTUNITIES

- ☐ Electrification of all heating systems within the building
- ☐ Incorporation of heat pump systems for heating and cooling
- ☐ Improved ventilation systems to provide enhanced filtration and maintain healthy indoor air quality
- ☐ Envelope enhancement to reduce conditioning loads and improve thermal comfort
- ☐ Increased tree canopy and green space
- ☐
- ☐
- ☐



*Electric emissions projection based on 2023 emissions outlook from PGE



RANKING (OUT OF 16)		
AREA	52,204 SQUARE FEET	13
EUI	86 kBTU/SF	3
ENERGY COSTS	\$86,309	12
EMISSIONS	258 MTCO ₂ e	11
EMISSIONS INTENSITY	10.9 LBS-CO ₂ e/SF	4
WATER-USE INTENSITY	9.2 GAL/SF	4

Llewellyn Elementary School

BUILDING CONSTRUCTED: 1928

SUMMARY OF EXISTING CONDITIONS

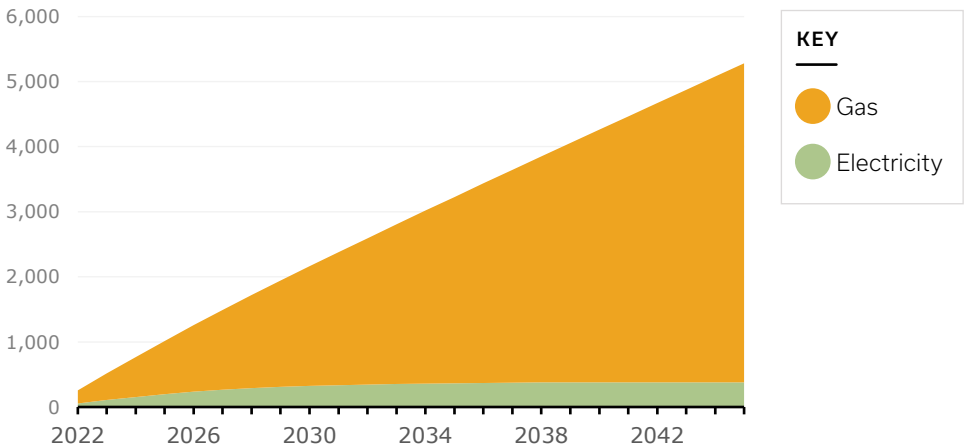
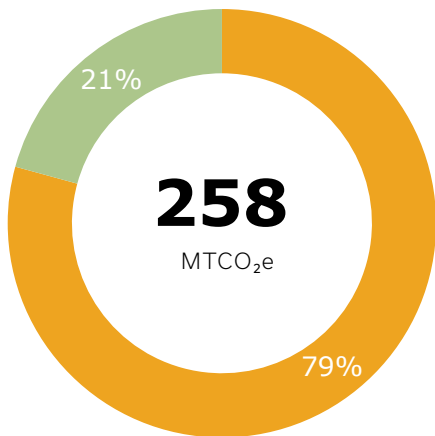
- Aging HVAC equipment
- Space and domestic water heating provided by gas boiler systems
- Limited existing cooling in building
- Aging envelope with limited insulation
- Aging and inefficient lighting technology

CURRENTLY PLANNED IMPROVEMENTS

- Upgrades to HVAC controls to improve efficiency and performance
- Upgrading lighting systems to high-efficiency LED fixtures

POTENTIAL OPPORTUNITIES

- ☐ Electrification of all heating systems within the building
- ☐ Incorporation of heat pump systems for heating and cooling
- ☐ Improved ventilation systems to provide enhanced filtration and maintain healthy indoor air quality
- ☐ Envelope enhancement to reduce conditioning loads and improve thermal comfort
- ☐ Incorporation of renewable energy systems to offset operational emissions
- ☐ Increased tree canopy and green space
- ☐
- ☐
- ☐



*Electric emissions projection based on 2023 emissions outlook from PGE

Cleveland Cluster

PORTLAND PUBLIC SCHOOLS



da Vinci Arts Middle School

BUILDING CONSTRUCTED: 1928

SUMMARY OF EXISTING CONDITIONS

- Aging HVAC equipment
- Space and domestic water heating provided by gas boiler systems
- Limited existing cooling in building
- Limited insulation in existing envelope
- Lighting systems recently upgraded

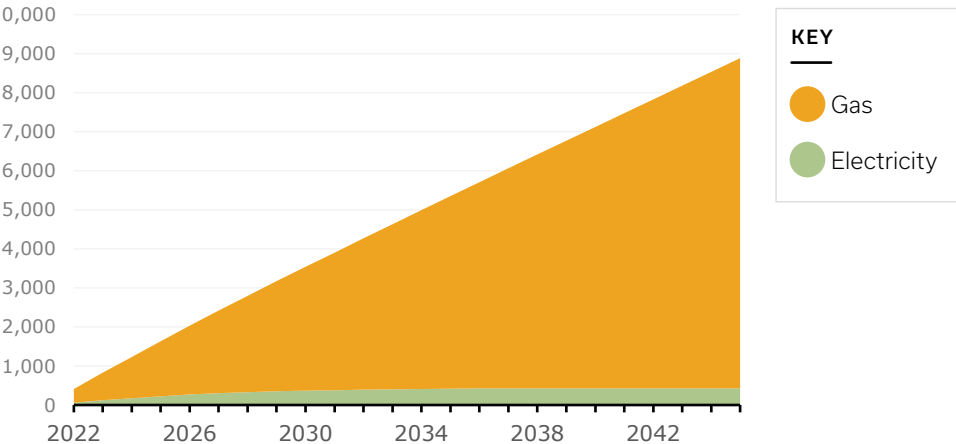
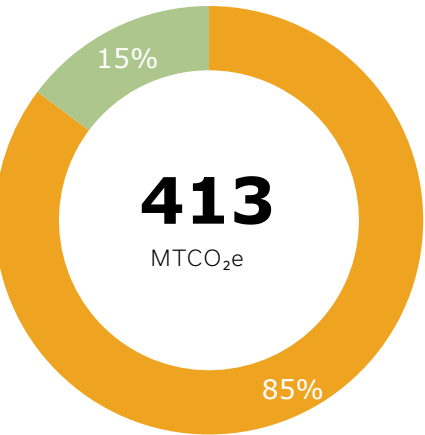
CURRENTLY PLANNED IMPROVEMENTS

- Upgrades to HVAC controls to improve efficiency and performance

POTENTIAL OPPORTUNITIES

- ☐ Electrification of all heating systems within the building
- ☐ Incorporation of heat pump systems for heating and cooling
- ☐ Improved ventilation systems to provide enhanced filtration and maintain healthy indoor air quality
- ☐ Envelope enhancement to reduce conditioning loads and improve thermal comfort
- ☐ Incorporation of renewable energy systems to offset operational emissions
- ☐ Increased tree canopy and green space
- ☐
- ☐
- ☐

RANKING (OUT OF 16)		
AREA	88,659 SQUARE FEET	3
EUI	83 kBtu/SF	4
ENERGY COSTS	\$120,770	4
EMISSIONS	413 MTCO ₂ e	4
EMISSIONS INTENSITY	10.3 LBS-CO ₂ e/SF	5
WATER-USE INTENSITY	7.8 GAL/SF	8



*Electric emissions projection based on 2023 emissions outlook from PGE



Rose City Park Elementary School

BUILDING CONSTRUCTED: 1912

SUMMARY OF EXISTING CONDITIONS

- Aging HVAC equipment
- Space and domestic water heating provided by gas boiler systems
- Limited existing cooling in building
- Limited insulation in existing envelope
- Aging and inefficient lighting technology

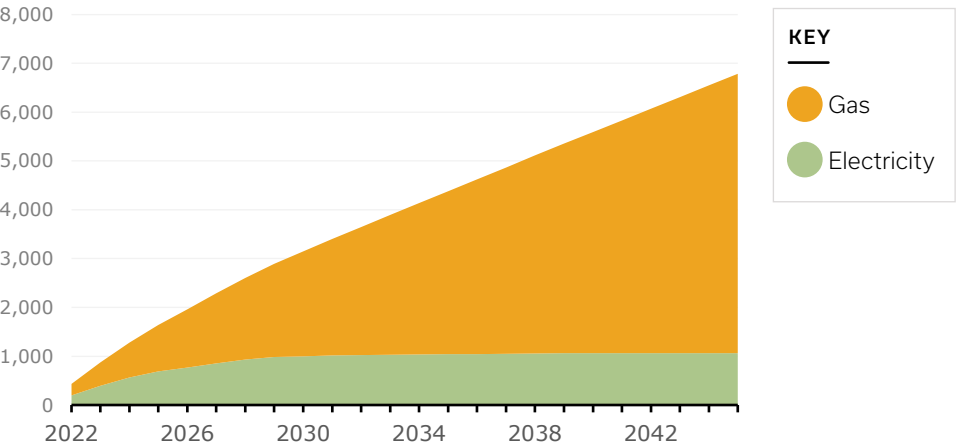
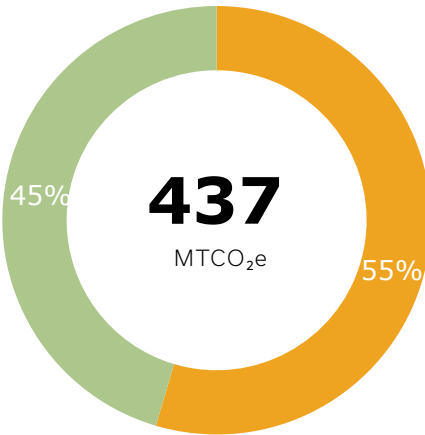
CURRENTLY PLANNED IMPROVEMENTS

- Upgrades to HVAC controls to improve efficiency and performance
- Upgrading lighting systems to high-efficiency LED fixtures

POTENTIAL OPPORTUNITIES

- ☐ Electrification of all heating systems within the building
- ☐ Incorporation of heat pump systems for heating and cooling
- ☐ Improved ventilation systems to provide enhanced filtration and maintain healthy indoor air quality
- ☐ Envelope enhancement to reduce conditioning loads and improve thermal comfort
- ☐ Incorporation of renewable energy systems to offset operational emissions
- ☐ Increased tree canopy and green space
- ☐

RANKING (OUT OF 16)		
AREA	73,719 SQUARE FEET	7
EUI	73 kBtu/SF	9
ENERGY COSTS	\$91,052	8
EMISSIONS	437 MTCO ₂ e	3
EMISSIONS INTENSITY	13.1 LBS-CO ₂ e/SF	1
WATER-USE INTENSITY	3.8 GAL/SF	15



*Electric emissions projection based on 2023 emissions outlook from Pacific Power

Cleveland Cluster

PORTLAND PUBLIC SCHOOLS



		RANKING (OUT OF 16)
AREA	56,245 SQUARE FEET	12
EUI	66 kBtu/SF	12
ENERGY COSTS	\$72,812	15
EMISSIONS	216 MTCO ₂ e	13
EMISSIONS INTENSITY	8.5 LBS-CO ₂ e/SF	12
WATER-USE INTENSITY	6.2 GAL/SF	11

Sunnyside Environmental School

BUILDING CONSTRUCTED: 1925

SUMMARY OF EXISTING CONDITIONS

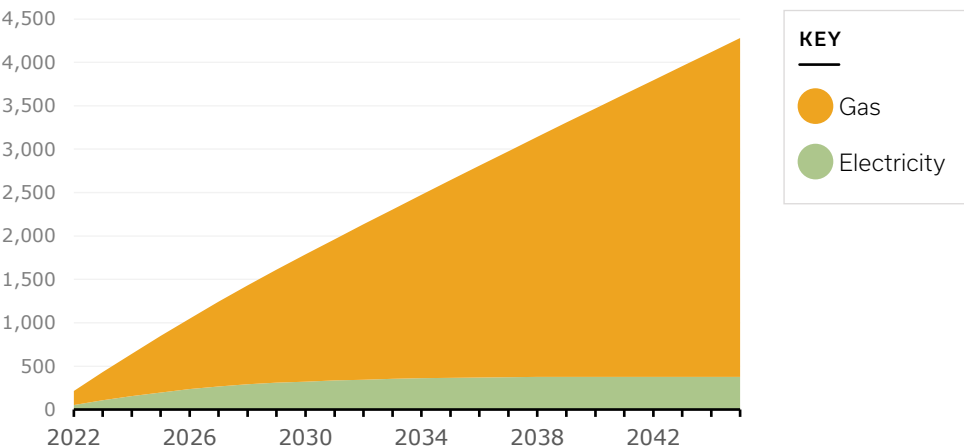
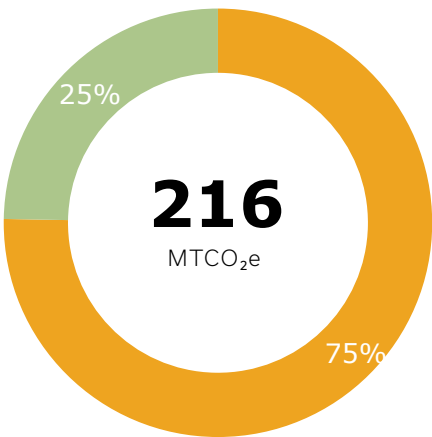
- Aging HVAC equipment
- Space and domestic water heating provided by gas boiler systems
- Limited existing cooling in building
- Aging envelope with limited insulation
- Aging and inefficient lighting technology

CURRENTLY PLANNED IMPROVEMENTS

- Upgrades to HVAC controls to improve efficiency and performance
- Upgrading lighting systems to high-efficiency LED fixtures

POTENTIAL OPPORTUNITIES

- ☐ Electrification of all heating systems within the building
- ☐ Incorporation of heat pump systems for heating and cooling
- ☐ Improved ventilation systems to provide enhanced filtration and maintain healthy indoor air quality
- ☐ Envelope enhancement to reduce conditioning loads and improve thermal comfort
- ☐ Incorporation of renewable energy systems to offset operational emissions
- ☐ Increased tree canopy and green space
- ☐
- ☐
- ☐



*Electric emissions projection based on 2023 emissions outlook from PGE



		RANKING (OUT OF 16)
AREA	87,364 SQUARE FEET	5
EUI	75 kBtu/SF	8
ENERGY COSTS	\$134,260	3
EMISSIONS	385 MTCO ₂ e	5
EMISSIONS INTENSITY	9.7 LBS-CO ₂ e/SF	8
WATER-USE INTENSITY	7.9 GAL/SF	7

Sellwood Middle School

BUILDING CONSTRUCTED: 1914

SUMMARY OF EXISTING CONDITIONS

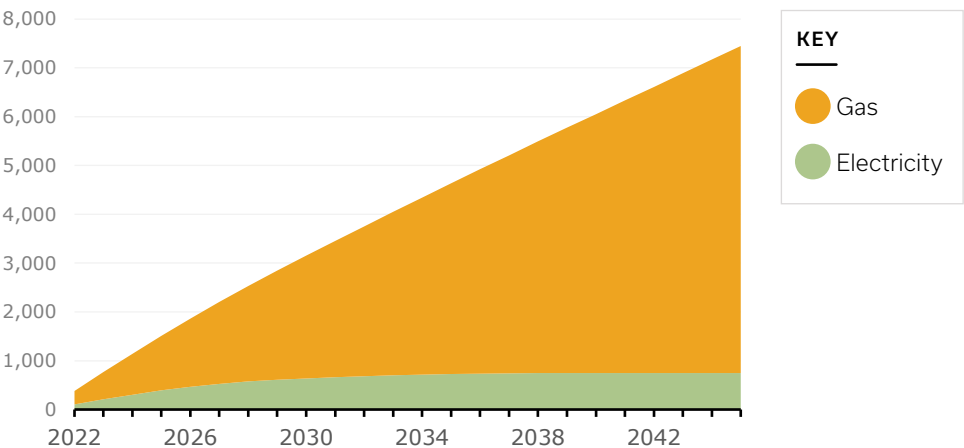
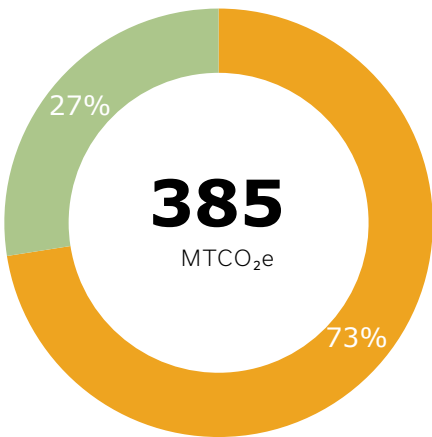
- Aging HVAC equipment
- Space and domestic water heating provided by gas boiler systems
- Limited existing cooling in building
- Aging envelope with limited insulation
- Lighting systems recently upgraded

CURRENTLY PLANNED IMPROVEMENTS

- Upgrades to HVAC controls to improve efficiency and performance

POTENTIAL OPPORTUNITIES

- ☐ Electrification of all heating systems within the building
- ☐ Incorporation of heat pump systems for heating and cooling
- ☐ Improved ventilation systems to provide enhanced filtration and maintain healthy indoor air quality
- ☐ Envelope enhancement to reduce conditioning loads and improve thermal comfort
- ☐ Incorporation of renewable energy systems to offset operational emissions
- ☐ Increased tree canopy and green space
- ☐
- ☐
- ☐



*Electric emissions projection based on 2023 emissions outlook from PGE

Cleveland Cluster

PORTLAND PUBLIC SCHOOLS



Winterhaven/Brooklyn Elementary School

BUILDING CONSTRUCTED: 1930

SUMMARY OF EXISTING CONDITIONS

- Aging HVAC equipment
- Space and domestic water heating provided by gas boiler systems
- Limited existing cooling in building
- Aging envelope with limited insulation
- Aging and inefficient lighting technology

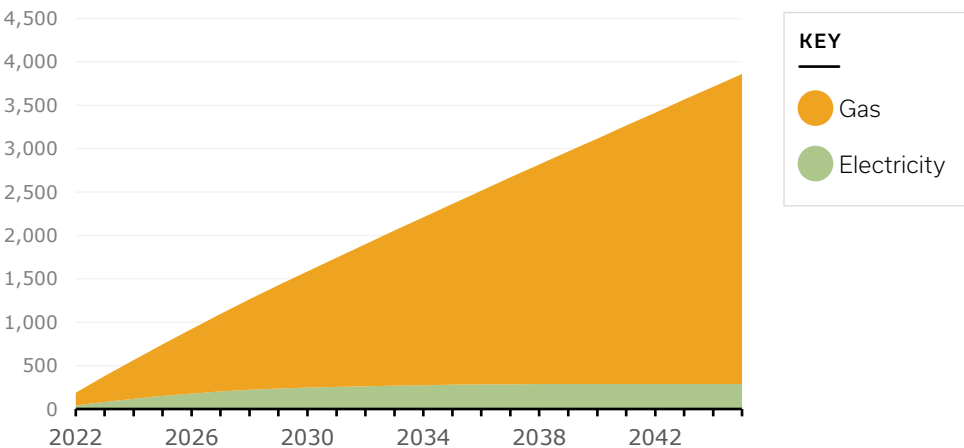
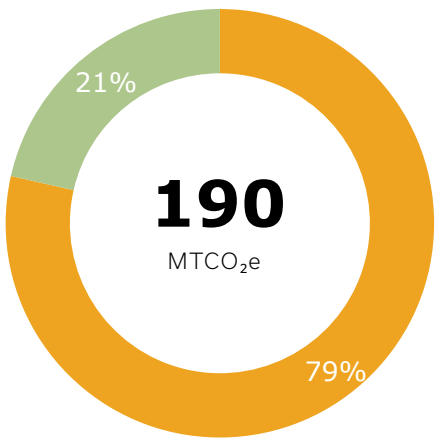
CURRENTLY PLANNED IMPROVEMENTS

- Upgrades to HVAC controls to improve efficiency and performance
- Upgrading lighting systems to high-efficiency LED fixtures

POTENTIAL OPPORTUNITIES

- ☐ Electrification of all heating systems within the building
- ☐ Incorporation of heat pump systems for heating and cooling
- ☐ Improved ventilation systems to provide enhanced filtration and maintain healthy indoor air quality
- ☐ Envelope enhancement to reduce conditioning loads and improve thermal comfort
- ☐ Incorporation of renewable energy systems to offset operational emissions
- ☐ Increased tree canopy and green space
- ☐
- ☐

		RANKING (OUT OF 16)
AREA	41,345 SQUARE FEET	16
EUI	80 kBtu/SF	5
ENERGY COSTS	\$66,345	16
EMISSIONS	190 MTCO ₂ e	15
EMISSIONS INTENSITY	10.1 LBS-CO ₂ e/SF	6
WATER-USE INTENSITY	7.1 GAL/SF	9



*Electric emissions projection based on 2023 emissions outlook from PGE



Woodstock Elementary School

BUILDING CONSTRUCTED: 1911

SUMMARY OF EXISTING CONDITIONS

- Aging HVAC equipment
- Space and domestic water heating provided by gas boiler systems
- Limited existing cooling in building
- Aging envelope with limited insulation
- Aging and inefficient lighting technology

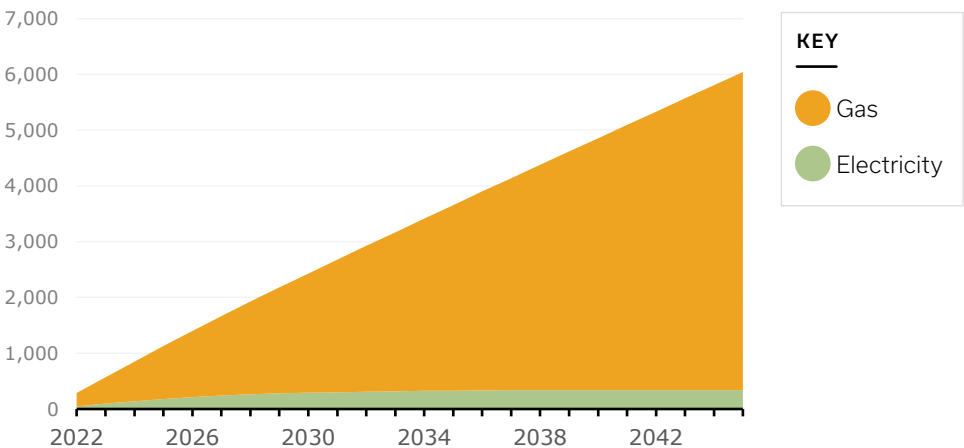
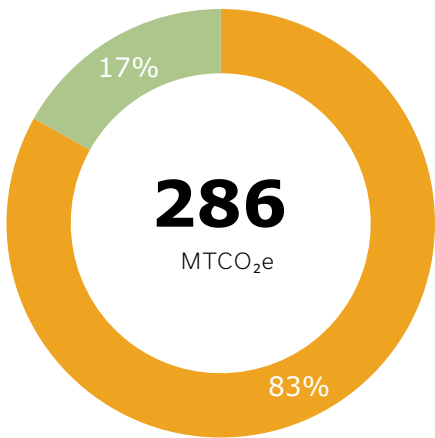
CURRENTLY PLANNED IMPROVEMENTS

- Upgrades to HVAC controls to improve efficiency and performance
- Upgrading lighting systems to high-efficiency LED fixtures

POTENTIAL OPPORTUNITIES

- ☐ Electrification of all heating systems within the building
- ☐ Incorporation of heat pump systems for heating and cooling
- ☐ Improved ventilation systems to provide enhanced filtration and maintain healthy indoor air quality
- ☐ Envelope enhancement to reduce conditioning loads and improve thermal comfort
- ☐ Incorporation of renewable energy systems to offset operational emissions
- ☐ Increased tree canopy and green space
- ☐
- ☐
- ☐

		RANKING (OUT OF 16)
AREA	65,221 SQUARE FEET	10
EUI	77 kBtu/SF	7
ENERGY COSTS	\$89,627	9
EMISSIONS	286 MTCO ₂ e	9
EMISSIONS INTENSITY	9.7 LBS-CO ₂ e/SF	9
WATER-USE INTENSITY	6.1 GAL/SF	12



*Electric emissions projection based on 2023 emissions outlook from PGE

Cleveland Cluster

PORTLAND PUBLIC SCHOOLS



RANKING (OUT OF 16)		
AREA	41,345 SQUARE FEET	16
EUI	80 kBTU/SF	5
ENERGY COSTS	\$66,345	16
EMISSIONS	190 MTCO ₂ e	15
EMISSIONS INTENSITY	10.1 LBS-CO ₂ e/SF	6
WATER-USE INTENSITY	7.1 GAL/SF	9

Winterhaven/Brooklyn Elementary School

BUILDING CONSTRUCTED: 1930

SUMMARY OF EXISTING CONDITIONS

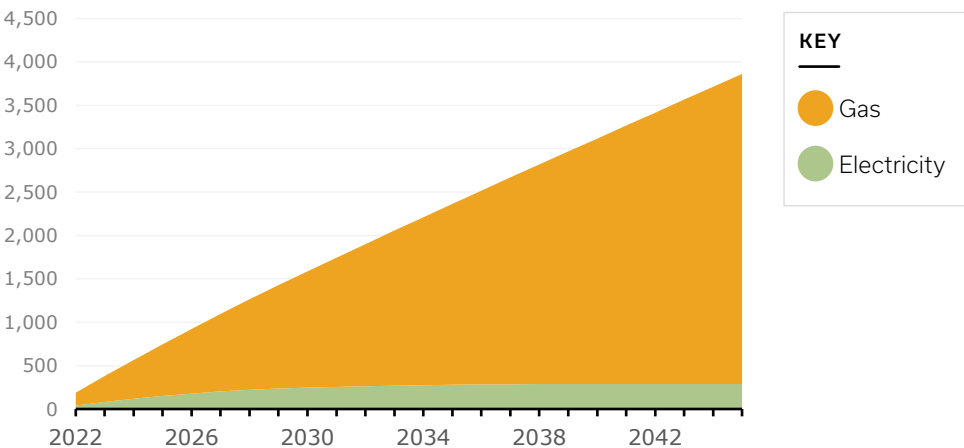
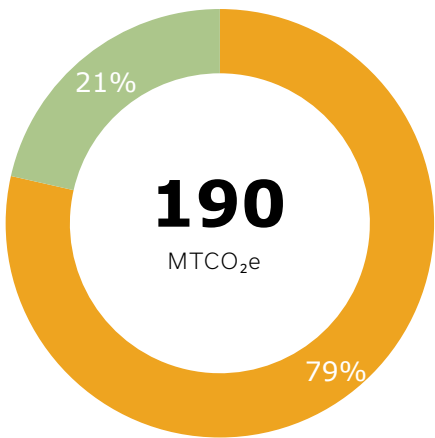
- Aging HVAC equipment
- Space and domestic water heating provided by gas boiler systems
- Limited existing cooling in building
- Aging envelope with limited insulation
- Aging and inefficient lighting technology

CURRENTLY PLANNED IMPROVEMENTS

- Upgrades to HVAC controls to improve efficiency and performance
- Upgrading lighting systems to high-efficiency LED fixtures

POTENTIAL OPPORTUNITIES

- ☐ Electrification of all heating systems within the building
- ☐ Incorporation of heat pump systems for heating and cooling
- ☐ Improved ventilation systems to provide enhanced filtration and maintain healthy indoor air quality
- ☐ Envelope enhancement to reduce conditioning loads and improve thermal comfort
- ☐ Incorporation of renewable energy systems to offset operational emissions
- ☐ Increased tree canopy and green space
- ☐
- ☐



*Electric emissions projection based on 2023 emissions outlook from PGE



RANKING (OUT OF 16)		
AREA	65,221 SQUARE FEET	10
EUI	77 kBTU/SF	7
ENERGY COSTS	\$89,627	9
EMISSIONS	286 MTCO ₂ e	9
EMISSIONS INTENSITY	9.7 LBS-CO ₂ e/SF	9
WATER-USE INTENSITY	6.1 GAL/SF	12

Woodstock Elementary School

BUILDING CONSTRUCTED: 1911

SUMMARY OF EXISTING CONDITIONS

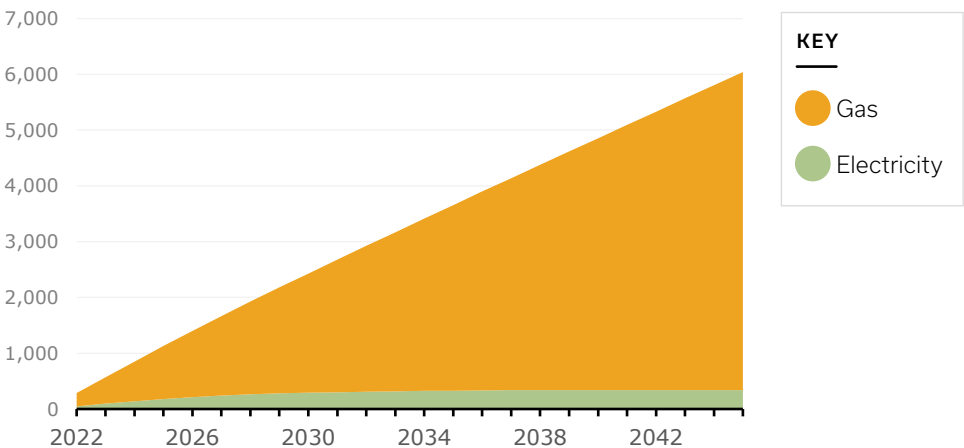
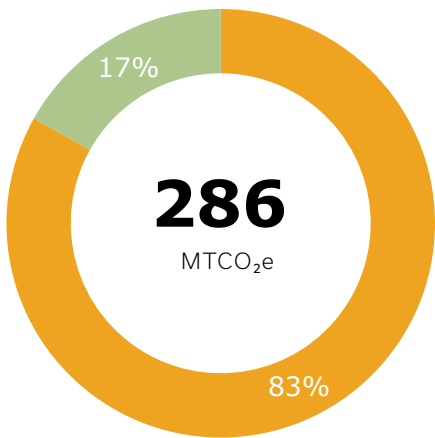
- Aging HVAC equipment
- Space and domestic water heating provided by gas boiler systems
- Limited existing cooling in building
- Aging envelope with limited insulation
- Aging and inefficient lighting technology

CURRENTLY PLANNED IMPROVEMENTS

- Upgrades to HVAC controls to improve efficiency and performance
- Upgrading lighting systems to high-efficiency LED fixtures

POTENTIAL OPPORTUNITIES

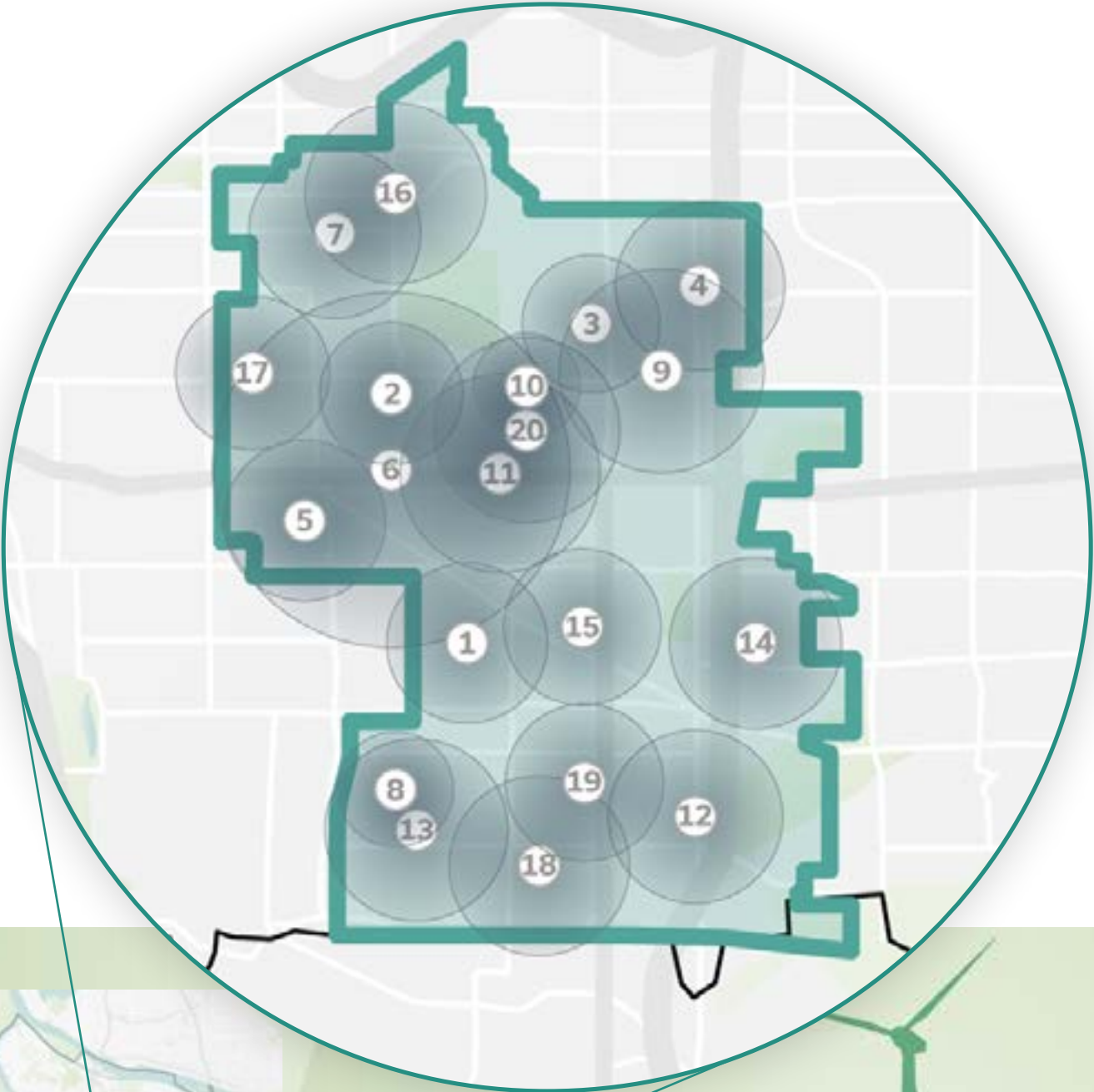
- ☐ Electrification of all heating systems within the building
- ☐ Incorporation of heat pump systems for heating and cooling
- ☐ Improved ventilation systems to provide enhanced filtration and maintain healthy indoor air quality
- ☐ Envelope enhancement to reduce conditioning loads and improve thermal comfort
- ☐ Incorporation of renewable energy systems to offset operational emissions
- ☐ Increased tree canopy and green space
- ☐
- ☐
- ☐



*Electric emissions projection based on 2023 emissions outlook from PGE

Building Performance for Franklin Cluster

PORTLAND PUBLIC SCHOOLS | 2022



FACILITY	AREA (SF)	EUI (kBtu/SF/YR)	ENERGY COST (\$)	GAS EMISSIONS (MTCO ₂ E)	ELECTRIC EMISSIONS (MTCO ₂ E)	TOTAL EMISSIONS (MTCO ₂ E)	EMISSIONS INTENSITY (LBS CO ₂ E/SF)	WATER USE INTENSITY (GAL/SF)
1 Arleta*	71,185	63	\$93,912	206	53	259	8.0	9.7
2 Atkinson	54,472	65	\$71,542	161	44	205	8.3	4.4
3 Bridger	48,948	64	\$86,930	127	64	191	8.6	12.8
4 Clark/CSS	50,227	100	\$103,232	229	58	287	12.6	9.6
5 Creston	79,978	58	\$84,017	222	40	262	7.2	3.8
6 Franklin*	296,719	68	\$439,623	616	719	1,335	9.9	5.6
7 Glencoe	60,094	87	\$89,700	246	50	296	10.9	5.5
8 Green Thumb/CTC	31,907	70	\$75,388	93	41	134	9.2	30.3
9 Binnsmead/Harrison Park	110,775	64	\$152,110	308	113	421	8.4	8.2
10 Holladay Annex/Division St	29,800	60	\$57,253	60	55	115	8.5	3.9
11 Kellogg*	105,647	44	\$188,539	0	398	398	8.3	12.5
12 Kelly (incl. Kelly Center)	77,995	63	\$130,764	185	120	305	8.6	9.0
13 Lane	94,753	60	\$123,354	244	93	337	7.8	7.5
14 Lent	78,100	66	\$104,546	233	64	297	8.4	5.9
15 Marysville (vacant)	52,724	82	\$89,759	198	50	248	10.4	25.9
16 Mt. Tabor	79,477	71	\$106,291	253	77	329	9.1	5.0
17 Richmond	79,894	51	\$89,970	177	61	238	6.6	6.4
18 Whitman	57,244	101	\$91,318	271	56	327	12.6	3.6
19 Woodmere	51,900	81	\$85,870	180	71	251	10.7	7.3
20 Youngson/Holladay Center	62,918	93	\$122,806	245	104	349	12.2	9.5
Cluster Total	1,574,757		\$2,378,980	4,254	2,330	6,584	N/A	N/A
District Total	9,065,846		\$12,197,485	22,581	18,113	40,694	N/A	N/A
Cluster Average	73,274	68	\$119,346	213	116	329	9.2	8.0
District Average	88,018	62	\$118,422	219	176	395	9.9	8.4

MAP KEY

City of Portland Boundary

Cluster Boundary

Total Emissions
MTCO₂E

** Electric emissions include offset from on-site PV*

20
TOTAL
BUILDINGS

6,584
MTCO₂E
TOTAL
EMISSIONS

9.7
LBS CO₂E/SF
AVERAGE EMISSIONS
INTENSITY

8.4
GAL/SF
AVERAGE WATER
USE INTENSITY

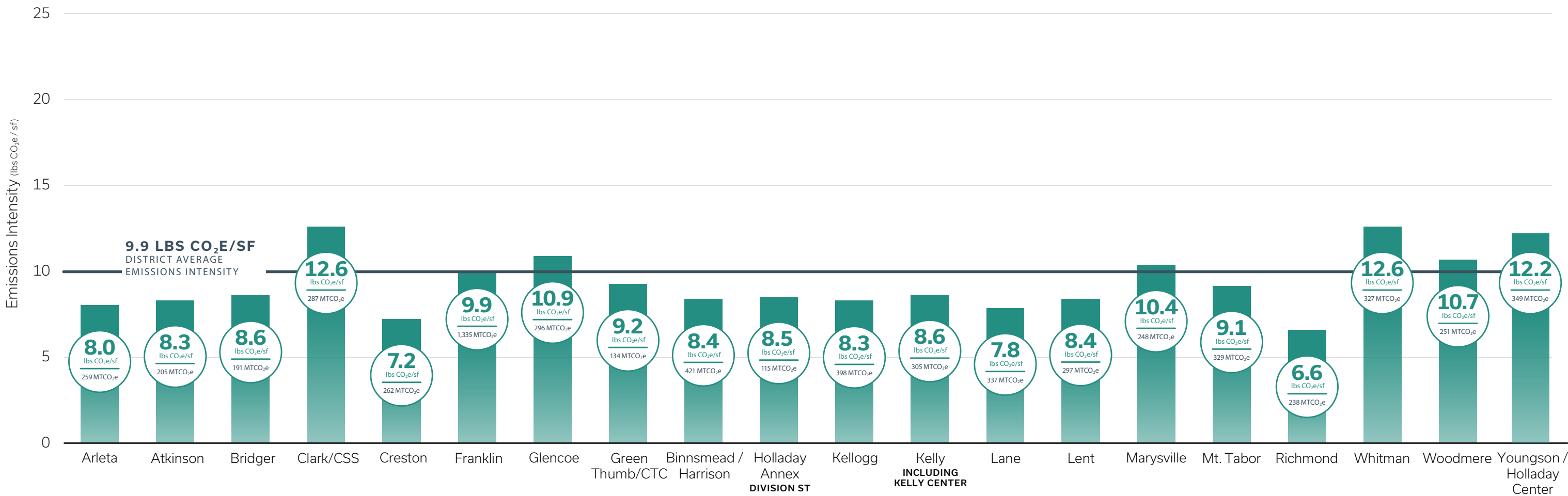
- The total emissions from these clusters account for roughly 16% of the total emissions for the district, with the average emissions intensities being roughly 2% lower than the district average.
- The school with the highest total emissions (Franklin High School) was recently modernized.
- Gas emissions account for the majority of emissions in 18/20 schools and electrifying gas equipment will have a significant impact in reducing these emissions, particularly as the electrical grid decarbonizes

KEY ABBREVIATIONS

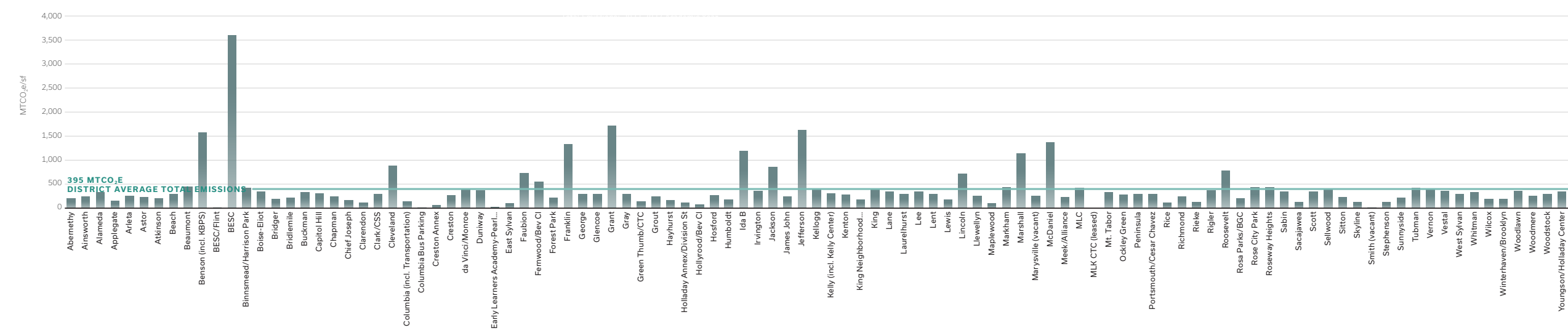
EUI | Energy Use Intensity
KBTU | Thousand British thermal units
SF | square feet
CO₂E | CO₂ equivalent
MT | Metric Ton
LBS | Pounds

Emissions Comparison for Franklin Cluster

PORTLAND PUBLIC SCHOOLS



PORTLAND PUBLIC SCHOOL TOTAL EMISSIONS: 2022-2023 ACADEMIC YEAR



Franklin Cluster

PORTLAND PUBLIC SCHOOLS



RANKING (OUT OF 20)		
AREA	71,185 SQUARE FEET	10
EUI	63 kBtu/SF	14
ENERGY COSTS	\$93,912	10
EMISSIONS	259 MTCO ₂ e	13
EMISSIONS INTENSITY	8.0 LBS-CO ₂ e/SF	17
WATER-USE INTENSITY	9.7 GAL/SF	5

Arleta Elementary School

BUILDING CONSTRUCTED: 1929

SUMMARY OF EXISTING CONDITIONS

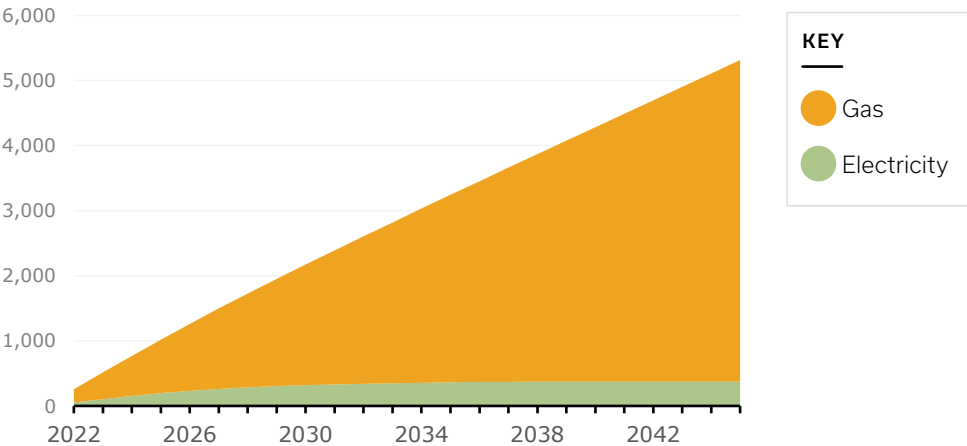
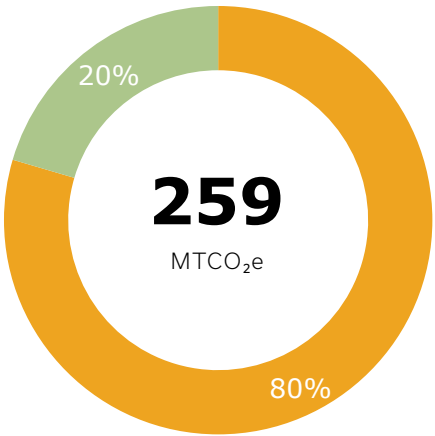
- Aging HVAC equipment
- Space and domestic water heating provided by gas boiler systems
- Limited existing cooling in building
- Aging envelope with limited insulation
- Lighting systems recently upgraded
- On-site PV offsets electricity consumption

