# DEPARTMENT OF PLANNING, BUILDING AND CODE ENFORCEMENT

## Purpose of the Compliance Checklist

In 2020, the City adopted a Greenhouse Gas Reduction Strategy (GHGRS) that outlines the actions the City will undertake to achieve its proportional share of State greenhouse gas (GHG) emission reductions for the interim target year 2030. The purpose of the Greenhouse Gas Reduction Strategy Compliance Checklist (Checklist) is to:

- Implement GHG reduction strategies from the 2030 GHGRS to new development projects.
- Provide a streamlined review process for proposed new development projects that are subject to discretionary review and trigger environmental review pursuant to the California Environmental Quality Act (CEQA).

The 2030 GHGRS presents the City's comprehensive path to reduce GHG emissions to achieve the 2030 reduction target, based on SB 32, BAAQMD, and OPR. Additionally, the 2030 GHGRS leverages other important City plans and policies; including the General Plan, Climate Smart San José, and the City Municipal Code in identifying reductions strategies that achieve the City's target. CEQA Guidelines Section 15183.5 allows for public agencies to analyze and mitigate GHG emissions as part of a larger plan for the reduction of greenhouse gases. Accordingly, the City of San José's 2030 GHGRS represents San José's qualified climate action plan in compliance with CEQA.

As described in the 2030 GHGRS, these GHG reductions will occur through a combination of City initiatives in various plans and policies and will provide reductions from both existing and new developments. This Compliance Checklist specifically applies to proposed discretionary projects that require environmental review pursuant to CEQA. Therefore, the Checklist is a critical implementation tool in the City's overall strategy to reduce GHG emissions. Implementation of applicable reduction actions in new development projects will help the City achieve incremental reductions toward its target. Per the 2030 GHGRS, the City will monitor strategy implementation and make updates, as necessary, to maintain an appropriate trajectory to the 2030 GHG target.

Pursuant to CEQA Guidelines Sections 15064(h)(3), 15130(d), and 15183(b), a project's incremental contribution to a cumulative GHG emissions effect may be determined not to be cumulatively considerable if it complies with the requirements of the GHGRS.

# Instructions for Compliance Checklist

Applicants shall complete the following sections to demonstrate conformance with the City of San José 2030 Greenhouse Gas Reduction Strategy for the proposed project. All projects must complete Section A. General Plan Policy Conformance and Section B. Greenhouse Gas Reduction Strategies. Projects that propose alternative GHG mitigation measures must also complete Section C. Alternative Project Measures and Additional GHG Reductions.

## A. General Plan Policy Compliance

Projects need to demonstrate consistency with the Envision San José 2040 General Plan's relevant policies for Land Use & Design, Transportation, Green Building, and Water Conservation, enumerated in Table A. All applicants shall complete the following steps.

1. Complete Table A, Item #1 to demonstrate the project's consistency with the General Plan Land Use and Circulation Diagram.
2. Complete Table A, Items #2 through #4 to demonstrate the project's consistency with General Plan policies[1] related to green building; pedestrian, bicycle & transit site design; and water conservation and urban forestry, as applicable. For each policy listed, mark the relevant yes/no check boxes to indicate project consistency, and provide a qualitative description of how the policy is implemented in the proposed project or why the policy is not applicable to the proposed project. Qualitative descriptions can be included in Table A or provided as separate attachments. This explanation will provide the basis for analysis in the CEQA document.

## B. Greenhouse Gas Reduction Strategies

Table B identifies the GHGRS strategies and recommended consistency options. Projects need to demonstrate consistency with the GHGRS reduction strategies listed in Table B or document why the strategies are not applicable or are infeasible. The corresponding GHGRS strategies are indicated in the table to provide additional context, with the full text of the strategies preceding Table B.

Residential projects must complete Table B, Part 1 and 2; Non-residential projects must complete Table B, Part 2 only. All applicants shall complete the following steps for Table B.

1. Review the project consistency options described in the column titled 'GHGRS Strategy and Consistency Options'.
2. Use the check boxes in the column titled "Project Conformance" to indicate if the strategy is 'Proposed', 'Not Applicable', 'Not Feasible', or if there is an 'Alternative Measure Proposed'.

[1] The lists in items # 2-4 do not represent all General Plan policies but allow projects to demonstrate consistency and achievement of policies that are related to quantified reduction estimates in the 2030 GHGRS.

3. Provide a qualitative analysis of the proposed project's compliance with the GHGRS strategies in the column titled "Description of Project Measure". This will be the basis for CEQA analysis to demonstrate compliance with the 2030 GHGRS and by extension, with SB 32. The qualitative analysis should provide:

    a. A description of which consistency options are included as part of the proposed project, or

    b. A description of why the strategy is not applicable to the proposed project, or

    c. A description of why the consistency options are infeasible. If applicants select 'Not Feasible' or 'Alternative Measure Proposed', they must complete Table C to document what alternative project measures will be implemented to achieve a similar level of greenhouse gas reduction and how those reduction estimates were calculated.

## C. Alternative Project Measures and Additional GHG Reductions

Projects that propose alternative GHG mitigation measures to those identified in Table B or propose to include additional GHG mitigation measures beyond those described in Tables A and B, shall provide a summary explanation of the proposed measures and demonstrate efficiency or greenhouse gas reductions achievable though the proposed measures. Documentation for these alternative or additional project measures shall be documented in Table C. Any applicants who select 'Not Feasible' or 'Alternative Measure Proposed' in Table B must complete the following steps for Table C.

1. In the column titled "Description of Proposed Measure" provide a qualitative description of what measure will be implemented, why it is proposed, and how it will reduce GHG emissions.
2. In the column titled "Description of GHG Reduction Estimate" demonstrate how the alternative project measure would achieve the same or greater level of greenhouse gas reductions as the GHGRS strategy it replaces. Documentation or calculation files can be attached separately.
3. In the column titled "Proposed Measure Implementation" identify how the measure will be implemented: incorporated as part of the project design or as an additional measure that is not part of the project (e.g., purchase of carbon offsets).

# Compliance Checklist

## Evaluation of Project Conformance with the 2030 Greenhouse Gas Reduction Strategy

## Table A: General Plan Consistency

**Development Type**: ☒ Commercial ☒ Residential ☒ Office ☐ Other: Specify

| ***1) Consistency with the Land Use/Transportation Diagram (Land Use and Density)*** | **Yes** | **No** |
|---|---|---|
| *Is the proposed Project consistent with the Land Use/Transportation Diagram?* | ☒ | ☐ |
| *If not, and the proposed project includes a General Plan Amendment, does the proposed amendment decrease GHG emissions (in absolute terms or per capita, per employee, per service population) below the level assumed in the GHGRS based on the existing planned land use? (The project could have a higher density, mix of uses, or other features that would reduce GHG emissions compared to the planned land use).*[2] | ☐ | ☐ |
| *If not, would the proposed project and the General Plan Amendment increase GHG emissions (in absolute terms or per capita, per employee, per service population)? Project is not consistent with GHGRS and further modeling will be required to determine if additional mitigation measures are necessary.* | ☐ | ☐ |

***Response documentation:*** *[Either here or as an attachment]*

San Jose Downtown Primary Commercial (DC) permitted uses: The current project uses comply with Table 20-140Downtown Zoning Districts Use Regulations:Office and Financial Services (P), Multi dwelling (P), and General Retail (P,A)

[2] For example, a General Plan Amendment to change use from single-family residential to multi-family residential or a General Plan Amendment to change the use from regional-serving commercial to mixed-use urban in a transit-served area might reduce travel demand, and therefore GHG emissions from mobile sources.

| ***2) Implementation of Green Building Measures*** | **Yes** | **No** |
| --- | --- | --- |
| ***MS-2.2**: Encourage maximized use of on-site generation of renewable energy for all new and existing buildings.* | ☒ | ☐ |
| *Not applicable* | ☐ | ☐ |
| *Describe how the project is consistent or why the measure is not applicable. [Either here or as an attachment]*<br>PV arrays to be implemented on the roof and horizontal louvers of the building. Based on the area, it could provide up to 17% of the building's electricity. See 100% SD Sustainability Report for further details. | | |
| ***MS-2.3**: Encourage consideration of solar orientation, including building placement, landscaping, design and construction techniques for new construction to minimize energy consumption.* | ☒ | ☐ |
| *Not applicable* | ☐ | ☐ |
| *Describe how the project is consistent or why the measure is not applicable. [Either here or as an attachment]*<br>Shading louvers have been incorporated onto the facade to reduce direct solar radiation thus reducing overall cooling needs of the building. See 100%SD Sustainability Report for further details. | | |
| ***MS-2.7**: Encourage the installation of solar panels or other clean energy power generation sources over parking areas.* | ☒ | ☐ |
| *Not applicable* | ☐ | ☐ |
| *Describe how the project is consistent or why the measure is not applicable. [Either here or as an attachment]*<br>Parking is underground but solar panels will be incorporated on the roof and horizontal louvers of the building. | | |
| ***MS-2.11**: Require new development to incorporate green building practices, including those required by the Green Building Ordinance. Specifically, target reduced energy use through construction techniques (e.g., design of building envelopes and systems to maximize energy performance), through architectural design (e.g., design to maximize cross ventilation and interior daylight) and through site design techniques (e.g., orienting buildings on sites to maximize the effectiveness of passive solar design).* | ☒ | ☐ |
| Not applicable | ☐ | ☐ |
| *Describe how the project is consistent or why the measure is not applicable. [Either here or as an attachment]*<br>All of these strategies are being studied and incorporated into the design as per the 100%SD Sustainability Report. | | |
| ***MS-16.2**: Promote neighborhood-based distributed clean/renewable energy generation to improve local energy security and to reduce the amount of energy wasted in transmitting electricity over long distances.* | ☒ | ☐ |
| *Not applicable* | ☐ | ☐ |
| *Describe how the project is consistent or why the measure is not applicable. [Either here or as an attachment]*<br>Solar panels are incorporated onto the roof to improve energy security. All exccess power generated will be sent back to the grid for distribution. | | |

| ***3) Pedestrian, Bicycle & Transit Site Design Measures*** | **Yes** | **No** |
|---|---|---|
| ***CD-2.1**: Promote the Circulation Goals and Policies in the Envision San José 2040 General Plan. Create streets that promote pedestrian and bicycle transportation by following applicable goals and policies in the Circulation section of the Envision San José 2040 General Plan.* | | |
| *a) Design the street network for its safe shared use by pedestrians, bicyclists, and vehicles. Include elements that increase driver awareness.* | ☑ | ☐ |
| *b) Create a comfortable and safe pedestrian environment by implementing wider sidewalks, shade structures, attractive street furniture, street trees, reduced traffic speeds, pedestrian-oriented lighting, mid-block pedestrian crossings, pedestrian-activated crossing lights, bulb-outs and curb extensions at intersections, and on-street parking that buffers pedestrians from vehicles.* | ☑ | ☐ |
| *c) Consider support for reduced parking requirements, alternative parking arrangements, and Transportation Demand Management strategies to reduce area dedicated to parking and increase area dedicated to employment, housing, parks, public art, or other amenities. Encourage de-coupled parking to ensure that the value and cost of parking are considered in real estate and business transactions.* | ☑ | ☐ |
| *Not applicable* | ☐ | ☐ |
| *Describe how the project is consistent or why the measure is not applicable. [Either here or as an attachment]*<br>See TDM report attached. | | |
| ***CD-2.5**: Integrate Green Building Goals and Policies of the Envision San José 2040 General Plan into site design to create healthful environments. Consider factors such as shaded parking areas, pedestrian connections, minimization of impervious surfaces, incorporation of stormwater treatment measures, appropriate building orientations, etc.* | ☑ | ☐ |
| *Not applicable* | ☐ | ☐ |
| *Describe how the project is consistent or why the measure is not applicable. [Either here or as an attachment]*<br>The proposed project would conform to the California Green Building Code and proposes LEED Platinum certification, which would exceed the requirements of San Jose Council Policy 6-32, Private Sector Greem Building Policy, and the City's Green Building Ordinance. The project also includes media filters to treat stormwater on-site. | | |

| | Yes | No |
|---|---|---|
| ***CD-2.11**: Within the Downtown and Urban Village Overlay areas, consistent with the minimum density requirements of the pertaining Land Use/Transportation Diagram designation, avoid the construction of surface parking lots except as an interim use, so that long-term development of the site will result in a cohesive urban form. In these areas, whenever possible, use structured parking, rather than surface parking, to fulfill parking requirements. Encourage the incorporation of alternative uses, such as parks, above parking structures.* | ☐ | ☐ |
| *Not applicable* | ☑ | ☐ |
| *Describe how the project is consistent or why the measure is not applicable. [Either here or as an attachment]*<br>No above ground parking is being implemented. | | |
| ***CD-3.2**: Prioritize pedestrian and bicycle connections to transit, community facilities (including schools), commercial areas, and other areas serving daily needs. Ensure that the design of new facilities can accommodate significant anticipated future increases in bicycle and pedestrian activity.* | ☑ | ☐ |
| *Not applicable* | ☐ | ☐ |
| *Describe how the project is consistent or why the measure is not applicable. [Either here or as an attachment]*<br>Long and short term bicycle storage to be provided, as well as on-site shower and changing facilities. | | |
| ***CD-3.4**: Encourage pedestrian cross-access connections between adjacent properties and require pedestrian and bicycle connections to streets and other public spaces, with particular attention and priority given to providing convenient access to transit facilities. Provide pedestrian and vehicular connections with cross-access easements within and between new and existing developments to encourage walking and minimize interruptions by parking areas and curb cuts.* | ☑ | ☐ |
| *Not applicable* | ☐ | ☐ |
| *Describe how the project is consistent or why the measure is not applicable. [Either here or as an attachment]*<br>Surrounding the site, there are existing alleys around and through the block. The massing of the building naturally connects the alleys across the site to create a pedestrian network with adjacent retail and urban spaces. | | |
| ***LU-3.5**: Balance the need for parking to support a thriving Downtown with the need to minimize the impacts of parking upon a vibrant pedestrian and transit oriented urban environment. Provide for the needs of bicyclists and pedestrians, including adequate bicycle parking areas and design measures to promote bicyclist and pedestrian safety.* | ☑ | ☐ |
| *Not applicable* | ☐ | ☐ |
| *Describe how the project is consistent or why the measure is not applicable. [Either here or as an attachment]*<br>Long and short term bicycle storage to be provided, as well as on-site shower and changing facilities. | | |

| | Yes | No |
|---|---|---|
| ***TR-2.8:*** *Require new development to provide on-site facilities such as bicycle storage and showers, provide connections to existing and planned facilities, dedicate land to expand existing facilities or provide new facilities such as sidewalks and/or bicycle lanes/paths, or share in the cost of improvements.* | ☑ | ☐ |
| *Not applicable* | ☐ | ☐ |
| *Describe how the project is consistent or why the measure is not applicable. [Either here or as an attachment]*<br>Long and short term bicycle storage to be provided, as well as on-site shower and changing facilities. | | |
| ***TR-7.1:*** *Require large employers to develop TDM programs to reduce the vehicle trips and vehicle miles generated by their employees through the use of shuttles, provision for car-sharing, bicycle sharing, carpool, parking strategies, transit incentives and other measures.* | ☑ | ☐ |
| *Not applicable* | ☐ | ☐ |
| *Describe how the project is consistent or why the measure is not applicable. [Either here or as an attachment]*<br>See TDM report attached. | | |
| ***TR-8.5:*** *Promote participation in car share programs to minimize the need for parking spaces in new and existing development.* | ☑ | ☐ |
| *Not applicable* | ☐ | ☐ |
| *Describe how the project is consistent or why the measure is not applicable. [Either here or as an attachment]*<br>Car share parking spots to be accommodated on-site. | | |

| ***4) Water Conservation and Urban Forestry Measures*** | Yes | No |
|---|---|---|
| ***MS-3.1****: Require water-efficient landscaping, which conforms to the State's Model Water Efficient Landscape Ordinance, for all new commercial, institutional, industrial and developer-installed residential development unless for recreation needs or other area functions.* | ☑ | ☐ |
| *Not applicable* | ☐ | ☐ |
| *Describe how the project is consistent or why the measure is not applicable. [Either here or as an attachment]*<br>We are still working on developing our water strategy but we are targeting a 50% reduction in potable water use for landscape irrigation and 40% reduction in potable water use for indoor fixtures and cooling. | | |

| | Yes | No |
|---|---|---|
| ***MS-3.2**: Promote the use of green building technology or techniques that can help reduce the depletion of the City's potable water supply, as building codes permit. For example, promote the use of captured rainwater, graywater, or recycled water as the preferred source for non-potable water needs such as irrigation and building cooling, consistent with Building Codes or other regulations.* | ☑ | ☐ |
| *Not applicable* | ☐ | ☐ |
| *Describe how the project is consistent or why the measure is not applicable. [Either here or as an attachment]*<br>We are still working on developing our water strategy but we are targeting a 50% reduction in potable water use for landscape irrigation and 40% reduction in potable water use for indoor fixtures and cooling. | | |
| ***MS-19.4**: Require the use of recycled water wherever feasible and cost-effective to serve existing and new development.* | ☑ | ☐ |
| *Not applicable* | ☐ | ☐ |
| *Describe how the project is consistent or why the measure is not applicable. [Either here or as an attachment]*<br>We are still working on developing our water strategy but we are targeting a 50% reduction in potable water use for landscape irrigation and 40% reduction in potable water use for indoor fixtures and cooling. | | |
| ***MS-21.3**: Ensure that San José's Community Forest is comprised of species that have low water requirements and are well adapted to its Mediterranean climate. Select and plant diverse species to prevent monocultures that are vulnerable to pest invasions. Furthermore, consider the appropriate placement of tree species and their lifespan to ensure the perpetuation of the Community Forest.* | ☑ | ☐ |
| *Not applicable* | ☐ | ☐ |
| *Describe how the project is consistent or why the measure is not applicable. [Either here or as an attachment]*<br>The landscape design is still being developed but all species will have low water requirements and be adapted to the Mediterranean climate. | | |
| ***MS-26.1**: As a condition of new development, require the planting and maintenance of both street trees and trees on private property to achieve a level of tree coverage in compliance with and that implements City laws, policies or guidelines.* | ☑ | ☐ |
| *Not applicable* | ☐ | ☐ |
| *Describe how the project is consistent or why the measure is not applicable. [Either here or as an attachment]*<br>During construction the project will preserve existing trees along S 2nd Street. Only one existing tree will need to be removed to provide access to the site.There will be additional trees within the new Paseo and along the network alleys. The intermittent terraces and the two roof terraces will also have trees planted to provide shade and mitigate a heat island effect. | | |

| | Yes | No |
|---|---|---|
| ***ER-8.7**: Encourage stormwater reuse for beneficial uses in existing infrastructure and future development through the installation of rain barrels, cisterns, or other water storage and reuse facilities.* | ☒ | ☐ |
| *Not applicable* | ☐ | ☐ |

*Describe how the project is consistent or why the measure is not applicable. [Either here or as an attachment]*

Stormwater reuse is not proposed. However, the project propose a media filter system to discharge storm water.

## GHGRS Strategies

**GHGRS #1**: The City will implement the San José Clean Energy program to provide residents and businesses access to cleaner energy at competitive rates.

**GHGRS #2**: The City will implement its building reach code ordinance (adopted September 2019) and its prohibition of natural gas infrastructure ordinance (adopted October 2019) to guide the city's new construction toward zero net carbon (ZNC) buildings.

**GHGRS #3**: The City will expand development of rooftop solar energy through the provision of technical assistance and supportive financial incentives to make progress toward the Climate Smart San José goal of becoming a one-gigawatt solar city.

**GHGRS #4:** The City will support a transition to building decarbonization through increased efficiency improvements in the existing building stock and reduced use of natural gas appliances and equipment.

**GHGRS #5**: As an expansion to Climate Smart San José, the City will update its Zero Waste Strategic Plan and reassess zero waste strategies. Throughout the development of the update, the City will continue to divert 90 percent of waste away from landfills through source reduction, recycling, food recovery and composting, and other strategies.

**GHGRS #6:** The City will continue to be a partner in the Caltrain Modernization Project to enhance local transit opportunities while simultaneously improving the city's air quality.

**GHGRS #7**: The City will expand its water conservation efforts to achieve and sustain long-term per capita reductions that ensure a reliable water supply with a changing climate, through regional partnerships, sustainable landscape designs, green infrastructure, and water-efficient technology and systems.

# Table B: 2030 Greenhouse Gas Reduction Strategy Compliance

| GHGRS Strategy and Consistency Options | Description of Project Measure | Project Conformance |
|---|---|---|
| **PART 1: RESIDENTIAL PROJECTS ONLY** | | |
| **Zero Net Carbon Residential Construction**<br>1. Achieve/exceed the City's Reach Code, and<br>2. Exclude natural gas infrastructure in new construction, or<br>3. Install on-site renewable energy systems or participate in a community solar program to offset 100% of the project's estimated energy demand, or<br>4. Participate in San José Clean Energy at the Total Green level (i.e., 100% carbon-free electricity) for electricity accounts associated with the project until which time SJCE achieves 100% carbon-free electricity for all accounts.<br>**Supports Strategies**:<br>GHGRS #1, GHGRS #2, GHGRS #3 | *Describe which, if any, project consistency options from the leftmost column you are implementing.*<br>*OR,*<br>*Describe why this strategy is not applicable to your project.*<br>*OR,*<br>*Describe why such measures are infeasible.* | ☐ Proposed<br>☒ Not Applicable<br>☐ Not Feasible*<br>☐ Alternative Measure Proposed<br>** The 2030 GHGRS assumed this strategy would be feasible for 50% of residential units constructed between 2020 and 2030.*<br>ALL PROPOSED METHODS HAVE BEEN HIGHLIGHTED |
| **PART 2: RESIDENTIAL AND NON-RESIDENTIAL PROJECTS** | | |
| **Renewable Energy Development**<br>1. Install solar panels, solar hot water, or other clean energy power generation sources on development sites, or<br>2. Participate in community solar programs to support development of renewable energy in the community, or<br>3. Participate in San José Clean Energy at the Total Green level (i.e., 100% carbon-free electricity) for electricity accounts associated with the project.<br>**Supports Strategies**:<br>GHGRS #1, GHGRS #3 | *Describe which, if any, project consistency options from the leftmost column you are implementing.*<br>*OR,*<br>*Describe why this strategy is not applicable to your project.*<br>*OR,*<br>*Describe why such measures are infeasible.*<br>The proposed project includes solar photovolatic panels on the louvers surrounding the facade of the building and on the rooftop for on-site energy generation. The project would procure 100% green power beyond what the on-site photovolatics can provide. In addition, the project would pursue ILFI Zero Carbon Certification, which requires all electric buildings and 100% renewable energy. | ☐ See Part 1 (Residential projects only)<br>☒ Proposed<br>☐ Not Applicable<br>☐ Not Feasible<br>☒ Alternative Measure Proposed |

| GHGRS Strategy and Consistency Options | Description of Project Measure | Project Conformance |
|---|---|---|
| **Building Retrofits – Natural Gas**[3]<br><br>This strategy only applies to projects that include a retrofit of an existing building. If the proposed project does not include a retrofit, select "Not Applicable" in the Project Conformance column.<br><br>1. Replace an existing natural gas appliance with an electric alternative (e.g., space heater, water heater, clothes dryer),<br>or<br><br>2. Replace an existing natural gas appliance with a high-efficiency model<br><br>**Supports Strategies:**<br>GHGRS #4 | *Describe which, if any, project consistency options from the leftmost column you are implementing.*<br><br>*OR,*<br><br>*Describe why this strategy is not applicable to your project.*<br><br>*OR,*<br><br>*Describe why such measures are infeasible.*<br>This strategy is not applicable to this project because it is new construction and there are no exisiting buildings on-site. | ☐ Proposed<br>☑ Not Applicable<br>☐ Not Feasible<br>☐ Alternative Measure Proposed |
| **Zero Waste Goal**<br><br>1. Provide space for organic waste (e.g., food scraps, yard waste) collection containers,<br>and/or<br><br>2. Exceed the City's construction & demolition waste diversion requirement.<br><br>**Supports Strategies:**<br>GHGRS #5 | *Describe which, if any, project consistency options from the leftmost column you are implementing.*<br><br>*OR,*<br><br>*Describe why this strategy is not applicable to your project.*<br><br>*OR,*<br><br>*Describe why such measures are infeasible.* | ☑ Proposed<br>☐ Not Applicable<br>☐ Not Feasible<br>☐ Alternative Measure Proposed |

[3] GHGRS Strategy #4 applies to existing building retrofits and not to new construction; Strategy #2 applies to new construction to reduce natural gas related GHG emissions

| GHGRS Strategy and Consistency Options | Description of Project Measure | Project Conformance |
|---|---|---|
| **Caltrain Modernization**<br>1. For projects located within ½ mile of a Caltrain station, establish a program through which to provide project tenants and/or residents with free or reduced Caltrain passes<br>or<br>2. Develop a program that provides project tenants and/or residents with options to reduce their vehicle miles traveled (e.g., a TDM program), which could include transit passes, bike lockers and showers, or other strategies to reduce project related VMT.<br>**Supports Strategies:**<br>GHGRS #6 | *Describe which, if any, project consistency options from the leftmost column you are implementing.*<br>*OR,*<br>*Describe why this strategy is not applicable to your project.*<br>*OR,*<br>*Describe why such measures are infeasible.*<br>See TDM report attached. | ☒ Proposed<br>☐ Not Applicable<br>☐ Not Feasible<br>☐ Alternative Measure Proposed |
| **Water Conservation**<br>1. Install high-efficiency appliances/fixtures to reduce water use, and/or include water-sensitive landscape design, and/or<br>2. Provide access to reclaimed water for outdoor water use on the project site.<br>**Supports Strategies:**<br>GHGRS #7 | *Describe which, if any, project consistency options from the leftmost column you are implementing.*<br>*OR,*<br>*Describe why this strategy is not applicable to your project.*<br>*OR,*<br>*Describe why such measures are infeasible.*<br>The project proposes LEED Platinum certification and would include installation of high-efficiency appliances/fixtures to reduce water use. | ☒ Proposed<br>☐ Not Applicable<br>☐ Not Feasible<br>☐ Alternative Measure Proposed |

# Table C: Applicant Proposed Greenhouse Gas Reduction Measures

| Description of Proposed Measure | Description of GHG Reduction Estimate | Proposed Measure Implementation |
|---|---|---|
| *[Describe the proposed project measure and why it is proposed]*<br><br>**Supports Strategies/Sectors:**<br>GHGRS # | *[Demonstrate the effectiveness of the proposed measure to reduce the project's GHG emissions.*<br><br>*Include a description of how your measure will reduce emissions and provide supporting quantification documentation/assumptions.]* | ☐ Part of Design<br>☐ Additional Measure |
| *[Describe the proposed project measure and why it is proposed]*<br><br>**Supports Strategies/Sectors:**<br>GHGRS # | *[Demonstrate the effectiveness of the proposed measure to reduce the project's GHG emissions.*<br><br>*Include a description of how your measure will reduce emissions and provide supporting quantification documentation/assumptions.]* | ☐ Part of Design<br>☐ Additional Measure |
| *[Describe the proposed project measure and why it is proposed]*<br><br>**Supports Strategies/Sectors:**<br>GHGRS # | *[Demonstrate the effectiveness of the proposed measure to reduce the project's GHG emissions.*<br><br>*Include a description of how your measure will reduce emissions and provide supporting quantification documentation/assumptions.]* | ☐ Part of Design<br>☐ Additional Measure |
| *[Describe the proposed project measure and why it is proposed]*<br><br>**Supports Strategies/Sectors:**<br>GHGRS # | *[Demonstrate the effectiveness of the proposed measure to reduce the project's GHG emissions.*<br><br>*Include a description of how your measure will reduce emissions and provide supporting quantification documentation/assumptions.]* | ☐ Part of Design<br>☐ Additional Measure |

# 100% SD Sustainability Narrative

**10344 Fountain Alley, 10.30.2020**

atelier ten

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# 100% SD Sustainability Narrative

**10344 Fountain Alley, 10.30.2020**

Atelier Ten and Westbank have established Sustainability goals across the portfolio of San Jose projects. These goals are adapted to be project specific, and this tracking matrix captures the design development relative to each goal for the Fountain Alley project.

This is a snapshot of a living document. As the design progresses this tracker will capture when the Sustainability Goal is confirmed as achievable.

**10344 Fountain Alley - Sustainability Goals Tracker**

Last Updated : 201027

| | Goal | Description | Critical Path | Key Disciplines | Key Milestone | Status | SD Comments |
|---|---|---|---|---|---|---|---|
| **Electrification** | All Electric Systems | All-electric systems for space heating, domestic hot water, and office floors. Any tenant kitchens/amenities on office floors will also be all-electric. | -- | Taylor A10 | 100% SD | | All electric systems are in the current design. |
| | All Electric Systems | Stretch goal: No natural gas utility connection | Further discussion with Westbank leasing team. | A10 Taylor Westbank | 100% SD | | Current direction is to include gas to ground floor retail, as San Jose is issuing a change to thier reach code that allows it. Open question is whether WB would consider all-electric kitchens anyway. This is awaiting feedback from thier leasing team. |
| **Energy Efficiency** | Title 24 compliance | Achieve 2019 Title 24 compliance | Reduce window-to-wall ratio to approximately 60% | A10 Taylor Nemetz BIG | 50% DD | | Title 24 model shows that 60 - 64% window-to-wall ratio (WWR) is needed for compliance, using curtainwall with a reasonable U-value. A10 and BIG to continue collaborating on design options into DD. While SD100 documents a 70% glass area, BIG has identified numerous opportunities for DD development where introducing more opacity makes sense. |
| | 25% Energy Use Savings | 25% energy use savings from ASHRAE 2010 Baseline, or a maximum EUI of 28 kBtu/sq.ft./year, as per ILFI Zero Carbon Certification requirements | Confirm which efficiency measures are agreed to as DD documentation evolves, and detail the extents of rooftop and facade PV | A10 Taylor Nemetz BIG | 100% SD | | Current design is 34 kBtu/sq.ft./year; with efficiency measures the project can achieve 29 kBtu/sq.ft./year. On site PV can reduce the EUI to between 19 and 24 kBtu/sq.ft./year. |
| | 40% Savings using LEED v4 ACP95 | 40% savings from ASHRAE 2010 baseline, calculated using LEED v4 ACP95 (which combines GHG, energy use, and/or energy cost as metrics) | | A10 Taylor Nemetz BIG | 100% DD | | Likely, pending the extents of rooftop and facade PV. LEED energy model to be developed in DD |
| | Target AIA 2030 EUI | Stretch goal: Meet AIA 2030 target for 2020. (Target EUI is 20 kbtu/sf/yr for office space.) | Identify AIA 2030 target. Develop energy model & test energy efficiency measures. Identify pathway to achieve each savings target. | A10 Taylor Nemetz BIG | 100% SD | | Possible with maximum PV extents. Current design is 34 kBtu/sq.ft./year; with efficiency measures the project can achieve 29 kBtu/sq.ft./year. On site PV can reduce the EUI to between 19 and 24 kBtu/sq.ft./year. |
| **Renewable Energy** | 5% of total energy generated on site PV | 5% of energy demand met through on-site PV across the Westbank San Jose portfolio; individual building targets to be developed. | Recommended PV target for SJFA - is 17% | A10 Westbank Nemetz | 100% SD | | This is a portfolio-wide goal. A10 has analyzed SJFA's PV potential if mounted on the external shades and rooftop, up to 17% offset is possible. SJFA is considered to be the largest contributor to the portfolio-wide goal of 5%. |
| | Carbon Free Electricity | 100% carbon-free electricity purchasing for whole building. | Confirm carbon-free electricity purchase approach for tenants: pass-through as part of lease or other means. | Westbank A10 | 100% CD | | Westbank and A10 to develop portfolio-wide carbon-free electricity purchasing strategy. |
| | Green Power vs. Virtual PPA | Carbon-free electricity purchasing procured through virtual PPA or similar to achieve true additionality (may not be San Jose Clean Energy) and meet LEED Tier 1 requirements. | Develop details on renewable power procurement strategy - green power vs. virtual PPA | Westbank A10 | 100% CD | | Westbank and A10 to develop portfolio-wide carbon-free electricity purchasing strategy. |
| **Embodied Carbon** | 10% Embodied Carbon Reduction | Reduce embodied carbon of structure & enclosure by 10% as per ILFI Zero Carbon Certification requirements | Develop LCAs for buildings and pathway to meet these targets. | A10 Glotman Simpson BIG Westbank | 50% DD | | LCA calculations will begin in DD. |
| | Maximum embodied carbon emissions of 500 kg-CO2e/m² | Maximum embodied carbon emissions of 500 kg-CO2e/m², averaged across the Westbank San Jose Portfolio, as per ILFI Zero Carbon Certification requirements | | | 100% DD | | LCA calculations will begin in DD. |
| | 100% remaining Carbon Emissions to be offset | Offset 100% of remaining embodied carbon emissions across the Westbank San Jose portfolio. | | | 100% DD | | Westbank and A10 to develop portfolio-wide carbon offset purchase. |
| | 50% reduction in embodied carbon across the Westbank San Jose portfolio | Stretch goal: 50% reduction in embodied carbon across the Westbank San Jose portfolio. Individual building stretch goals to be developed | | | 100% DD | | LCA calculations will begin in DD. |
| **Low GWP Refrigerants** | Achieve LEED Enhanced Refrigerant Management credit | HVAC: Achieve LEED Enhanced Refrigerant Management credit | Develop low-GWP refrigerant guideline for project teams; for projects where chiller types have already been determined, identify available refrigerants with the lowest GWP possible. | Taylor A10 Westbank | 100% SD | | Taylor Engineering confirmed refrigerant complies with LEED criteria. |
| | Use refrigerants with GWP close to zero | Stretch goal: Use refrigerants with GWP as close to zero as possible | | | 100% DD | | Taylor Engineering to evaluate very low GPW refrigerants in DD |
| | Offset all refrigerant GWP | Stretch goal: offset refrigerant GWP across the Westbank San Jose Portfolio | Recommend method for offsetting refrigerant GWP. | A10 Westbank | 100% CD | | A10 to recommend a method for offsetting refrigerant GWP. |

| | | | | | |
|---|---|---|---|---|---|
| **Smart Building Controls** | Smart Controls for energy efficiency | Consider smart controls as part of each building's energy efficiency strategy. | Refine goals and budget for smart building features. Establish a single point of contact or a coordinated platform for smart building controls | Taylor<br>Nemetz<br>A10 | 100% DD | Master Switch controls and smart thermostats in residential units allow lighting, equipment, heating, cooling and ventilation setback during unoccupied hours. |
| | Use smart building controls to reduce GHGs further | Stretch goal: Use smart building controls to control loads/renewables/energy storage across the Westbank San Jose portfolio, to reduce GHGs beyond what energy efficiency measures accomplish. | Develop "virtual microgrid" concept for coordinating renewables, energy storage, and loads to reduce GHGs | Taylor<br>Nemetz<br>Westbank<br>A10 | 100% DD | Portfolio-wide goal. A10 to study what potential there is for this concept and coordinate with Nemetz. |
| **Transportation** | Achieve 17 LEED v4/4.1 Location & Transportation points | Achieve 17 LEED v4/4.1 Location & Transportation points | -- | A10 | 100% SD | A10 confirmed. |
| | 10% EV parking on opening day & 100% EV-ready spaces | 10% EV parking on opening day (measured by number of cars that can be charged); 100% EV-ready including empty conduit and space for future electrical equipment. | Confirm number and type of chargers and operational strategy to achieve 10% EV on opening day | A10<br>Westbank | 100% DD | A10 to study EV parking goal for BOI and SJFA combined |
| **Daylight** | 55% of spaces to be daylit | Stretch goal: Achieve LEED Daylight credit criteria - 55% of floorplate daylight autonomous | Deep dive daylight analysis in DD to test facade design and potential options to improve glare-free daylight | A10<br>BIG | 100% DD | A10 has evaluated the shading options, which are very effective. Next steps are to test daylight access; target glazing reductions while maintaining daylight access; and coordinate on shade geometry/finish to eliminate glare as much as possible. While the deep floorplates of SJFA are unlikely to result in LEED daylighting points, A10 will validate visual comfort in DD. |
| **Natural Ventilation** | All spaces to have an operable window within 25 ft. | All locations adjacent to a perimeter wall (exterior or courtyard) should have an operable window within 25 ft. | Holmes to confirm smoke control strategy acceptance by the city. | Holmes<br>BIG<br>A10<br>Taylor | 100% DD | Operable window locations and strategy to be confirmed with Holmes as primarily a smoke control design issue. Operable windows are already included in the residential floors. |
| | Natural Ventilation for space conditioning | All buildings should integrate natural ventilation as part of the space conditioning strategy. | Holmes to confirm smoke control strategy acceptance by the city. | Holmes<br>BIG<br>A10<br>Taylor | 100% DD | Natural ventilation concept in development. Noise and air quality issues are not severe and do not preclude natural ventilation. The office portion of the tower is wrapped in outdoor vegetation spaces, and natural ventilation is an assumed cobenefit of the facade plantings. Smoke control strategy will ultimately define the opportunity. |
| **Biophilia/ Landscape** | Secondary benefit provided by 50% of open spaces | At least 50% of all open space and vegetated areas must be provide a secondary benefit such as stormwater management, food production, pollutant filtration, or habitat restoration. | Continue coordination with BIG landscape to ensure feasible target green roof/planted surface area and strategy for secondary benefits. | BIG<br>A10 | 100% SD | BIG landscape design on track. |
| **Landscape Water Use** | Irrigation Water Savings | 50% reduction in potable water use for landscape irrigation. | Review blackwater options with Westbank. | BIG<br>A10<br>Taylor<br>Westbank | 50% DD | Water balance shows that blackwater reuse can almost meet the stretch goal, and the 50% goal can be met via plant selection/planter type and irrigation design. Taylor and A10 have ROM estimates from vendors for blackwater system to review with Weestbank |
| | Net Zero Irrigation | Stretch goal: No potable water for landscape irrigation | | | | |
| **Indoor Water Use** | Potable Water Savings | 40% reduction in potable water use for indoor fixtures & cooling | Review blackwater options with Westbank. | Taylor<br>A10<br>Westbank | 50% DD | Water balance shows that 40% savings is possible with hyper-conserving fixtures (eg vacuum fixtures) without reuse. To meet the stretch goal of zero water waste, blackwater reuse is needed. Taylor and A10 have ROM estimates from vendors for blackwater system to review with Westbank |
| | Net Zero Water | Stretch goal: Zero water waste (i.e., maximum water conservation and non-potable water used for all end uses that allow it by code) | | | | |
| **Certifications** | LEED C&S Platinum Certification | LEED C&S Platinum Certification | Team meeting to review targeted LEED points | A10<br>BIG<br>RMW<br>Taylor<br>Nemetz<br>Civil | 100% SD | A10 has identified a recommended path to LEED Platinum. Design team has reviewed pathway and agreed to requisite strategies. A10 to continue LEED admin through DD. |
| | ILFI Zero Carbon Certification | ILFI Zero Carbon Certification | Meet with ILFI to approve portfolio-scale approach to certification. | A10<br>Westbank | 50% DD | A10 to issue memo outlining portfolio-scale approach, and set up meeting with ILFI to review. |
| | WELL Portfolio Certification | WELL Portfolio Certification | Confirm WELL Portfolio vs. WELL certification, evaluate Fitwell as an alternate | Westbank<br>A10 | 50% DD | A10 to review of WELL / Fitwell feasibility with Westbank. |

## ENERGY ANALYSIS

Atelier Ten conducted a whole building energy analysis for Fountain Alley at 100% Schematic Design (SD) Phase. Fountain Alley is a new building located in San Jose, California. The building has a conditioned area of approx. 721,351 ft², with program comprising of open office, residential units, amenities, retail, food services and back of house areas. The purpose of this analysis is to:

- Estimate the Energy Use Intensity (EUI) of the Proposed Design at 100% SD to understand compliance against the project energy targets of achieving an EUI of 25% energy use savings from ASHRAE 90.1-2010 Baseline or a maximum EUI of approximately 28 kBtu/sq.ft./year, as per ILFI Zero Carbon Certification requirements. In addition, determine compliance against the Stretch energy target of 24 kBtu/sq.ft./yr to comply with AIA 2030.
- Perform envelope sensitivity analysis to identify the optimum performance targets.
- Understand the key energy drivers in the Proposed Design to identify and evaluate additional energy efficiency measures (EEMs) needed to meet and exceed the EUI targets set for the project.

The energy models were created using eQUEST v3.65 (DOE-2.3 simulation engine). The Proposed Design model reflects the energy performance of the building based on the 50% SD building geometry. Detailed assumptions for the analysis, including internal loads, envelope construction, typical use schedules, and HVAC parameters are presented at the end of this report.

The Proposed Design has an EUI of 34 kBTU/sq.ft./yr, and with efficiency measures the project can achieve 29 kBtu/sq.ft./year. Depending on the size of the array, on site PV can reduce the EUI to between 19 and 24 kBtu/sq.ft./year which would enable the project to likely achieve the EUI target for ILFI Zero Carbon Certification and also reach the AIA 2030 stretch energy target.

The Proposed Design model includes a custom unitized window wall system, thermally broken with aluminum frame, terracotta shading devices (spandrel panel:R-15), a roof assembly comprising of concrete slab with rigid insulation (U-0.034 from Title-24 2019) and a glazing assembly with thermal performance of U-0.35 (SHGC: 0.28 and VLT-0.64). Electric lighting is designed to meet the minimum performance requirement of Title 24-2019. The air-side HVAC system is comprised of an underfloor air distribution system for the office spaces, 4-pipe coils, with Energy Recovery Ventilators integrated, for the residential apartments, 4-pipe fan coil units for the lobbies, basement, back of house, core and shell spaces and hot water and chilled water from central plants for the retail spaces. The energy model includes a chilled water meter and a hot water meter that captures the CHW load and HW load of the proposed central plant. A custom calculator was created to derive the energy consumption of the central plant based on the load profiles from the Bank of Italy and San Jose Fountain Alley energy models. The plant efficiencies were then sent back to the root energy model to capture the full energy savings potential of the central plant.

