Gensler

CLIMATE CHANGE
GENSLER SIGNS PARIS PLEDGE AT COP21

IMPACT THROUGH DESIGN

Knowing the impact that design has on climate change, we signed this historic pledge to mark our commitment and urge our clients and fellow architects to reduce emissions through high-performance design.

GENSLER JOINED A LANDMARK MEETING (COP21) TO DEAL WITH CLIMATE CHANGE AS THE CRITICAL ISSUE OF OUR TIME.

One of the most important points made is that the built environment plays a crucial role in mitigating climate change. The time to act is now.

01

WHY DESIGN MUST BE PART OF A CLIMATE CHANGE STRATEGY

THE SUSTAINABILITY OF THE BUILT ENVIRONMENT CAN HELP ENORMOUSLY TO MITIGATE CLIMATE CHANGE

Gensler believes that investments in the sustainability of the built environment can contribute significantly to reducing the demand for energy that drives much of climate change. By keeping the issue at the forefront, we intend to raise awareness of the immediate impact that architecture and design have on water use, energy consumption, and greenhouse gas (GHG) emissions. In addition, by initiating conversations with our clients and encouraging more robust sustainable design practices in our offices, we dedicate ourselves to lead in this effort.

The energy demand from buildings is responsible for at least 30 percent of global CO_2 emissions.[1] Increased efficiency in this arena is necessary for any climate change mitigation effort to succeed. The issue is not limited to the design of sustainable buildings that support high-performance human activity while requiring less fossil fuel and embodied energy to build. We also need to support our clients' life-cycle operational success. Our goal is to reduce the climate impact of the building industry as our clients develop innovative solutions and transition to more eco-friendly business models.

Given our position as a leader in our industry and our widespread expertise in sustainable design—represented by projects as diverse as the Tower at PNC Plaza, Worldhaus's prototype of affordable homes built in 10 days for families in rural India, and the 121-story Shanghai Tower—we see an opportunity for Gensler to become a global advisor capable of helping governments, corporations, and institutions craft climate change plans and recalibrate their real estate portfolios.

In 2014, Gensler's new building projects were designed to a standard of approximately 81.1 kBtus of energy per square foot per year, representing a 32-percent improvement over the U.S. national average. In the same year, Gensler's commercial interiors portfolio was designed to use approximately 0.82 watts per square foot for lighting, which is 23 percent better than the U.S. average.

Moving forward, Gensler is committed to concrete action and strong collaborative efforts with our clients for the sustainable transformation of our shared, global built environment at every project scale.

02

ARCHITECTS AND THEIR CLIENTS CAN MAKE A HUGE DIFFERENCE

UN Delegates at COP21, Paris, France

RAISING PUBLIC AWARENESS OF THE BUILDING SECTOR'S ENVIRONMENTAL IMPACT

The global building sector consumes half of the world's annual output of energy. The built environment is responsible for over one-third of global energy usage and one-third of CO_2 emissions.[2] The International Energy Agency (IEA) estimates that limiting global temperature rise to two degrees Celsius will require a 77-percent reduction in total emissions attributed to the building sector by 2050.[3] The IEA estimates that if the best practices in building energy efficiency available in 2012 and 2013 were applied across the global built environment, the total energy savings would be equivalent to the combined energy usage of both India and Russia (the world's fourth and fifth largest greenhouse gas emitters).[4] Advances in sustainable design and technology since the IEA made its last estimate suggest an even greater impact is possible now.

In highly developed countries, the mid- to late-20th century tendency to construct relatively low-efficiency, single-use office complexes and large shopping centers along freeways has created thousands of low-density communities with poor space utilization, huge electricity demand, and meager public transportation infrastructure. This pattern is particularly pronounced in post-war cities and suburbs across the U.S. In contrast, denser, more efficient buildings located near urban centers and transit can play a significant role in reducing GHG emissions.