CURRENTLY PLANNED IMPROVEMENTS

- Upgrades to HVAC controls to improve efficiency and performance

POTENTIAL OPPORTUNITIES

- ☐ Electrification of all heating systems within the building
- ☐ Incorporation of heat pump systems for heating and cooling
- ☐ Improved ventilation systems to provide enhanced filtration and maintain healthy indoor air quality
- ☐ Envelope enhancement to reduce conditioning loads and improve thermal comfort
- ☐ Incorporation of renewable energy systems to offset operational emissions
- ☐ Increased tree canopy and green space
- ☐
- ☐
- ☐



*Electric emissions projection based on 2023 emissions outlook from PGE



RANKING (OUT OF 20)		
AREA	54,472 SQUARE FEET	14
EUI	65 kBtu/SF	11
ENERGY COSTS	\$71,542	19
EMISSIONS	205 MTCO ₂ e	17
EMISSIONS INTENSITY	8.3 LBS-CO ₂ e/SF	16
WATER-USE INTENSITY	4.4 GAL/SF	17

Atkinson Elementary School

BUILDING CONSTRUCTED: 1953

SUMMARY OF EXISTING CONDITIONS

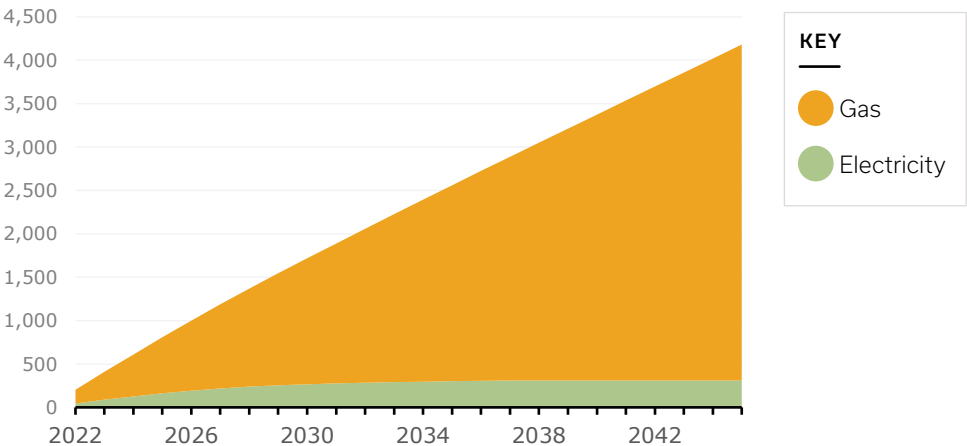
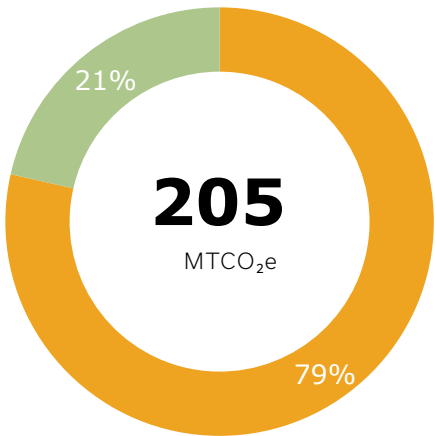
- Aging HVAC equipment
- Space and domestic water heating provided by gas boiler systems
- Limited existing cooling in building
- Aging envelope with limited insulation
- Aging and inefficient lighting technology

CURRENTLY PLANNED IMPROVEMENTS

- Upgrades to HVAC controls to improve efficiency and performance

POTENTIAL OPPORTUNITIES

- ☐ Electrification of all heating systems within the building
- ☐ Incorporation of heat pump systems for heating and cooling
- ☐ Improved ventilation systems to provide enhanced filtration and maintain healthy indoor air quality
- ☐ Envelope enhancement to reduce conditioning loads and improve thermal comfort
- ☐ Upgrading lighting systems to high-efficiency LED fixtures
- ☐ Incorporation of renewable energy systems to offset operational emissions
- ☐ Increased tree canopy and green space
- ☐
- ☐
- ☐



*Electric emissions projection based on 2023 emissions outlook from PGE

Franklin Cluster

PORTLAND PUBLIC SCHOOLS



		RANKING (OUT OF 20)
AREA	48,948 SQUARE FEET	18
EUI	64 kBTU/SF	12
ENERGY COSTS	\$86,930	15
EMISSIONS	191 MTCO ₂ e	18
EMISSIONS INTENSITY	8.6 LBS-CO ₂ e/SF	11
WATER-USE INTENSITY	12.8 GAL/SF	3

Bridger Elementary School

BUILDING CONSTRUCTED: 1951

SUMMARY OF EXISTING CONDITIONS

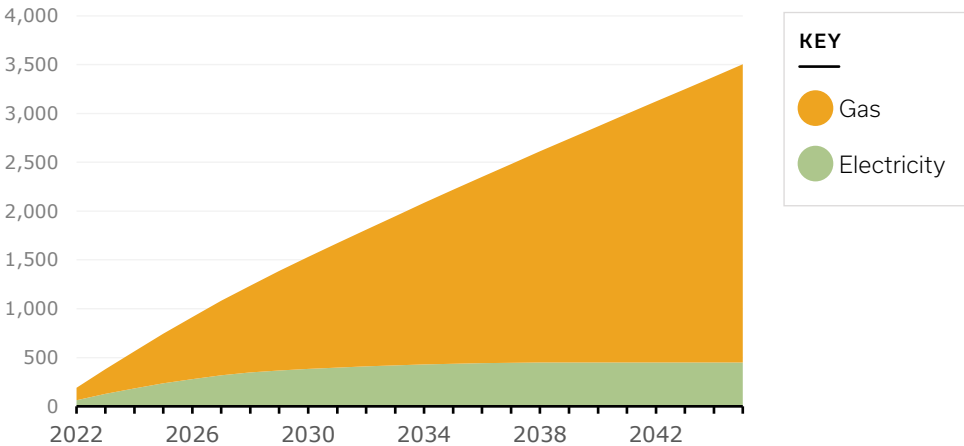
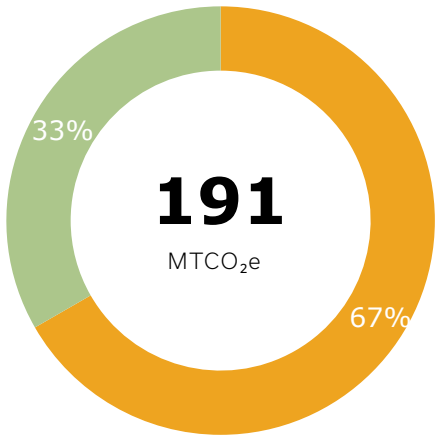
- Aging HVAC equipment
- Space and domestic water heating provided by gas boiler systems
- Limited existing cooling in building
- Aging envelope with limited insulation
- Aging and inefficient lighting technology

CURRENTLY PLANNED IMPROVEMENTS

- Upgrades to HVAC controls to improve efficiency and performance
- Upgrading lighting systems to high-efficiency LED fixtures

POTENTIAL OPPORTUNITIES

- ☐ Electrification of all heating systems within the building
- ☐ Incorporation of heat pump systems for heating and cooling
- ☐ Improved ventilation systems to provide enhanced filtration and maintain healthy indoor air quality
- ☐ Envelope enhancement to reduce conditioning loads and improve thermal comfort
- ☐ Incorporation of renewable energy systems to offset operational emissions
- ☐ Increased tree canopy and green space
- ☐
- ☐
- ☐



*Electric emissions projection based on 2023 emissions outlook from PGE



		RANKING (OUT OF 20)
AREA	50,227 SQUARE FEET	17
EUI	100 kBTU/SF	2
ENERGY COSTS	\$103,232	9
EMISSIONS	287 MTCO ₂ e	11
EMISSIONS INTENSITY	12.6 LBS-CO ₂ e/SF	1
WATER-USE INTENSITY	9.6 GAL/SF	6

Clark/CSS Elementary School

BUILDING CONSTRUCTED: 1955

SUMMARY OF EXISTING CONDITIONS

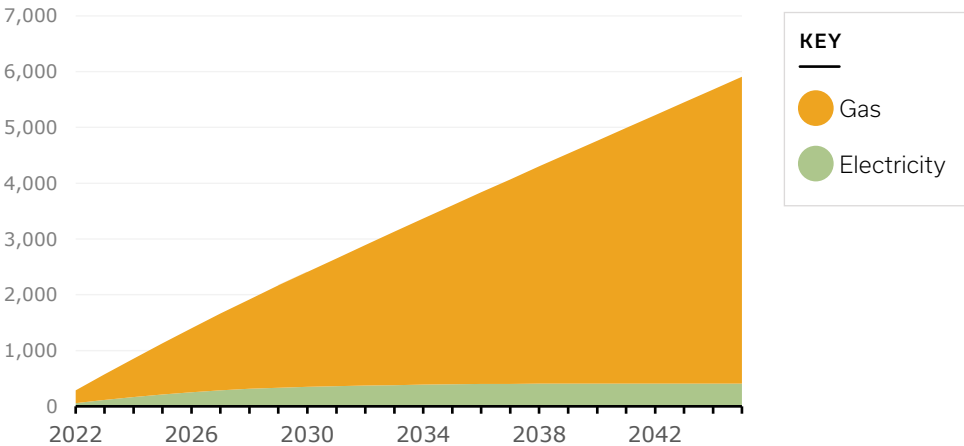
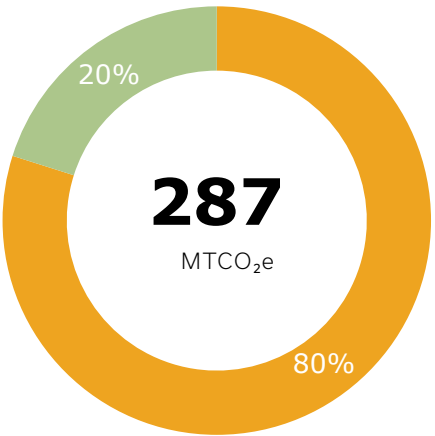
- Aging HVAC equipment
- Space and domestic water heating provided by gas boiler systems
- Limited existing cooling in building
- Limited insulation in existing envelope
- Aging and inefficient lighting technology

CURRENTLY PLANNED IMPROVEMENTS

- Upgrades to HVAC controls to improve efficiency and performance

POTENTIAL OPPORTUNITIES

- ☐ Electrification of all heating systems within the building
- ☐ Incorporation of heat pump systems for heating and cooling
- ☐ Improved ventilation systems to provide enhanced filtration and maintain healthy indoor air quality
- ☐ Envelope enhancement to reduce conditioning loads and improve thermal comfort
- ☐ Upgrading lighting systems to high-efficiency LED fixtures
- ☐ Incorporation of renewable energy systems to offset operational emissions
- ☐ Increased tree canopy and green space
- ☐
- ☐
- ☐



*Electric emissions projection based on 2023 emissions outlook from PGE

Franklin Cluster

PORTLAND PUBLIC SCHOOLS



RANKING (OUT OF 20)		
AREA	79,978 SQUARE FEET	5
EUI	58 kBtu/SF	18
ENERGY COSTS	\$84,017	17
EMISSIONS	262 MTCO ₂ e	12
EMISSIONS INTENSITY	7.2 LBS-CO ₂ e/SF	19
WATER-USE INTENSITY	3.8 GAL/SF	19

Creston Elementary School

BUILDING CONSTRUCTED: 1946

SUMMARY OF EXISTING CONDITIONS

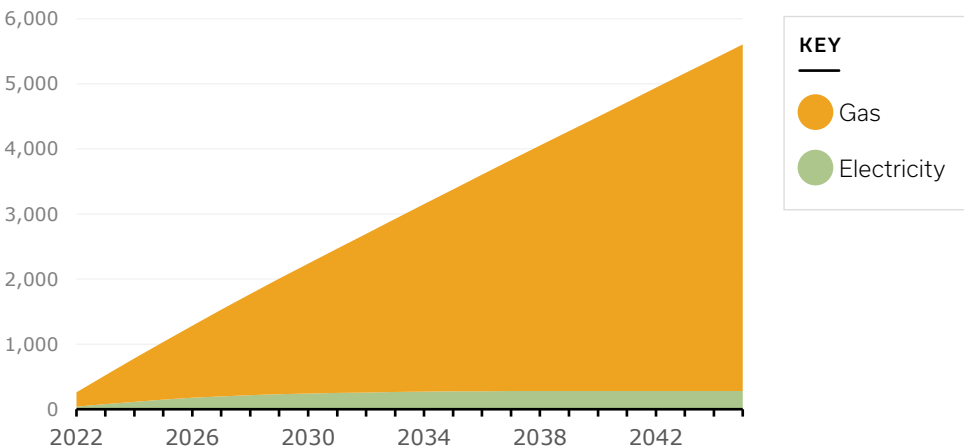
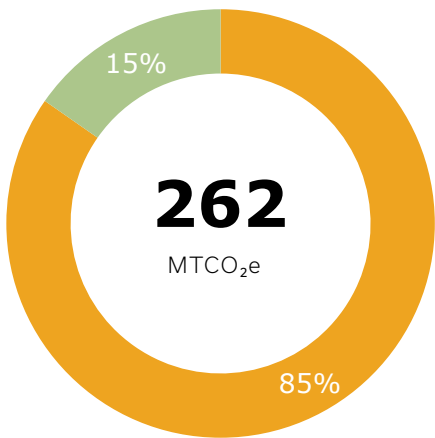
- Aging HVAC equipment
- Space and domestic water heating provided by gas boiler systems
- Limited existing cooling in building
- Limited insulation in existing envelope
- Lighting systems recently upgraded

CURRENTLY PLANNED IMPROVEMENTS

- Upgrades to HVAC controls to improve efficiency and performance

POTENTIAL OPPORTUNITIES

- ☐ Electrification of all heating systems within the building
- ☐ Incorporation of heat pump systems for heating and cooling
- ☐ Improved ventilation systems to provide enhanced filtration and maintain healthy indoor air quality
- ☐ Envelope enhancement to reduce conditioning loads and improve thermal comfort
- ☐ Incorporation of renewable energy systems to offset operational emissions
- ☐ Increased tree canopy and green space
- ☐
- ☐
- ☐



*Electric emissions projection based on 2023 emissions outlook from PGE



RANKING (OUT OF 20)		
AREA	296,719 SQUARE FEET	1
EUI	68 kBtu/SF	9
ENERGY COSTS	\$439,623	1
EMISSIONS	1,335 MTCO ₂ e	1
EMISSIONS INTENSITY	9.9 LBS-CO ₂ e/SF	7
WATER-USE INTENSITY	5.6 GAL/SF	14

Franklin High School

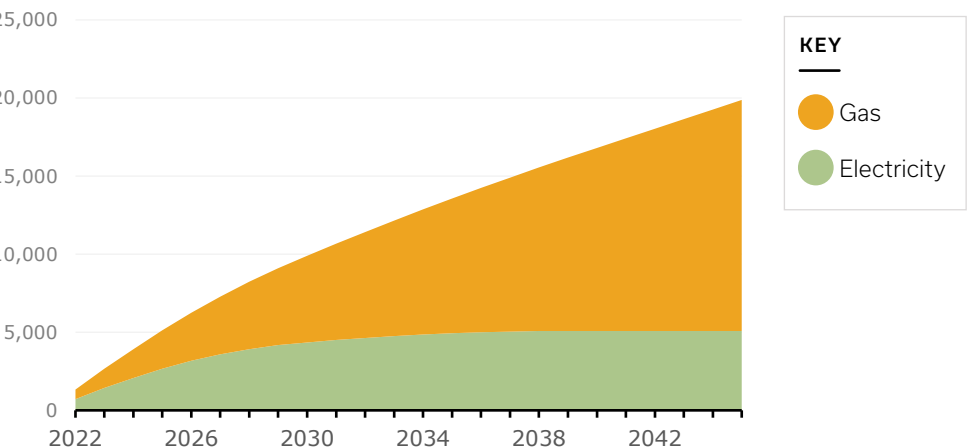
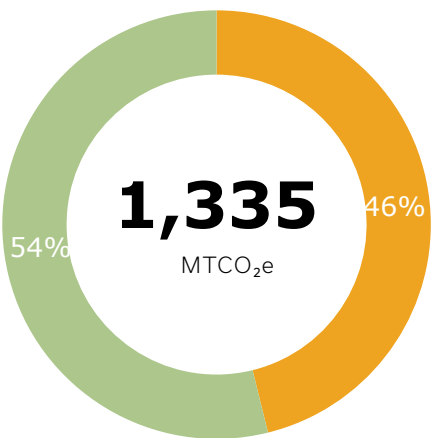
BUILDING CONSTRUCTED: 1914 | MODERNIZED: 2017

SUMMARY OF EXISTING CONDITIONS

- Recent modernization
- Updated envelope, lighting, and mechanical systems
- Gas is still used for space and domestic water heating
- On-site PV offsets electricity consumption

POTENTIAL OPPORTUNITIES

- ☐ Electrify all heating systems within the building
- ☐ Increased tree canopy and green space
- ☐
- ☐
- ☐
- ☐



*Electric emissions projection based on 2023 emissions outlook from PGE

Franklin Cluster

PORTLAND PUBLIC SCHOOLS



		RANKING (OUT OF 20)
AREA	60,094 SQUARE FEET	12
EUI	87 kBTU/SF	4
ENERGY COSTS	\$89,700	14
EMISSIONS	296 MTCO ₂ e	10
EMISSIONS INTENSITY	10.9 LBS-CO ₂ e/SF	4
WATER-USE INTENSITY	5.5 GAL/SF	15

Glencoe Elementary School

BUILDING CONSTRUCTED: 1923

SUMMARY OF EXISTING CONDITIONS

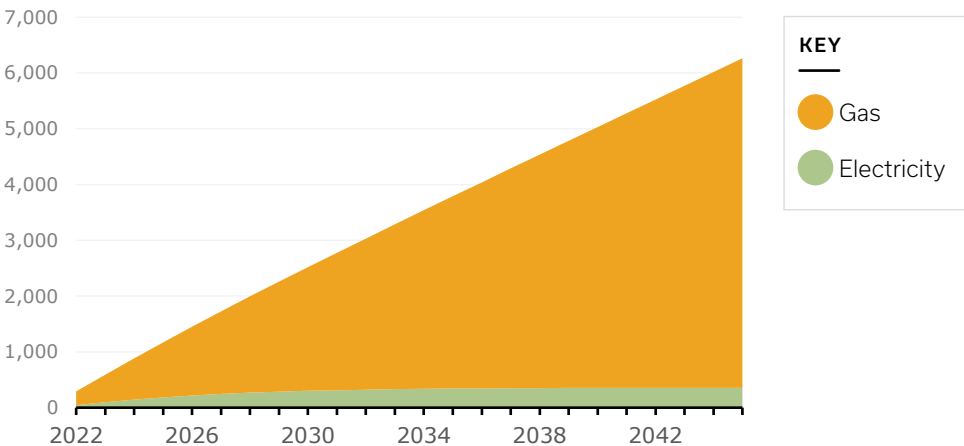
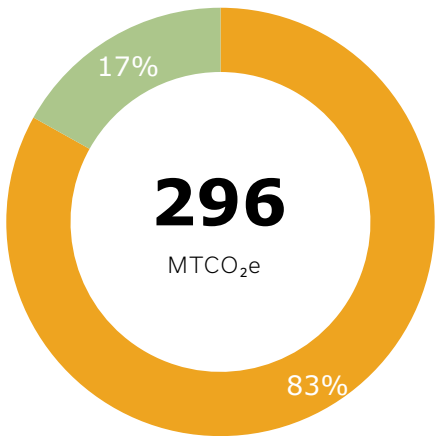
- Aging HVAC equipment
- Space and domestic water heating provided by gas boiler systems
- Limited existing cooling in building
- Aging envelope with limited insulation
- Lighting systems recently upgraded

CURRENTLY PLANNED IMPROVEMENTS

- Upgrades to HVAC controls to improve efficiency and performance

POTENTIAL OPPORTUNITIES

- ☐ Electrification of all heating systems within the building
- ☐ Incorporation of heat pump systems for heating and cooling
- ☐ Improved ventilation systems to provide enhanced filtration and maintain healthy indoor air quality
- ☐ Envelope enhancement to reduce conditioning loads and improve thermal comfort
- ☐ Incorporation of renewable energy systems to offset operational emissions
- ☐ Increased tree canopy and green space
- ☐
- ☐
- ☐



*Electric emissions projection based on 2023 emissions outlook from PGE



		RANKING (OUT OF 20)
AREA	31,907 SQUARE FEET	19
EUI	70 kBTU/SF	8
ENERGY COSTS	\$75,388	18
EMISSIONS	134 MTCO ₂ e	19
EMISSIONS INTENSITY	9.2 LBS-CO ₂ e/SF	8
WATER-USE INTENSITY	30.3 GAL/SF	1

Green Thumb/CTC

BUILDING CONSTRUCTED: 1975

SUMMARY OF EXISTING CONDITIONS

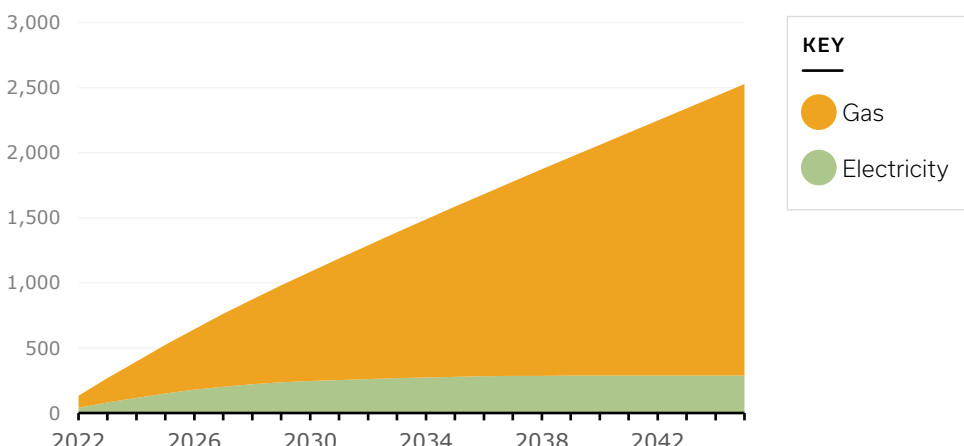
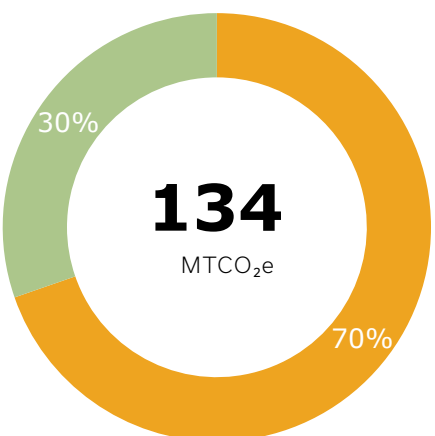
- Aging HVAC equipment
- Space and domestic water heating provided by gas boiler systems
- Limited existing cooling in building
- Limited insulation in existing envelope
- Aging and inefficient lighting technology

CURRENTLY PLANNED IMPROVEMENTS

- Upgrades to HVAC controls to improve efficiency and performance

POTENTIAL OPPORTUNITIES

- ☐ Electrification of all heating systems within the building
- ☐ Incorporation of heat pump systems for heating and cooling
- ☐ Improved ventilation systems to provide enhanced filtration and maintain healthy indoor air quality
- ☐ Envelope enhancement to reduce conditioning loads and improve thermal comfort
- ☐ Upgrading lighting systems to high-efficiency LED fixtures
- ☐ Incorporation of renewable energy systems to offset operational emissions
- ☐ Increased tree canopy and green space
- ☐
- ☐



*Electric emissions projection based on 2023 emissions outlook from PGE

Franklin Cluster

PORTLAND PUBLIC SCHOOLS



		RANKING (OUT OF 20)
AREA	110,775 SQUARE FEET	2
EUI	64 kBtu/SF	12
ENERGY COSTS	\$152,110	3
EMISSIONS	421 MTCO ₂ e	2
EMISSIONS INTENSITY	8.4 LBS-CO ₂ e/SF	14
WATER-USE INTENSITY	8.2 GAL/SF	9

Binnsmead/Harrison Park Middle School

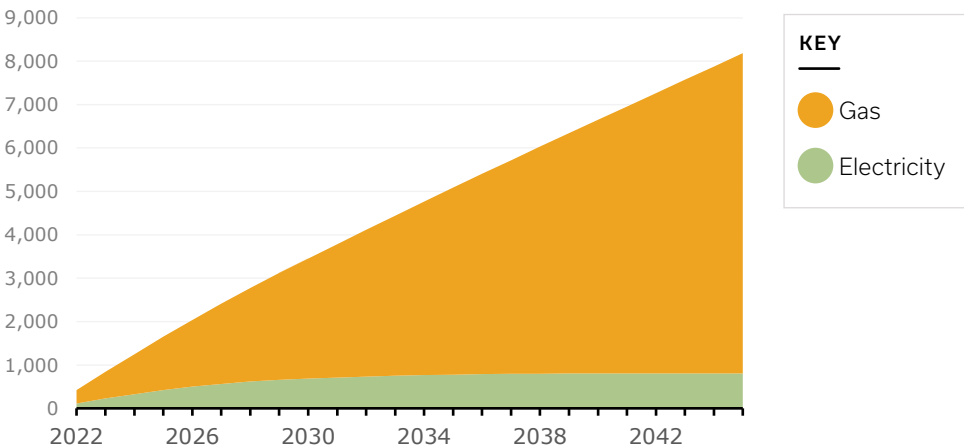
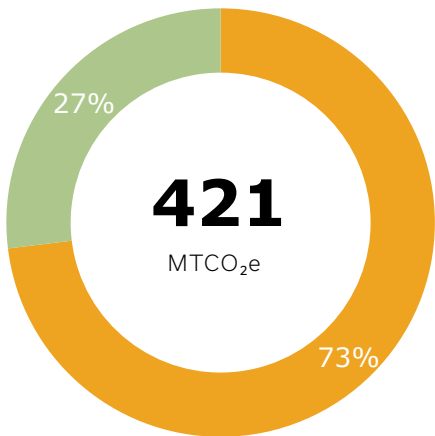
BUILDING CONSTRUCTED: 1949

SUMMARY OF EXISTING CONDITIONS

- Aging HVAC equipment
- Space and domestic water heating provided by gas boiler systems
- Limited existing cooling in building
- Aging envelope with limited insulation
- Aging and inefficient lighting technology

POTENTIAL OPPORTUNITIES

- ☐ Electrification of all heating systems within the building
- ☐ Incorporation of heat pump systems for heating and cooling
- ☐ Improved ventilation systems to provide enhanced filtration and maintain healthy indoor air quality
- ☐ Envelope enhancement to reduce conditioning loads and improve thermal comfort
- ☐ Upgrading lighting systems to high-efficiency LED fixtures
- ☐ Incorporation of renewable energy systems to offset operational emissions
- ☐ Increased tree canopy and green space
- ☐
- ☐
- ☐



*Electric emissions projection based on 2023 emissions outlook from PGE



		RANKING (OUT OF 20)
AREA	29,800 SQUARE FEET	20
EUI	60 kBtu/SF	16
ENERGY COSTS	\$57,253	20
EMISSIONS	115 MTCO ₂ e	20
EMISSIONS INTENSITY	8.5 LBS-CO ₂ e/SF	12
WATER-USE INTENSITY	3.9 GAL/SF	18

Holladay Annex/Division St Elementary School

BUILDING CONSTRUCTED: 1961

SUMMARY OF EXISTING CONDITIONS

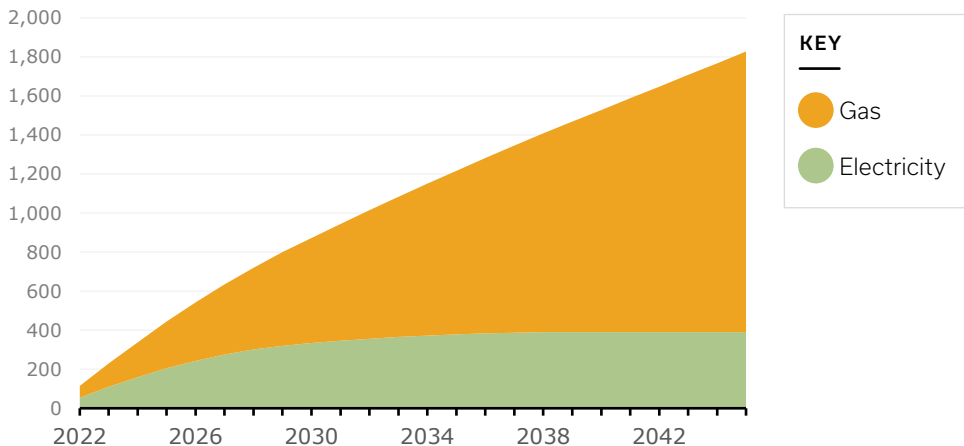
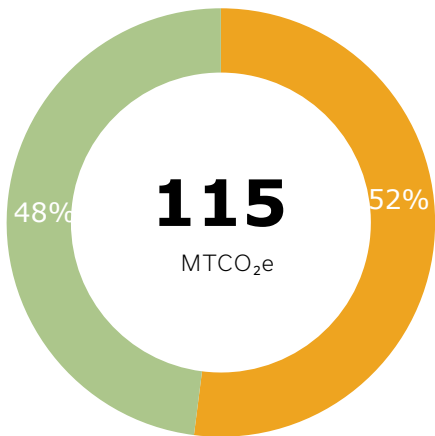
- Aging HVAC equipment
- Space and domestic water heating provided by gas boiler systems
- Limited existing cooling in building
- Aging envelope with limited insulation
- Aging and inefficient lighting technology

CURRENTLY PLANNED IMPROVEMENTS

- Upgrades to HVAC controls to improve efficiency and performance
- Upgrading lighting systems to high-efficiency LED fixtures

POTENTIAL OPPORTUNITIES

- ☐ Electrification of all heating systems within the building
- ☐ Incorporation of heat pump systems for heating and cooling
- ☐ Improved ventilation systems to provide enhanced filtration and maintain healthy indoor air quality
- ☐ Envelope enhancement to reduce conditioning loads and improve thermal comfort
- ☐ Incorporation of renewable energy systems to offset operational emissions
- ☐ Increased tree canopy and green space
- ☐
- ☐



*Electric emissions projection based on 2023 emissions outlook from PGE

Franklin Cluster

PORTLAND PUBLIC SCHOOLS



		RANKING (OUT OF 20)
AREA	105,647 SQUARE FEET	3
EUI	44 kBtu/SF	20
ENERGY COSTS	\$180,594	2
EMISSIONS	398 MTCO ₂ e	3
EMISSIONS INTENSITY	8.3 LBS-CO ₂ e/SF	15
WATER-USE INTENSITY	12.5 GAL/SF	4

Kellogg Middle School

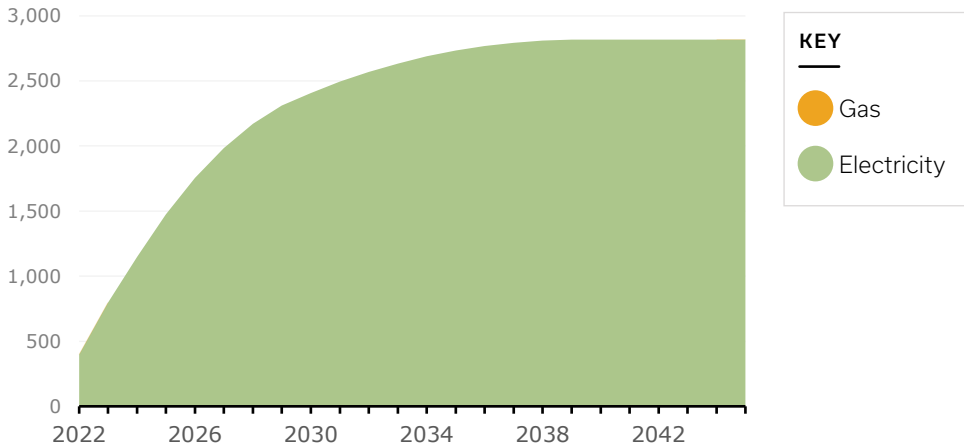
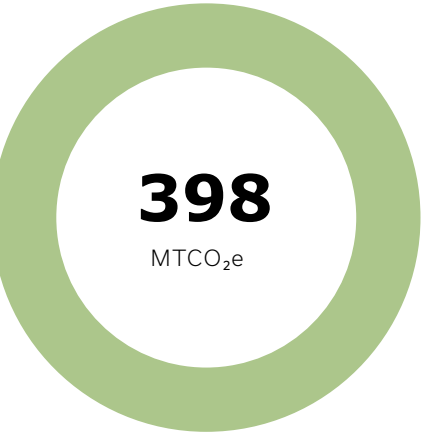
BUILDING CONSTRUCTED: 2021

SUMMARY OF EXISTING CONDITIONS

- Recent modernization
- Updated envelope, lighting, and mechanical systems
-

POTENTIAL OPPORTUNITIES

- Electrify all heating systems within the building
- Incorporate renewable energy systems to offset operational emissions
- Increased tree canopy and green space
-
-
-



		RANKING (OUT OF 20)
AREA	77,995 SQUARE FEET	9
EUI	63 kBtu/SF	14
ENERGY COSTS	\$320,160	4
EMISSIONS	305 MTCO ₂ e	8
EMISSIONS INTENSITY	8.6 LBS-CO ₂ e/SF	10
WATER-USE INTENSITY	9.0 GAL/SF	8

Kelly Elementary School

INCLUDING KELLY CENTER

BUILDING CONSTRUCTED: 1952

SUMMARY OF EXISTING CONDITIONS

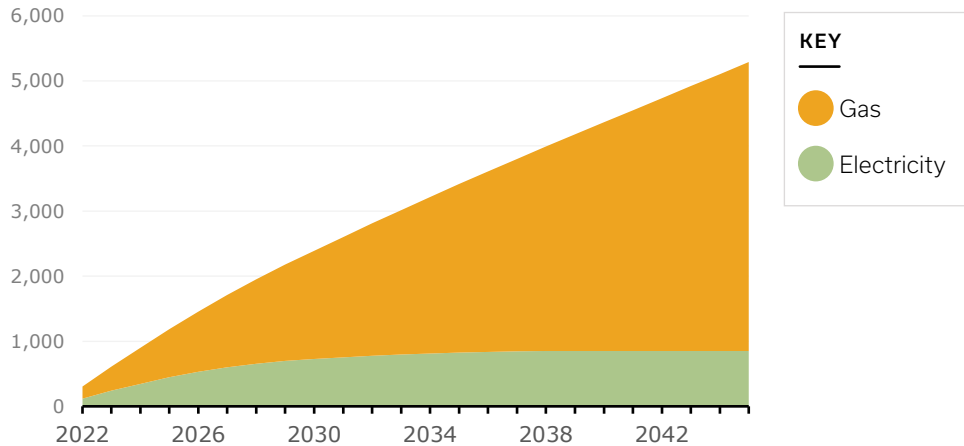
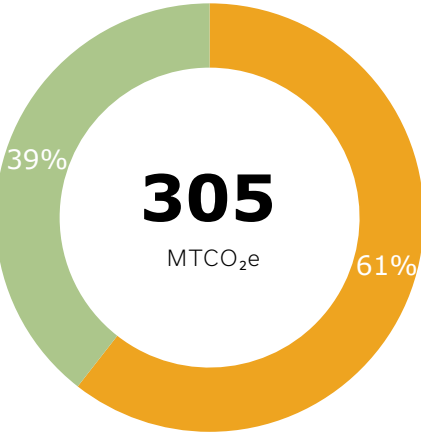
- Aging HVAC equipment
- Space and domestic water heating provided by gas boiler systems
- Limited existing cooling in building
- Aging envelope with limited insulation
- Lighting systems recently upgraded

CURRENTLY PLANNED IMPROVEMENTS

- Upgrades to HVAC controls to improve efficiency and performance

POTENTIAL OPPORTUNITIES

- Electrification of all heating systems within the building
- Incorporation of heat pump systems for heating and cooling
- Improved ventilation systems to provide enhanced filtration and maintain healthy indoor air quality
- Envelope enhancement to reduce conditioning loads and improve thermal comfort
- Incorporation of renewable energy systems to offset operational emissions
- Increased tree canopy and green space
-
-



Franklin Cluster

PORTLAND PUBLIC SCHOOLS



RANKING (OUT OF 20)		
AREA	94,753 SQUARE FEET	4
EUI	60 kBtu/SF	16
ENERGY COSTS	\$123,354	5
EMISSIONS	337 MTCO ₂ e	5
EMISSIONS INTENSITY	7.8 LBS-CO ₂ e/SF	18
WATER-USE INTENSITY	7.5 GAL/SF	10

Lane Middle School

BUILDING CONSTRUCTED: 1927

SUMMARY OF EXISTING CONDITIONS

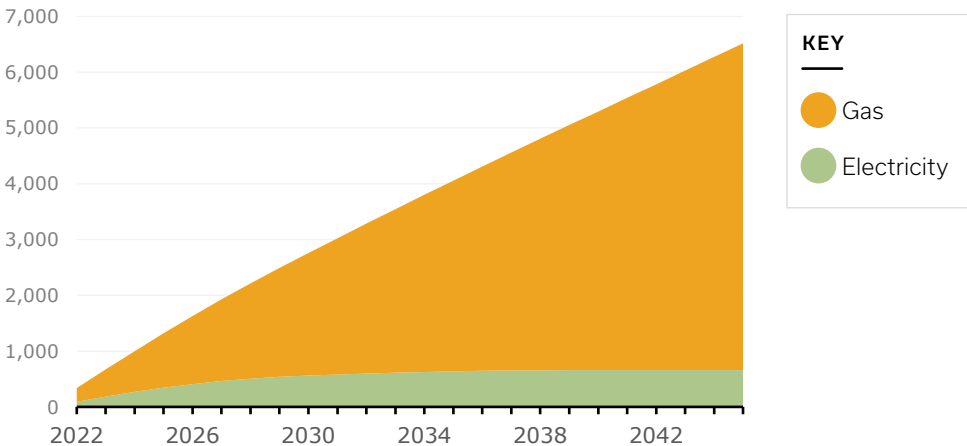
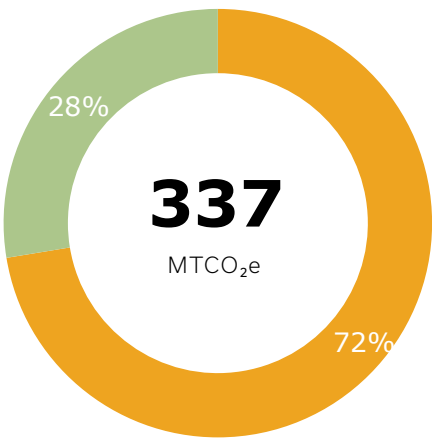
- Aging HVAC equipment
- Space and domestic water heating provided by gas boiler systems
- Limited existing cooling in building
- Limited insulation in existing envelope
- Lighting systems recently upgraded

CURRENTLY PLANNED IMPROVEMENTS

- Upgrades to HVAC controls to improve efficiency and performance

POTENTIAL OPPORTUNITIES

- ☐ Electrification of all heating systems within the building
- ☐ Incorporation of heat pump systems for heating and cooling
- ☐ Improved ventilation systems to provide enhanced filtration and maintain healthy indoor air quality
- ☐ Envelope enhancement to reduce conditioning loads and improve thermal comfort
- ☐ Incorporation of renewable energy systems to offset operational emissions
- ☐ Increased tree canopy and green space
- ☐
- ☐
- ☐



*Electric emissions projection based on 2023 emissions outlook from PGE



RANKING (OUT OF 20)		
AREA	78,100 SQUARE FEET	8
EUI	66 kBtu/SF	10
ENERGY COSTS	\$104,546	8
EMISSIONS	297 MTCO ₂ e	9
EMISSIONS INTENSITY	8.4 LBS-CO ₂ e/SF	13
WATER-USE INTENSITY	5.9 GAL/SF	13

Lent Elementary School

BUILDING CONSTRUCTED: 1949

SUMMARY OF EXISTING CONDITIONS

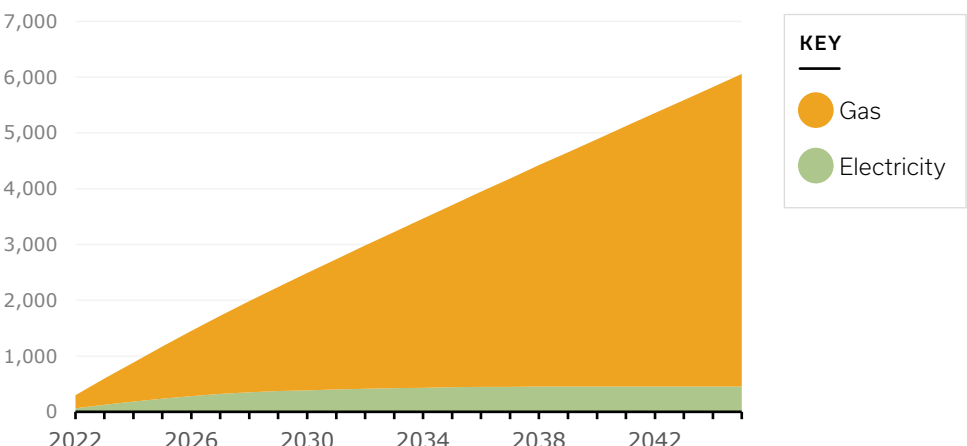
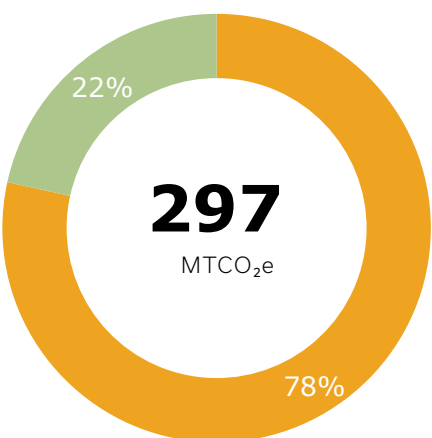
- Aging HVAC equipment
- Space and domestic water heating provided by gas boiler systems
- Limited existing cooling in building
- Aging envelope with limited insulation
- Lighting systems recently upgraded

CURRENTLY PLANNED IMPROVEMENTS

- Upgrades to HVAC controls to improve efficiency and performance

POTENTIAL OPPORTUNITIES

- ☐ Electrification of all heating systems within the building
- ☐ Incorporation of heat pump systems for heating and cooling
- ☐ Improved ventilation systems to provide enhanced filtration and maintain healthy indoor air quality
- ☐ Envelope enhancement to reduce conditioning loads and improve thermal comfort
- ☐ Incorporation of renewable energy systems to offset operational emissions
- ☐ Increased tree canopy and green space
- ☐
- ☐
- ☐



*Electric emissions projection based on 2023 emissions outlook from PGE

Franklin Cluster

PORTLAND PUBLIC SCHOOLS



RANKING (OUT OF 20)		
AREA	52,724 SQUARE FEET	15
EUI	82 kBtu/SF	5
ENERGY COSTS	\$89,759	13
EMISSIONS	248 MTCO ₂ e	15
EMISSIONS INTENSITY	10.4 LBS-CO ₂ e/SF	6
WATER-USE INTENSITY	25.9 GAL/SF	2

Marysville Elementary School

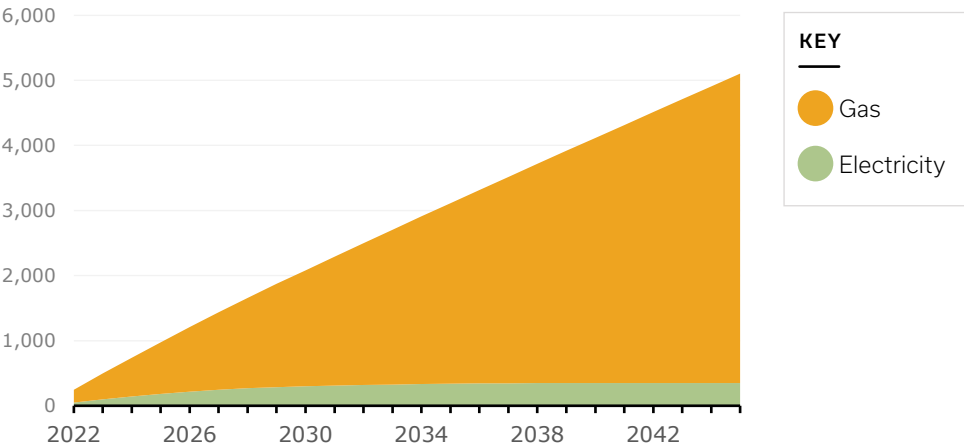
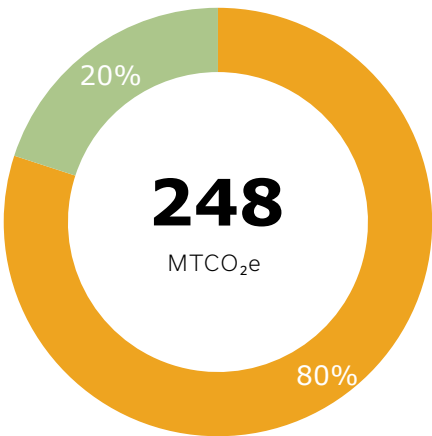
BUILDING CONSTRUCTED: 1921

