SUSTAINABILITY REPORT 2018-19

WORKING TOWARD A **SUSTAINABLE** FUTURE

GLUMAC
A TETRA TECH COMPANY

TETRA TECH
High Performance Buildings Group

INDEX

Using the United Nations' established Sustainable Development Goals as a rubric to measure ourselves against, we set a series of internal goals and examine how we're achieving them.
FIRM-WIDE GOALS **| P. 6**

We examine how successful we are in empowering staff to use sustainable transportation methods, and look at the resulting carbon emissions
COMMUTE TRENDS **| P. 8**

Several of our offices are certified LEED Platinum, but how are they performing? We examine how they are performing against expectations.
ENERGY USE BY OFFICE **| P. 10**

Each office approaches its waste, composting, and recycling differently. In this section we look at how well we do in reducing waste and redirecting trash from landfills.
WASTE REDUCTION **| P. 12**

Tracking water use and reduction strategies across offices
WATER USE BY OFFICE **| P. 14**

In this section we look at the different initiatives our offices are involved with that support direct give-back to the communities we live in.
FIRM-WIDE GIVEBACK **| P. 16**

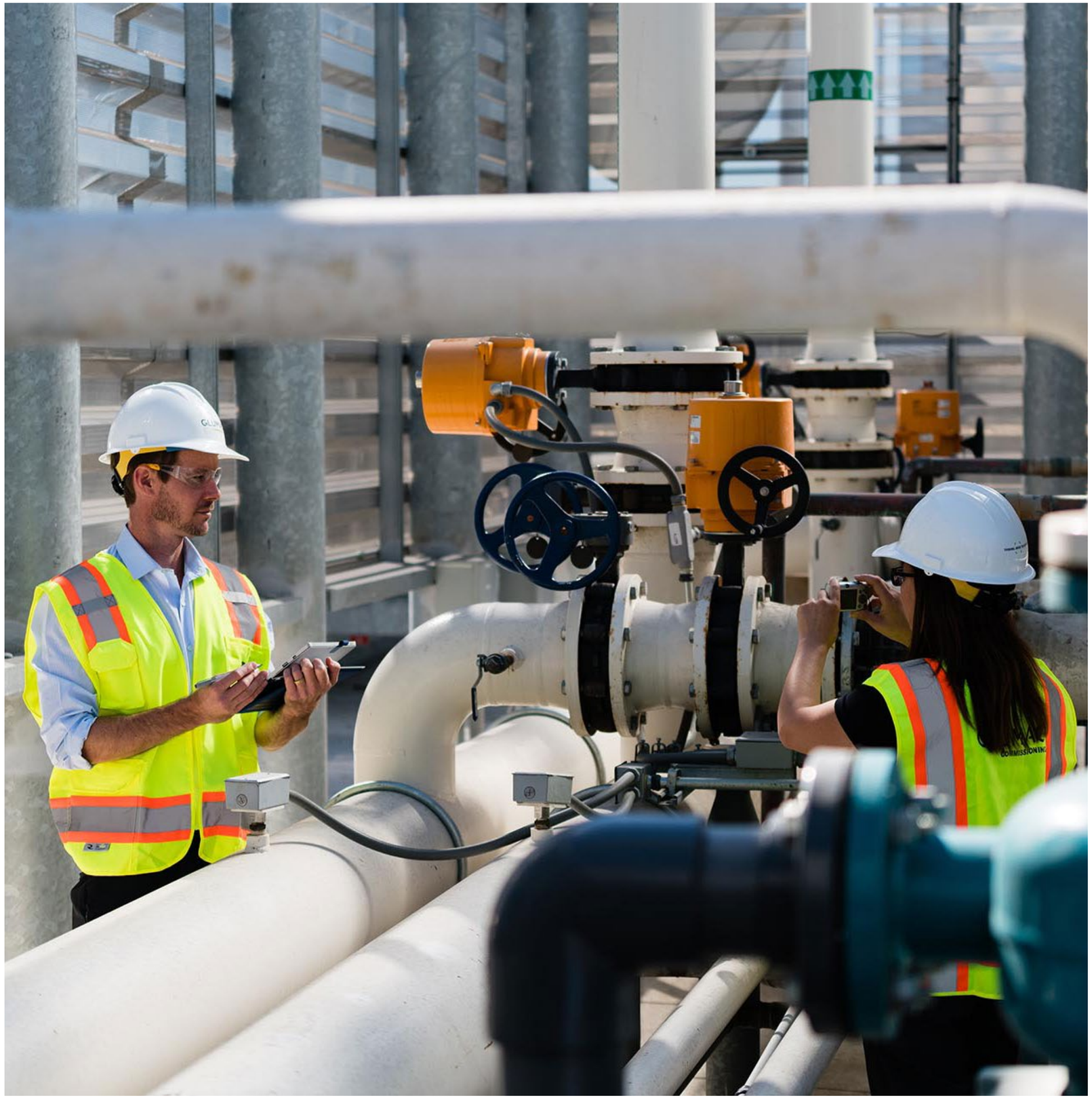
Equity and Inclusion are areas in need of great improvement across the AEC industry. We examine gender representation at Glumac, and how it compares to our industry at large.
GLUMAC DEMOGRAPHICS **| P. 18**

We discuss how we approach sustainable building design, and why it's a core value at Glumac.
SUSTAINABLE DESIGN **| P. 20**

Here, we examine a selection of projects from across market sectors to see how well they are performing against our Sustainable Design Approaches.
GREAT PROJECTS **| P. 26**

Our leadership and continuing education in industry organizations focused on sustainability and wellness.
PROFESSIONAL LEADERSHIP **| P. 32**

We highlight and give a special thanks for all the Glumac staff who helped us put together our second Corporate Sustainability Report.
CSR CONTRIBUTORS **| P. 34**



ALASKAN WAY VIADUCT
IMAGE COURTESY OF **WASHINGTON STATE DEPARTMENT**

To be engineers for a **sustainable** future, we need to start in our own backyard...

This is our second year of publishing a corporate sustainability report. Since last year we've seen improvement in every sector of our business and operations towards more sustainable strategies.

We have an obligation to do more to mitigate climate change and reduce CO_2 emissions. As a member of the Tetra Tech High Performance Buildings Group, we are now better positioned than ever to lead by example, drawing on Tetra Tech's depth of global resources and expertise to deliver system designs that reduce a building's embodied carbon, and lessen environmental impact over its lifespan.

We continue to pursue clients that share our passion for sustainability. And we work hard to be their trusted advisor in assisting them to achieve their carbon and water reduction goals.

To be that trusted advisor, we feel Glumac must also demonstrate its commitment to sustainability in our operations, including:

- CO_2 Reduction
- Water reduction
- Waste reduction and recycling
- Diversity

This report demonstrates our commitment to all aspects of sustainable practices and continuous improvement.

We are "Engineers for a **Sustainable** Future"

STEVEN STRAUS
President
Glumac

FIRM-WIDE **GOALS**

SUSTAINABLE BUILDINGS LEAD TO **RESILIENT** COMMUNITIES

We want our measurement and reporting efforts to drive internal improvement. At Glumac, we are committed to defining and tracking impactful metrics, including internal energy usage and waste diversion in each of our offices. The results give insight on how to best direct our efforts to improve the way we operate by the same high standards of sustainability we design into our projects. To create a real framework to grow this practice, we are joining many of our industry peers in following the United Nations' 17 Sustainable Development Goals. We believe using this broad rubric will help us create a better workplace for Glumac staff, design more sustainable buildings, and create more **resilient** communities. We aren't checking every box yet, but we're getting there. This document presents an honest assessment of where we are and what we want to achieve.