Atelier Ten evaluated the Proposed Design annual energy use characterization and identified additional energy efficiency measures and design alternatives that could help improve the buildings energy performance. The following energy efficiency measures and alternative systems were identified and studied in this analysis:

- EEM 1 – LPD Reduction in Common Spaces
- EEM 2 – LPD Reduction in Residential Apartments
- EEM 3 – Office Plug Load Management
- EEM 4 – Energy Star rated appliances for residential unit
- EEM 5 – Apartment Unit Master Switches
- EEM 6 – Energy Star rated efficient heat pump dryers
- EEM 7 – Induction Stove vs Electric Resistance
- EEM 8 – Ceiling Fans
- ALT 1 – Fan Coil Units with DOAS for the office spaces
- ALT 2 – Radiant Heating and Cooling with DOAS for the office spaces
- Cumulative cases - include all the EEMs related to internal loads (EEM 1 to EEM 7) in the study.

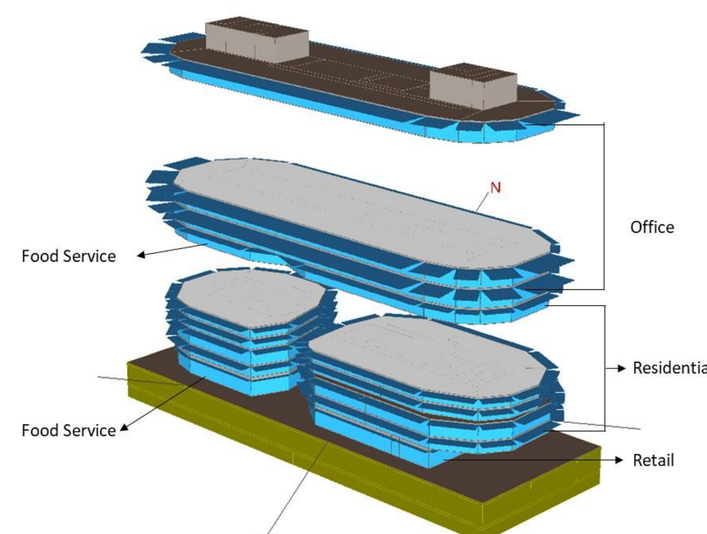



*Figure 1 - Energy Model Schematic*

**Table 1** below summarizes the results from this energy analysis.

| | Annual Energy Use (million Btu/yr) | Energy Use Intensity (kBTU/sq.ft./yr) | Annual Site Energy Savings over Proposed Design |
|---|---|---|---|
| Proposed Design | 24,521 | 34 | - |
| EEM 1 LPD Reduction in Common Spaces | 24,216 | 33.6 | 1% |
| EEM 2 LPD Reduction in Residential Units | 24,283 | 33.7 | 1% |
| EEM 3 Plug Load Management in Offices | 23,031 | 31.9 | 6% |
| EEM 4 Energy Star Appliances (Residential) | 24,303 | 33.7 | 1% |
| EEM 5 Master Switch Control | 24,032 | 33.3 | 2% |
| EEM 6 Energy Star Heat Pump Dryer | 24,082 | 33.4 | 2% |
| EEM 7 Induction Stovetop | 24,425 | 33.9 | 0.39% |
| EEM 8 Ceiling Fan | 24,250 | 33.6 | 1% |
| ALT-1 DOAS with FCU | 24,631 | 34.1 | 0% |
| ALT-2 DOAS with Radiant Panel | 23,972 | 33.2 | 2% |
| Cumulative Case | 21,193 | 29 | **14%** |
| Cumulative Case (Maximum PV) | 13,495 | 19 | **45%** |
| Cumulative Case (50% PV) | 17,344 | 24 | **29%** |

## PROPOSED DESIGN ENERGY OVERVIEW

The office program accounts for about half of the floor area, while residential and ground floor retail program accounts for the other half. Included in both the office and retail program types is an assumption for food service. This accounts for likely restaurant tenants at street level and for a likely cafeteria food service within the office tower. Food service program in isolation carries a very high EUI, it uses a lot of energy per square foot, and is captured in the energy model by an assumed program-specific EUI of 195 kBtu/ft2. The model assumes 8% (about one floor) of the office program is dedicated to food service, and 20% of the ground floor retail.

Figure 2 shows the energy use breakdown by end use and by total EUI of the proposed design including food service. The whole building with food service is anticipated to have an EUI of 34 kbtu/ft2. Without food service the EUI would be 27 kBtu/ft2. As can be seen from this graph, food service program is highly energy intensive and the project energy use will be greatly influenced by this program.

Given the high performing building design and central plant, food service energy use is both one of the largest assumptions in the energy model, and one of the largest single end uses.

If the ground floor retail space is predominately restaurant, then the energy use of the overall building could substantially increase. Assuming 90% of the ground floor retail space is restaurant tenants, the overall EUI of the building could increase from 34 kbtu/ft2 to 36 kbtu/ft2. Figure 3 illustrates the change in energy use breakdown and total EUI.

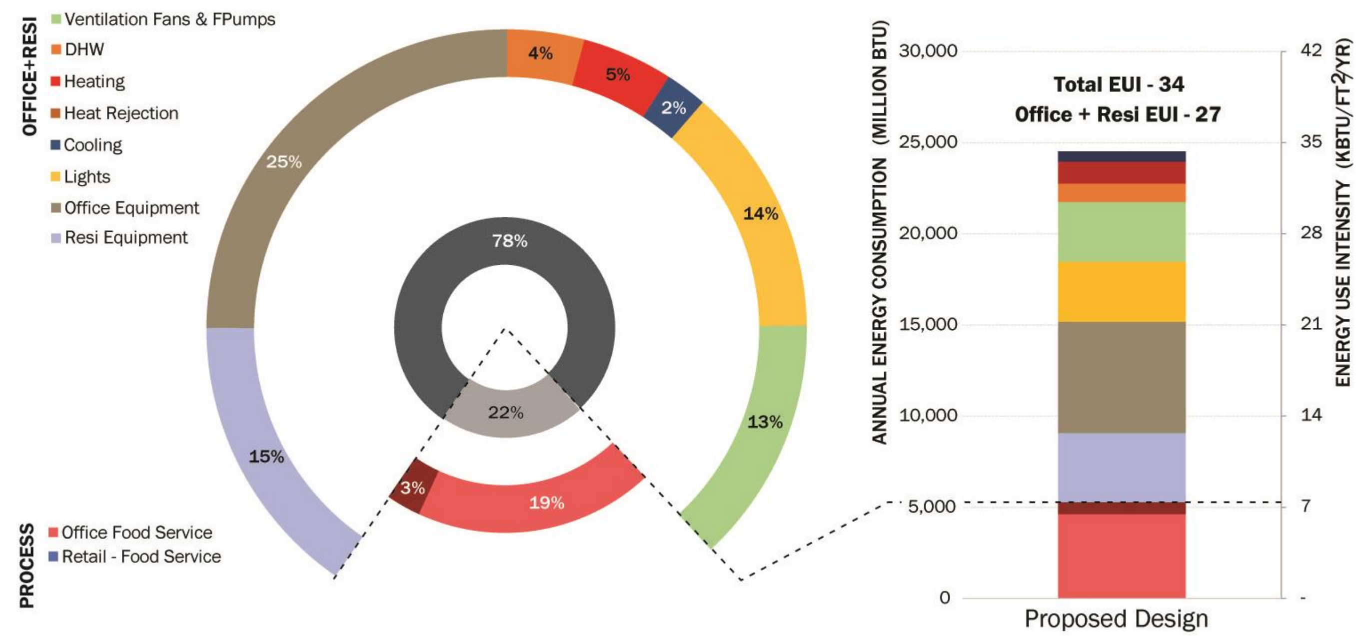



*Figure 2 - Proposed Design Energy End Use and EUI*

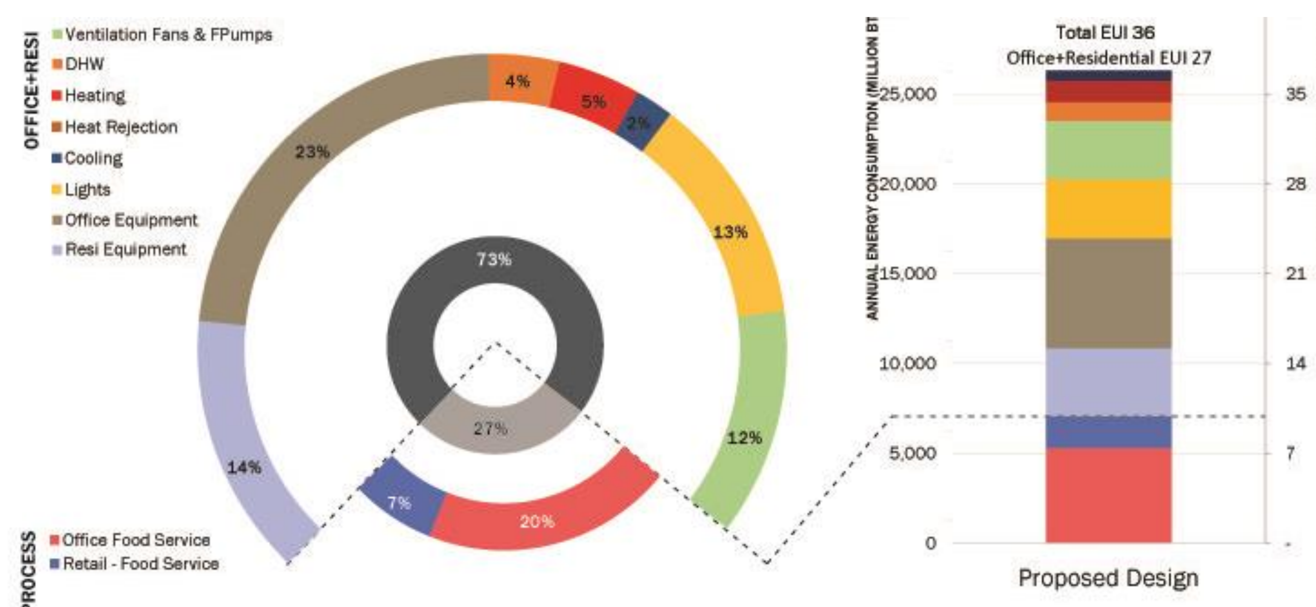



*Figure 3 – Proposed Design with 90% of Ground Floor Retail as Food Service*

## ENERGY USE CHARACTERIZATION

To understand the energy performance of the architecture and mechanical design, Figure 4 summarizes the energy end uses for the Proposed Design, without the assumed food service loads.

The inner ring of the characterization graph breaks down the whole building energy use by end-uses. The outer ring describes the load components which contribute to the space heating and cooling energy end-uses.

**Office equipment and residential appliances** form the two largest energy end uses at 32% and 20%, respectively. While the team will specify the residential appliances, the office equipment (plug loads, computers, monitors, etc) is similar to the food service as another very large assumption and end use.

**Pumps and fans** (17%) are the next highest end use. Targeting high efficiency fan configurations and low-pressure drops will help reduce this.

**Lighting** (17%) is also a high-end use. This energy can be targeted with efficient lighting design tenant guidelines and automated interior shades to assist with maximizing daylight hours.

**Heating** (6%): Much of the heating energy is related to heating of outdoor air in winter; and 3% (half of the total heating load) is directly impacted by heat losses (conduction) through the high percentage of glazing across the facade.

**Domestic hot water** (5%) is mostly attributed to hot water use in the residential portion of the building. This can be reduced through low-flow fixtures and energy star appliances.

**Cooling** (3%) cooling energy is a small end use because of the very efficient central plant, and due to the generous exterior shading provided across the façade.

Based on these energy drivers, several EEMs were identified and studied as part of this analysis. An envelope sensitivity analysis was performed to understand the optimum performance targets, results which are discussed in the following pages of this report.

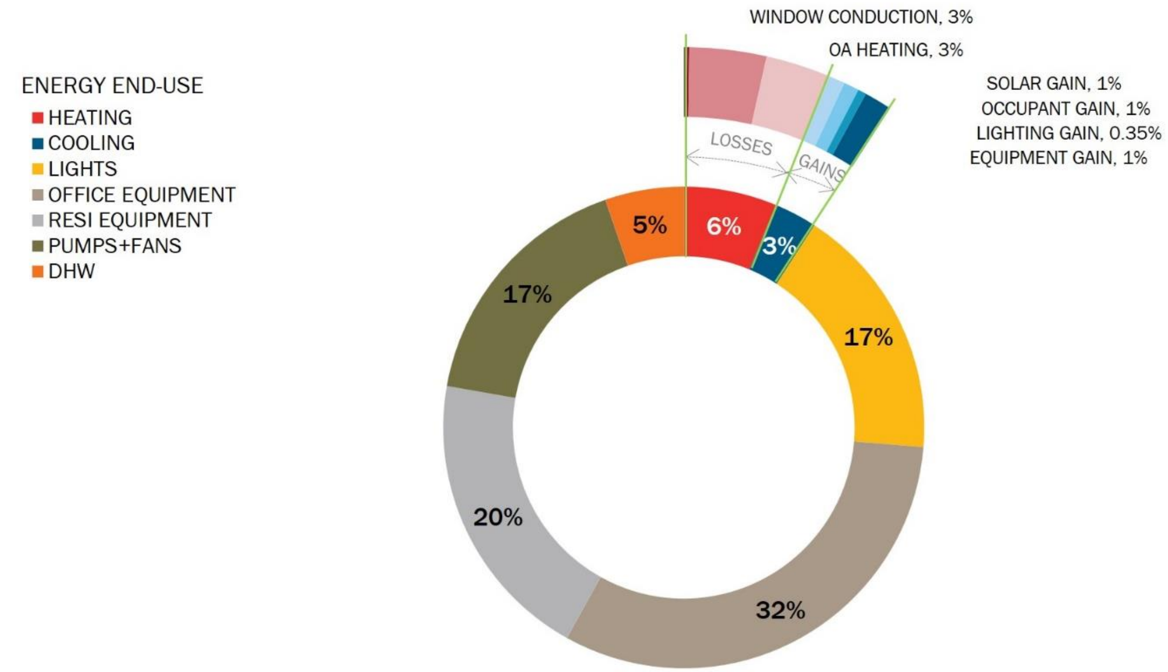



*Figure 4 - Proposed Design Energy Use Characterization Without Food Service*

## TITLE 24 PART 6 COMPLIANCE

The project goals are to estimate the Energy Use Intensity (EUI) of the Proposed Design and benchmark compliance against various energy targets. In this unit of measurement, real world energy, the Fountain Alley project is tracking well.

However, the project must also comply with the 2019 Title 24 Part 6 California Energy Code. The performance of the building using Title 24 is measured in **Time Dependent Valuation (TDV) which is not the same as energy.** It's important to outline the key differences between a whole building energy model and a Title 24 Part 6 compliance model:

- **Proposed Design Model (Whole Building Energy Model):**
  - Performance is measured with ENERGY
  - Model represents actual design conditions
  - Full accounting of the central plant and energy efficient design features
- **Title 24 Part 6 Compliance Model:**
  - Compliance is measured with TDV
  - TDV is a time of use metric which aims to capture the societal and environmental impacts of the cost of energy for each hour of the year
  - TDV includes higher greenhouse gas emissions rates and the real cost of electricity from peak plants brought online during high energy demand in the afternoon
  - Baseline T24 model uses gas, which has lower TDV multiplier than electricity. The proposed design, while highly efficient, is all-electric.
  - Model represents mixture of design conditions and Title 24 required inputs, such as schedule of operations, equipment loads, and setpoint temperatures
  - Model must be created in state-required software (CBECC-COM) with limitations of modeling of complex systems

Because of these differences, the Title 24 Part 6 compliance model results in a different set of energy end use drivers – key features that the design needs to focus on to ensure compliance is achieved.

When looking at the proposed design energy model characterization graph, it can be seen that heating + cooling make up about 9% of the total building energy, making them less critical design drivers. The energy use is low due to the high efficiency central plant.

However, when reviewing the preliminary Title 24 Part 6 compliance results, the heating plus cooling TDV makes up 21% of the total building TDV. In addition, the high efficiency central plant cannot be modeled as designed in CBECC-Com, and the full efficiency cannot be accounted for. This means, that **minimizing the loads at the façade are critical for ensuring a clear and comfortable path to Title 24 Part 6 compliance.**

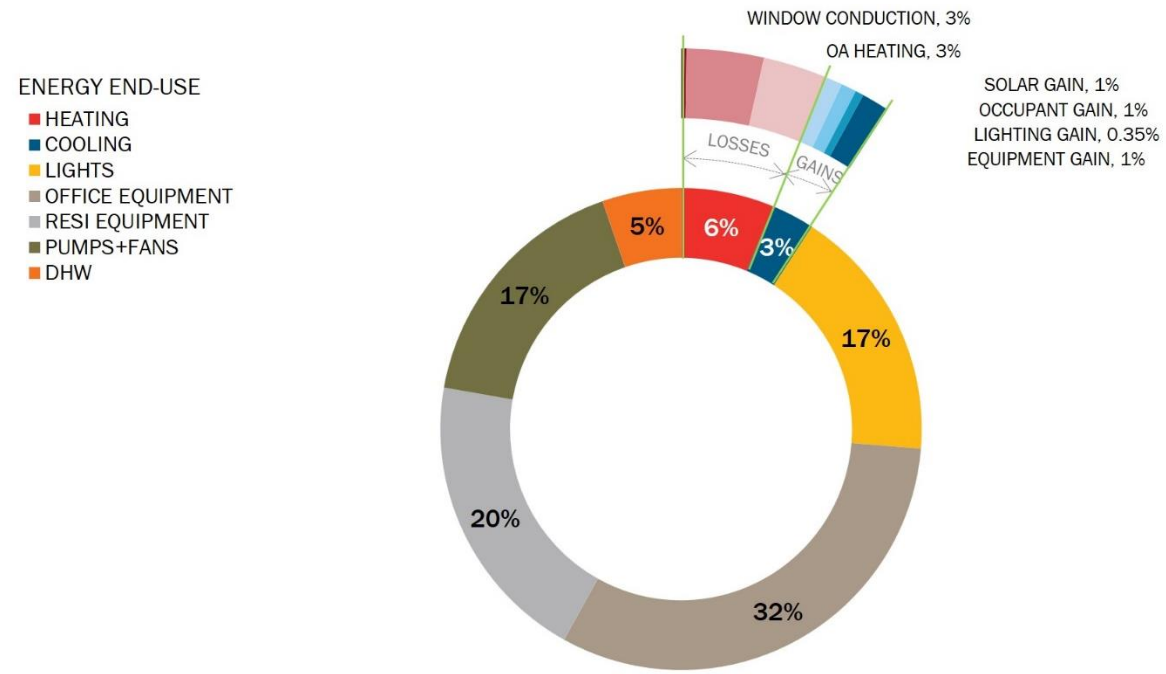



*Figure 4 - Proposed Design Energy Use Characterization Without Food Service*

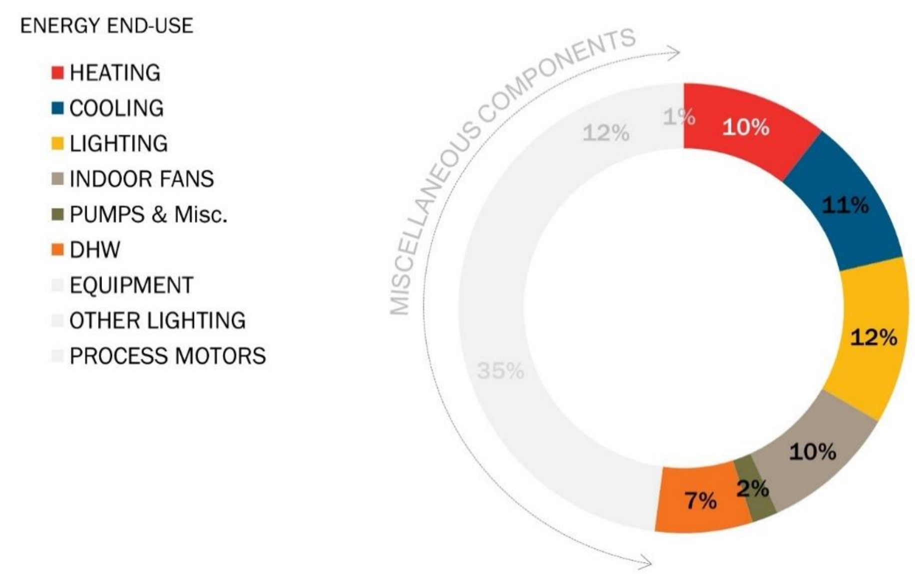



*Figure 4a - Proposed Design Energy Use TDV Characterization*

# ENVELOPE U-VALUE SENSITIVITY

## Envelope and Title 24 Compliance

As outlined in the previous page, there are several features in this project that result in challenges for Title 24 Part 6 compliance. This all-electric building results in a tighter Title 24 compliance margin since the proposed design is compared against a gas building. In addition, the current design has a WWR of 83%, which is much higher than the baseline of 40%. Finally, the residential portion of the building will be compared against a Title 24 Part 6 baseline building with solar hot water heating, and the full benefit of the high performance central plant is made difficult to capture by the state-required Title 24 compliance software CBECC-Com.

For these reasons, optimizing the façade design is critical to ensuring a clear and comfortable path to Title 24 part 6 energy compliance.

## Wall and Window Insulation Sensitivity

An envelope sensitivity analysis s was performed to understand the optimum performance targets. Figure 5 shows the results of the wall insulation (R-value) and window insulation (U-value) sensitivity analysis. The graph shows the percentage of the relative HVAC-only savings for the annual building energy consumption compared to the Proposed Design.

Increasing the wall insulation from the current design of R-15 has a negligible increase in savings. Increasing the glazing U-value beyond the current design of U-0.35, however, does have an increased benefit to the design. There is an inflection point in energy savings with a U-value of 0.3 to 0.25 that would provide an additional 1-2% in HVAC savings. While this presents a savings opportunity, a U-value of 0.25 represents a very expensive façade with triple element glazing, gas fills, and extremely thermally broken façade systems not common to the San Jose climate or market. The cost

## Window-to-Wall Ratio Sensitivity

Figure 6 shows the sensitivity of the window U-value for various window-to-wall ratios. The greatest opportunity for energy savings comes from reducing window-to-wall ratio, possibly up to 12%. Note that for all glass area options, there are diminishing returns as U-value increase, representing the balance guarding against heat loss in the winter without over insulating in the summer.

Maintaining a high WWR of 83% means that a very high performance glazing (U-0.15 to 0.20) must be selected to help offset energy use, and this expensive scenario will still make Title 24 compliance unlikely.

Atelier Ten recommends achieving at least 6% savings to ensure Title 24 compliance and optimize performance. This results in a target WWR of at least 60%.

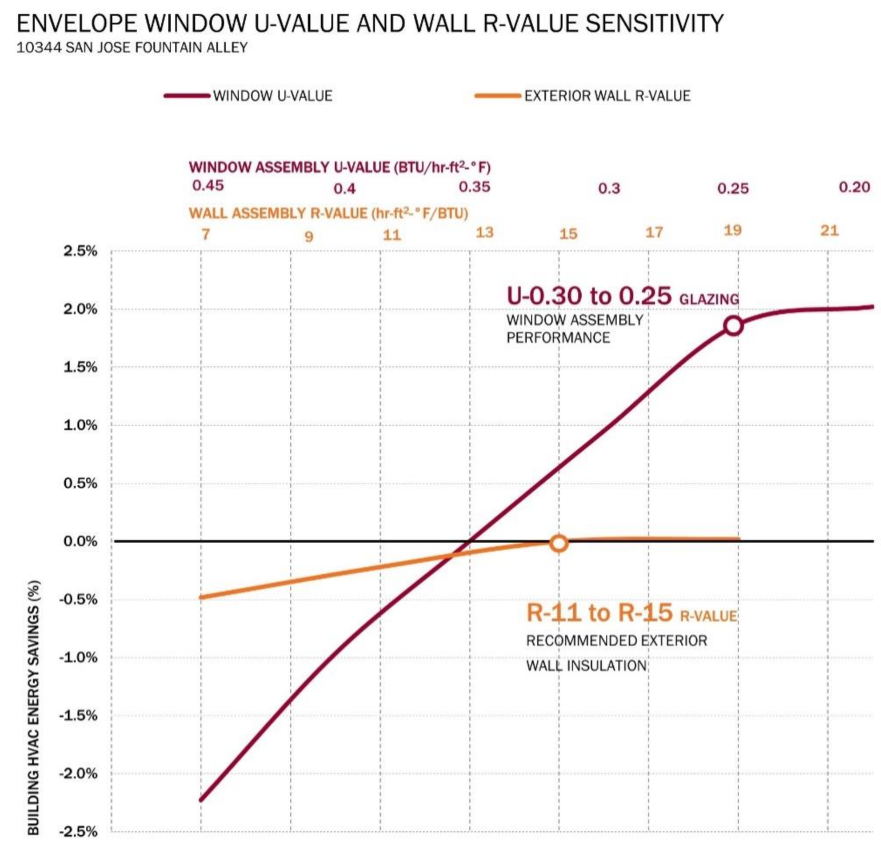



*Figure 5 – Envelope U-value and R-value Sensitivity*

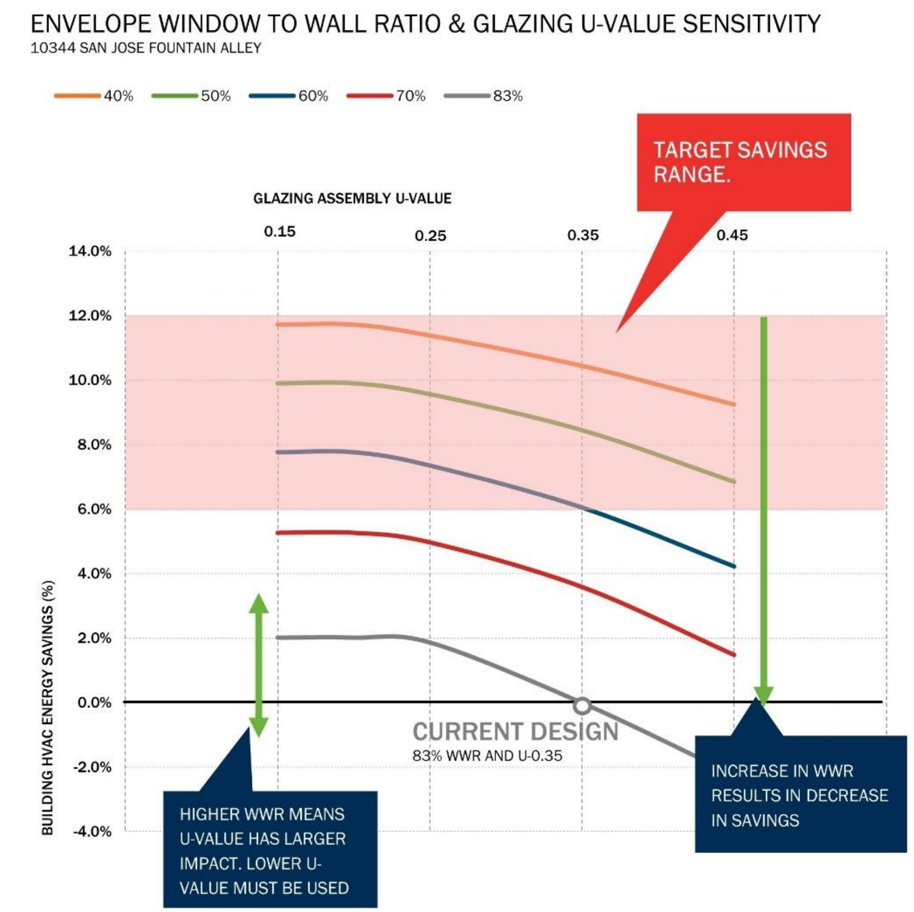



*Figure 6 – WWR and U-Value Sensitivities*

## CENTRAL PLANT

The Fountain Alley project includes an advanced, high-efficiency central plant which provides the heating and cooling for the site. A good central plant is more than efficient equipment lined up together. A great central plant finds opportunities to turn waste into benefits, and saves rejected heating and cooling to use later. Imagine collecting the heat that comes from the back of a kitchen refrigerator, saving it, and using it to warm a living room later at night.

The central principle of the Fountain Alley plant is energy storage. The daily temperature swing in San Jose often results in morning warm-up heating switching to cooling in the afternoon. This happens throughout most of the year, leading to a central thermal energy storage (TES) tank for use as a heat sink throughout the day. This scheme is inspired by a geothermal system, but adapted for cost and San Jose climate applicability.

A traditional geothermal system uses deep bore holes to ground couple pipes with the earth to reject heat into the ground in warm months for use later in the year in cold months. This results in a complex and expensive system, reliant on balanced heating and cooling loads annually. These systems are better suited for more extreme climates. Instead of storing energy for an entire year, the Fountain Alley plant stores energy in the TES tank for a single day.

The plant includes a heat recovery chiller, which is sized based on the peak heating load and is designed to meet the heating load of the building. The plant takes heat rejected from cooling loads via high efficiency, low lift, centrifugal chillers and stores it in a TES tank at tepid temperatures between 60°F and 80°F. When energy is then needed for building heating, heat is extracted from the tank using water-to-water heat recovery chillers. In effect, the cooling chillers and heat recovery chillers are placed in a cascade configuration: the cooling chillers have a lift envelope of 40°F CHWST to 80°F CWRT, while the heat recovery chillers have a lift envelope of 60°F CWST to the active hot water supply temperature setpoint (e.g. 125°F).

The Coefficient of Performance (COP) describes how many units of input energy the plant needs to move x-many units of heating or cooling energy into the building. This design results in annual heating and cooling COPs of:

- ANNUAL HEATING COP: 3.5
- ANNUAL COOLING COP: 11

For every 1 watt of electricity put into the plant, it delivers 3.5 watts of heating energy into the building, or 11 watts of cooling energy. This extremely efficient plant dramatically reduces the overall energy consumption of the project. This all-electric plant will also interconnect with the air source heat pumps planned for the adjacent Bank of Ital project, connecting both projects into one efficient plant.

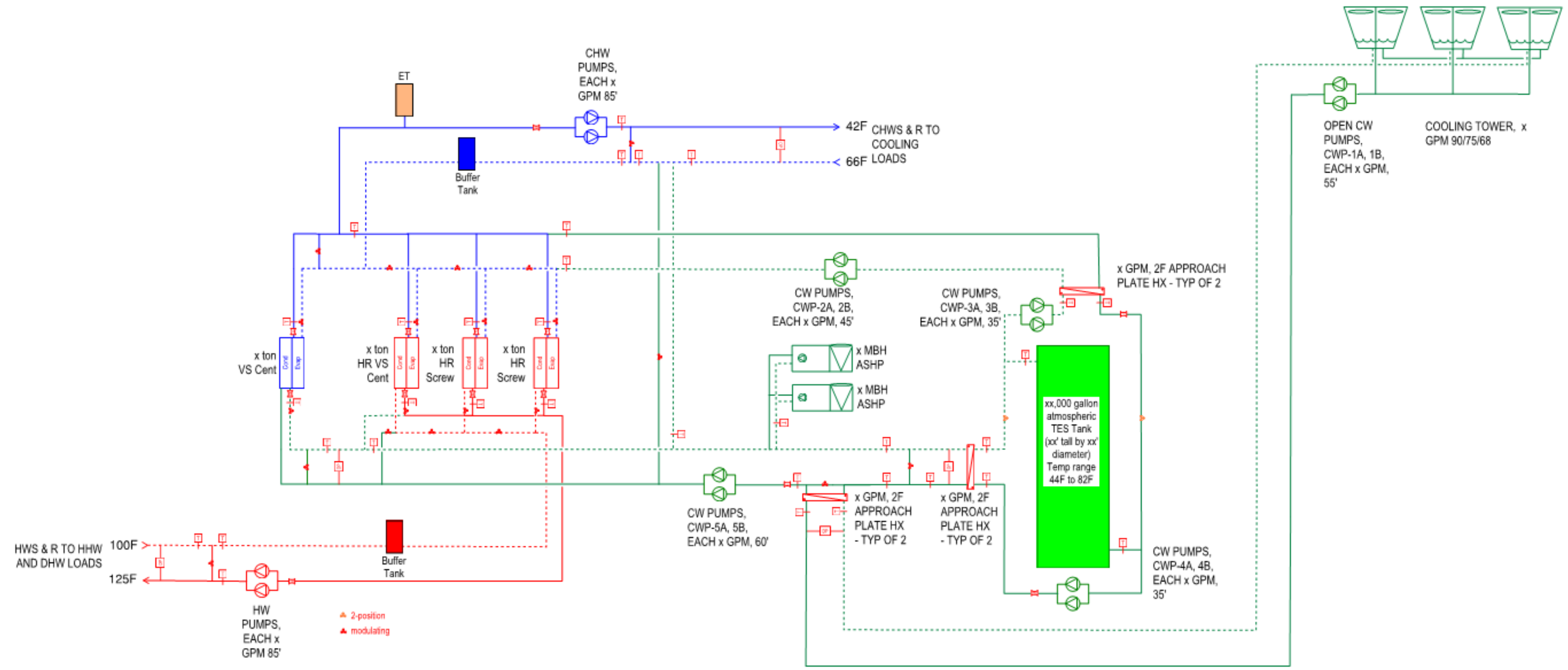



*Figure 7 – Central Plant Schematic from Taylor Engineering*

## SUMMARY OF WHOLE BUILDING MODEL RESULTS

This analysis is based on the 50% Schematic Design (SD) progress set dated July 24th, 2020, design narrative and conversations with the design team. The report begins with the discussion of additional energy efficiency measures studied in this analysis. The report concludes with recommendations, next steps for the design team, and an appendix with the energy model assumptions.

Atelier Ten evaluated several energy efficiencies measures and HVAC alternatives to help reduce the project's energy use further.

Figure 8 on the following page shows the annual energy consumption comparison for the various envelope and internal load measures tested in this analysis. All measures are tested individually against the Proposed Design.

### Lighting Measures:

EEM1 LPD Reduction Plan for Common Spaces: This energy efficiency measure tests a 20% reduction in lighting power density (LPD) compared to Title 24-2019 requirement for common spaces. This measure helps increase the annual energy savings by 1% compared to the Proposed Design. The core and shell model is limited to public spaces only which makes the impact of this measure on overall energy use savings subtle.

EEM2 LPD Reduction Plan for Residential Apartments: In this measure, the lighting power density for the residential apartments is reduced by 20% to 0.4 W/ft$^2$. This measure helps increase the annual energy by 1% compared to the Proposed Design. Overall, with this measure the Proposed Design achieves an EUI of 33.7 kBTU/sq.ft./yr.

### Office Space Equipment Measures:

EEM3: Office Plug Load Management: This measure tests the plug load with smart load sensing control and its energy saving potential. This measure assumes a EPD of 1 W/sq.ft. for office spaces (compared to 1.5W/sq.ft. in the Proposed Design) through automatic plug loads controls such as occupancy/vacancy sensors for non-critical plug loads, scheduled timer controls, or a majority laptop+1 external monitor per workstation environment. This measure helps increase the annual energy by 6% compared to the Proposed Design. With this measure the Proposed Design achieves an EUI of 31.9 kBTU/sq.ft./yr. Atelier Ten will work through the DD phase to identify design applications that can maximize the potential for tenants to reduce their plug loads, such as dedicated green circuits and vacancy sensors. This measure is strongly linked to tenant behavior.

### Residential Space Equipment / Internal Load Measures:

EEM4 Energy Star rated appliances for residential units: The total equipment loads were calculated using the Energy Star MFHR calculator v1.5. The equipment include refrigerator, dishwasher, electric resistance stovetop, washer and dryer. This measure increases the annual energy use savings by 1% and helps the Proposed Design achieve an EUI of 33.7 kBTU/sq.ft/yr. As seen in the Energy Use characterization graph, the residential apartments equipment loads is a major energy driver for this building. This measure is recommended to be vetted out with the design team and ownership, as it will help reduce the equipment end energy use.

EEM5 Apartment Unit Master Switches: The residential apartment master switches are tested to have key-card control which will turn OFF the lights, set back thermostat to unoccupied mode and turn down the ventilation. In order to account for the energy savings from the residential unit master switches, the following schedule changes were made:

- 10 % reduction in lighting utilization from 10 am – 6 pm
- 10% reduction in equipment utilization from 9 am – 6 pm
- Ventilation requirement to 48% from 100% from 10 am to 6 pm
- Cooling setpoint to 81 F from 75 F during unoccupied hours
- Heating setpoint to 66 F from 70 F during unoccupied hours

This measure results in 5% HVAC energy savings and an EUI of 33.3 kBTU/sq.ft/yr.

EEM6: Energy Star rated efficient heat pump dryers: Overall reduction of 61% in annual energy consumption of dryer energy can be achieved by using electric heat pump technology compared to conventional electric energy star dryer. Use of Heat Pump technology for in-unit dryers along with the energy star rated appliances for residential units (EEM1) results in additional 2% energy savings and reduced the Proposed Design EUI to 33.4 kBTU/sq.ft./yr.

EEM7: Induction Stove vs Electric Resistance: Studies showing energy use savings from using induction cooktop technology compared to a conventional electric resistance stovetop suggest 18% reduction in annual energy consumption for residential cooktop. This reduction in energy consumption by residential stovetop has been tested as an energy efficiency measure over the Proposed Design. Along with 0.39 % energy savings, using induction cooktop provides benefits in terms of reduced exhaust air flow, faster heat transfer to the food, precise temperature adjustments and thermal comfort.

### Cumulative Measures:

Cumulative Energy Efficiency Measure: This measure includes all load measures listed above (lighting and equipment). It yields in 14% overall energy savings.

Cumulative EEM + Maximum PV Potential: This project has a maximum PV potential of 2,256 MWh, with the façade and roof area combined. With maximum PV potential, the combined energy efficiency measure achieves 45% annual energy use savings.

Cumulative EEM + Moderate PV Potential: The combined EEM design case results in 29% annual energy use savings by utilizing moderate PV potential i.e. 1,128 MWh (this comprises of the roof area, primarily).

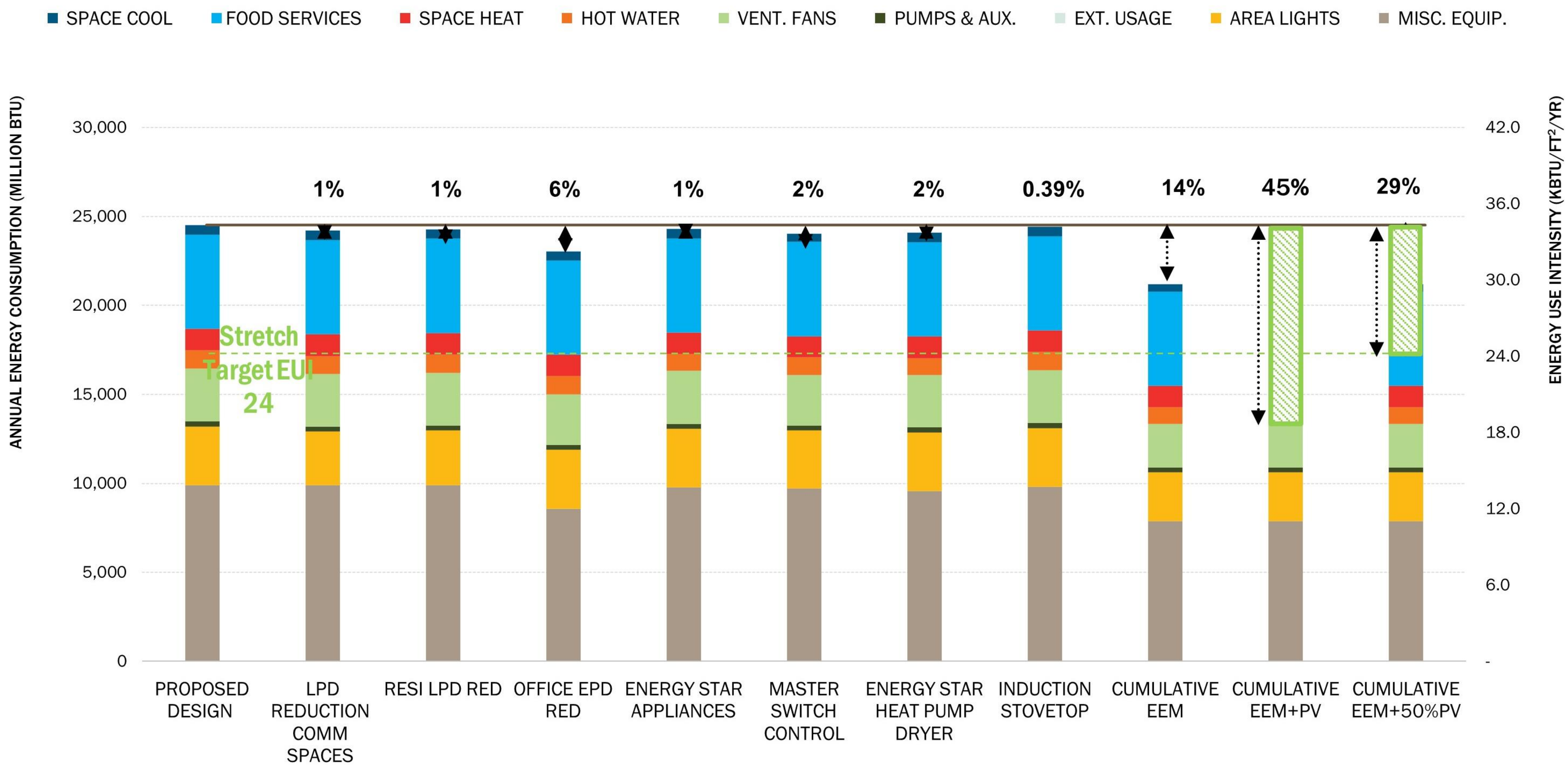



*Figure 8 – Annual Energy Consumption of Fountain Alley, Proposed Design, Energy Efficiency Measures, and Cumulative Scenarios*

### Office HVAC Measures and Alternatives:

EEM8: Residential unit ceiling fans: This measure assumes that ceiling fans will be designed and installed in all the bedrooms and living rooms in the residential apartments. Natural ventilation will take place when outdoor air is suitable for indoor thermal comfort. To account for the thermal comfort benefit due to the elevated air speed, the cooling temperature setpoint is assumed to be 80°F compare to 75 °F in the Proposed Design. This measure provides adaptive thermal comfort to the occupants and is recommended to combine with natural ventilation for higher energy savings.