THE ROLE BUILDINGS PLAY

In many developing countries, the building sector is responsible for up to 80 percent of total energy usage due to the relevance of biomass fuels as an energy source.[5] The burning of biomass fuels produces massive amounts of black carbon and particulate matter (PM) 2.5 air pollution, the highly toxic pollutant that has made asthma and other forms of chronic respiratory illness a public health crisis in parts of South Asia, Latin America, China, Sub-Saharan Africa, and the Middle East.[6]

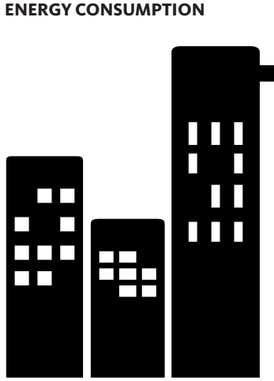
REDUCTION IN EMISSIONS

77%

THE BUILDING SECTOR MUST DROP TOTAL EMISSIONS 77 PERCENT BY 2050 TO CAP GLOBAL TEMPERATURE RISE AT 2°C—THE BEST CASE SCENARIO FOR PLANETARY SURFACE TEMPERATURE RISE.

Source: *The International Energy Agency, 2013*

ENERGY CONSUMPTION



BUILDINGS CONSUME

50%

OF GLOBAL ELECTRICITY

Source: *The International Energy Agency 2013*

CHANGE AT THE URBAN SCALE

Helping major urban centers transition to cleaner energy sources and deal with the problems associated with current levels of air pollution will be a major challenge for architects and engineers operating in developing markets. By designing infrastructure systems and prioritizing the energy efficiency of the urban building stock, architects, planners, and engineers can reduce energy costs and increase the amount of electricity available for the world's poorest communities. This could help reduce emissions of short-term GHGs such as black carbon by providing a more readily available alternative to biomass fuels, dramatically improving human health in the process. While significant opportunities exist to use sustainable design to improve human health and economic vitality in developing nations, the GHG emissions coming from more developed nations continue to outpace those of less developed ones, which means curbing emissions from buildings in the industrialized world remains our top priority.

PROMISING SIGNS

The global green building industry has shown encouraging growth over the past five years, reaching a reported $260 billion in revenues in 2013.[7] Now it is predicted that up to $1 trillion will be spent on sustainable retrofits for existing buildings in the next 10 years.[8] Even with this growth, green buildings will make up only a small fraction of the total building stock in highly industrialized, wealthy nations.

There are positive signs that green buildings will steadily raise the bar of energy efficiency and sustainability in the world's most highly developed real estate markets. But these efforts have to be scaled up dramatically, with increased emphasis from civic, business, and government leaders, in order to have a real impact in the built environment.

GENSLER AT COP21
MARKET OBSERVATIONS

1

Many policymakers believe that mandating green buildings would be economically damaging. However, cities like Boston, Seattle, Austin, Washington, D.C., and Chicago have adopted forward-looking regulations that have helped them become leading cities for green building.

2

There is a common market assumption that current building codes are sufficient and that they represent the most practical and stringent guidelines in energy efficiency available. Although some markets have progressive codes, standard building codes remain stuck in old models of performance. In some markets, building codes have not been updated in years and basic code compliance only demonstrates that a building is in line with regional standards. This can be a competitive disadvantage as more portfolio managers look to measure their holdings against emerging international standards for environmental quality and human health.

3

Green buildings have proven to be more valuable assets than conventional buildings, with a global average value that is up to 17 percent greater than their peers. Some top markets have seen a 33 percent premium for high-performance green buildings.[9]

03

GENSLER COMMITS AT COP21 TO ACTION IN THE FIGHT AGAINST CLIMATE CHANGE

RESEARCH AND INNOVATION THAT TARGET CLEAN ENERGY EFFICIENCY

During the COP21 negotiations, the U.N. Framework Convention on Climate Change (UNFCCC) convened Buildings Day on December 3, 2015. Its purpose was to emphasize the importance of the sustainable transformation of the built environment. Gensler sent a team to Paris to observe the talks, particiapte in Buildings Day, and offer a supportive design industry perspective. While the conversations surrounding the built environment's role in climate change mitigation were productive, much work remains to set concrete, achievable goals for it.

The question on everyone's mind: What will we need to do to meet new climate change goals?

In the context of broader COP21 negotiations, sustainable building design was mostly discussed as one tactic out of many being deployed against climate change. COP21 elevated the conversation, but did not fully change the perceptions of policymakers or the public regarding the urgent need for building sustainably.