UN GOAL: SUSTAINABLE CITIES + COMMUNITIES **P.9**

Our projects have a direct impact on the communities in which we work. However, it's also crucial to examine our internal practices to learn where we as a company can make a stronger impact on contributing to sustainable cities.

UN GOAL: REDUCED INEQUALITIES **P.18**

A sustainable future is an equitable future. Here, we look at demographic trends in the A/E/C industry, and consider what we can do to improve them.

UN GOAL: GOOD HEALTH + WELL-BEING **P.22**

For years now, the A/E/C industry has shown a spotlight on sustainable design and construction practices. However, we are now seeing pathways toward developing spaces that are both sustainable in operation, but also actively improve the health and well-being of occupants.

UN GOAL: AFFORDABLE + CLEAN ENERGY **P.24-27**

One of the most direct ways toward providing both clean and affordable energy on a project is to utilize renewable energy generation. Here, we highlight three projects that take a forward thinking approach to scaling up renewable energy use for large, urban buildings and campuses.

UN GOAL: INDUSTRY, INNOVATION + INFRASTRUCTURE **P.33**

Our leadership in industry organizations help us bring the latest technology and ideas to our clients' building projects.

The UN's Sustainable Development Goals serve as a guide for Glumac to meet its goals both internally and externally.

GOODWILL LEARNING CENTER
IMAGE COURTESY OF **BENJAMIN BENSCHNEIDER**

COMMUTES MATTER

Each office location experiences different challenges in mitigating single car commutes to work. **Glumac encourages staff to utilize mass transit or other non-car options by subsidizing monthly bus and train passes, as well as semi-regular bike repairs for employees**. Several offices participate in Tetra Tech's "Bike to Month" challenge to help staff get comfortable with bike commutes and to normalize the practice. While certain offices like Portland, Seattle, and Los Angeles are high performers, Glumac has room to improve our support for employee commute options. Carpooling and remote work options are explored on an office-to-office basis.

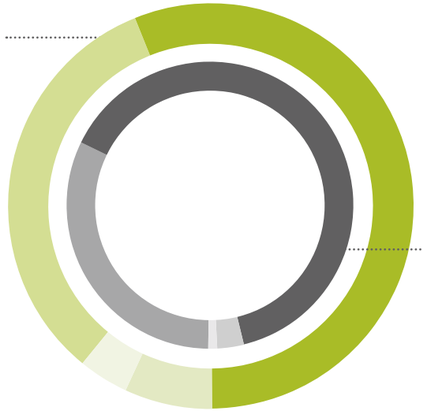
UN GOAL: SUSTAINABLE CITIES + COMMUNITIES

COMMUTE TRENDS **BY OFFICE**

For the last two years, Glumac has been tracking the trends of its staff commutes. This is done on a volunteer basis, and allows us to understand the challenges staff face daily in getting to and from our offices, to learn what we can do to improve their experience, and ultimately lead us toward creating **a more equitable work place.**

PERCENT STAFF WHO TAKE:

- CAR **56%**
- PUBLIC TRANSIT **33%**
- BIKE **7%**
- WALK **4%**



PERCENT MILES TRAVELED BY:

- CAR **64%**
- PUBLIC TRANSIT **32%**
- BIKE **3%**
- WALK **1%**

FIRM-WIDE **AIR TRAVEL**

Air travel is a major carbon emitter. And here's what we emitted this year on domestic flights in terms of **carbon dioxide equivalent (CO2e)**.

For this metric, we are only presenting domestic flights because of the limitations in how we are able to track miles on international flights. As we grow our global footprint, this will become more streamlined and we will improve this metric.

We tallied the total distance of airplane miles traveled by running a blind report for employee work-related travel and multiplied that by the national average of CO2e emitted per airline mile.

While operating requires some level of air travel, we'll be working this year to find ways to lower these numbers.

0.39
AVG CO2e **PER AIRLINE MILE - NATIONAL AVERAGE**

703,675
TOTAL DISTANCE **IN MILES TRAVELED BY PLANE***

274,433
TOTAL LBS OF CO2e **FROM GLUMAC AIR TRAVEL 2019**

*domestic flights only

What is CO2e?
Carbon dioxide equivalent, or CO2e, is a unit that measures carbon footprint. It's used to contextualize greenhouse gas (GHG) emissions in a uniform way that is more easily understood.

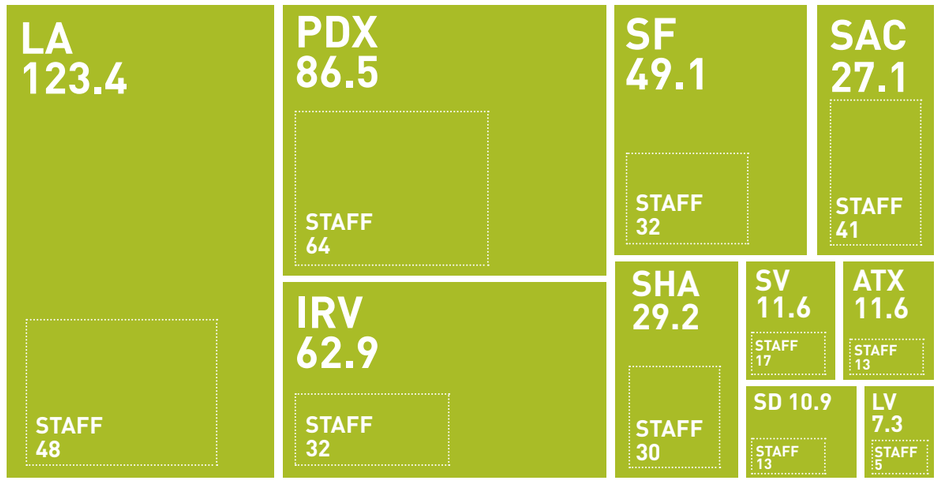
GHG emissions include carbon dioxide, methane, nitrous oxide, and fluorinated gases (e.g. refrigerants). CO2e groups the relative impact of these GHG's into a single metric.

CO2e is a metric commonly used by state and federal governments, as well as building and design industry firms to understand the environmental impact of their actions and their work.

ENERGY PERFORMANCE **BY OFFICE**

OFFICE EMISSIONS - **$MTCO_2e$**

Each office is different - different environments, different communities, different power sources. Some spaces, like our Sacramento and Shanghai offices, employ on-site energy generation that help lower emissions despite having larger staff count.



*Seattle office reported less than 1 ton of CO_2 and is not charted

EMISSIONS BY PERSON

Estimating the carbon impact of our office energy- use is one step in a much larger project to understand the full carbon impact of Glumac's operations. Carbon accounting is a complex process, and has been standardized by organizations like the **World Resources Institute** and the **Greenhouse Gas Protocol** to create consistent measurement and reporting between organizations. This year Glumac has informally estimated some carbon emissions, with the goal of participating in a standardized emissions accounting and reporting process in later years.

Carbon emissions are categorized into three groups: Scope 1, Scope 2, and Scope 3. The scopes are delineated based on the level of control an entity has over its emissions. For Glumac, Scope 1 and 2 are building related. Scope 1 includes emissions from natural gas equipment and Scope 2 includes emissions from the generation of electricity that is used in the buildings we occupy. Scope 3 emissions include electricity transmission and distribution losses, business travel, employee commuting, and solid waste removal.

Glumac operations has begun to assess our carbon emissions across all three scopes. We are working to put in place data gathering methods that allow us to more accurately characterize the emissions from our overall operations. Next steps include efforts to understand our emissions from purchasing and from international flights.

As the global community seeks to dramatically reduce emissions to curtail climate change impacts, understanding how to mitigate our own emissions is one tool for improving the impact we leave from the work we do.