SUMMARY OF EXISTING CONDITIONS

- Aging HVAC equipment
- Space and domestic water heating provided by gas boiler systems
- Limited existing cooling in building
- Aging envelope with limited insulation
- Aging and inefficient lighting technology

POTENTIAL OPPORTUNITIES

- ☐ Electrification of all heating systems within the building
- ☐ Incorporation of heat pump systems for heating and cooling
- ☐ Improved ventilation systems to provide enhanced filtration and maintain healthy indoor air quality
- ☐ Envelope enhancement to reduce conditioning loads and improve thermal comfort
- ☐ Upgrading lighting systems to high-efficiency LED fixtures
- ☐ Incorporation of renewable energy systems to offset operational emissions
- ☐ Increased tree canopy and green space
- ☐
- ☐
- ☐
- ☐



*Electric emissions projection based on 2023 emissions outlook from PGE



RANKING (OUT OF 20)		
AREA	79,477 SQUARE FEET	7
EUI	71 kBtu/SF	7
ENERGY COSTS	\$106,291	6
EMISSIONS	329 MTCO ₂ e	6
EMISSIONS INTENSITY	9.1 LBS-CO ₂ e/SF	9
WATER-USE INTENSITY	5.0 GAL/SF	16

Mt. Tabor Middle School

BUILDING CONSTRUCTED: 1952

SUMMARY OF EXISTING CONDITIONS

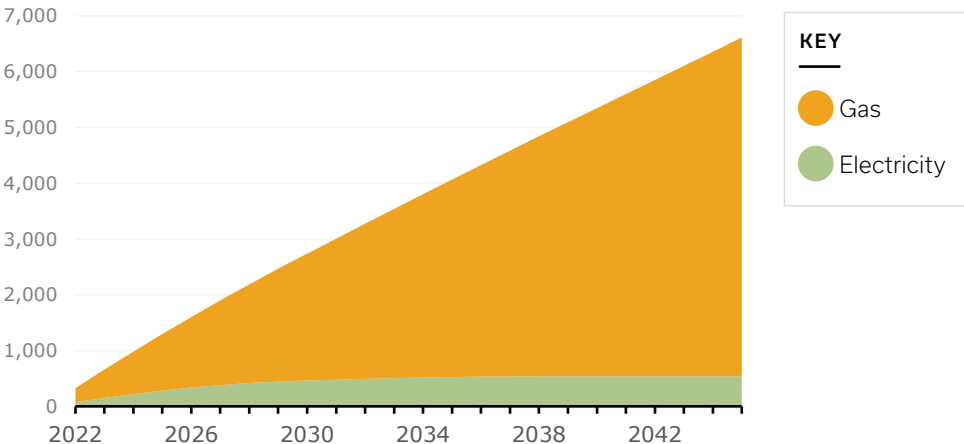
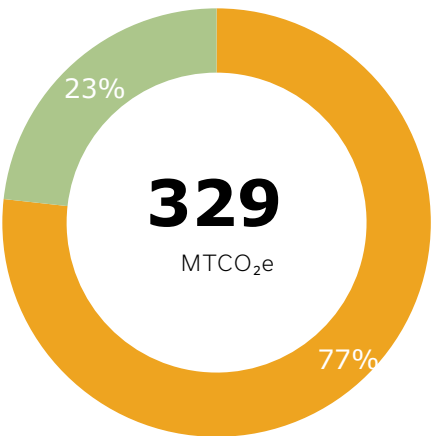
- Aging HVAC equipment
- Space and domestic water heating provided by gas boiler systems
- Limited existing cooling in building
- Aging envelope with limited insulation
- Lighting systems recently upgraded

CURRENTLY PLANNED IMPROVEMENTS

- Upgrades to HVAC controls to improve efficiency and performance

POTENTIAL OPPORTUNITIES

- ☐ Electrification of all heating systems within the building
- ☐ Incorporation of heat pump systems for heating and cooling
- ☐ Improved ventilation systems to provide enhanced filtration and maintain healthy indoor air quality
- ☐ Envelope enhancement to reduce conditioning loads and improve thermal comfort
- ☐ Incorporation of renewable energy systems to offset operational emissions
- ☐ Increased tree canopy and green space
- ☐
- ☐
- ☐
- ☐



*Electric emissions projection based on 2023 emissions outlook from PGE

Franklin Cluster

PORTLAND PUBLIC SCHOOLS



RANKING (OUT OF 20)		
AREA	79,894 SQUARE FEET	6
EUI	51 kBTU/SF	19
ENERGY COSTS	\$89,970	12
EMISSIONS	238 MTCO ₂ e	16
EMISSIONS INTENSITY	6.6 LBS-CO ₂ e/SF	20
WATER-USE INTENSITY	6.4 GAL/SF	12

Richmond Elementary School

BUILDING CONSTRUCTED: 1908

SUMMARY OF EXISTING CONDITIONS

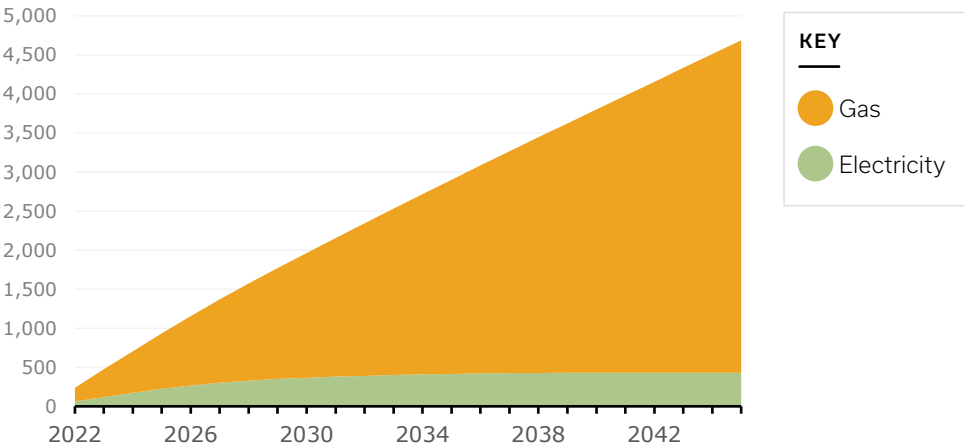
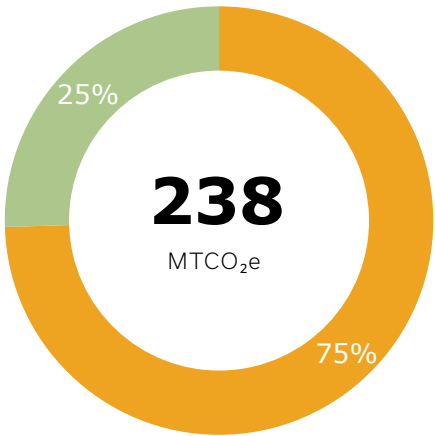
- Aging HVAC equipment
- Space and domestic water heating provided by gas boiler systems
- Limited existing cooling in building
- Aging envelope with limited insulation
- Lighting systems recently upgraded

CURRENTLY PLANNED IMPROVEMENTS

- Upgrades to HVAC controls to improve efficiency and performance

POTENTIAL OPPORTUNITIES

- ☐ Electrification of all heating systems within the building
- ☐ Incorporation of heat pump systems for heating and cooling
- ☐ Improved ventilation systems to provide enhanced filtration and maintain healthy indoor air quality
- ☐ Envelope enhancement to reduce conditioning loads and improve thermal comfort
- ☐ Incorporation of renewable energy systems to offset operational emissions
- ☐ Increased tree canopy and green space
- ☐
- ☐
- ☐
- ☐



*Electric emissions projection based on 2023 emissions outlook from PGE



RANKING (OUT OF 20)		
AREA	57,244 SQUARE FEET	12
EUI	101 kBTU/SF	1
ENERGY COSTS	\$91,318	11
EMISSIONS	327 MTCO ₂ e	7
EMISSIONS INTENSITY	12.6 LBS-CO ₂ e/SF	2
WATER-USE INTENSITY	3.6 GAL/SF	20

Whitman Elementary School

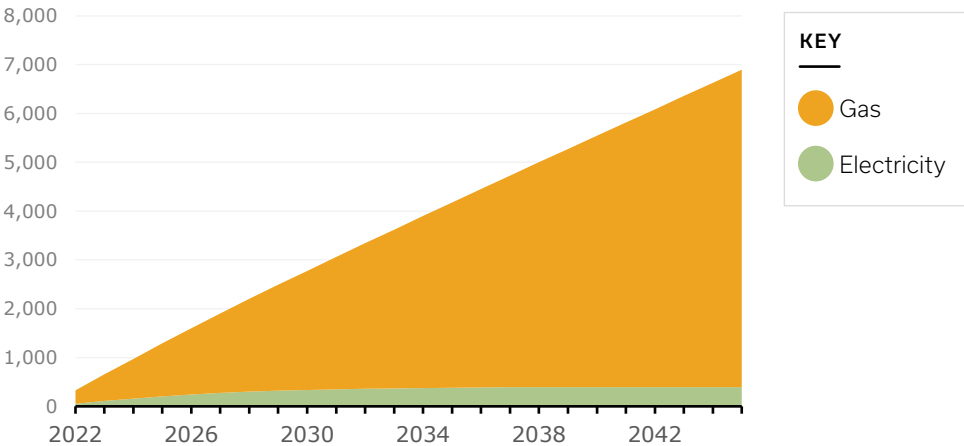
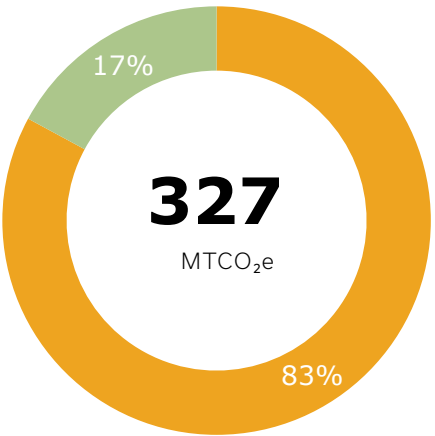
BUILDING CONSTRUCTED: 1954

SUMMARY OF EXISTING CONDITIONS

- Aging HVAC equipment
- Space and domestic water heating provided by gas boiler systems
- Limited existing cooling in building
- Aging envelope with limited insulation
- Lighting systems recently upgraded

POTENTIAL OPPORTUNITIES

- ☐ Electrification of all heating systems within the building
- ☐ Incorporation of heat pump systems for heating and cooling
- ☐ Improved ventilation systems to provide enhanced filtration and maintain healthy indoor air quality
- ☐ Envelope enhancement to reduce conditioning loads and improve thermal comfort
- ☐ Incorporation of renewable energy systems to offset operational emissions
- ☐
- ☐
- ☐
- ☐



*Electric emissions projection based on 2023 emissions outlook from PGE

Franklin Cluster

PORTLAND PUBLIC SCHOOLS



RANKING (OUT OF 20)		
AREA	51,900 SQUARE FEET	16
EUI	81 kBTU/SF	6
ENERGY COSTS	\$85,870	16
EMISSIONS	251 MTCO ₂ e	14
EMISSIONS INTENSITY	10.7 LBS-CO ₂ e/SF	5
WATER-USE INTENSITY	7.3 GAL/SF	11

Woodmere Elementary School

BUILDING CONSTRUCTED: 1954

SUMMARY OF EXISTING CONDITIONS

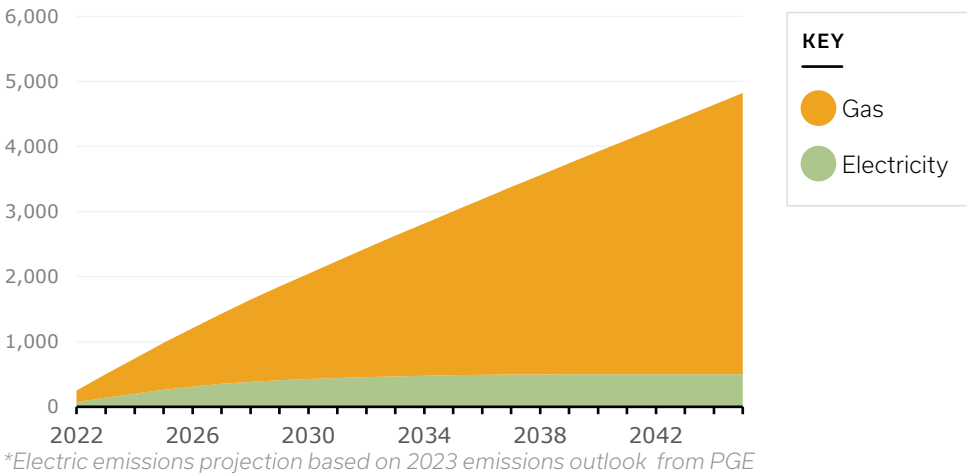
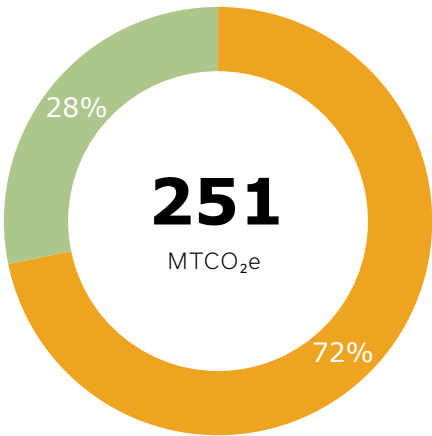
- Aging HVAC equipment
- Space and domestic water heating provided by gas boiler systems
- Limited existing cooling in building
- Aging envelope with limited insulation
- Aging and inefficient lighting technology

CURRENTLY PLANNED IMPROVEMENTS

- Upgrades to HVAC controls to improve efficiency and performance

POTENTIAL OPPORTUNITIES

- ☐ Electrification of all heating systems within the building
- ☐ Incorporation of heat pump systems for heating and cooling
- ☐ Improved ventilation systems to provide enhanced filtration and maintain healthy indoor air quality
- ☐ Envelope enhancement to reduce conditioning loads and improve thermal comfort
- ☐ Upgrading lighting systems to high-efficiency LED fixtures
- ☐ Incorporation of renewable energy systems to offset operational emissions
- ☐
- ☐
- ☐



RANKING (OUT OF 20)		
AREA	62,918 SQUARE FEET	11
EUI	93 kBTU/SF	3
ENERGY COSTS	\$122,806	5
EMISSIONS	349 MTCO ₂ e	4
EMISSIONS INTENSITY	12.2 LBS-CO ₂ e/SF	3
WATER-USE INTENSITY	9.5 GAL/SF	7

Youngson/Holladay Center K-8 School

BUILDING CONSTRUCTED: 1955

SUMMARY OF EXISTING CONDITIONS

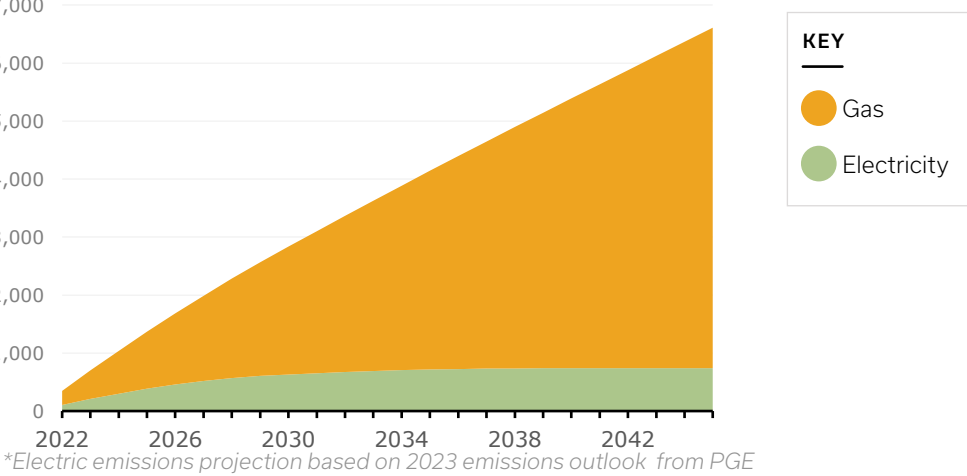
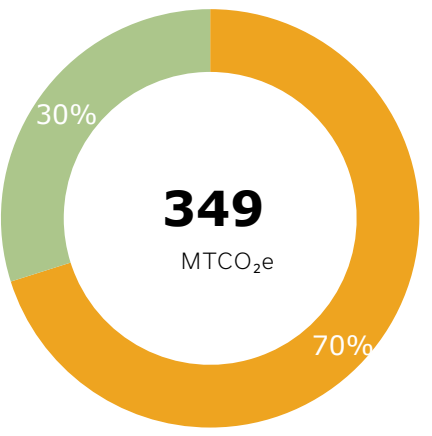
- Aging HVAC equipment
- Space and domestic water heating provided by gas boiler systems
- Limited existing cooling in building
- Limited insulation in existing envelope
- Aging and inefficient lighting technology

CURRENTLY PLANNED IMPROVEMENTS

- Upgrades to HVAC controls to improve efficiency and performance
- Upgrading lighting systems to high-efficiency LED fixtures

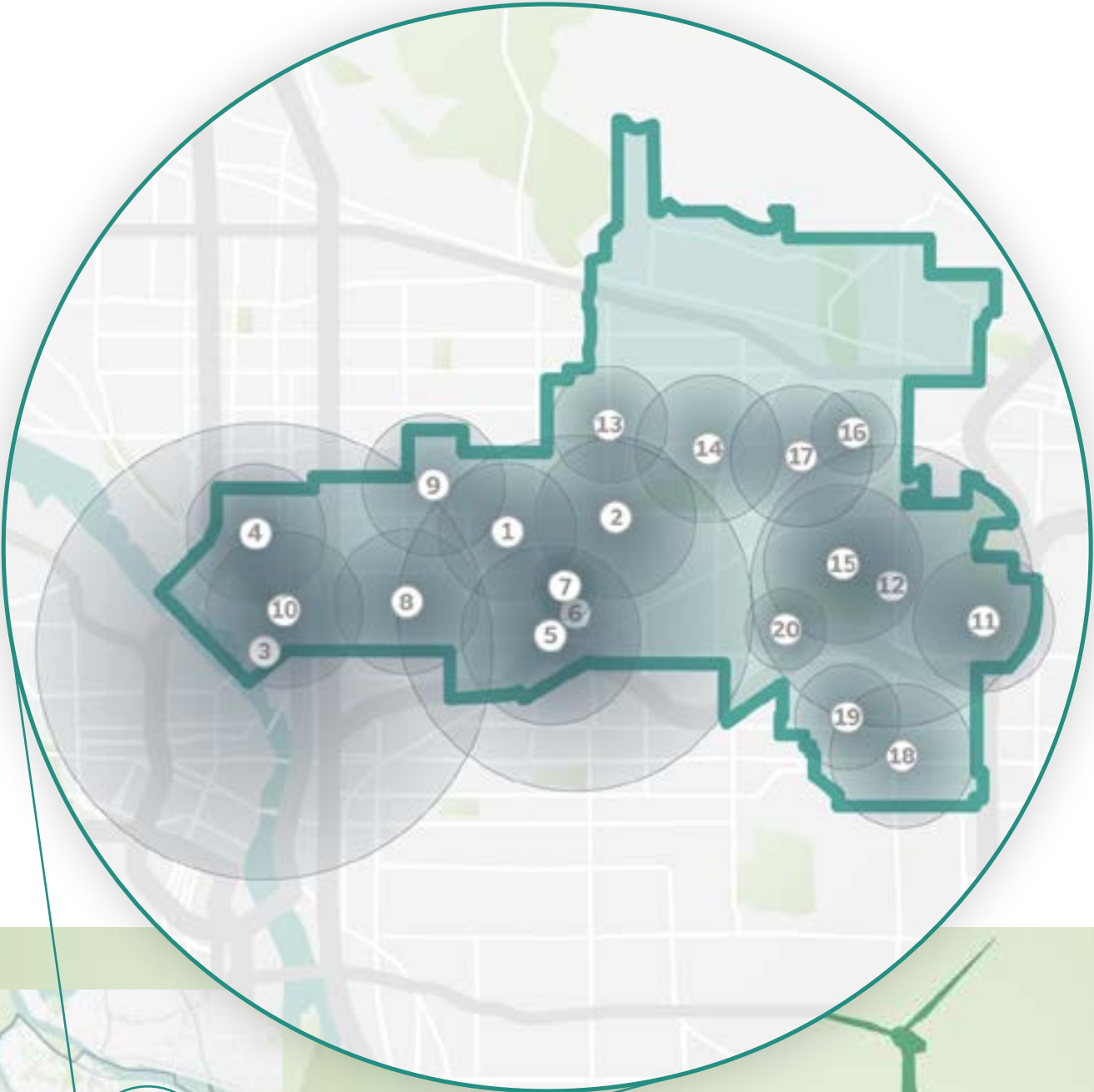
POTENTIAL OPPORTUNITIES

- ☐ Electrification of all heating systems within the building
- ☐ Incorporation of heat pump systems for heating and cooling
- ☐ Improved ventilation systems to provide enhanced filtration and maintain healthy indoor air quality
- ☐ Envelope enhancement to reduce conditioning loads and improve thermal comfort
- ☐ Incorporation of renewable energy systems to offset operational emissions
- ☐ Increased tree canopy and green space
- ☐
- ☐



Building Performance for Grant-McDaniel Clusters

PORTLAND PUBLIC SCHOOLS | 2022



FACILITY	AREA (SF)	EUI (kBtu/SF/YR)	ENERGY COST (\$)	GAS EMISSIONS (MTCO ₂ E)	ELECTRIC EMISSIONS (MTCO ₂ E)	TOTAL EMISSIONS (MTCO ₂ E)	EMISSIONS INTENSITY (LBS CO ₂ E/SF)	WATER USE INTENSITY (GAL/SF)
1 Alameda	65,765	59	\$88,152	168	160	328	11.0	14.4
2 Beaumont	91,294	61	\$99,458	248	198	445	10.8	4.3
3 BESC/PEC	419,802	58	\$526,135	544	3,048	3,592	18.9	6.2
4 Boise-Eliot	65,248	52	\$76,645	135	202	337	11.4	5.5
5 Fernwood/Bev Cl	88,815	61	\$130,593	210	337	547	13.6	15.3
6 Grant	319,715	53	\$346,412	641	1,075	1,715	11.8	11.2
7 Hollyrood/Bev Cl	15,541	45	\$20,787	26	50	76	10.8	7.7
8 Irvington	59,874	81	\$83,763	229	133	361	13.3	7.3
9 Sabin	65,769	61	\$85,469	172	179	350	11.7	5.3
10 Tubman	87,610	42	\$108,463	120	302	422	10.6	6.7
11 Lee	63,170	65	\$81,489	188	153	340	11.9	5.5
12 McDaniel	333,441	33	\$336,868	293	1,074	1,367	9.0	3.2
13 Meek/Alliance	35,945	64	\$53,592	88	144	232	14.2	6.6
14 Rigler	69,143	69	\$97,942	221	153	373	11.9	12.6
15 Roseway Heights	103,610	44	\$90,417	180	255	434	9.2	3.1
16 Sacajawea	18,862	78	\$38,307	65	59	124	14.5	19.5
17 Scott	68,805	67	\$86,642	214	132	346	11.1	6.9
18 Vestal	72,906	68	\$88,616	231	123	354	10.7	7.8
19 Wilcox	20,432	64	\$35,449	29	162	190	20.5	7.2
20 Rice	16,136	80	\$30,193	55	58	113	15.5	12.5
Cluster Total	2,081,883		\$2,505,392	4,054	7,995	12,048	N/A	N/A
District Total	9,065,846		\$12,197,485	22,581	18,113	40,694	N/A	N/A
Clusters Average	104,094	55	\$125,270	203	400	602	12.8	7.4
District Average	88,018	62	\$118,422	219	176	395	9.9	8.4

MAP KEY

○

City of Portland Boundary

●

Cluster Boundary

●

Total Emissions
MTCO₂E

20

TOTAL
BUILDINGS

12,048

MTCO₂E

TOTAL
EMISSIONS

12.8

LBS CO₂E/SF

AVERAGE EMISSIONS
INTENSITY

7.4

GAL/SF

AVERAGE WATER
USE INTENSITY

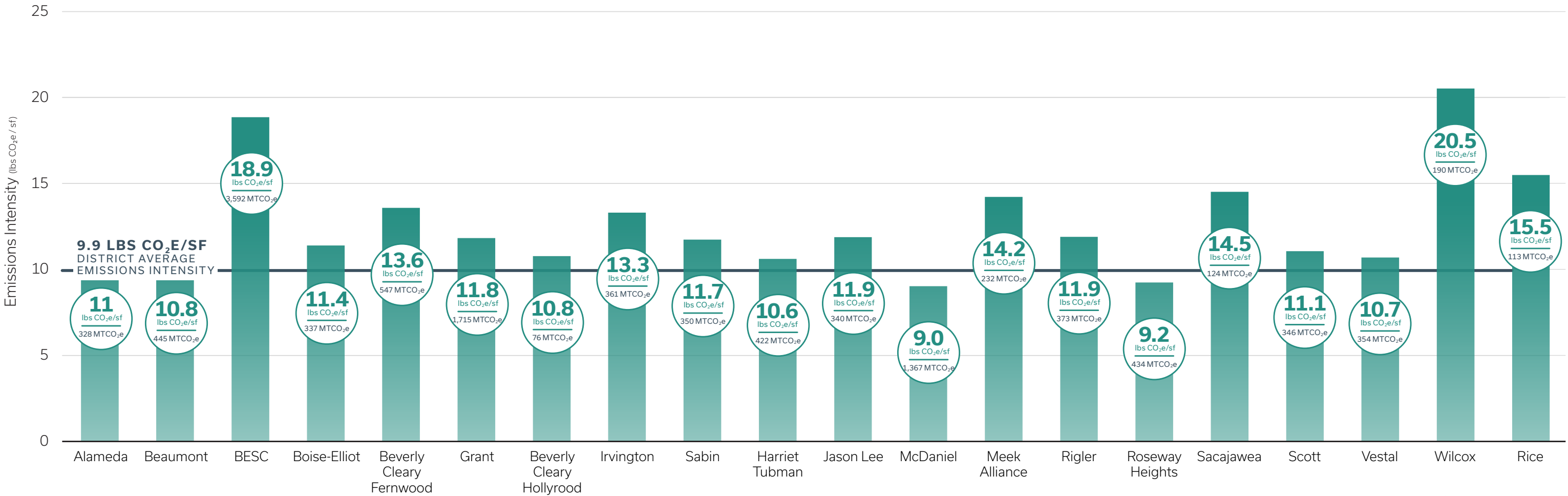
- The total emissions from these clusters account for roughly 30% of the total emissions for the district, with the average emissions intensities being roughly 29% higher than the district average.
- The building with the highest total emissions is district admin facility (BESC) which includes the district server facility and operates 24/7
- Electric emissions account for the majority of emissions in 12/20 building and the electrical grid decarbonization will have a significant impact on the future emissions of these facilities

KEY ABBREVIATIONS

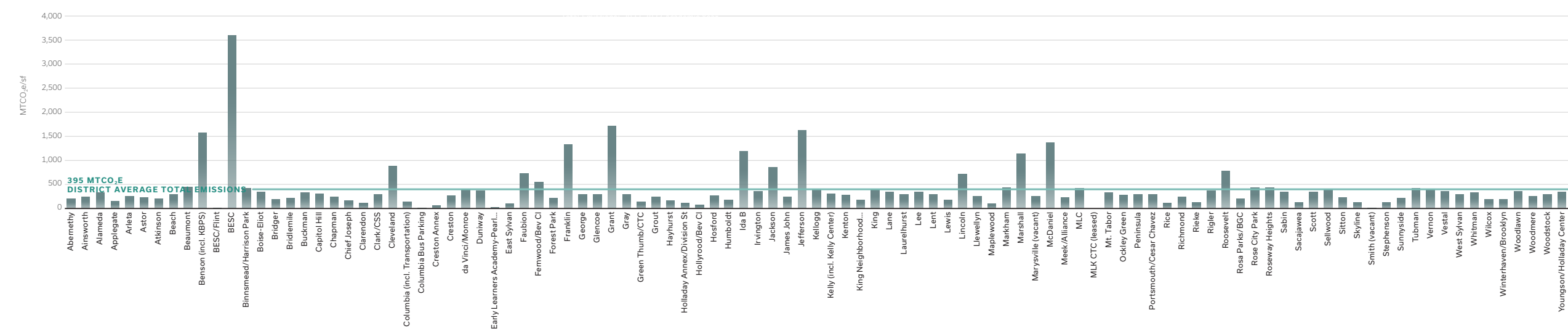
EUI | Energy Use Intensity
KBTU | Thousand British thermal units
SF | square feet
CO₂E | CO₂ equivalent
MT | Metric Ton
LBS | Pounds

Emissions Comparison for Grant-McDaniel Clusters

PORTLAND PUBLIC SCHOOLS



PORTLAND PUBLIC SCHOOL TOTAL EMISSIONS: 2022-2023 ACADEMIC YEAR



Grant-McDaniel Cluster

PORTLAND PUBLIC SCHOOLS



RANKING (OUT OF 20)		
AREA	65,765 SQUARE FEET	12
EUI	59 kBtu/SF	13
ENERGY COSTS	\$88,152	10
EMISSIONS	328 MTCO ₂ e	15
EMISSIONS INTENSITY	11 LBS-CO ₂ e/SF	14
WATER-USE INTENSITY	14.4 GAL/SF	3

Alameda Elementary School

BUILDING CONSTRUCTED: 1921

SUMMARY OF EXISTING CONDITIONS

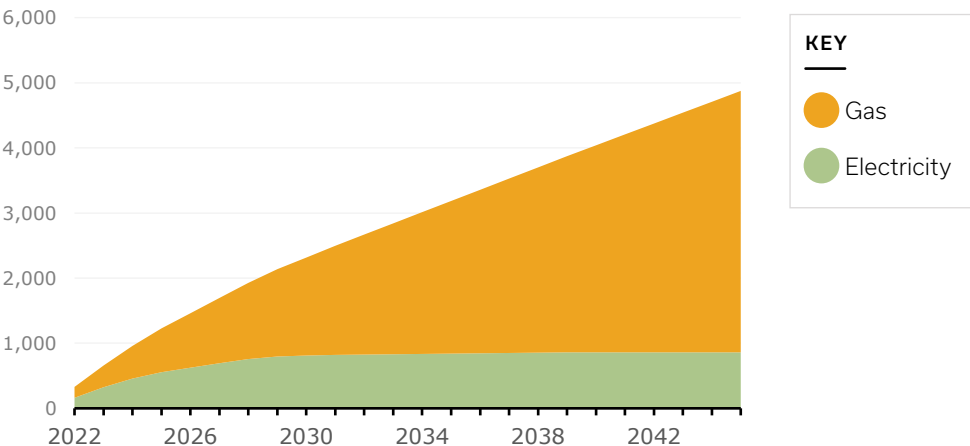
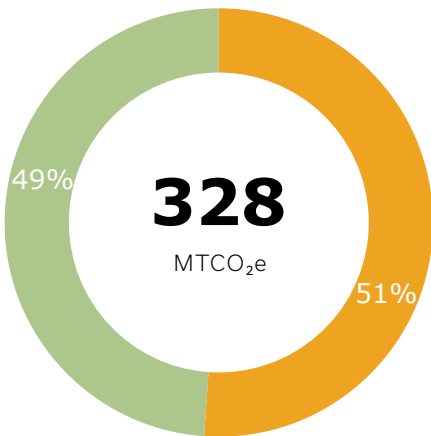
- Aging HVAC equipment
- Space and domestic water heating provided by gas boiler systems
- Limited existing cooling in building
- Aging envelope with limited insulation
- Lighting systems recently upgraded

CURRENTLY PLANNED IMPROVEMENTS

- Upgrades to HVAC controls to improve efficiency and performance

POTENTIAL OPPORTUNITIES

- ☐ Electrify all heating systems within the building
- ☐ Incorporate heat pump systems for heating and cooling
- ☐ Improve ventilation systems to provide enhanced filtration and maintain healthy indoor air quality
- ☐ Envelope enhancement to reduce conditioning loads and improve thermal comfort
- ☐ Incorporate renewable energy systems to offset operational emissions
- ☐ Increased tree canopy and green space
- ☐
- ☐
- ☐



*Electric emissions projection based on 2023 emissions outlook from Pacific Power



RANKING (OUT OF 20)		
AREA	91,294 SQUARE FEET	5
EUI	61 kBtu/SF	12
ENERGY COSTS	\$99,458	6
EMISSIONS	445 MTCO ₂ e	5
EMISSIONS INTENSITY	10.8 LBS-CO ₂ e/SF	16
WATER-USE INTENSITY	4.3 GAL/SF	18

Beaumont Middle School

BUILDING CONSTRUCTED: 1989

SUMMARY OF EXISTING CONDITIONS

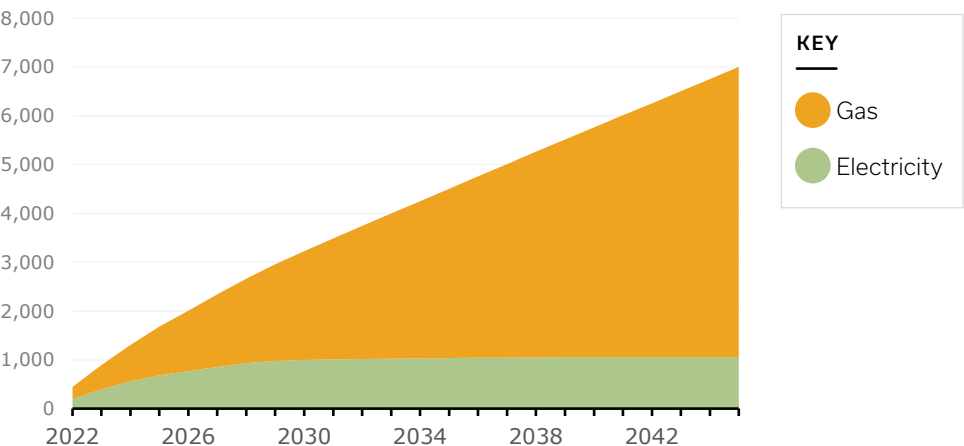
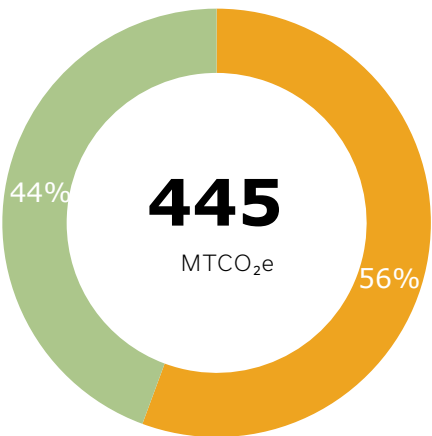
- Aging HVAC equipment
- Space and domestic water heating provided by gas boiler systems
- Limited existing cooling in building
- Aging envelope with limited insulation
- Lighting systems recently upgraded

CURRENTLY PLANNED IMPROVEMENTS

- Upgrades to HVAC controls to improve efficiency and performance

POTENTIAL OPPORTUNITIES

- ☐ Electrify all heating systems within the building
- ☐ Incorporate heat pump systems for heating and cooling
- ☐ Improve ventilation systems to provide enhanced filtration and maintain healthy indoor air quality
- ☐ Envelope enhancement to reduce conditioning loads and improve thermal comfort
- ☐ Incorporate renewable energy systems to offset operational emissions
- ☐ Increased tree canopy and green space
- ☐
- ☐
- ☐



*Electric emissions projection based on 2023 emissions outlook from Pacific Power

Grant-McDaniel Cluster

PORTLAND PUBLIC SCHOOLS



		RANKING (OUT OF 20)
AREA	419,802 SQUARE FEET	1
EUI	58 kBtu/SF	14
ENERGY COSTS	\$526,135	1
EMISSIONS	3,592 MTCO ₂ e	1
EMISSIONS INTENSITY	18.9 LBS-CO ₂ e/SF	2
WATER-USE INTENSITY	6.2 GAL/SF	14

BESC/PEC - Dr. Matthew Prophet Education Center

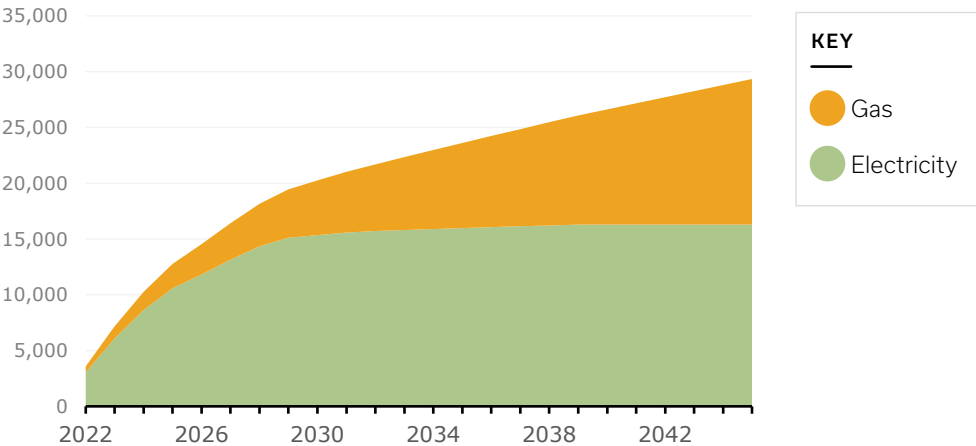
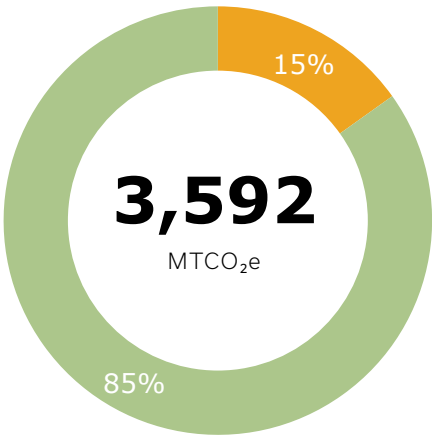
BUILDING CONSTRUCTED: 1978

SUMMARY OF EXISTING CONDITIONS

- Aging HVAC equipment with existing cooling systems
- Space and domestic water heating provided by gas boiler systems
- 24/7 facility with significant district Data Center load
- Limited insulation in existing envelope
- Recently updated LED lighting

POTENTIAL OPPORTUNITIES

- ☐ Electrify all heating systems within the building
- ☐ Data Center optimization and server visualization
- ☐ Improve ventilation systems to provide enhanced filtration and maintain healthy indoor air quality
- ☐ Envelope enhancement to reduce conditioning loads and improve thermal comfort
- ☐ Incorporate renewable energy systems to offset operational emissions
- ☐ Increased tree canopy and green space
- ☐
- ☐
- ☐



*Electric emissions projection based on 2023 emissions outlook from Pacific Power



		RANKING (OUT OF 20)
AREA	65,248 SQUARE FEET	13
EUI	53 kBtu/SF	15
ENERGY COSTS	\$76,645	15
EMISSIONS	337 MTCO ₂ e	14
EMISSIONS INTENSITY	11.4 LBS-CO ₂ e/SF	12
WATER-USE INTENSITY	5.5 GAL/SF	15

Boise-Eliot Elementary School

BUILDING CONSTRUCTED: 1926

SUMMARY OF EXISTING CONDITIONS

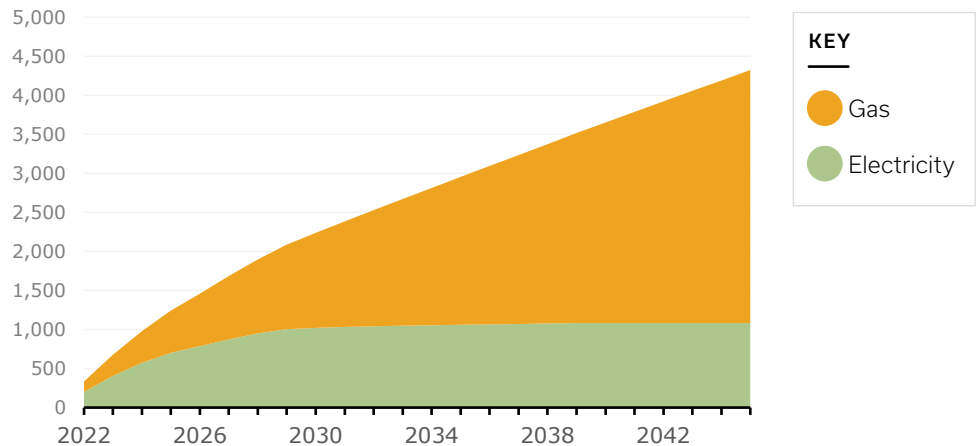
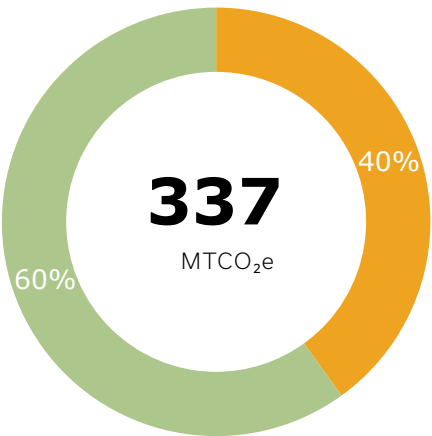
- Aging HVAC equipment
- Space and domestic water heating provided by gas boiler systems
- Limited existing cooling in building
- Limited insulation in existing envelope
- Lighting systems recently upgraded

CURRENTLY PLANNED IMPROVEMENTS

- Upgrades to HVAC controls to improve efficiency and performance

POTENTIAL OPPORTUNITIES

- ☐ Electrify all heating systems within the building
- ☐ Incorporate heat pump systems for heating and cooling
- ☐ Improve ventilation systems to provide enhanced filtration and maintain healthy indoor air quality
- ☐ Envelope enhancement to reduce conditioning loads and improve thermal comfort
- ☐ Incorporate renewable energy systems to offset operational emissions
- ☐ Increased tree canopy and green space
- ☐
- ☐
- ☐



*Electric emissions projection based on 2023 emissions outlook from Pacific Power

Grant-McDaniel Cluster

PORTLAND PUBLIC SCHOOLS



RANKING (OUT OF 20)		
AREA	88,815 SQUARE FEET	6
EUI	62 kBtu/SF	10
ENERGY COSTS	\$130,593	4
EMISSIONS	547 MTCO ₂ e	4
EMISSIONS INTENSITY	13.6 LBS-CO ₂ e/SF	6
WATER-USE INTENSITY	15.3 GAL/SF	2

Beverly Cleary Fernwood Elementary School

BUILDING CONSTRUCTED: 1911

SUMMARY OF EXISTING CONDITIONS

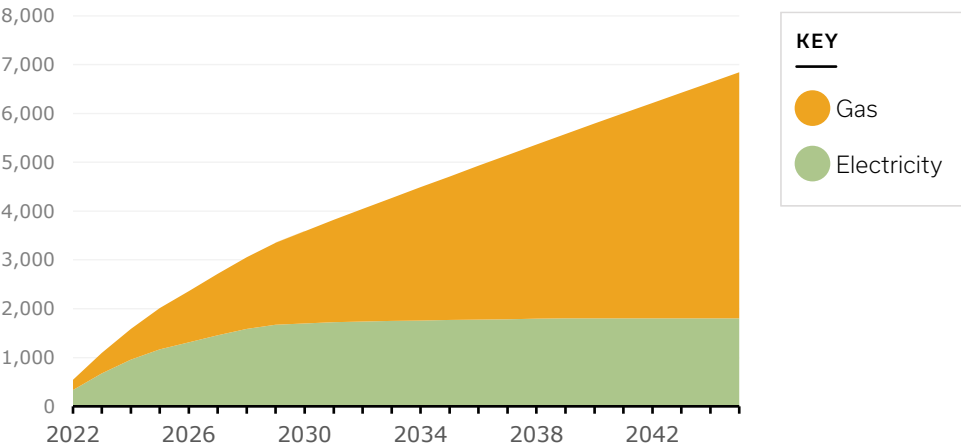
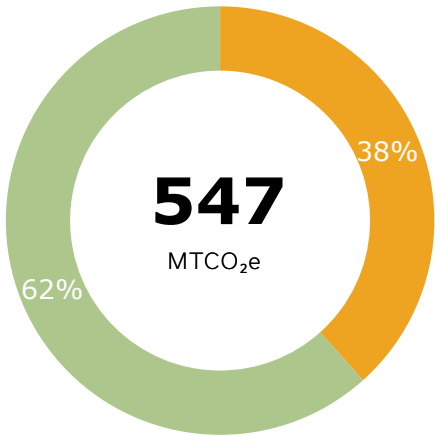
- Aging HVAC equipment
- Space and domestic water heating provided by gas boiler systems
- Limited existing cooling in building
- Limited insulation in existing envelope
- Lighting systems recently upgraded