A CALL FOR NEW PARTNERSHIPS

COP21 provided a sense that governments, businesses, and institutions are ready to work together and commited to meaningful change. The question on everyone's mind: What will we need to do to meet the new climate change goals? What steps do we take, and how do we monitor and report progress? Over the course of the conference, there was broad agreement that public-private partnerships are critical to reaching any new climate change objectives. Every speaker recognized the need for innovation from the energy sector, framed in terms of active reinvestment in research and development of emerging, low-carbon technologies.

AN OPPORTUNITY FOR INNOVATION

We see an opportunity for research and innovation targeting energy efficiency and clean energy generation in the building sector. When measured against the human and economic costs of climate change, the investment necessary to transform the global built environment is relatively low. This approach yields significant economic benefits as a dividend. The sustainable building industry is a proven driver of economic growth, delivering tangible benefits for building owners and tenants, and lowering healthcare costs.[10] Smart design focused on city-scaled approaches such as encouraging urban density, and transit-oriented mixed-use development, and repurposing existing building stock can significantly bolster this climate impact strategy. Reimagining dated urban infrastructure also improves resilience and encourages healthier communities.

There are significant ongoing initiatives aimed at financing for green projects, but many appear years away from realization. Market incentives for making the necessary investments in sustainable building remains low until public policy closes the gap between building codes and the standards required to achieve critical energy savings.

Ice Watch by Olafur Eliasson and Minik Rosing, Place du Panthéon, Paris

STRONGER TOGETHER
THE PARIS PLEDGE FOR ACTION

Along with cities, regions, businesses, investors, civil society groups, trade unions and other signatories, coming from every sector of society and every corner of the world, we realize that dangerous climate change threatens our ability and the ability of future generations to live and thrive in a peaceful and prosperous world. We also realize that taking strong action to reduce emissions will not only reduce the risks of climate change but also deliver better growth and sustainable development.

For those reasons, Gensler affirms its strong commitment to a safe and stable climate in which temperature rise is limited to under two degrees Celsius.

In support of this, we welcome the Paris Climate Accord, which is a critical step on the path to solving climate change. We pledge our support to ensuring that the level of ambition set by the agreement is met or exceeded.