HVAC ALT-1: Fan Coil Units with DOAS for the office spaces: This alternative replaces the UFAD system for the offices with a central Dedicated Outside Air System (DOAS) supplying ventilation air and combined with zone level fan coil units (FCUs) for space conditioning. This alternative could benefit from minimizing the reheat energy for heating but lose the "free cooling" from the economizer mode during the cooling season. This measure also shows a penalty associated with fan energy because of the higher load operation of the central DOAS unit. The main advantages of this strategy are reduced shaft area requirements and the ability to have localized filtration in the FCUs. Possible increases in operational and maintenance costs could be a limitation. This alternative brings the EUI to 34.1 kBTU/sq.ft./yr.

HVAC ALT-2 Radiant Heating and Cooling with DOAS for the office spaces: This alternative is similar to ALT-1 but the FCUs are replaced by radiant heating and cooling panels to provide zone level conditioning. This measure results in lower fan energy consumption and helps reduce the building's EUI to 33.2 kBTU/sq.ft./yr. However, it imposes challenges related to tenant integration.

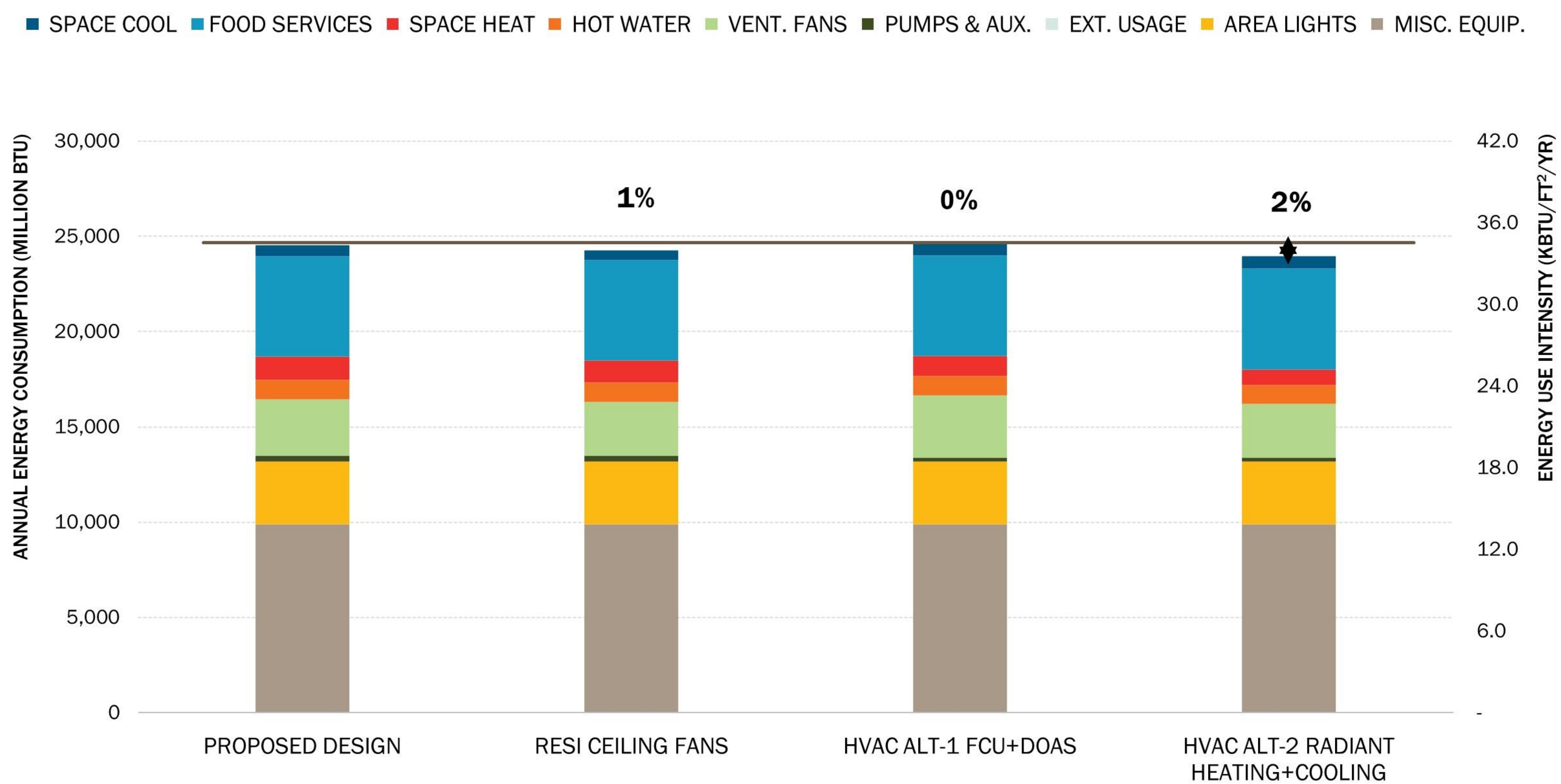



*Figure 9 - Annual Energy Consumption of Fountain Alley, Proposed Design and HVAC Alternatives*

## EUI BENCHMARKING

Assuming a typical tech tenant for the office portion of the building, Fountain Alley has modeled an EUI on par with some of the highest performing ZNE tech office buildings in Silicon Valley.

This comparison shows relative to existing typical office buildings in San Jose, and typical new tech office buildings common to Silicon Valley.

The addition of potential PV to the building can further push the EUI of the project to very low levels. Moderate PV represents the potential contribution from rooftop PV on Fountain Alley, and Aggressive PV represents the building EUI if both rooftop and façade integrated PV are deployed.

The ZNE LinkedIn building shown on the chart is located in Sunnyvale, and published it's EUI of 30 in High Performance Buildings Magazine.

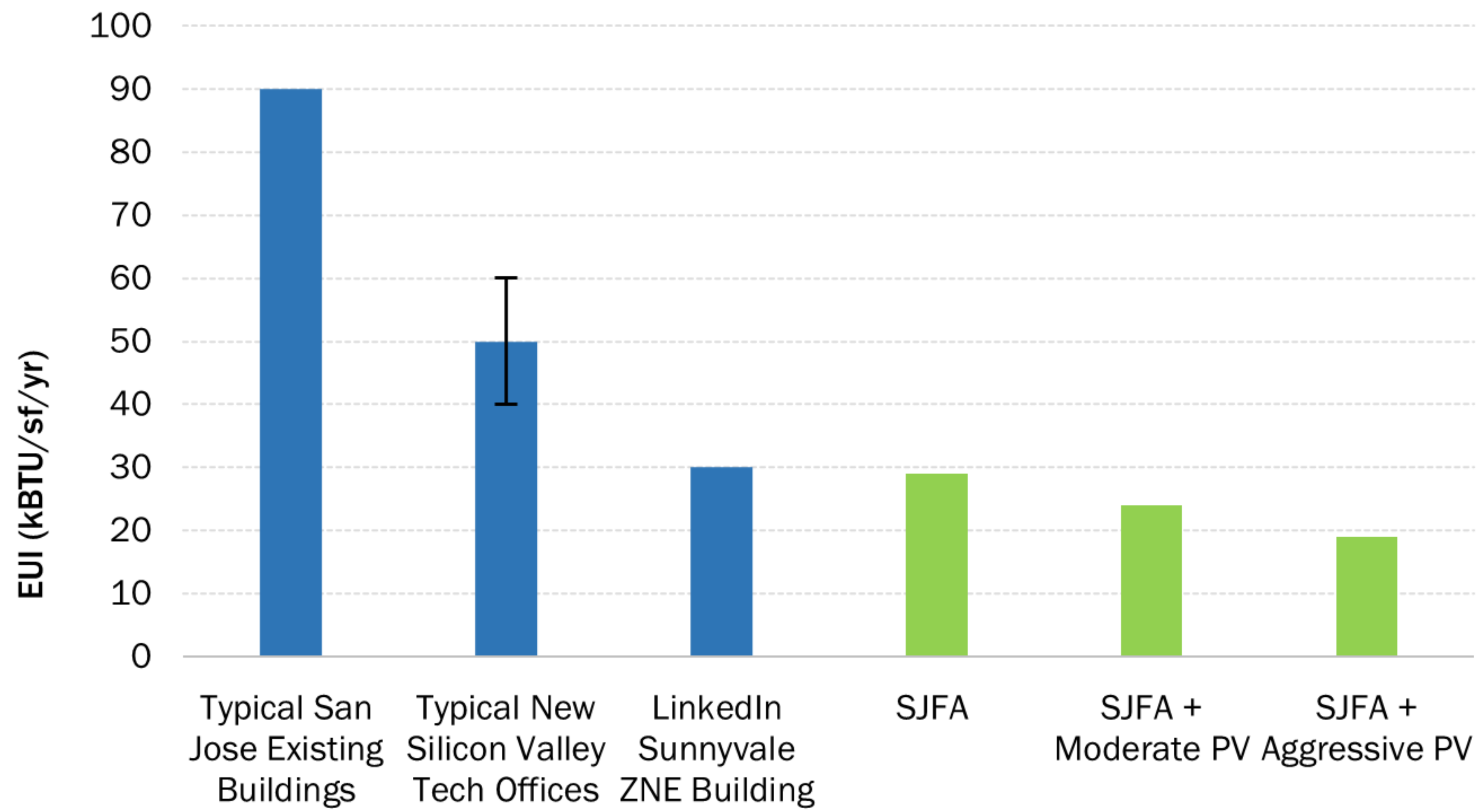



*Figure 10 – EUI Comparisons*

## MARGINAL CARBON EMISSIONS

Atelier Ten evaluates building performance relative to the marginal carbon emissions of an electricity grid to properly capture the real carbon impact of a new building on a specific grid. Adding demand to a power grid at a specific place and time changes the load on the power plants that produce electricity at that moment, otherwise known as the marginal power plant(s). The specific properties of the marginal power plant(s), including efficiency and fuel type, determine the magnitude of the emissions of that plant. Because marginal plants vary greatly by both time and location, changing demand on the electric grid has significantly different reductions in emissions depending on the siting and timing of the change in demand.

Because of this reality, Atelier Ten uses the marginal emissions rate to define building performance and assess design strategies. The annual marginal carbon emissions of the California grid reveal the unique patterns of statewide energy demands and the available power sources ultimately feeding the Fountain Alley site in San Jose.

California Independent System Operator (CAISO) is the state entity tasked with managing the state electrical grid, and determines which power plants are brought online, and when, to meet the daily demand on the state grid. The grid decisions made by CAISO directly impact the greenhouse gas emissions released by the state building stock every day.

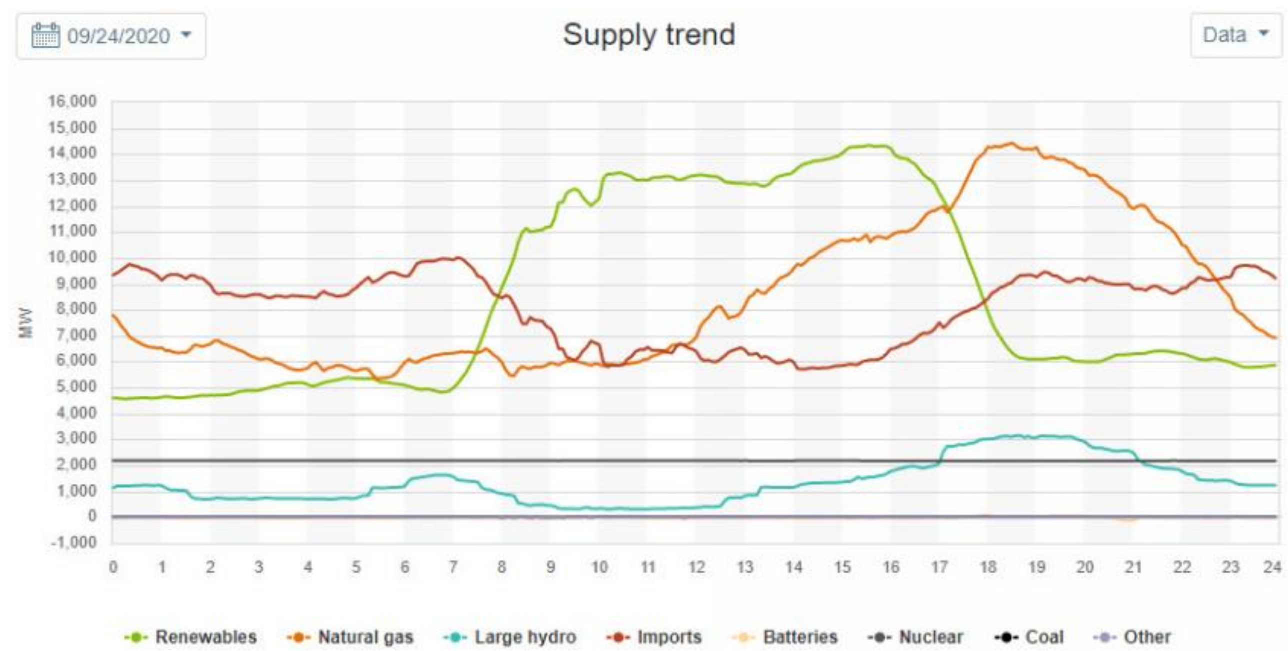



*Figure 11 - Example of CAISO energy grid mix for a September day*


*Figure 12 - Example of CAISO $CO_2$ emissions for the same September day*

## MARGINAL CARBON EMISSIONS

The annual marginal carbon emissions of the California grid reveal the unique patterns of statewide energy demands and the available power sources ultimately feeding Fountain Alley in San Jose.

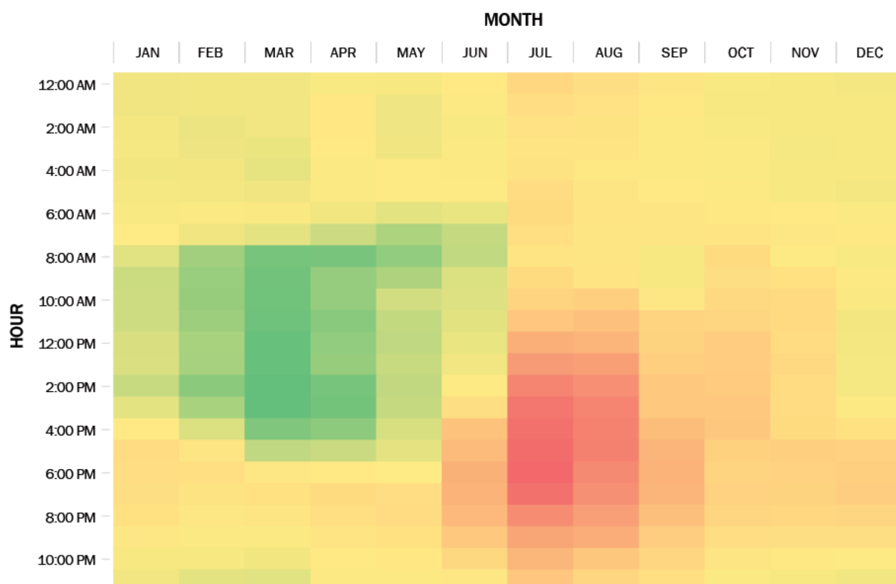



*Figure 13 - Annual Marginal Greenhouse Gas Emissions Profile for CAISO, Relative CO2lbs/kWh electricity*

The grid is most clean at midday in the springtime when the Sierra snowcap has begun to melt and substantial hydro resources compliment wind and solar plants. Peak emissions occur in the late summer afternoon hours, when supplemental natural gas plants are required to meet statewide demand for cooling.

Our ultimate performance goal is to reduce Fountain Alley's real CO2 emissions. For the new load it will be on the grid, we are clear eyed on which power plants will turn on, when they turn on, and what fuel source will be used or avoided though our design.

On-site PV on the rooftop and façade of Fountain Alley offers immediate access to carbon free electricity for the building, and provides a substantial benefit even if only a portion of the annual energy use is offset on-site. There is an elegance in on-site PV that its seasonal peak production capacity aligns with the seasonal peak emissions profile of the electricity grid that it will offset.

If considered without on-site PV, the emissions profile for Fountain Alley mirrors the profile of the CAISO grid, and is further influenced by the occupancy schedule given the combined residential and commercial uses.

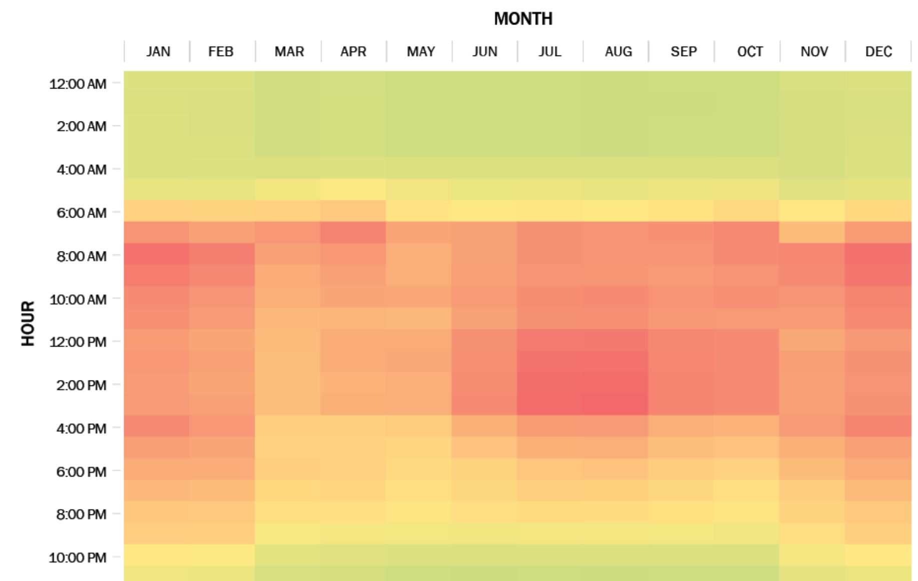



*Figure 14 - Annual Marginal Greenhouse Gas Emissions Profile for Fountain Alley, without on-site PV. Relative CO2lbs/kWh electricity*

Once 100% emissions-free on-site PV provides electricity to the building, the emissions profile over the year change dramatically. The on-site PV can produce electricity during some of the most dirty seasons of the electricity grid.

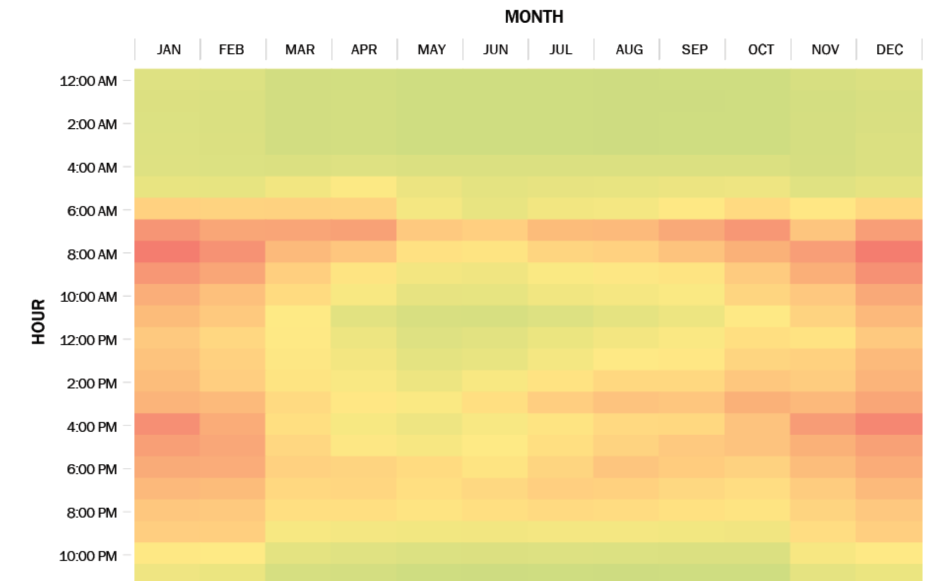



*Figure 15 -Annual Marginal Greenhouse Gas Emissions Profile for Fountain Alley, with Moderate PV array. Relative CO2lbs/kWh electricity*

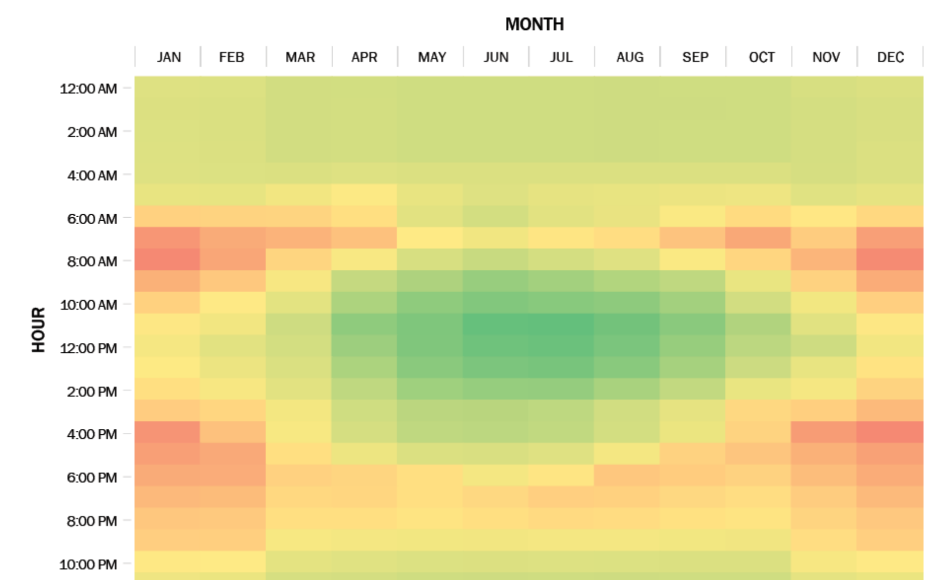



*Figure 16 - Annual Marginal Greenhouse Gas Emissions Profile for Fountain Alley, with Maximum PV array. Relative CO2lbs/kWh electricity*

## MARGINAL CARBON EMISSIONS

Reducing energy consumption is only part of the story toward optimizing the performance of Fountain Alley. Hourly grid emissions data help reveal the true performance benefits of different design strategies.

| Annual CO2 Emissions | % Emissions Reduction | % Energy Reduction | EUI kBTU/sf/yr |
|---|---|---|---|
| **Proposed Design:**<br>**2,150 metric tons/year**<br>(~467 passenger cars on the road for one year) | - | - | 34 |
| **Proposed Design with Bundle of Efficiency Measures**<br>**1,777 metric tons/year**<br>(~386 passenger cars on the road for one year) | 17% | 15% | 29 |
| **Cumulative Efficiency Measures with Moderate PV**<br>**1,347 metric tons/year**<br>(~293 passenger cars on the road for one year) | 37% | 29% | 24 |
| **Cumulative Efficiency Measures with Maximum PV**<br>**917 metric tons/year**<br>(~200 passenger cars on the road for one year) | 57% | 44% | 19 |

THE RELATIVE EMISSIONS REDUCTIONS ARE EVEN BETTER THAN THE ENERGY REDUCTIONS BECAUSE OF WHEN THE PV CAN OFFSET GRID DEPENDENCE

## CONCLUSION

Atelier Ten conducted a whole building energy analysis for Fountain Alley at 100% Schematic Design (SD). Eight individual energy efficiency measures, three scenarios (with maximum and moderate PV potential) of cumulative cases and two alternative designs were studied to discover the path to the desired energy performance targets. With the energy efficiency measures incorporated in the Proposed Design along with maximum PV, the project can achieve the low EUI that helps to meet both the required and stretch goals for energy performance across all Westbank projects. All efficiency measures currently in the design should be incorporated into the Design Development documentation.

Atelier Ten recommends that all additional energy efficiency measures and design alternatives discussed in this report, should continue being studied in DD along with detailed life cycle cost assessments to validate design decisions.

## NEXT STEPS

- Atelier Ten requests that the design team review the energy analysis results, recommendations and energy model assumptions
- Atelier Ten will continue to coordinate with Taylor Engineering to refine the estimate of central plant efficiencies
- Atelier Ten will coordinate with the owner to access the utility rate structure applicable to this building and update the energy analysis provide a refined annual utility cost estimate
- Atelier Ten will continue to investigate additional energy efficiency measures that can help achieve the stretch EUI target of 24kBTU/sq.ft./yr
- Atelier Ten will refine the potential of on-site PV as the façade design progresses
- Atelier Ten will continue to work with the design team to achieve Title 24 compliance

## ENVIRONMENTAL CONSIDERATIONS IN DOWNTOWN SAN JOSE

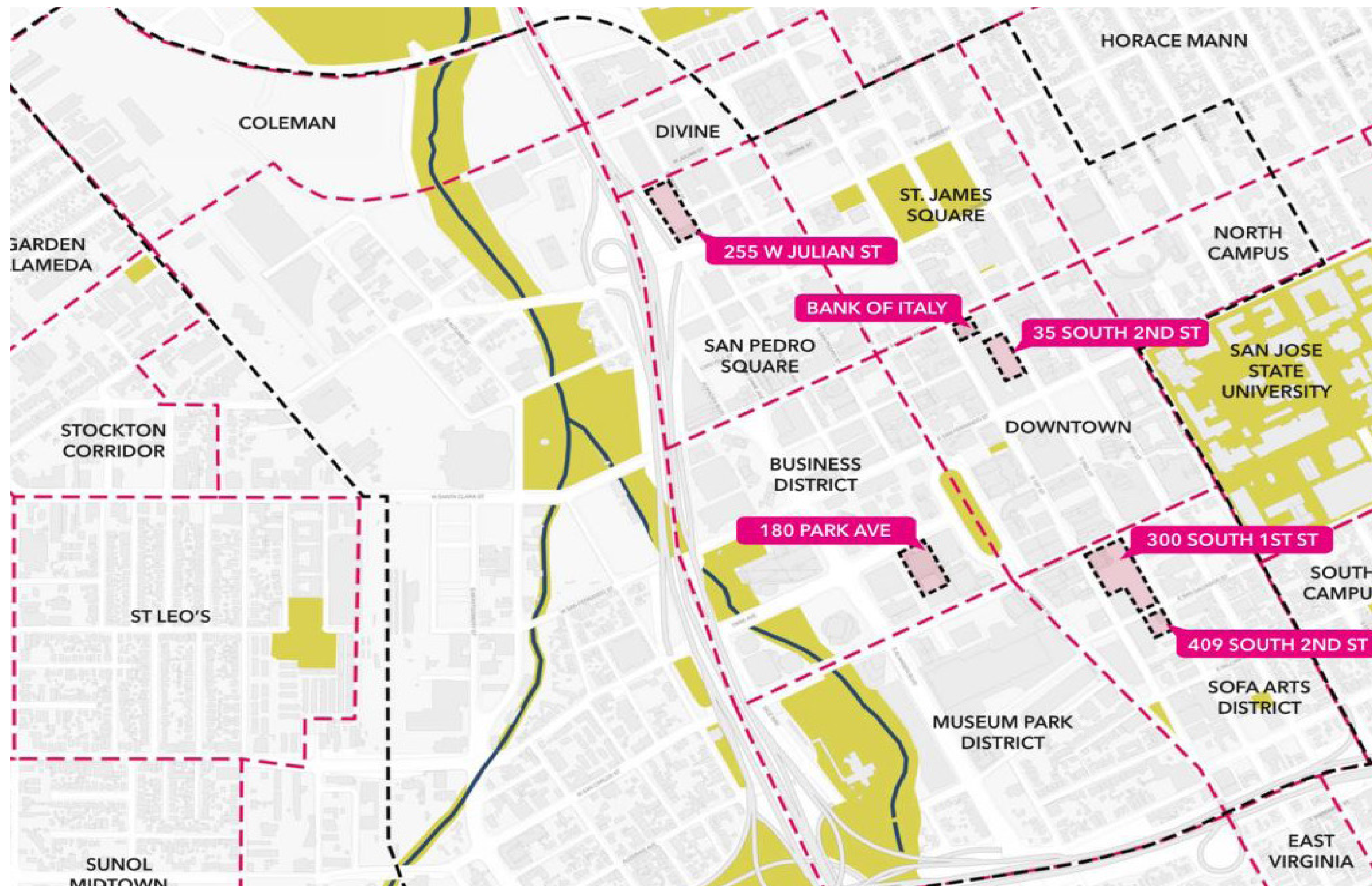
# OVERVIEW

Atelier Ten compiled this report to present air quality and noise considerations to inform natural ventilation systems. Proximity to the San Jose Airport, Highway 87, and major roads is a major contributor to the environmental considerations of each project. Ambient outdoor noise and seasonal wildfires should also inform the design and programming of the Westbank projects.

**Key Findings**

- With the exception of wildfire events, San Jose has great air quality. Operable windows and natural ventilation should be incorporated on Fountain Alley.
- The Fountain Alley facade design should plan for smoke events related to regional wildfires, and consider local air quality sensing to override operable windows in the event of very bad air quality.

  Air filters, outdoor buffers, and green infrastructure should be used to mitigate street-level air and noise pollution.




Recommendations are based on industry best practices and public health research, as Atelier Ten is not a public health expert or acoustic design consultant.

## AIR QUALITY INDEX (AQI)

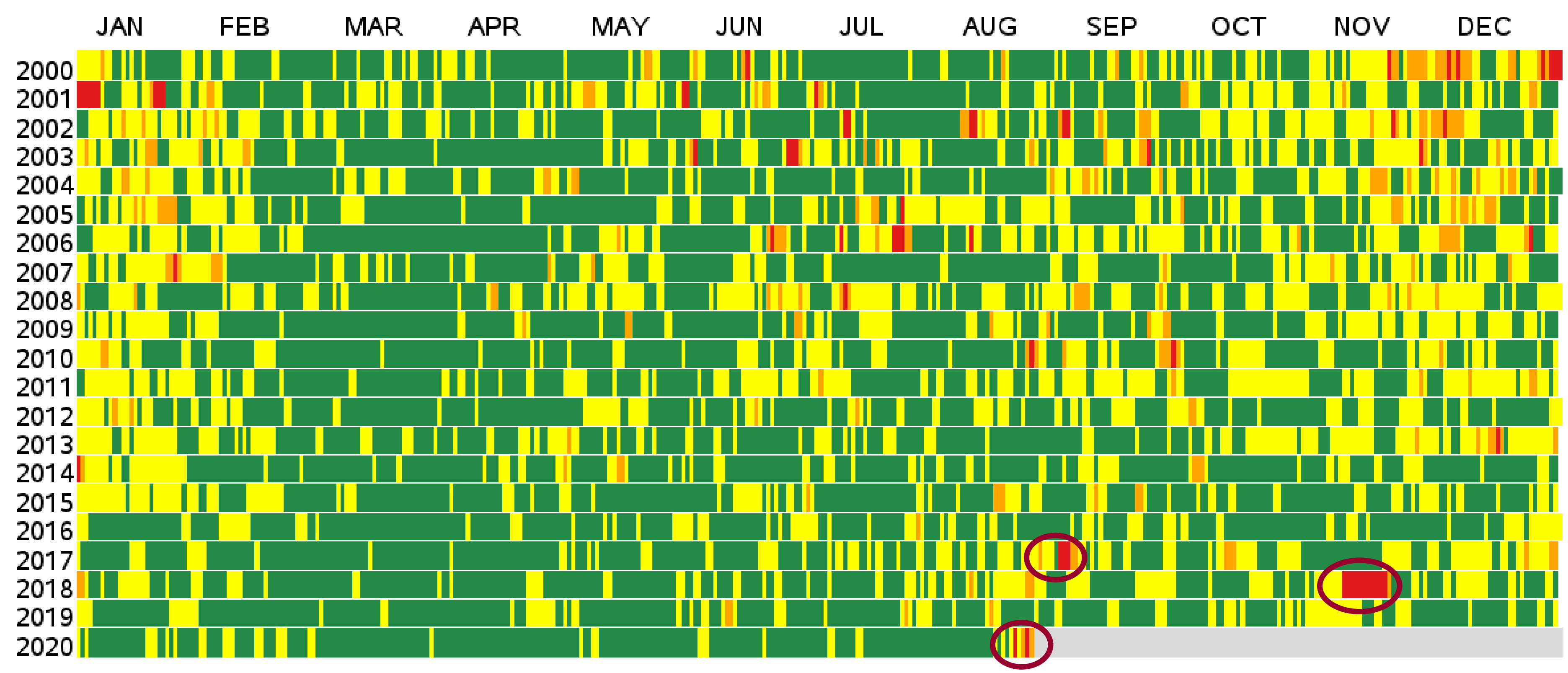
The Air Quality Index (AQI) represents overall air quality on a scale of 0-500. AQI is a combined measurement of five major air pollutants, each regulated by the Clean Air Act:

- Ground-level Ozone (O3)
- Particle Pollution (PM2.5 and PM10)
- Carbon Monoxide (CO)
- Sulfur Dioxide (SO)
- Nitrogen Dioxide (NO2)

The US EPA established AQI to communicate daily air quality and minimize exposure to unhealthy environmental conditions. AQI is communicated through color-coded categories.

| 0 - 50 | 51 - 100 | 101 - 150 | 151 - 200 | 201 - 300 | 301 - 500 |
|---|---|---|---|---|---|
| Good | Moderate | Unhealthy for Sensitive Groups | Unhealthy | Very Unhealthy | Hazardous |

This graph illustrates the daily AQI for Santa Clara County between 2000-2020. Santa Clara County, including San Jose, has "Good" or "Moderate" air quality almost every day of the year. In general, people in San Jose and their activities are not affected by air quality concerns.




For the majority of the year, San Jose has "Good" or "Moderate" air quality days. Projects should incorporate operable windows, direct outdoor air supply, as well as maximize use of outdoor space, where available.

In the fall, San Jose and Northern California are impacted by regional wildfires. Smoke increases particle pollution and creating unhealthy outdoor conditions. During these smoke events, projects should minimize intake of outdoor air and ensure occupants have healthy indoor air.

Daily Air Quality Index for Santa Clara County (200-2020), EPA AirData, <http://www.epa.gov/air-data>

## AIR QUALITY INDEX (AQI)

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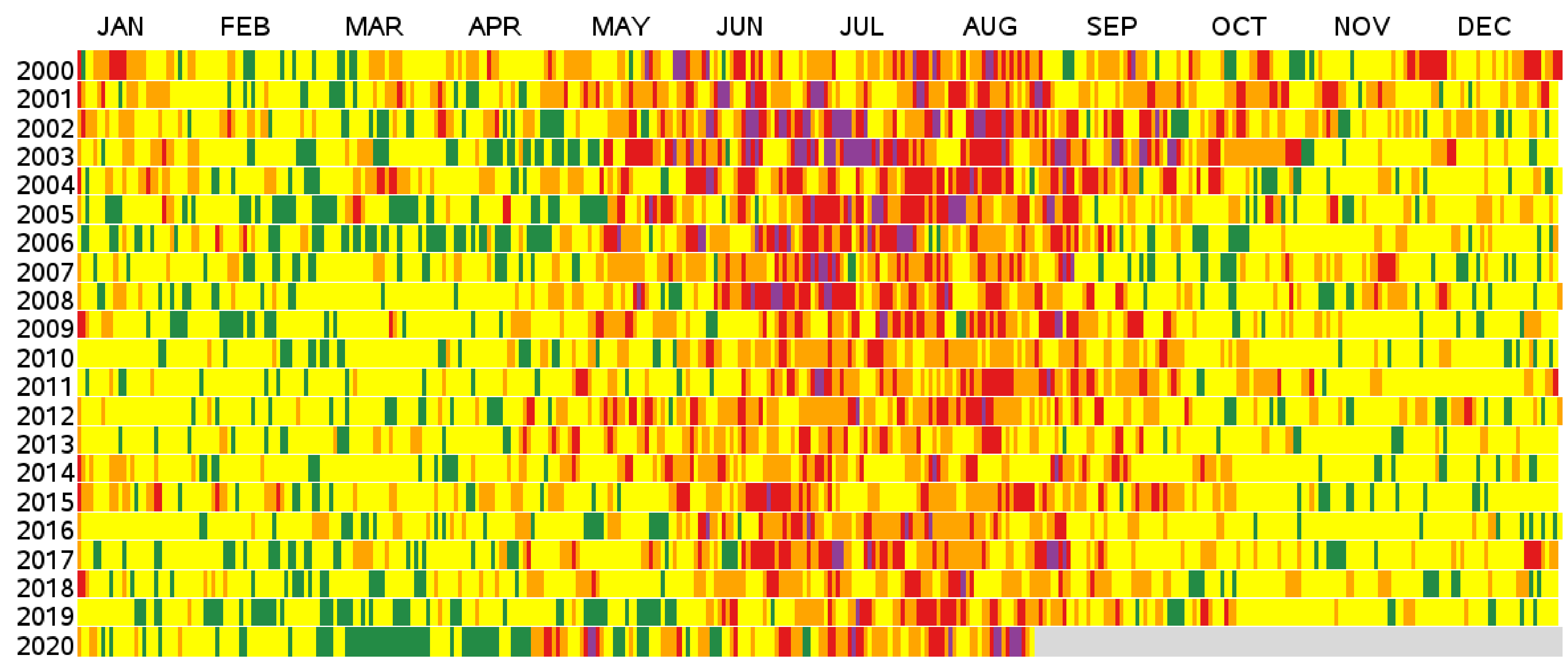
The US EPA established AQI to communicate daily air quality and minimize exposure to unhealthy environmental conditions. AQI is communicated through color-coded categories.


**For reference**, this graph illustrates the daily AQI for **Los Angeles County** between 2000-2020. Daily activities are regularly affected by poor air quality, especially between May and September.




The AQI for Los Angeles is shown to provide context for the natural ventilation opportunities unique to the San Jose climate.

Daily Air Quality Index for Los Angeles County (200-2020), EPA AirData, <http://www.epa.gov/air-data>

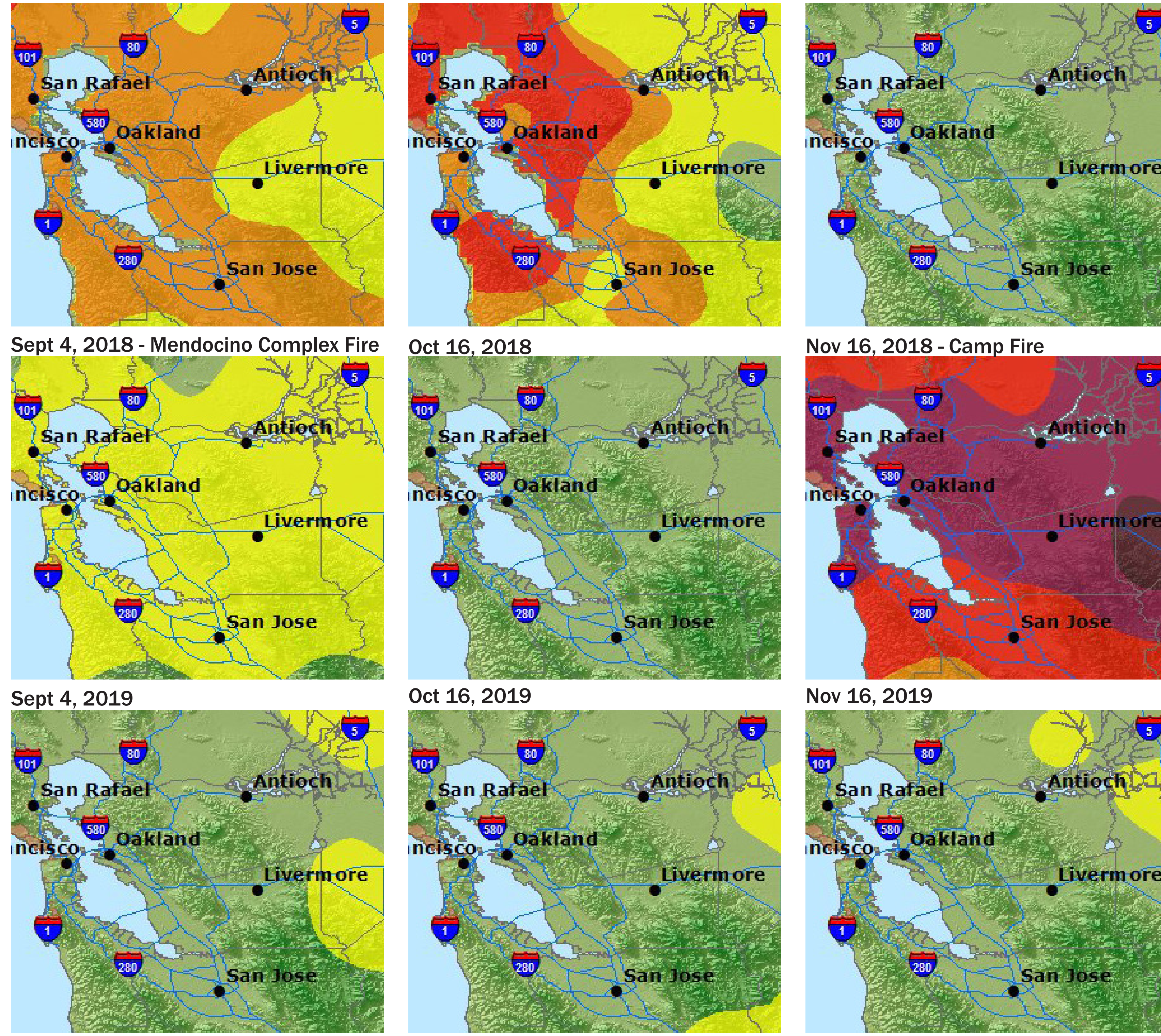
## REGIONAL WILDFIRES

The Air Quality Index (AQI) shows that San Jose has good air quality for the majority of the year. However with the increasing frequency and intensity of wildfires throughout California, these projects will likely be impacted by smoke and particulate matter during some autumn days.