CURRENTLY PLANNED IMPROVEMENTS

- Upgrades to HVAC controls to improve efficiency and performance

POTENTIAL OPPORTUNITIES

- ☐ Electrify all heating systems within the building
- ☐ Incorporate heat pump systems for heating and cooling
- ☐ Improve ventilation systems to provide enhanced filtration and maintain healthy indoor air quality
- ☐ Envelope enhancement to reduce conditioning loads and improve thermal comfort
- ☐ Incorporate renewable energy systems to offset operational emissions
- ☐ Increased tree canopy and green space
- ☐
- ☐



*Electric emissions projection based on 2023 emissions outlook from Pacific Power



RANKING (OUT OF 20)		
AREA	319,715 SQUARE FEET	3
EUI	53 kBtu/SF	16
ENERGY COSTS	\$346,412	2
EMISSIONS	1,715 MTCO ₂ e	2
EMISSIONS INTENSITY	11.8 LBS-CO ₂ e/SF	10
WATER-USE INTENSITY	11.2 GAL/SF	6

Grant High School

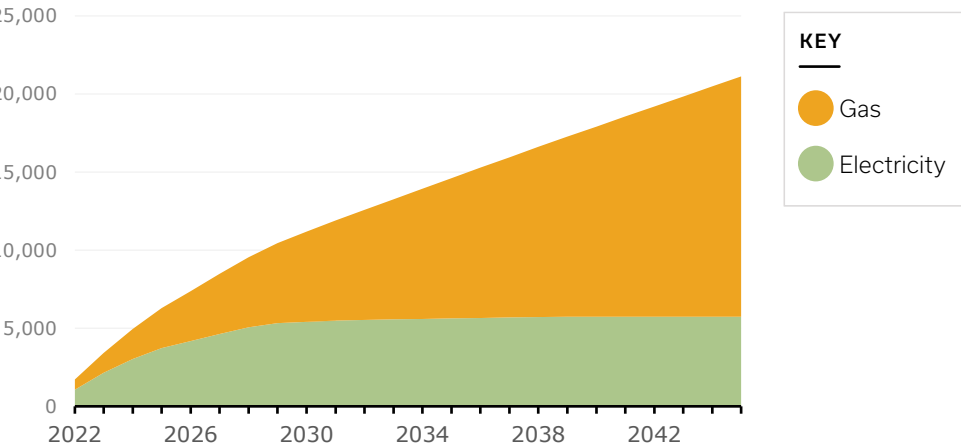
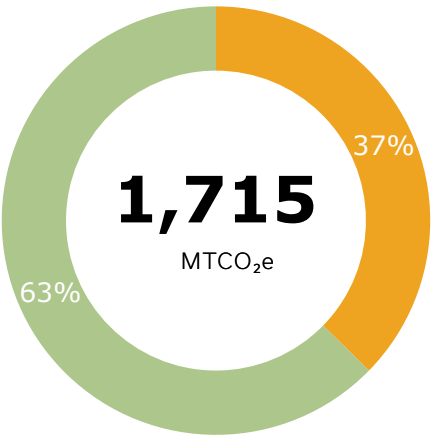
BUILDING CONSTRUCTED: 1923 | MODERNIZED: 2019

SUMMARY OF EXISTING CONDITIONS

- Recent modernization
- Updated envelope, lighting, and mechanical systems
- Gas is still used for space and domestic water heating

POTENTIAL OPPORTUNITIES

- ☐ Electrify all heating systems within the building
- ☐ Incorporate renewable energy systems to offset operational emissions
- ☐ Increased tree canopy and green space
- ☐
- ☐
- ☐
- ☐



*Electric emissions projection based on 2023 emissions outlook from Pacific Power

Grant-McDaniel Cluster

PORTLAND PUBLIC SCHOOLS



RANKING (OUT OF 20)		
AREA	15,541 SQUARE FEET	20
EUI	46 kBtu/SF	17
ENERGY COSTS	\$20,787	20
EMISSIONS	76 MTCO ₂ e	20
EMISSIONS INTENSITY	10.8 LBS-CO ₂ e/SF	15
WATER-USE INTENSITY	7.7 GAL/SF	8

Hollyrood Elementary School

BUILDING CONSTRUCTED: 1959

SUMMARY OF EXISTING CONDITIONS

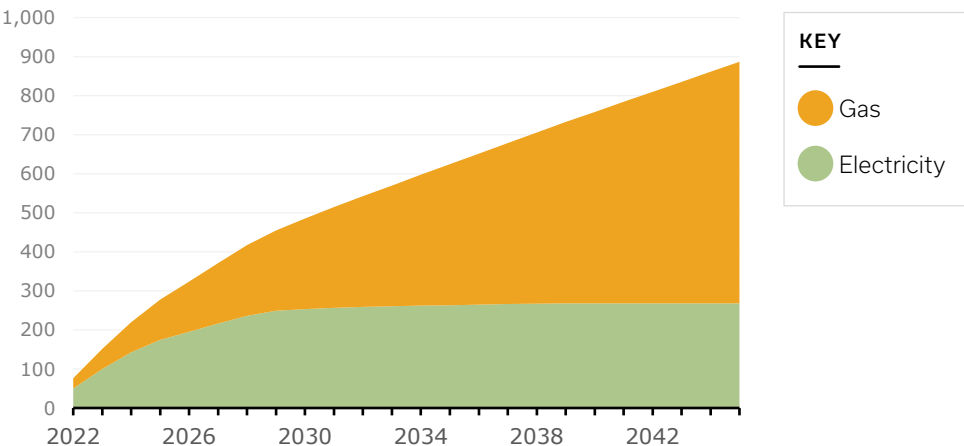
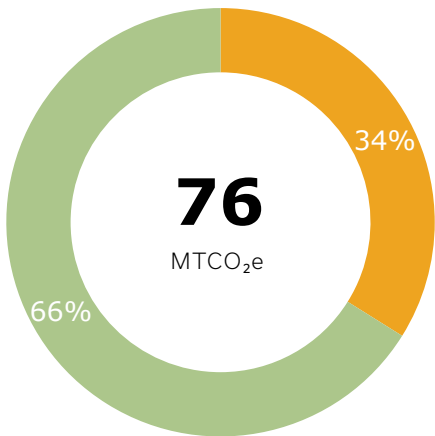
- Aging HVAC equipment
- Space and domestic water heating provided by gas boiler systems
- Limited existing cooling in building
- Limited insulation in existing envelope
- Aging and inefficient lighting technology

CURRENTLY PLANNED IMPROVEMENTS

- Upgrades to HVAC controls to improve efficiency and performance

POTENTIAL OPPORTUNITIES

- ☐ Electrify all heating systems within the building
- ☐ Incorporate heat pump systems for heating and cooling
- ☐ Improve ventilation systems to provide enhanced filtration and maintain healthy indoor air quality
- ☐ Envelope enhancement to reduce conditioning loads and improve thermal comfort
- ☐ Upgrading lighting systems to high-efficiency LED fixtures
- ☐ Incorporate renewable energy systems to offset operational emissions
- ☐ Increased tree canopy and green space
- ☐
- ☐
- ☐



*Electric emissions projection based on 2023 emissions outlook from Pacific Power



RANKING (OUT OF 20)		
AREA	59,874 SQUARE FEET	15
EUI	82 kBtu/SF	1
ENERGY COSTS	\$83,763	13
EMISSIONS	361 MTCO ₂ e	9
EMISSIONS INTENSITY	13.3 LBS-CO ₂ e/SF	7
WATER-USE INTENSITY	7.3 GAL/SF	9

Irvington Elementary School

BUILDING CONSTRUCTED: 1932

SUMMARY OF EXISTING CONDITIONS

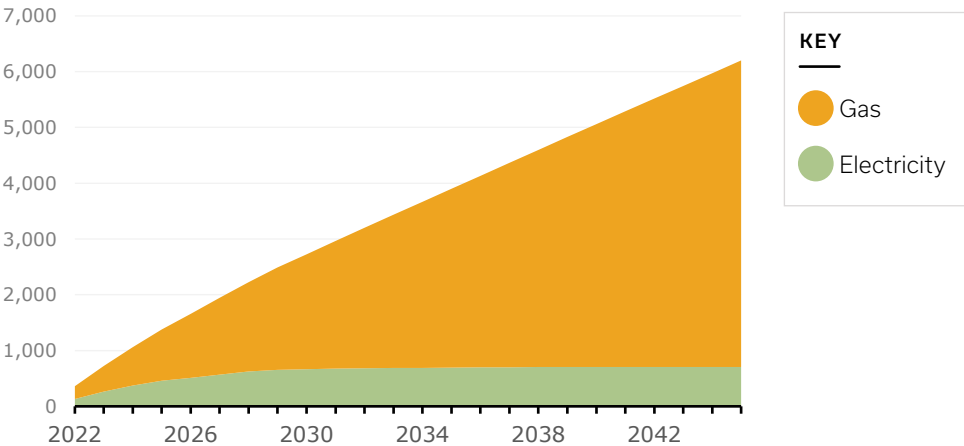
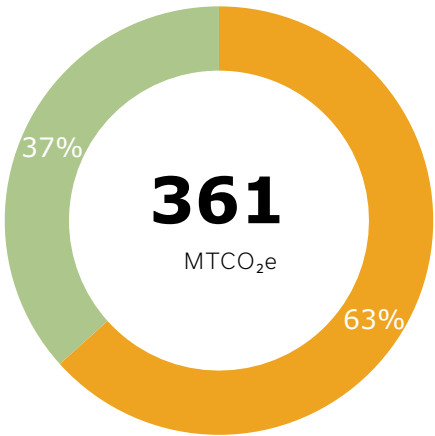
- Aging HVAC equipment
- Space and domestic water heating provided by gas boiler systems
- Limited existing cooling in building
- Aging envelope with limited insulation
- Lighting systems recently upgraded

CURRENTLY PLANNED IMPROVEMENTS

- Upgrades to HVAC controls to improve efficiency and performance

POTENTIAL OPPORTUNITIES

- ☐ Electrify all heating systems within the building
- ☐ Incorporate heat pump systems for heating and cooling
- ☐ Improve ventilation systems to provide enhanced filtration and maintain healthy indoor air quality
- ☐ Envelope enhancement to reduce conditioning loads and improve thermal comfort
- ☐ Incorporate renewable energy systems to offset operational emissions
- ☐ Increased tree canopy and green space
- ☐
- ☐
- ☐



*Electric emissions projection based on 2023 emissions outlook from Pacific Power

Grant-McDaniel Cluster

PORTLAND PUBLIC SCHOOLS



		RANKING (OUT OF 20)
AREA	63,170 SQUARE FEET	14
EUI	67 kBTU/SF	7
ENERGY COSTS	\$81,489	14
EMISSIONS	340 MTCO ₂ e	13
EMISSIONS INTENSITY	11.9 LBS-CO ₂ e/SF	9
WATER-USE INTENSITY	5.5 GAL/SF	16

Jason Lee Elementary School

BUILDING CONSTRUCTED: 1953

SUMMARY OF EXISTING CONDITIONS

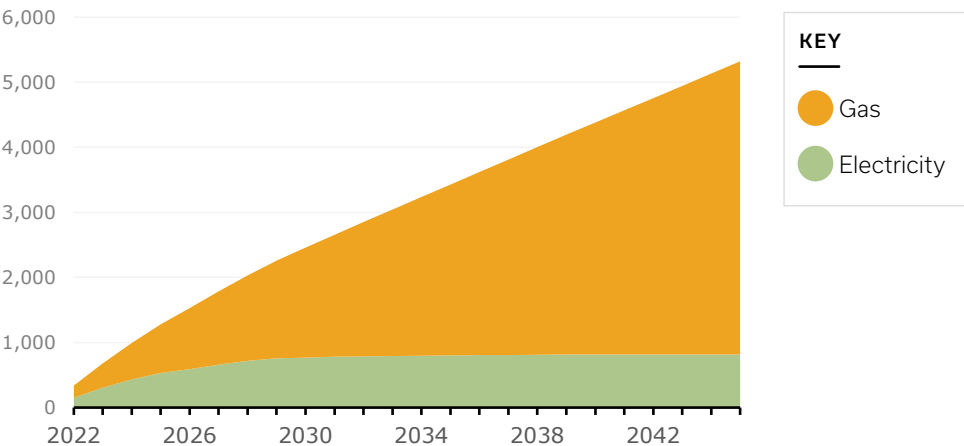
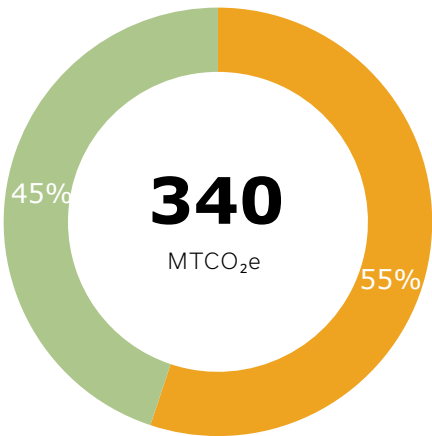
- Aging HVAC equipment
- Space and domestic water heating provided by gas boiler systems
- Limited existing cooling in building
- Limited insulation in existing envelope
- Aging and inefficient lighting technology

CURRENTLY PLANNED IMPROVEMENTS

- Upgrades to HVAC controls to improve efficiency and performance

POTENTIAL OPPORTUNITIES

- ☐ Electrify all heating systems within the building
- ☐ Incorporate heat pump systems for heating and cooling
- ☐ Improve ventilation systems to provide enhanced filtration and maintain healthy indoor air quality
- ☐ Envelope enhancement to reduce conditioning loads and improve thermal comfort
- ☐ Upgrading lighting systems to high-efficiency LED fixtures
- ☐ Incorporate renewable energy systems to offset operational emissions
- ☐ Increased tree canopy and green space
- ☐
- ☐



*Electric emissions projection based on 2023 emissions outlook from Pacific Power



		RANKING (OUT OF 20)
AREA	333,441 SQUARE FEET	2
EUI	31 kBTU/SF	20
ENERGY COSTS	\$320,160	3
EMISSIONS	1,507 MTCO ₂ e	3
EMISSIONS INTENSITY	9 LBS-CO ₂ e/SF	20
WATER-USE INTENSITY	3.2 GAL/SF	19

McDaniel High School

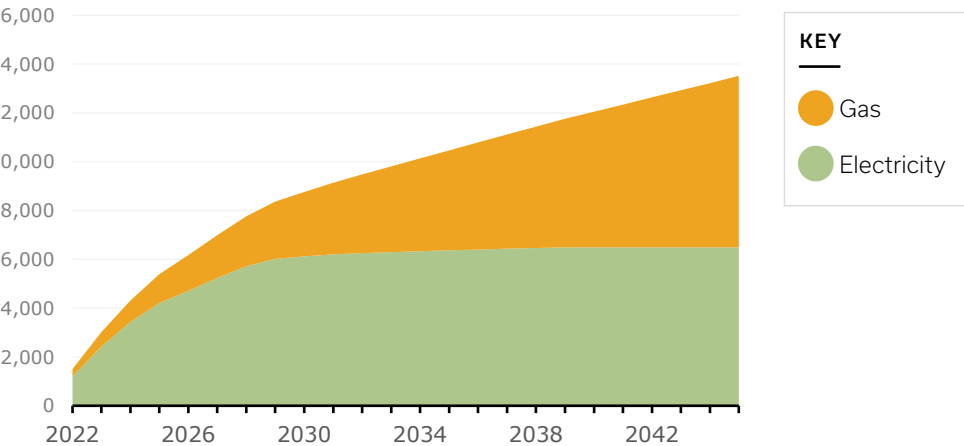
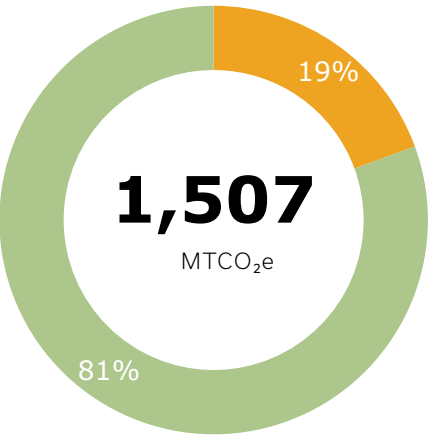
BUILDING CONSTRUCTED: 1955 | MODERNIZED: 2021

SUMMARY OF EXISTING CONDITIONS

- Updated envelope, lighting, and mechanical systems
- Gas is still used for space and domestic water heating

POTENTIAL OPPORTUNITIES

- ☐ Electrify all heating systems within the building
- ☐ Incorporate renewable energy systems to offset operational emissions
- ☐ Increased tree canopy and green space
- ☐
- ☐
- ☐



*Electric emissions projection based on 2023 emissions outlook from Pacific Power

Grant-McDaniel Cluster

PORTLAND PUBLIC SCHOOLS



		RANKING (OUT OF 20)
AREA	35,945 SQUARE FEET	16
EUI	65 kBtu/SF	8
ENERGY COSTS	\$53,592	16
EMISSIONS	232 MTCO ₂ e	16
EMISSIONS INTENSITY	14.2 LBS-CO ₂ e/SF	5
WATER-USE INTENSITY	6.6 GAL/SF	13

Alliance High School at Meek

BUILDING CONSTRUCTED: 1953

SUMMARY OF EXISTING CONDITIONS

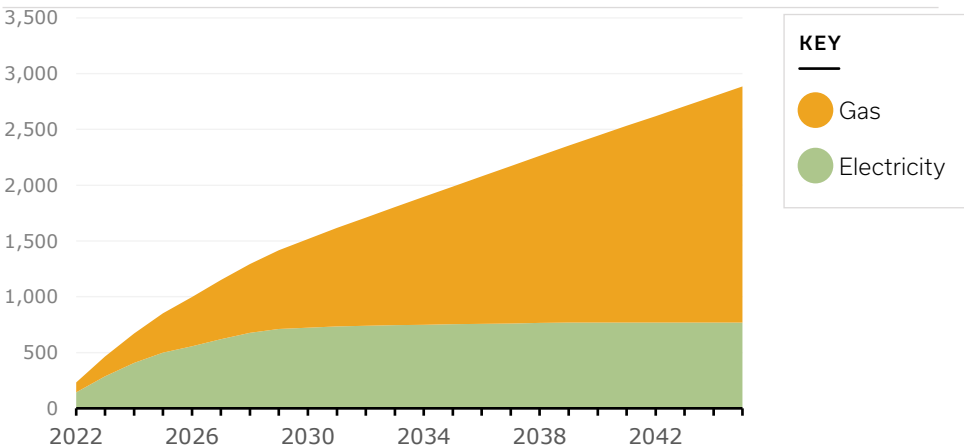
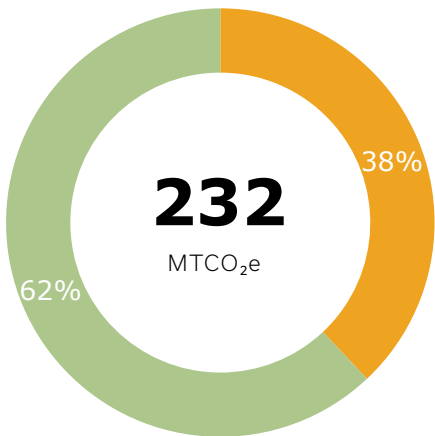
- Aging HVAC equipment
- Space and domestic water heating provided by gas boiler systems
- Limited existing cooling in building
- Limited insulation in existing envelope
- Aging and inefficient lighting technology

CURRENTLY PLANNED IMPROVEMENTS

- Upgrades to HVAC controls to improve efficiency and performance

POTENTIAL OPPORTUNITIES

- ☐ Electrify all heating systems within the building
- ☐ Incorporate heat pump systems for heating and cooling
- ☐ Improve ventilation systems to provide enhanced filtration and maintain healthy indoor air quality
- ☐ Envelope enhancement to reduce conditioning loads and improve thermal comfort
- ☐ Upgrading lighting systems to high-efficiency LED fixtures
- ☐ Incorporate renewable energy systems to offset operational emissions
- ☐ Increased tree canopy and green space
- ☐
- ☐
- ☐



*Electric emissions projection based on 2023 emissions outlook from Pacific Power



		RANKING (OUT OF 20)
AREA	16,136 SQUARE FEET	19
EUI	81 kBtu/SF	2
ENERGY COSTS	\$30,193	19
EMISSIONS	113 MTCO ₂ e	19
EMISSIONS INTENSITY	15.5 LBS-CO ₂ e/SF	3
WATER-USE INTENSITY	12.5 GAL/SF	5

Rice Admin Building

BUILDING CONSTRUCTED: 1956

SUMMARY OF EXISTING CONDITIONS

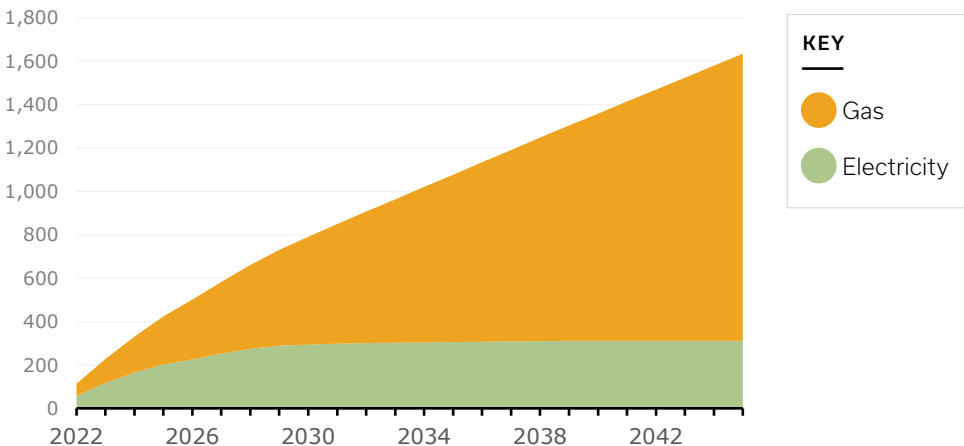
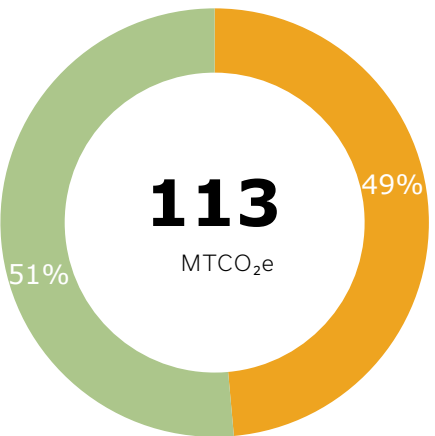
- Aging HVAC equipment
- Space and domestic water heating provided by gas boiler systems
- Limited existing cooling in building
- Aging envelope with limited insulation
- Aging and inefficient lighting technology

CURRENTLY PLANNED IMPROVEMENTS

- Upgrades to HVAC controls to improve efficiency and performance

POTENTIAL OPPORTUNITIES

- ☐ Electrify all heating systems within the building
- ☐ Incorporate heat pump systems for heating and cooling
- ☐ Improve ventilation systems to provide enhanced filtration and maintain healthy indoor air quality
- ☐ Envelope enhancement to reduce conditioning loads and improve thermal comfort
- ☐ Upgrading lighting systems to high-efficiency LED fixtures
- ☐ Incorporate renewable energy systems to offset operational emissions
- ☐ Increased tree canopy and green space
- ☐
- ☐
- ☐



*Electric emissions projection based on 2023 emissions outlook from Pacific Power

Grant-McDaniel Cluster

PORTLAND PUBLIC SCHOOLS



		RANKING (OUT OF 20)
AREA	69,143 SQUARE FEET	9
EUI	70 kBTU/SF	4
ENERGY COSTS	\$97,942	7
EMISSIONS	373 MTCO ₂ e	8
EMISSIONS INTENSITY	11.9 LBS-CO ₂ e/SF	8
WATER-USE INTENSITY	12.6 GAL/SF	4

Rigler Elementary School

BUILDING CONSTRUCTED: 1931

SUMMARY OF EXISTING CONDITIONS

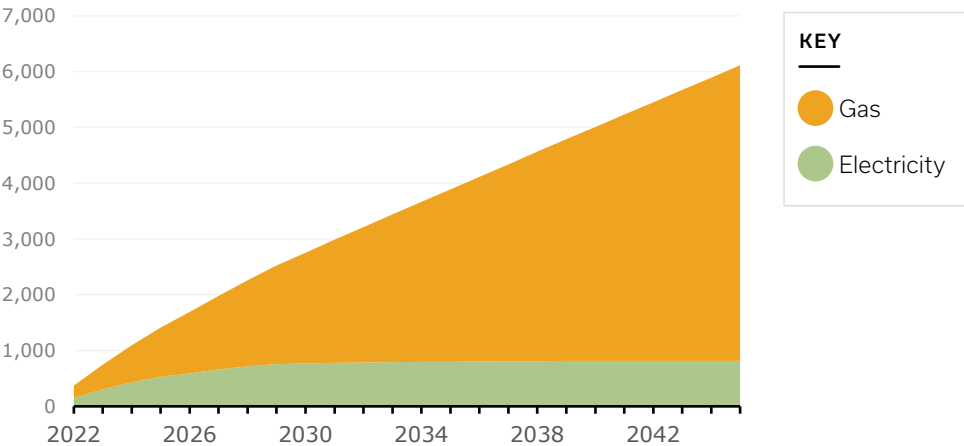
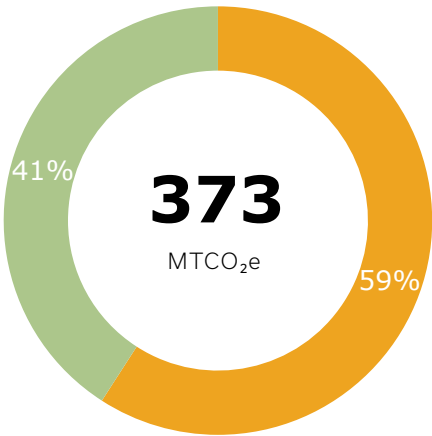
- Aging HVAC equipment
- Space and domestic water heating provided by gas boiler systems
- Limited existing cooling in building
- Limited insulation in existing envelope
- Lighting systems recently upgraded

CURRENTLY PLANNED IMPROVEMENTS

- Upgrades to HVAC controls to improve efficiency and performance

POTENTIAL OPPORTUNITIES

- ☐ Electrify all heating systems within the building
- ☐ Incorporate heat pump systems for heating and cooling
- ☐ Improve ventilation systems to provide enhanced filtration and maintain healthy indoor air quality
- ☐ Envelope enhancement to reduce conditioning loads and improve thermal comfort
- ☐ Incorporate renewable energy systems to offset operational emissions
- ☐ Increased tree canopy and green space
- ☐
- ☐
- ☐



*Electric emissions projection based on 2023 emissions outlook from Pacific Power



		RANKING (OUT OF 20)
AREA	103,610 SQUARE FEET	4
EUI	44 kBTU/SF	18
ENERGY COSTS	\$90,417	8
EMISSIONS	434 MTCO ₂ e	6
EMISSIONS INTENSITY	9.2 LBS-CO ₂ e/SF	19
WATER-USE INTENSITY	3.1 GAL/SF	20

Roseway Heights Middle School

BUILDING CONSTRUCTED: 1923

SUMMARY OF EXISTING CONDITIONS

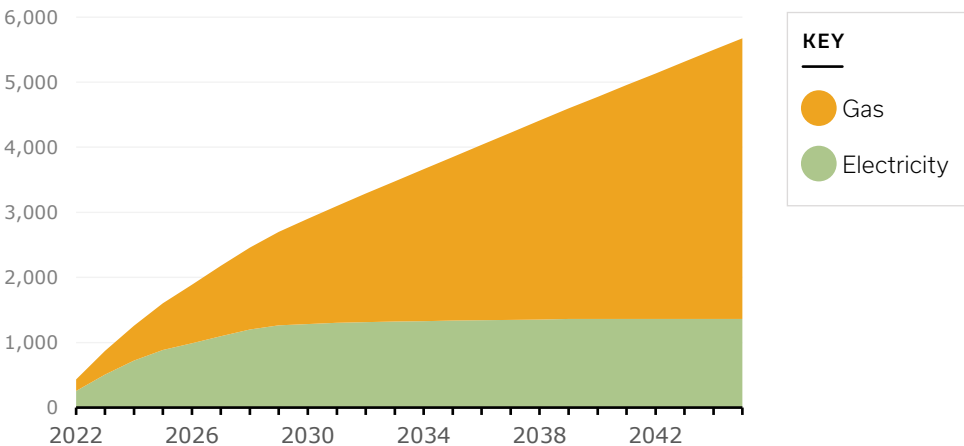
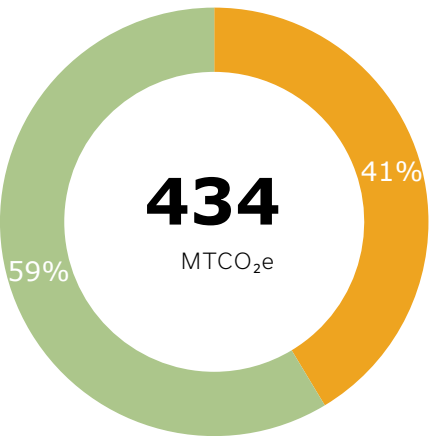
- Aging HVAC equipment
- Space and domestic water heating provided by gas boiler systems
- Limited existing cooling in building
- Aging envelope with limited insulation
- Lighting systems recently upgraded

CURRENTLY PLANNED IMPROVEMENTS

- Upgrades to HVAC controls to improve efficiency and performance

POTENTIAL OPPORTUNITIES

- ☐ Electrify all heating systems within the building
- ☐ Incorporate heat pump systems for heating and cooling
- ☐ Improve ventilation systems to provide enhanced filtration and maintain healthy indoor air quality
- ☐ Envelope enhancement to reduce conditioning loads and improve thermal comfort
- ☐ Incorporate renewable energy systems to offset operational emissions
- ☐ Increased tree canopy and green space
- ☐
- ☐
- ☐



*Electric emissions projection based on 2023 emissions outlook from Pacific Power

Grant-McDaniel Cluster

PORTLAND PUBLIC SCHOOLS



RANKING (OUT OF 20)		
AREA	65,769 SQUARE FEET	11
EUI	62 kBtu/SF	10
ENERGY COSTS	\$85,469	12
EMISSIONS	350 MTCO ₂ e	11
EMISSIONS INTENSITY	11.7 LBS-CO ₂ e/SF	11
WATER-USE INTENSITY	5.3 GAL/SF	17

Sabin Elementary School

BUILDING CONSTRUCTED: 1965

SUMMARY OF EXISTING CONDITIONS

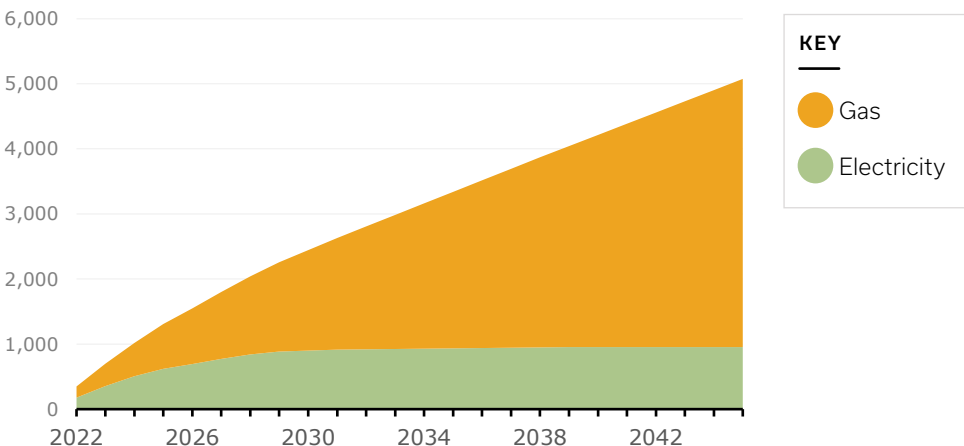
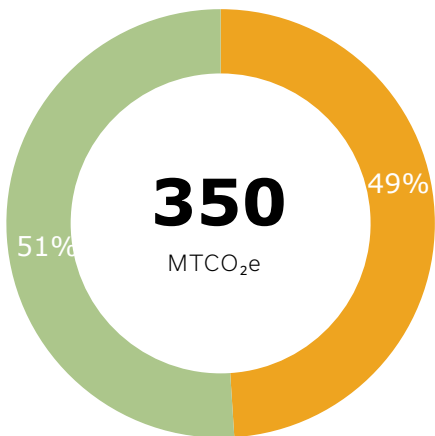
- Aging HVAC equipment
- Space and domestic water heating provided by gas boiler systems
- Limited existing cooling in building
- Limited insulation in existing envelope
- Lighting systems recently upgraded

CURRENTLY PLANNED IMPROVEMENTS

- Upgrades to HVAC controls to improve efficiency and performance

POTENTIAL OPPORTUNITIES

- ☐ Electrify all heating systems within the building
- ☐ Incorporate heat pump systems for heating and cooling
- ☐ Improve ventilation systems to provide enhanced filtration and maintain healthy indoor air quality
- ☐ Envelope enhancement to reduce conditioning loads and improve thermal comfort
- ☐ Incorporate renewable energy systems to offset operational emissions
- ☐ Increased tree canopy and green space
- ☐
- ☐
- ☐



*Electric emissions projection based on 2023 emissions outlook from Pacific Power



RANKING (OUT OF 20)		
AREA	18,862 SQUARE FEET	18
EUI	80 kBtu/SF	3
ENERGY COSTS	\$38,307	17
EMISSIONS	124 MTCO ₂ e	18
EMISSIONS INTENSITY	14.5 LBS-CO ₂ e/SF	4
WATER-USE INTENSITY	19.5 GAL/SF	1

Sacajawea Head Start

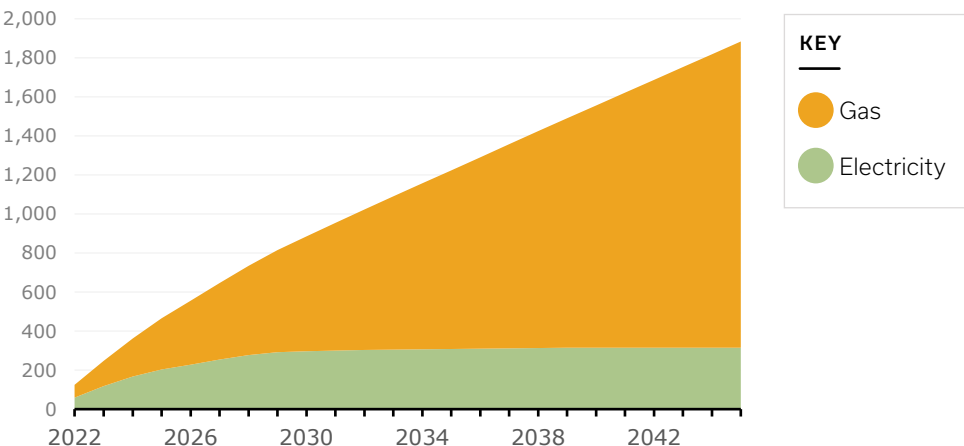
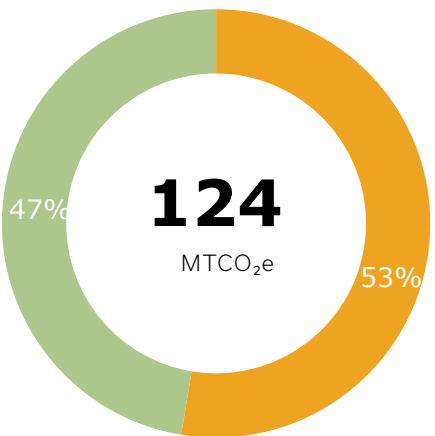
BUILDING CONSTRUCTED: 1952

SUMMARY OF EXISTING CONDITIONS

- Aging HVAC equipment
- Space and domestic water heating provided by gas boiler systems
- Limited existing cooling in building
- Aging envelope with limited insulation
- Aging and inefficient lighting technology

POTENTIAL OPPORTUNITIES

- ☐ Electrify all heating systems within the building
- ☐ Incorporate heat pump systems for heating and cooling
- ☐ Improve ventilation systems to provide enhanced filtration and maintain healthy indoor air quality
- ☐ Envelope enhancement to reduce conditioning loads and improve thermal comfort
- ☐ Upgrading lighting systems to high-efficiency LED fixtures
- ☐ Incorporate renewable energy systems to offset operational emissions
- ☐ Increased tree canopy and green space
- ☐
- ☐
- ☐



*Electric emissions projection based on 2023 emissions outlook from Pacific Power

Grant-McDaniel Cluster

PORTLAND PUBLIC SCHOOLS



RANKING (OUT OF 20)		
AREA	68,805 SQUARE FEET	10
EUI	67 kBTU/SF	6
ENERGY COSTS	\$86,642	11
EMISSIONS	346 MTCO ₂ e	12
EMISSIONS INTENSITY	11.1 LBS-CO ₂ e/SF	13
WATER-USE INTENSITY	6.9 GAL/SF	11

Scott Elementary School

BUILDING CONSTRUCTED: 1951

SUMMARY OF EXISTING CONDITIONS

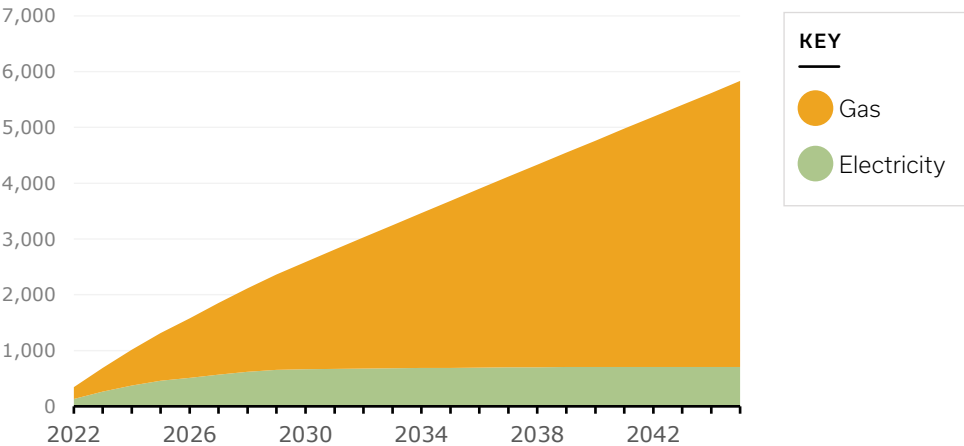
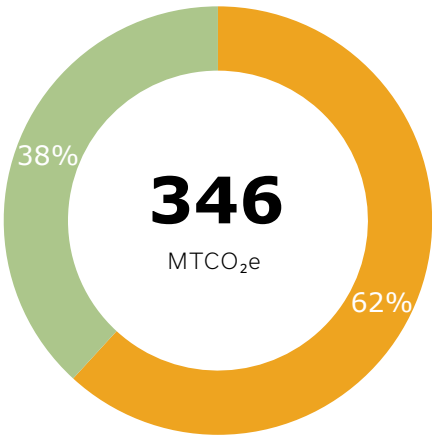
- Aging HVAC equipment
- Space and domestic water heating provided by gas boiler systems
- Limited existing cooling in building
- Limited insulation in existing envelope
- Lighting systems recently upgraded

CURRENTLY PLANNED IMPROVEMENTS

- Upgrades to HVAC controls to improve efficiency and performance

POTENTIAL OPPORTUNITIES

- ☐ Electrify all heating systems within the building
- ☐ Incorporate heat pump systems for heating and cooling
- ☐ Improve ventilation systems to provide enhanced filtration and maintain healthy indoor air quality
- ☐ Envelope enhancement to reduce conditioning loads and improve thermal comfort
- ☐ Incorporate renewable energy systems to offset operational emissions
- ☐ Increased tree canopy and green space
- ☐
- ☐
- ☐



*Electric emissions projection based on 2023 emissions outlook from Pacific Power



RANKING (OUT OF 20)		
AREA	87,610 SQUARE FEET	7
EUI	42 kBTU/SF	19
ENERGY COSTS	\$108,463	5
EMISSIONS	422 MTCO ₂ e	7
EMISSIONS INTENSITY	10.6 LBS-CO ₂ e/SF	18
WATER-USE INTENSITY	6.7 GAL/SF	12

Harriet Tubman Middle School

BUILDING CONSTRUCTED: 1986 | PARTIAL MODERNIZATION: 2018

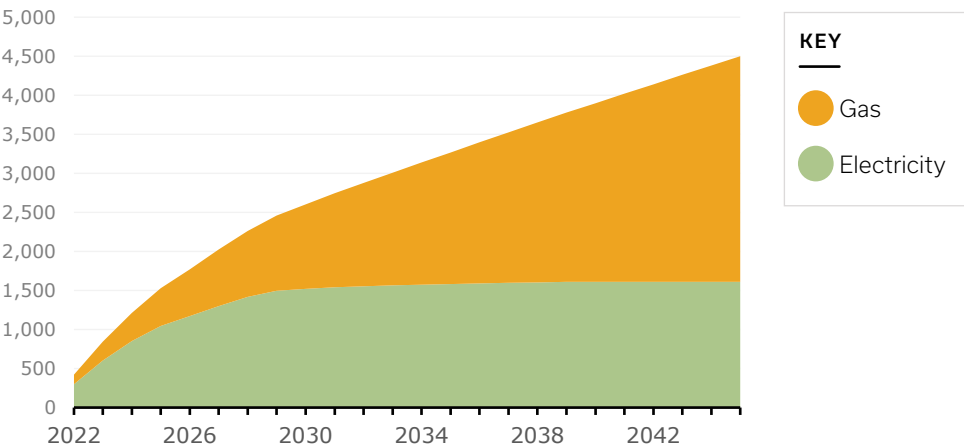
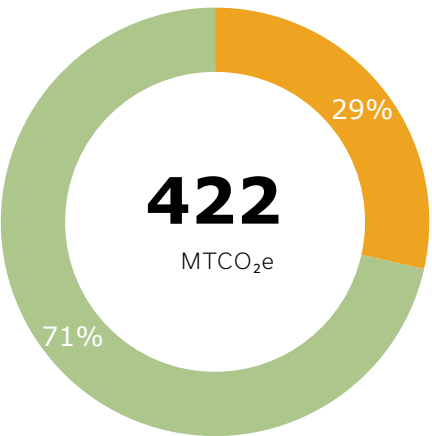
NOTE: SCHOOL RELOCATION PLANS UNDER CONSIDERATION

SUMMARY OF EXISTING CONDITIONS

- Renovated or new envelope elements
- Updated lighting systems
- New mechanical systems still use gas for space and domestic water heating

POTENTIAL OPPORTUNITIES

- ☐ Electrify all heating systems within the building
- ☐ Incorporate renewable energy systems to offset operational emissions
- ☐ Increased tree canopy and green space
- ☐
- ☐
- ☐



*Electric emissions projection based on 2023 emissions outlook from Pacific Power

Grant-McDaniel Cluster

PORTLAND PUBLIC SCHOOLS



		RANKING (OUT OF 20)
AREA	72,906 SQUARE FEET	8
EUI	67 kBTU/SF	5
ENERGY COSTS	\$88,616	9
EMISSIONS	354 MTCO ₂ e	10
EMISSIONS INTENSITY	10.7 LBS-CO ₂ e/SF	17
WATER-USE INTENSITY	7.8 GAL/SF	7

Vestal Elementary School

BUILDING CONSTRUCTED: 1931

SUMMARY OF EXISTING CONDITIONS

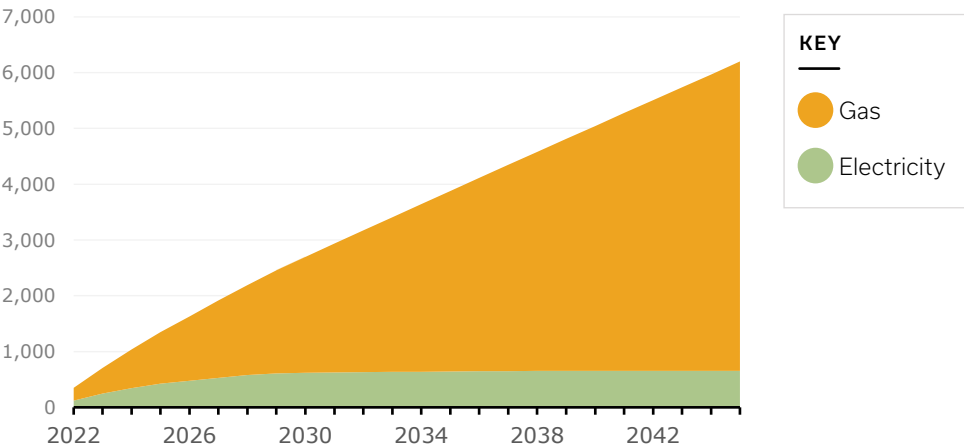
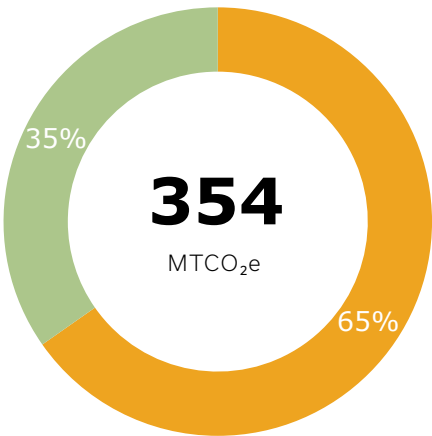
- Aging HVAC equipment
- Space and domestic water heating provided by gas boiler systems
- Limited existing cooling in building
- Aging envelope with limited insulation
- Lighting systems recently upgraded