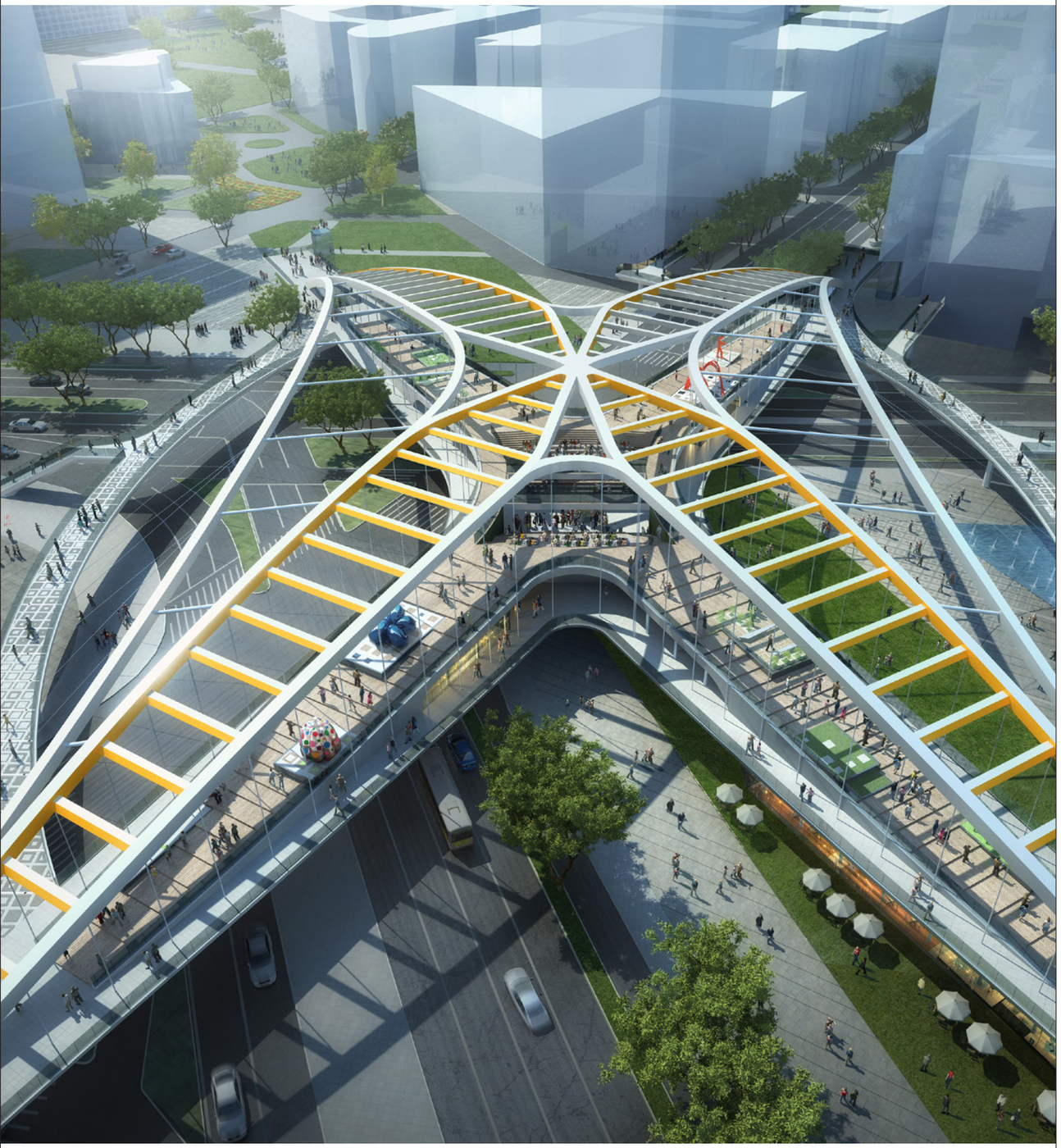
We will do this by taking concrete steps now, without waiting for the aggreement to come into force. Both on our own and in cooperation with others, we will work to reduce greenhouse gas emissions to a safe level and build resilience against those changes already occurring.

We will look back at this moment as our turning point, when the transition to a low-emission and climate resilient economy became inevitable, irreversible, and irresistible.

2°

GOAL OF THE PARIS PLEDGE

CAP GLOBAL WARMING AT 2°CELSIUS BY LIMITING CARBON EMISSIONS



Songhu-Sanmen Road Pedestrian Bridge, in Shanghai, is an urban oasis connecting two neighborhoods.

04

A COORDINATED CLIMATE ACTION PLAN

GOVERNMENTS, INDUSTRIES, AND COMMUNITIES JOIN FORCES TO SOLVE CLIMATE CHANGE

Architectural designers, planners, and engineers need to deliver effective solutions to ensure the resilience of the communities most vulnerable to climate change. As the world's largest architecture and design firm, we face these challenges every day. Our work in communities that are experiencing the impact of climate change has prompted Gensler's involvement in the development and implementation of scalable sustainable design strategies. Because of this, we believe that it is important to elevate the conversation about the connections between climate change and the built environment. We are focusing our attention on new models that address the challenges and opportunities of climate change at every scale of the built environment and its supporting systems.

WHAT WE CAN DO

Substantial reduction in GHG emissions cannot be accomplished without a global emphasis on energy efficiency in the built environment. Based on the current and potential impacts of climate change, designers and architects also need to develop solutions to cope with global water insecurity, more frequent extreme weather events, and toxic levels of air pollution. We will also need to develop scalable design solutions that help cities overcome projected losses in available arable land. These strategies should be considered as essential dimensions of any broader international climate change program.

As a global design firm with projects in more than 95 countries in 2015, Gensler is committed to making a difference on climate change and human health, as well as being mindful of the environmental legacy of the physical places that we design. We believe that business leadership is necessary to lessen the impact of climate and avoid a devastating rise in global temperatures, and we as architects and designers have a responsibility to support it. We are especially encouraged by the widespread support that the Paris Climate Accord has received from the global business community, including many of our clients.