The maps to the right show San Jose's worst air quality during recent wildfires and corresponding days in different years. Average autumn days have Good or Moderate air quality. Regional wildfires negatively impact air quality and increase particulate matter pollutants.

| 0 - 50 | 51 - 100 | 101 - 150 | 151 - 200 | 201 - 300 | 301 - 500 |
|---|---|---|---|---|---|
| Good | Moderate | Unhealthy for Sensitive Groups | Unhealthy | Very Unhealthy | Hazardous |

During wildfire events, the San Jose projects should provide occupants with healthy indoor air quality. **Building-envelope commissioning** should be considered to minimizing pollutant infiltration during a smoke event. As part of regular operations, the projects should consider **indoor air quality testing** and regular **replacement of HVAC filters.**




Sept 4, 2018 - Mendocino Complex Fire

Oct 16, 2018

Nov 16, 2018 - Camp Fire

Sept 4, 2019

Oct 16, 2019

Nov 16, 2019

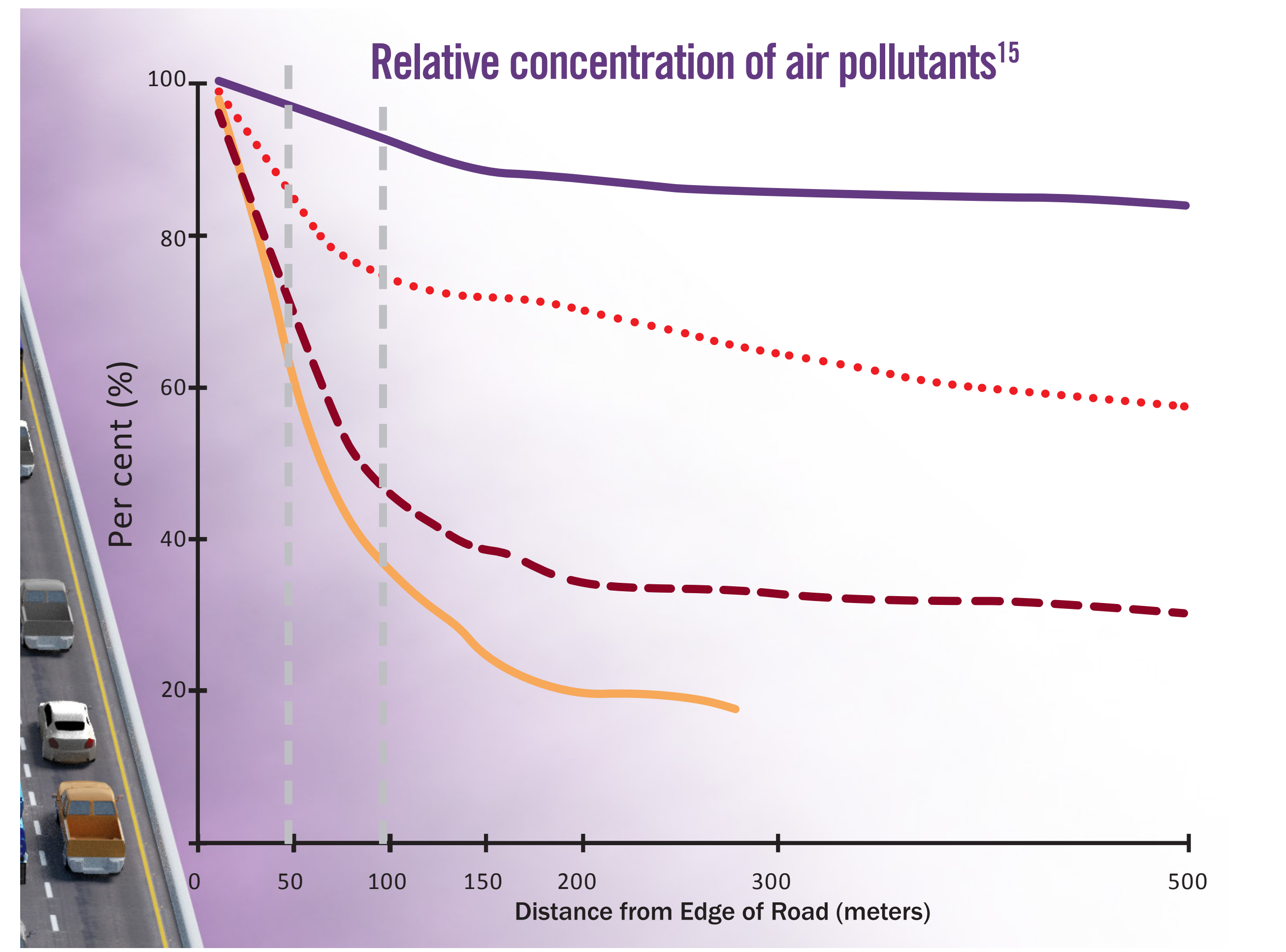
Maps from AirNow, EPA's Air Quality Index.

The Air Quality Index (AQI) shows that San Jose has good air quality for the majority of the year. However, proximity to heavily trafficked road directly impacts air quality at the project site.

Fountain Alley should **incorporate vegetated buffer zones** or "green infrastructure" to trap pollutants and minimize infiltration indoors.


1. 255 West Julian
2. Bank of Italy
3. Fountain Alley
4. Park Habitat
5. 300 South 1st Street
6. 409 South 2nd Street

50m from Heavy Traffic
100m from Heavy Traffic
Highway or Freeway
Major Roadway




PM2.5
Nitrous Dioxide
Nitrous Oxide
Ultrafine Particles

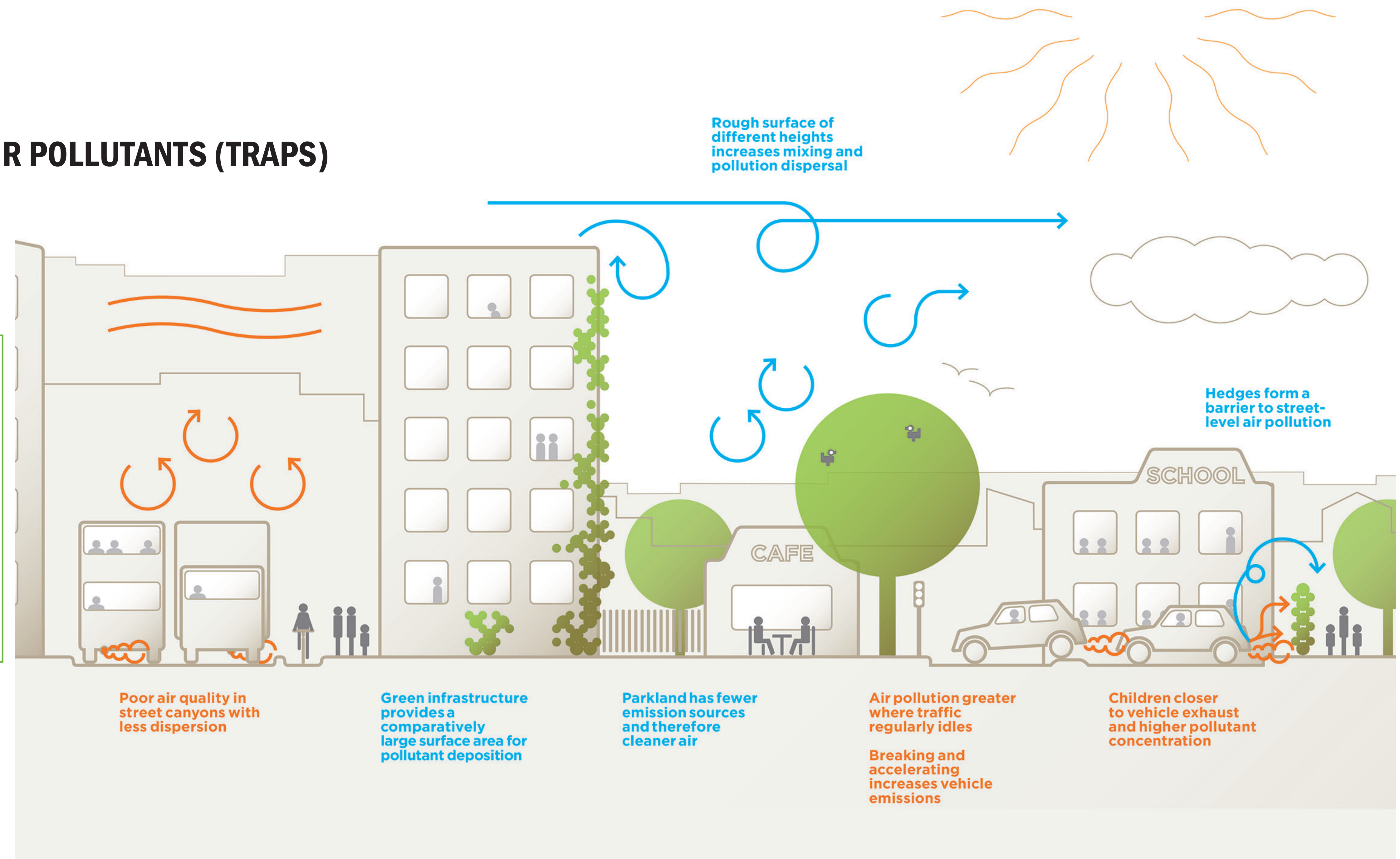
Ontario Public Health, Traffic Related Air Pollution: Avoiding the TRAP Zone, 2016.

# TRANSPORTATION-RELATED AIR POLLUTANTS (TRAPS)

Green infrastructure, like trees, green walls, and shrubs, provide a large amount of surface area to collect airborne pollutants from vehicle exhaust.

Fountain Alley should consider **vegetated buffer zones** to trap transportation-related air pollutants at street level. Especially at outdoor seating and recreational space, vegetation will help limit exposure to TRAPs.

Operational policies should **restrict idling**, especially in rideshare pickup and drop-off zones.




"Planning Healthy Places: A Guidebook for Addressing Local

**ENVIRONMENTAL CONSIDERATIONS IN DOWNTOWN SAN JOSE**

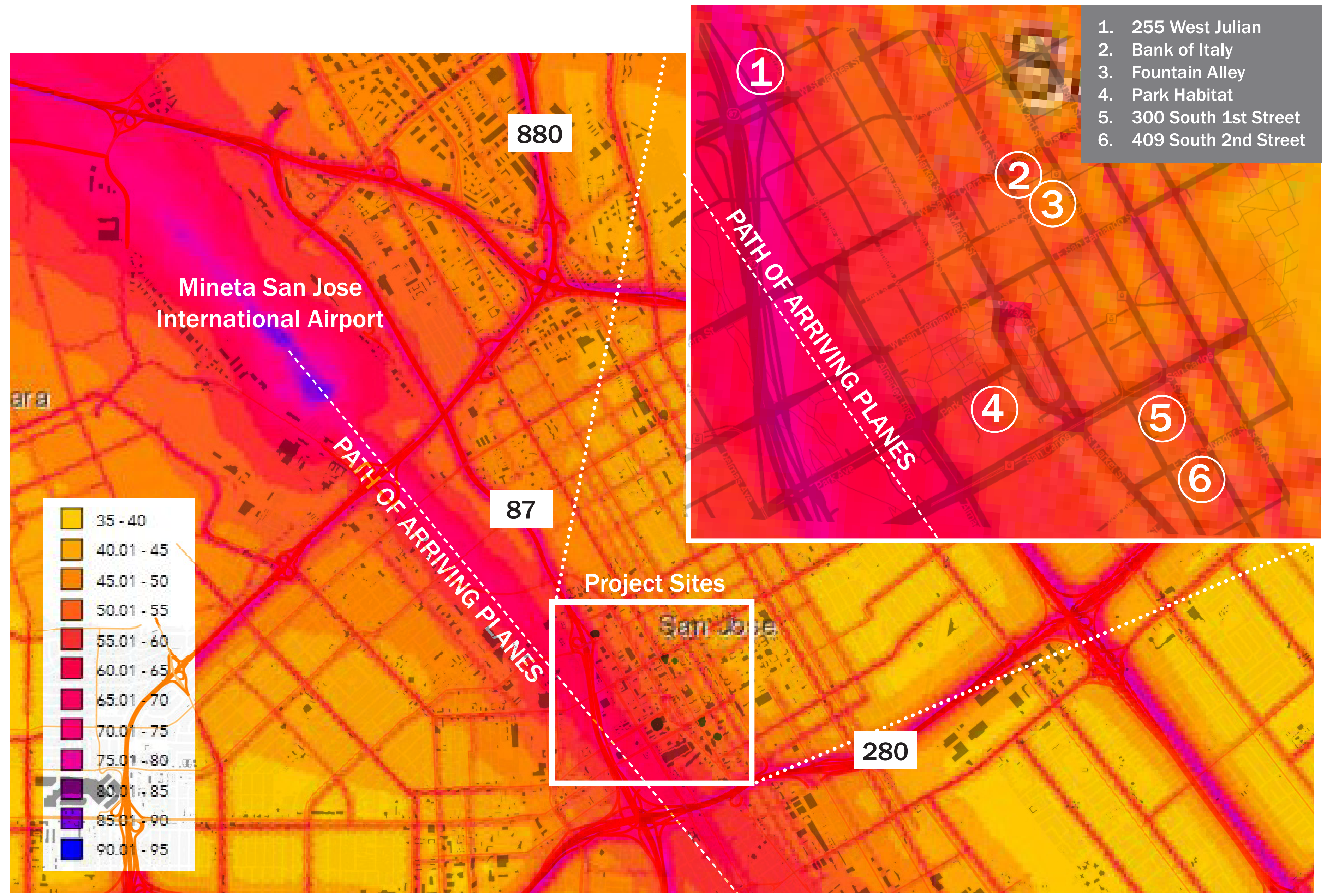
## NOISE POLLUTION

Planes arriving at Mineta San Jose Airport descend over downtown San Jose. Noise pollution from these planes can reach up to 75 decibels, which is equivalent to an active vacuum cleaner.

Based on National Transportation Atlas Database, aircraft noise level increases by ~55 decibels within 0.25 miles of an airport and ~35 decibels around the path of arrival or departure.

| Common Comparable Sounds (weighted decibel average) | |
|---|---|
| <50 dBa | Refrigerator Humming |
| 50-59 | Quiet Office |
| 60-69 | Conversational Speech |
| 70-79 | Vacuum Cleaner |
| 80 + | Active Garbage Disposal |

Fountain Alley is far enough from freeway and aircraft that windows can likely be left open for ventilation for extended periods of time.



# BEST PRACTICES TO MINIMIZE EXPOSURE TO LOCAL AIR + NOISE POLLUTION

### Ventilation

Install MERV 13 or HEPA filters to capture pollution before air is introduced into a space. High efficiency HVAC filters can remove 50% - 98% of particle pollutants in the indoor air.

For projects with operable windows and natural ventilation, a robust filtration system will still be useful, especially during poor air quality days.

Because concentration of air pollution decreases with distance and height, projects should locate air intake locations farthest from the street.

### Buffer Space

Open space between a project and the street can improve airflow and prevent air pollution to concentrate.

Solid barriers, or sound walls, near freeways can minimize the impact of both air and noise pollution. Solid barriers and vegetation buffers are most effective when implemented together.

Operational policies should restrict idling, especially in rideshare pickup and drop-off zones.

### Green Infrastructure

Green infrastructure, like trees, green walls, and shrubs, provide a large amount of surface area to collect airborne pollutants from vehicle exhaust.

Evergreen plants with fine foliage and long lifespans are best for trapping and filtering air pollution. Project should consider native shrubs, pine cypress, hybrid popular and redwoods.

Landscaped areas have many cobenefits, including reducing heat island effect by providing shade, increasing stormwater retention, supporting local biodiversity, and contributing to visually appealing public space.

### Interior Design

Acoustic experience will depend on both blocking exterior noise, and absorbing sounds generated indoors. For example, wall assemblies with acoustic insulation can block or mitigate outdoor noise from reaching indoor spaces. Carpets and ceiling tiles can minimize sounds generated inside of the project.

Indoor water features or white noise machines are examples of sound masking systems, which introduce new sounds to hide unwanted noise. Sound masking is appropriate for addressing indoor noise, but should not be considered for loud exterior noises, like overhead planes.

Adopted from: "Planning Healthy Places: A Guidebook for Addressing Local Sources of Air Pollutants in Community Planning," Bay Area Quality Management District (BAQMD), May 2016.

## WATER BALANCE

### Executive Summary

Atelier Ten conducted a water balance and water reuse study for the Bank of Italy and Fountain Alley projects.

The projects are targeting four water efficiency goals:
1. 40% reduction in indoor and cooling tower water uses.
2. Zero water waste (stretch goal): no potable water used for non-potable demands.
3. 50% reduction in irrigation water use.
4. Net zero irrigation (stretch goal): no potable water used for irrigation.

A key goal of this analysis is to understand the water uses and evaluate different options toward these water conservation goals.

Six scenarios were tested in this study:

1. **LEED Baseline:** LEED baseline fixtures with no water reuse system.
2. **A10 Recommended Fixtures:** Water-conserving flow and flush fixtures. No water reuse system.
3. **Hyper Conservation:** Aggressive water-conserving fixtures, including vacuum-flush WCs and waterless urinals. No water reuse system.
4. **Collect from Fountain Alley Only:** Centralized water reuse system collecting blackwater (BW) from Fountain Alley for treatment and reuse in both Fountain Alley and Bank of Italy. Fixtures are same as in the A10 Recommended Fixtures scenario.
5. **Collect from Fountain Alley and Bank of Italy:** Separate blackwater collection and treatment systems in each building for reuse in both buildings. Fixtures are same as in the A10 Recommended Fixtures scenario.
6. **Clearwater Reuse:** Collection and reuse of clearwater, i.e., water requiring minimal treatment before reuse. Primarily rainwater. Fixtures are same as in the Atelier Ten Recommended Fixtures scenario.

### Results

Implementing Atelier Ten's recommended water efficient fixtures allows the project to achieve 40% indoor and cooling tower water use reduction without a blackwater reuse system. Implementing the hyper conservation fixtures achieves in further water use reduction.

Collecting blackwater from Fountain Alley only for reuse in both buildings provides a sufficient supply of water to achieve the zero water waste goal, with the possible exception of some irrigation demand during summer months.

Collecting blackwater from both the Bank of Italy and Fountain Alley buildings provides a small amount of additional non-potable water supply. However, with separate blackwater treatment systems in each building and the higher treatment intensity needed for the Bank of Italy blackwater, this option has increased space and maintenance requirements compared to collecting from Fountain Alley only.

Collecting and reusing clearwater only results in a small water use reduction due to the relatively small quantity of rainwater available. However, a substantial storage tank would still be required to collect and hold water from rain events.

A detailed comparison of these scenarios can be found on the next page.

### Note on Irrigation Demands

Depending on the Fountain Alley facade planting design, there is a significant range of possible irrigation demands. The assumption in this study is a green wall system covering 20% of the facade with an irrigation water reuse system conferring a 50% water use reduction. This assumption is constant across the test cases.

A vine planter design would require less water than this green wall system, allowing the project to achieve the zero water waste goal with blackwater collection from Fountain Alley only.

### Note on Cooling Tower Demands

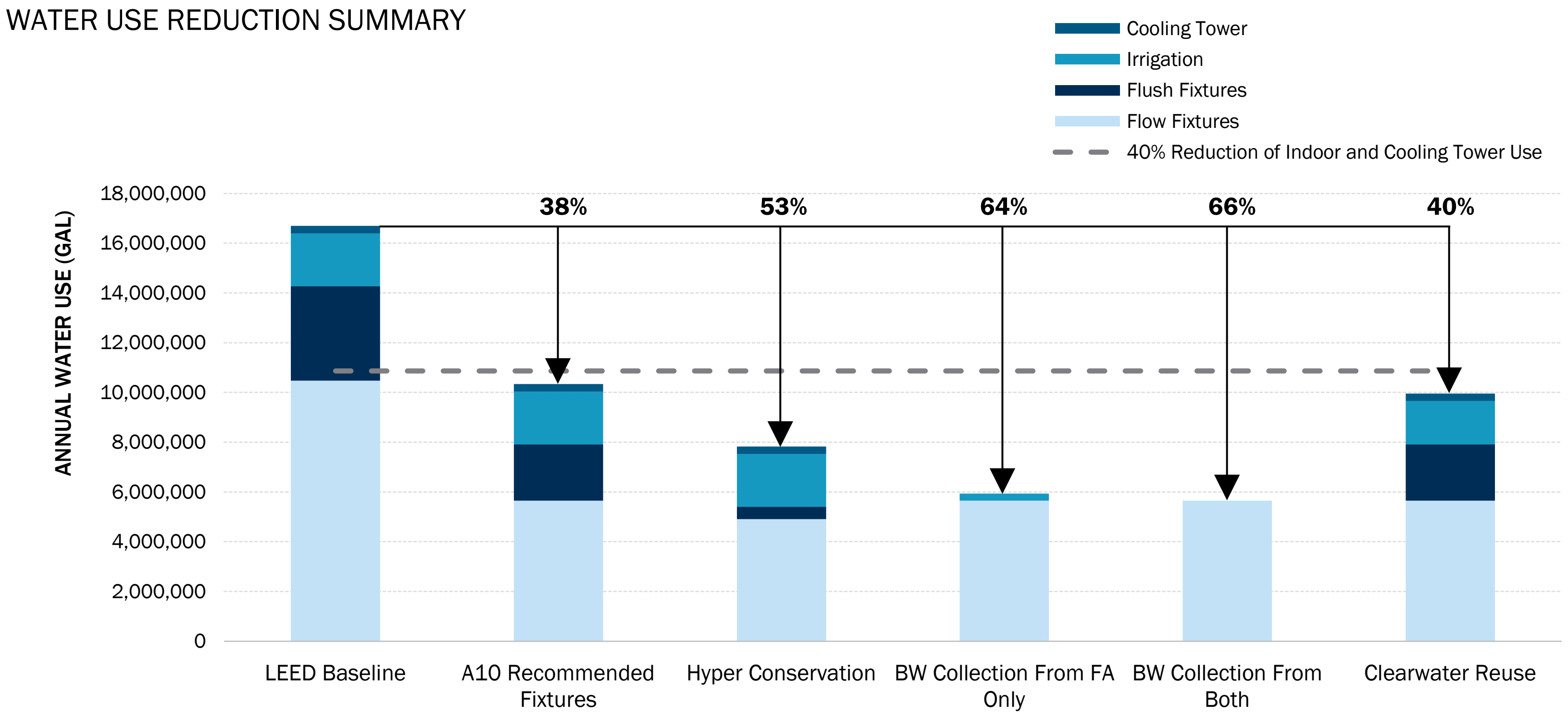
This project is expected to have significantly less (in the range of a 90% reduction) cooling tower use than would normally be expected due to the design of the mechanical systems. This is reflected in the cooling tower demands in this water balance.

### Next Steps

Atelier Ten recommends implementing a centralized blackwater reuse system collecting from Fountain Alley only, in conjunction with a water-conserving facade planting design on the Fountain Alley building.

Alternatively, if blackwater reuse is to be avoided, Atelier Ten recommends the project team consider the Hyper Conservation option.

WATER USE REDUCTION SUMMARY



## WATER BALANCE - SCENARIO COMPARISON

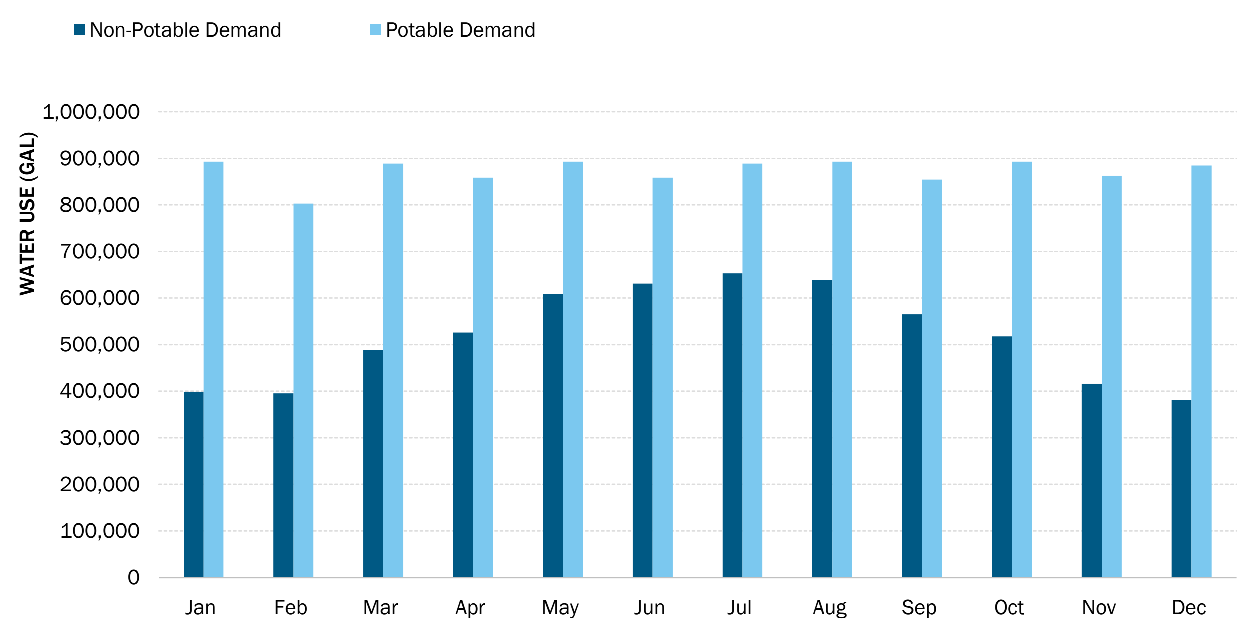
| | | LEED Baseline | A10 Recommended Fixtures | Hyper Conservation | BW Collection From FA Only | BW Collection From Both | Clearwater Reuse |
|---|---|---|---|---|---|---|---|
| Water Use Reduction | % Water Use Reduction | N/A | 38% | 53% | 64% | 66% | 40% |
| | Annual Water Use Reduction (Gallons) | N/A | 6,355,926 | 8,865,553 | 10,753,431 | 11,034,122 | 6,730,347 |
| Plumbing and Equipment Requirements | Dual Plumbing Required | None | None | None | Blackwater collection from Fountain Alley. Recycled water distribution in both buildings. | Blackwater collection and recycled water distribution in both buildings | Rainwater collection from both building roofs. Distribution to some end uses (e.g., irrigation only). |
| | Reclaimed Water Quality | N/A | N/A | N/A | Relatively clean. 53% of reclaimed water from washing machines, showers, or lavatory faucets. | Relatively clean from Fountain Alley; relatively dirty from Bank of Italy (primarily from flush fixtures). | Clean, requiring minimal treatment |
| | Tank Size | None required | None required | None required | Approx. 20,000 gallon tank suggested | Approx. 20,000 gallon tank suggested | Approx. 15,000 gallon tank suggested |
| | Space and Operational Requirements | None | None | None | Centralized blackwater treatment system | Higher space and operational requirements due to separate systems per building | Less treatment of water needed compared to blackwater system |
| Goals Achieved | 40% Indoor and Cooling Tower Water Reduction | No | Yes | Yes | Yes | Yes | Yes |
| | Zero Water Waste | No | No | No | Yes, with water conserving facade planting on Fountain Alley | Yes | No |
| | 50% Irrigation Reduction | No | No | No | Yes | Yes | No |
| | Net Zero Irrigation | No | No | No | Yes, with water conserving facade planting on Fountain Alley | Yes | No |
| LEED Points | WEc2 Indoor Water Use Reduction (6 pts max) | N/A | 4 | 6 | 6 | 6 | 5 |
| | Regional Priority for WEc2 (4 pt threshold) | N/A | 1 | 1 | 1 | 1 | 1 |

## WATER BALANCE - LEED BASELINE SCENARIO

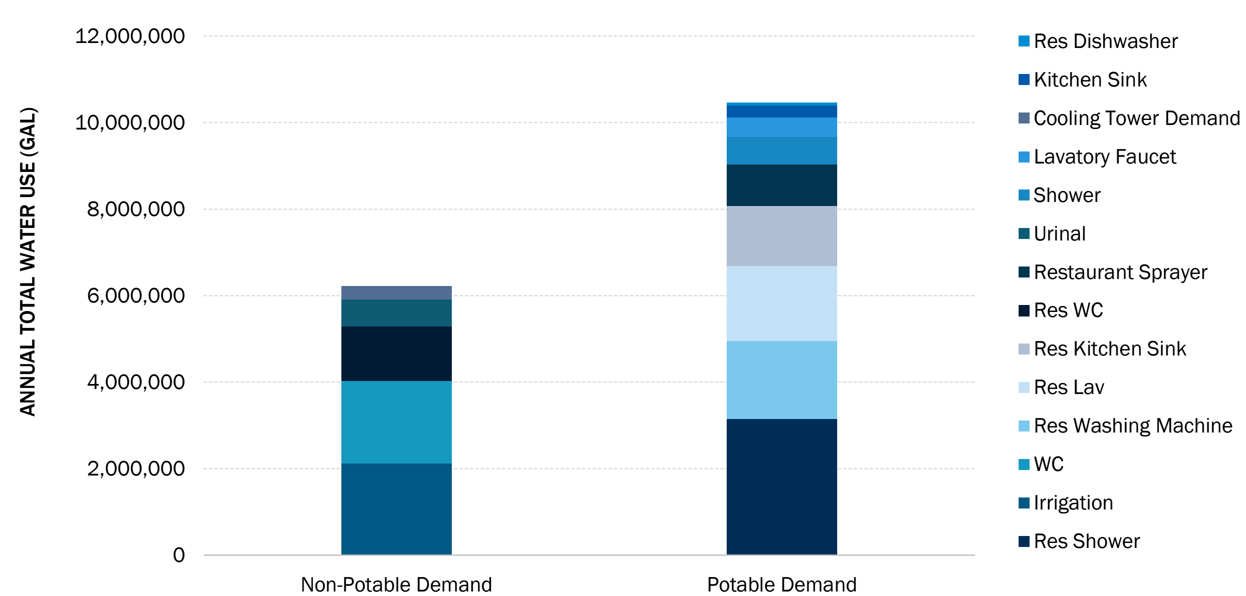
This scenario uses LEED baseline fixtures with no water reuse system. Flow rates for restaurant sprayers, washing machines, and dishwashers are based on values from the SFPUC Non-Potable Water Calculator, as these do not have a defined LEED baseline.

This scenario serves as a standard baseline against which the following scenarios are compared.

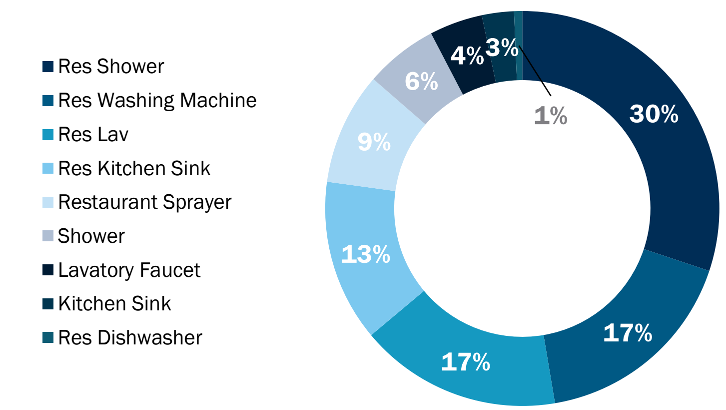
### MONTHLY SUMMARY



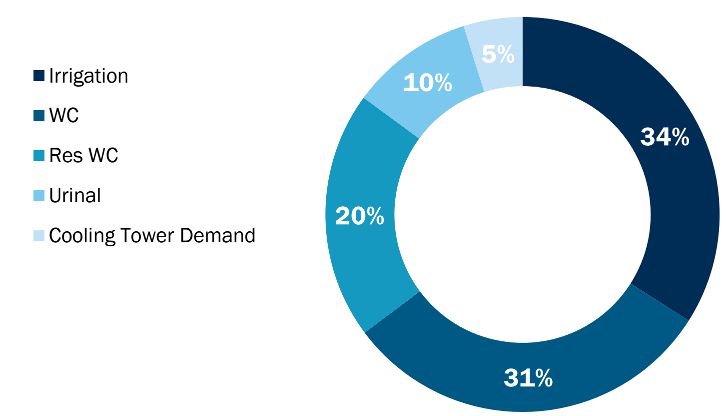

### SUPPLY AND DEMAND ANNUAL TOTALS




### POTABLE DEMAND PROFILE




### NON-POTABLE DEMAND PROFILE

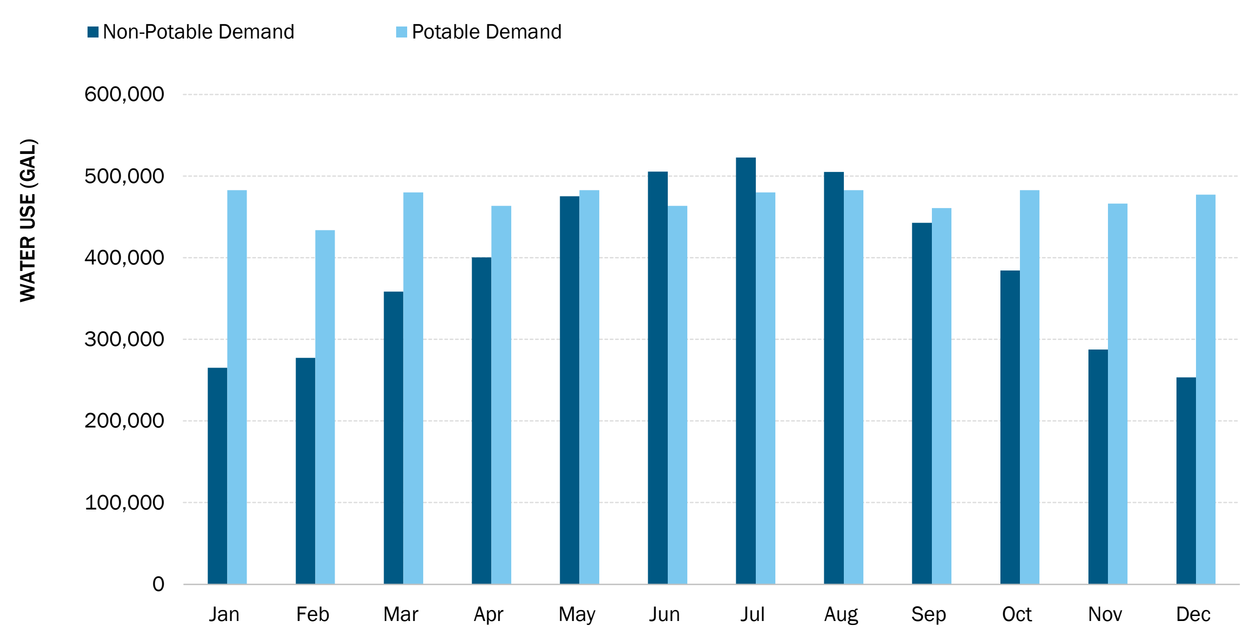


## WATER BALANCE - A10 RECOMMENDED FIXTURES SCENARIO

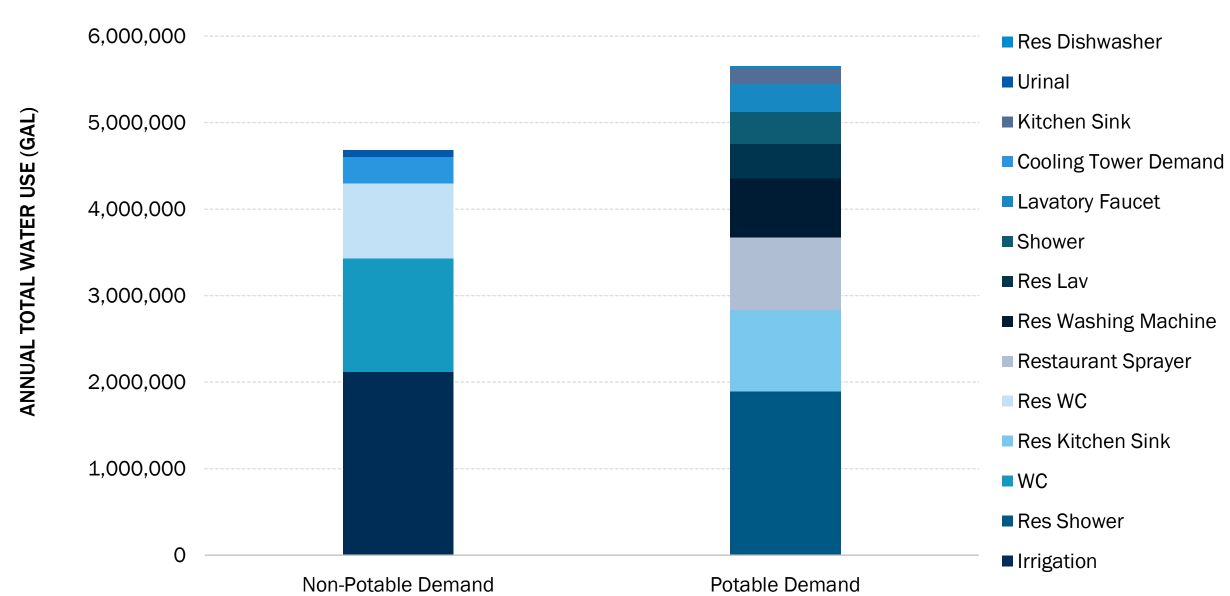
This scenario substitutes the LEED baseline fixtures for water-conserving fixtures as typically recommended by Atelier Ten. Flowrates for restaurant sprayers, washing machines, and dishwashers are based on the Energy Star standard.

There is no water reuse system in this scenario; savings in this scenario over the LEED Baseline are solely the result of the more efficient fixtures.

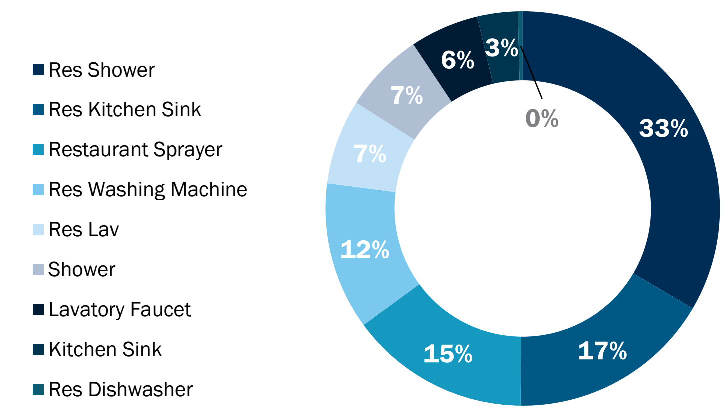
### MONTHLY SUMMARY



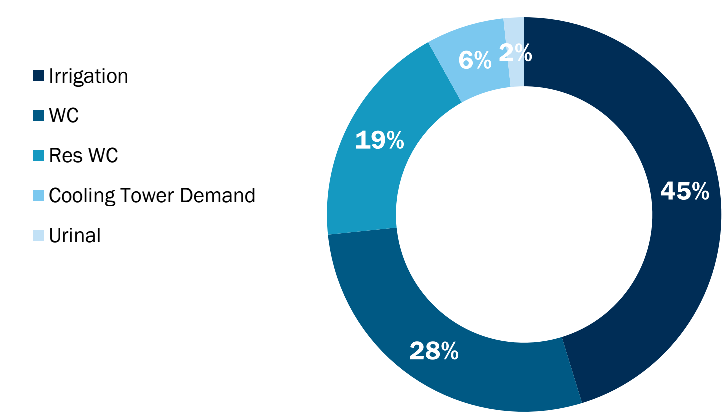

### SUPPLY AND DEMAND ANNUAL TOTALS




### POTABLE DEMAND PROFILE




### NON-POTABLE DEMAND PROFILE

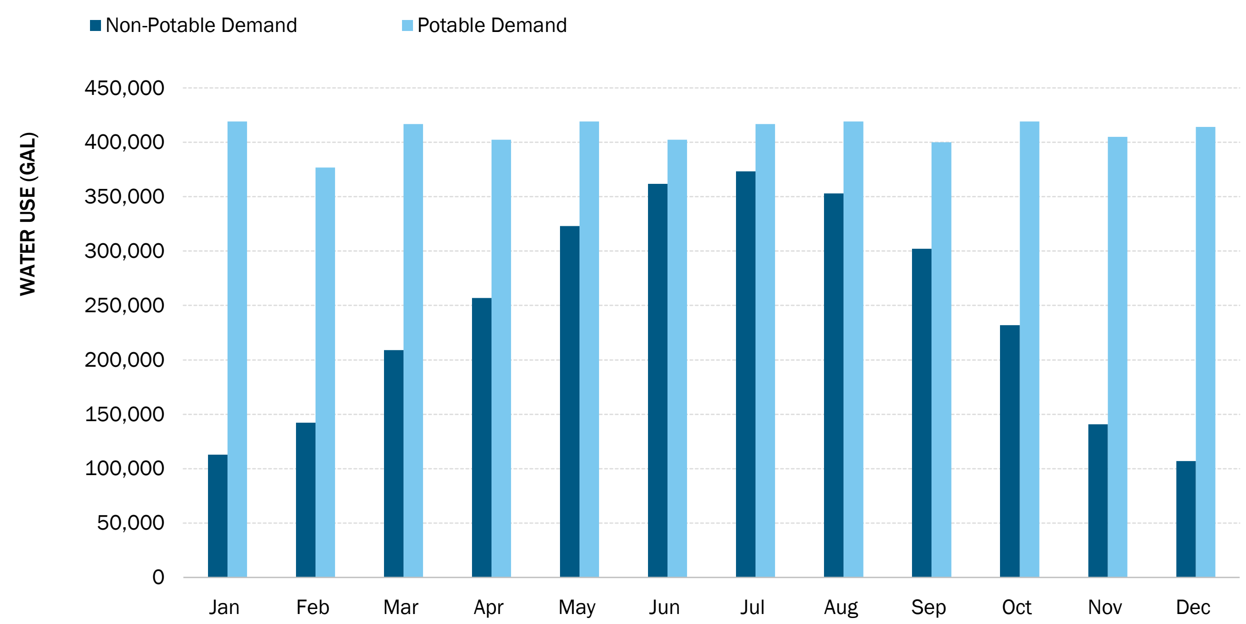


## WATER BALANCE - HYPER CONSERVATIVE FIXTURES SCENARIO

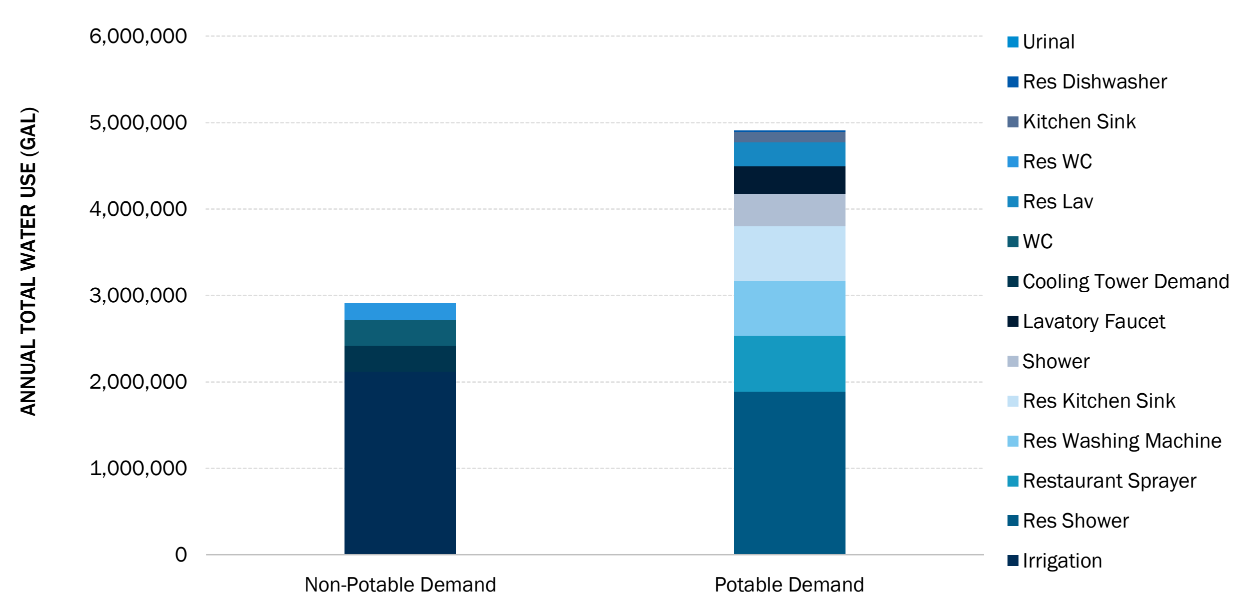
This scenario represents use of the most efficient water-conserving fixtures, including vacuum-flush toilets and water-free urinals.