CURRENTLY PLANNED IMPROVEMENTS

- Upgrades to HVAC controls to improve efficiency and performance

POTENTIAL OPPORTUNITIES

- ☐ Electrify all heating systems within the building
- ☐ Incorporate heat pump systems for heating and cooling
- ☐ Improve ventilation systems to provide enhanced filtration and maintain healthy indoor air quality
- ☐ Envelope enhancement to reduce conditioning loads and improve thermal comfort
- ☐ Incorporate renewable energy systems to offset operational emissions
- ☐ Increased tree canopy and green space
- ☐
- ☐
- ☐



*Electric emissions projection based on 2023 emissions outlook from Pacific Power



		RANKING (OUT OF 20)
AREA	20,432 SQUARE FEET	17
EUI	63 kBTU/SF	9
ENERGY COSTS	\$35,449	18
EMISSIONS	190 MTCO ₂ e	17
EMISSIONS INTENSITY	20.5 LBS-CO ₂ e/SF	1
WATER-USE INTENSITY	7.2 GAL/SF	10

Wilcox Admin Building

BUILDING CONSTRUCTED: 1959

SUMMARY OF EXISTING CONDITIONS

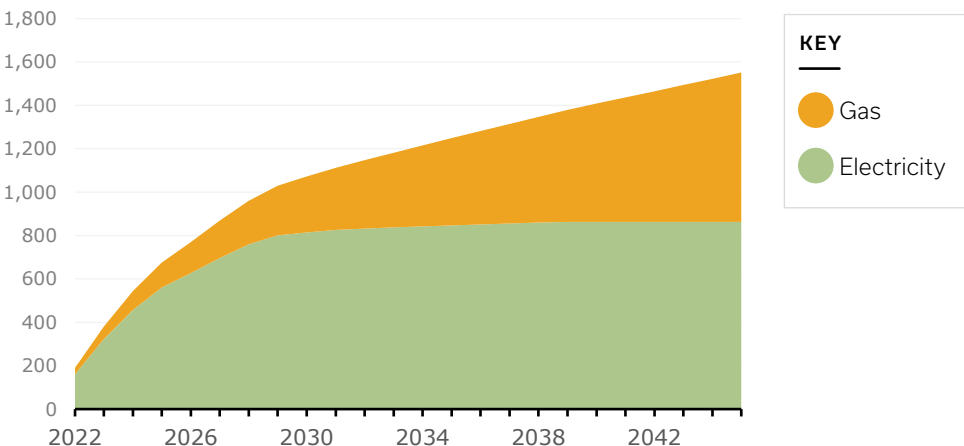
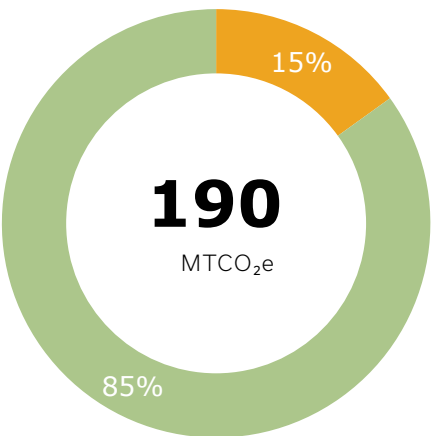
- Aging HVAC equipment
- Some space and domestic water heating provided by gas boiler systems
- Limited existing cooling in building
- Limited insulation in existing envelope
- Aging and inefficient lighting technology

CURRENTLY PLANNED IMPROVEMENTS

- Upgrades to HVAC controls to improve efficiency and performance

POTENTIAL OPPORTUNITIES

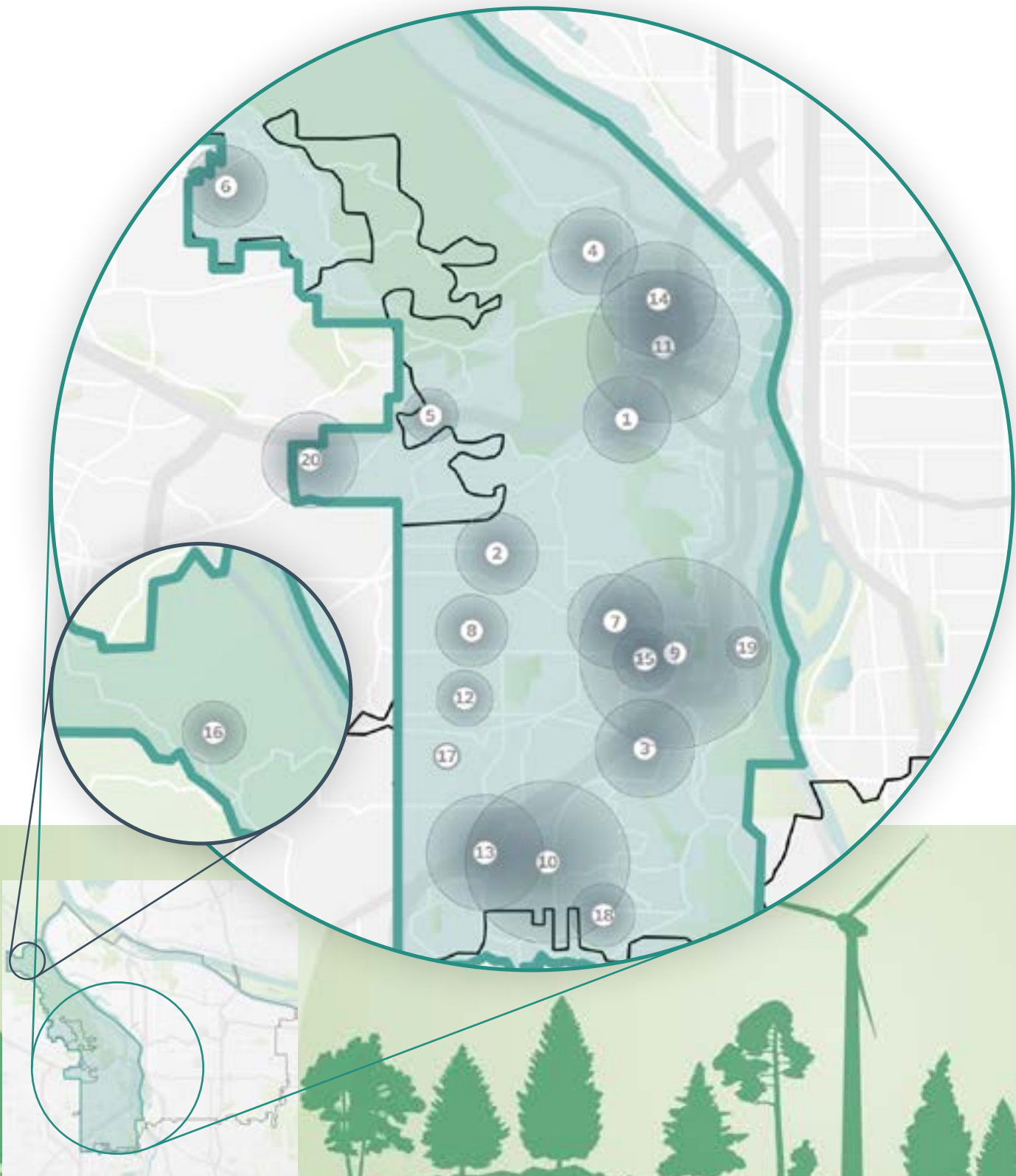
- ☐ Electrify all heating systems within the building
- ☐ Incorporate heat pump systems for heating and cooling
- ☐ Improve ventilation systems to provide enhanced filtration and maintain healthy indoor air quality
- ☐ Envelope enhancement to reduce conditioning loads and improve thermal comfort
- ☐ Upgrading lighting systems to high-efficiency LED fixtures
- ☐ Incorporate renewable energy systems to offset operational emissions
- ☐ Increased tree canopy and green space
- ☐
- ☐



*Electric emissions projection based on 2023 emissions outlook from Pacific Power

Building Performance for Lincoln + Ida B Wells Clusters

PORTLAND PUBLIC SCHOOLS | 2022



FACILITY	AREA (SF)	EUI (kBtu/SF/YR)	ENERGY COST (\$)	GAS EMISSIONS (MTCO ₂ E)	ELECTRIC EMISSIONS (MTCO ₂ E)	TOTAL EMISSIONS (MTCO ₂ E)	EMISSIONS INTENSITY (LBS CO ₂ E/SF)	WATER USE INTENSITY (GAL/SF)
1 Ainsworth	57,188	64	\$102,633	126	115	241	9.3	9.2
2 Bridlemile*	56,220	63	\$101,574	144	74	218	8.6	13.0
3 Capitol Hill	51,812	104	\$96,191	249	60	310	13.2	5.9
4 Chapman	64,385	64	\$92,224	176	68	243	8.3	7.9
5 East Sylvan	24,875	62	\$40,576	67	27	94	8.4	4.8
6 Forest Park	62,833	50	\$99,669	87	128	215	7.6	15.3
7 Gray	74,614	67	\$98,451	231	58	290	8.6	7.5
8 Hayhurst	50,314	56	\$71,557	128	40	167	7.3	5.7
9 Ida B*	290,246	68	\$410,436	868	325	1,193	9.1	8.2
10 Jackson*	219,281	65	\$317,203	607	247	854	8.6	13.4
11 Lincoln*	205,809	51	\$330,911	285	430	715	7.7	13.2
12 Maplewood	40,636	37	\$62,600	45	55	100	5.4	47.8
13 Markham	79,714	94	\$138,629	349	85	434	12.0	10.9
14 MLC	70,349	106	\$136,021	357	67	424	13.3	19.0
15 Rieke	34,272	59	\$61,843	81	43	124	8.0	15.1
16 Skyline	38,327	56	\$36,516	94	32	126	7.2	0.0
17 Smith (vacant)	53,460	1	\$12,860	0	2	2	0.1	2.0
18 Stephenson	40,460	49	\$58,030	69	60	129	7.0	6.7
19 Terwilliger	26,365	86	\$53,551	101	32	133	11.1	5.6
20 West Sylvan	108,187	44	\$132,991	193	99	292	6.0	14.4
Cluster Total	1,649,347		\$2,321,476	4,257	2,048	6,305	N/A	N/A
District Total	9,065,846		\$12,197,485	22,581	18,113	40,694	N/A	N/A
Cluster Average	82,467	63	\$122,723	213	102	316	8.4	11.4
District Average	88,018	62	\$118,422	219	176	395	9.9	8.4

MAP KEY

City of Portland Boundary

Cluster Boundary

Total Emissions
MTCO₂E

* Electric emissions include offset from on-site PV

20
TOTAL
BUILDINGS

6,305
MTCO₂E
TOTAL
EMISSIONS

8.4
LBS CO₂E/SF
AVERAGE EMISSIONS
INTENSITY

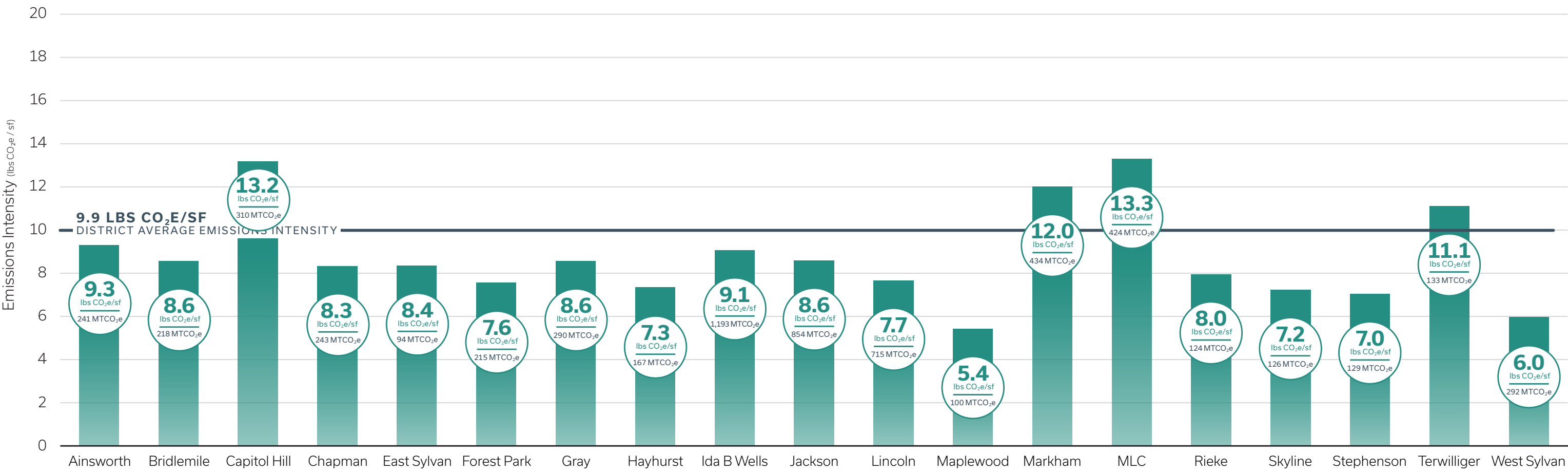
11.4
GAL/SF
AVERAGE WATER
USE INTENSITY

- The total emissions from these clusters account for roughly 15% of the total emissions for the district, with the average emissions intensities being roughly 15% lower than the district average.
- The school with the highest total emissions (Cleveland High School) is currently in the planning phase of a modernization project.
- Gas emissions account for the majority of emissions in 16/20 schools and electrifying gas equipment will have a significant impact in reducing these emissions, particularly as the electrical grid decarbonizes.

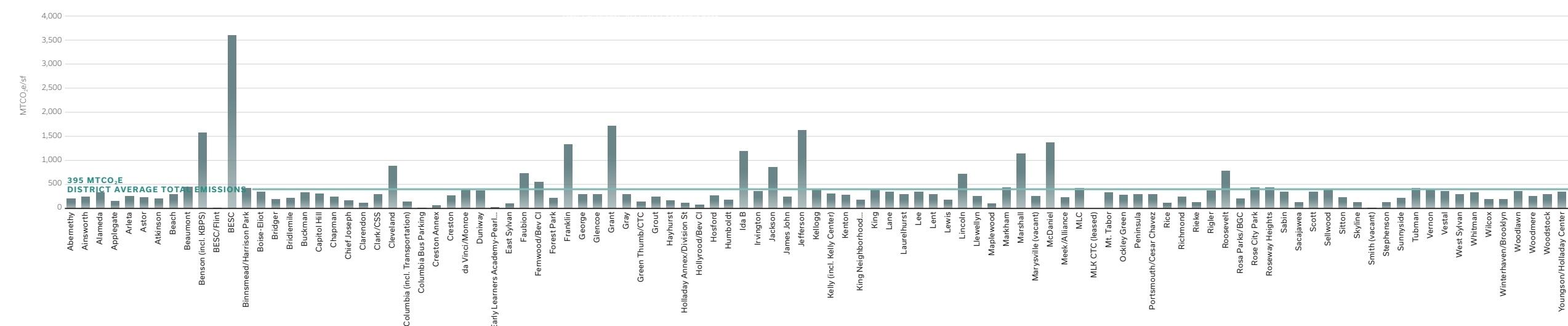
KEY ABBREVIATIONS
EUI | Energy Use Intensity
KBTU | Thousand British thermal units
SF | square feet
CO₂E | CO₂ equivalent
MT | Metric Ton
LBS | Pounds

Building Performance for Lincoln + Ida B Wells Clusters

PORTLAND PUBLIC SCHOOLS | 2022



PORTLAND PUBLIC SCHOOL TOTAL EMISSIONS: 2022-2023 ACADEMIC YEAR



Lincoln + Ida B Wells Cluster

PORTLAND PUBLIC SCHOOLS



RANKING (OUT OF 20)		
AREA	57,188 SQUARE FEET	10
EUI	65 kBtu/SF	8
ENERGY COSTS	\$102,633	7
EMISSIONS	241 MTCO ₂ e	10
EMISSIONS INTENSITY	9.3 LBS-CO ₂ e/SF	5.0
WATER-USE INTENSITY	9.2 GAL/SF	10

Ainsworth Elementary School

BUILDING CONSTRUCTED: 1962

SUMMARY OF EXISTING CONDITIONS

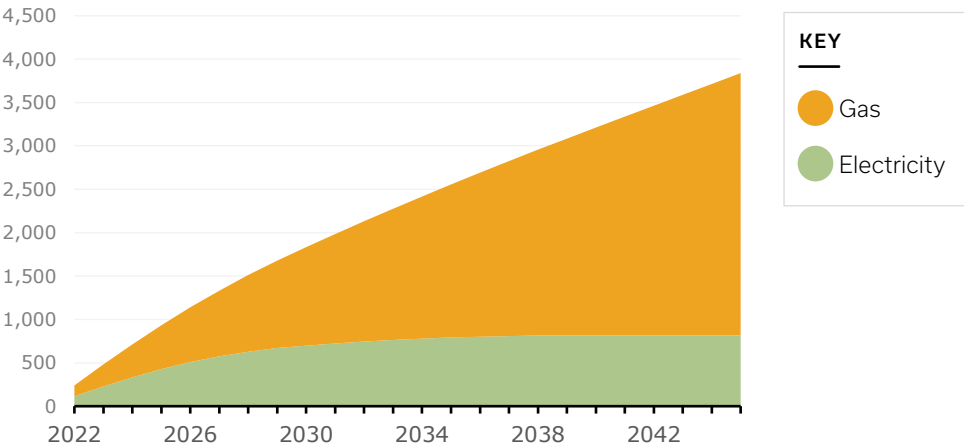
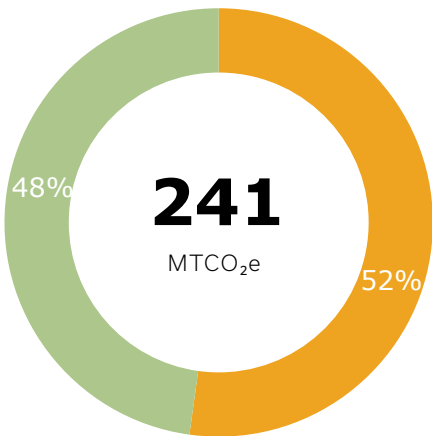
- Aging HVAC equipment
- Space and domestic water heating provided by gas boiler systems
- Limited existing cooling in building
- Aging envelope with limited insulation
- Aging and inefficient lighting technology

CURRENTLY PLANNED IMPROVEMENTS

- Upgrades to HVAC controls to improve efficiency and performance

POTENTIAL OPPORTUNITIES

- ☐ Electrification of all heating systems within the building
- ☐ Incorporation of heat pump systems for heating and cooling
- ☐ Improved ventilation systems to provide enhanced filtration and maintain healthy indoor air quality
- ☐ Envelope enhancement to reduce conditioning loads and improve thermal comfort
- ☐ Upgrading lighting systems to high-efficiency LED fixtures
- ☐ Incorporation of renewable energy systems to offset operational emissions
- ☐ Increased tree canopy and green space
- ☐
- ☐
- ☐



*Electric emissions projection based on 2023 emissions outlook from PGE



RANKING (OUT OF 20)		
AREA	56,220 SQUARE FEET	11
EUI	64 kBtu/SF	9
ENERGY COSTS	\$101,574	8
EMISSIONS	218 MTCO ₂ e	11
EMISSIONS INTENSITY	8.6 LBS-CO ₂ e/SF	9.0
WATER-USE INTENSITY	13.0 GAL/SF	8

Bridlemile Elementary School

BUILDING CONSTRUCTED: 1958

SUMMARY OF EXISTING CONDITIONS

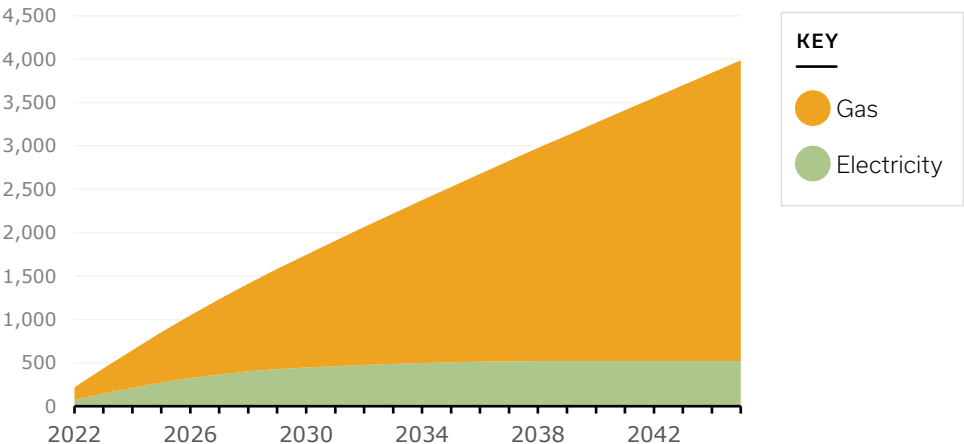
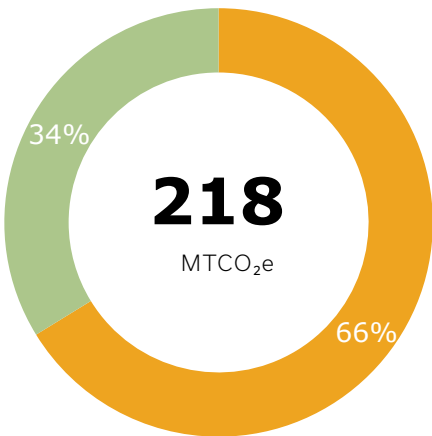
- Aging HVAC equipment
- Space and domestic water heating provided by gas boiler systems
- Limited existing cooling in building
- Aging envelope with limited insulation
- Aging and inefficient lighting technology
- On-site PV offsets electricity consumption

CURRENTLY PLANNED IMPROVEMENTS

- Upgrades to HVAC controls to improve efficiency and performance

POTENTIAL OPPORTUNITIES

- ☐ Electrification of all heating systems within the building
- ☐ Incorporation of heat pump systems for heating and cooling
- ☐ Improved ventilation systems to provide enhanced filtration and maintain healthy indoor air quality
- ☐ Envelope enhancement to reduce conditioning loads and improve thermal comfort
- ☐ Upgrading lighting systems to high-efficiency LED fixtures
- ☐ Increased tree canopy and green space
- ☐
- ☐
- ☐



*Electric emissions projection based on 2023 emissions outlook from PGE

Lincoln + Ida B Wells Cluster

PORTLAND PUBLIC SCHOOLS



RANKING (OUT OF 20)		
AREA	51,812 SQUARE FEET	13
EUI	105 kBtu/SF	2
ENERGY COSTS	\$96,191	11
EMISSIONS	310 MTCO ₂ e	6
EMISSIONS INTENSITY	13.2 LBS-CO ₂ e/SF	2.0
WATER-USE INTENSITY	5.9 GAL/SF	15

Capitol Hill Elementary School

BUILDING CONSTRUCTED: 1958

SUMMARY OF EXISTING CONDITIONS

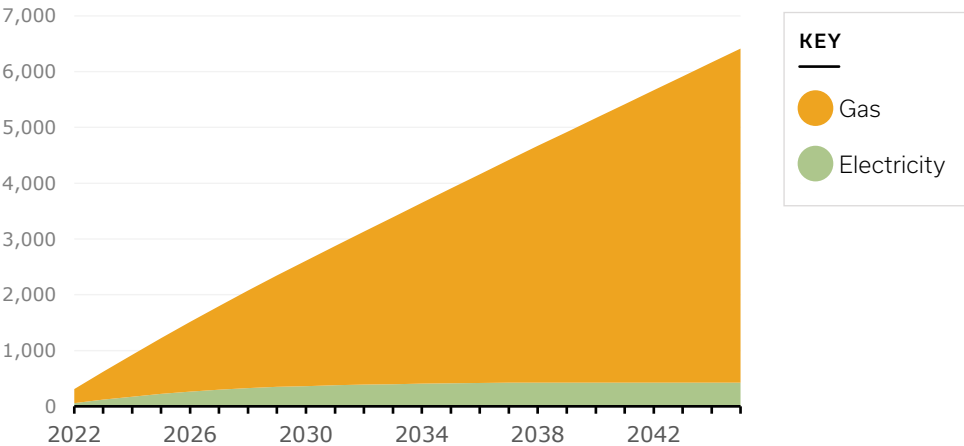
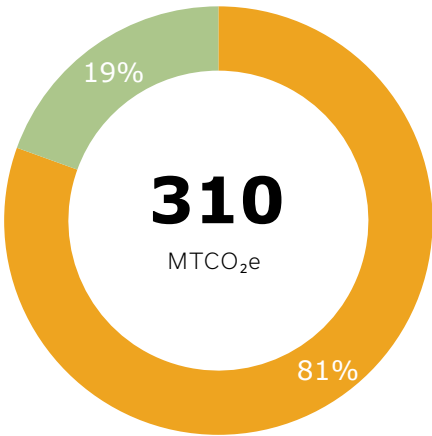
- Aging HVAC equipment
- Space and domestic water heating provided by gas boiler systems
- Limited existing cooling in building
- Aging envelope with limited insulation
- Aging and inefficient lighting technology

CURRENTLY PLANNED IMPROVEMENTS

- Upgrades to HVAC controls to improve efficiency and performance
- Upgrading lighting systems to high-efficiency LED fixtures

POTENTIAL OPPORTUNITIES

- ☐ Electrification of all heating systems within the building
- ☐ Incorporation of heat pump systems for heating and cooling
- ☐ Improved ventilation systems to provide enhanced filtration and maintain healthy indoor air quality
- ☐ Envelope enhancement to reduce conditioning loads and improve thermal comfort
- ☐ Incorporation of renewable energy systems to offset operational emissions
- ☐ Increased tree canopy and green space
- ☐
- ☐
- ☐



*Electric emissions projection based on 2023 emissions outlook from PGE



RANKING (OUT OF 20)		
AREA	64,385 SQUARE FEET	8
EUI	64 kBtu/SF	10
ENERGY COSTS	\$92,224	12
EMISSIONS	243 MTCO ₂ e	9
EMISSIONS INTENSITY	8.3 LBS-CO ₂ e/SF	11.0
WATER-USE INTENSITY	7.9 GAL/SF	12

Chapman Elementary School

BUILDING CONSTRUCTED: 1923

SUMMARY OF EXISTING CONDITIONS

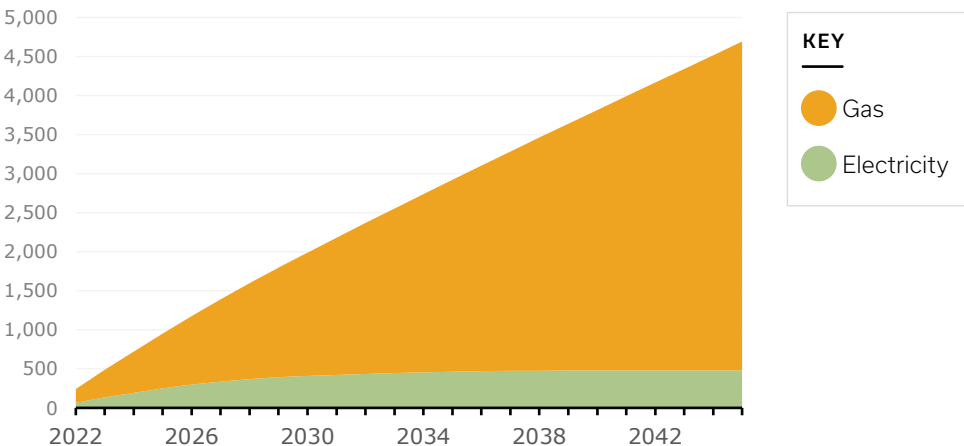
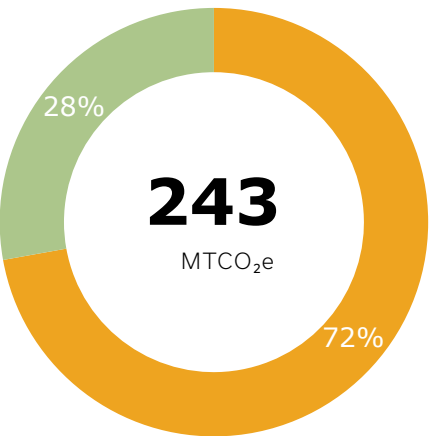
- Aging HVAC equipment
- Space and domestic water heating provided by gas boiler systems
- Limited existing cooling in building
- Aging envelope with limited insulation
- Lighting systems recently upgraded

CURRENTLY PLANNED IMPROVEMENTS

- Upgrades to HVAC controls to improve efficiency and performance

POTENTIAL OPPORTUNITIES

- ☐ Electrification of all heating systems within the building
- ☐ Incorporation of heat pump systems for heating and cooling
- ☐ Improved ventilation systems to provide enhanced filtration and maintain healthy indoor air quality
- ☐ Envelope enhancement to reduce conditioning loads and improve thermal comfort
- ☐ Incorporation of renewable energy systems to offset operational emissions
- ☐ Increased tree canopy and green space
- ☐
- ☐
- ☐



*Electric emissions projection based on 2023 emissions outlook from PGE

Lincoln + Ida B Wells Cluster

PORTLAND PUBLIC SCHOOLS



		RANKING (OUT OF 20)
AREA	24,875 SQUARE FEET	20
EUI	64 kBTU/SF	11
ENERGY COSTS	\$40,576	18
EMISSIONS	94 MTCO ₂ e	19
EMISSIONS INTENSITY	8.4 LBS-CO ₂ e/SF	10.0
WATER-USE INTENSITY	4.8 GAL/SF	18

East Sylvan Elementary School

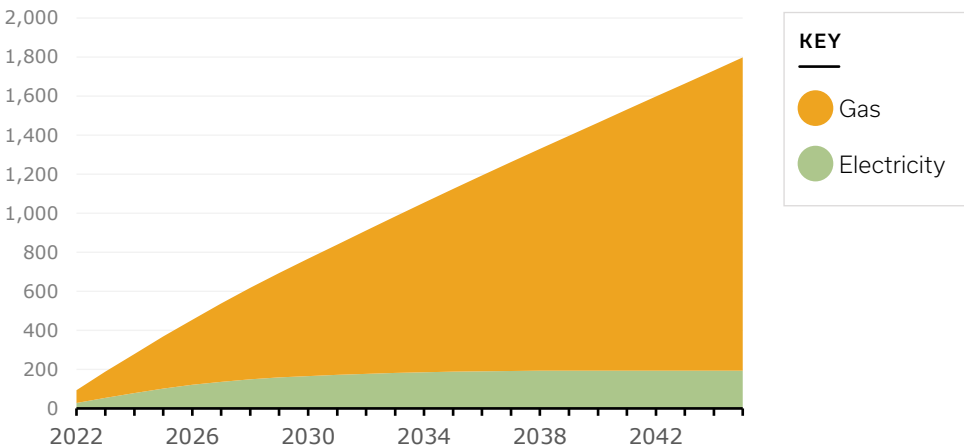
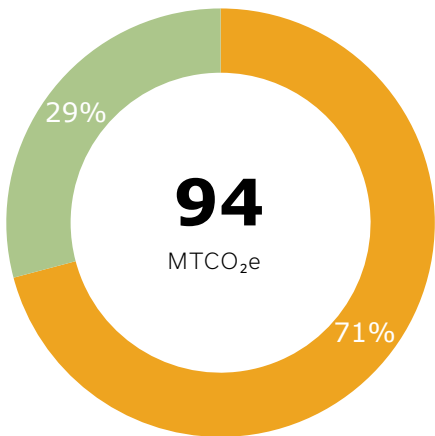
BUILDING CONSTRUCTED: 1933

SUMMARY OF EXISTING CONDITIONS

- Aging HVAC equipment
- Space and domestic water heating provided by gas boiler systems
- Limited existing cooling in building
- Aging envelope with limited insulation
- Aging and inefficient lighting technology

POTENTIAL OPPORTUNITIES

- ☐ Electrification of all heating systems within the building
- ☐ Incorporation of heat pump systems for heating and cooling
- ☐ Improved ventilation systems to provide enhanced filtration and maintain healthy indoor air quality
- ☐ Envelope enhancement to reduce conditioning loads and improve thermal comfort
- ☐ Upgrading lighting systems to high-efficiency LED fixtures
- ☐ Incorporation of renewable energy systems to offset operational emissions
- ☐ Increased tree canopy and green space
- ☐
- ☐
- ☐



*Electric emissions projection based on 2023 emissions outlook from PGE



		RANKING (OUT OF 20)
AREA	62,833 SQUARE FEET	9
EUI	50 kBTU/SF	16
ENERGY COSTS	\$99,669	9
EMISSIONS	215 MTCO ₂ e	12
EMISSIONS INTENSITY	7.6 LBS-CO ₂ e/SF	14.0
WATER-USE INTENSITY	15.3 GAL/SF	3

Forest Park Elementary School

BUILDING CONSTRUCTED: 1998

SUMMARY OF EXISTING CONDITIONS

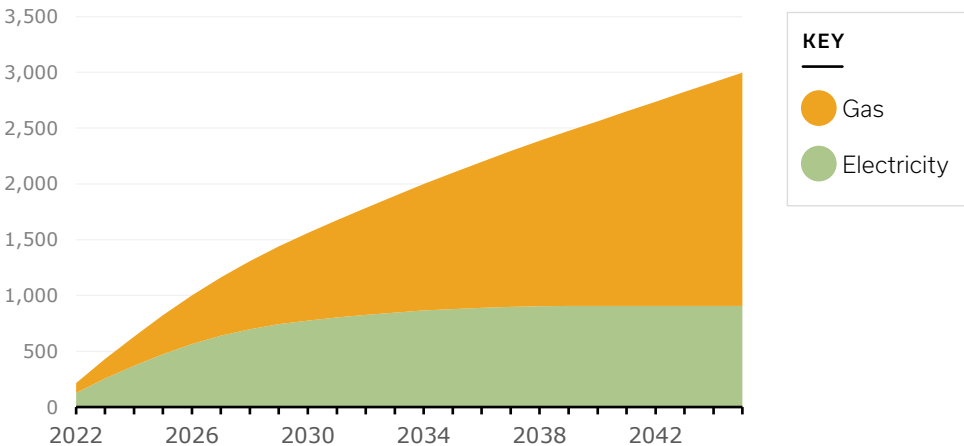
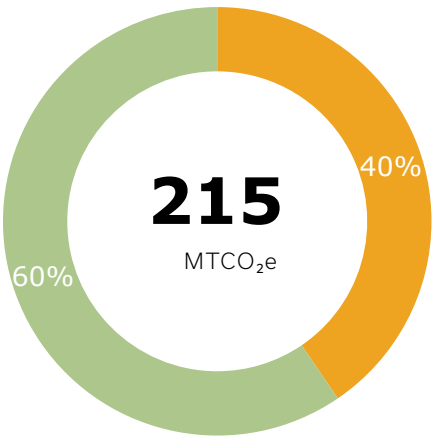
- Aging HVAC equipment
- Space and domestic water heating provided by gas boiler systems
- Limited insulation in existing envelope
- Aging and inefficient lighting technology

CURRENTLY PLANNED IMPROVEMENTS

- Upgrades to HVAC controls to improve efficiency and performance
- Upgrading lighting systems to high-efficiency LED fixtures

POTENTIAL OPPORTUNITIES

- ☐ Electrification of all heating systems within the building
- ☐ Incorporation of heat pump systems for heating and cooling
- ☐ Improved ventilation systems to provide enhanced filtration and maintain healthy indoor air quality
- ☐ Envelope enhancement to reduce conditioning loads and improve thermal comfort
- ☐ Incorporation of renewable energy systems to offset operational emissions
- ☐ Increased tree canopy and green space
- ☐
- ☐
- ☐



*Electric emissions projection based on 2023 emissions outlook from PGE

Lincoln + Ida B Wells Cluster

PORTLAND PUBLIC SCHOOLS



RANKING (OUT OF 20)		
AREA	74,614 SQUARE FEET	6
EUI	68 kBtu/SF	6
ENERGY COSTS	\$98,451	10
EMISSIONS	290 MTCO ₂ e	8
EMISSIONS INTENSITY	8.6 LBS-CO ₂ e/SF	8.0
WATER-USE INTENSITY	7.5 GAL/SF	13

Gray Middle School

BUILDING CONSTRUCTED: 1952

SUMMARY OF EXISTING CONDITIONS

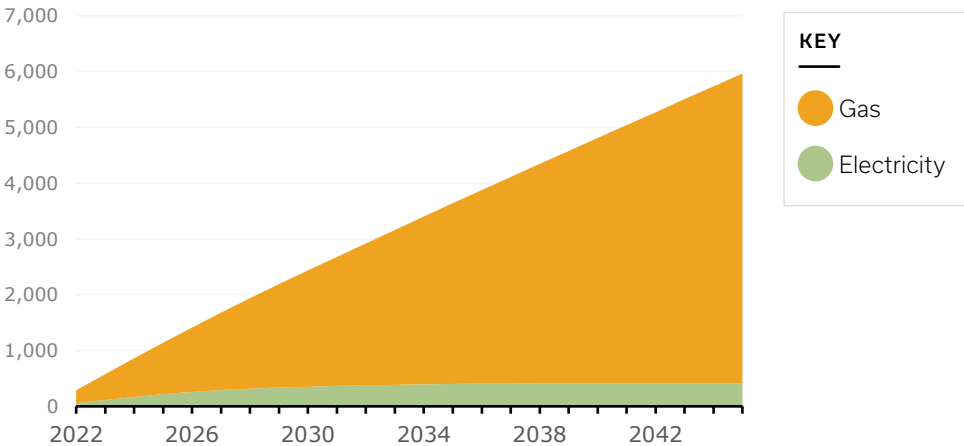
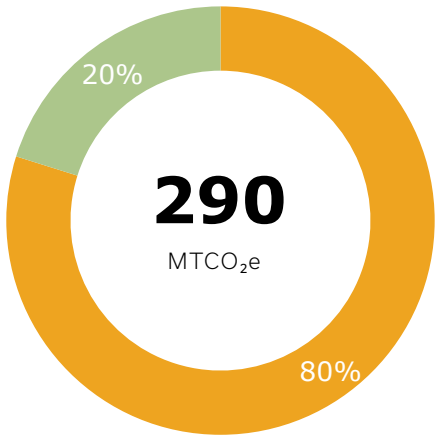
- Aging HVAC equipment
- Space and domestic water heating provided by gas boiler systems
- Limited existing cooling in building
- Aging envelope with limited insulation
- Lighting systems recently upgraded

CURRENTLY PLANNED IMPROVEMENTS

- Upgrades to HVAC controls to improve efficiency and performance

POTENTIAL OPPORTUNITIES

- ☐ Electrification of all heating systems within the building
- ☐ Incorporation of heat pump systems for heating and cooling
- ☐ Improved ventilation systems to provide enhanced filtration and maintain healthy indoor air quality
- ☐ Envelope enhancement to reduce conditioning loads and improve thermal comfort
- ☐ Incorporation of renewable energy systems to offset operational emissions
- ☐ Increased tree canopy and green space
- ☐
- ☐
- ☐



*Electric emissions projection based on 2023 emissions outlook from PGE



RANKING (OUT OF 20)		
AREA	50,314 SQUARE FEET	14
EUI	57 kBtu/SF	13
ENERGY COSTS	\$71,557	13
EMISSIONS	167 MTCO ₂ e	13
EMISSIONS INTENSITY	7.3 LBS-CO ₂ e/SF	15.0
WATER-USE INTENSITY	5.7 GAL/SF	16

Hayhurst Elementary School

BUILDING CONSTRUCTED: 1954

SUMMARY OF EXISTING CONDITIONS

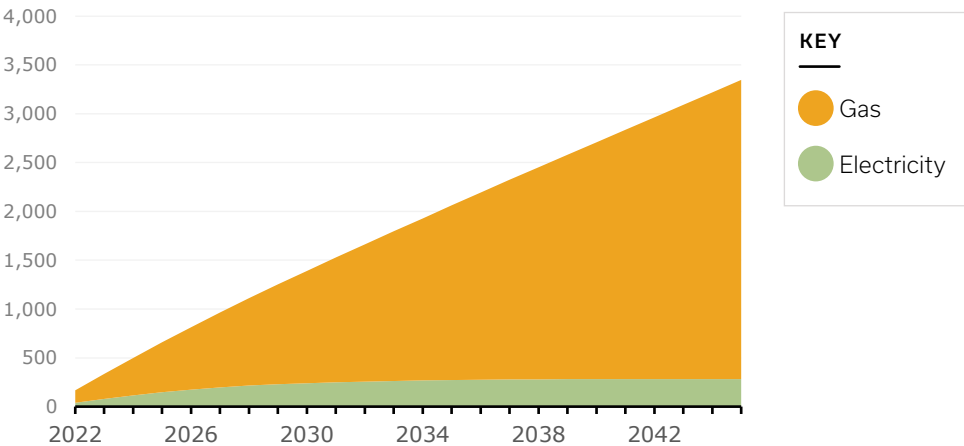
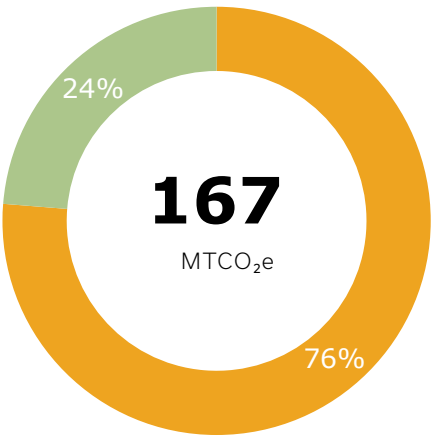
- Aging HVAC equipment
- Space and domestic water heating provided by gas boiler systems
- Limited existing cooling in building
- Limited insulation in existing envelope
- Aging and inefficient lighting technology

CURRENTLY PLANNED IMPROVEMENTS

- Upgrades to HVAC controls to improve efficiency and performance

POTENTIAL OPPORTUNITIES

- ☐ Electrification of all heating systems within the building
- ☐ Incorporation of heat pump systems for heating and cooling
- ☐ Improved ventilation systems to provide enhanced filtration and maintain healthy indoor air quality
- ☐ Envelope enhancement to reduce conditioning loads and improve thermal comfort
- ☐ Upgrading lighting systems to high-efficiency LED fixtures
- ☐ Incorporation of renewable energy systems to offset operational emissions
- ☐ Increased tree canopy and green space
- ☐
- ☐
- ☐



*Electric emissions projection based on 2023 emissions outlook from PGE

Lincoln + Ida B Wells Cluster

PORTLAND PUBLIC SCHOOLS



		RANKING (OUT OF 20)
AREA	290,246 SQUARE FEET	1
EUI	70 kBtu/SF	5
ENERGY COSTS	\$410,436	1
EMISSIONS	1,193 MTCO ₂ e	1
EMISSIONS INTENSITY	9.1 LBS-CO ₂ e/SF	6.0
WATER-USE INTENSITY	8.2 GAL/SF	11

Ida B Wells High School

BUILDING CONSTRUCTED: 1954

SUMMARY OF EXISTING CONDITIONS

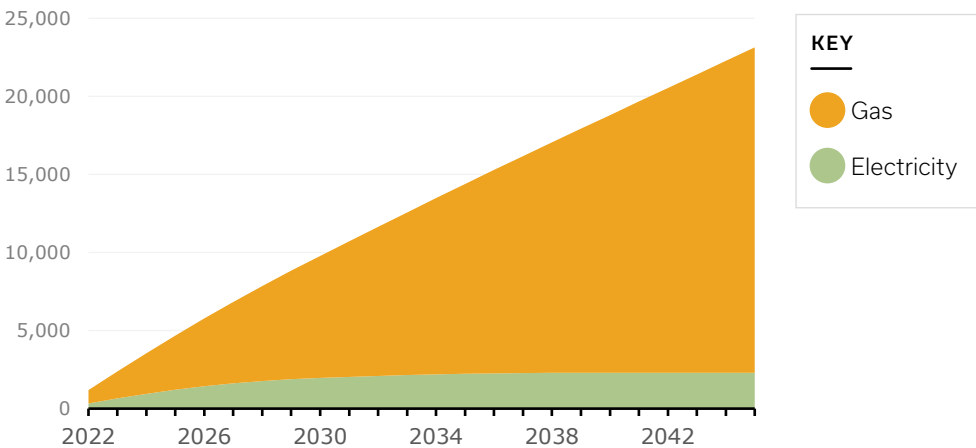
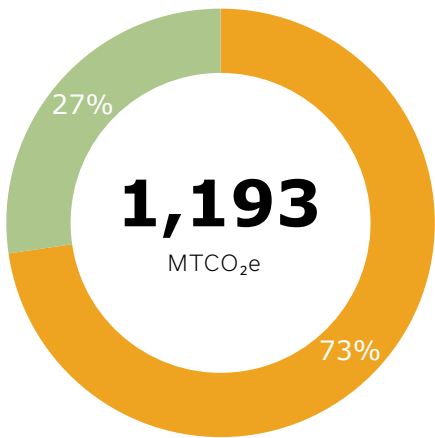
- Aging HVAC equipment
- Space and domestic water heating provided by gas boiler systems
- Limited existing cooling in building
- Aging envelope with limited insulation
- Lighting systems recently upgraded
- On-site PV offsets electricity consumption