GLUMAC IRVINE
IMAGE COURTESY OF BRUCE DAMONTE

EMISSIONS PER PERSON

One of Glumac's goals this year was to focus on lowering emissions in our offices. Many

1.45 AVG CO_2 PER PERSON

1.66 PER PERSON IN 2018

of our offices utilize low-energy design integrations, such as chilled beams, LEDs, daylight harvesting, natural ventilation, and Energy Star certified appliances. So the challenge is educating staff, and encouraging them to take an active part in making a difference. Glumac staff acknowledge their role in making a difference not just on our projects, but also in how we work day-to-day. In 2019, that effort made a difference, even as staff count increased by more than 20 firm-wide.

WASTE REDUCTION **MEASURES**

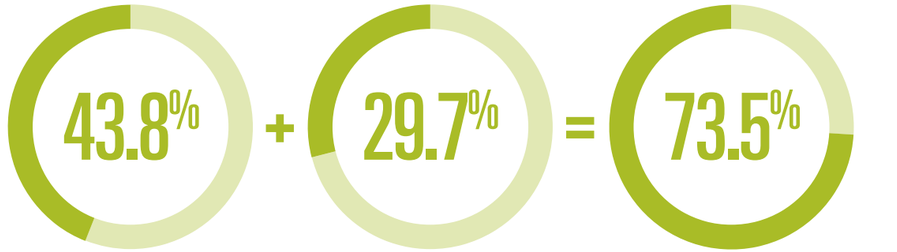
SUSTAINABLE ENVIRONMENTS

Glumac is committed to reducing the footprint of our internal operations. Reducing our waste is one way to reduce overall carbon emissions – the EPA estimates that 70 megatons of carbon could be avoided by increasing the rate of recycling in the US to 50%. One strategy Glumac investigated this year was to weigh garbage in various offices to determine how much waste we are sending to landfills versus composting or recycling. Four of our 9 offices participated. Of those 4 participating offices, only 26.5% of our waste was sent to landfill. To truly understand where we can reduce our overall waste, next year's goals include performing a full trash audit in each office.

Other opportunities were identified this year in our assessment of how we treat our trash! Glumac doesn't currently have a company-wide purchasing policy for items like copy paper and office supplies. Most offices (5/6 surveyed) are purchasing some form of recycled material, but we can improve at walking the talk by ensuring that every office is purchasing post-consumer recycled material.

WHAT ABOUT WASTE FROM CATERING AND IN-OFFICE LUNCHES?

Many offices have regular in-office lunches catered from local businesses. Six of the 9 full-time offices we have say they ask incoming caterers to reduce overall packaging. Every office has durable dishware for use, and most offices have water fountains to reduce plastic water bottle waste. But we can still do better! Glumac is working on communicating a formal "catering policy" for our incoming food to eliminate unneeded disposable dishware and napkins.



*waste tabulated by weight

COMPOSTED WASTE

Glumac is nearing a mark of diverting half its waste to compost.

RECYCLED WASTE

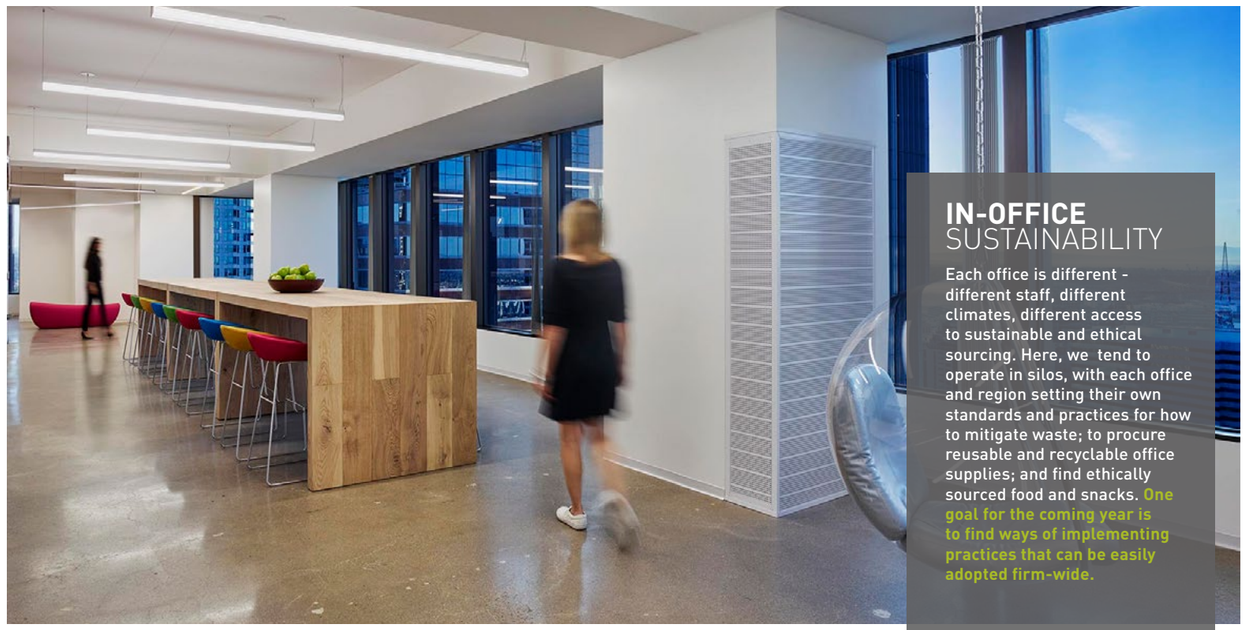
Every community is different. Some have more strict rules than others, but in-office education plays a key role in improving this metric.

LANDFILL DIVERSION

We're proud to report the majority of waste from our reporting offices is diverted from landfills.

LANDFILL WASTE

Some waste at Glumac still goes to a landfill. We continue working at reducing this number, mainly via staff education and reducing single-use plastics from meals.



IN-OFFICE SUSTAINABILITY

Each office is different - different staff, different climates, different access to sustainable and ethical sourcing. Here, we tend to operate in silos, with each office and region setting their own standards and practices for how to mitigate waste; to procure reusable and recyclable office supplies; and find ethically sourced food and snacks. **One goal for the coming year is to find ways of implementing practices that can be easily adopted firm-wide.**