There is no water reuse system in this scenario; savings in this scenario over the LEED Baseline are solely the result of the more efficient fixtures.

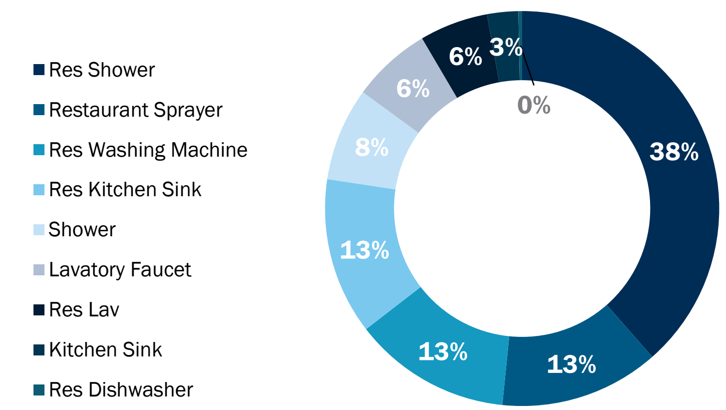
### MONTHLY SUMMARY



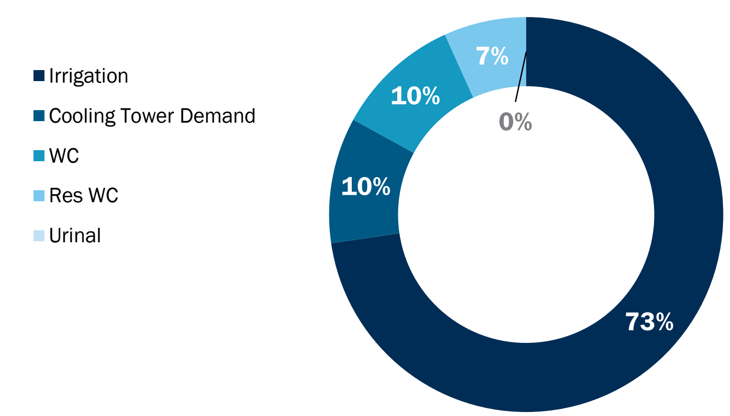

### SUPPLY AND DEMAND ANNUAL TOTALS




### POTABLE DEMAND PROFILE




### NON-POTABLE DEMAND PROFILE



## WATER BALANCE - BLACKWATER COLLECTION FROM FOUNTAIN ALLEY ONLY SCENARIO

This scenario uses the same fixtures as in the A10 Recommended Fixtures scenario, but adds a water reuse system collecting blackwater from the Fountain Alley building for distribution to both Bank of Italy and Fountain Alley. The recycled water is applied to all non-potable demands. A 15% blackwater processing loss is assumed.

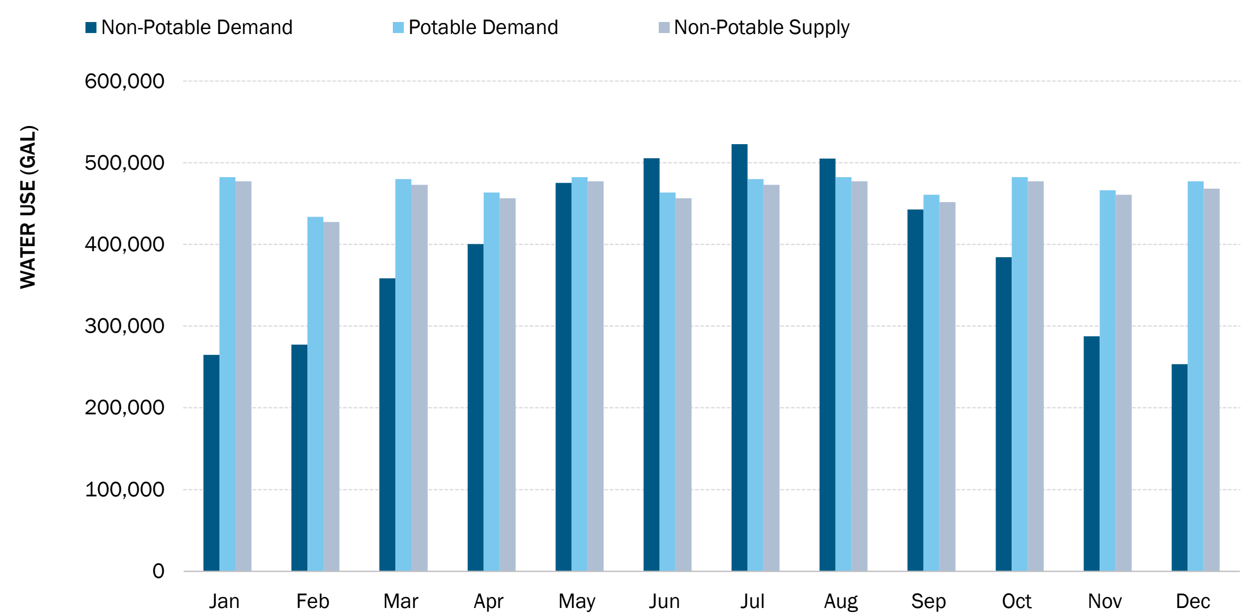
The blackwater can be considered to be fairly clean due to the large residential program area in Fountain Alley; approximately 53% of the water comes from showers, washing machines, and lavatory faucets. The remaining water comes from kitchen or flush fixtures.

Annually, there is sufficient non-potable water supply to meet all non-potable demands; however, during the summer months, the non-potable demand is insufficient due to an increase in the irrigation demand.

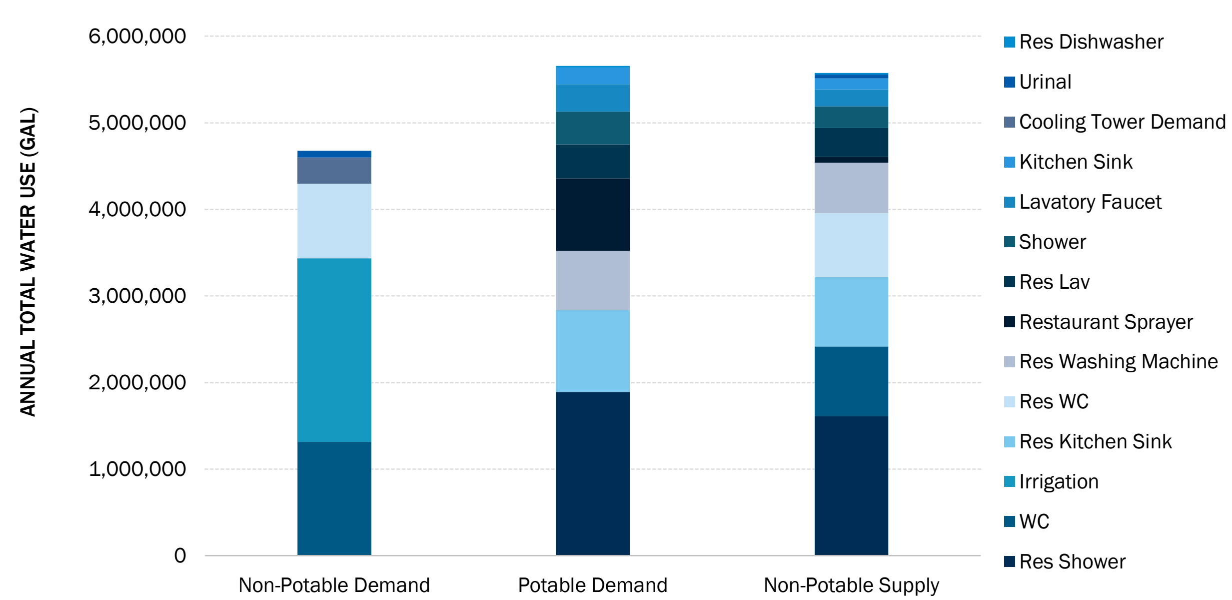
As in the other scenarios, the irrigation demand assumes a green wall design for Fountain Alley with 20% coverage of the facade area and an irrigation water capture/reuse system. The green wall is significantly more water-intensive than a hanging vine planter design, which is explored on the following page.

The suggested tank size is approximately 20,000 gallons, roughly equal to the daily throughput of the reuse system. While it is possible to store water from the winter months to meet the irrigation shortfall during the summer months, doing so requires a significantly larger tank size (approx. 140,000 gallons) due to rapidly diminishing returns.

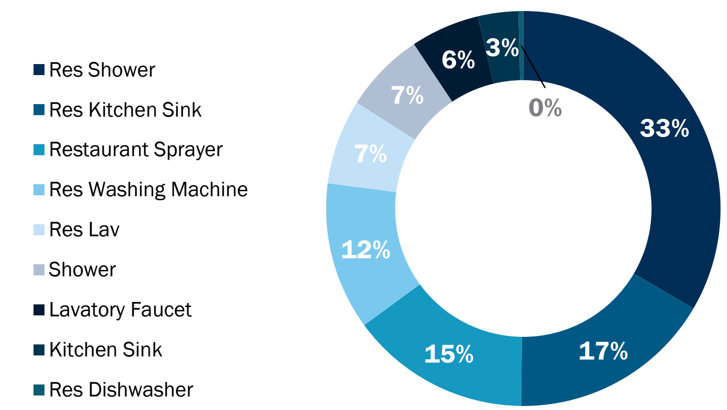
### MONTHLY SUMMARY



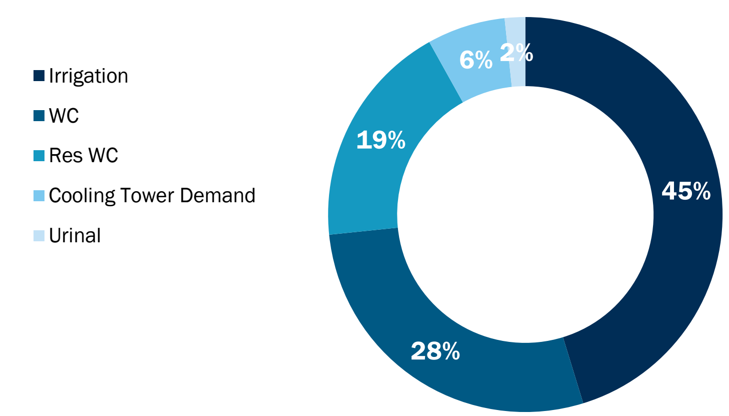

### SUPPLY AND DEMAND ANNUAL TOTALS



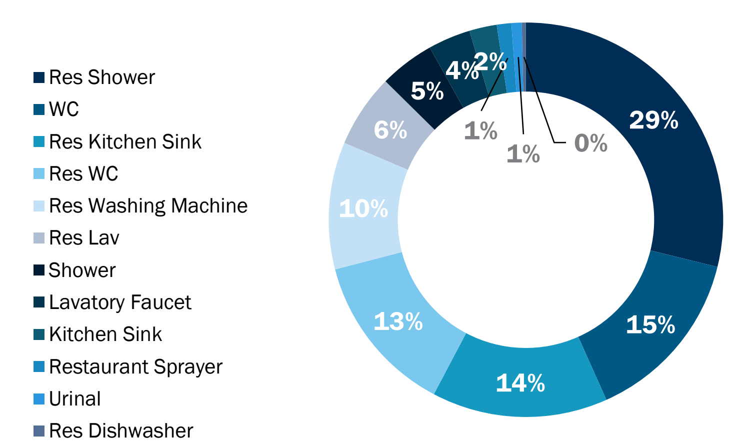

### POTABLE DEMAND PROFILE




### NON-POTABLE DEMAND PROFILE




### NON-POTABLE SUPPLY PROFILE

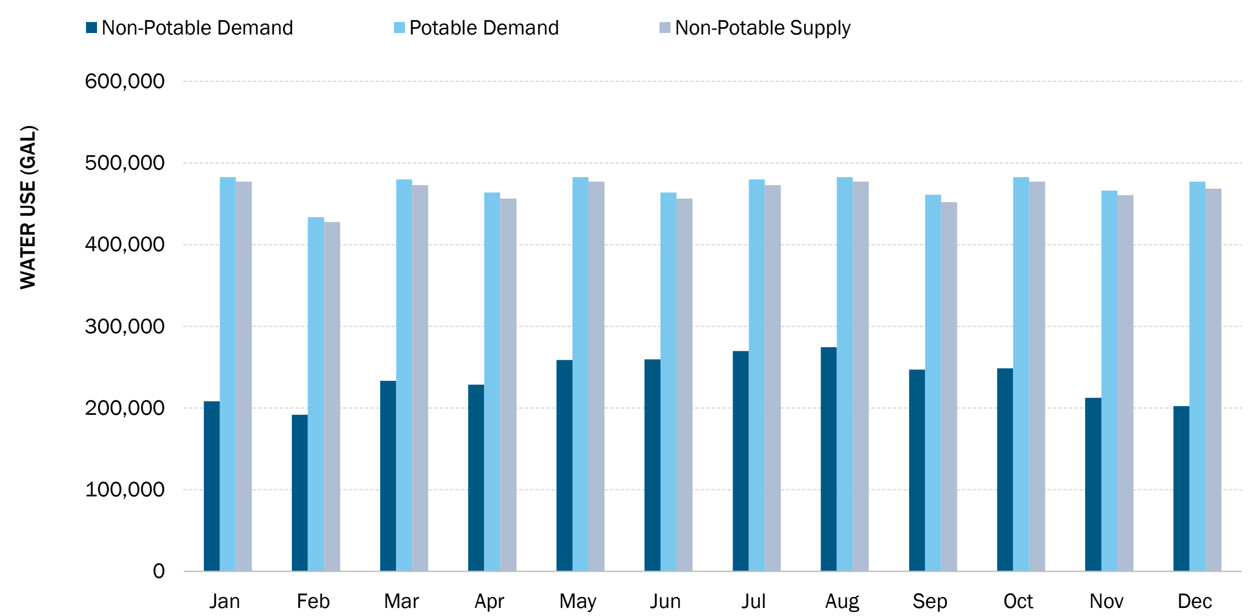


## WATER BALANCE - BLACKWATER COLLECTION FROM FOUNTAIN ALLEY ONLY SCENARIO - VINE PLANTER IRRIGATION

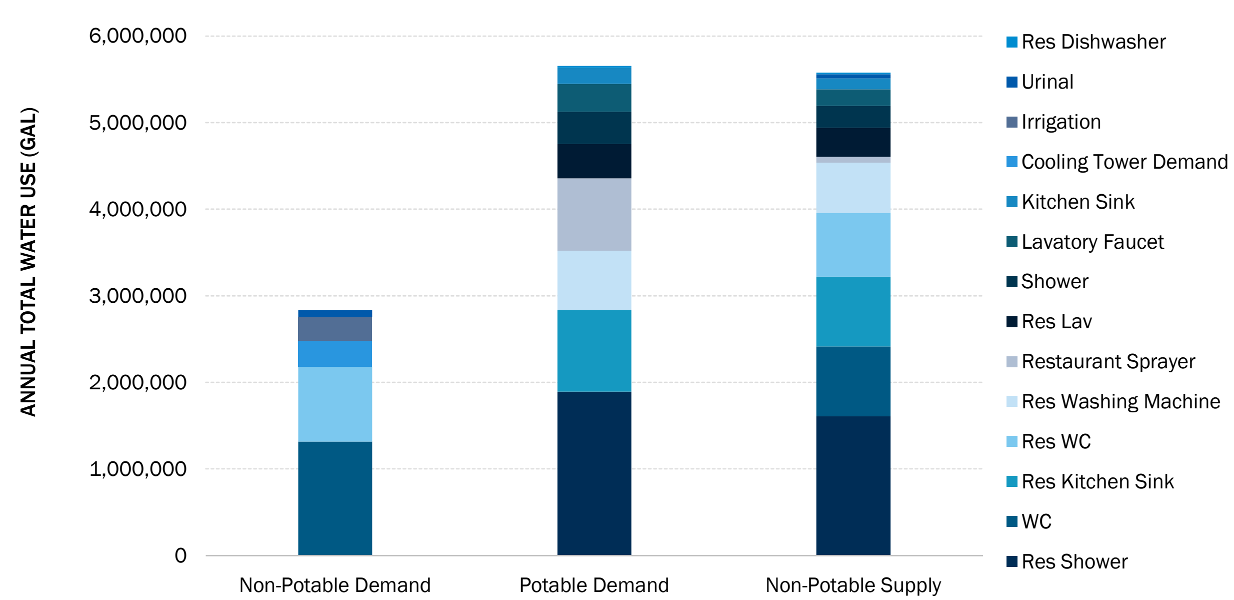
This variant of the Blackwater Collection From Fountain Alley scenario assumes vine planters on the Fountain Alley facade instead of green walls, resulting in a significant reduction in estimated irrigation demand.

By choosing a less water-intensive facade planting design, the non-potable water demand is reduced to a level such that the non-potable supply (from Fountain Alley alone) is sufficient to meet the demand year-round.

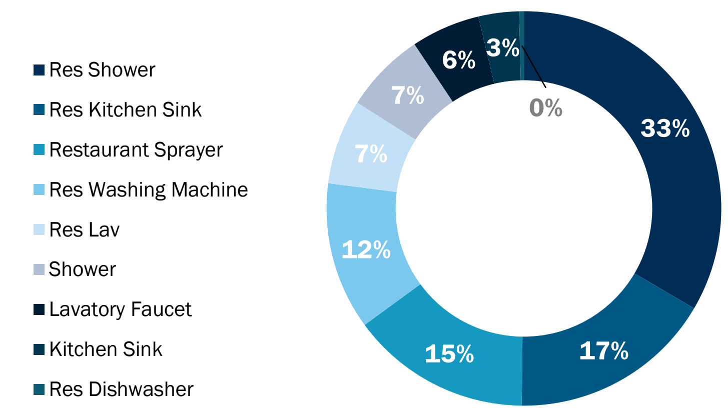
### MONTHLY SUMMARY



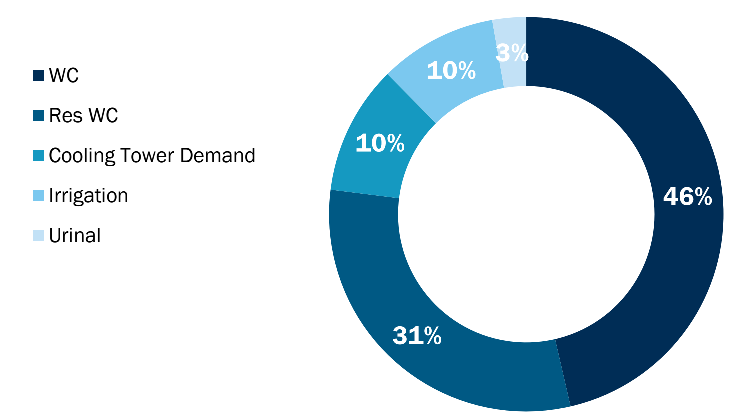

### SUPPLY AND DEMAND ANNUAL TOTALS



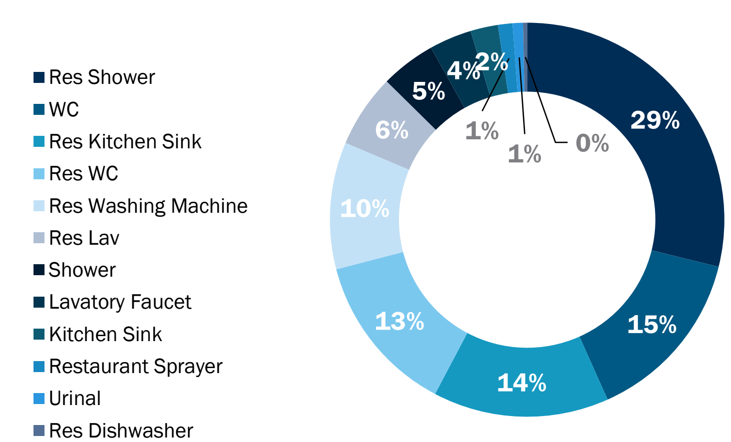

### POTABLE DEMAND PROFILE




### NON-POTABLE DEMAND PROFILE




### NON-POTABLE SUPPLY PROFILE



## WATER BALANCE - BLACKWATER COLLECTION FROM FOUNTAIN ALLEY & BANK OF ITALY SCENARIO

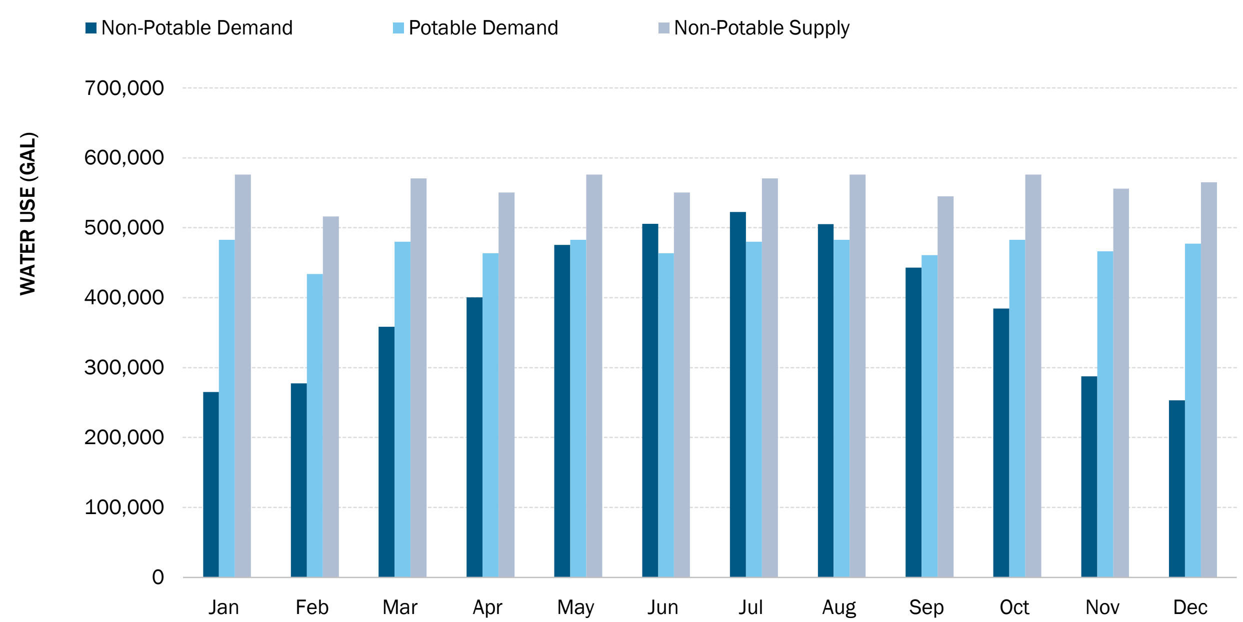
This scenario uses the same fixtures as in the A10 Recommended Fixtures scenario, but adds a water reuse system in each building. The recycled water is applied to all non-potable demands. A 15% blackwater processing loss is assumed.

The blackwater contribution from Bank of Italy is relatively dirty, as it comes primarily from flush fixtures. The blackwater supply from Fountain Alley is relatively clean; as described previously, due to the residential program in Fountain Alley, 53% of the Fountain Alley blackwater is from showers, washing machines, and lavatory faucets.

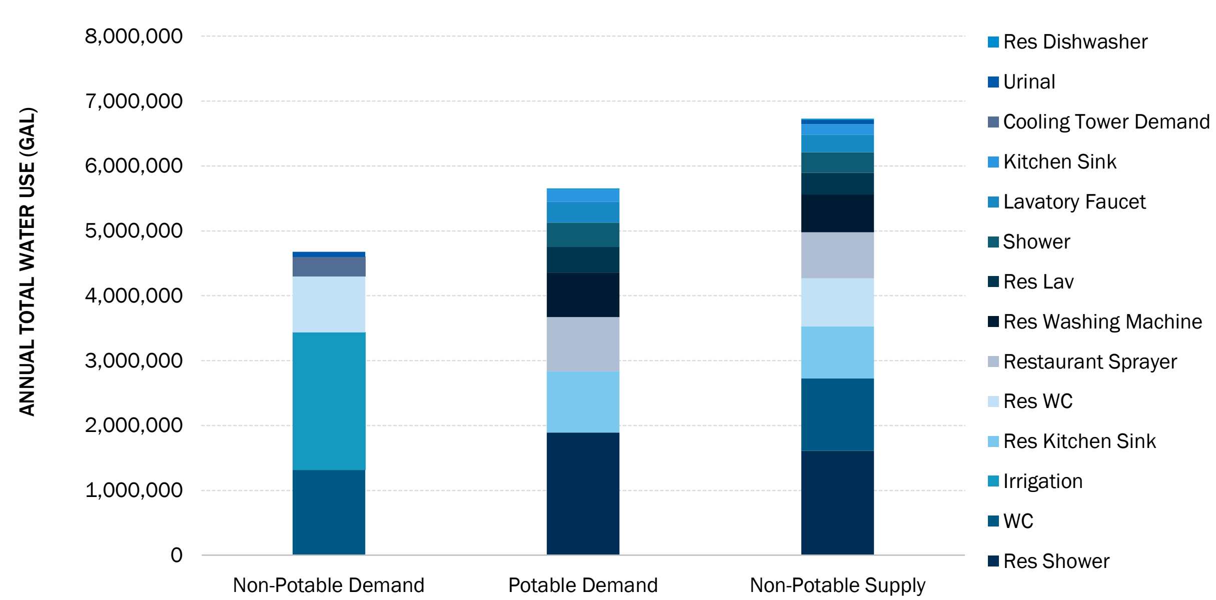
Compared to the scenario in which blackwater is collected only from Fountain Alley, this scenario adds a small amount of non-potable supply but requires additional space and operational expense to treat the Bank of Italy blackwater.

The suggested total tank size is approximately 20,000 gallons, roughly equal to the daily throughput of the reuse system.

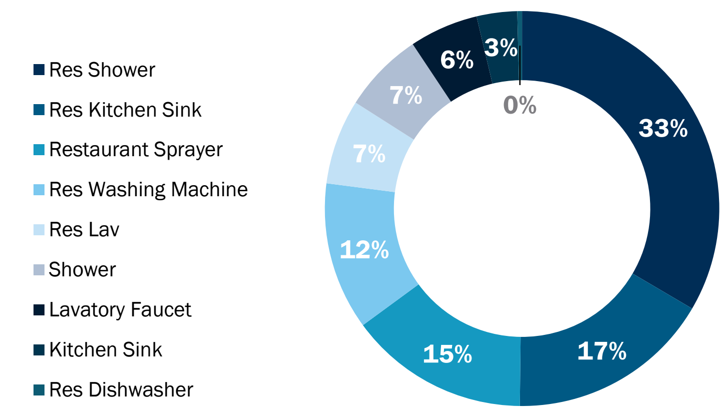
### MONTHLY SUMMARY



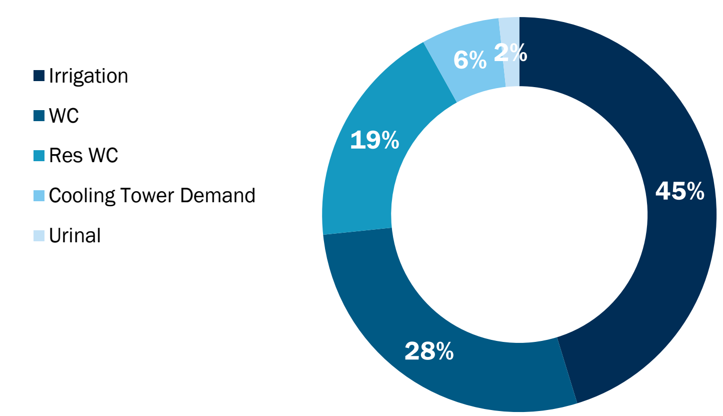

### SUPPLY AND DEMAND ANNUAL TOTALS



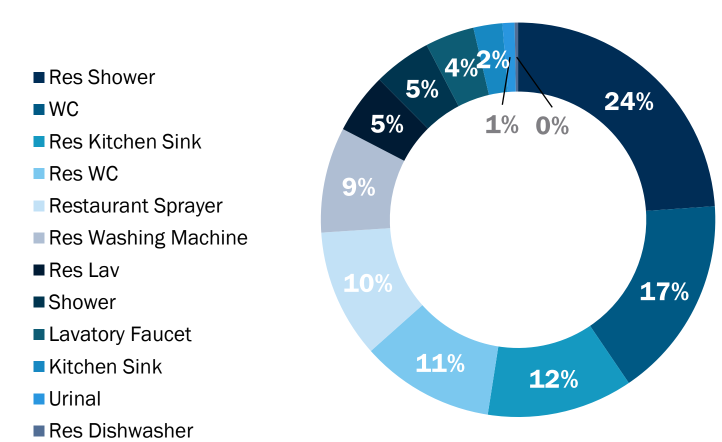

### POTABLE DEMAND PROFILE




### NON-POTABLE DEMAND PROFILE




### NON-POTABLE SUPPLY PROFILE



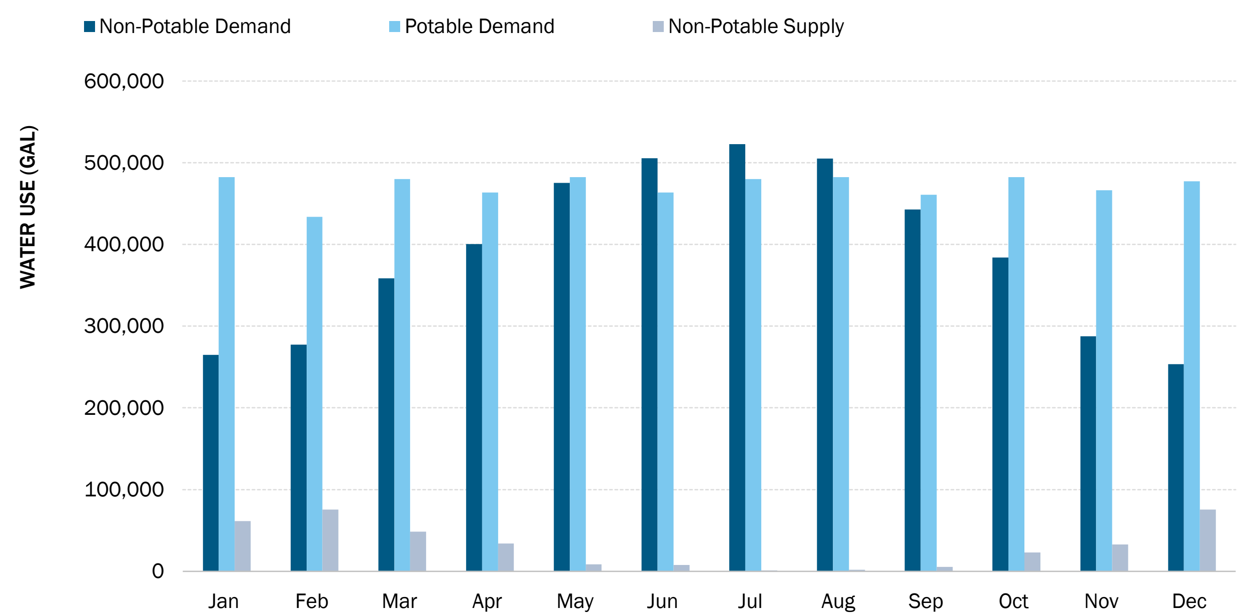
## WATER BALANCE - CLEARWATER REUSE SCENARIO

This scenario explores collecting only rooftop rainwater for reuse with minimal treatment required. Cooling tower water could also be collected as part of this scenario but is expected to be a small contribution and was not included in this study.

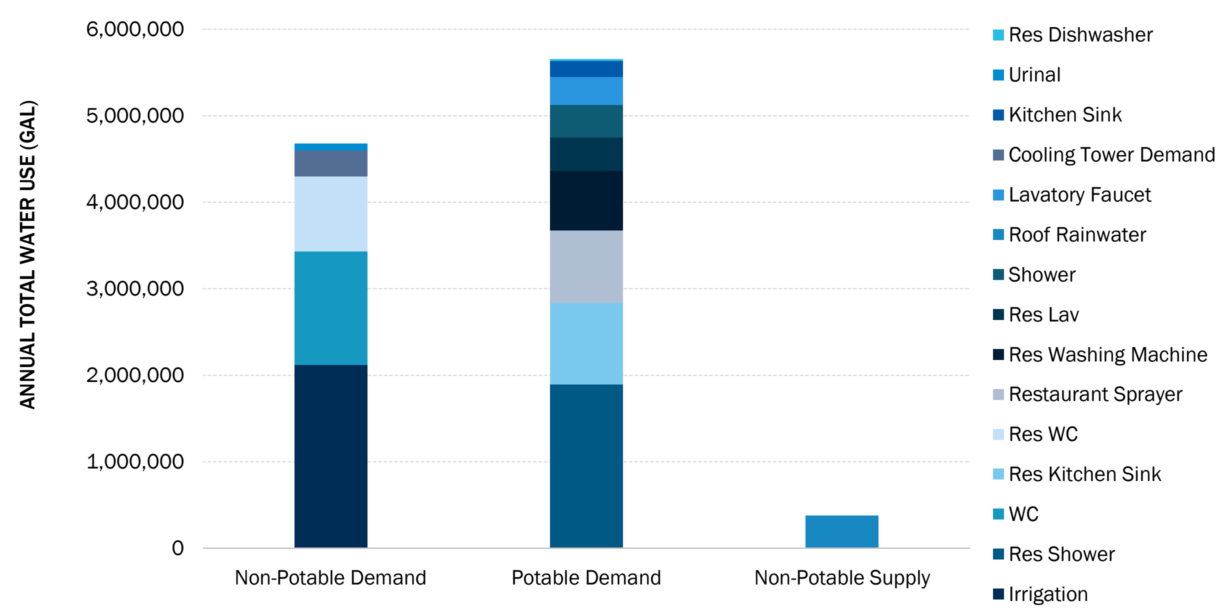
Although less treatment would be required compared to a blackwater system, the rainwater collected represents only a small proportion of the total non-potable water demand.

The suggested tank size is approximately 15,000 gallons due to the need to store water from rain events for use over a period of time.

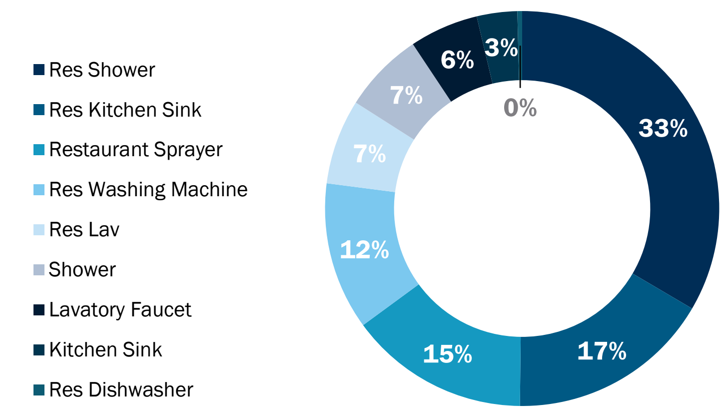
### MONTHLY SUMMARY



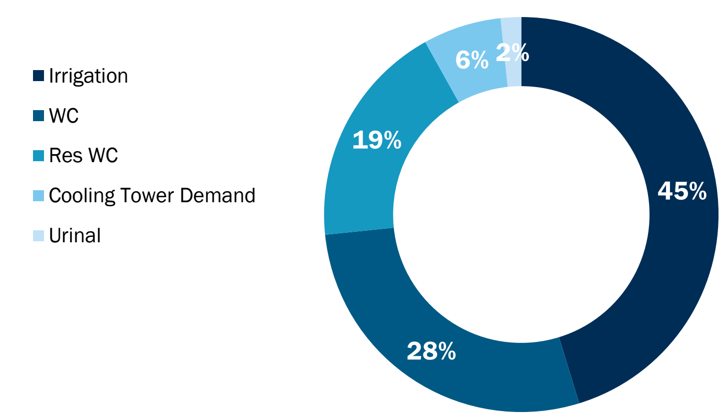

### SUPPLY AND DEMAND ANNUAL TOTALS



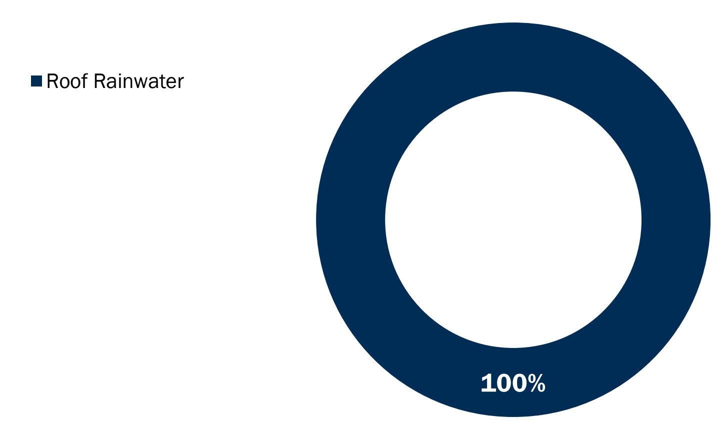

### POTABLE DEMAND PROFILE




### NON-POTABLE DEMAND PROFILE




### NON-POTABLE SUPPLY PROFILE



## WATER BALANCE - FIXTURE FLOW RATES

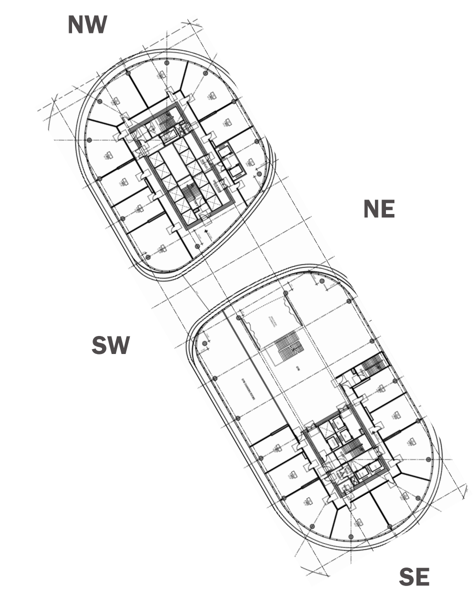
| | LEED Baseline | A10 Recommended | Hyper Conservation | |
|---|---|---|---|---|
| WC | 1.6 | 1.1 | 0.25 | GPF |
| Urinal | 1 | 0.125 | 0 | GPF |
| Lavatory Faucet | 0.5 | 0.35 | 0.35 | GPM |
| Shower | 2.5 | 1.5 | 1.5 | GPM |
| Kitchen Sink | 2.2 | 1.5 | 1 | GPM |
| Restaurant Sprayer | 1.5 | 1.3 | 1 | GPM |
| Residential WC | 1.6 | 1.1 | 0.25 | GPF |
| Residential Lav | 2.2 | 0.5 | 0.35 | GPM |
| Residential Shower | 2.5 | 1.5 | 1.5 | GPM |
| Residential Kitchen Sink | 2.2 | 1.5 | 1 | GPM |
| Residential Dishwasher | 11.15 | 3.5 | 2.4 | Gal/Cycle |
| Residential Washing Machine | 36.9 | 14 | 13 | Gal/Cycle |

## FACADE ANALYSIS

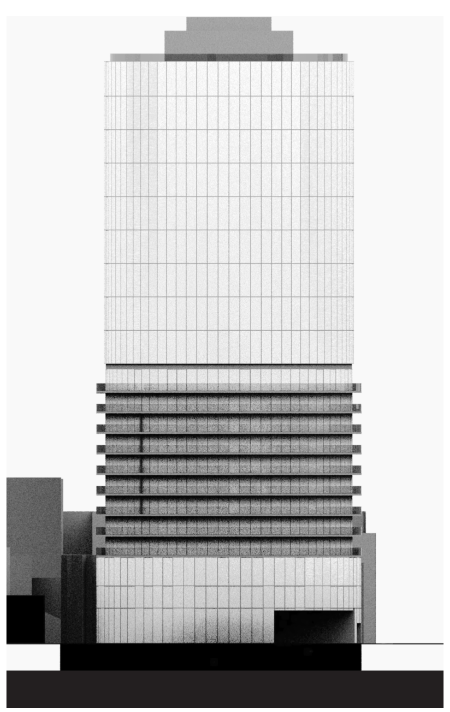
# Solar Exposure, PV Opportunities, and Facade Performance Targets

This PDF evaluates the impact of the exterior fixed horizontal shades, the potential for energy production form building integrated PV, and identifies thermal performance targets for the building envelope.