CURRENTLY PLANNED IMPROVEMENTS

- Upgrades to HVAC controls to improve efficiency and performance

POTENTIAL OPPORTUNITIES

- ☐ Electrification of all heating systems within the building
- ☐ Incorporation of heat pump systems for heating and cooling
- ☐ Improved ventilation systems to provide enhanced filtration and maintain healthy indoor air quality
- ☐ Envelope enhancement to reduce conditioning loads and improve thermal comfort
- ☐ Increased tree canopy and green space
- ☐
- ☐
- ☐



*Electric emissions projection based on 2023 emissions outlook from PGE



		RANKING (OUT OF 20)
AREA	219,281 SQUARE FEET	2
EUI	65 kBtu/SF	7
ENERGY COSTS	\$317,203	3
EMISSIONS	854 MTCO ₂ e	2
EMISSIONS INTENSITY	8.6 LBS-CO ₂ e/SF	7.0
WATER-USE INTENSITY	13.4 GAL/SF	6

Jackson Middle School

BUILDING CONSTRUCTED: 1966

SUMMARY OF EXISTING CONDITIONS

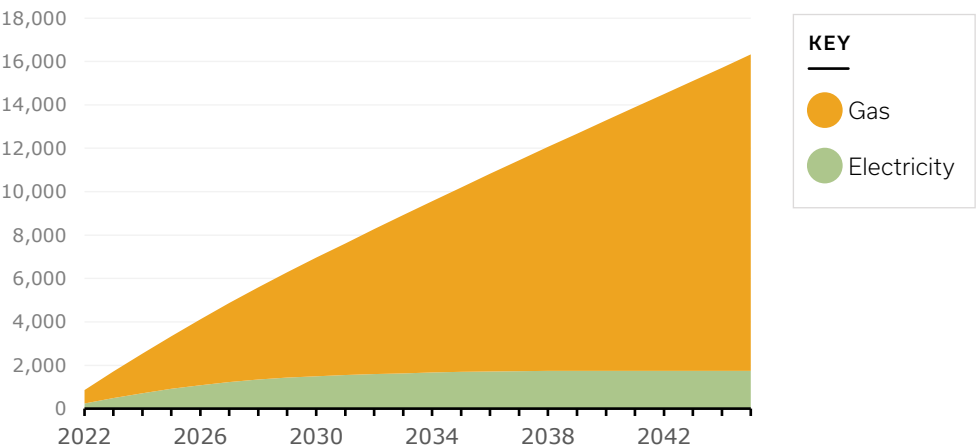
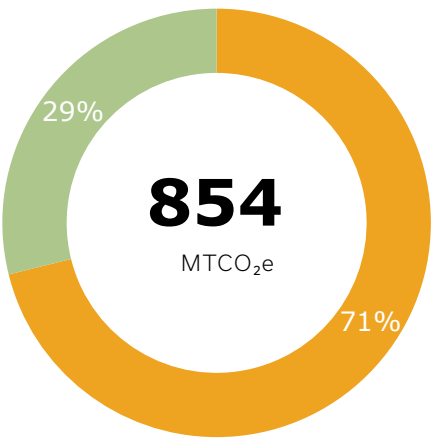
- Aging HVAC equipment
- Space and domestic water heating provided by gas boiler systems
- Limited existing cooling in building
- Limited insulation in existing envelope
- Lighting systems recently upgraded

CURRENTLY PLANNED IMPROVEMENTS

- Upgrades to HVAC controls to improve efficiency and performance

POTENTIAL OPPORTUNITIES

- ☐ Electrification of all heating systems within the building
- ☐ Incorporation of heat pump systems for heating and cooling
- ☐ Improved ventilation systems to provide enhanced filtration and maintain healthy indoor air quality
- ☐ Envelope enhancement to reduce conditioning loads and improve thermal comfort
- ☐ Incorporation of renewable energy systems to offset operational emissions
- ☐ Increased tree canopy and green space
- ☐
- ☐
- ☐



*Electric emissions projection based on 2023 emissions outlook from PGE

Lincoln + Ida B Wells Cluster

PORTLAND PUBLIC SCHOOLS



		RANKING (OUT OF 20)
AREA	205,809 SQUARE FEET	3
EUI	51 kBTU/SF	15
ENERGY COSTS	\$330,911	\$2
EMISSIONS	715 MTCO ₂ e	3
EMISSIONS INTENSITY	7.7 LBS-CO ₂ e/SF	13.0
WATER-USE INTENSITY	13.2 GAL/SF	7

Lincoln High School

BUILDING CONSTRUCTED: 2023

NOTE

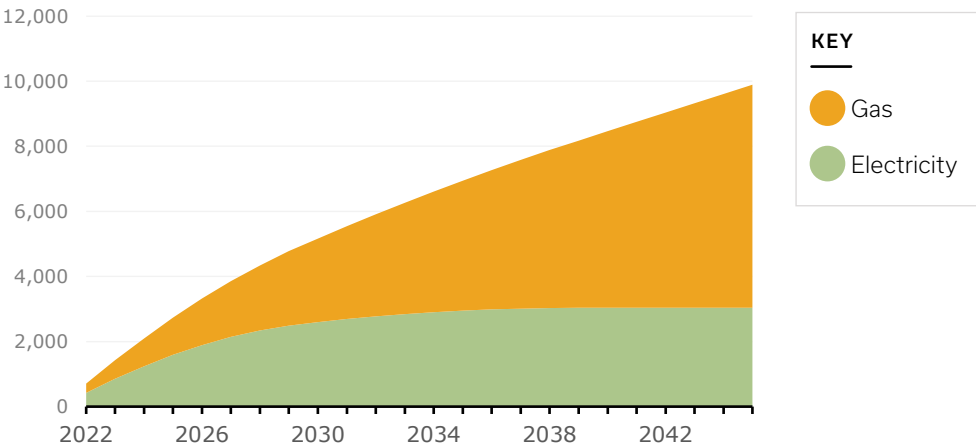
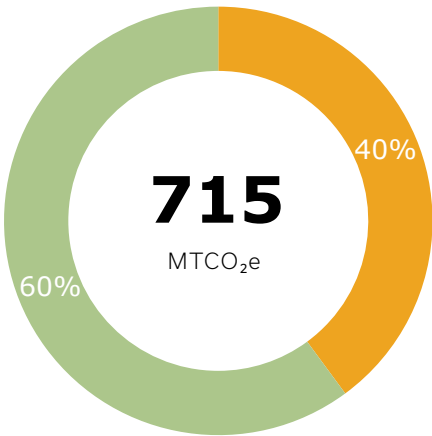
Lincoln High School was recently replaced with a new structure that incorporates many of the improvements recommended for other schools in the district.

SUMMARY OF EXISTING CONDITIONS

- New building, including envelope, lighting, and mechanical systems
- New equipment still uses gas for space heating

POTENTIAL OPPORTUNITIES

- ☐ Electrification of all heating systems within the building
- ☐ Incorporation of renewable energy systems to offset operational emissions
- ☐ Increased tree canopy and green space
- ☐
- ☐
- ☐



*Electric emissions projection based on 2023 emissions outlook from PGE



		RANKING (OUT OF 20)
AREA	40,636 SQUARE FEET	15
EUI	37 kBTU/SF	19
ENERGY COSTS	\$62,600	14
EMISSIONS	100 MTCO ₂ e	18
EMISSIONS INTENSITY	5.4 LBS-CO ₂ e/SF	19.0
WATER-USE INTENSITY	47.8 GAL/SF	1

Maplewood Elementary School

BUILDING CONSTRUCTED: 1948

SUMMARY OF EXISTING CONDITIONS

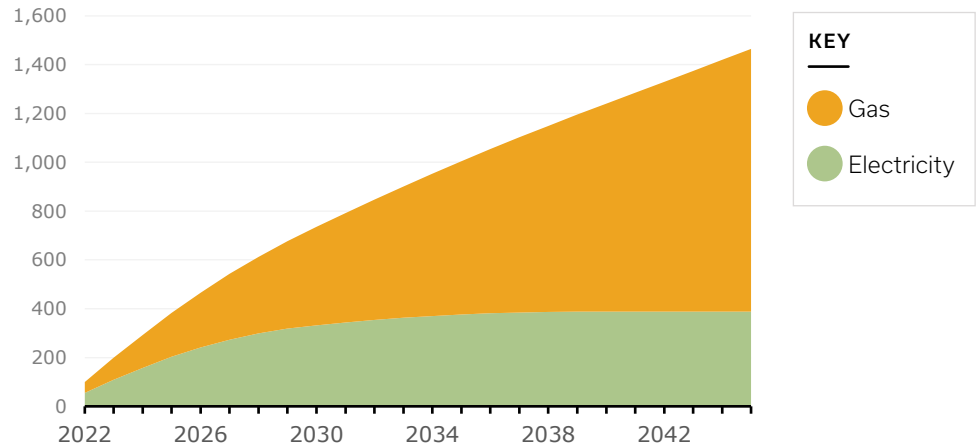
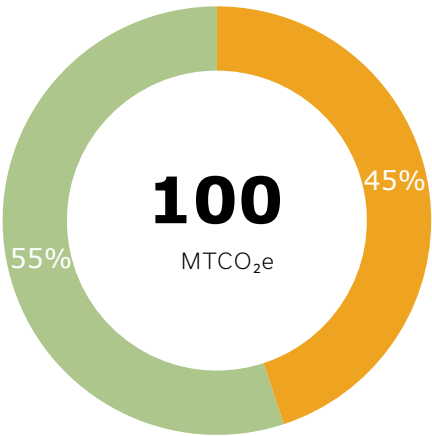
- Aging HVAC equipment
- Limited existing cooling in building
- Space and domestic water heating provided by gas boiler systems
- Aging envelope with limited insulation
- Aging and inefficient lighting technology

CURRENTLY PLANNED IMPROVEMENTS

- Upgrades to HVAC controls to improve efficiency and performance
- Upgrading lighting systems to high-efficiency LED fixtures

POTENTIAL OPPORTUNITIES

- ☐ Electrification of all heating systems within the building
- ☐ Incorporation of heat pump systems for heating and cooling
- ☐ Improved ventilation systems to provide enhanced filtration and maintain healthy indoor air quality
- ☐ Envelope enhancement to reduce conditioning loads and improve thermal comfort
- ☐ Incorporation of renewable energy systems to offset operational emissions
- ☐ Increased tree canopy and green space
- ☐
- ☐
- ☐



*Electric emissions projection based on 2023 emissions outlook from PGE

Lincoln + Ida B Wells Cluster

PORTLAND PUBLIC SCHOOLS



		RANKING (OUT OF 20)
AREA	79,714 SQUARE FEET	5
EUI	95 kBtu/SF	3
ENERGY COSTS	\$138,629	4
EMISSIONS	434 MTCO ₂ e	4
EMISSIONS INTENSITY	12.0 LBS-CO ₂ e/SF	3.0
WATER-USE INTENSITY	10.9 GAL/SF	9

Markham Elementary School

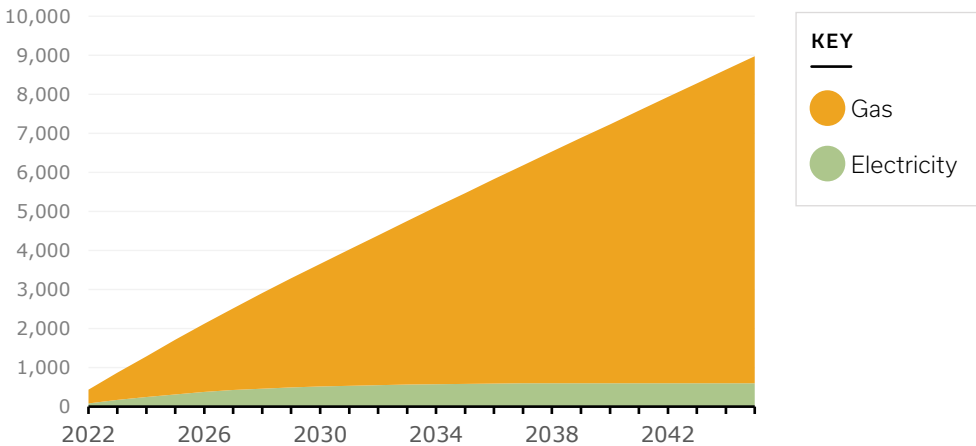
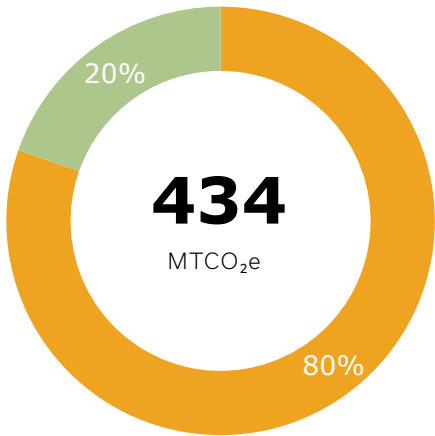
BUILDING CONSTRUCTED: 1951

SUMMARY OF EXISTING CONDITIONS

- Space and domestic water heating provided by gas boiler systems
- Limited existing cooling in building
- Aging envelope with limited insulation
- Lighting systems recently upgraded
- Central HVAC equipment upgraded relatively recently

POTENTIAL OPPORTUNITIES

- ☐ Electrification of all heating systems within the building
- ☐ Incorporation of heat pump systems for heating and cooling
- ☐ Improved ventilation systems to provide enhanced filtration and maintain healthy indoor air quality
- ☐ Envelope enhancement to reduce conditioning loads and improve thermal comfort
- ☐ Incorporation of renewable energy systems to offset operational emissions
- ☐ Increased tree canopy and green space
- ☐
- ☐
- ☐



*Electric emissions projection based on 2023 emissions outlook from PGE



		RANKING (OUT OF 20)
AREA	70,349 SQUARE FEET	7
EUI	107 kBtu/SF	1
ENERGY COSTS	\$136,021	5
EMISSIONS	424 MTCO ₂ e	5
EMISSIONS INTENSITY	13.3 LBS-CO ₂ e/SF	1.0
WATER-USE INTENSITY	19.0 GAL/SF	2

MLC Metropolitan Learning Center (K-12)

BUILDING CONSTRUCTED: 1926

SUMMARY OF EXISTING CONDITIONS

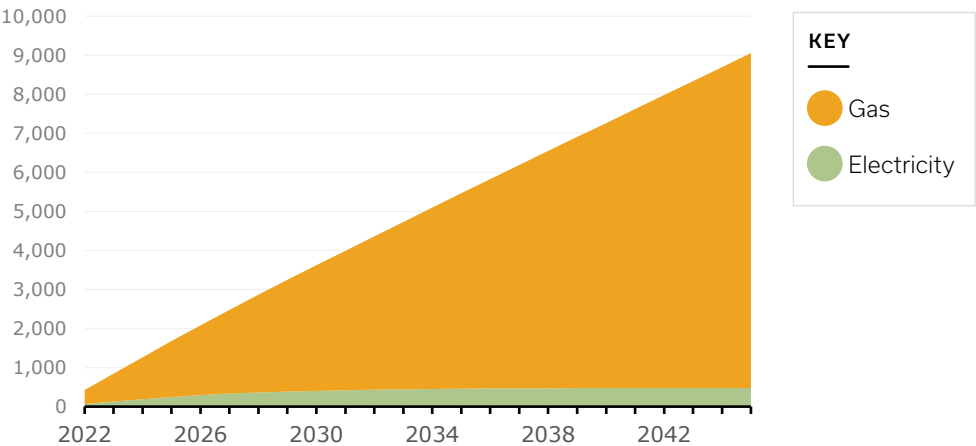
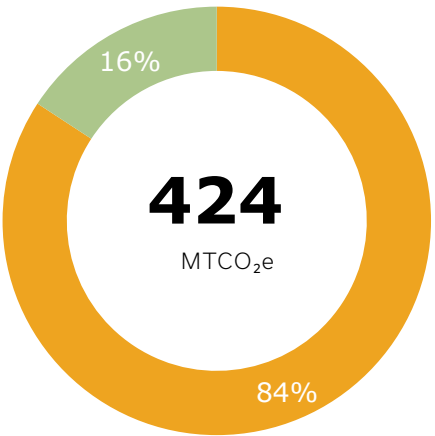
- Aging HVAC equipment
- Limited existing cooling in building
- Space and domestic water heating provided by gas boiler systems
- Aging envelope with limited insulation
- Aging and inefficient lighting technology

CURRENTLY PLANNED IMPROVEMENTS

- Upgrades to HVAC controls to improve efficiency and performance
- Upgrading lighting systems to high-efficiency LED fixtures

POTENTIAL OPPORTUNITIES

- ☐ Electrification of all heating systems within the building
- ☐ Incorporation of heat pump systems for heating and cooling
- ☐ Improved ventilation systems to provide enhanced filtration and maintain healthy indoor air quality
- ☐ Envelope enhancement to reduce conditioning loads and improve thermal comfort
- ☐ Incorporation of renewable energy systems to offset operational emissions
- ☐ Increased tree canopy and green space
- ☐
- ☐



*Electric emissions projection based on 2023 emissions outlook from PGE

Lincoln + Ida B Wells Cluster

PORTLAND PUBLIC SCHOOLS



		RANKING (OUT OF 20)
AREA	34,272 SQUARE FEET	18
EUI	59 kBtu/SF	12
ENERGY COSTS	\$61,843	15
EMISSIONS	124 MTCO ₂ e	17
EMISSIONS INTENSITY	8.0 LBS-CO ₂ e/SF	12.0
WATER-USE INTENSITY	15.1 GAL/SF	4

Rieke Elementary School

BUILDING CONSTRUCTED: 1961

SUMMARY OF EXISTING CONDITIONS

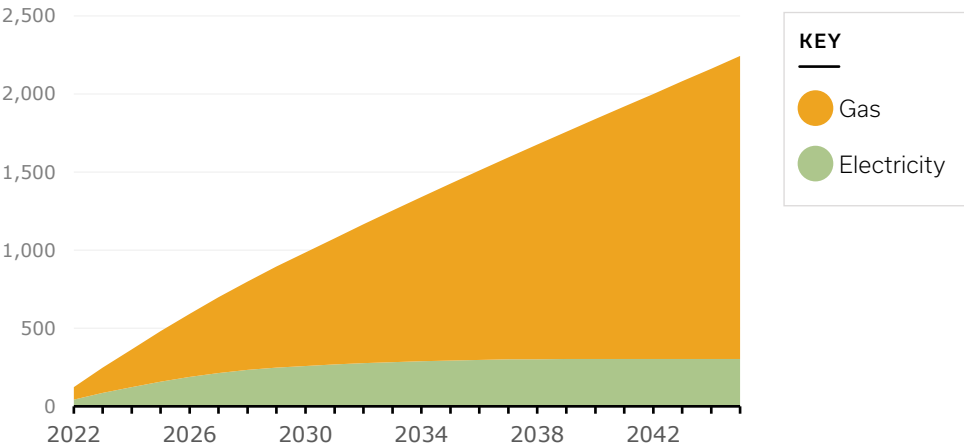
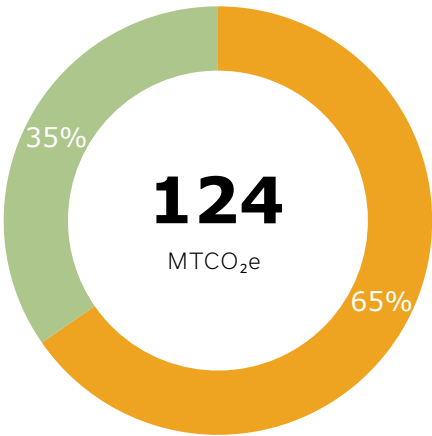
- Aging HVAC equipment
- Limited existing cooling in building
- Space and domestic water heating provided by gas boiler systems
- Aging envelope with limited insulation
- Aging and inefficient lighting technology

CURRENTLY PLANNED IMPROVEMENTS

- Upgrades to HVAC controls to improve efficiency and performance

POTENTIAL OPPORTUNITIES

- ☐ Electrification of all heating systems within the building
- ☐ Incorporation of heat pump systems for heating and cooling
- ☐ Improved ventilation systems to provide enhanced filtration and maintain healthy indoor air quality
- ☐ Envelope enhancement to reduce conditioning loads and improve thermal comfort
- ☐ Upgrading lighting systems to high-efficiency LED fixtures
- ☐ Incorporation of renewable energy systems to offset operational emissions
- ☐ Increased tree canopy and green space
- ☐
- ☐
- ☐



*Electric emissions projection based on 2023 emissions outlook from PGE



		RANKING (OUT OF 20)
AREA	38,327 SQUARE FEET	17
EUI	56 kBtu/SF	14
ENERGY COSTS	\$36,516	19
EMISSIONS	126 MTCO ₂ e	16
EMISSIONS INTENSITY	7.2 LBS-CO ₂ e/SF	16.0
WATER-USE INTENSITY	0.0 GAL/SF	20

Skyline Elementary School

BUILDING CONSTRUCTED: 1939

SUMMARY OF EXISTING CONDITIONS

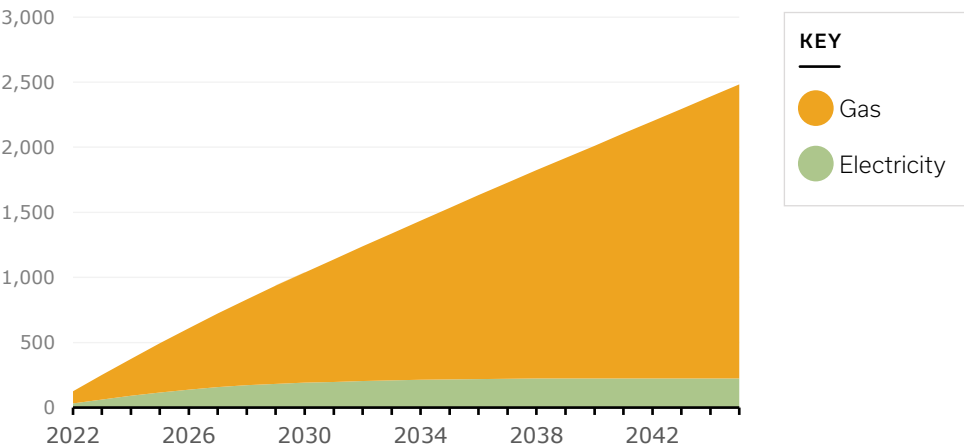
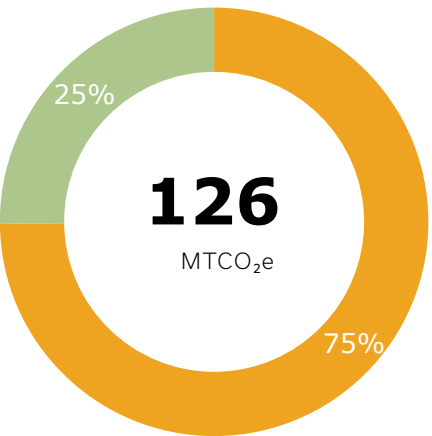
- Aging HVAC equipment
- Limited existing cooling in building
- Space and domestic water heating provided by gas boiler systems
- Aging envelope with limited insulation
- Aging and inefficient lighting technology

CURRENTLY PLANNED IMPROVEMENTS

- Upgrades to HVAC controls to improve efficiency and performance
- Upgrading lighting systems to high-efficiency LED fixtures

POTENTIAL OPPORTUNITIES

- ☐ Electrification of all heating systems within the building
- ☐ Incorporation of heat pump systems for heating and cooling
- ☐ Improved ventilation systems to provide enhanced filtration and maintain healthy indoor air quality
- ☐ Envelope enhancement to reduce conditioning loads and improve thermal comfort
- ☐ Incorporation of renewable energy systems to offset operational emissions
- ☐ Increased tree canopy and green space
- ☐
- ☐
- ☐



*Electric emissions projection based on 2023 emissions outlook from PGE

Lincoln + Ida B Wells Cluster

PORTLAND PUBLIC SCHOOLS



Smith Elementary School

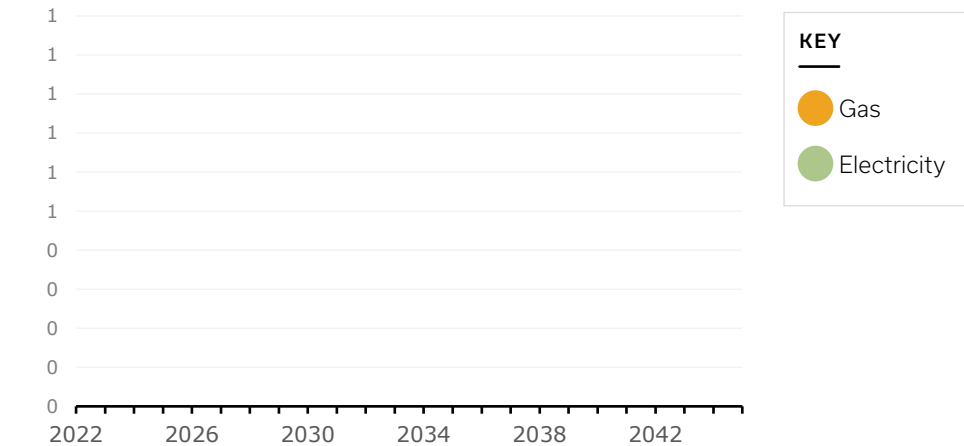
VACANT

BUILDING CONSTRUCTED: 1958

NOTE

Smith Elementary has been closed since 2006 and currently serves as storage space for the district.

		RANKING (OUT OF 20)
AREA	53,460 SQUARE FEET	12
EUI	1 kBtu/SF	20
ENERGY COSTS	\$12,949	20
EMISSIONS	2 MTCO ₂ e	20
EMISSIONS INTENSITY	0.1 LBS-CO ₂ e/SF	20.0
WATER-USE INTENSITY	2.0 GAL/SF	19



*Electric emissions projection based on 2023 emissions outlook from PGE



Stephenson Elementary School

BUILDING CONSTRUCTED: 1964

SUMMARY OF EXISTING CONDITIONS

- Aging HVAC equipment
- Limited existing cooling in building
- Space and domestic water heating provided by gas boiler systems
- Aging envelope with limited insulation
- Aging and inefficient lighting technology

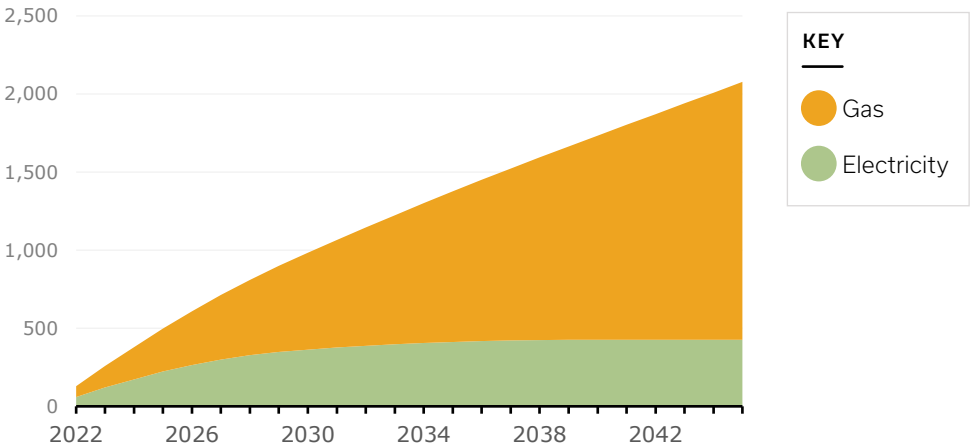
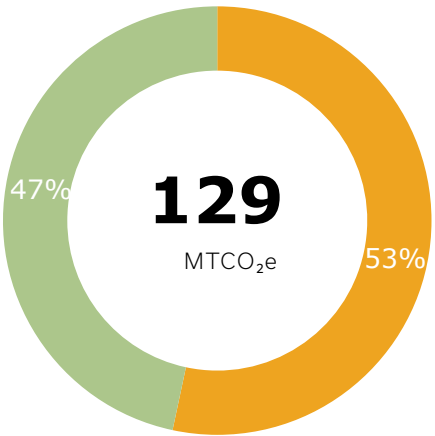
CURRENTLY PLANNED IMPROVEMENTS

- Upgrades to HVAC controls to improve efficiency and performance
- Upgrading lighting systems to high-efficiency LED fixtures

POTENTIAL OPPORTUNITIES

- ☐ Electrification of all heating systems within the building
- ☐ Incorporation of heat pump systems for heating and cooling
- ☐ Improved ventilation systems to provide enhanced filtration and maintain healthy indoor air quality
- ☐ Envelope enhancement to reduce conditioning loads and improve thermal comfort
- ☐ Incorporation of renewable energy systems to offset operational emissions
- ☐ Increased tree canopy and green space
- ☐
- ☐
- ☐

		RANKING (OUT OF 20)
AREA	40,460 SQUARE FEET	16
EUI	50 kBtu/SF	17
ENERGY COSTS	\$58,030	16
EMISSIONS	129 MTCO ₂ e	15
EMISSIONS INTENSITY	7.0 LBS-CO ₂ e/SF	17.0
WATER-USE INTENSITY	6.7 GAL/SF	14



*Electric emissions projection based on 2023 emissions outlook from PGE

Lincoln + Ida B Wells Cluster

PORTLAND PUBLIC SCHOOLS



RANKING (OUT OF 20)		
AREA	26,365 SQUARE FEET	19
EUI	86 kBTU/SF	4
ENERGY COSTS	\$53,551	17
EMISSIONS	133 MTCO ₂ e	14
EMISSIONS INTENSITY	11.1 LBS-CO ₂ e/SF	4.0
WATER-USE INTENSITY	5.6 GAL/SF	17

Terwilliger ACCESS Academy Alternative

BUILDING CONSTRUCTED: 1917

SUMMARY OF EXISTING CONDITIONS

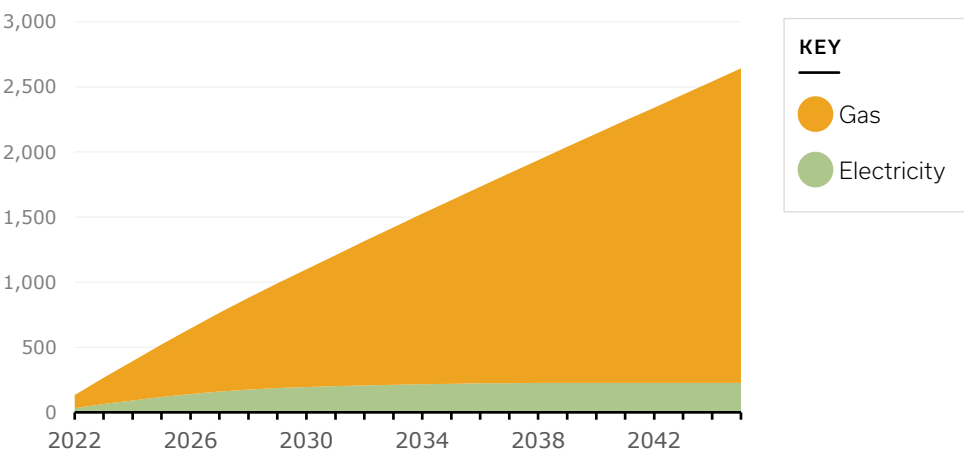
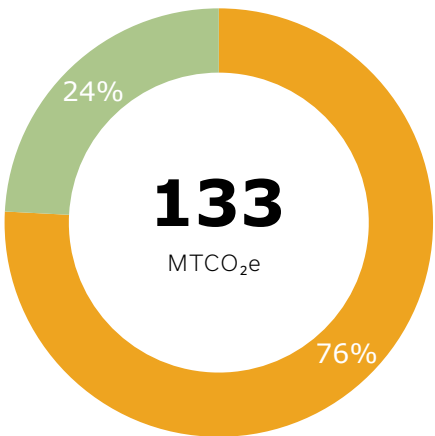
- Aging HVAC equipment
- Limited existing cooling in building
- Space and domestic water heating provided by gas boiler systems
- Aging envelope with limited insulation
- Aging and inefficient lighting technology

CURRENTLY PLANNED IMPROVEMENTS

- Upgrading lighting systems to high-efficiency LED fixtures

POTENTIAL OPPORTUNITIES

- ☐ Electrification of all heating systems within the building
- ☐ Incorporation of heat pump systems for heating and cooling
- ☐ Improved ventilation systems to provide enhanced filtration and maintain healthy indoor air quality
- ☐ Envelope enhancement to reduce conditioning loads and improve thermal comfort
- ☐ Incorporation of renewable energy systems to offset operational emissions
- ☐ Increased tree canopy and green space
- ☐
- ☐
- ☐



*Electric emissions projection based on 2023 emissions outlook from PGE



RANKING (OUT OF 20)		
AREA	108,187 SQUARE FEET	4
EUI	44 kBTU/SF	18
ENERGY COSTS	\$132,991	6
EMISSIONS	292 MTCO ₂ e	7
EMISSIONS INTENSITY	6.0 LBS-CO ₂ e/SF	18.0
WATER-USE INTENSITY	14.4 GAL/SF	5

West Sylvan Middle School

BUILDING CONSTRUCTED: 1953

SUMMARY OF EXISTING CONDITIONS

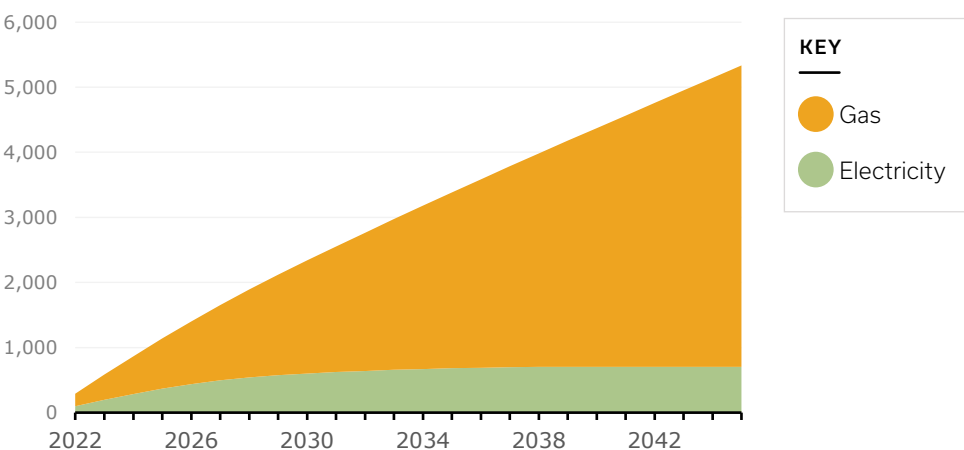
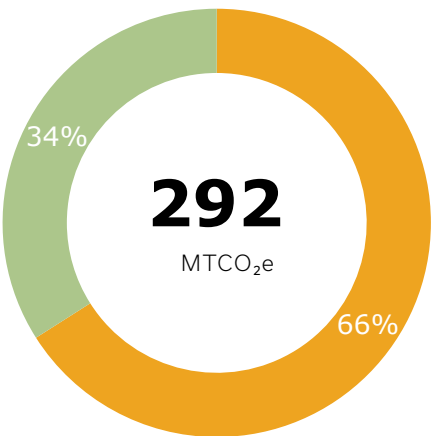
- Aging HVAC equipment
- Space and domestic water heating provided by gas boiler systems
- Limited existing cooling in building
- Aging envelope with limited insulation
- Lighting systems recently upgraded

CURRENTLY PLANNED IMPROVEMENTS

- Upgrades to HVAC controls to improve efficiency and performance

POTENTIAL OPPORTUNITIES

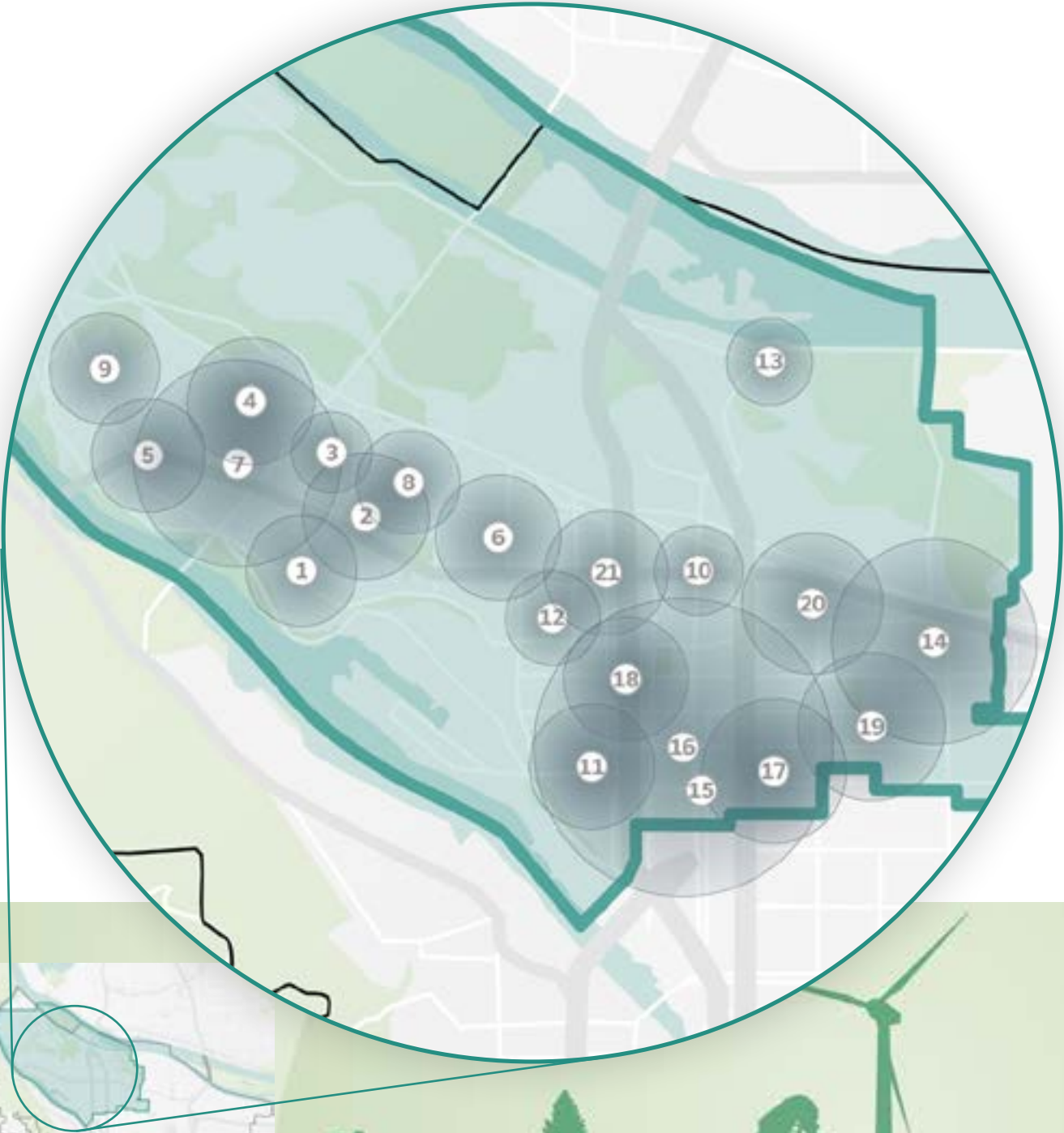
- ☐ Electrification of all heating systems within the building
- ☐ Incorporation of heat pump systems for heating and cooling
- ☐ Improved ventilation systems to provide enhanced filtration and maintain healthy indoor air quality
- ☐ Envelope enhancement to reduce conditioning loads and improve thermal comfort
- ☐ Incorporation of renewable energy systems to offset operational emissions
- ☐ Increased tree canopy and green space
- ☐
- ☐
- ☐



*Electric emissions projection based on 2023 emissions outlook from PGE

Building Performance for Roosevelt-Jefferson Clusters

PORTLAND PUBLIC SCHOOLS | 2022



FACILITY	AREA (SF)	EUI (kBtu/SF/YR)	ENERGY COST (\$)	GAS EMISSIONS (MTCO ₂ E)	ELECTRIC EMISSIONS (MTCO ₂ E)	TOTAL EMISSIONS (MTCO ₂ E)	EMISSIONS INTENSITY (LBS CO ₂ E/SF)	WATER USE INTENSITY (GAL/SF)
1 Astor	49,434	75	\$82,614	152	72	225	10.0	6.6
2 Cesar Chavez	78,061	63	\$104,739	209	82	291	8.2	4.7
3 Clarendon	40,723	42	\$69,940	45	75	119	6.5	17.4
4 George	76,142	65	\$134,104	214	80	294	8.5	15.4
5 James John*	64,285	63	\$93,200	183	53	236	8.1	10.3
6 Peninsula	62,231	79	\$92,548	222	64	286	10.1	4.8
7 Roosevelt*	271,306	40	\$338,055	244	533	777	6.3	13.0
8 Rosa Parks/BGC	68,176	44	\$100,030	101	95	196	6.3	11.9
9 Sitton	58,487	62	\$86,999	144	79	223	8.4	6.9
10 Applegate	27,785	57	\$37,876	65	81	146	11.6	7.9
11 Beach	70,498	69	\$100,532	210	77	286	9.0	5.8
12 Chief Joseph	44,859	60	\$67,403	108	55	163	8.0	6.2
13 Columbia	41,075	24	\$58,050	25	113	137	7.4	8.7
14 Faubion*	170,638	40	\$150,754	240	492	732	9.5	2.6
15 Humboldt**	43,489	43	\$44,285	71	91	162	8.2	8.1
16 Jefferson	318,790	70	\$352,983	1,046	577	1,623	11.2	8.0
17 King	108,598	46	\$82,202	226	157	383	7.8	3.5
18 Ockley Green	74,018	65	\$97,108	210	72	282	8.4	5.5
19 Vernon	70,833	69	\$88,457	215	184	399	12.4	4.1
20 Woodlawn	106,432	43	\$82,729	205	156	361	7.5	2.8
21 Kenton	52,433	93	\$88,960	226	54	280	11.8	7.2
Cluster Total	1,898,293	NA	\$2,353,567	4,360	3,241	7,601	NA	NA
District Total	9,065,846		\$12,197,485	22,581	18,113	40,694	NA	NA
Clusters Average	90,395	56	\$112,075	208	154	362	8.8	7.7
District Average	88,018	62	\$118,422	219	176	395	9.9	8.4

MAP KEY

City of Portland Boundary

Cluster Boundary

Total Emissions
MTCO₂E

* Electric emissions include offset from on-site PV

** Energy and emissions calculated using 2020 AY data

21

TOTAL BUILDINGS

7,601

MTCO₂E

TOTAL EMISSIONS

8.8

LBS CO₂E/SF

AVERAGE EMISSIONS INTENSITY

7.7

GAL/SF

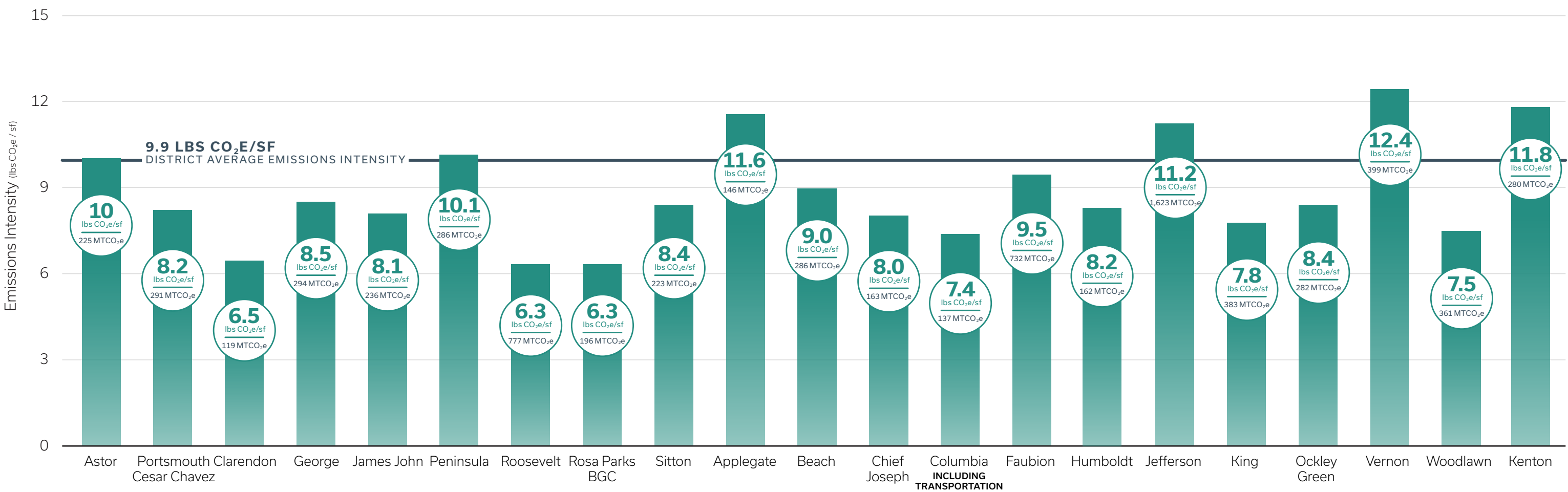
AVERAGE WATER USE INTENSITY

- The total emissions from these clusters account for roughly 19% of the total emissions for the district, with the average emissions intensities being roughly 11% lower than the district average.
- The school with the highest total emissions (Jefferson High School) is currently undergoing a modernization project
- Gas emissions account for the majority of emissions in 15/21 schools and electrifying gas equipment will have a significant impact in reducing these emissions, particularly as the electrical grid decarbonizes