If left unchecked, the current pace of climate change will have profound impacts on our global society, threatening resource availability and human health.

05

GENSLER-DESIGNED HIGH-PERFORMANCE BUILDINGS ARE PART OF THE SOLUTION

GENSLER'S OWN PORTFOLIO OF WORK DEMONSTRATES HOW HIGH-PERFORMANCE BUILDINGS CAN REDUCE GHG EMISSIONS

The push toward higher levels of sustainable design innovation based on the rising sustainability goals of our clients, coupled with Gensler's focus on ensuring the high performance of every project, has created a portfolio of projects that reflects a design energy use that is 25 percent better on average than a comparable suite of projects designed to standard codes.[11]

A MEASURABLE IMPACT

The American Institute of Architects estimates that five billion square feet of new construction and another five billion square feet of existing building renovations are completed in the commercial real estate sector each year.[12] If the entire market were designed to match the performance standard of the top 20 percent of Gensler's design portfolio, the U.S. could dramatically reduce its annual CO_2 emissions. To understand the energy savings potential of raising building performance standards, we looked at our own global portfolio, equivalent in square footage to 13 percent of the annual commercial real estate market in the U.S. in 2014.

In 2014, Gensler's new building projects spanned 820 million square feet and were designed to use approximately 81.1 kBtus of energy per square foot per year—a 32 percent improvement over the U.S. national average.[13] For the same period, Gensler's commercial interiors portfolio spanned 469 million square feet and was designed to use approximately 0.82 watts per square foot for lighting—a 23 percent improvement over the U.S. national average. The aggregate square footage of these projects is nearly 1.3 billion square feet, meaning that these energy savings represent a significant reduction in GHG emissions.[14] This measurable impact validates the strategic value of design as a climate change mitigation strategy.

A HIGHER STANDARD

Using the Greenhouse Gas Equivalencies Calculator developed by the U.S. Environmental Protection Agency (EPA), we have developed predictive models that help contextualize the impact on macro-level CO_2 emissions of buildings that are designed to perform better than the established U.S. national baseline.

Examining our roster of active projects, we see some projects designed to meet our standard practice, some designed for even higher performance, and some designed for exceedingly high performance. Assuming that each building is operating as designed, the cumulative year-over-year energy savings for Gensler's 2014 portfolio is approximately 4 million metric tons of carbon dioxide. According to the calculations based on EPA metrics, the reduction in CO_2 emissions resulting from Gensler's standard practice energy efficiency measures is roughly equivalent to removing 840,000 American passenger cars from the roads for an entire year.[15] That's roughly equivalent to nearly all the cars in the state of Mississippi.[16] It is also equal to preventing 1.1 years of emissions from a coal-fired power plant. [17]

GENSLER AT A GLANCE

IMPACT OF NEW CONSTRUCTION

NEW BUILDINGS

820m

SQUARE FEET WERE DESIGNED AND BUILT

ENERGY USE

81.1

KBTU'S USED PER SQUARE FOOT PER YEAR

REDUCED ENERGY USE

32%

IMPROVEMENT OVER THE U.S. NATIONAL AVERAGE

IMPACT OF INTERIORS

COMMERCIAL INTERIORS

469m

SQUARE FEET

ENERGY USE

0.82

WATTS USED PER SQUARE FOOT PER YEAR

REDUCED ENERGY USE

23%

IMPROVEMENT OVER THE U.S. NATIONAL AVERAGE

Source: *Gensler Research, 2014*

CASE STUDY
SHANGHAI TOWER
SHANGHAI

The shape of the building, achieved with a lightweight outer skin, cuts wind loads (in a city subject to typhoons) and trims the weight of the supporting structure, reducing embedded energy and the cost of construction. The double skin and on-site renewable systems lower energy use while providing sky garden atriums and other amenities.