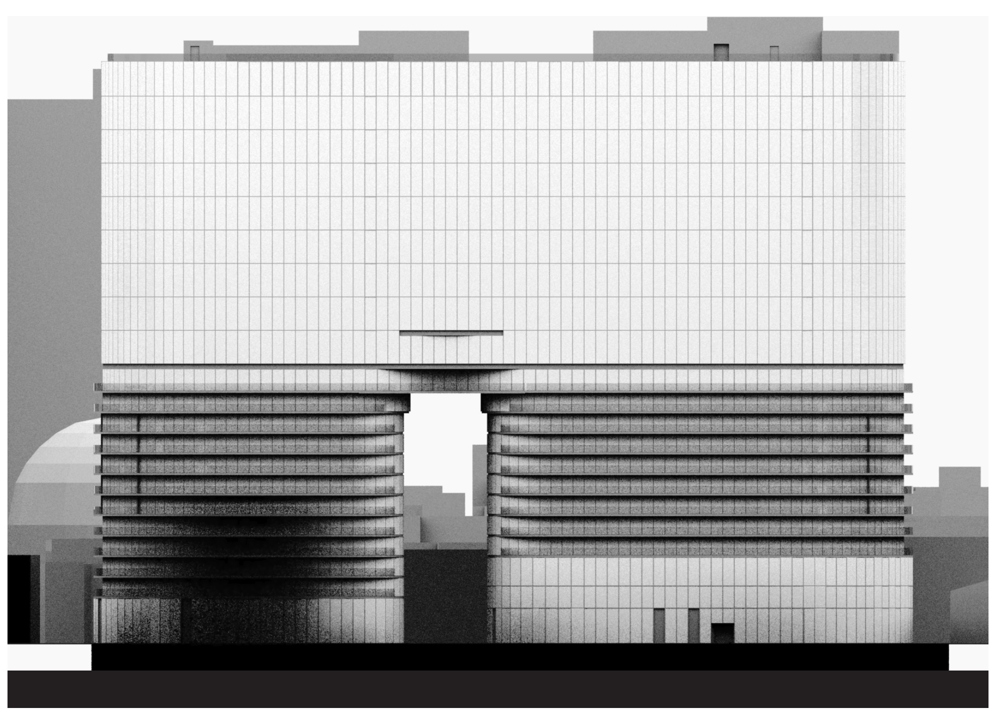
Beginning with a study of solar exposure, we used the building form without shades as a baseline to see the effect of climate, site, and context on annual sun exposure.



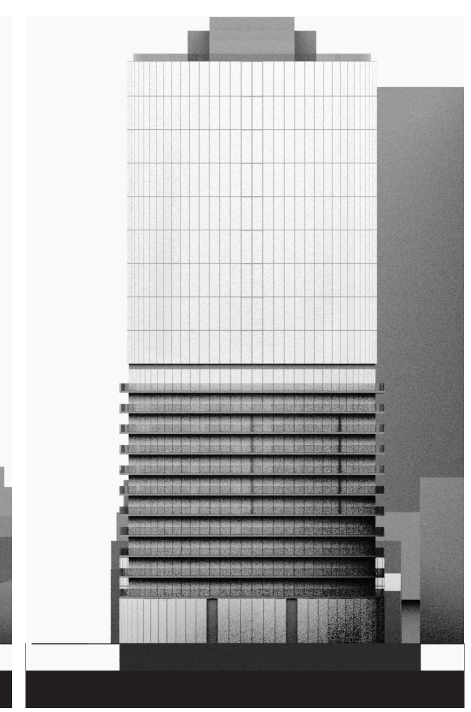

**SOUTHEAST ELEVATION**



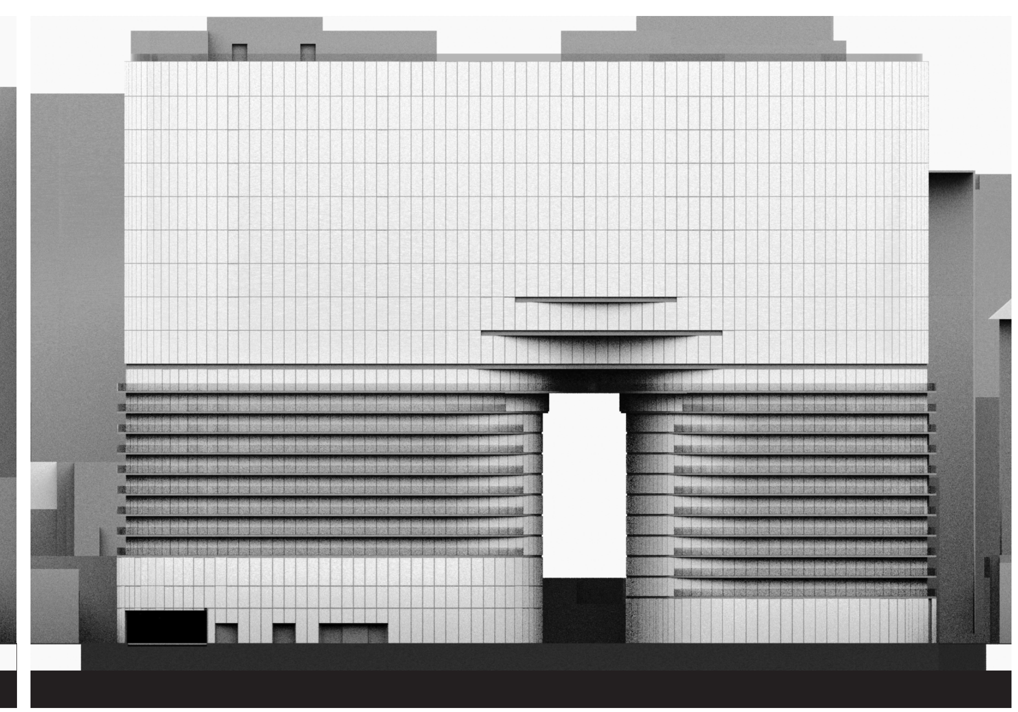
**SOUTHWEST ELEVATION**

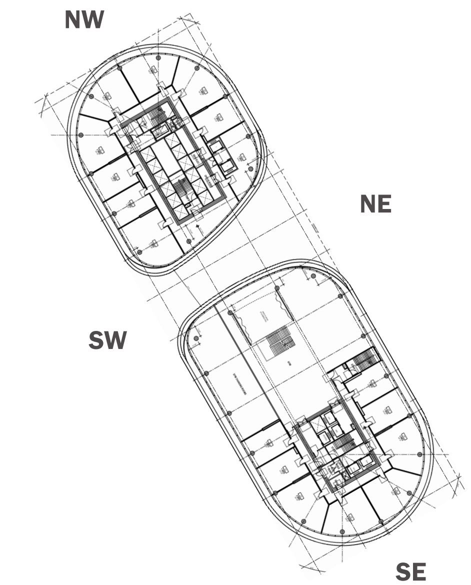


**NORTHWEST ELEVATION**



**NORTHEAST ELEVATION**






# Baseline Solar Exposure Mapping

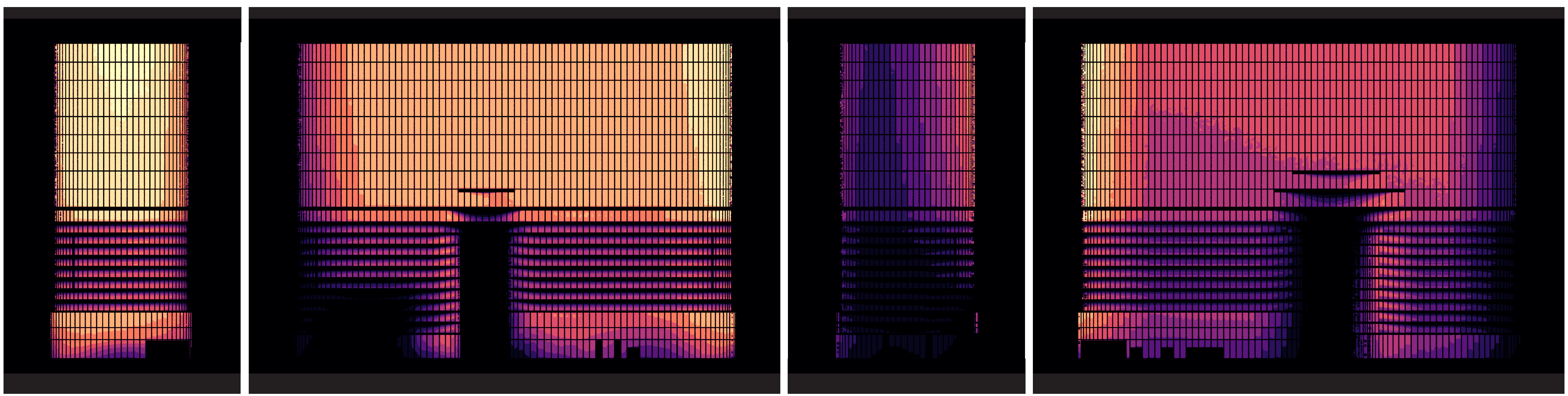
Without the exterior horizontal shading, the building is very exposed to annual patterns of solar radiation. The site orientation relative to north results in long southwest and northeast exposures of facade.

The long facades behave as east and west exposures, and will receive patterns of significant sun every clear day of the year.

The natural overhang conditions created by the residential balconies provide substantial relief to those portions of skin.

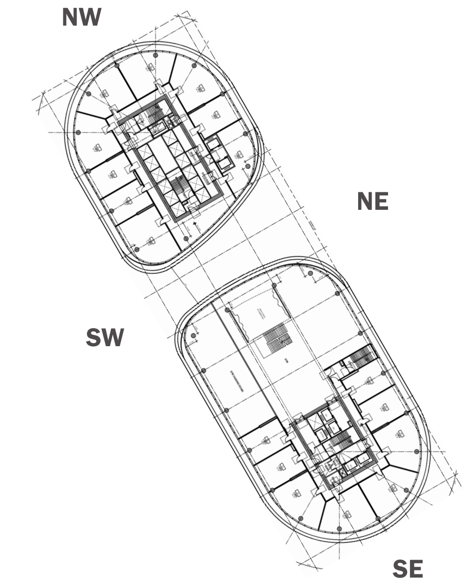
The majority of surrounding context is of a smaller scale, and site shadowing from adjacent buildings is limited to the lower corner of the southwest facade.

**SOUTHEAST ELEVATION** **SOUTHWEST ELEVATION** **NORTHWEST ELEVATION** **NORTHEAST ELEVATION**



**kWh/m2**


(continued next page)

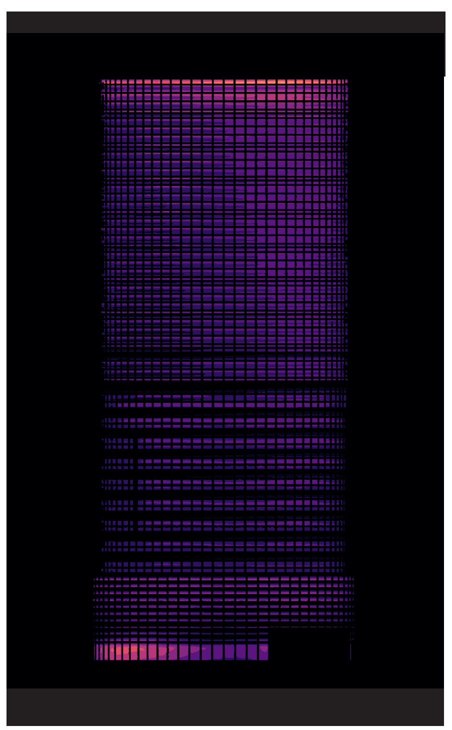



# Solar Exposure and Horizontal Shades

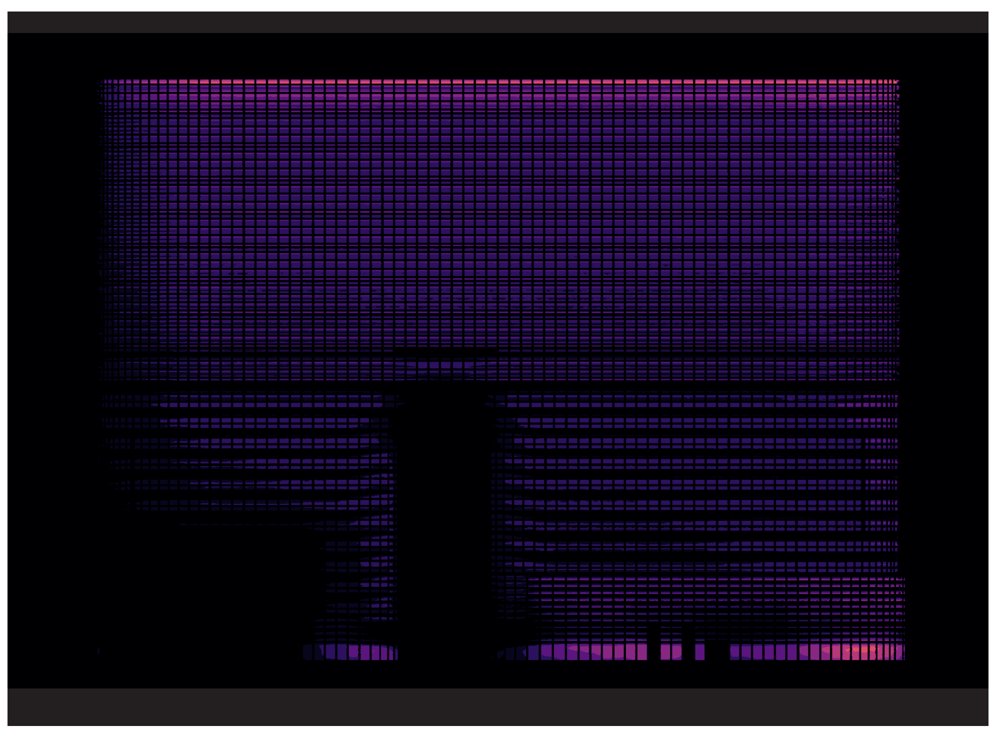
The dense spacing of horizontal shade members provides a substantial amount of annual relief from direct sun exposure.

All orientations are very well shaded, and only very low angle sun at sunset and sunrise will fall on the glazing.

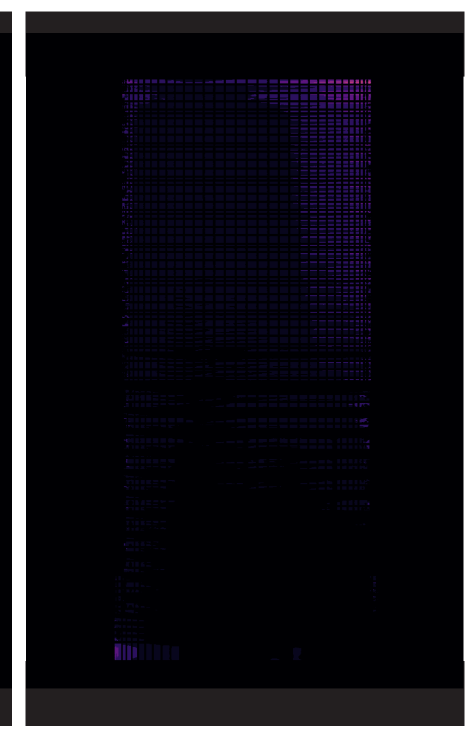
**SOUTHEAST ELEVATION**



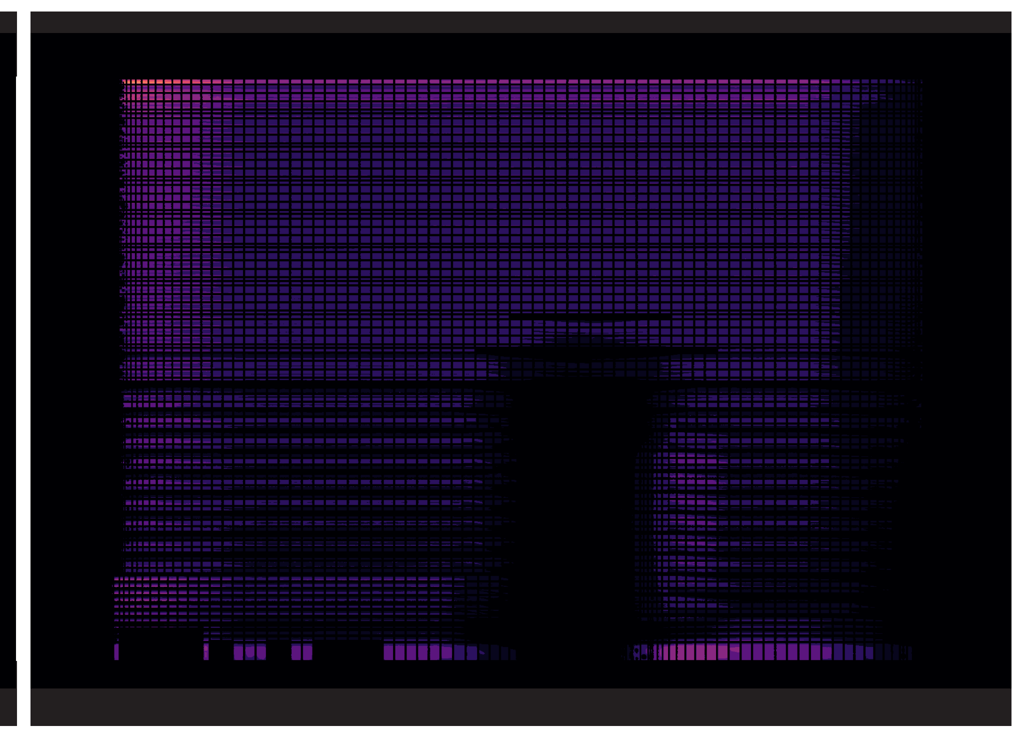
**SOUTHWEST ELEVATION**



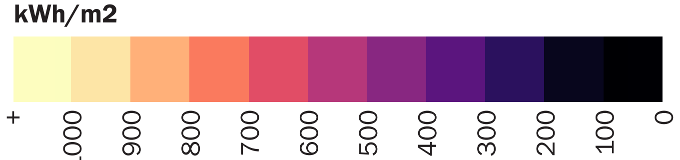
**NORTHWEST ELEVATION**

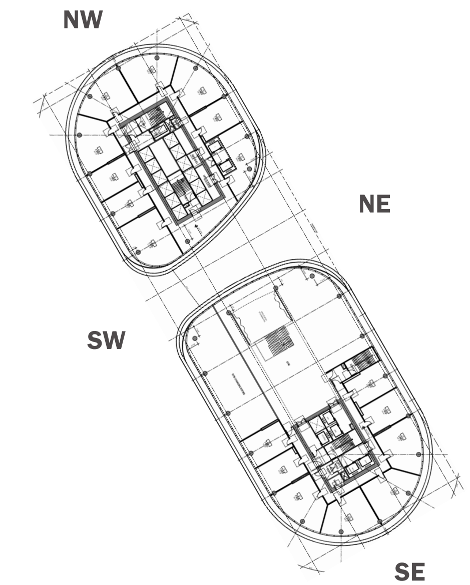


**NORTHEAST ELEVATION**



**kWh/m2**



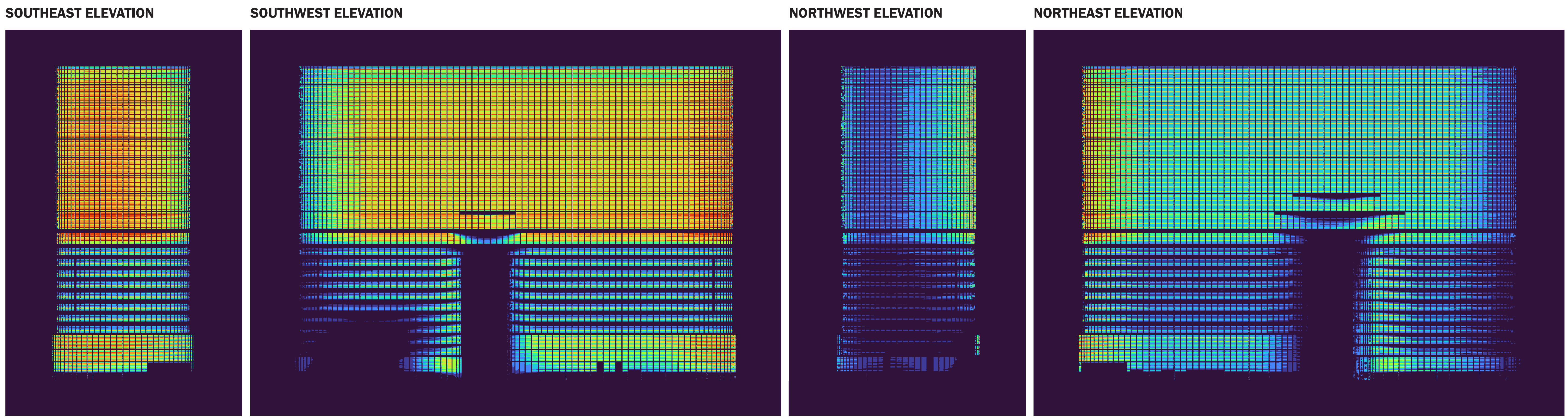



# Annual Insolation Reduction

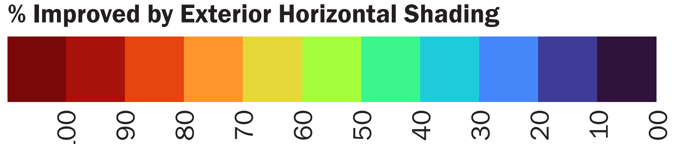
These diagrams show the relative impact of the shading design by highlighting the percent reduction in annual sun exposure at the vertical skin.

Where the residential balconies already shade the glass, the further benefit of the exterior shading elements is muted. Where the skin would be completely unshaded, the impact of the shading is substantial. On the southernmost portions of skin, the fixed shading blocks up to 80 percent of the annual sun.

The southwest facade of the office portion receives a critical 60% reduction of annual sun. This long exposure is coincident with the directional sun patterns aligning with likely peak cooling loads between 2 and 4 pm between June and September.



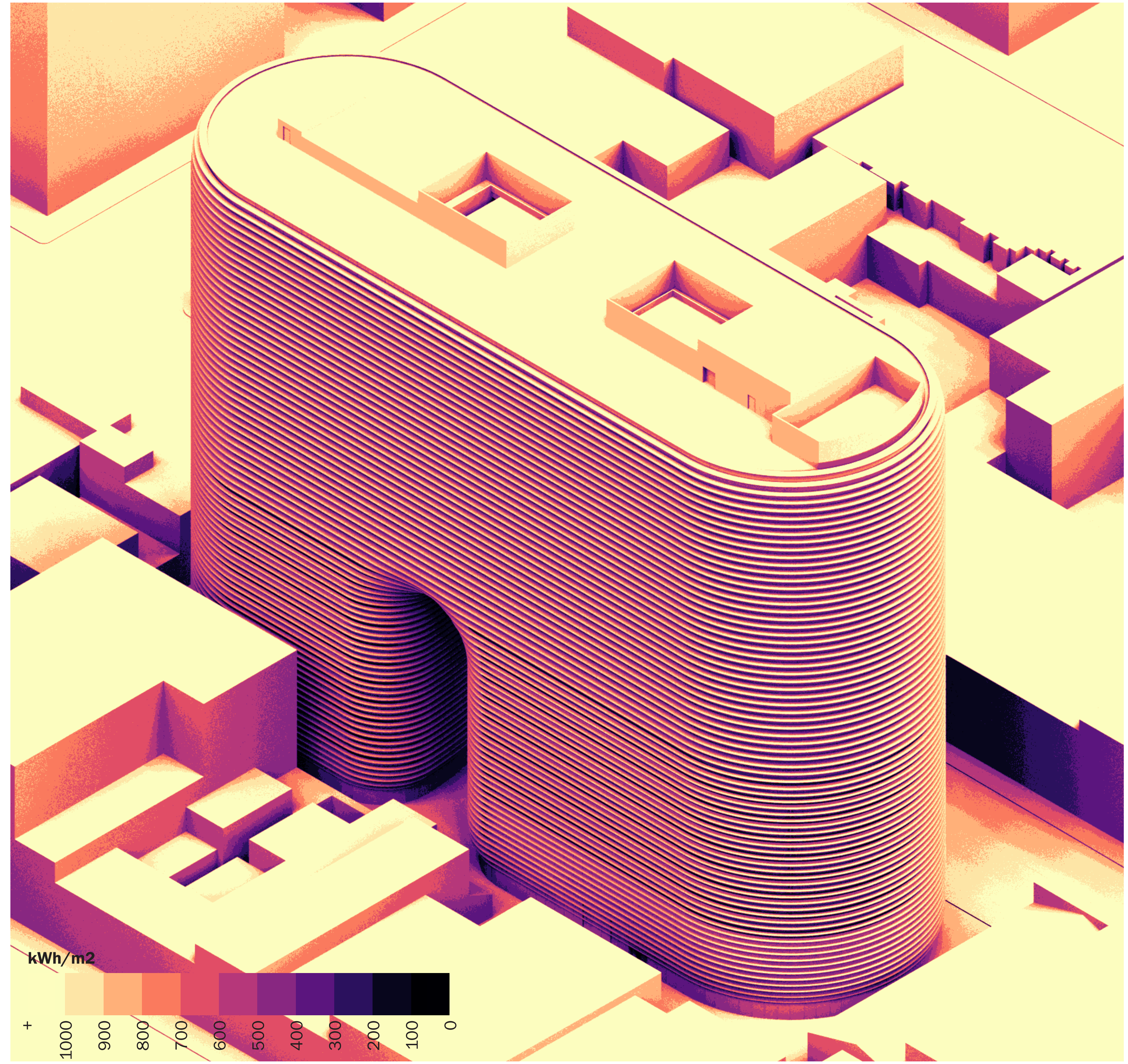

**% Improved by Exterior Horizontal Shading**



## PV OPPORTUNITIES

The substantial quantity of shade surfaces presents a unique opportunity to capture sun for electricity through building integrated photovoltaic panels.

As each surface accepts the solar radiation that would otherwise fall on the glass. If these funs were clad with thin film PV elements, the shading surfaces could become a sizeable PV array.

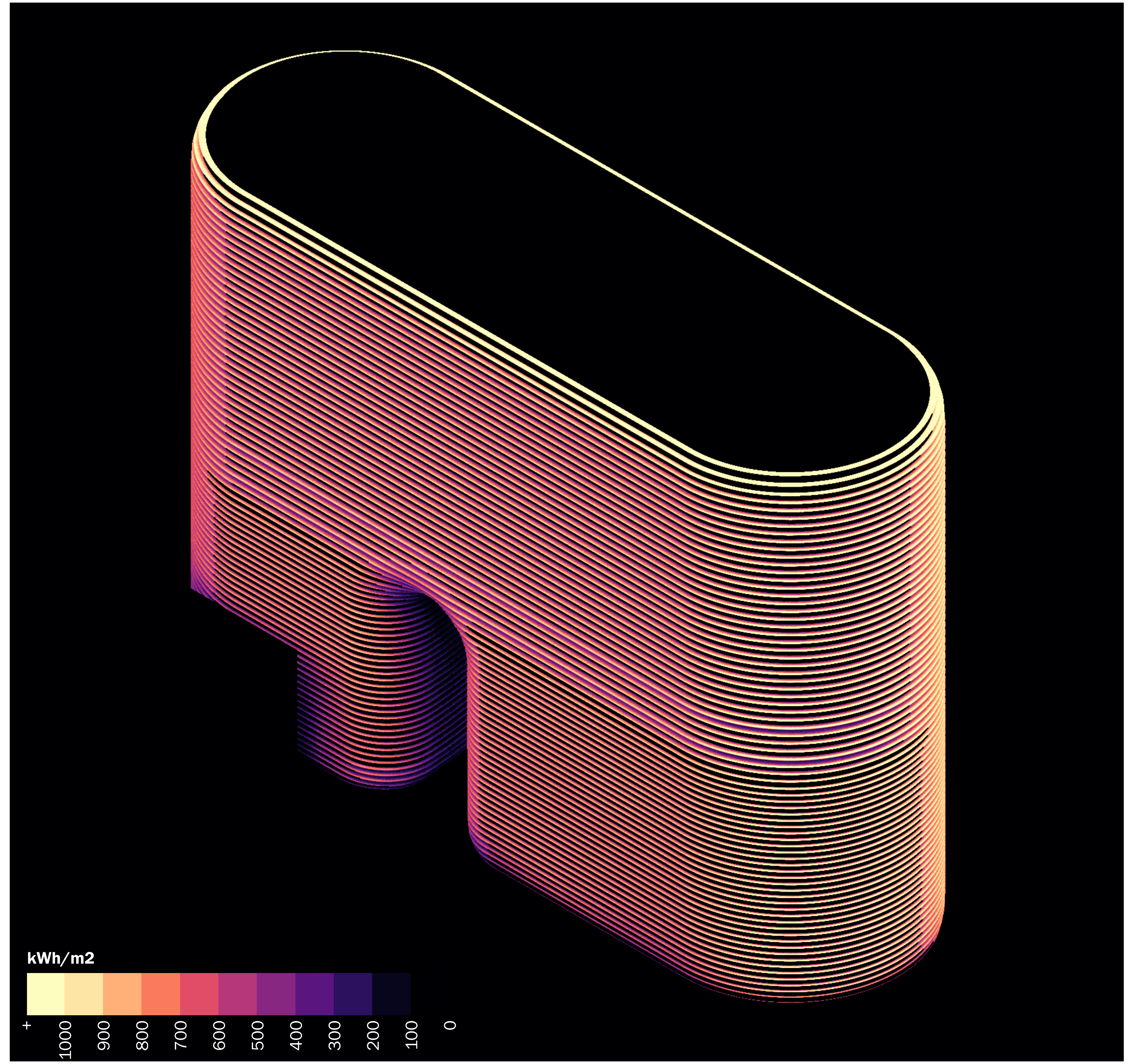


## PV OPPORTUNITIES - FACADE

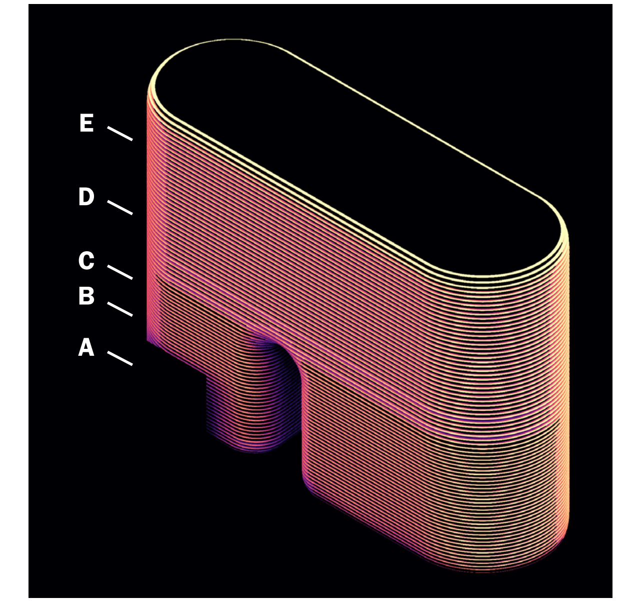
The substantial quantity of shade surfaces presents a unique opportunity to capture sun for electricity through building integrated photovoltaic panels.

As each surface accepts the solar radiation that would otherwise fall on the glass. If these funs were clad with thin film PV elements, the shading surfaces could become a sizeable PV array.

By isolating the solar exposure of the fins alone, we can estimate the potential for energy production at the fins.



| TYPICAL OVERHANG | AVERAGE IRRADIANCE | AREA | #FINS | X | THIN FILM PANEL EFF. | X | SYSTEM EFFICIENCY | X | FIN SURFACE COVERAGE | = | PRODUCTION POTENTIAL |
|---|---|---|---|---|---|---|---|---|---|---|---|
| A | 418 kWh/m² | 188 m² | 15 | | 0.165 | | 0.90 | | 0.90 | | **1,105 MWh** |
| B | 468 kWh/m² | 188 m² | 15 | | | | | | | | |
| C | 424 kWh/m² | 203 m² | 5 | | | | | | | | |
| D | 533 kWh/m² | 249 m² | 20 | | | | | | | | |
| E | 538 kWh/m² | 249 m² | 20 | | | | | | | | |




## PV OPPORTUNITIES - FACADE + ROOF

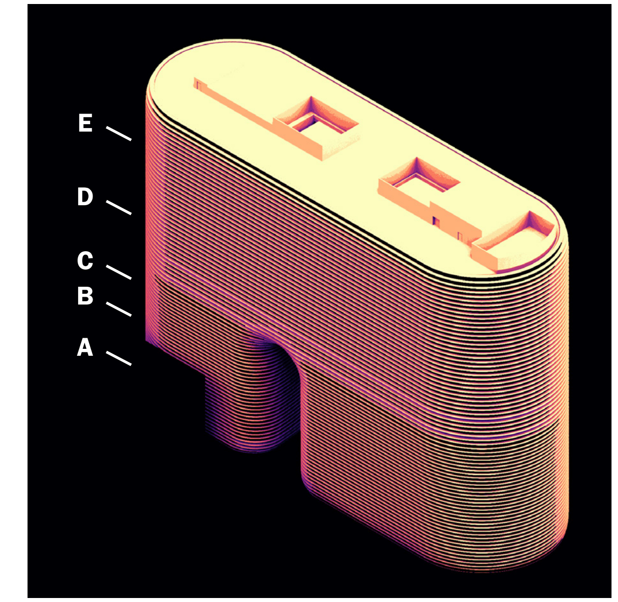
| TYPICAL OVERHANG | AVERAGE IRRADIANCE | AREA | #FINS |
|---|---|---|---|
| A | 418 kWh/m² | 188 m² | 15 |
| B | 468 kWh/m² | 188 m² | 15 |
| C | 424 kWh/m² | 203 m² | 5 |
| D | 533 kWh/m² | 249 m² | 20 |
| E | 538 kWh/m² | 249 m² | 20 |

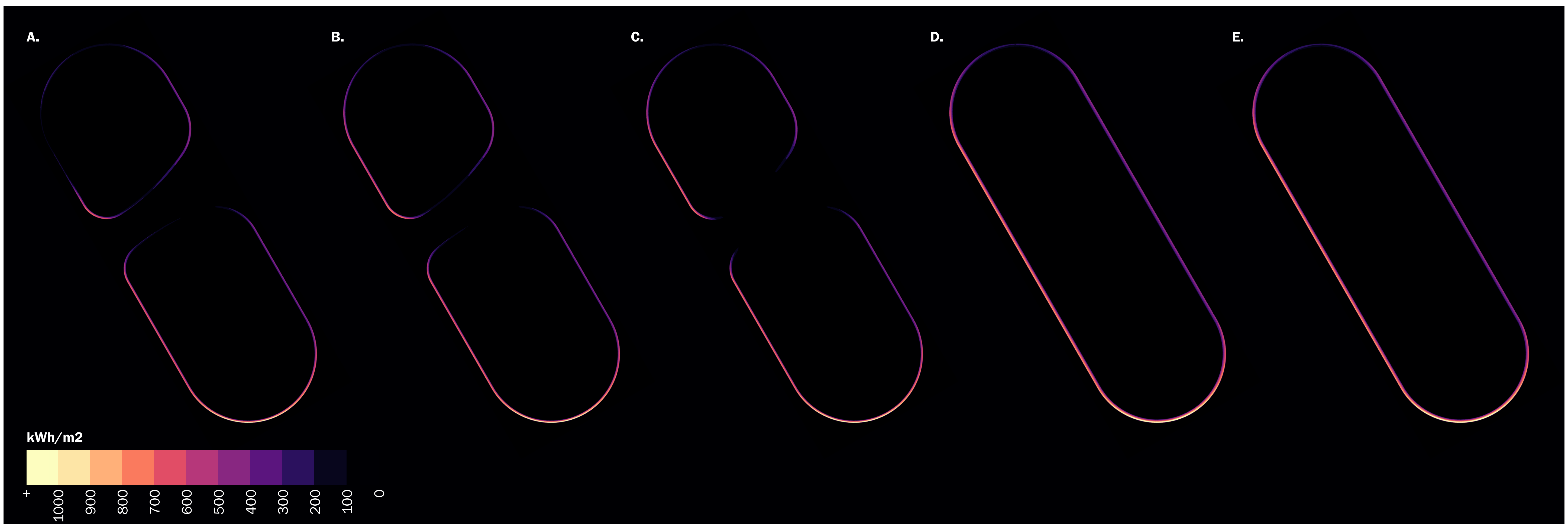
| | THIN FILM PANEL EFF. | | SYSTEM EFFICIENCY | | FIN SURFACE COVERAGE | | PRODUCTION POTENTIAL |
|---|---|---|---|---|---|---|---|
| X | 0.165 | X | 0.90 | X | 0.90 | = | **1,105 MWh** |

| | AVERAGE IRRADIANCE | AREA | | STANDARD PANEL EFF. | | SYSTEM EFFICIENCY | | ROOF AREA COVERAGE | | PRODUCTION POTENTIAL |
|---|---|---|---|---|---|---|---|---|---|---|
| ROOF | 1810 kWh/m² | 7065 m² | X | 0.20 | X | 0.90 | X | 0.50 | = | **1,151 MWh** |

\+ =

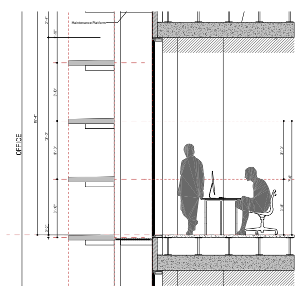
TOTAL PRODUCTION POTENTIAL
**2,256 MWh**



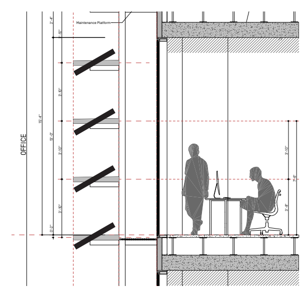
## PV OPPORTUNITIES - IMPROVING FACADE PRODUCTION

PRODUCTION POTENTIAL
**1,105 MWh**



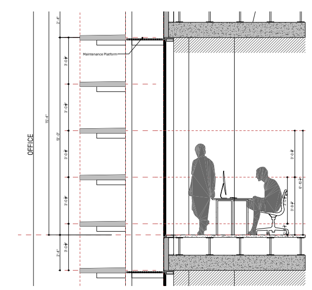
Baseline.

PRODUCTION POTENTIAL
**1,320 MWh**



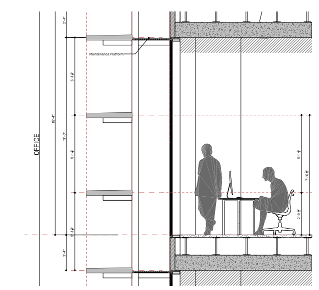
More exposure per fin with rotation.

PRODUCTION POTENTIAL
**1,217 MWh**



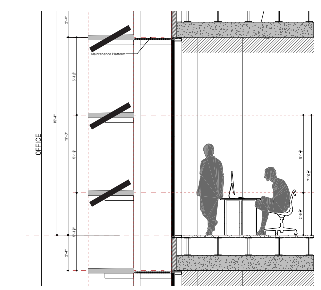
Less exposure per fin with tighter spacing, but more total fins.

PRODUCTION POTENTIAL
**955 MWh**

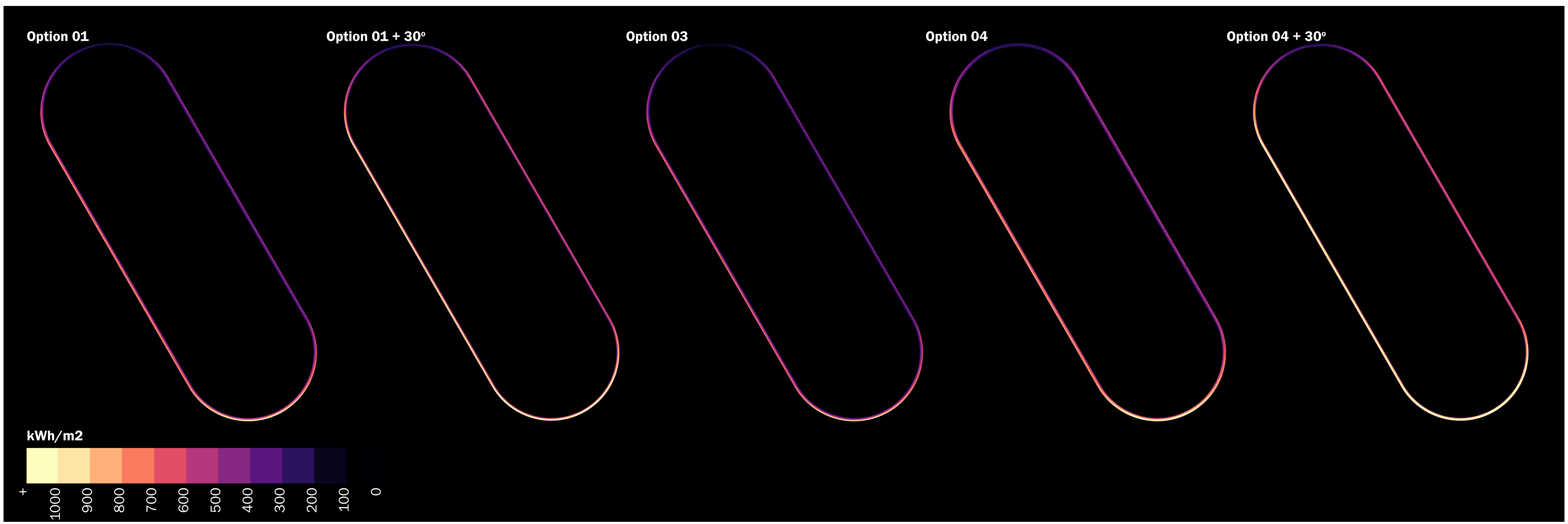


More exposure per fin with looser spacing, but fewer total fins.