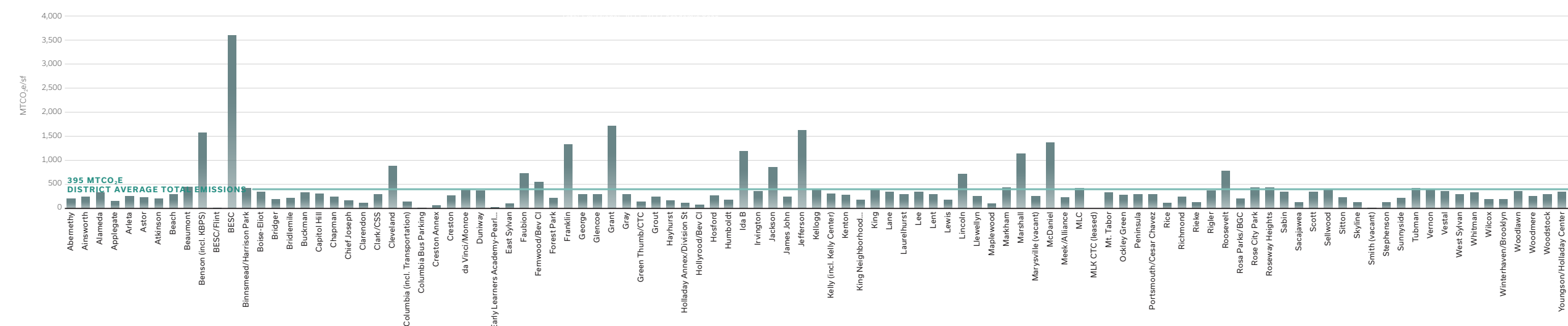
KEY ABBREVIATIONS
EUI | Energy Use Intensity
kBtu | Thousand British thermal units
SF | square feet
CO₂E | CO₂ equivalent
MT | Metric Ton
LBS | Pounds

Emissions Comparison for Roosevelt-Jefferson Clusters

PORTLAND PUBLIC SCHOOLS



PORTLAND PUBLIC SCHOOL TOTAL EMISSIONS: 2022-2023 ACADEMIC YEAR



Roosevelt-Jefferson Cluster

PORTLAND PUBLIC SCHOOLS



		RANKING (OUT OF 21)
AREA	27,785 SQUARE FEET	21
EUI	57 kBTU/SF	13
ENERGY COSTS	\$37,876	21
EMISSIONS	146 MTCO ₂ e	19
EMISSIONS INTENSITY	11.6 LBS-CO ₂ e/SF	3
WATER-USE INTENSITY	7.9 GAL/SF	9

Applegate Elementary School

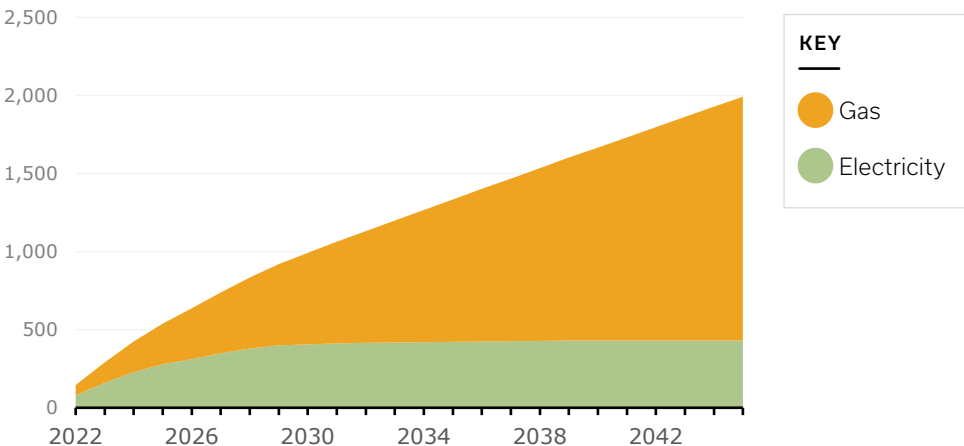
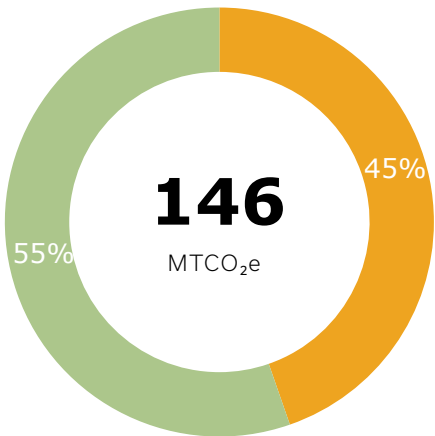
BUILDING CONSTRUCTED: 1954

SUMMARY OF EXISTING CONDITIONS

- Aging HVAC equipment
- Space and domestic water heating provided by gas boiler systems
- Limited existing cooling in building
- Aging envelope with limited insulation
- Aging and inefficient lighting technology

POTENTIAL OPPORTUNITIES

- ☐ Electrification of all heating systems within the building
- ☐ Incorporation of heat pump systems for heating and cooling
- ☐ Improved ventilation systems to provide enhanced filtration and maintain healthy indoor air quality
- ☐ Envelope enhancement to reduce conditioning loads and improve thermal comfort
- ☐ Upgrading lighting systems to high-efficiency LED fixtures
- ☐ Incorporation of renewable energy systems to offset operational emissions
- ☐ Increased tree canopy and green space
- ☐
- ☐
- ☐



*Electric emissions projection based on 2023 emissions outlook from Pacific Power



		RANKING (OUT OF 21)
AREA	49,434 SQUARE FEET	16
EUI	75 kBTU/SF	3
ENERGY COSTS	\$82,614	15
EMISSIONS	225 MTCO ₂ e	14
EMISSIONS INTENSITY	10.0 LBS-CO ₂ e/SF	6
WATER-USE INTENSITY	6.6 GAL/SF	12

Astor Elementary School

BUILDING CONSTRUCTED: 1949

SUMMARY OF EXISTING CONDITIONS

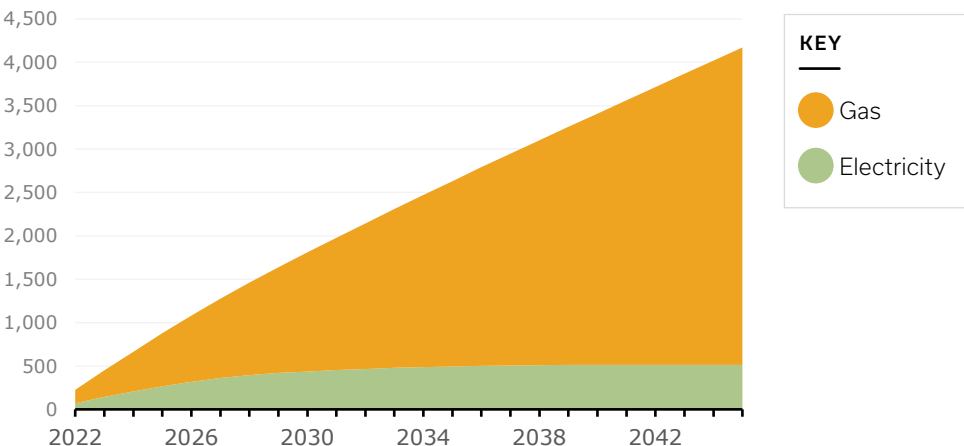
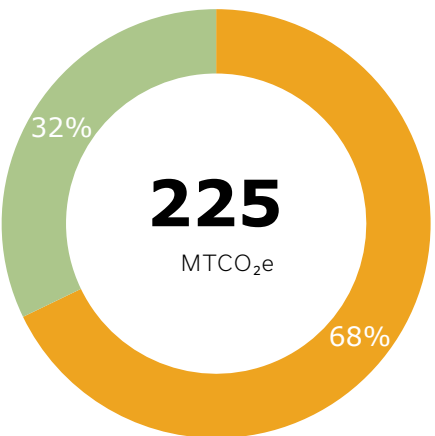
- Aging HVAC equipment
- Space and domestic water heating provided by gas boiler systems
- Limited existing cooling in building
- Limited insulation in existing envelope
- Aging and inefficient lighting technology

CURRENTLY PLANNED IMPROVEMENTS

- Upgrade lighting to high-efficiency LED fixtures
- Upgrades to HVAC controls to improve efficiency and performance

POTENTIAL OPPORTUNITIES

- ☐ Electrification of all heating systems within the building
- ☐ Incorporation of heat pump systems for heating and cooling
- ☐ Improved ventilation systems to provide enhanced filtration and maintain healthy indoor air quality
- ☐ Envelope enhancement to reduce conditioning loads and improve thermal comfort
- ☐ Incorporation of renewable energy systems to offset operational emissions
- ☐ Increased tree canopy and green space
- ☐
- ☐



*Electric emissions projection based on 2023 emissions outlook from PGE

Roosevelt-Jefferson Cluster

PORTLAND PUBLIC SCHOOLS



		RANKING (OUT OF 21)
AREA	70,498 SQUARE FEET	10
EUI	69 kBTU/SF	6
ENERGY COSTS	\$100,532	6
EMISSIONS	286 MTCO ₂ e	9
EMISSIONS INTENSITY	9.0 LBS-CO ₂ e/SF	8
WATER-USE INTENSITY	5.8 GAL/SF	14

Beach Elementary School

BUILDING CONSTRUCTED: 1928

SUMMARY OF EXISTING CONDITIONS

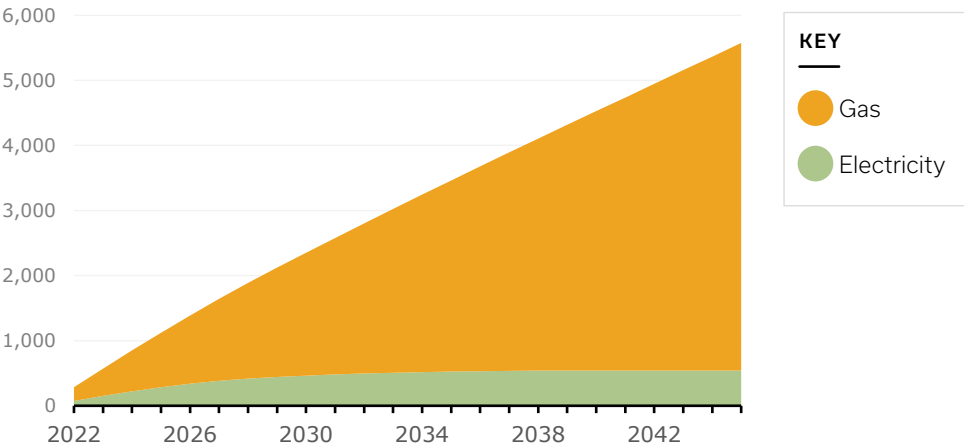
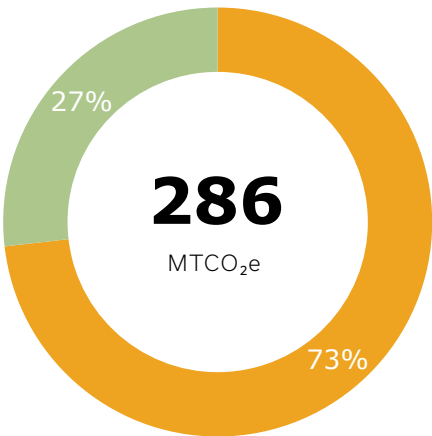
- Aging HVAC equipment
- Space and domestic water heating provided by gas boiler systems
- Limited existing cooling in building
- Aging envelope with limited insulation
- Lighting systems recently upgraded

CURRENTLY PLANNED IMPROVEMENTS

- Upgrades to HVAC controls to improve efficiency and performance

POTENTIAL OPPORTUNITIES

- ☐ Electrification of all heating systems within the building
- ☐ Incorporation of heat pump systems for heating and cooling
- ☐ Improved ventilation systems to provide enhanced filtration and maintain healthy indoor air quality
- ☐ Envelope enhancement to reduce conditioning loads and improve thermal comfort
- ☐ Incorporation of renewable energy systems to offset operational emissions
- ☐ Increased tree canopy and green space
- ☐
- ☐
- ☐



*Electric emissions projection based on 2023 emissions outlook from PGE



		RANKING (OUT OF 21)
AREA	44,859 SQUARE FEET	17
EUI	60 kBTU/SF	12
ENERGY COSTS	\$67,403	18
EMISSIONS	163 MTCO ₂ e	17
EMISSIONS INTENSITY	8.0 LBS-CO ₂ e/SF	15
WATER-USE INTENSITY	6.2 GAL/SF	13

Chief Joseph Elementary School

BUILDING CONSTRUCTED: 1949

SUMMARY OF EXISTING CONDITIONS

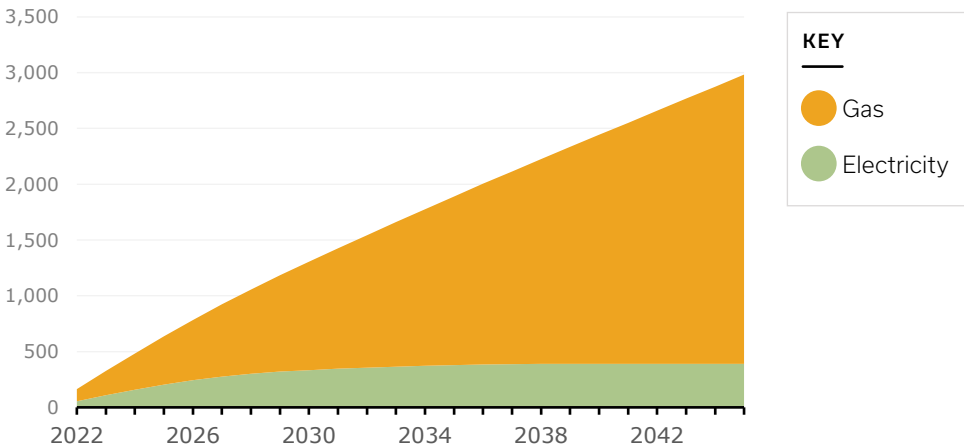
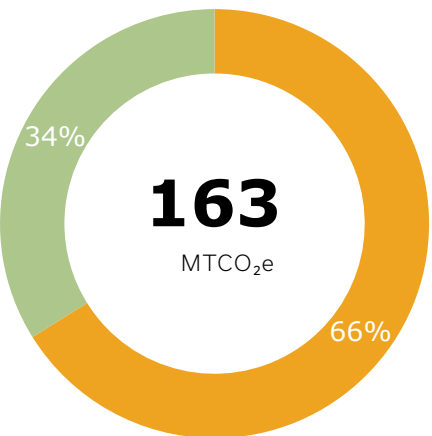
- Aging HVAC equipment
- Space and domestic water heating provided by gas boiler systems
- Limited existing cooling in building
- Existing envelope includes aging windows and limited insulation
- Aging and inefficient lighting technology

CURRENTLY PLANNED IMPROVEMENTS

- Upgrade lighting to high-efficiency LED fixtures
- Upgrades to HVAC controls to improve efficiency and performance

POTENTIAL OPPORTUNITIES

- ☐ Electrification of all heating systems within the building
- ☐ Incorporation of heat pump systems for heating and cooling
- ☐ Improved ventilation systems to provide enhanced filtration and maintain healthy indoor air quality
- ☐ Envelope enhancement to reduce conditioning loads and improve thermal comfort
- ☐ Incorporation of renewable energy systems to offset operational emissions
- ☐ Increased tree canopy and green space
- ☐
- ☐
- ☐



*Electric emissions projection based on 2023 emissions outlook from PGE

Roosevelt-Jefferson Cluster

PORTLAND PUBLIC SCHOOLS



		RANKING (OUT OF 21)
AREA	40,723 SQUARE FEET	20
EUI	42 kBtu/SF	18
ENERGY COSTS	\$69,940	17
EMISSIONS	119 MTCO ₂ e	21
EMISSIONS INTENSITY	6.5 LBS-CO ₂ e/SF	19
WATER-USE INTENSITY	17.4 GAL/SF	1

Clarendon School

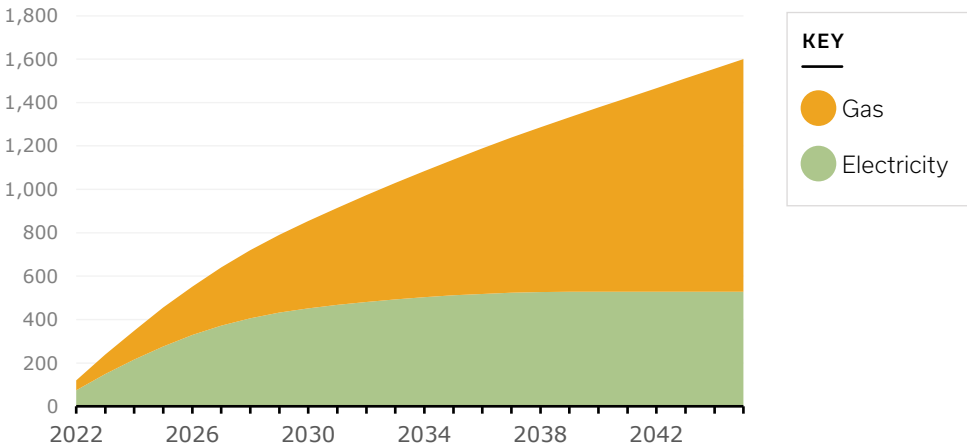
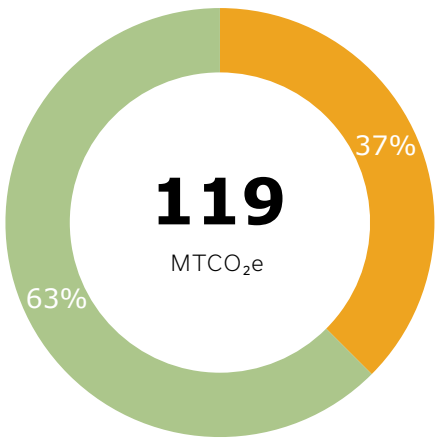
BUILDING CONSTRUCTED: 1970

SUMMARY OF EXISTING CONDITIONS

- Aging HVAC equipment
- Space and domestic water heating provided by gas boiler systems
- Limited insulation in existing envelope
- Aging and inefficient lighting technology

POTENTIAL OPPORTUNITIES

- ☐ Electrification of all heating systems within the building
- ☐ Incorporation of heat pump systems for heating and cooling
- ☐ Improved ventilation systems to provide enhanced filtration and maintain healthy indoor air quality
- ☐ Envelope enhancement to reduce conditioning loads and improve thermal comfort
- ☐ Upgrading lighting systems to high-efficiency LED fixtures
- ☐ Incorporation of renewable energy systems to offset operational emissions
- ☐ Increased tree canopy and green space
- ☐
- ☐
- ☐



*Electric emissions projection based on 2023 emissions outlook from PGE



		RANKING (OUT OF 21)
AREA	41,075 SQUARE FEET	19
EUI	24 kBtu/SF	21
ENERGY COSTS	\$58,050	19
EMISSIONS	137 MTCO ₂ e	20
EMISSIONS INTENSITY	7.4 LBS-CO ₂ e/SF	18
WATER-USE INTENSITY	8.7 GAL/SF	6

Columbia (incl. Transportation)

BUILDING CONSTRUCTED: 1937

SUMMARY OF EXISTING CONDITIONS

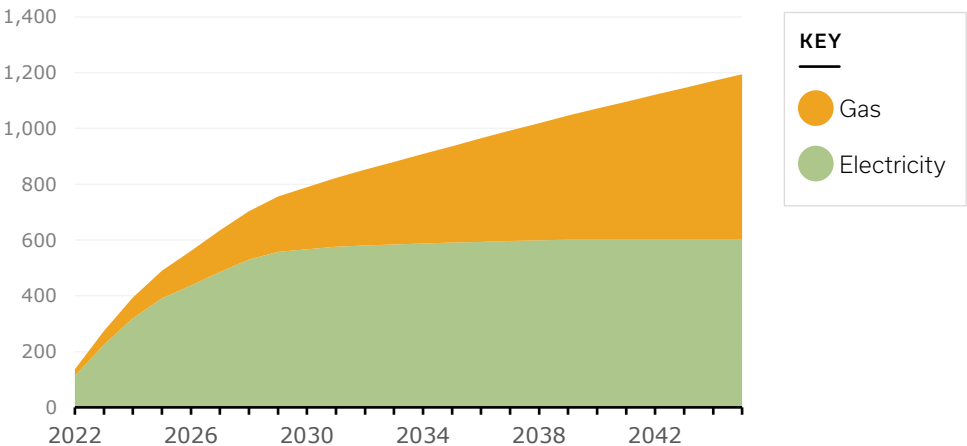
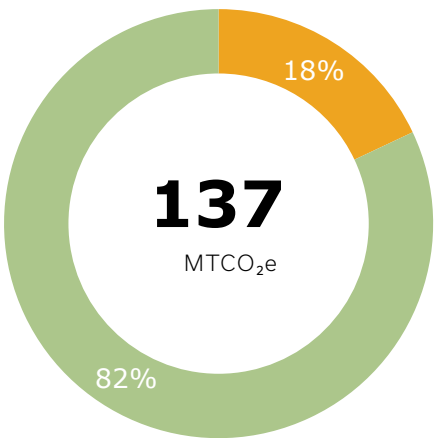
- Aging HVAC equipment
- Space and domestic water heating provided by gas boiler systems
- Limited existing cooling in building
- Aging envelope with limited insulation
- Lighting systems recently upgraded

CURRENTLY PLANNED IMPROVEMENTS

- Upgrades to HVAC controls to improve efficiency and performance

POTENTIAL OPPORTUNITIES

- ☐ Electrification of all heating systems within the building
- ☐ Incorporation of heat pump systems for heating and cooling
- ☐ Improved ventilation systems to provide enhanced filtration and maintain healthy indoor air quality
- ☐ Envelope enhancement to reduce conditioning loads and improve thermal comfort
- ☐ Incorporation of renewable energy systems to offset operational emissions
- ☐ Increased tree canopy and green space
- ☐
- ☐
- ☐



*Electric emissions projection based on 2023 emissions outlook from Pacific Power

Roosevelt-Jefferson Cluster

PORTLAND PUBLIC SCHOOLS



		RANKING (OUT OF 21)
AREA	170,638 SQUARE FEET	3
EUI	40 kBtu/SF	20
ENERGY COSTS	\$150,754	3
EMISSIONS	732 MTCO ₂ e	3
EMISSIONS INTENSITY	9.5 LBS-CO ₂ e/SF	7
WATER-USE INTENSITY	2.6 GAL/SF	21

Faubion Elementary School

BUILDING CONSTRUCTED: 2016

NOTE

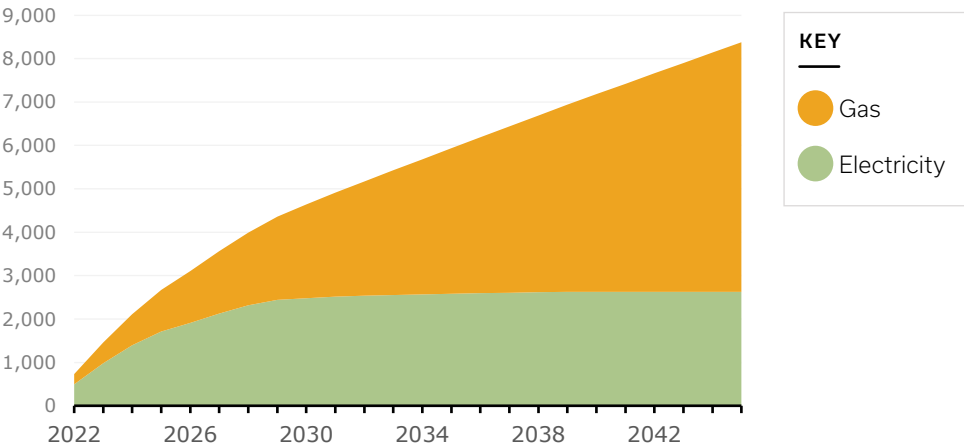
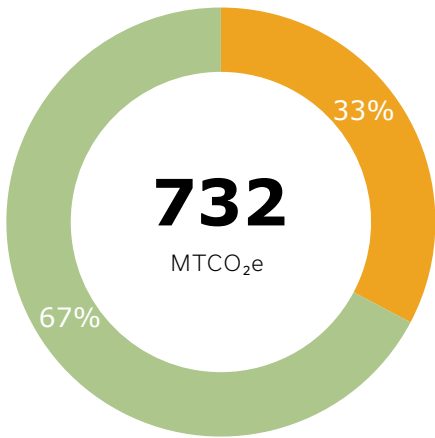
Faubion has recently undergone a modernization project in which the existing building was demolished and replaced with a new structure that incorporates many of the improvements recommended for other schools in the district.

SUMMARY OF EXISTING CONDITIONS

- New building, including envelope, lighting, and mechanical systems
- New equipment still uses gas for space and domestic water heating

POTENTIAL OPPORTUNITIES

- ☐ Electrification of all heating systems within the building
- ☐ Incorporation of renewable energy systems to offset operational emissions
- ☐ Increased tree canopy and green space
- ☐
- ☐
- ☐



*Electric emissions projection based on 2023 emissions outlook from Pacific Power



		RANKING (OUT OF 21)
AREA	76,142 SQUARE FEET	7
EUI	65 kBtu/SF	7
ENERGY COSTS	\$134,104	4
EMISSIONS	294 MTCO ₂ e	7
EMISSIONS INTENSITY	8.5 LBS-CO ₂ e/SF	9
WATER-USE INTENSITY	15.4 GAL/SF	2

George Middle School

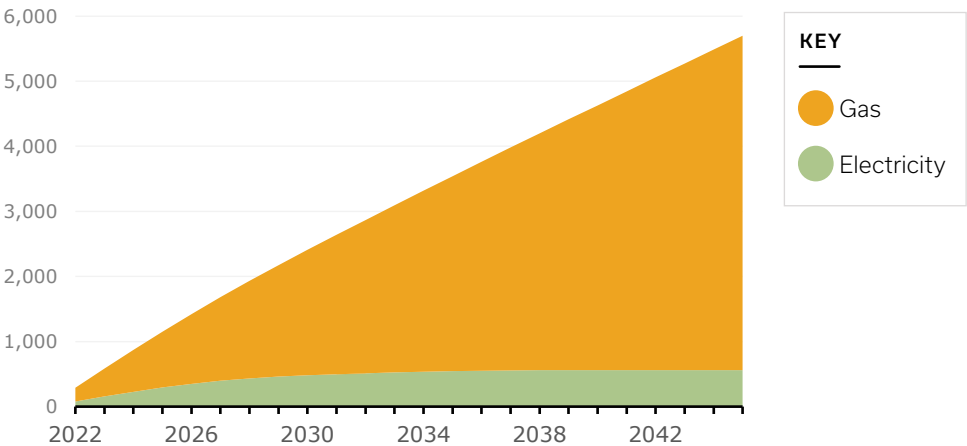
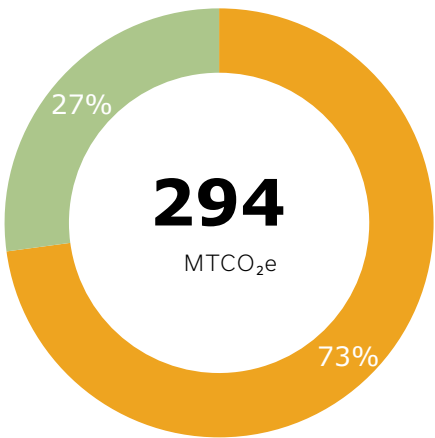
BUILDING CONSTRUCTED: 1950

SUMMARY OF EXISTING CONDITIONS

- Aging HVAC equipment
- Space and domestic water heating provided by gas boiler systems
- Limited existing cooling in building
- Limited insulation in existing envelope
- HVAC controls system was recently upgraded
- Lighting systems were recently upgraded

POTENTIAL OPPORTUNITIES

- ☐ Electrification of all heating systems within the building
- ☐ Incorporation of heat pump systems for heating and cooling
- ☐ Improved ventilation systems to provide enhanced filtration and maintain healthy indoor air quality
- ☐ Envelope enhancement to reduce conditioning loads and improve thermal comfort
- ☐ Incorporation of renewable energy systems to offset operational emissions
- ☐ Increased tree canopy and green space
- ☐
- ☐
- ☐



*Electric emissions projection based on 2023 emissions outlook from PGE

Roosevelt-Jefferson Cluster

PORTLAND PUBLIC SCHOOLS



RANKING (OUT OF 21)		
AREA	43,489 SQUARE FEET	18
EUI	43 kBtu/SF	17
ENERGY COSTS	\$44,285	20
EMISSIONS	162 MTCO ₂ e	18
EMISSIONS INTENSITY	8.2 LBS-CO ₂ e/SF	13
WATER-USE INTENSITY	8.1 GAL/SF	7

Humboldt Elementary School

BUILDING CONSTRUCTED: 1959

NOTE

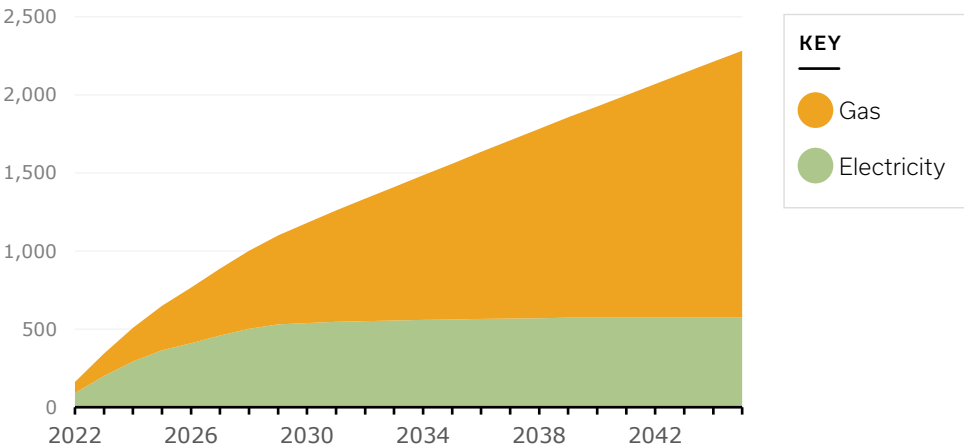
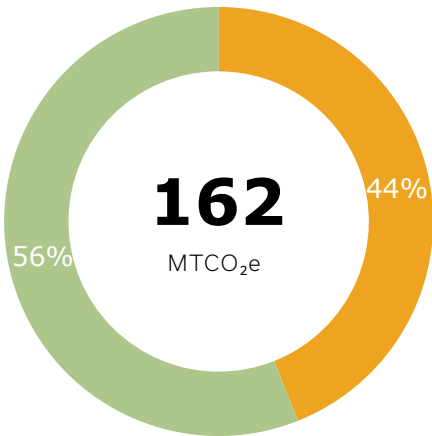
Utility data from 2020-2021

SUMMARY OF EXISTING CONDITIONS

- Aging HVAC equipment
- Space and domestic water heating provided by gas boiler systems
- Limited existing cooling in building
- Aging envelope with limited insulation
- Aging and inefficient lighting technology

POTENTIAL OPPORTUNITIES

- ☐ Electrification of all heating systems within the building
- ☐ Incorporation of heat pump systems for heating and cooling
- ☐ Improved ventilation systems to provide enhanced filtration and maintain healthy indoor air quality
- ☐ Envelope enhancement to reduce conditioning loads and improve thermal comfort
- ☐ Upgrading lighting systems to high-efficiency LED fixtures
- ☐ Incorporation of renewable energy systems to offset operational emissions
- ☐ Increased tree canopy and green space
- ☐
- ☐



*Electric emissions projection based on 2023 emissions outlook from Pacific Power



RANKING (OUT OF 21)		
AREA	64,285 SQUARE FEET	12
EUI	63 kBtu/SF	9
ENERGY COSTS	\$93,200	9
EMISSIONS	236 MTCO ₂ e	13
EMISSIONS INTENSITY	8.1 LBS-CO ₂ e/SF	14
WATER-USE INTENSITY	10.3 GAL/SF	5

James John Elementary School

BUILDING CONSTRUCTED: 1929

SUMMARY OF EXISTING CONDITIONS

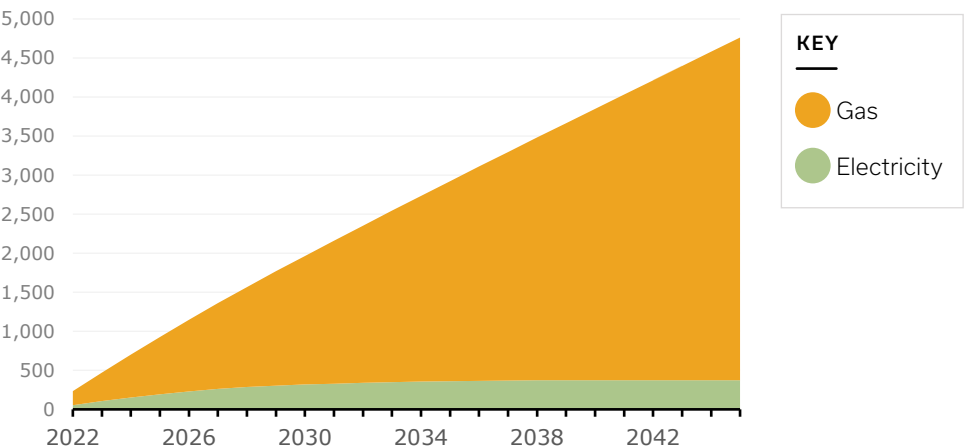
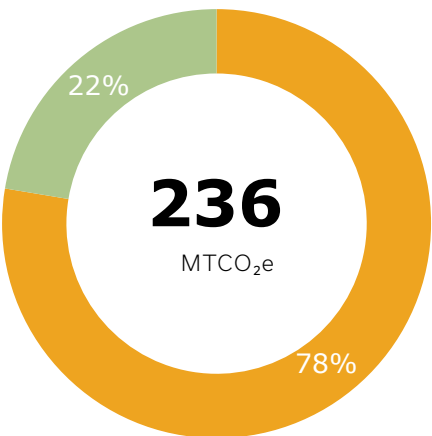
- Aging HVAC equipment
- Space and domestic water heating provided by gas boiler systems
- Limited existing cooling in building
- Aging envelope with limited insulation
- Lighting systems recently upgraded

CURRENTLY PLANNED IMPROVEMENTS

- Upgrades to HVAC controls to improve efficiency and performance

POTENTIAL OPPORTUNITIES

- ☐ Electrification of all heating systems within the building
- ☐ Incorporation of heat pump systems for heating and cooling
- ☐ Improved ventilation systems to provide enhanced filtration and maintain healthy indoor air quality
- ☐ Envelope enhancement to reduce conditioning loads and improve thermal comfort
- ☐ Incorporation of renewable energy systems to offset operational emissions
- ☐ Increased tree canopy and green space
- ☐
- ☐
- ☐



*Electric emissions projection based on 2023 emissions outlook from PGE

Roosevelt-Jefferson Cluster

PORTLAND PUBLIC SCHOOLS



RANKING (OUT OF 21)		
AREA	318,790 SQUARE FEET	1
EUI	70 kBTU/SF	4
ENERGY COSTS	\$352,983	1
EMISSIONS	1,623 MTCO ₂ e	1
EMISSIONS INTENSITY	11.2 LBS-CO ₂ e/SF	4
WATER-USE INTENSITY	8.0 GAL/SF	8

Jefferson High School

BUILDING CONSTRUCTED: 1969

NOTE

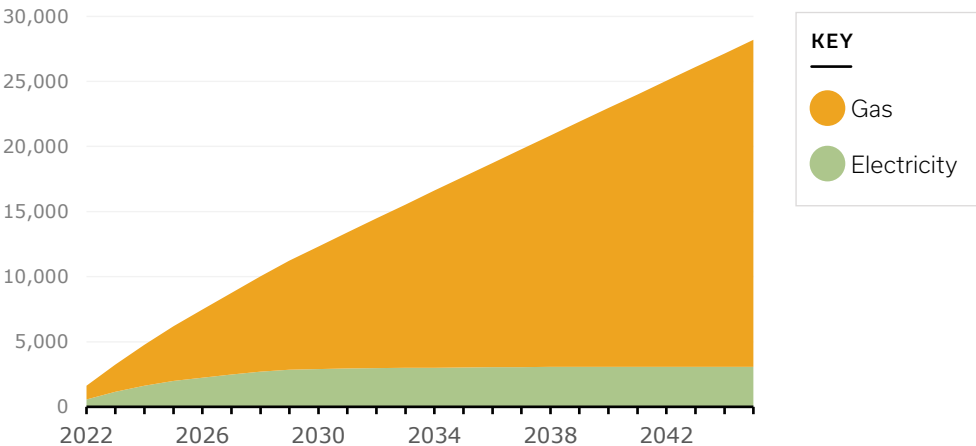
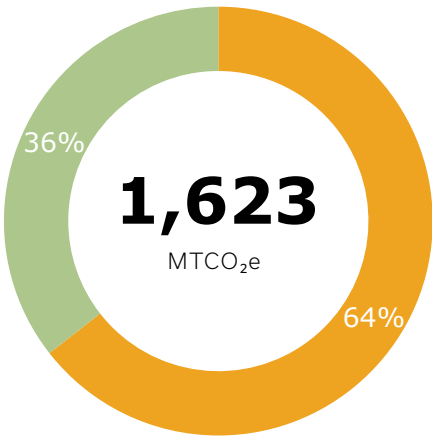
This building is currently in the planning phase of a modernization effort.