WATER PERFORMANCE **BY OFFICE**

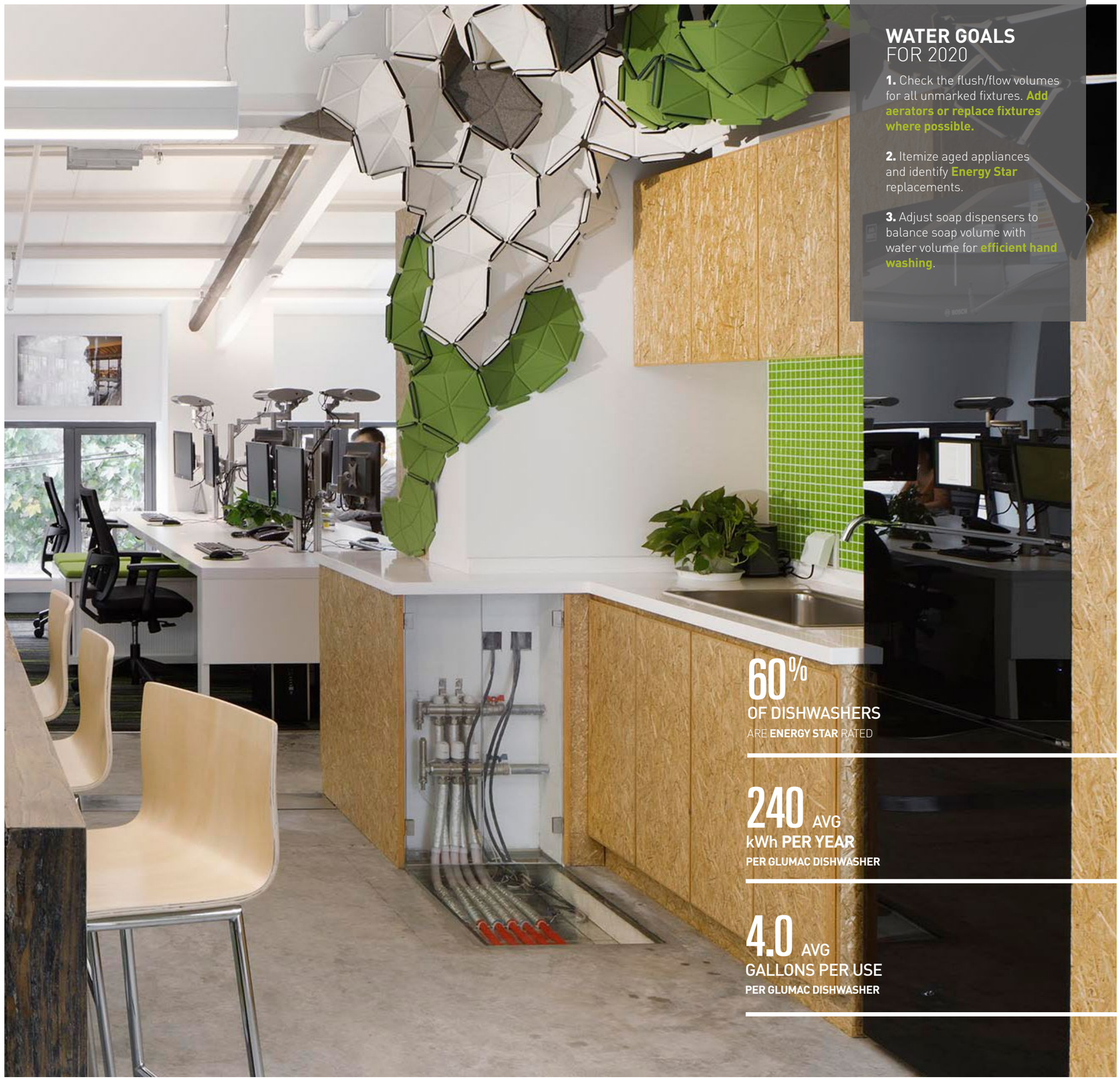
Tracking water performance in offices is a challenge. But it's a major part of creating sustainable and resilient buildings. We need to do better as an industry to empower clients and occupants to track this data, to create spaces that have the flexibility to improve over time, and to respond to changing local and federal baselines.

As climate change impacts precipitation patterns and global weather, in many areas water scarcity is increasingly becoming a concern. Globally, less than 1% of the earth's water is fresh liquid water, and as aquifers become overdrawn, pollution impacts water resources, and climate change reduces access, it's ever more important to reduce our unnecessary water use wherever we can.

Quantifying Glumac's annual water use is not a simple task. As with many large buildings, Glumac offices are in locations where there is only one water meter per building, so individual tenant water use isn't readily available. Further, municipalities measure building water use in CCF (Centum, or 100, Cubic Feet). One CCF is equivalent to 748 gallons of water! Utilities charge per CCF, and not per fraction of a CCF, so your water bill is often only an estimate of the actual amount of water used in a building.

Strategies to understand actual water use in a building are dependent upon tenant level metering initiatives or installation of water efficient fixtures in a building. Metering gives accurate usage data, and while Glumac investigates whether that's an option for us, we are invested in ensuring all of our fixtures use the least amount of water possible.

The most water and energy efficient dishwashers on the market are Energy Star certified dishwashers. These appliances use less than 240 kWh of energy per year and an average of about 4.0 gallons per cycle. Currently, about 60% of the dishwashers in Glumac offices are Energy Star appliances. Moving to fully Energy Star appliances across all of our offices in the future could save thousands of gallons of water annually.



WATER GOALS FOR 2020

1. Check the flush/flow volumes for all unmarked fixtures. **Add aerators or replace fixtures where possible.**

2. Itemize aged appliances and identify **Energy Star** replacements.

3. Adjust soap dispensers to balance soap volume with water volume for **efficient hand washing**.

60%
OF DISHWASHERS
ARE **ENERGY STAR** RATED

240 AVG
kWh **PER YEAR**
PER GLUMAC DISHWASHER

4.0 AVG
GALLONS PER USE
PER GLUMAC DISHWASHER

FIRM-WIDE **GIVEBACK**

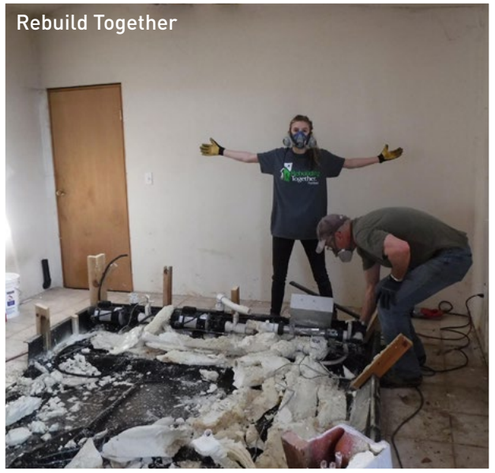
SOCIAL RESPONSIBILITY

Our community-engagement efforts are largely spear-headed by intrepid staff. In each office, we encourage staff to seek out and bring to the table new opportunities for community give back. This has resulted in some amazing partnerships that have led to a sustained impact on the cities in which we work.

ORGANIZATIONS

- ACE
- Adopt a Family
- CANstruction
- Rappel for Her
- Habitat for Humanity
- OSU Advantage Accelerator Mentor
- Rebuilding Together
- Run for Love organized by The KFoundation
- Willamette Innovators Network
- Architects in Schools
- PSU Sustainability Mentorship Program


Rappel for Her


Rebuild Together


Beacon Food Forest

STEM Education

GLUMAC
DEMOGRAPHICS

DEPARTMENT BREAKDOWN

GLUMAC BY
GENDER

33% of Glumac staff identify as women

67% of Glumac staff identify as men

13% of a/e industry identify as women*

*According to Bureau of Labor Statistics survey published in 2017

TECHNICAL
STAFF

26% of Glumac staff identify as women

74% of Glumac staff identify as men

ADMINISTRATIVE
STAFF

82% of Glumac staff identify as women

18% of Glumac staff identify as men

UN GOAL: REDUCED INEQUITIES

EQUITY + INCLUSION

At Glumac, we bring together staff from diverse backgrounds that reflect the diversity of the communities in which we work and live. Our overall goal is to create a supportive work environment in which inclusivity is expected and prioritized.

The A/E industry has work to do in improving its inclusion. The Bureau of Labor Statistics recently reported only 14 percent of full-time wage and salary workers in our industry are women, and only 13 percent of working pool of engineers in our industry are women. This obviously leaves a lot of work to be done. However, at Glumac, we are pleased to report averages well above these numbers across our firm.