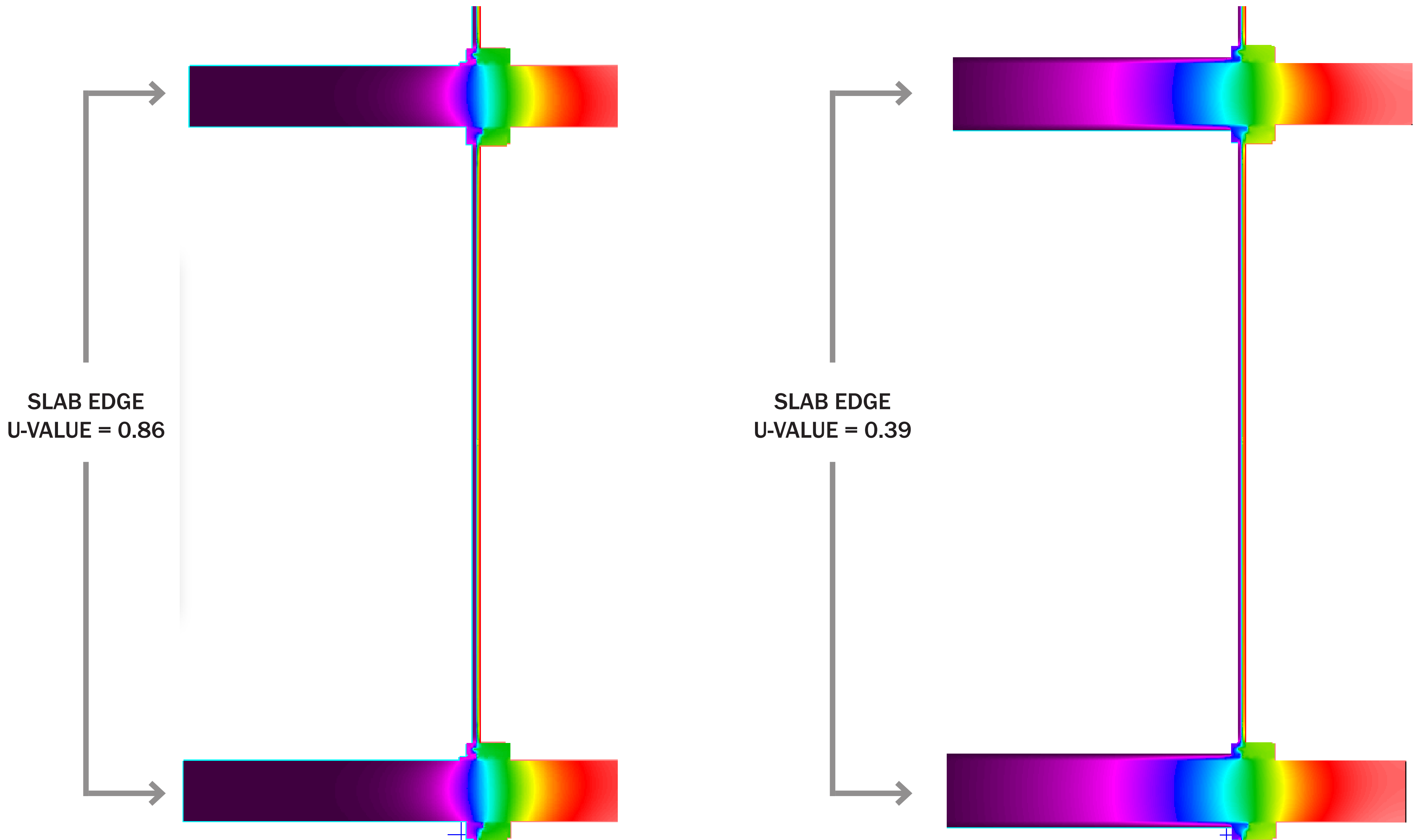
PRODUCTION POTENTIAL
**1,065 MWh**



Most exposure per fin with looser spacing and rotation, but fewer total fins.



## SLAB EDGE AND ENVELOPE U-VALUE




**UNINSULATED EXTERIOR SLAB**

**INSULATED EXTERIOR SLAB**
1" RIGID MINERAL WOOL TOP AND BOTTOM

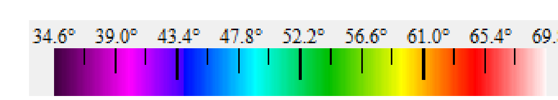
The effect of thermal bridging from a continuous slab to the exterior of the building can be understood by the slab edge U-value.

In a normative building, the slab edge would sit behind the an insulated spandrel panel, resulting in a standard opaque portion of wall U-value. A spandrel with R-9 insulation would have a U-value of 0.11.

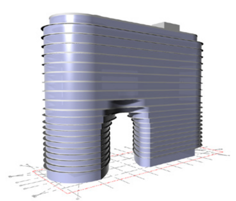
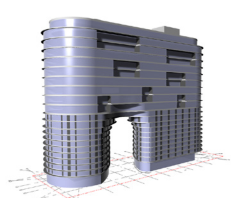
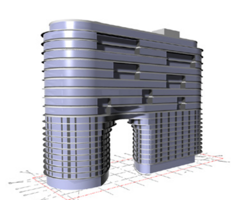
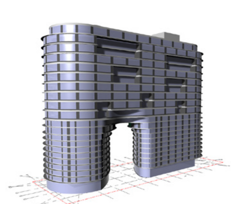
An uninsulated slab can be a thermal bridge, and the resultant slab edge U-value for Fountain Alley would be 0.86 (R-1.2).

Insulating the exterior portion of slab can improve the slab edge U-value, in the case of Fountain Alley improving to 0.39 (R-2.6).

**The capacity of the slab edge U-value to problematically de-rate the overall U-value depends on the overall window to wall ratio.**



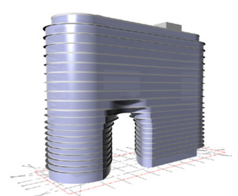
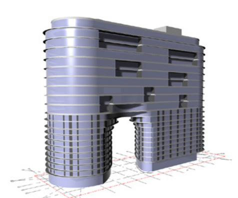
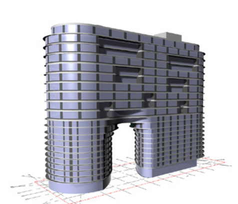
## ENVELOPE THERMAL PERFORMANCE

| Facade Options and Overall U - Values | | Glass to Opaque Ratio | Overall Wall Assembly U-value | % Better | Overall Opaque Area U-value | Overall Opaque Area R-value |
|---|---|---|---|---|---|---|
| | T-24 Baseline | 40% | 0.24 | baseline | 0.06 | R-16 |
|  | Full Glass | 83% | 0.35 | -44% | 0.35 | R-2.8 |
|  | Option 01 | 74% | 0.32 | -39% | 0.22 | R-4.5 |
|  | Option 02 | 70% | 0.31 | -25% | 0.20 | R-5.0 |
|  | Option 03 | 64% | 0.29 | -18% | 0.18 | R-5.7 |

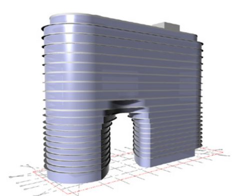
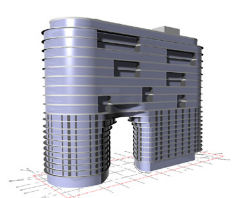
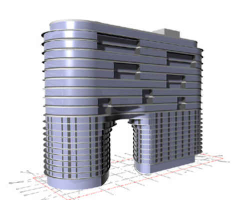
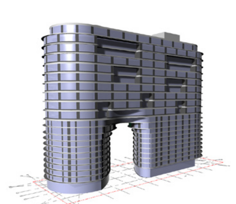
The overall wall assembly U-value of a T-24 baseline skin is approximately 0.24. The combination of high glass area and exposed slab edge results in an effective skin that is up to 44% worse than code baseline.

While these real-world R-values are low for the opaque wall, T-24 does not explicitly require a sophisticated de-rated R-value from thermal bridging as input to the compliance calculation.

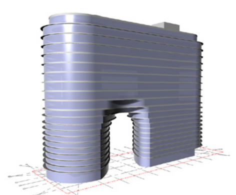
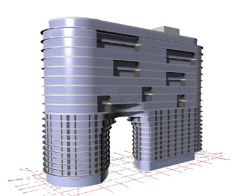
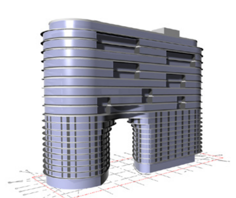
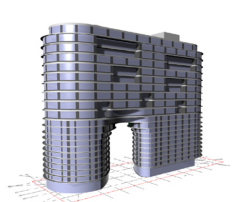
**While not an issue toward T-24 compliance, these de-rated R-values should be the input for mechanical load calculations, and may significantly impact system sizing.**

| Facade Options and Overall U - Values | Glass to Opaque Ratio | Overall Wall Assembly U-value | % Better | Overall Opaque Area U-value | Overall Opaque Area R-value |
|---|---|---|---|---|---|
| T-24 Baseline | 40% | 0.24 | baseline | 0.06 | R-16 |
|  Full Glass w/ Insulated Slab | 83% | 0.32 | -33% | 0.17 | R-5.7 |
|  Option 01 w/ Insulated Slab | 74% | 0.29 | -20% | 0.12 | R-8.1 |
|  Option 02 w/ Insulated Slab | 70% | 0.28 | -16% | 0.11 | R-8.6 |
|  Option 03 w/ Insulated Slab | 64% | 0.26 | -9% | 0.10 | R-9.3 |

In the real world, insulating the slab extensions will benefit the overall opaque wall R-value, and may significantly impact system sizing.

| Facade Options and Overall U - Values | | Glass to Opaque Ratio | Overall Wall Assembly U-value | % Better | Overall Opaque Area U-value | Overall Opaque Area R-value |
|---|---|---|---|---|---|---|
| | T-24 Baseline | 40% | 0.24 | baseline | 0.06 | R-16 |
|  | Full Glass w/o Slab Edge De-rating | 83% | 0.31 | -26% | 0.10 | R-10 |
|  | Option 01 w/o Slab Edge De-rating | 74% | 0.28 | -13% | 0.10 | R-10 |
|  | Option 02 w/o Slab Edge De-rating | 70% | 0.27 | -9% | 0.10 | R-10 |
|  | Option 03 w/o Slab Edge De-rating | 64% | 0.25 | -1.6% | 0.10 | R-10 |

For the purposes of T24 compliance calculations, the opaque wall can be considered simply as the definition of the wall assembly. We have assumed R-10 as the opaque spandrel panel in our T24 performance modeling, reflecting 2” of rigid mineral wool in the panel.

| Facade Options and Overall U - Values | | Glass to Opaque Ratio | % Worse Than T-24 TDV |
|---|---|---|---|
| | T-24 Baseline | 40% | - |
|  | Full Glass w/o Slab Edge De-rating | 83% | -8.9% |
|  | Option 01 w/o Slab Edge De-rating | 74% | -5.7% |
|  | Option 02 w/o Slab Edge De-rating | 70% | -4.2% |
|  | Option 03 w/o Slab Edge De-rating | 64% | -1.9% |

In SD, A10 aims for a T24 performance model to track ~+2% or better than T24 to ensure compliance. With 64% glass area, Fountain Alley is nearing compliance, and in line with our previous compliance runs that tested a generic 60% WWR.

A10 recommends the envelope proceed with the design thinking reflected in Option 3.

**Next Steps:**
**Taylor Engineering to confirm WWR and real-world R-value impacts of the envelope on system sizing.**

**A10 to continue refining T24 compliance model, with the goal of capturing the remaining ~1.9% of exceedance in the central plant definition.**

**BIG to continue refining Option 3 distribution of solid and glass facade.**

## EMBODIED CARBON OF EXTERIOR SHADING

Atelier Ten compared material options for Fountain Alley's exterior shading system with a focus on embodied carbon. This memo presents the findings of this analysis and provides high-level commentary for the design team to consider while deciding materiality of the shades.

### Summary

- Wooden louvers or fins are a potentially carbon-sequestering option, and are recommended for the lower levels of the building where feasible with the building code.
- Aluminum shades are the most-carbon intensive due to the energy-intensive manufacturing process of the metal as well as its finishing.
- GFRC products sold by Germany-based Rieder have demonstrated low carbon emissions, and represent significant savings compared to FRP, terracotta and conventional GFRC - all of which are roughly equivalent.
- Impact of the subconstruction that connects the shading system to the curtainwall can be comparable to the shades themselves. It has not been quantified in this analysis, and mass-per-unit-area of the shade system is provided as a proxy.
- The shading system could make up 8.4% of the core and shell's emboided carbon if aluminum is selected, while a Rieder GFRC based system would only make up about 1.3%. Thus, on the building-scale, the shading materiality can potentially reduce more than 6% of the total embodied carbon.

#### DATA AND COMPARABILITY

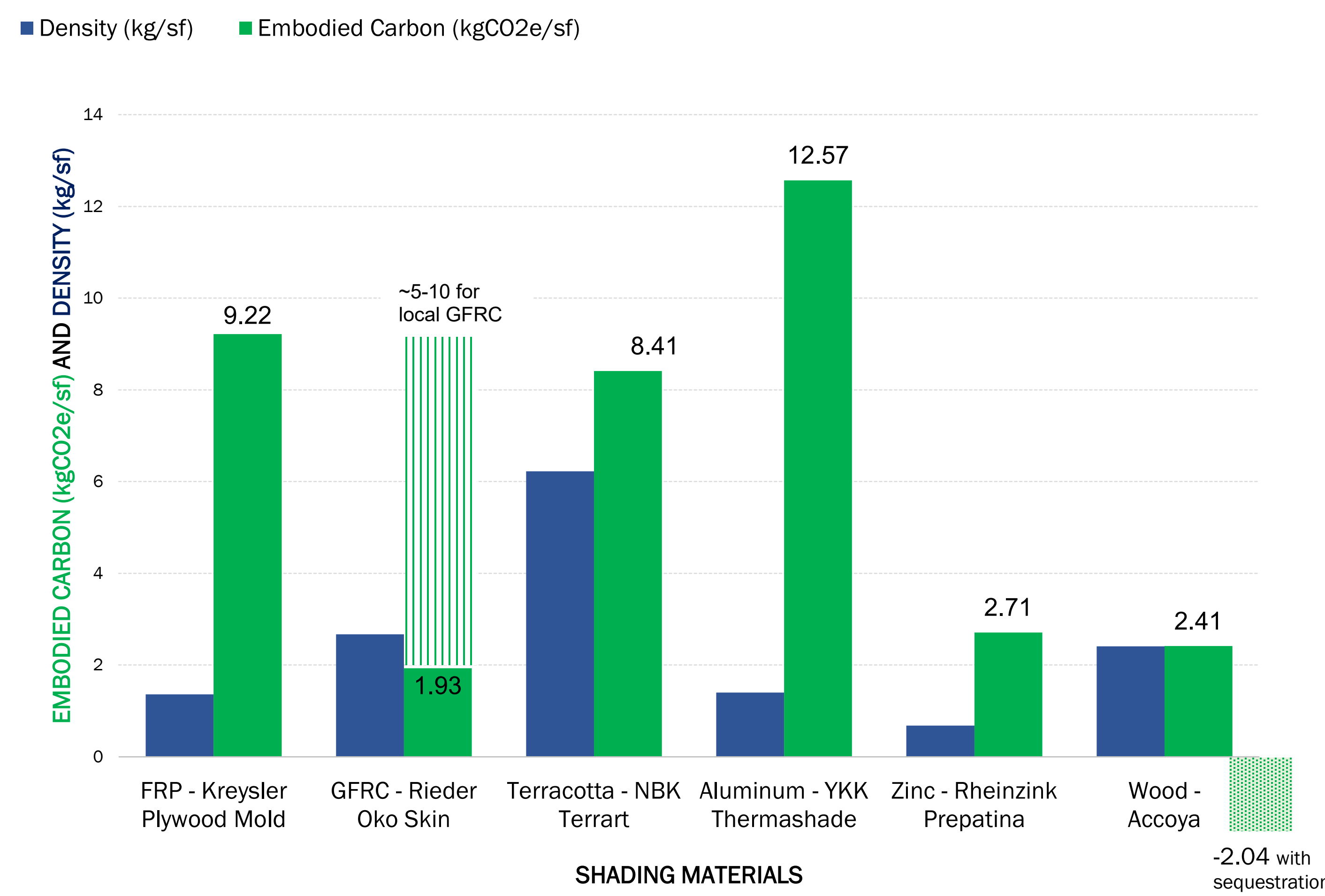
The graph on the right compares the embodied carbon of each shading system on a per-square-foot-of-horizontal-overhang basis. Life-cycle data for manufacturing stages of the product (A1-A3) was used for comparison. Data was obtained from product-specific Environmental Product Declarations (EPDs) for all materials, except for FRP from Kreysler associates for which LCA data was obtained from an academic study of the product conducted at Stanford University.

It is noted that EPDs are best data sources available, but they do not represent a fully accurate comparison as not all EPDs here are subject to the same Product Category Rules (PCRs). Moreover, sub-construction associated with support need to be accounted for in a future study. Differences may also result from transportation and installation, but these are expected to be less significant than manufacturing.

For decision-making, the design team is recommended to think of these options in the following brackets:

- 'high emissions' - aluminum
- 'middle emissions' - terracotta, FRP and conventional GFRC
- 'low emissions' - Rieder FibreC, zinc and wood

EMBODIED CARBON OF SHADING MATERIALS
10344 FOUNTAIN ALLEY




## LIFE-CYCLE EMISSIONS OF THIN-FILM PV

Product-specific EPDs are not available for thin-film photovolatic products. Several academic LCA studies have been conducted for both thin-film and crystalline silicon PV modules, and while the latter are slightly better performers in terms of life-cycle emissions, the difference is not estimated to be significant. Both types of PV modules are estimated to have 30-50 grams of CO2e life-cycle emissions for each kWh produced in a 30-year lifespan.

On a per-square foot basis, thin-film PV is estimated to release 9.27 kgCO2e/sf of life-cycle emissions, which includes manufacturing, installation, use, disassembly and disposal (not counting renewable energy production). This is comparable to the 'middle emissions' bracket of shading materials.

Embodied carbon of thin-film PV will be offset in less than 5 years with the estimated annual production of 1105 MWh for the facade, by avoiding emissions from the CAISO grid which has a marginal emissions intensity of about 467 kgCO2e/MWh. It is noted that this is a conservative, rough order of magnitude number since the renewable energy production would actually avoid emissions in the late afternoons when grid emissions are about to peak.

NATURAL

**WOOD | 2 inch thick fins**

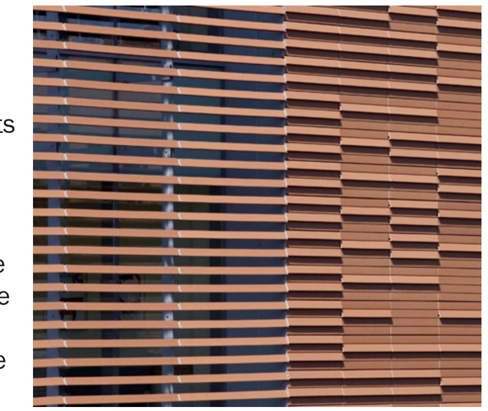
Accoya is a European wood product used in exterior applications that is available with FSC certification and is Cradle to Cradle Gold certified. It is actually a carbon-sequestering product if the CO2 absored during the life of the trees used in manufacturing is accounted for. Harvesting wood into commercial products locks up the CO2 for 50+ years, as opposed to it being released through decomposition of dead much sooner.

Wood makes for desirable aesthetics, but is challenging to implement in high-rise buildings due to code compliance issues.

**TERRACOTTA | 2 inch thick fins**

Terracotta is made by baking clay in kilns at high temperatures of about 2000 degrees Fahrenheit, and is thus a relatively carbon-intensive material despite its 'earthen' reputation.

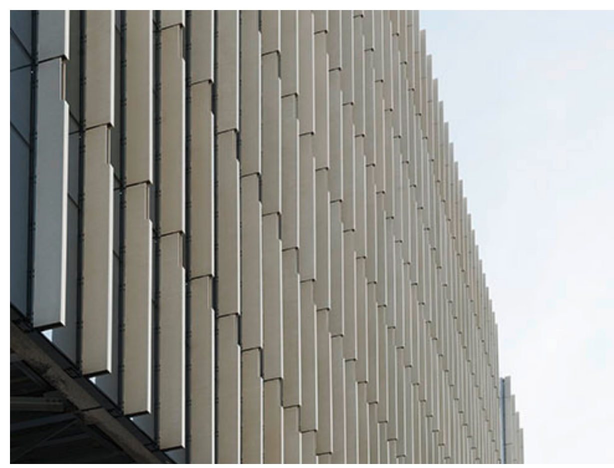
NBK Terrart is a promiment line of architectural terracotta products produced in Europe. The products reviewed by Atelier Ten had high mass densities, more than twice that of GFRC and thus are expected to have more extensive support systems. The design team is encouraged to explore hollow configurations to reduce weight.



GLASS-FIBER

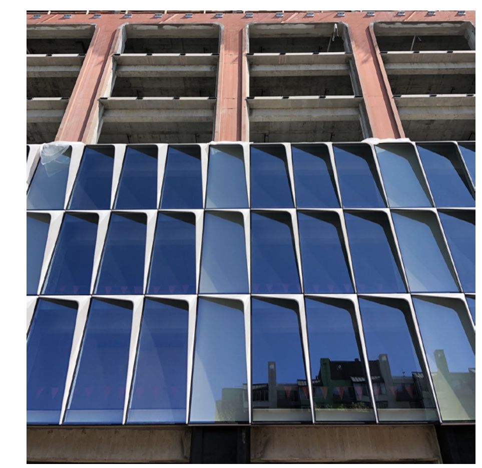
**GFRC | 0.5 inch thick fins**

Rieder FibreC, available as concrete skin, oko skin or formparts, is a German GFRC product which is significantly lower-carbon compared to conventional GFRC products. Conventional GFRC available in the US is expected to have slightly higher emissions than FRP. The product is known for its 'lively' appearance due to pours and multiple shades.



**FRP | 0.35 inch thick fins**

FRP panels are produced by Kreysler Associates in Napa Valley, CA and can be molded into a variety of complex shapes. The life-cycle data used for this study is for a plywood molded FRP product, and it is noted that an MDF mold can result in 10x higher embodied carbon.

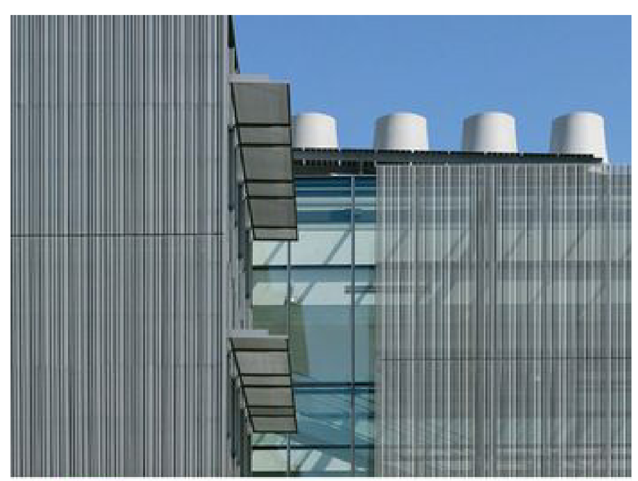


METALLIC

**Zinc | 1 mm thick perforated fins**

Zinc perforated panels are the most light-weight option available, by virtue of being extremely thin. Zinc is also an abundant metal which is not as energy-intensive to extract and process as other metals such as steel and aluminum, and thus makes for a low embodied carbon option.

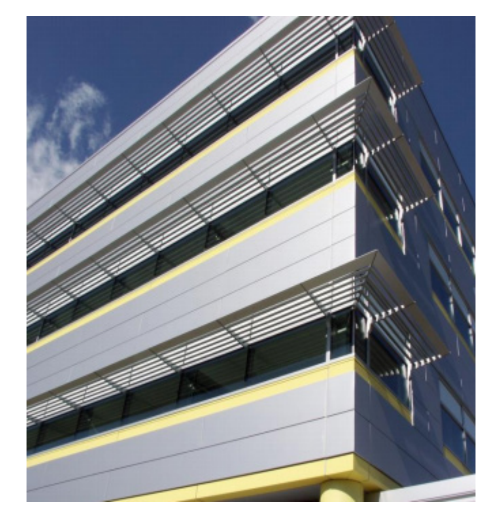
Shading applications, however, are limited, and will need to be explored with the manufacturer Rheinzink.



**Aluminum | 3-inch tilted louvers**

Aluminum shading systems are the most common commercially available systems, and are as light as FRP. On a per kg basis, finished aluminum is a highly carbon-intensive product, but is needed in lower quantities and comes in hollow configurations.

The product studied is the YKK Thermashade system, the only aluminum sunshades to have published an EPD.



# RENEWABLE ENERGY TARGETS - PV ANALYSIS

## Executive Summary

The portfolio of Westbank San Jose projects intends to offset 5% of total energy use with on site PV at the buildings. Given the variety of design constraints, each building will have a unique target to offset. Some buildings can not offset 5% locally, and some buildings have the capacity to offset substantially more than 5%.

Fountain Alley is uniquely positioned to offset a substantial about of its own energy use, and significantly contribute to the 5% portfolio-wide goal. The Fountain Alley goal for on-site PV generation is to offset 17% of its total electricity consumption. This goal requires 35% of the available roof area to be PV, and 75% of the horizontal shades top surface area. The roof and façade combined is approximately an 1,287 kW PV array. The electricity generation potential of the array yields approximately 1,619,370 kWh/yr, approximately 16.9% of the building total energy use if the operational EUI is 34 kBTU/sf.

The rooftop PV is assumed to be a combination of standard flat-packed PV modules over the mechanical penthouses, and bifacial PV trellis structures. Bifacial PV generates electricity from both the top and bottom of the modules, and the modules feature cells with small gaps between them that allow dappled light to pass through, providing the right amount of shade for occupants to work on a laptop outside comfortably, and also enjoy natural daylight.

## On-Site PV Target:

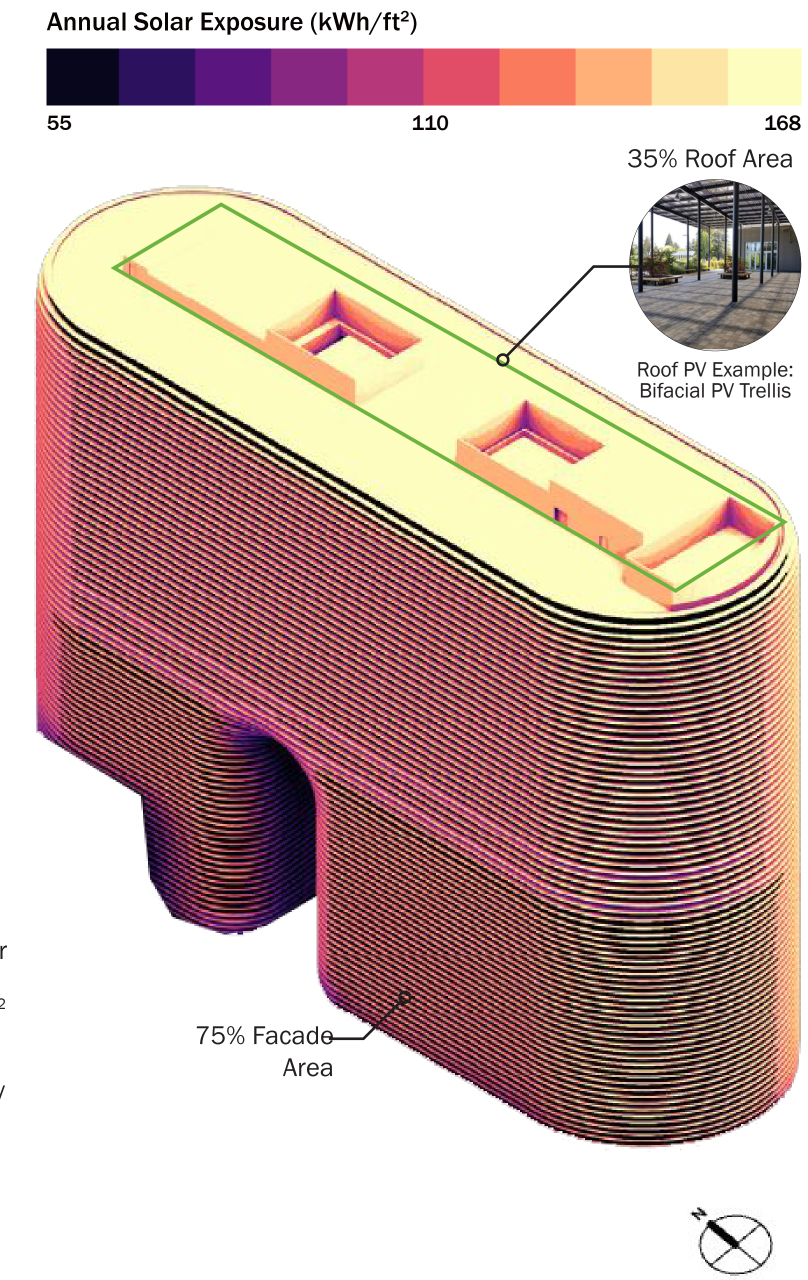
| 16.9% | 35% | 75% |
|---|---|---|
| Energy Reduction | Roof Area | Facade Area |

| | |
|---|---|
| EUI Target | 34 kBTU/ft² (9.96 kWh/ft²) |
| GFA | 961,972 ft² |
| Annual Energy Use | 9,585,887 kWh |
| Available Roof Area | 76,048 ft² |
| Available Facade Area | 178,844 ft² |
| Solar Energy Density | 168 kW/ft² (1810 kW/m²) |

### PV Area

| | |
|---|---|
| PV Roof Area | 26,617 ft² |
| PV Facade Area | 134,132 ft² |
| PV System Size | 1,773 kW |
| PV Annual Output | 1,619,370 kWh/yr |
| % Energy Reduction | 16.9% |

* Array system size calculations were based on a standard efficiency panel with power of 18 W/sf for PV roof area and a thin-film efficiency panel with a power of 10 W/sf for PV facade area.




## Calculations

PV Annual Output Calculation

Available Roof Area x PV Area Coverage (35% Total Roof Area, 75% Total Facade Area) x Annual Solar Irradiance 168 kWh/ft²

x Panel Efficiency 0.165 - 0.20 (Thin-Film) (Standard) x System Efficiency 0.9 x Inverter Efficiency 0.96

=

**1,619,370 kWh**

Annual Energy Output

**16.9% Reduction**

Annual Energy Use

## LEED SCORECARD

**San Jose Fountain Alley (SJFA)**
**LEED v4 for Core & Shell**

**Certified** 40 to 49 points **Silver** 50 to 59 points **Gold** 60 to 79 points **Platinum** 80 or more points
Achievability rating: **High** = 90%, **Med** = 60%, **Low** = 10%, **NP** = not possible.

| high | med | low | NP | | | | Achievability | Standard |
|---|---|---|---|---|---|---|---|---|
| 84 | 9 | 13 | 5 | | | **82 Projected Points** | | |
| 1 | 0 | 0 | 0 | | | **Integrative Process** | | Standard |
| 1 | | | | | IP Credit 1 | **Integrative Process** | | Perform preliminary energy model and water budget before the completion of SD and document in OPR & BOD. |
| 19 | 0 | 1 | 0 | | | **Location & Transportation** | | Standard |
| | | | 20 | | LT Credit 1 | LEED for Neighborhood Development Location | | Locate the project in within a development certified under LEED for Neighborhood Development. |
| 2 | | | | | LT Credit 2 | **Sensitive Land Protection** | | Locate the development footprint on land that has been previously developed - OR - does not meet LEED criteria for sensitive land (prime farmland, floodplains, habitat for threatened species, near water bodies, in or near wetlands). |
| 2 | | 1 | | | LT Credit 3 | **High Priority Site and Equitable Development (v4.1)** | | Locate the project in an economically disadvantaged community (2pts) - OR - a brownfield site (2pts) - OR - develop an equitable development plan (2pts) - OR - include affordable housing units (1pt). |
| 6 | | | | | LT Credit 4 | **Surrounding Density and Diverse Uses** | | Locate on a site with an existing density of 22,000sf/acre - 35,000 sf/acre and within 1/2 mile of 4-8 basic services. |
| 6 | | | | | LT Credit 5 | **Access to Quality Transit (v4.1)** | | Locate project within 1/2 mile of a rail station or ferry terminal that meets min. daily transit service - OR - 1/4 mile of bus, streetcar or rideshare that meets min. daily transit service. |
| 1 | | | | | LT Credit 6 | **Bicycle Facilities (v4.1)** | | Provide short term (2.5% peak visitors) and long term (5% all regular occupants) bike parking within 100 ft of main entrance, FTE showers, and access to bicycle network. |
| 1 | | | | | LT Credit 7 | **Reduced Parking Footprint (v4.1)** | | Provide parking capacity that is 30% below base ratios determined by ITE Planning Handbook - OR - provide parking for carshare vehicles - OR - implement a daily parking fee equal to at least daily cost of municipal transit. |
| 1 | | | | | LT Credit 8 | **Electric Vehicles (v4.1)** | | Install electrical vehicle supply equipment (EVSE) in 2% of all parking spaces used by the project or at least two spaces |
| 6 | 2 | 3 | 0 | | | **Sustainable Sites** | | Standard |
| Y | | | | CA - ACP | SS Prereq 1 | **Construction Activity Pollution Prevention** | | Create and implement erosion control plan that meets the 2003 EPA Construction General Permit. |
| 1 | | | | | SS Credit 1 | **Site Assessment** | | Complete comprehensive site survey; topography, hydrology, climate, vegetation, soils, human use and human health effects. |
| | 1 | 1 | | | SS Credit 2 | **Site Development:** Protect or Restore Habitat | | Protect 40% of greenfield area, restore soils, and restore 30% of previously developed site with native/adapted plants (2pts) - OR - provide $0.40/sf to accredited land trust (1pt). |
| 1 | | | | | SS Credit 3 | **Open Space** | | Provide outdoor space greater than or equal to 30% of the total site area (including building footprint), with min. 25% vegetated. |
| | 1 | 2 | | | SS Credit 4 | **Rainwater Management (v4.1)** | | Manage runoff for the 80th percentile (1pt) 85th percential (2 pts) or 90th percentile (3 pts) using low-impact development (LID) and green infrastructure. |
| 2 | | | | | SS Credit 5 | **Heat Island Reduction** | | Meet high albedo requirements for roof and site (2pts) - OR - place a minimum of 75% parking under cover (1pt). |
| 1 | | | | CA - ACP | SS Credit 6 | **Light Pollution Reduction** | | Meet uplight and light trespass requirements, and do not exceed exterior signage luminance requirements. |
| 1 | | | | | SS Credit 7 | **Tenant Design and Construction Guidelines** | | Publish an illustrated document to educate tenants in implementing sustainable design and construction features in their tenant improvement build-outs. |

# 100% SD Sustainability Narrative

**10344 Fountain Alley, 10.30.2020**

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 7 | 4 | 1 | 0 | | **Water Efficiency** | | **Standard** |
| Y | | | | CA - ACP | WE Prereq 1 | **Outdoor Water Use Reduction:** 30% | Reduce outdoor water use by 30% over the baseline specified in LEED. |
| Y | | | | CA - ACP | WE Prereq 2 | **Indoor Water Use Reduction:** 20% | Reduce indoor water use by 20% over the baseline specified in LEED, use fixtures with WaterSense label, and meet requirements for process water use. |
| Y | | | | | WE Prereq 3 | **Building-Level Water Metering** | Install permanent water meters for building and grounds, and commit to share data with USGBC for 5 years. |
| 1 | 1 | | | CA - ACP | WE Credit 1 | **Outdoor Water Use Reduction:** 50% Reduction / No Potable Water Use | Reduce potable water used for irrigation by 50% (1pt) - AND - use no potable water for irrigation (1pt). |
| 4 | 2 | | | | WE Credit 2 | **Indoor Water Use Reduction:** 25% / 30% / 35% AND / OR 40% / 45% / 50% | Reduce building water use over LEED baseline. |
| 1 | 1 | 1 | | | WE Credit 3 | **Cooling Tower Water Use (v4.1)** | Conduct a water analysis to optimize cooling tower cycles. Maximizing cycles (1pt), >25% improvement OR 20% non-potable water use (2pts,) increase cycles by 30% OR 30% non-potable water use (3 pts). |
| 1 | | | | | WE Credit 4 | **Water Metering** | Install permanent water meters for two or more water subsystems. |
| 27 | 1 | 5 | 0 | | **Energy & Atmosphere** | | **Standard** |
| Y | | | | CA - ACP | EA Prereq 1 | **Fundamental Commissioning and Verification** | Engage commissioning agent by end of DD, develop and execute a commissioning plan, and prepare O&M plan for current facilities. |
| Y | | | | | EA Prereq 2 | **Minimum Energy Performance** | Reduce energy cost by 5%, compared to ASHRAE 90.1-2010, Appendix G; meet mandatory provisions of ASHRAE 90.1-2010. -OR Comply with HVAC and service water heating requirements for the climate zone in ASHRAE 50% Advanced Energy Design Guide, and meet ASHRAE 90.1-010 mandatory and prescriptive provisions. |
| Y | | | | | EA Prereq 3 | **Building-Level Energy Metering** | Install meters to provide data on total energy consumption, and commit to share data with USGBC for 5 years. |
| Y | | | | CA - ACP | EA Prereq 4 | **Fundamental Refrigerant Management** | Eliminate CFCs in building HVAC&R, and complete CFC phase-out conversion before project completion for any CFC equipment to remain. |
| 4 | | 2 | | | EA Credit 1 | **Enhanced Commissioning** | Complete CD review, post occupancy review, and recommissioning manual (3pts), and develop monitoring procedures (+1pt) - AND/OR - complete envelope Cx (+2pts) |
| 3 | | | | CA - ACP | EA Credit 2 | **Optimize Energy Performance:** 3% / 5% / 7% | Reduce building energy cost by 3% / 5% / 7% compared to ASHRAE 90.1-2010, Appendix G. |
| 3 | | | | | EA Credit 2 | **Optimize Energy Performance:** 9% / 11% / 13% | Reduce building energy cost by 9% / 11% / 13% compared to ASHRAE 90.1-2010, Appendix G. |
| 3 | | | | | EA Credit 2 | **Optimize Energy Performance:** 15% / 17% / 19% | Reduce building energy cost by 15%/ 17%/ 19% compared to ASHRAE 90.1-2010, Appendix G. |
| 3 | | | | | EA Credit 2 | **Optimize Energy Performance:** 21% / 23% / 26% | Reduce building energy cost by 21% / 23% / 26% compared to ASHRAE 90.1-2010, Appendix G. |
| 3 | | | | | EA Credit 2 | **Optimize Energy Performance:** 29% / 32% / 35% | Reduce building energy cost by 29%/ 32%/ 35% compared to ASHRAE 90.1-2010, Appendix G. |
| 1 | 1 | 1 | | | EA Credit 2 | **Optimize Energy Performance:** 39% / 43% / 47% | Reduce building energy cost by 39%/ 43%/ 47% compared to ASHRAE 90.1-2010, Appendix G. |
| 1 | | | | | EA Credit 3 | **Advanced Energy Metering** | Install meters for tenant spaces to independently meter energy consumptions for all systems dedicated to tenant space, with minimum of one meter per energy source per floor. Install advanced metering for base-building energy sources, per reference guide. |
| | | 2 | | | EA Credit 4 | **Grid Harmonization (v4.1)** | Design building and equipment for participation in demand response programs through load shedding or shifting (2pts) - OR - if DR program not available, provide infrastructure for future (1pt). Implement other load flexibility and management strategies (1-2pts) |
| 3 | | | | | EA Credit 5 | **Renewable Energy Production:** 1% / 3% / 5% | Produce renewable energy on-site for 1% / 3% / 5% of building energy consumption, calculated by cost. |
| 1 | | | | | EA Credit 6 | **Enhanced Refrigerant Management** | Select refrigerants with low global warming potential and ozone depletion potential. |
| 2 | | | | | EA Credit 7 | **Green Power and Carbon Offsets** | Engage a 5 year contract for at least 50% or 100% of the project's energy from green power, carbon offsets, or RECs. |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 8 | 1 | 2 | 3 | | | **Materials & Resources** | **Standard** |
| Y | | | | CA - ACP | MR Prereq 1 | **Storage & Collection of Recyclables** | Provide space for the collection and storage of paper, cardboard, glass, plastic, metals, and at least two of the following: batteries, mercury-containing lamps, and electronic waste. |
| Y | | | | CA - ACP | MR Prereq 2 | **Construction and Demolition Waste Management Planning** | Develop and implement a construction and demolition waste management plan. |
| 3 | | | 3 | | MR Credit 1 | **Building Life-Cycle Impact Reduction (v4.1)** | Conduct a life-cycle assessment (1 pt) that demonstrates a minimum of 5% / 10% reduction in at least three of the six impact measures (2-3pts). |
| 1 | | 1 | | | MR Credit 2 | **Building Product Disclosure & Optimization (v4.1):** Environmental Product Declarations | Use 10 products sourced from three different manufacturers that meet disclosure criteria (1pt) - AND/OR - use products that exhibit optimized performance , 10% by cost (1 pt). |
| 1 | 1 | | | | MR Credit 3 | **Building Product Disclosure & Optimization (v4.1):** Sourcing of Raw Materials | Use products that meet responsible extraction criteria, from 3 / 5 different manufacturers for 20% / 40% of total material cost (1-2pts). |
| 1 | | 1 | | | MR Credit4 | **Building Product Disclosure & Optimization (v4.1):** Material Ingredients | Use 10 products sourced from three different manufacturers that demonstrate the chemical inventory of the products (1pt) - AND/OR - use products that document their material ingredient optimization, 10% material cost (1pt). |
| 2 | | | | CA - ACP | MR Credit 5 | **Construction & Demolition Waste Management (v4.1):** 50% / 75% | Divert 50%, two material streams (1pt) - OR - 75%, three material streams (2pts), - OR - generate less than 7.5 lbs waste/sf (2pts) |
| 6 | 1 | 1 | 2 | | | **Indoor Environmental Quality** | **Standard** |
| Y | | | | CA - ACP | EQ Prereq 1 | **Minimum IAQ Performance** | For mechanically ventilated spaces: Meet minimum outdoor air intake flow requirements determined by ASHRAE 62.1-2010 ventilation rate procedure, meet sections 4 through 7 of ASHRAE 62.1-2010, and monitor outdoor air intake flows.<br>For naturally ventilated spaces: Meet minimum outdoor air opening and space configuration requirements determined by ASHRAE 62.1-2010 natural ventilation procedure; confirm natural ventilation is effective per CIBSE Applications Manual AM10, March 2005 Fig. 2.8.; and meet one of the following: measure exhaust airflow; provide automatic indication devices on natural ventilation openings; or monitor CO2 concentrations. |
| Y | | | | CA - ACP | EQ Prereq 2 | **Environmental Tobacco Smoke** (ETS) **Control** | Prohibit smoking inside building, locate exterior smoking areas at least 25 feet away from building, and post no-smoking signage within 10 ft of all building entrances. |
| 2 | | | | | EQ Credit 1 | **Enhanced Air Quality Strategies** | Provide entryway systems, prevent interior cross-contamination, and specify MERV 13 filters (1pt) - AND/OR - prevent exterior contamination or increase ventilation or monitor CO2 (1pt). |
| 3 | | | | | EQ Credit 2 | **Low-Emitting Materials (v4.1):** 2 / 3 / 4 / 5 categories | Achieve the threshold level of compliance with VOC emissions and content standards for 2, 3, 4 or 5 product categories. |
| 1 | | | | CA - ACP | EQ Credit 3 | **Construction IAQ Management Plan** | Develop an IAQ plan for construction and preoccupancy phases that meets SMACNA IAQ Guidelines for Occupied Buildings Under Construction. |
| | | 1 | 2 | | EQ Credit 4 | **Daylight (v4.1):** 40% / 55% / 75% | Meet spatial daylight autonomy and annual sunlight exposure requirements for percentage (40%/55%/75%) of regularly occupied floor area through simulation (1-3pts) - OR - meet illuminance level requirements for percentage (55%/75%/90%) of regularly occupied floor area through simulation (1-3pts) or measurement (1-3pts). |
| | 1 | | | | EQ Credit 5 | **Quality Views** | Provide direct views to the outside that meet 2 out of 4 LEED view criteria in 75% of regularly occupied spaces. |
| 6 | 0 | 0 | 0 | | | **Innovation** | **Standard** |
| 1 | | | | | IN Credit 1.1 | **EP, BPDO - EPDs** | Install products with 20 EPDs. |
| 1 | | | | | IN Credit 1.2 | **EP, AQT, LEM or Heat Island Reduction** | Design project to achieve features that promote non-motorized transportation on the project site and surrounding community. |
| 1 | | | | | IN Credit 1.3 | **Pilot, Procurement of Low Carbon Construction Materials** | Pending GBCI review and comment. |
| 1 | | | | | IN Credit 1.4 | **Innovation, TBD** | Pending GBCI review and comment. |
| 1 | | | | | IN Credit 1.5 | **Innovation, TBD** | Pending GBCI review and comment. |
| 1 | | | | | IN Credit 2 | **LEED™ Accredited Professional** | LEED Accredited Professional on design team. |
| 4 | 0 | 0 | 0 | | | **Regional Priority** | **Standard** |
| 1 | | | | | RP Credit 1.1 | **Building Life Cycle Impact Reduction** | Point Threshold: 3 |
| 1 | | | | | RP Credit 1.2 | **BDPO: Sourcing of Raw Materials** | Point Threshold: 1 |
| 1 | | | | | RP Credit 1.3 | **Optimize Energy performance** | Point Threshold: 10 |
| 1 | | | | | RP Credit 1.4 | **Access to Quality Transit** | Point threshold: 5 |
| | | | | | RP Credit | **Indoor Water use Reduction** | |
| | | | | | RP Credit | **Regional Priority**, TBD | |