SUMMARY OF EXISTING CONDITIONS

- Large historic building with significantly aged equipment
- Space and DHW heating provided by gas boiler systems
- Limited existing cooling in building
- Existing lighting includes inefficient fluorescent and incandescent fixtures
- Existing envelope includes single-pane glazing and limited insulation

CURRENTLY PLANNED IMPROVEMENTS

- Electrification of all heating and cooking systems within the building
- Incorporation of heat pump systems for heating and cooling
- Improved ventilation systems to provide enhanced filtration and maintain healthy indoor air quality
- Enhanced daylighting to improve occupant experience and reduce energy consumption
- Envelope enhancement to reduce conditioning loads and improve thermal comfort
- Incorporation of mass timber to reduce embodied carbon impact of the modernization
- Incorporation of renewable energy systems to offset operational emissions
- Increased tree canopy and green space



*Electric emissions projection based on 2023 emissions outlook from Pacific Power



RANKING (OUT OF 21)		
AREA	52,433 SQUARE FEET	15
EUI	93 kBTU/SF	1
ENERGY COSTS	\$88,960	11
EMISSIONS	280 MTCO ₂ e	12
EMISSIONS INTENSITY	11.8 LBS-CO ₂ e/SF	2
WATER-USE INTENSITY	7.2 GAL/SF	10

Kenton Elementary School

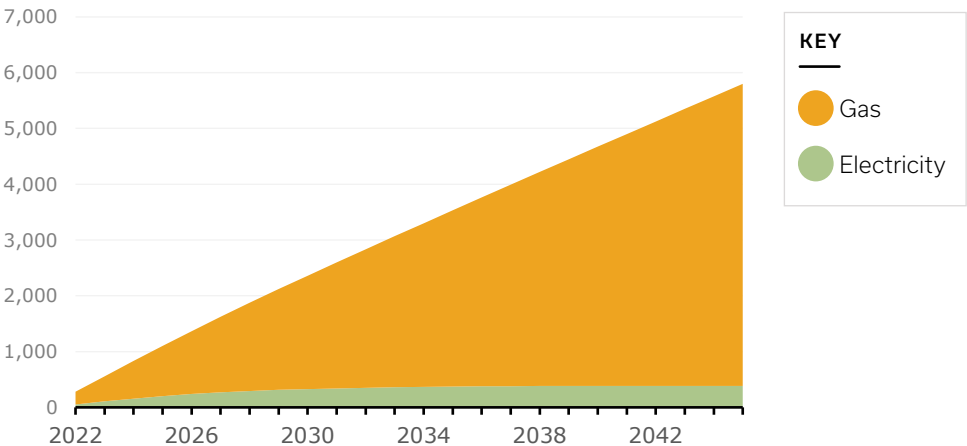
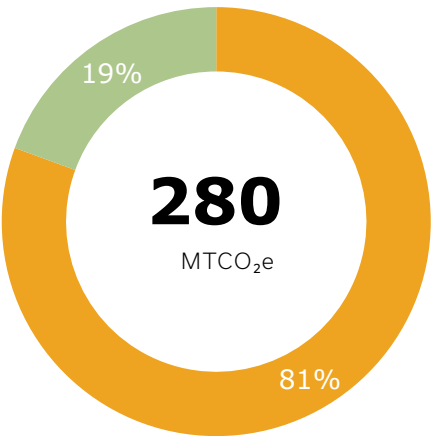
BUILDING CONSTRUCTED: 1913

SUMMARY OF EXISTING CONDITIONS

- Aging HVAC equipment
- Space and domestic water heating provided by gas boiler systems
- Aging envelope with limited insulation
- Aging and inefficient lighting technology

POTENTIAL OPPORTUNITIES

- Electrification of all heating systems within the building
- Incorporation of heat pump systems for heating and cooling
- Improved ventilation systems to provide enhanced filtration and maintain healthy indoor air quality
- Envelope enhancement to reduce conditioning loads and improve thermal comfort
- Upgrading lighting systems to high-efficiency LED fixtures
- Incorporation of renewable energy systems to offset operational emissions
- Increased tree canopy and green space



*Electric emissions projection based on 2023 emissions outlook from PGE

Roosevelt-Jefferson Cluster

PORTLAND PUBLIC SCHOOLS



		RANKING (OUT OF 21)
AREA	108,598 SQUARE FEET	4
EUI	46 kBtu/SF	14
ENERGY COSTS	\$82,202	16
EMISSIONS	383 MTCO ₂ e	5
EMISSIONS INTENSITY	7.8 LBS-CO ₂ e/SF	16
WATER-USE INTENSITY	3.5 GAL/SF	19

King Elementary School

BUILDING CONSTRUCTED: 1913

SUMMARY OF EXISTING CONDITIONS

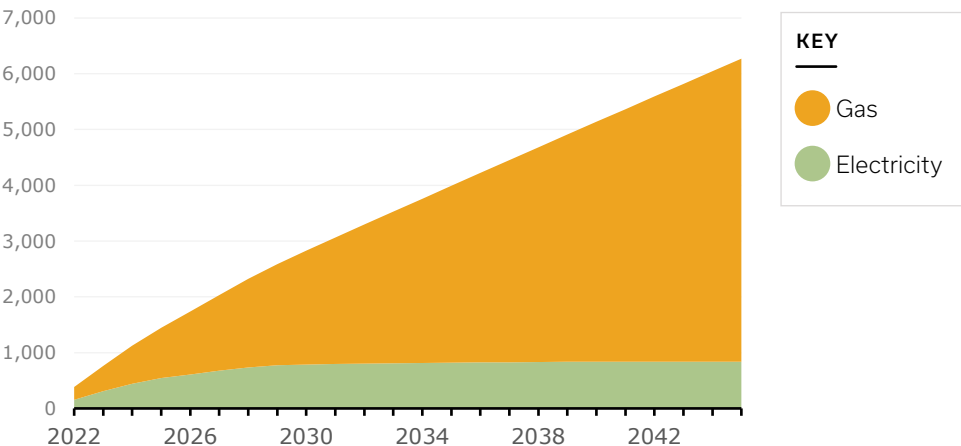
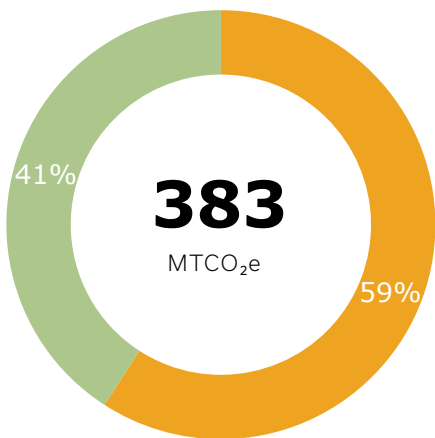
- Aging HVAC equipment
- Space and domestic water heating provided by gas boiler systems
- Limited existing cooling in building
- Limited insulation in existing envelope
- Lighting systems recently upgraded

CURRENTLY PLANNED IMPROVEMENTS

- Upgrades to HVAC controls to improve efficiency and performance

POTENTIAL OPPORTUNITIES

- ☐ Electrification of all heating systems within the building
- ☐ Incorporation of heat pump systems for heating and cooling
- ☐ Improved ventilation systems to provide enhanced filtration and maintain healthy indoor air quality
- ☐ Envelope enhancement to reduce conditioning loads and improve thermal comfort
- ☐ Incorporation of renewable energy systems to offset operational emissions
- ☐ Increased tree canopy and green space
- ☐
- ☐
- ☐



*Electric emissions projection based on 2023 emissions outlook from Pacific Power



		RANKING (OUT OF 21)
AREA	74,018 SQUARE FEET	8
EUI	65 kBtu/SF	8
ENERGY COSTS	\$97,108	8
EMISSIONS	282 MTCO ₂ e	11
EMISSIONS INTENSITY	8.4 LBS-CO ₂ e/SF	10
WATER-USE INTENSITY	5.5 GAL/SF	15

Ockley Green Middle School

BUILDING CONSTRUCTED: 1925

SUMMARY OF EXISTING CONDITIONS

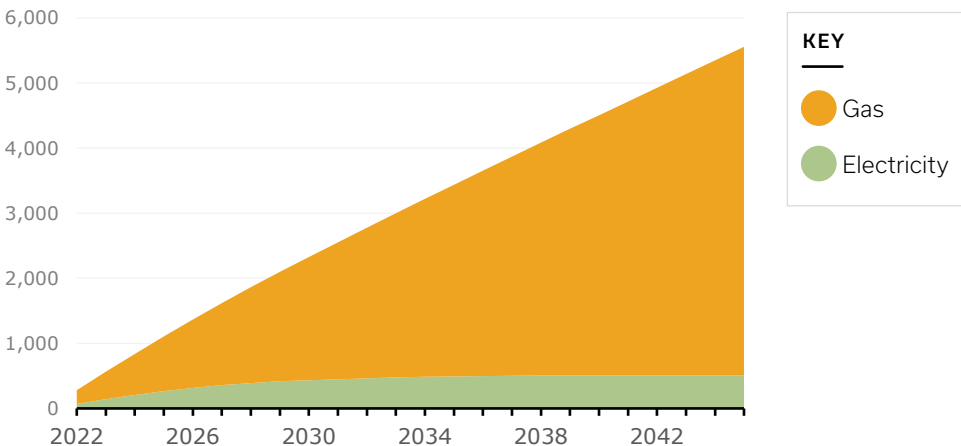
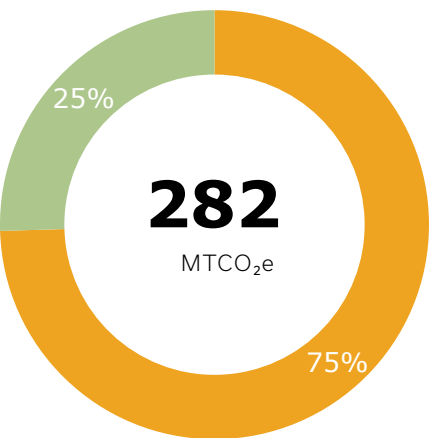
- Aging HVAC equipment
- Space and domestic water heating provided by gas boiler systems
- Limited existing cooling in building
- Limited insulation in existing envelope
- Lighting systems recently upgraded

CURRENTLY PLANNED IMPROVEMENTS

- Upgrades to HVAC controls to improve efficiency and performance

POTENTIAL OPPORTUNITIES

- ☐ Electrification of all heating systems within the building
- ☐ Incorporation of heat pump systems for heating and cooling
- ☐ Improved ventilation systems to provide enhanced filtration and maintain healthy indoor air quality
- ☐ Envelope enhancement to reduce conditioning loads and improve thermal comfort
- ☐ Incorporation of renewable energy systems to offset operational emissions
- ☐ Increased tree canopy and green space
- ☐
- ☐
- ☐



*Electric emissions projection based on 2023 emissions outlook from PGE

Roosevelt-Jefferson Cluster

PORTLAND PUBLIC SCHOOLS



		RANKING (OUT OF 21)
AREA	62,231 SQUARE FEET	13
EUI	79 kBtu/SF	2
ENERGY COSTS	\$92,548	10
EMISSIONS	286 MTCO ₂ e	10
EMISSIONS INTENSITY	10.1 LBS-CO ₂ e/SF	5
WATER-USE INTENSITY	4.8 GAL/SF	16

Peninsula Elementary School

BUILDING CONSTRUCTED: 1952

SUMMARY OF EXISTING CONDITIONS

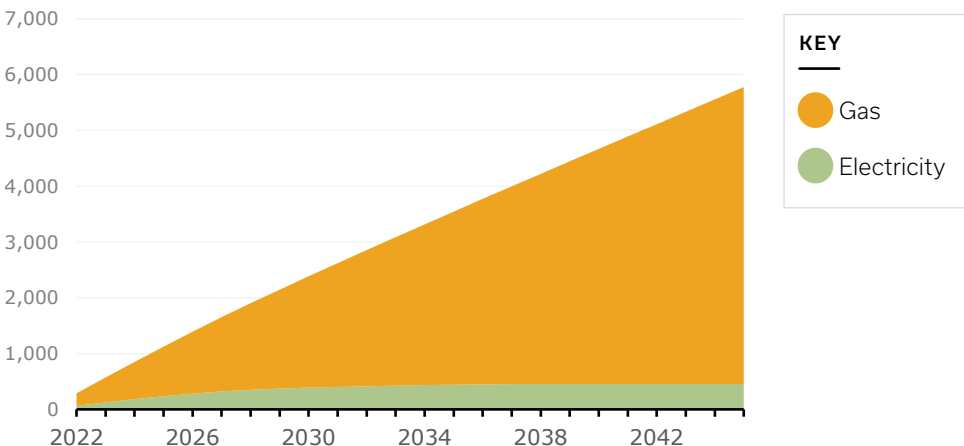
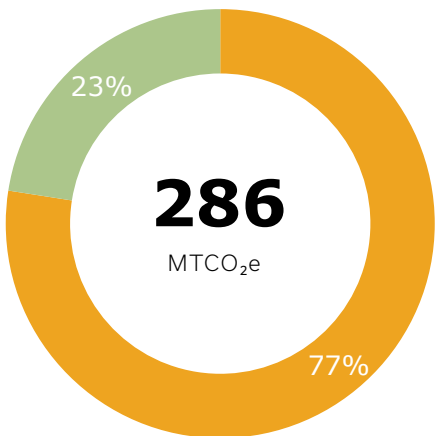
- Aging HVAC equipment
- Space and domestic water heating provided by gas boiler systems
- Limited existing cooling in building
- Limited insulation in existing envelope

CURRENTLY PLANNED IMPROVEMENTS

- Upgrades to HVAC controls to improve efficiency and performance
- Upgrading lighting systems to high-efficiency LED fixtures

POTENTIAL OPPORTUNITIES

- ☐ Electrification of all heating systems within the building
- ☐ Incorporation of heat pump systems for heating and cooling
- ☐ Improved ventilation systems to provide enhanced filtration and maintain healthy indoor air quality
- ☐ Envelope enhancement to reduce conditioning loads and improve thermal comfort
- ☐ Incorporation of renewable energy systems to offset operational emissions
- ☐ Increased tree canopy and green space
- ☐
- ☐
- ☐



*Electric emissions projection based on 2023 emissions outlook from PGE



		RANKING (OUT OF 21)
AREA	78,061 SQUARE FEET	6
EUI	63 kBtu/SF	10
ENERGY COSTS	\$104,739	5
EMISSIONS	291 MTCO ₂ e	8
EMISSIONS INTENSITY	8.2 LBS-CO ₂ e/SF	12
WATER-USE INTENSITY	4.7 GAL/SF	17

Portsmouth/Cesar Chavez Middle School

BUILDING CONSTRUCTED: 1927

SUMMARY OF EXISTING CONDITIONS

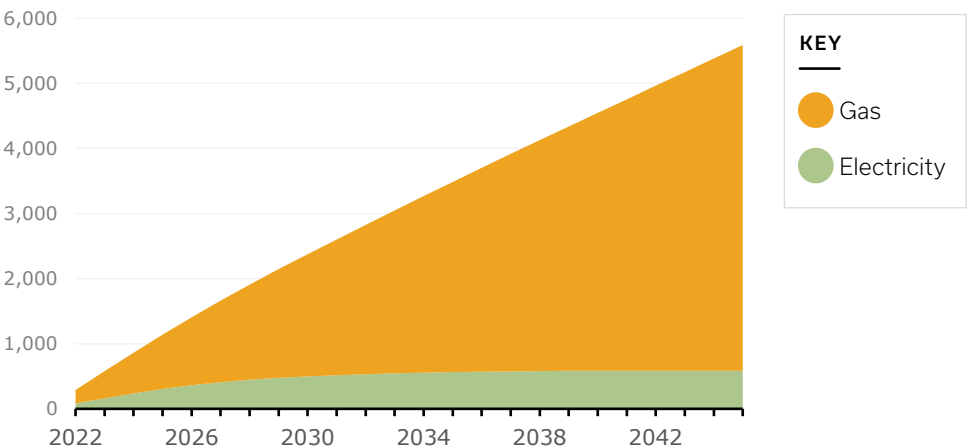
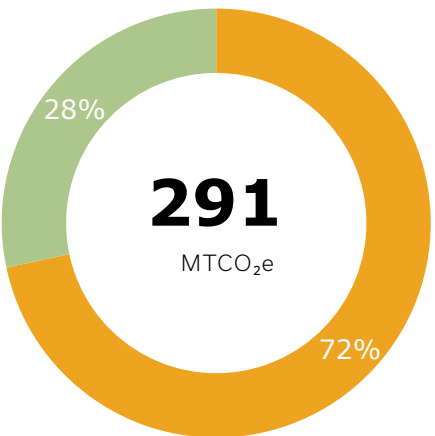
- Aging HVAC equipment
- Space and domestic water heating provided by gas boiler systems
- Limited existing cooling in building
- Aging envelope with limited insulation
- Lighting systems recently upgraded

CURRENTLY PLANNED IMPROVEMENTS

- Upgrades to HVAC controls to improve efficiency and performance

POTENTIAL OPPORTUNITIES

- ☐ Electrification of all heating systems within the building
- ☐ Incorporation of heat pump systems for heating and cooling
- ☐ Improved ventilation systems to provide enhanced filtration and maintain healthy indoor air quality
- ☐ Envelope enhancement to reduce conditioning loads and improve thermal comfort
- ☐ Incorporation of renewable energy systems to offset operational emissions
- ☐ Increased tree canopy and green space
- ☐
- ☐



*Electric emissions projection based on 2023 emissions outlook from PGE

Roosevelt-Jefferson Cluster

PORTLAND PUBLIC SCHOOLS



		RANKING (OUT OF 21)
AREA	271,306 SQUARE FEET	2
EUI	40 kBtu/SF	19
ENERGY COSTS	\$338,055	2
EMISSIONS	777 MTCO ₂ e	2
EMISSIONS INTENSITY	6.3 LBS-CO ₂ e/SF	21
WATER-USE INTENSITY	13.0 GAL/SF	3

Roosevelt High School

BUILDING CONSTRUCTED: 1921 | MODERNIZED: 2016

NOTE

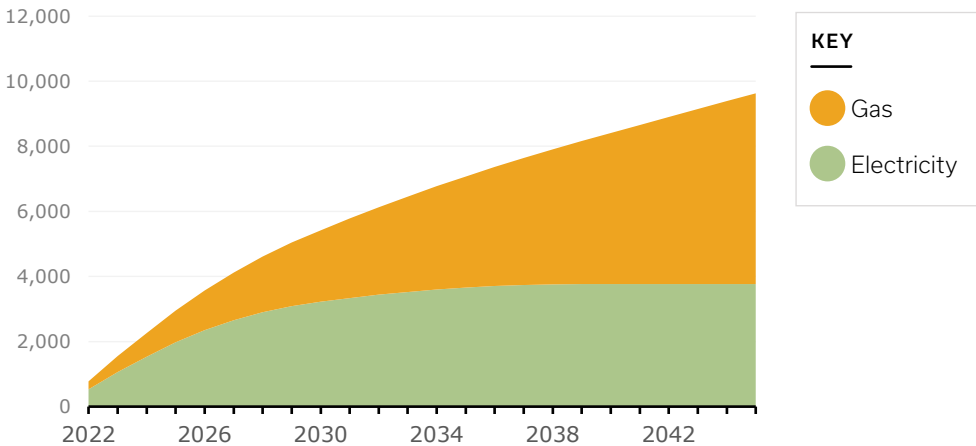
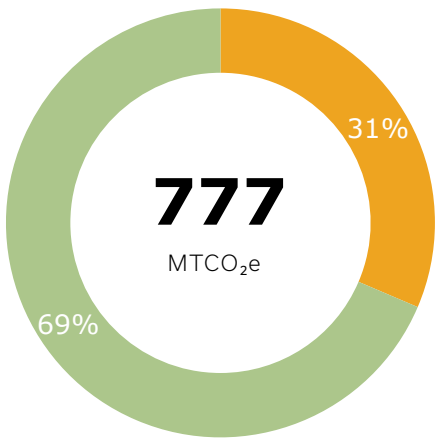
The recently completed Roosevelt modernization project included many of the typically recommended improvements

SUMMARY OF EXISTING CONDITIONS

- Modernized envelope, mechanical systems, and lighting
- Upgraded equipment still uses gas for space and domestic water heating

POTENTIAL OPPORTUNITIES

- Electrification of all heating systems within the building
- Incorporation of renewable energy systems to offset operational emissions
- Increased tree canopy and green space
-
-
-



*Electric emissions projection based on 2023 emissions outlook from PGE



		RANKING (OUT OF 21)
AREA	68,176 SQUARE FEET	11
EUI	44 kBtu/SF	15
ENERGY COSTS	\$100,030	7
EMISSIONS	196 MTCO ₂ e	16
EMISSIONS INTENSITY	6.3 LBS-CO ₂ e/SF	20
WATER-USE INTENSITY	11.9 GAL/SF	4

Rosa Parks/BGC Elementary School

BUILDING CONSTRUCTED: 2006

SUMMARY OF EXISTING CONDITIONS

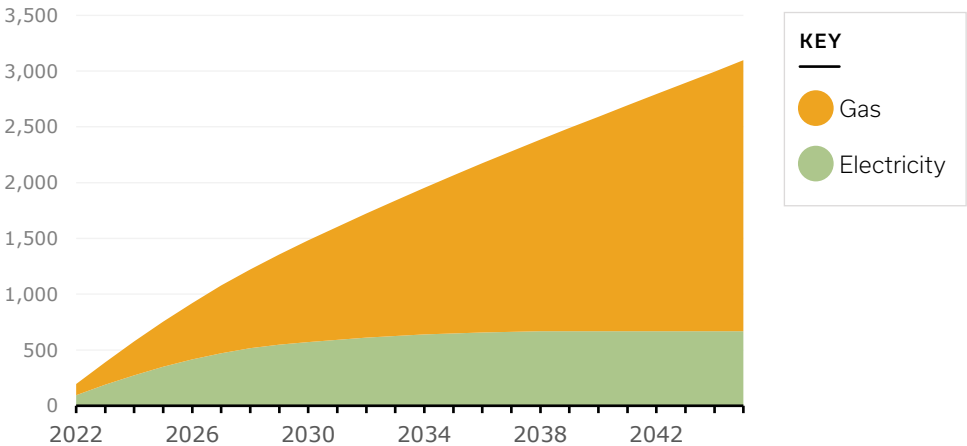
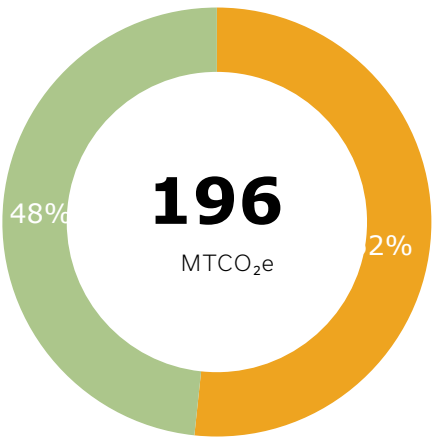
- Space and domestic water heating provided by gas boiler systems
- Limited existing cooling in building
- Limited insulation in existing envelope

CURRENTLY PLANNED IMPROVEMENTS

- Upgrading lighting systems to high-efficiency LED fixtures

POTENTIAL OPPORTUNITIES

- Electrification of all heating systems within the building
- Incorporation of heat pump systems for heating and cooling
- Improved ventilation systems to provide enhanced filtration and maintain healthy indoor air quality
- Envelope enhancement to reduce conditioning loads and improve thermal comfort
- Incorporation of renewable energy systems to offset operational emissions
- Increased tree canopy and green space
-
-
-



*Electric emissions projection based on 2023 emissions outlook from PGE

Roosevelt-Jefferson Cluster

PORTLAND PUBLIC SCHOOLS



RANKING (OUT OF 21)		
AREA	58,487 SQUARE FEET	14
EUI	62 kBtu/SF	11
ENERGY COSTS	\$86,999	13
EMISSIONS	223 MTCO ₂ e	15
EMISSIONS INTENSITY	8.4 LBS-CO ₂ e/SF	11
WATER-USE INTENSITY	6.9 GAL/SF	11

Sitton Elementary School

BUILDING CONSTRUCTED: 1949

SUMMARY OF EXISTING CONDITIONS

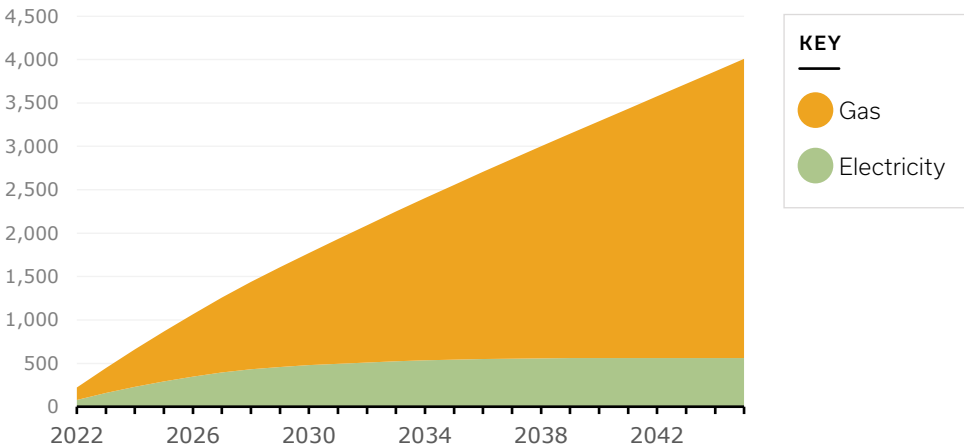
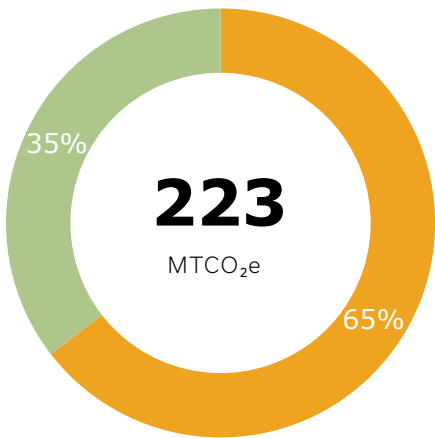
- Aging HVAC equipment
- Space and domestic water heating provided by gas boiler systems
- Limited existing cooling in building
- Aging envelope with limited insulation

CURRENTLY PLANNED IMPROVEMENTS

- Upgrades to HVAC controls to improve efficiency and performance

POTENTIAL OPPORTUNITIES

- ☐ Electrification of all heating systems within the building
- ☐ Incorporation of heat pump systems for heating and cooling
- ☐ Improved ventilation systems to provide enhanced filtration and maintain healthy indoor air quality
- ☐ Envelope enhancement to reduce conditioning loads and improve thermal comfort
- ☐ Upgrading lighting systems to high-efficiency LED fixtures
- ☐ Incorporation of renewable energy systems to offset operational emissions
- ☐
- ☐
- ☐



*Electric emissions projection based on 2023 emissions outlook from PGE



RANKING (OUT OF 21)		
AREA	70,833 SQUARE FEET	9
EUI	69 kBtu/SF	5
ENERGY COSTS	\$88,457	12
EMISSIONS	399 MTCO ₂ e	4
EMISSIONS INTENSITY	12.4 LBS-CO ₂ e/SF	1
WATER-USE INTENSITY	4.1 GAL/SF	18

Vernon Elementary School

BUILDING CONSTRUCTED: 1931

SUMMARY OF EXISTING CONDITIONS

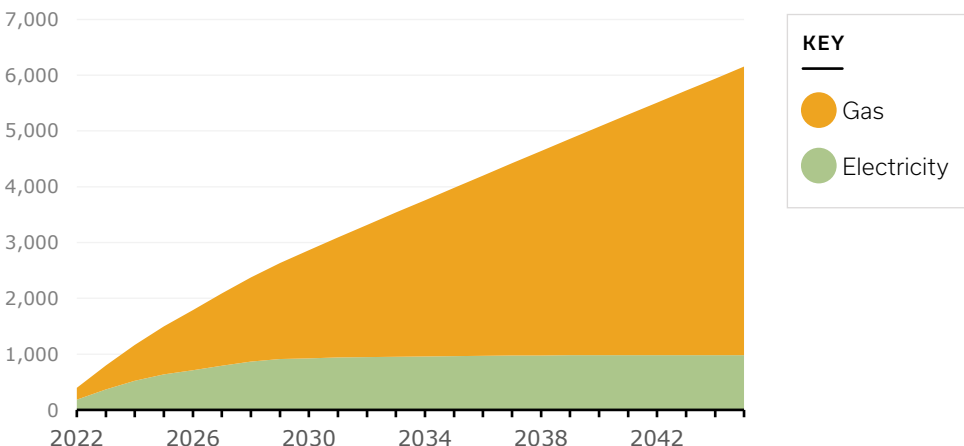
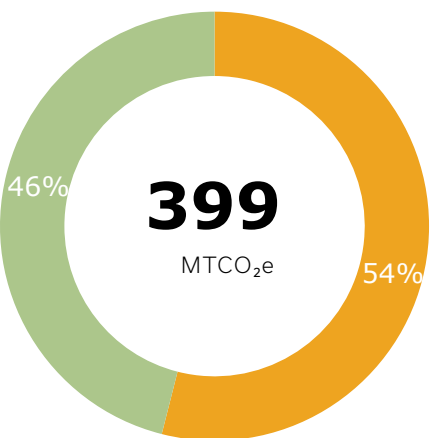
- Aging HVAC equipment
- Space and domestic water heating provided by gas boiler systems
- Limited existing cooling in building
- Limited insulation in existing envelope
- Lighting systems recently upgraded

CURRENTLY PLANNED IMPROVEMENTS

- Upgrades to HVAC controls to improve efficiency and performance

POTENTIAL OPPORTUNITIES

- ☐ Electrification of all heating systems within the building
- ☐ Incorporation of heat pump systems for heating and cooling
- ☐ Improved ventilation systems to provide enhanced filtration and maintain healthy indoor air quality
- ☐ Envelope enhancement to reduce conditioning loads and improve thermal comfort
- ☐ Incorporation of renewable energy systems to offset operational emissions
- ☐ Increased tree canopy and green space
- ☐
- ☐
- ☐



*Electric emissions projection based on 2023 emissions outlook from Pacific Power

Roosevelt-Jefferson Cluster

PORTLAND PUBLIC SCHOOLS



Woodlawn Elementary School

BUILDING CONSTRUCTED: 1966

SUMMARY OF EXISTING CONDITIONS

- Aging HVAC equipment
- Space and domestic water heating provided by gas boiler systems
- Limited existing cooling in building
- Aging envelope with limited insulation
- Lighting systems recently upgraded

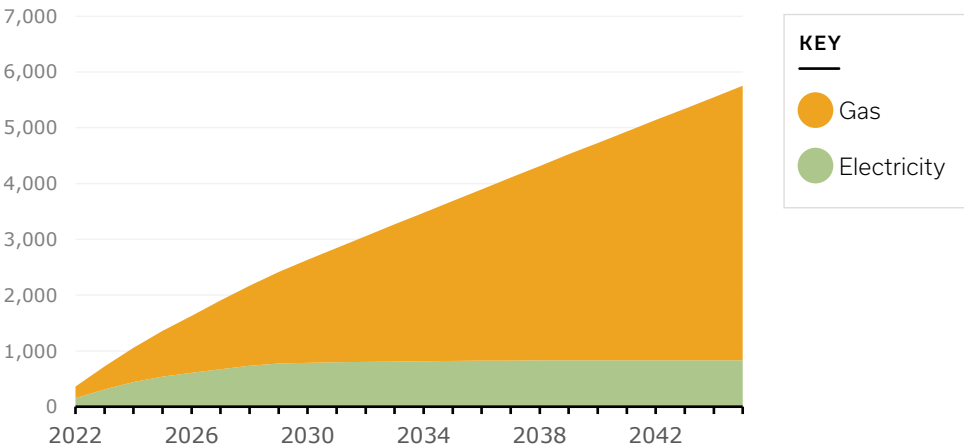
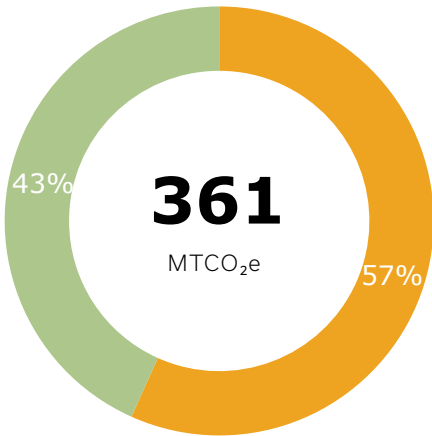
CURRENTLY PLANNED IMPROVEMENTS

- Upgrades to HVAC controls to improve efficiency and performance

POTENTIAL OPPORTUNITIES

- ☐ Electrification of all heating systems within the building
- ☐ Incorporation of heat pump systems for heating and cooling
- ☐ Improved ventilation systems to provide enhanced filtration and maintain healthy indoor air quality
- ☐ Envelope enhancement to reduce conditioning loads and improve thermal comfort
- ☐ Incorporation of renewable energy systems to offset operational emissions
- ☐ Increased tree canopy and green space
- ☐
- ☐
- ☐

		RANKING (OUT OF 21)
AREA	106,432 SQUARE FEET	5
EUI	43 kBtu/SF	16
ENERGY COSTS	\$82,729	14
EMISSIONS	361 MTCO ₂ e	6
EMISSIONS INTENSITY	7.5 LBS-CO ₂ e/SF	17
WATER-USE INTENSITY	2.8 GAL/SF	20



PPS Decarbonization

When and Where

Ongoing - Online Questionnaire

How Many Attended

Not applicable

Purpose

The purpose of this document is to share the results of our engagement meetings towards Decarbonization with the community.

Ranking Results

- 1 (most important)... Efficiency
- 2..... Equity
- 3..... Comfort
- 4..... Scale
- 5 (least important)... Cost

Equity: prioritizing schools in front-line communities

Cost: prioritizing lowest cost option

Efficiency: prioritizing measures that save the most carbon emissions per dollar

Scale: prioritizing small changes at many schools over large changes at few schools

PPS Decarbonization: Survey

Session 4: Online Questionnaire, Ongoing

Q1: Are there any schools you are affiliated with?

- James John Elementary
- Da Vinci Middle
- The Emerson School (K-5)
- Jefferson HS
- MLK Elementary
- Harriet Tubman Middle
- Roosevelt HS - 3
- Sunnyside (K-8)
- Franklin HS - 4
- Laurelhurst (K-8) - 2
- Marysville Elementary
- Bridlemile Elem - 2
- D.A Grout Elementary
- Bridger Creative Science (K-8)
- Robert Gray
- Ida B Wells
- Beach Elementary
- Lewis Elementary
- Scott Elementary (K-8)
- Glencoe Elementary
- Winterhaven Elementary

PPS Decarbonization: Survey

Session 4: Online Questionnaire, Ongoing

Q2: What does Decarbonization at the District and your local school sites mean to you?

- Solar and Battery Storage
- Solar Power, Electric Buses, Reusable Cafeteria Materials
- Fuel efficient buses, Less parental commuting, encourage walking
- Solar Power, Energy efficient buildings, electric transportation/buildings
- Reduction of meat & dairy in lunches, Composting, Solar Power
- Building HVAC, transportation, supplies
- Refactor society to live within healthy & safe bounds of what our plant can support
- Educating new gen bout protecting environment, community, planet
- Means a lot to individual has a public health degree
- Remove antiquated heat/cool systems, transition to renewable energy sources, electric buses, educating new generation
- Radical action, Radical words
- Lowering carbon emissions from transportation or building
- A crucial local part of the global effort to mitigate climate crisis
- Discourage parents commuting, incentivize walking, biking, public transit
- Hiring reputable firm to create feasibility plan
- Composting, recycling as much as possible, decrease commuting, increase accessible sidewalks
- Awareness, important for students to know (educating)
- Better trajectory for future generations
- Rigorous standards for construction and operations
- Convert to heat pumps, electric bus, anti-idling, energy eff. buildings, more recyclable materials in cafeteria, natural habitats on school campus
- Means a lot to know school and community are improving
- Raises concerns about disruptions in terms of cost, efficiency, and comfort.
- Safe clean air, moving to heat pump systems.
- Public transit, walk, or bike to school.

PPS Decarbonization: Survey

Session 4: Online Questionnaire, Ongoing

Q3: Why is it important to you that PPS reduces its greenhouse gas emissions?

- Everyone has to play their part, otherwise we will not reach scientifically determined GHG reduction goals
- We have to do what we can, We can at least slow down the effects
- Leave behind a viable planet for future generations.
- Will reduce state's climate emissions and educate other districts firsthand.
- Future generations will otherwise deal with the consequences of current climate crisis
- New gen is deserving of respect, we must model what we want them to learn from
- Essential for children's future
- Avoid human extinction
- Betterment of our society and collective health and wellbeing
- Sustainability is life saving
- We all must play a part in reducing our carbon footprint to help stop the catastrophic climate change. By PPS taking actionable steps, students will take notice.
- We have a duty to students in the rest in the country that may face oppressive leadership. PPS must lead by example, students can make these changes happen.
- PPS should align itself with the cities actions and goals since Portland is a fairly green city.
- PPS is the biggest district in the state, making it have a greater climate impact. Taking effective action can mean longterm gains in budgetary efficiency. Raising efficiency & maintenance standards will improve equity in educational services and resources.
- Because we are collectively cooking the planet.
- Its our obligation, we have to try and reduce GHG.
- For the safety, health, and earth conscious awareness that will carry over to the next gen.
- Global movement to cut carbon emissions requires all of us. Students need to be a part of that.
- Schools are critical leaders that have a big role in changing the course of our future.
- Not only a critical priority for future generations but also creates a better learning environment for the current generation.
- PPS needs to do their part.
- Very important
- While it may not be economically sensible, its essential to understand the urgency and practicality of certain initiatives.
- We must do what we can to limit the damage for future generations. Reducing GHGs often brings better indoor air quality and efficiency.
- Car traffic, parking, and emissions are terrible.

PPS Decarbonization: Survey

Session 4: Online Questionnaire, Ongoing

Q4: How should PPS balance things like equity, cost, comfort, efficiency, and scale?

- Equity should be number 1, but other things should be determined with budgetary and community input.
- We've gotta find the money to get it done across the board
- Take it one step at a time but add decarbonization to your list of values you ACTUALLY respond to.
- Efficiency, scale and comfort should be prioritized. That is the best way to achieve the lowest cost to implement the measures that will have maximum impact for everyone.
- That's a big question. Obviously updating all the high schools has been one way to modernize and make schools more efficient. Adding plant-based options to lunches would also address all those issues.
- I would like to see equity prioritized. As a tax payer I am more then willing to pay higher taxes if I know it is going to PPS and the libraries. If there is transparency in sharing the plans to PPS/ Mult Co have to cut greenhouse gases, I will happily pay higher taxes.
- There are a lot of co-benefits of decarbonization efforts- for example, remodeling a building for heat efficiency likely improves comfort, air quality, etc. If the goal is JUST decarbonization, equity is not really a concern, because the benefits will be felt at the global scale. If OTHER benefits are being considered, then equity is a concern.
- Equity should inform all choices; cost is inconsequential given the risk; some choices we must make will cause us to be less comfortable; efficiency is an overloaded term and needs to be defined; test and iterate solution at a small scale and then implement at a large scale.
- PPS should allow children that live in close proximity, less than a mile from a school, walk to that school rather than place them in a zone twice the distance from their home which would require they are driven. This is a disservice to our children's health, contribute to childhood obesity, increases our GHGs, and affects the community at large.
- Communicate with specific schools and listen to the most vulnerable within each school. The needs of the most vulnerable should be baseline.
- Start with the schools that need the most support first. And as modernization efforts happen, ensure ALL of those changes are done with decarbonization in mind.
- PPS must model in actions what we teach with our words. This means PPS should offer free transit passes to all staff who can reduce their car trips. PPS should not build new schools with parking lots. PPS should let appropriate staff work at home. The new buildings use more energy than what they replaced. This is true of Franklin and Roosevelt in 2015 all the way to Benson in 2024. No AC was needed in the old buildings nor new buildings. We just needed better designs.
- Check in with school communities and gain/implement feedback before making major decisions.
- Start with high quality climate footprint assessment (US EPA, SME Climate Hub, Berkeley Cool Climate,...)
- Listen to the experts you hire; they can provide you with several options that balance these factors differently.
- It is a public school system and the fact that we are dealing with asbestos at RGMS is crazy and any thing that gets exposed at Bridlemile gets plastic covering with duct tape due to asbestos exposure. It's time to invest in the schools.

PPS Decarbonization: Survey

Session 4: Online Questionnaire, Ongoing

Q4: How should PPS balance things like equity, cost, comfort, efficiency, and scale? (cont..)

- Equity has to come first. Historically under served communities like North Portland already bear the brunt of environmental pollution. These communities must be at the center of whatever corrective actions we take next.
- Efficiency, comfort, scale, equity, cost
- Efficiency & scale should take priority.
- By informing us and hearing our opinions.
- PPS should approach the issue of decarbonization with a balanced perspective, considering equity, cost, comfort, efficiency, and scale simultaneously. Equity should not be sacrificed in the pursuit of aggressive emission reduction targets, and the district must be cautious about placing an undue financial burden on certain communities. Cost considerations should be thoroughly analyzed, ensuring that the economic implications do not hinder the district’s ability to provide quality education. Comfort and efficiency must also be factored in to maintain conducive learning environments without compromising educational standards. Additionally, the scale of any initiatives should be pragmatic, avoiding overambitious targets that may lead to unintended consequences for the district and its stakeholders. It is about finding a sustainable balance that serves the best interests of the community, taking into account both economic and educational considerations.
- I think the district should assess and triage the buildings where air quality, both indoors and outdoors, is the unhealthiest and work on moving those schools to heat pumps with air filtration. We know that air pollution leads to all kinds of negative health outcomes for children, like asthma, poor attention and increased illness, not to mention increased transmission of Covid-19. Similarly, schools with the most uncomfortable indoor spaces should be prioritized for improvements first.
- PPS should subsidize a Trimet pass for staff at 100%, especially student facing staff so they promote transit. Encourage kids and parents to bike pool- have walking school bus and bike bus and Trimet travel groups.

PPS Decarbonization: Survey

Session 4: Online Questionnaire, Ongoing

Q5: Is there anything specific to you, your school, or your community that you want us to know as it relates to decarbonization efforts at PPS?

- It is important to think about long term costs to our planet, not just a price tag. We need to make smart choices that make a difference to the planet. You can share big successes and their impacts on the state/planet, even if they are not at every site.
- Ensure that the developed plan includes rooftop solar and energy efficiency. There are ample state and federal incentives.
- Reducing food waste and plant-rich diets are #1 and #2 on Project Drawdown’s top climate solutions. These would cost little to do and deliver a large result and could be equitable across school districts, yet it is given very little attention.
- Provided goals are not measurable, accountable, or time-bound. And who knows if they are realistic or not without those other qualities. What you are calling Goals are really just Tactics. Without SMART goals, these are just empty promises.
- Cutting out a small square of the Grant HS neighborhood that lives 0.75-mile from the school will directly increase our GHG emissions. PPS should focus on appropriate zoning for schools based on location and allow children to continue to be part of their existing communities, while maintaining a healthier lifestyle.
- Last year PBOT asked our school (marysville elementary) for input because they had a lot of funds to improve 82nd. We asked for a school zone (along 82nd) for existing students and for the 90 additional students (from Lent) that would need to cross 82nd this (23/24) school year. We asked Safe Routes to staff a crossing guard at 82nd or someone to lead a walking school bus. Between PBOT, PPS and safe routes, the “solution” was to add 2 school buses. This tells us that the best solution is for kids to get up earlier, sit on a bus instead of walk, pay bus drivers instead of safety personnel and contribute to carbon emissions. I am very interested in school bus alternatives especially for kids who live 20 minutes or less walking distance to school. Can PBOT, PPS, Safe Routes and others that might have an impact, join efforts to make things healthier for our kids and communities?
- Bridlemile currently has an under-performing boiler room. This is massively inefficient. Space like this is also precious in schools and could be re-purposed with smaller more efficient heating and cooling elements with additional space then given back to the school either for storage or functional use.
- The survey should have been better designed by a survey expert who knows survey like scales and how to avoid the bias I see in this survey.
- We see School Bus use for inner SE Portland (D. Grout K-5) that could be far more efficient, while also improving equity & reducing costs — especially by having clearer & more consistent communication (with riders & their families)

PPS Decarbonization: Survey

Session 4: Online Questionnaire, Ongoing

Q5: Is there anything specific to you, your school, or your community that you want us to know as it relates to decarbonization efforts at PPS? (cont..)

- Do whatever you can to discourage parents from driving their kids to school individually in private vehicles, and to encourage and incentivize them instead to walk, bike, or use the bus or public transit.
- I am an architect at LSW Architects, specializing in mass timber design. I am currently working on 5-8 school in Ridgefield, WA which will be a fully mass timber structure. We are working closely with a pre-construction estimator to ensure the use of mass timber is either cost-neutral or cost-negative when compared to the same building utilizing a steel structure. The benefits of mass timber reach beyond carbon sequestration, including occupant health and happiness, shorter construction timelines, and local economy and forestry support. I would be happy to discuss our process and findings with Ridgefield, as it relates to any efforts related to mass timber and decarbonization.
- Lewis Elementary has the largest garden space in the PPS district, and yet we receive no support for our efforts at making the gardens a natural habitat and a conducive place for outdoor education. We need more trees planted to create shade for the kids during the warm months. The landscaping crew makes occasional appearances and ruins the work parent volunteers have done. They remove our mulch; they cut down our plants; they don't take away the green bins we've filled from raking and weeding. There were classrooms in the high 90s last year during heat waves. Parents paid for teachers to have portable AC units in the classroom. There's one kitchen worker who says she has no time to clean reusable trays and flatware or recycle milk cartons, so she resorts to using disposable trays and flatware. All the plastic flatware, plastic trays, and milk cartons end up in the dumpster, and that could be avoided if PPS paid for more kitchen staff. The kids need to have experiential learning about climate change through gardening and being outside, where they can be exposed to plants & nature, but the teachers don't have support to add that into their curriculum.
- I question the wisdom of precipitous decarbonization efforts, particularly within educational institutions like PPS. While environmental responsibility is crucial, we argue for a measured approach that balances the economic realities faced by the district, the well-being of its stakeholders, and the need for quality education. Hastily embracing decarbonization without thorough consideration of the economic impact risks undermining the very foundations upon which our education system relies. Let us advocate for a pragmatic and thoughtful approach that prioritizes both environmental responsibility and the socio-economic health of our communities. Thank you.
- We may need to keep windows open for airflow because of disease.

PPS Decarbonization

March 28th, 2024

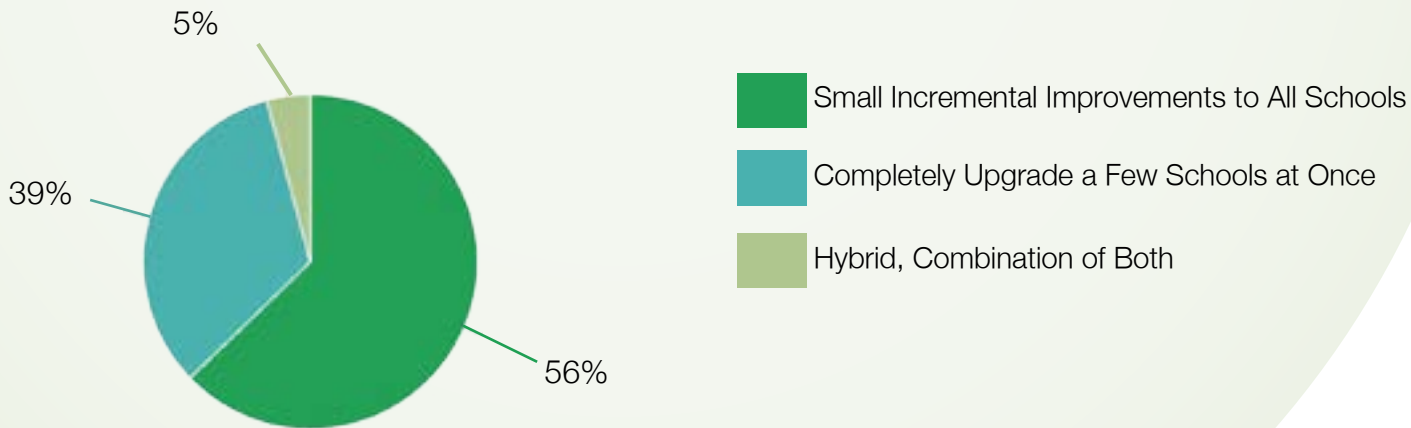
How Many Participated

43 participants

Purpose

The purpose of this document is to share the Dot Poll implementation question and Ranking outcomes from the 4 in-person meetings and 1 virtual meeting.

Dot Poll Implementation Question



Ranking Results

- 1 (highest priority)..... Improve thermal comfort.
- 2..... Reduce energy & carbon emissions.
- 3..... Improve indoor air quality.
- 4..... Add energy resilience.
- 5..... Reduce operating cost & maintenance.
- 6..... Improve outdoor environment.
- 7 (lowest priority)..... Improve visual comfort.

PPS Decarbonization FAQ

Q: How is PPS handling the topic of transportation and solid waste emissions?

A: Both transportation and solid waste are included in the scope of the overall PPS emissions portfolio and in the emissions reductions goals of the Climate Crisis Response Policy. Transportation tracking includes school bus fleet and PPS operations fleets, but not personal staff and family transportation. Solid waste emissions are tracked through total weight of PPS trash. However, neither transportation nor solid waste are included in the scope of this decarbonization roadmap, which focuses on buildings.

will come from voter-approved bonds or other capital funding sources, not general funds. Another chunk will come from local, state, and federal grants.

Q: Is PPS planning to use these facilities for safe spaces in natural disasters? Forest fires and air pollution?

A: The CCRP states that PPS “will make available its facilities, as appropriate, during community response efforts to climate events.” Many new facilities will be designed to accommodate the community during climate events, with the health and safety of our students and school staff being the first priority. PPS is [working closely with Multnomah County](#) and the EPA to determine the best approach to this important part of our policy.

Q: Is indoor air quality a part of the equation for decarbonization?

A: Indoor air quality is being considered as part of the health and equity factors when we determine and weigh the various priorities and needs associated with decarbonization.

Q: How does equity fit into the equation for decarbonization?

A: Equity is being considered when we determine and weigh the various priorities and needs associated with decarbonization. Prioritizing historically underserved schools is a key metric used to decide the order in which PPS will decarbonize its campuses. For example, if two schools have similar opportunities for carbon reduction and electrification, a school that serves a high population of low-income or students of color, or is in a neighborhood with severe effects from urban heat islands, will take precedence.

Q: What role will solar panels play in the future of decarbonization?

A: The goal of creating a decarbonization roadmap is to determine the most efficient and effective pathway to getting to carbon neutrality. Part of that work will be exploring the cost-effectiveness of solar as a part of that solution. However, energy efficiency and electrification will be paramount in our journey to net zero emissions.

Q: Does decarbonization work take away from the deferred maintenance of buildings or staffing needs?

A: This roadmap is designed to take into account multiple factors, including maintenance needs. The goal is to find opportunities to decarbonize our buildings while also addressing deferred maintenance and needed upgrades. The vast majority of the funding for decarbonization work



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