More than 26% of our technical staff are women, with several of our offices

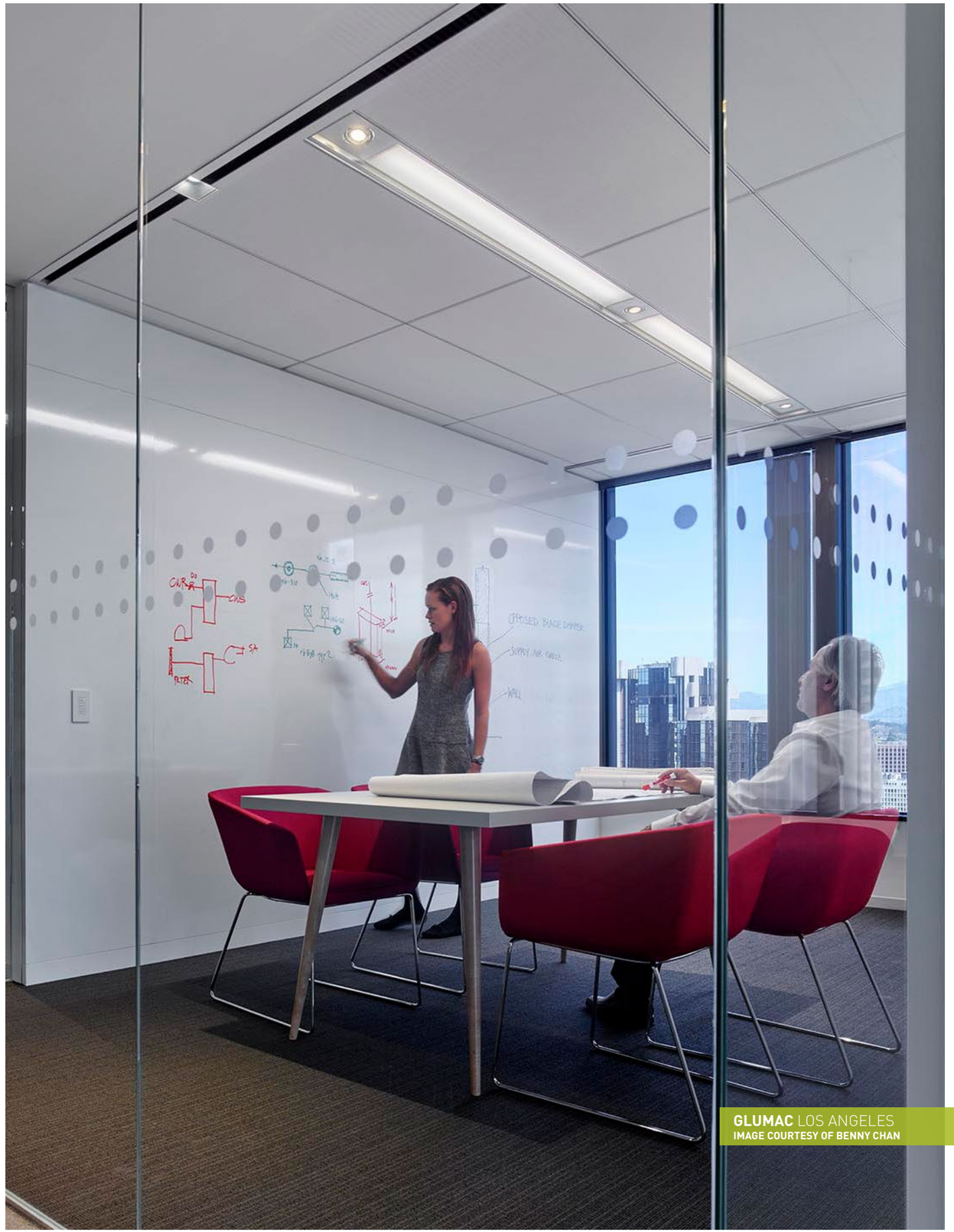
50% OF SHANGHAI TECHNICAL STAFF IDENTIFY AS WOMEN

reporting numbers higher than that mark. While we work to increase the diversity of our staff, we are also working to improve paths to leadership for all staff. **Of our Associates and Vice Presidents group, 19% are women**. However, that number has increased in recent years, and we are working to continue that positive trend.

Our commitment extends beyond recruitment, retention and promotion. Each of our offices participates in various women-focused organizations throughout the industry to help provide paths to career development for current professionals,

13% OF OUR STAFF W/ PE DESIGNATION IDENTIFY AS WOMEN

but also to develop the next generation of industry leaders. Most notably, our CFO Angela Sheehan partnered with Girls, Inc to promote awareness of STEM field opportunities to girls at every level of schooling, and offering mentorship toward finding success in our industry.



GLUMAC LOS ANGELES
IMAGE COURTESY OF BENNY CHAN

UN GOAL: GOOD HEALTH + WELL-BEING

SUSTAINABLE DESIGN **APPROACH**

At Glumac, sustainable design is a way of life. For more than 45 years, our unifying principle has been sustainability and creating systems that optimize energy efficiencies and minimize environmental impact. We believe there are sustainable design opportunities on every single project and we strive to provide our clients with cost effective solutions that match their goals.

Holistically, we utilize five high-level design concepts to ensure that we are developing the best and most effective solutions for each building. These principles drive the decision making behind each project, allowing us to guide solutions to meet the needs of building owners, occupants, and the environment.

- Design buildings to suit their immediate environment, rather than attempt to recreate an advanced building design from another locale and different climate.
- Collaborate with every member of the design and consultant team as part of an integrated process to optimize overall performance and cost efficiency.
- Communicate consistently with all parties. Particularly, maintain strong interactions and relationships with clients – and make a commitment to stand behind the work.
- Justify sustainable features by calculating lifecycle costs. Realizing higher performance may be achievable through smart design without affecting the overall construction budget.
- Apply expertise from one market area or industry to another. Project experience in microelectronics, for example, has been used to improve air quality in laboratories – so that new and unexpected ideas may lead to design breakthroughs.

What follows are case studies focusing on these approaches, which we feel are necessary toward delivering a sustainable future.

To learn more, visit our blog, Sustainability Matters, at **glumac.com/sustainability-matters**

GENSLER SAN DIEGO DESIGN STUDIO
IMAGE COURTESY RYAN GOBUTY

HEALTHY BUILDING **DESIGN**

WHY ARE HEALTHY BUILDINGS IMPORTANT?

Healthy buildings support our physical, mental and social well-being and have a huge impact on our lives as we spend upwards of 90% of our time indoors.

There are more than 100 studies backing the concept of healthy building design. Results from several office studies found employees are more satisfied, productive and report fewer sick days in a healthy building. The business case is notable, as employees are the most expensive operations cost for companies. In school studies, students have higher test scores. And, we have seen health-focused residential

Because **we now spend**

90%

of our lives **INDOORS**

buildings lease up faster than their conventional neighbors. The result is also similar for hotel rooms.