06

PUSHING BEYOND THE STATE OF THE ART

GENSLER PORTFOLIO DATA
OUR CURRENT PROJECTS PROVIDE MEANINGFUL PERFORMANCE BENCHMARKS

Gensler's projects will deliver substantial energy savings each year, compounding their impact over time. If the size and performance of the firm's annual design portfolio continue at the 2014 level of about 1.3 billion square feet of space, the reduction in electricity-generated emissions produced by Gensler projects will be roughly equivalent to removing 17.6 coal-fired power plants from the nation's energy grid by the year 2030. That's 3.4 percent of U.S. coal-fired power plants—a significant impact, considering that the U.S. is the world's second largest GHG emitter, and the 511 coal-fired power plants currently in operation account for 77 percent of CO_2 emissions from the U.S. electricity sector.[18]

If our annual design portfolio of 1.3 billion square feet was implemented at the same average energy efficiency between now and 2030, the resulting energy savings would be equivalent to shutting down about 150 coal-fired power plants for an entire year. While this is impressive, the need for even great GHG reductions from the building sector requires an even higher standard. We believe that this can be achieved without adding extraordinary costs to building design, construction, and operation.

INCREASED WATER SAVINGS

In addition to energy savings, sustainable design has a macro-level impact on water usage. Gensler has designed 855 million square feet of buildings that adhere to LEED® water requirements. These buildings provide an average water savings of 22.16 gallons per square foot per year. Together they will save nearly 19 billion gallons of water annually (per baselines set by the Energy Policy Act of 1992). Using EPA estimates, that equals the amount of water used each year by a city of 450,000 people.

GENSLER AT A GLANCE

-150

CURRENT PRACTIC SAVINGS

CO_2 EMISSION REDUCTIONS REALIZED BY GENSLER'S STANDARD PRACTICE WILL BY 2030 BE EQUAL TO CLOSING ROUGHLY 150 COAL-FIRED POWER PLANTS IN THE U.S. FOR ONE YEAR.

-252

NEXT-GEN ENERGY SAVINGS

IF ALL GENSLER PROJECTS WERE DESIGNED TO BE AS EFFICIENT AS THE TOP 20% OF ITS PORTFOLIO, THE AMOUNT OF ENERGY SAVED BY 2030 WOULD BE EQUAL TO CLOSING 252 COAL-FIRED POWER PLANTS—49% OF THE U.S.TOTAL—FOR ONE YEAR.

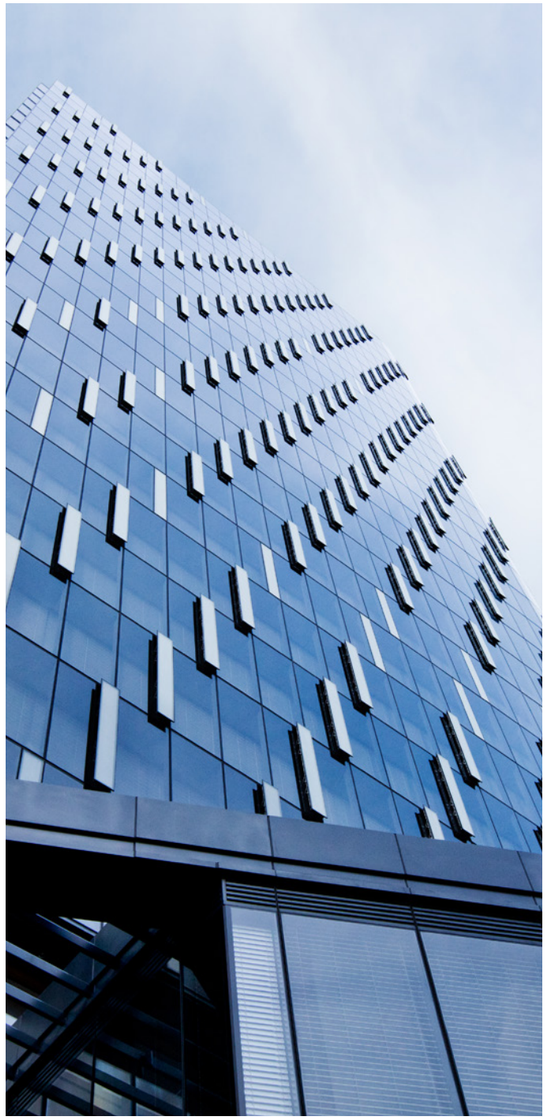
THE NEXT GENERATION
OUR HIGH-PERFORMANCE BUILDINGS CAN DO EVEN BETTER

We have developed models that demonstrate the potential of high-performance buildings to greatly reduce GHG emissions.