## LEED PATH TO PLATINUM

| | |
|---|---|
| **IPc1** Integrative Process - 1 pt | Perform preliminary energy model and water budget before the completion of SD and document in OPR & BOD. |
| **LTc2** Sensitive Land Protection - 1 pt | Locate the development footprint on land that has been previously developed |
| **LTc3** High Priority Site - 2 pts | Locate the development footprint on land that has been previously developed |
| **LTc4** Surrounding Density and Diverse Uses - 6 pts | Locate on a site with an existing density of > 35,000 sf/acre and within 1/2 mile of 8+ basic services. |
| **LTc5** Access to Quality Transit (v4.1) - 6 pts (continued) | Locate project within 1/2 mile of a rail station or ferry terminal that meets min. daily transit service - OR - 1/4 mile of bus, streetcar or rideshare that meets min. daily transit service. |
| (continued) **LTc5** Access to Quality Transit (v4.1) - 6 pts | Locate project within 1/2 mile of a rail station or ferry terminal that meets min. daily transit service - OR - 1/4 mile of bus, streetcar or rideshare that meets min. daily transit service. |
| **LTc6** Bicycle Facilities (v4.1) - 1 pt | Provide short term (2.5% visitors) & long term (5% of occupants) bike parking within 100 ft of main entrance, FTE showers, and access to bicycle network. |
| **LTc7** Reduced Parking Footprint (v4.1) - 1 pt | Provide parking capacity that is 30% below base ratios determined by ITE Planning Handbook |
| **LTc8** Electric Vehicles (v4.1) - 1 pt | Install electrical vehicle supply equipment (EVSE) in 2% of all parking spaces used by the project |
| **SSc1** Site Assessment - 1 pt | Complete comprehensive site survey; topography, hydrology, climate, vegetation, soils, human use and human health effects |
| **SSc3** Open Space - 1 pt | Provide outdoor space greater than or equal to 30% of the total site area (including building footprint), with min. 25% vegetated. |
| **SSc5** Heat Island Reduction - 2 pts | Meet high albedo requirements for roof and site & parking under cover |
| **SSc6** Light Pollution Reduction - 1 pt | Meet CAL Green uplight and light trespass requirements, and do not exceed exterior signage luminance requirements. |
| **SSc7** Tenant Design and Const. Guidelines - 1 pt | Publish a document to educate tenants in implementing sustainable design and construction features in their TI build-outs. |
| **WEc1** Outdoor Water Use Reduction - 1 pt | Reduce potable water used for irrigation by 50% - or - use no potable water for irrigation |
| **WEc2** Indoor Water Use Reduction - 4 pts (continued) | Reduce building water use over LEED baseline by minimum 40% using ultra low flow fixtures and alternative water sources |
| (continued) **WEc2** Indoor Water Use Reduction - 4 pts | Reduce building water use over LEED baseline by minimum 40% using ultra low flow fixtures and alternative water sources |
| **WEc3** Cooling Tower Water Use (v4.1) - 1 pt | Conduct a water analysis to optimize cooling tower cycles. Maximizing cycles. |
| **WEc4** Water Metering - 1 pt | Install permanent water meters for two or more water subsystems. |
| **EAc1** Enhanced Commissioning - 4 pts | Complete CD review, post occupancy review, and recommissioning manual (3pts), and develop monitoring procedures (+1pt) - AND/OR - complete envelope Cx (+2pts) |
| **EAc2** Optimize Energy Performance - 16 pts (continued) | Reduce building energy cost by 39% compared to ASHRAE 90.1-2010, Appendix G. |

| | |
|---|---|
| continued EAc2 Optimize Energy Performance - 16 pts | Reduce building energy cost by 39% compared to ASHRAE 90.1-2010, Appendix G. |
| EAc3 Advanced Energy Metering - | Install meters for energy for all systems dedicated to tenant space, with min. one meter/ energy source/floor. Install advanced metering for base-building energy sources. |
| EAc5 Rnewable Energy Production - 3 pts | Produce renewable energy on-site for 5% of building energy consumption, calculated by cost. |
| EAc6 Enhanced Refrigerant Management - 1 pt | Select refrigerants with low global warming potential and ozone depletion potential. |
| EAc7 Green Power and Carbon Offsets - 1 pt | Engage a 5 year contract for 100% of the project's energy from green power, carbon offsets, or RECs. |
| MRc1 Building Life Cycle Impact Reduction (v4.1) - 3 pts | Conduct a life-cycle assessment (1 pt) that demonstrates a minimum of 5% / 10% reduction in at least three of the six impact measures (2-3pts). |
| MRc2 Environmental Product Declarations (v4.1) - 1 pt | Use 10 products from three manufacturers that meet disclosure criteria or use products that exhibit optimized performance by 10% |
| MRc3 Sourcing of Raw Materials (v4.1) - 1 pt | Use products sourced that meet at least one responsible sourcing and extraction criteria |
| MRc4 Construction & Demolition Waste Management (v4.1) - 1 pt | Divert 50% of construction waste, with three material streams |
| MRc5 Construction & Demolition Waste Management (v4.1) - 3 pts | Divert 50%, two material streams (1pt) - OR - 75%, three material streams (2pts), - OR - generate less than 7.5 lbs waste/sf (2pts) |
| EQc1 Enhanced Air Quality Strategies - 2 pts | Provide entryway systems, prevent interior cross-contamination, and specify MERV 13 filters |
| EQc2 Low Emitting Materials (v4.1) - 3 pts continued | Achieve the threshold level of compliance with VOC emissions and content standards for 5 product categories. |
| continued EQc2 Low Emitting Materials (v4.1) - 3 pts | Achieve the threshold level of compliance with VOC emissions and content standards for 5 product categories. |
| EQc3 Construction IAQ Management Plan - 1 pt | Develop an IAQ plan for construction and preoccupancy phases that meets SMACNA IAQ Guidelines for Occupied Buildings Under Construction. |
| INc1.1 EP, BPDO- EPDs - 1 pt | Install Products with 20 EPDs |
| INc1.2 EP, AQT, LEM or Heat Island Reduction - 1 pt | Design project to achieve features that promote non-motorized transportation on the project site and surrounding community. |
| INc1.3 Procurement of Low Carbon Construction Materials - 1 pt | Improve the data and the comparability of data from life cycle assessment (LCA) results. |
| INc1.4 TBD - 1 pt | To be decided. |
| INc1.5 TBD - 1 pt | To be decided. |
| INc1.5 LEED Accredited Professional - 1 pt | LEED Accredited Professional on design team. |
| RP1.1 Building LCA Impact Reduction - 1 pt | Pursue credit MRc1 achieving 3 points |
| RP1.2 BPDO Sourcing of Raw Materials- 1 pt | Pursue credit MRc3 |
| RP1.3 Optimize Energy Performance - 1 pt | Pursue credit EAc2 achieving 10 points |
| RP1.4 Access to Quality Transit - 1 pt | Pursue credit LTc5 achieving 5 points |

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**LEED CERTIFIED**

## APPENDIX A: GENERAL MODELING PARAMETERS

**Analysis Tool:** eQUEST (DOE 2.3 Engine) v3.65.7175

**Weather File:** TMY3 weather file-CA_San_Jose_Intl_AP.bin

**ASHRAE Climate Zone:** 3C

**Title 24 Climate Zone:** 4

**Energy Modeling Standard**: ASHRAE 90.1-2010 Appendix G
**Ventilation Standard:** Title 24-2019 Ventilation Rates

**Building Area (as simulated with DOE 2.2):** 721,351 gross $ft^2$

**Building Area (actual):** 963,000 $ft^2$

**Number of Floors:** 3 below grade, 21 above grade+roof

**New Construction: 100%**

**Principal Heating Source:** District Chilled Water System

**Principal Cooling Source:** District Hot Water System

| Space Type | Conditioned Area ($ft^2$) |
|---|---|
| Residential Units | 330,000 |
| Office | 325,500 |
| Retail | 15,000 |
| Other | 50,851 |
| Total | 721,351 |

Review Log

| Date | Version | Analyst | Model Reviewed by | Report Reviewed by |
|---|---|---|---|---|
| 08/28/20 | 1 | AS | AB | AB |
| 10/26/20 | 2 | AS | AB | AB |
| | | | | |

## APPENDIX B: BUILDING ENVELOPE CONSTRUCTION

| Building Element | Baseline Building (ASHRAE 90.1-2010) | Proposed Building | Proposed Design Input Source |
|---|---|---|---|
| Exterior Wall Description | ASHRAE Compliant Zone 3C Exterior Wall Construction: Steel Framed<br>Residential: U-0.064 Btu/hr-ft$^2$-°F<br>Non- Residential: U-0.084 Btu/hr-ft$^2$-°F | EWS-01: Custom unitized window wall system, aluminum frame, structure silicone, thermally broken outriggers to hollow vertical posts, terracotta shading devices<br><br>U-opaque: 0.06 (R-opaque: 15) | Basis of Design (BOD) |
| Roof Construction | ASHRAE Compliant Zone 3C Exterior Roof Construction: Insulation Entirely Above Deck | RF-03: Concrete slab with rigid insulation INS-01 (extruded polystyrene, 1.5-inch minimum thickness, R-value: 7.5) | Basis of Design |
| Roof U-value | Total U-value: 0.048 Btu/hr-ft$^2$-°F<br>Total R-value: 20 hr-ft$^2$-°F/Btu | Total U-value: 0.034 Btu/hr-ft$^2$-°F<br>Total R-value: 30 hr-ft$^2$-°F/Btu | Title 24-2019 Table 140.3-B |
| Window-to-Wall Ratio | 40% | 83% | Basis of Design |
| Fenestration Type | ASHRAE Compliant Zone 3C Glazing | GL-01 (Glass at EWS-01): Argon-filled triple glazed IGU, U-window: 0.35 Btu/hr-ft$^2$-°F | Glass description: BOD<br>Assembly U value: A10 assumption |
| Fenestration U-value | Metal Framing (Curtainwall/Storefront) 0.6 Btu/hr-ft$^2$-°F (overall)<br>Metal Framing (Operable Windows): 0.65 Btu/hr-ft$^2$-°F (overall) | GL-01: 0.35 Btu/hr-ft2-°F | Assembly U value: A10 assumption |
| Fenestration SHGC | 0.25 | GL-01: 0.28 | A10 assumption |
| Visible Transmittance (assembly without frames) | n/a | GL-01: 64% | A10 assumption |
| Skylight Description | n/a | n/a | |
| Skylight U-value and SHGC | n/a | n/a | |
| External Shading | none | External horizontal fins | |

## APPENDIX C: OCCUPANCY, LIGHTING POWER DENSITY, EQUIPMENT LOADS

The table below lists maximum occupancy, the average peak connected power density (Watts/ft²) of the ambient lighting (including task lights), decorative lighting, and the average peak equipment load (Watts/ft²) for all zones throughout the building.

| | Space Type | Baseline LPD (W/sf.) | Proposed LPD (W/sf.) | Proposed Input Source |
|---|---|---|---|---|
| | Corridor | 0.66 | 0.6 | Title-24-2019 Table 140.6-C |
| | Storage | 0.63 | 0.4 | |
| | Amenity Spaces/Breakrooms | 0.73 | 0.65 | |
| | Mail/Print | 0.66 | 0.5 | |
| | Fitness | 0.72 | 0.5 | |
| | Electrical rooms | 0.95 | 0.4 | |
| | IDF/MDF/ELEV | 0.95 | 0.4 | |
| | Lobby | 0.90 | 0.85 | |
| | Open Office | 0.98 | 0.6 | |
| | Retail Spaces | 1.68 | 1.0 | |
| | Toilet | 0.98 | 0.65 | |
| | Washroom/Locker Rooms | 0.75 | 0.45 | |
| | Apartments | 0.5 | 0.5 | |
| | Stairwell | 0.69 | 0.5 | |
| | Parking | 0.19 | 0.1 | |
| | Mechanical Rooms | 0.95 | 0.4 | |
| | **Space Type** | **EPD (w/sf.)** | **EPD (w/sf.)** | **Proposed Input Source** |
| Receptacle Equipment Power Density | Corridor | 0.1 | 0.1 | A10 Assumption |
| | Storage | 0.3 | 0.3 | A10 Assumption |
| | Amenity | 1.5 | 1.5 | |
| | Mail/Print | 4.0 | 4.0 | |
| | Fitness | 2 | 2 | |
| | Electrical rooms | 25 | 25 | |
| | IDF/MDF/ELEV | 50 | 50 | |
| | Lobby | 0.3 | 0.3 | Basis of Design Dated 200724 |
| | Open Office | 1.5 | 1.5 | |
| | Retail Spaces | 1.5 | 1.5 | |
| | Toilet | 0.12 | 0.12 | |
| | Washroom/Locker | 0.12 | 0.12 | |
| | Apartments | 1.63 | 1.63 | ENERGY STAR MFHR Performance Path Calculator_V1.5 |
| | Stairwell | 0.1 | 0.1 | A10 Assumption |
| | Parking | 0.1 | 0.1 | A10 Assumption |
| | Mechanical Rooms | 0.6 | 0.6 | A10 Assumption |
| | **Space Type** | **Density (ppl/sq.ft..)** | **Density (ppl/sq.ft..)** | **Proposed Input Source** |
| Occupant Density | Corridor | 100 | 100 | Title-24: Appendix_5.4A |
| | Storage | 100 | 100 | |
| | Amenity | 15 | 15 | |
| | Mail/Print | 100 | 100 | |
| | Fitness | 15 | 15 | |
| | Electrical rooms | 333 | 333 | |
| | Lobby | 15 | 15 | |
| | Open Office | 100 | 100 | |
| | Retail Spaces | 30 | 30 | |
| | Toilet | 100 | 100 | |
| | Washroom/Locker | 50 | 50 | |
| | Apartments | 200 | 200 | |
| | Stairwell | 100 | 100 | |
| | Parking | 200 | 200 | |
| | Mechanical Rooms | 333 | 333 | |

| | Baseline | Proposed |
|---|---|---|
| **Lighting Controls** | Description of auto-shutoff controls, occupancy sensors, daylight controls, etc | Automatic Description of auto-shutoff controls, occupancy sensors, daylight controls, based on T-24 Section 110.9 |

## APPENDIX D: OCCUPANCY, LIGHTING POWER DENSITY, EQUIPMENT SCHEDULES

The modeling assumptions for the maximum occupancy and area per person in the building were estimated based on the email communication with the design team in SD Phase. Peak lighting and equipment loads were diversified by estimating an electric usage pattern for the building based on scheduling assumptions. The tables below list occupancy, lighting and equipment schedules assumed for the individual usage type for the building. The owner and the design team should review the schedules and provide feedback based on their expected use of the building.

**Office Schedule**
**Source:** Title 24-2019

| Hour | | Occupancy | | | Lighting | | | Misc. Equipment | | |
|---|---|---|---|---|---|---|---|---|---|---|
| From | To | Weekday | Saturday | Sunday | Weekday | Saturday | Sunday | Weekday | Saturday | Sunday |
| 12:00 AM | 1:00 AM | 0% | 0% | 0% | 5% | 5% | 5% | 5% | 5% | 5% |
| 1:00 AM | 2:00 AM | 0% | 0% | 0% | 5% | 5% | 5% | 5% | 5% | 5% |
| 2:00 AM | 3:00 AM | 0% | 0% | 0% | 5% | 5% | 5% | 5% | 5% | 5% |
| 3:00 AM | 4:00 AM | 0% | 0% | 0% | 5% | 5% | 5% | 5% | 5% | 5% |
| 4:00 AM | 5:00 AM | 0% | 0% | 0% | 5% | 5% | 5% | 5% | 5% | 5% |
| 5:00 AM | 6:00 AM | 0% | 0% | 0% | 10% | 5% | 5% | 10% | 5% | 5% |
| 6:00 AM | 7:00 AM | 10% | 10% | 5% | 10% | 10% | 5% | 10% | 10% | 5% |
| 7:00 AM | 8:00 AM | 20% | 10% | 5% | 30% | 10% | 5% | 30% | 10% | 5% |
| 8:00 AM | 9:00 AM | 95% | 30% | 5% | 65% | 30% | 5% | 90% | 30% | 5% |
| 9:00 AM | 10:00 AM | 95% | 30% | 5% | 65% | 30% | 5% | 90% | 30% | 5% |
| 10:00 AM | 11:00 AM | 95% | 30% | 5% | 65% | 30% | 5% | 90% | 30% | 5% |
| 11:00 AM | 12:00 PM | 95% | 30% | 5% | 65% | 30% | 5% | 90% | 30% | 5% |
| 12:00 PM | 1:00 PM | 50% | 10% | 5% | 65% | 15% | 5% | 90% | 15% | 5% |
| 1:00 PM | 2:00 PM | 95% | 10% | 5% | 65% | 15% | 5% | 90% | 15% | 5% |
| 2:00 PM | 3:00 PM | 95% | 10% | 5% | 65% | 15% | 5% | 90% | 15% | 5% |
| 3:00 PM | 4:00 PM | 95% | 10% | 5% | 65% | 15% | 5% | 90% | 15% | 5% |
| 4:00 PM | 5:00 PM | 95% | 10% | 5% | 65% | 15% | 5% | 90% | 15% | 5% |
| 5:00 PM | 6:00 PM | 30% | 5% | 5% | 35% | 5% | 5% | 50% | 5% | 5% |
| 6:00 PM | 7:00 PM | 10% | 5% | 0% | 30% | 5% | 5% | 30% | 5% | 5% |
| 7:00 PM | 8:00 PM | 10% | 0% | 0% | 30% | 5% | 5% | 30% | 5% | 5% |
| 8:00 PM | 9:00 PM | 10% | 0% | 0% | 20% | 5% | 5% | 20% | 5% | 5% |
| 9:00 PM | 10:00 PM | 10% | 0% | 0% | 20% | 5% | 5% | 20% | 5% | 5% |
| 10:00 PM | 11:00 PM | 5% | 0% | 0% | 10% | 5% | 5% | 10% | 5% | 5% |
| 11:00 PM | 12:00 AM | 5% | 0% | 0% | 5% | 5% | 5% | 5% | 5% | 5% |

**Residential Living Schedule**
**Source:** Title 24-2019

| Hour | | Occupancy | | | Lighting | | | Misc. Equipment | | |
|---|---|---|---|---|---|---|---|---|---|---|
| From | To | Week day | Satu rday | Sund ay | Weekday | Saturday | Sunday | Weekday | Saturday | Sunday |
| 12:00 AM | 1:00 AM | 90% | 90% | 90% | 10% | 10% | 10% | 10% | 10% | 10% |
| 1:00 AM | 2:00 AM | 90% | 90% | 90% | 10% | 10% | 10% | 10% | 10% | 10% |
| 2:00 AM | 3:00 AM | 90% | 90% | 90% | 10% | 10% | 10% | 10% | 10% | 10% |
| 3:00 AM | 4:00 AM | 90% | 90% | 90% | 10% | 10% | 10% | 10% | 10% | 10% |
| 4:00 AM | 5:00 AM | 90% | 90% | 90% | 10% | 10% | 10% | 10% | 10% | 10% |
| 5:00 AM | 6:00 AM | 90% | 90% | 90% | 30% | 30% | 30% | 30% | 30% | 30% |
| 6:00 AM | 7:00 AM | 70% | 70% | 70% | 45% | 45% | 45% | 45% | 45% | 45% |
| 7:00 AM | 8:00 AM | 40% | 40% | 40% | 45% | 45% | 45% | 45% | 45% | 45% |
| 8:00 AM | 9:00 AM | 40% | 40% | 40% | 45% | 45% | 45% | 45% | 45% | 45% |
| 9:00 AM | 10:00 AM | 20% | 20% | 20% | 45% | 45% | 45% | 45% | 45% | 45% |
| 10:00 AM | 11:00 AM | 20% | 20% | 20% | 30% | 30% | 30% | 30% | 30% | 30% |
| 11:00 AM | 12:00 PM | 20% | 20% | 20% | 30% | 30% | 30% | 30% | 30% | 30% |
| 12:00 PM | 1:00 PM | 20% | 20% | 20% | 30% | 30% | 30% | 30% | 30% | 30% |
| 1:00 PM | 2:00 PM | 20% | 20% | 20% | 30% | 30% | 30% | 30% | 30% | 30% |
| 2:00 PM | 3:00 PM | 20% | 20% | 20% | 30% | 30% | 30% | 30% | 30% | 30% |
| 3:00 PM | 4:00 PM | 30% | 30% | 30% | 30% | 30% | 30% | 30% | 30% | 30% |
| 4:00 PM | 5:00 PM | 50% | 50% | 50% | 30% | 30% | 30% | 30% | 30% | 30% |
| 5:00 PM | 6:00 PM | 50% | 50% | 50% | 30% | 30% | 30% | 30% | 30% | 30% |
| 6:00 PM | 7:00 PM | 50% | 50% | 50% | 60% | 60% | 60% | 60% | 60% | 60% |
| 7:00 PM | 8:00 PM | 70% | 70% | 70% | 80% | 80% | 80% | 80% | 80% | 80% |
| 8:00 PM | 9:00 PM | 70% | 70% | 70% | 90% | 90% | 90% | 90% | 90% | 90% |
| 9:00 PM | 10:00 PM | 80% | 80% | 80% | 80% | 80% | 80% | 80% | 80% | 80% |
| 10:00 PM | 11:00 PM | 90% | 90% | 90% | 60% | 60% | 60% | 60% | 60% | 60% |
| 11:00 PM | 12:00 AM | 90% | 90% | 90% | 30% | 30% | 30% | 30% | 30% | 30% |

**Residential Common Schedule**
**Source:** Title 24-2019

| Hour | | Occupancy | | | Lighting | | | Misc. Equipment | | |
|---|---|---|---|---|---|---|---|---|---|---|
| From | To | Week day | Satu rday | Sund ay | Weekday | Saturday | Sunday | Weekday | Saturday | Sunday |
| 12:00 AM | 1:00 AM | 90% | 90% | 90% | 10% | 10% | 10% | 10% | 10% | 10% |
| 1:00 AM | 2:00 AM | 90% | 90% | 90% | 10% | 10% | 10% | 10% | 10% | 10% |
| 2:00 AM | 3:00 AM | 90% | 90% | 90% | 10% | 10% | 10% | 10% | 10% | 10% |
| 3:00 AM | 4:00 AM | 90% | 90% | 90% | 10% | 10% | 10% | 10% | 10% | 10% |
| 4:00 AM | 5:00 AM | 90% | 90% | 90% | 10% | 10% | 10% | 10% | 10% | 10% |
| 5:00 AM | 6:00 AM | 90% | 90% | 90% | 30% | 30% | 30% | 30% | 30% | 30% |
| 6:00 AM | 7:00 AM | 70% | 70% | 70% | 45% | 45% | 45% | 45% | 45% | 45% |
| 7:00 AM | 8:00 AM | 40% | 40% | 40% | 45% | 45% | 45% | 45% | 45% | 45% |
| 8:00 AM | 9:00 AM | 40% | 40% | 40% | 45% | 45% | 45% | 45% | 45% | 45% |
| 9:00 AM | 10:00 AM | 20% | 20% | 20% | 45% | 45% | 45% | 45% | 45% | 45% |
| 10:00 AM | 11:00 AM | 20% | 20% | 20% | 30% | 30% | 30% | 30% | 30% | 30% |
| 11:00 AM | 12:00 PM | 20% | 20% | 20% | 30% | 30% | 30% | 30% | 30% | 30% |
| 12:00 PM | 1:00 PM | 20% | 20% | 20% | 30% | 30% | 30% | 30% | 30% | 30% |
| 1:00 PM | 2:00 PM | 20% | 20% | 20% | 30% | 30% | 30% | 30% | 30% | 30% |
| 2:00 PM | 3:00 PM | 20% | 20% | 20% | 30% | 30% | 30% | 30% | 30% | 30% |
| 3:00 PM | 4:00 PM | 30% | 30% | 30% | 30% | 30% | 30% | 30% | 30% | 30% |
| 4:00 PM | 5:00 PM | 50% | 50% | 50% | 30% | 30% | 30% | 30% | 30% | 30% |
| 5:00 PM | 6:00 PM | 50% | 50% | 50% | 30% | 30% | 30% | 30% | 30% | 30% |
| 6:00 PM | 7:00 PM | 50% | 50% | 50% | 60% | 60% | 60% | 60% | 60% | 60% |
| 7:00 PM | 8:00 PM | 70% | 70% | 70% | 80% | 80% | 80% | 80% | 80% | 80% |
| 8:00 PM | 9:00 PM | 70% | 70% | 70% | 90% | 90% | 90% | 90% | 90% | 90% |
| 9:00 PM | 10:00 PM | 80% | 80% | 80% | 80% | 80% | 80% | 80% | 80% | 80% |
| 10:00 PM | 11:00 PM | 90% | 90% | 90% | 60% | 60% | 60% | 60% | 60% | 60% |
| 11:00 PM | 12:00 AM | 90% | 90% | 90% | 30% | 30% | 30% | 30% | 30% | 30% |

**Retail Schedule**

**Source:** Title 24-2019

| Hour | | Occupancy | | | Lighting | | | Misc. Equipment | | |
|---|---|---|---|---|---|---|---|---|---|---|
| From | To | Weekday | Saturday | Sunday | Weekday | Saturday | Sunday | Weekday | Saturday | Sunday |
| 12:00 AM | 1:00 AM | 0% | 0% | 0% | 5% | 5% | 5% | 5% | 5% | 5% |
| 1:00 AM | 2:00 AM | 0% | 0% | 0% | 5% | 5% | 5% | 5% | 5% | 5% |
| 2:00 AM | 3:00 AM | 0% | 0% | 0% | 5% | 5% | 5% | 5% | 5% | 5% |
| 3:00 AM | 4:00 AM | 0% | 0% | 0% | 5% | 5% | 5% | 5% | 5% | 5% |
| 4:00 AM | 5:00 AM | 0% | 0% | 0% | 5% | 5% | 5% | 5% | 5% | 5% |
| 5:00 AM | 6:00 AM | 0% | 0% | 0% | 5% | 5% | 5% | 5% | 5% | 5% |
| 6:00 AM | 7:00 AM | 0% | 0% | 0% | 5% | 5% | 5% | 5% | 5% | 5% |
| 7:00 AM | 8:00 AM | 10% | 10% | 0% | 20% | 10% | 5% | 20% | 10% | 5% |
| 8:00 AM | 9:00 AM | 20% | 20% | 0% | 50% | 30% | 10% | 50% | 30% | 10% |
| 9:00 AM | 10:00 AM | 50% | 50% | 10% | 85% | 55% | 10% | 90% | 60% | 10% |
| 10:00 AM | 11:00 AM | 50% | 60% | 20% | 85% | 85% | 40% | 90% | 90% | 40% |
| 11:00 AM | 12:00 PM | 70% | 80% | 20% | 85% | 85% | 40% | 90% | 90% | 40% |
| 12:00 PM | 1:00 PM | 70% | 80% | 40% | 85% | 85% | 55% | 90% | 90% | 60% |
| 1:00 PM | 2:00 PM | 70% | 80% | 40% | 85% | 85% | 55% | 90% | 90% | 60% |
| 2:00 PM | 3:00 PM | 70% | 80% | 40% | 85% | 85% | 55% | 90% | 90% | 60% |
| 3:00 PM | 4:00 PM | 80% | 80% | 40% | 85% | 85% | 55% | 90% | 90% | 60% |
| 4:00 PM | 5:00 PM | 70% | 80% | 40% | 85% | 85% | 55% | 90% | 90% | 60% |
| 5:00 PM | 6:00 PM | 50% | 60% | 20% | 85% | 85% | 40% | 90% | 90% | 40% |
| 6:00 PM | 7:00 PM | 50% | 20% | 10% | 55% | 50% | 20% | 60% | 50% | 20% |
| 7:00 PM | 8:00 PM | 30% | 20% | 0% | 55% | 30% | 5% | 60% | 30% | 5% |
| 8:00 PM | 9:00 PM | 30% | 20% | 0% | 50% | 30% | 5% | 50% | 30% | 5% |
| 9:00 PM | 10:00 PM | 0% | 10% | 0% | 20% | 10% | 5% | 20% | 10% | 5% |
| 10:00 PM | 11:00 PM | 0% | 0% | 0% | 5% | 5% | 5% | 5% | 5% | 5% |
| 11:00 PM | 12:00 AM | 0% | 0% | 0% | 5% | 5% | 5% | 5% | 5% | 5% |

**Assembly Schedule**

**Source:** Title 24-2019

| Hour | | Occupancy | | | Lighting | | | Misc. Equipment | | |
|---|---|---|---|---|---|---|---|---|---|---|
| From | To | Weekday | Saturday | Sunday | Weekday | Saturday | Sunday | Weekday | Saturday | Sunday |
| 12:00 AM | 1:00 AM | 0% | 0% | 0% | 5% | 5% | 5% | 5% | 5% | 5% |
| 1:00 AM | 2:00 AM | 0% | 0% | 0% | 5% | 5% | 5% | 5% | 5% | 5% |
| 2:00 AM | 3:00 AM | 0% | 0% | 0% | 5% | 5% | 5% | 5% | 5% | 5% |
| 3:00 AM | 4:00 AM | 0% | 0% | 0% | 5% | 5% | 5% | 5% | 5% | 5% |
| 4:00 AM | 5:00 AM | 0% | 0% | 0% | 5% | 5% | 5% | 5% | 5% | 5% |
| 5:00 AM | 6:00 AM | 0% | 0% | 0% | 5% | 5% | 5% | 5% | 5% | 5% |
| 6:00 AM | 7:00 AM | 0% | 0% | 0% | 35% | 5% | 5% | 40% | 5% | 5% |
| 7:00 AM | 8:00 AM | 0% | 0% | 0% | 35% | 30% | 30% | 40% | 30% | 30% |
| 8:00 AM | 9:00 AM | 20% | 20% | 10% | 35% | 30% | 30% | 40% | 30% | 30% |
| 9:00 AM | 10:00 AM | 20% | 20% | 10% | 65% | 40% | 30% | 75% | 50% | 30% |
| 10:00 AM | 11:00 AM | 20% | 20% | 10% | 65% | 40% | 30% | 75% | 50% | 30% |
| 11:00 AM | 12:00 PM | 80% | 60% | 10% | 65% | 40% | 30% | 75% | 50% | 30% |
| 12:00 PM | 1:00 PM | 80% | 60% | 10% | 65% | 40% | 55% | 75% | 50% | 65% |
| 1:00 PM | 2:00 PM | 80% | 60% | 70% | 65% | 40% | 55% | 75% | 50% | 65% |
| 2:00 PM | 3:00 PM | 80% | 60% | 70% | 65% | 40% | 55% | 75% | 50% | 65% |
| 3:00 PM | 4:00 PM | 80% | 60% | 70% | 65% | 40% | 55% | 75% | 50% | 65% |
| 4:00 PM | 5:00 PM | 80% | 60% | 70% | 65% | 40% | 55% | 75% | 50% | 65% |
| 5:00 PM | 6:00 PM | 80% | 60% | 70% | 65% | 40% | 55% | 75% | 50% | 65% |
| 6:00 PM | 7:00 PM | 20% | 60% | 70% | 65% | 40% | 55% | 75% | 50% | 65% |
| 7:00 PM | 8:00 PM | 20% | 60% | 70% | 65% | 40% | 55% | 75% | 50% | 65% |
| 8:00 PM | 9:00 PM | 20% | 60% | 70% | 65% | 40% | 55% | 75% | 50% | 65% |
| 9:00 PM | 10:00 PM | 20% | 80% | 70% | 65% | 40% | 55% | 75% | 50% | 65% |
| 10:00 PM | 11:00 PM | 10% | 10% | 20% | 25% | 40% | 5% | 25% | 50% | 5% |
| 11:00 PM | 12:00 AM | 0% | 0% | 0% | 5% | 5% | 5% | 5% | 5% | 5% |

## APPENDIX E: HVAC SYSTEM PARAMETERS

**Basic Zone Parameters**

Minimum Design Flow: 0.4 cfm/ft²

**Design Conditions**

| Space (AHU) | Winter temp °F | Summer temp °F | High RH% | Low RH% |
|---|---|---|---|---|
| Interior Zone | 70 | 73 | N/A | |
| Exterior Zone | 70 | 75 | | |
| Residential Spaces | 70 | 75 | | |
| Electrical Room | - | 90 | N/A | N/A |

**Description of the Proposed Building and Baseline Building System Parameters**

| Building Element | Baseline Building | Proposed Building |
|---|---|---|
| **Mechanical Systems** | | |
| HVAC System Type | ASHRAE 90.1-2010 Appendix G Table G3.1.1A and G3.1.1B<br>System Type 7: VAV with Reheat (primary system) serving office spaces<br><br>System Type 9: Heating & Ventilating units for stairs/ mechanical spaces<br><br>System Type 1: PTAC | Basement:<br>- Conditioned spaces will be served by 4-pipe FCU with outdoor air from a louver on the L1 façade<br>- Electrical/IDF/MPOE rooms will be served by chilled water fan coils<br><br>Retail:<br>- Lobbies, BOH and other areas in core and shell will be served by 4-pipe FCU with OA directly connected from façade<br>- Tenant Spaces: Hot water and Chilled water from central plants. This will be submetered with BTU meters for tenant chargeback.<br><br>Gym and Amenities:<br>- Climbing wall, gym floor (4-11) and amenities floor (12) will be served by 4-pipe VAV boxes with changeover coils from the south core office AHU.<br><br>Residential:<br>- Apartments: Conditioned by vertical 4-pipe (hot water/chilled water) 4-speed fan coils.<br>- Corridor Supply and Exhaust: Supply air by VAV boxes on L12 of the office AHU<br>- Electrical/IDF rooms: Chilled water fan coils<br><br>Offices (13-24th floor):<br>UFAD system with interior pressurized plenums and perimeter UF 2-pipe changeover fan coils to provide additional cooling capacity |

| Building Element | Baseline Building | Proposed Building |
|---|---|---|
| Air Distribution System | Overhead | Residential/Retail spaces: Overhead<br>Office Spaces: Underfloor |
| Design Supply Air Temperature Differential | 20°F | Overhead:<br>Interior: 16°F<br>Exterior: 18 °F<br>Underfloor:<br>Interior: 15°F<br>Exterior: 17°F |
| Total Building Ventilation Air Flow Rate | TBD from the energy model | 215,631 |
| **AIR SIDE: Cooling** | | |
| AHU Minimum Supply Temperature | Residential Spaces: 55 F<br>Office Spaces: 62 F | Residential Spaces: 55 F<br>Office Spaces: 62 F |
| AHU Cooling Source | Chilled water from central plant | Chilled water from central plant |
| Cool Control | Supply Temperature Reset based on warmest zone (5 °F rise over minimum supply air temperature) | Constant |
| **AIR SIDE: Heating** | | |
| Zone Heat Source | Hot Water Reheat | Hot Water Reheat from central hot water system |
| Zonal Reheat Delta T (°F) | 30°F Maximum | 30°F Maximum |
| Radiant Heating | No | Office spaces: Fin tube radiation in all perimeter zones with VAV |
| **Air-Side Economizer** | | |
| Economizer Cycle | N/A | AHUs serving office floors (AHU-1) |
| Outside Air Control | N/A | Dual Temperature |
| **Fan Power** | | |
| Supply Fan Power (kW/CFM)/TSP/BHP | AHU-1: TBD<br>AHU-2: TBD | AHU-1: 0.0007385 kW/cfm |
| Return Fan Power (kW/cfm))/TSP/BHP | AHU-1: TBD<br>AHU-2: TBD | AHU-1: 0.0002 kW/cfm |

| Building Element | Baseline Building | Proposed Building |
|---|---|---|
| Fan Placement | Draw through | Draw through |
| Fan Control | Variable Speed Drive | Variable Speed Drive |
| Fan EIR Curve | ASHRAE Fan Curve | Any Fan w/VSD |
| **Outside Air** | | |
| Demand-Controlled Ventilation | High Density Spaces as required by ASHRAE 90.1-2010 section 6.4.3.9 | N/A |
| Energy Recovery | N/A | Residential Spaces |
| Energy Recovery Type | N/A | ERV integrated with the fan coils |
| Energy Recovery Effectiveness (Sensible/Latent) | N/A | 70% |
| **Water side systems - Cooling** | | |
| Cooling Type | Same as proposed | Chilled water from central chilled water plant |
| Central Plant Cooling Efficiency (COP) | Same as proposed | 11 |
| Chilled Water Temperature (°F), and Delta T (°F) | Same as Proposed Design | 42 °F, 10 °F delta |
| Chilled Water Pump Control and Configuration | Building circulation pumps – variable speed | Building circulation pumps – variable speed |
| Chillled Water Pump Power | 16W/gpm | 16W/gpm |
| **Water side systems – Heating** | | |
| Heating Type | Hot water from central plant | Hot water from central plant |
| Central Plant Heating Efficiency | TBD | 3.5 |
| Hot Water Temperature (°F) and Delta T (°F) | Same as Proposed | 140 °F /30 °F |
| Hot Water Pump Configuration | Single Hot Water pumps | Single hot water pump |
| HW Pump Power | none | 14W/gpm |

| Building Element | Baseline Building | Proposed Building |
|---|---|---|
| HW Pump Controls | Variable Speed Drive | Variable Speed Drive |
| Hot Water Reset Schedule | Fixed | Fixed |
| **Domestic Hot Water (DHW)** | | |
| DHW Heater Type | Steam | Water to water heat exchanger |
| DHW Supply Temperature (°F) | 160°F | 135°F |
| DHW Flow Rate (GPM) | TBD | 38<br><br>Residential DHW Calculation: ENERGY STAR MFHR Performance Path Calculator_V1.5<br>Office DHW Calculation: Assuming 1 gallon/person/day |