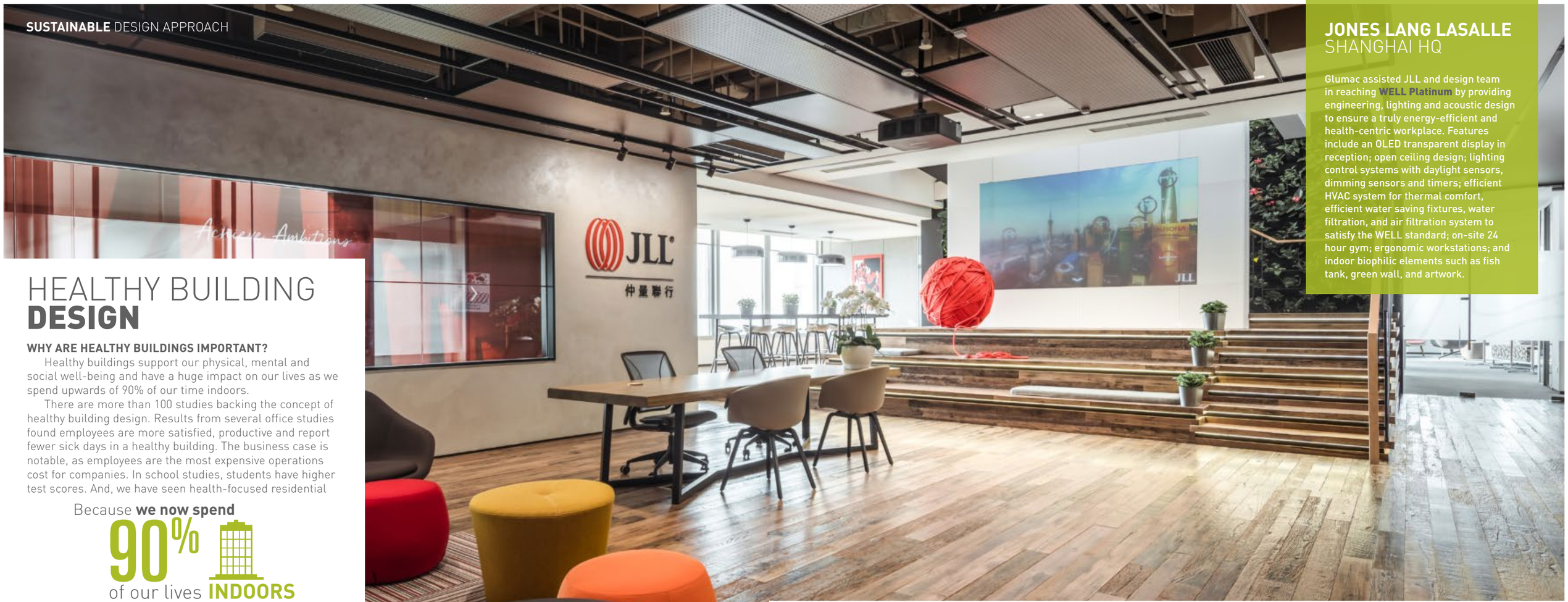
People are also spending more money on health-related products and services, so the trend for healthy living is extending to where we live, work and play.

WHAT IS A HEALTHY BUILDING?

Glumac's MEP engineers, energy analysts and sustainability consultants as well as lighting designers and commissioning agents help our clients create healthy buildings for their customers.

Healthy building projects are designed to have great indoor air quality due to high levels of natural ventilation and/or enhanced mechanical filtration, and installed materials that minimally off-gas chemicals. Air quality is continuously monitored to maintain performance and improve maintenance procedures. Ventilation systems are often decoupled from heating and cooling to improve energy efficiency and indoor air quality, and provide optimal thermal comfort, such as radiant technology.

Healthy buildings also connect people with nature through effective daylight designs, outdoor views, and the incorporation of plants and animals into interior spaces. Supplemental electric lighting follows the color and intensity of natural daylight creating relaxing, inviting, and sensory-rich spaces.



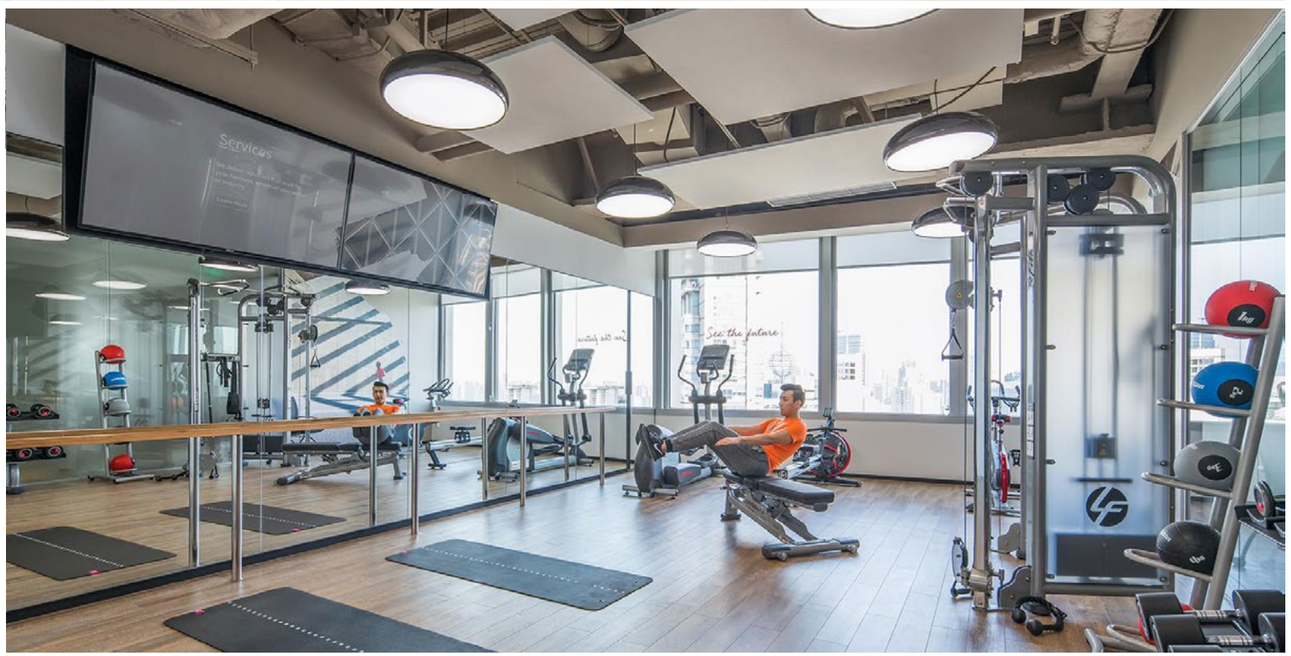
JONES LANG LASALLE SHANGHAI HQ

Glumac assisted JLL and design team in reaching **WELL Platinum** by providing engineering, lighting and acoustic design to ensure a truly energy-efficient and health-centric workplace. Features include an OLED transparent display in reception; open ceiling design; lighting control systems with daylight sensors, dimming sensors and timers; efficient HVAC system for thermal comfort, efficient water saving fixtures, water filtration, and air filtration system to satisfy the WELL standard; on-site 24 hour gym; ergonomic workstations; and indoor biophilic elements such as fish tank, green wall, and artwork.

CONCEPTS OF THE WELL BUILDING STANDARD

OUR DELOS WELL PARTNERSHIP

We work closely with Delos on WELL certifications and assessments to integrate healthy building solutions into tenant improvement projects, office, residential buildings, and hotels. We have a 13 WELL Accredited Professionals to inform our clients' healthy building goals.



CSU LONG BEACH **CLEAN ENERGY MASTER PLAN** strategic recommendations

UN GOAL: AFFORDABLE + CLEAN ENERGY

IN 2018 WE WORKED WITH CALIFORNIA STATE UNIVERSITY LONG BEACH TO DEVELOP A STRATEGIC ROAD MAP FOR BECOMING **A CARBON NEUTRAL CAMPUS BY 2030**

BUILDING ENERGY EFFICIENCY

1. Implement all EE projects with a reasonable payback periods (Increased Investment Scenario) prior to 2030 – increase average annual EE investment rate to at least $2.8 million
2. Prioritize projects with lower paybacks up front and couple with external financing
3. Combine capital intensive retrofit projects with larger building renewal projects to reduce net project cost for EE project and limit impact to campus operations
4. Establish a campus wide retro-commissioning/control optimization initiative
5. Review building hours of operations and reduce the HVAC hours of operation when buildings are always unoccupied or underutilized
6. Establish a quarterly classroom & EMS schedule review process to optimize building utilization. This should include: Summer Building Shutdown, Friday/Saturday Shutdown, Schedule & Space Optimization, etc.
7. Maintain ZNE and low-EUI standards for new construction and major renovation projects