On the energy side, the buildings in the top 20 percent of designed energy efficiency within Gensler's portfolio have a total predicted energy use intensity (EUI) of 50.9 kBtus per square foot for new buildings, and 0.73 watts per square foot of lighting power density for commercial interiors. By raising the baseline to match this top 20 percent of our highest performing projects, we could double our impact and achieve a net reduction of approximately 8 million metric tons in CO_2 emissions. Compounded annually until 2030—when the Paris Climate Accord mandates that peak global GHG emissions—this amount equals more than 102 million tons of CO_2 saved from the atmosphere.

Each year that Gensler designs to these elevated standards, the cumulative impact would be equal to removing 2.1 coal-fired power plants from the U.S. electricity grid each year. Over 15 years, the emissions savings would be equal to permanently removing six percent of U.S. power plants from the grid. If all Gensler projects were as efficient as the top 20 percent of our design portfolio, by 2030 the cumulative energy savings would be equal to taking 252 coal-fired power plants—49 percent of the U.S. total—offline for one entire year.

These savings represent 2014 real projects and real construction costs under current market conditions, demonstrating that high-performance design is achievable for projects of all scales.



CASE STUDY
THE TOWER AT PNC PLAZA
PITTSBURGH, PA

The Tower at PNC Plaza sets an ambitious, net-zero energy target in a cold climate by using design strategies that optimize energy use and minimize the building's carbon footprint. An integrated system uses the tower's operable skin to provide shading and natural ventilation, the latter aided by a central thermal chimney that operates without fans. The workspace is optimized for daylight, employee satisfaction and productivity, and energy savings.

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7 Lux Research, *"Driven by Higher Rents and Values, Green Buildings Market Grows to $260 Billion,"* 2014. http://www.luxresearchinc.com/news-and-events/press-releases/read/driven-higher-rents-and-values-green-buildings-market-grows-260

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10 IEA, 2013

11 As compared to the building industry baseline established by the U.S. Energy Information Agency (EIA) through its 2003 Commercial Buildings Energy Consumption Survey (CBECS).

12 Also: Building energy use is measured in EUI (Energy Use Intensity). Its units are kBtu per square feet per year. Interior work is measured in terms of its installed lighting capacity or LPD (Lighting Power Density). Its units are watts per square foot.

We are using the U.S. Energy Information Administration's Commercial Buildings Energy Consumption Survey (CBECS) to determine the U.S. national average. The United States is the second largest emitter of GHG in the world, it remains our largest single-nation market, and it has a mature building stock that makes it a good model for making comparative analysis. CBECS is not an internationally determined baseline for evaluating building efficiency. As a global design firm serving over 2,700 clients in 88 countries during 2015 alone, most of Gensler's portfolio represents construction in major urban centers that have building codes that are similar to U.S. norms.

13 Other contextual examples: American drivers would need to drive 9,592,792,745 fewer miles (based on the fuel efficiency of the average American passenger vehicle), power 552,249 homes with 100 percent renewable energy, or burn 21,605 fewer railcars of coal to reach similar savings.

14 Statista: http://www.statista.com/statistics/191011/registered-private-and-commercial-us-motor-vehicles-by-state-2009/

15 John Muyskens, Dan Keating and Samuel Granados, "Mapping How the United States Generates its Electricity," *The Washington Post*, Jul. 31, 2015. https://www.washingtonpost.com/graphics/national/power-plants/

16 In forward-thinking markets, many top developers have embraced green building and developed internal policies that require sustainable thinking during design and operation across their portfolios. A drastic reduction in the cost of LED fixtures, combined with rapid advancements in lighting controls, has allowed interior projects to significantly reduce energy consumed by lighting. Gensler advocates for green building to be the industry standard in all markets.

17 All data is based on average carbon intensity per unit of energy in the U.S.

18 *Reducing the Carbon Footprint of the Built Environment: A Roadmap for Action After COP21*, Washington, D.C.: The American Institute of Architects, 2015

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