RENEWABLE ENERGY

1. Assess the opportunity to switching the existing 4.8MW solar system to a net energy metered (NEM) contract, and added additional PV under a NEM agreement
2. Establish a renewed competitive solar PV procurement process for future PV phases
3. Conduct a due diligence assessment of Solar PV proposals to address potential economic challenges on campus (4.8MW No-Export Agreement, New SCE Rate Structure, etc.)
4. Establish self-generation targets based on PPA rates from the competitive procurement process and due diligence assessment

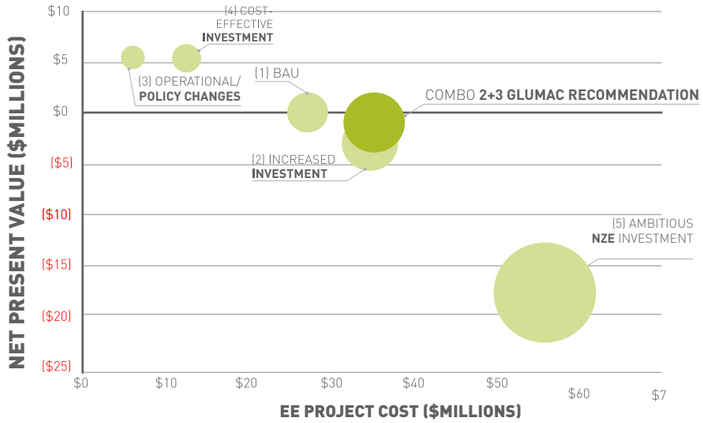
CLEAN ENERGY VEHICLES

1. Prioritize purchasing fully electric vehicles long term
2. Establish a clean energy vehicle standard and review process for all replacement vehicles
3. Establish interim electrification targets between now and 2030
4. Assess using electric shuttle buses in five years when the current third-party provider's contract expires under the competitive RFP process
5. Continue to track and pursue funding opportunities for clean energy vehicles
6. Establish a pilot electric vehicle program immediately
7. Establish an electric grounds equipment pilot program with the facilities department

CARBON OFFSETS

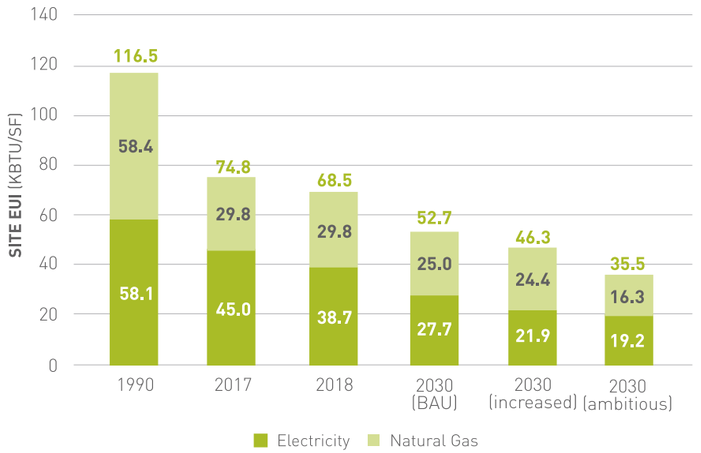
1. Establish a Campus Carbon Management Hierarchy policy prioritizing mitigation measures
2. Establish minimum requirements for the make-up and sources of carbon offsets
3. Clearly communication carbon management hierarchy and benefits of offsets with the key campus stakeholders and the CSULB community

ENERGY REDUCTION SCENARIOS



This figure displays financial return for **five of the energy efficiency project portfolios assessed**. Each scenario is represented as a bubble, with total investment on the x-axis, Net Present Value along the y-axis (better economics to the top), and total GHG reductions represented by the width of the bubble. Based on this analysis, Glumac recommend CSULB combine the low/no-cost policies scenario **(3)** with an increased EE investment strategy **(2)** to achieve a cost neutral investment strategy. This is estimated to reduce campus Scope 1 & 2 emission by over 30% over the next 12 years.

POTENTIAL EUI OF CSU LONG BEACH IN 2030



This chart shows the potential EUI of the campus in 2030 given Glumac's recommendations. It was determined that CSULB **can realistically achieve an overall campus EUI as low as 35.5 kBtu/sf** through various energy-efficiency & renewable energy projects.

GHG MITIGATION STRATEGIES

SOLAR PHOTOVOLTAICS

The CSULB campus can support up to **~10 MW of on-site solar photovoltaics**. Shifting utility rate structures across CA will adjust the economics of solar, but PV can still be a cost-effective investment.

HVAC RETROFITS

HVAC retrofit investments should be made over the next 12 years leading up to 2030. Glumac identified HVAC retrofit opportunities were identified across the entire campus.

CAMPUS ELECTRIFICATION

Campus electrification is recommended to be a fundamental part of CSULB's long term carbon neutrality plans. **CA Senate Bill 100** will provide carbon free electricity by 2045.

ZERO EMISSION VEHICLES

Electric vehicles should be prioritized for future purchases. **Diesel grounds equipment is most difficult to mitigate** – electric grounds equipment pilot program recommended.

LED LIGHTING

LED lighting retrofit projects should be prioritized near term. They are cost effective projects and minimally impactful to campus operations - but **the energy impacts can be immediate** and powerful.

FUNDING & FINANCING

There are numerous funding/ financing sources available. A long-term funding plan will **improve capital outlay for energy-efficiency investments** across campus.

O STREET / P STREET STATE OFFICE BUILDINGS

UN GOAL: AFFORDABLE + CLEAN ENERGY

Sacramento, CA

Glumac is providing mechanical,electrical, plumbing, sustainability consulting and energy services for two new office buildings for the State of California Department of General Services (DGS).

The two combined buildings are within a few blocks of one another and bring a total of 1,210,000 square feet of new **LEED Platinum and Zero Net Energy** office space to DGS's building portfolio.

The P Street Building will serve as the new 838,000-square-foot Department of Natural Resources headquarters. Ultimately the tower, which will also encompass a 300-seat auditorium, will be the workplace of 3,500 state employees.

The building is designed to operate at an EUI of 28 kBtu/sf/yr with a with a high performance envelope and using low velocity air distribution, radiant comfort, advanced controls, and daylight and occupancy controlled LED lighting. A building reclaim water system will recycle an estimated 1.3 million gallons of water per year.

Along with low flow plumbing fixtures, the building is expected to use 50 percent less water than a typical, comparable office building.

The O Street Building will serve as a 372,000-square-foot office building, comprising the Department of Developmental Services, the Department of State Hospitals, and the California Health and Human Services Agency.

It is expected to use 68 percent less water than a similarly-sized office building via of low flow fixtures, 70,000 gallons per year of greywater production, 170,000 gallons of rainwater reuse, and 170,000 gallons of condensate recovery reuse. The building is designed to operate at an EUI of less than 25 kBTU/sf/yr with a high performance envelope and using radiant heating and cooling systems, water-source heat pump for heating hot water and DHW, demand-controlled ventilation, energy recovery in the AHUs, and high efficiency LED lighting.

Both buildings will operate with solar power through the Sacramento Municipal Utility District (SMUD) SolarShare program. This energy program is part of a first-of-its-kind agreement with SMUD in which DGS' entire Sacramento portfolio will move to solar power.

PROJECT DETAILS

SIZE: combined 1,210,000 sf
COMPLETION DATE: 2021
OWNER: State of California
ARCHITECT: P Street - AC Martin; O Street - ZGF/Lionakis
CONTRACTOR: P Street - Turner; O Street - Rudolph and Sletten
SERVICES: Mechanical, Electrical, and Plumbing Design; Energy Analysis, Commissioning, Sustainability Consulting

RENDERING COURTESY OF **ZGF**

WATCH ONLINE
Learn how we used Autodesk's BIM360 cloud platform to deliver these Net-Zero projects: **https://bit.ly/2EpvsmQ**

RENDERING COURTESY OF **AC MARTIN**

400 WESTLAKE

Seattle, WA

The developers of this old-meets-new project are working to make it the greenest of its size in the world, targeting petal certification under the **Seattle Living Building Pilot Program**. Its operating total building energy consumption will be 25% below the baseline 2012 Seattle Energy Code site energy use targets.

The 15-story office tower will sit over the existing Firestone Auto Supply and Service historic landmark building in the booming South Lake Union neighborhood. The updated building will include 176,000 sf of office space; 8,000 sf of ground-floor retail; and two levels of below-grade parking totaling 35,000 sf. The project will also feature a 4,500 sf roof terrace.

Glumac is providing energy modeling to support the project's Living Building Pilot Program pursuit and is assisting the team with the following:

Providing feedback on mechanical system types suitable for the project's aggressive sustainability goals. **Systems include chilled beams, modular air source heat pump chillers, and an oversized dedicated outside air system (DOAS) with heat recovery and demand-control ventilation.**

Detailed energy modeling to forecast energy use, in order to inform the project team of the trade-offs between core-and-shell system performance and future tenant obligations.

- Providing guidance for steep water reduction goals. The building's aim is to use no potable water for non-potable uses. Strategies investigated include low-flow fixtures; greywater reuse; rainwater capture and reuse; and possible blackwater treatment and reuse.
- Energy modeling and feedback on an LED lighting package to achieve stringent lighting power density targets, plug load controls, and on- and off-site renewable energy systems.

PROJECT DETAILS

SIZE: 265,000 square feet
COMPLETION DATE: 2020
ARCHITECT: Perkins + Will
CONTRACTOR: Lease Crutcher Lewis
OWNER: Martin Selig Real Estate
SERVICES: Energy Modeling

RENDERING COURTESY OF **PERKINS + WILL**

MISSION COLLEGE
STUDENT ENGAGEMENT CENTER

Santa Clara, CA

Glumac provided mechanical, plumbing and electrical engineering and energy services for the three-story Student Services Building. The facility will serve 1,000 students and faculty and serve as the new main entry point for the campus.

Mission College's commitment to sustainability requires that all new buildings achieve a minimum level of LEED Silver, campus-wide composting and recycling efforts, the use of eco-friendly cleaning products and classes that focus on habitat enhancement and sustainable aquaponics.

The design team understood these goals and responded with a design that targeted a strong level of LEED Gold. However, after analyzing the energy resource inputs and potential for energy adjustments within the project's budgetary reach, the design team revised their target and achieved LEED Platinum. The Lean and collaborative approach, along with Glumac's energy usage database, fostered the creativity needed to achieve the end-user savings and functionality necessary to position Mission College as a sustainable campus.

FEATURES

- LEED Platinum
- Mixed-Mode Displacement Ventilation
- Extensive Daylighting & High-Efficiency LEDs

PROJECT DETAILS

SIZE: 100,000 square feet
COMPLETION DATE: 2018
OWNER: West Valley Community College District
ARCHITECT: Lionakis
CONTRACTOR: Gilbane
SERVICES: Mechanical, Electrical, Plumbing Design, Lighting Design

IMAGE COURTESY OF
TIM MALONEY TECHNICAL IMAGERY

OUR BROADER IMPACT

PROFESSIONAL LEADERSHIP

PARTNERING WITH AND HELPING ADVANCE THE IMPLEMENTATION OF SUSTAINABILITY AND EFFICIENCY-FOCUSED INDUSTRY STANDARDS

WELL BUILDING STANDARD

Good buildings work for the people who inhabit them. The indoor quality of a space is dependent upon many factors, and the WELL certification program aims to help building designers improve spaces by understanding all of the components that influence occupant health and happiness. Glumac is committed to designing healthy buildings, and has 13 WELL AP design staff who are experts in design strategies. To date, Glumac has worked on 22 buildings designed with the WELL Standard, 8 of which are certified.

LIVING BUILDING CHALLENGE

We are long time sponsors of the International Living Future Institute's (ILFI) Living Building Challenge program and a founding member of ILFI's Biophilic Design Initiative. Through our advocacy and education efforts, we are finding that our clients are increasingly interested in targeting LBC certification goals with a keen focus on net zero energy and water systems, biophilic design, and materials for minimal toxicity and lowered embodied carbon. We are currently working with clients to integrate biophilic design strategies into hotel and office projects and tracking metered data for our net zero energy and water projects. We look forward to sharing the outcomes of these efforts in our 2020 report.

LEED

The U.S. Green Building Council LEED Certification program is likely the world's most-widely known (and prolific) green building certification program in the world. Glumac is a long time active member of the USGBC and we've been part of the design for more than 370 LEED Certified Buildings (more than 70 of those have been certified LEED Platinum). More than 120 of our staff are LEED Accredited Professionals, and Glumac supports staff membership and participation within USGBC.

ASHRAE

As the leading trade organization for HVAC engineers, ASHRAE is a critical organization for scientific research in the field and for building codes and standards development. Glumac has a long history of participation within ASHRAE, and actively supports employee membership and attendance at meetings and technical presentations. Many Glumac staff have been involved in the boards of local chapters (we boast a number of former Chapter Presidents) and in ASHRAE Technical Committees at the Society level. More than 20% of our technical staff are current ASHRAE members.

*Completed building and master plan projects designed to meet EUI net zero energy goals or are currently operating at net zero energy. The purpose of including this metric is to show the industry's progression toward carbon neutrality

WELL PROJECTS
22

WELL APs
13

LBC AMBASSADORS
10

LEED APs
120

LEED PLATINUM PROJECTS
70+

LBC PURSUITS
6

NZE READY & OPERATING PROJECTS*
50+

CSR CONTRIBUTORS

CSR PROJECT LEADER
Nicole Dunbar
Mechanical Designer
Northern Region

SUSTAINABILITY EXPERT
Nicole Isle
Chief Sustainability Strategist
Northern Region

CONTRIBUTORS
Lauren Adams
Energy Analyst
Central Region

Brian Goldcrump
Energy Analyst
Northern Region

Siyang Zhou
Sustainability Consultant
China Region

Xiao Shi
Sustainability Consultant
China Region

Annie Levan
Sustainability Strategist
Central Region

Ashley Esquivel
Electrical Designer
Southern Region

Michael Adams
Energy Analyst
Southern Region

Katie Mackenzie
Mechanical Designer
Northern Region

MARKETING
Alex Baumgardner
Marketing+Communications
Corporate

FINANCIAL REPORTING
Colette Adams
Accounts Payable Manager
Corporate

LEADERSHIP
Steven Straus
President/CEO
Corporate

We would also like to thank our regional leadership for allowing the CSR team to invest time and effort necessary to pull this data together. Your leadership is helping make Glumac fulfill its mission of designing a sustainable future.

Glumac is a Tetra Tech Company, working within its High Performance Buildings Group**. Tetra Tech's High Performance Building group brings the expertise of 1,500 building designers and commissioners from across four continents, delivering cutting edge technical approaches to some of the most sustainable building projects across the globe.**

TETRA TECH
High Performance Buildings Group

BUILDING TOWARD A RESILIENT FUTURE THROUGH SUSTAINABLE DESIGN

GLUMAC PORTLAND
IMAGE COURTESY OF BRUCE DAMONTE

THINKING. INSIDE THE BUILDING.™

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