

Why is Sustainable Design More and More Demanding?



60%

An area equal to 60% of the entire building stock of the world...

During the next two decades, over

80 billion m² (900 billion ft²)

of new and rebuilt buildings
will be constructed in urban areas worldwide.

Sources:

UN Habitat; Adapted from *State of the World's Cities 2010/2011*, McKinsey Global Institute.





or the equivalent of building a Hong Kong
every 35 days...

with energy and emissions patterns
locked-in for 80 to 120 years!

Sources:

UN Habitat, Adapted from *State of the World's Cities 2010/2011*, McKinsey Global Institute.



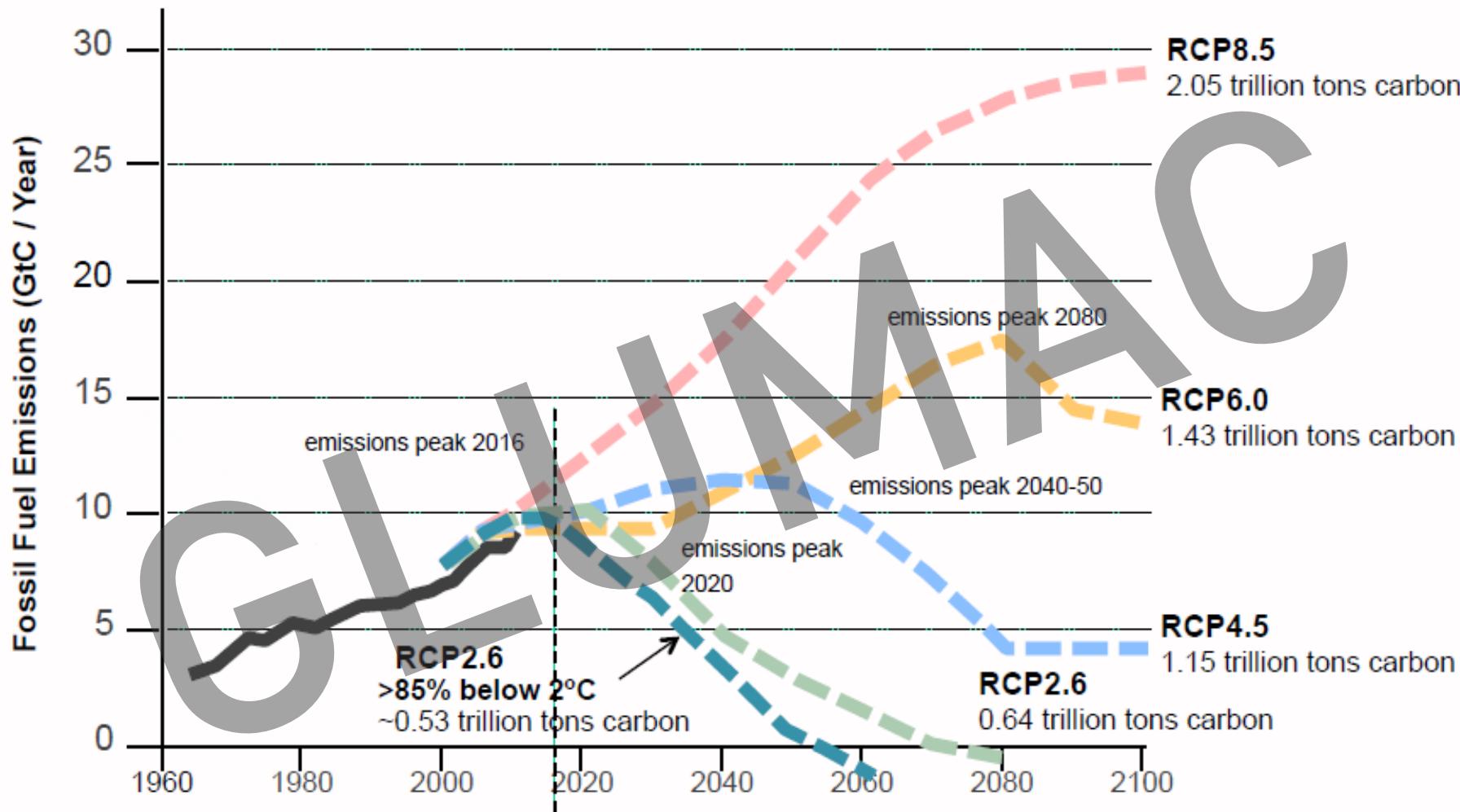
Urban environments are responsible for

75%

of all human-produced global greenhouse gas emissions.

UN Habitat



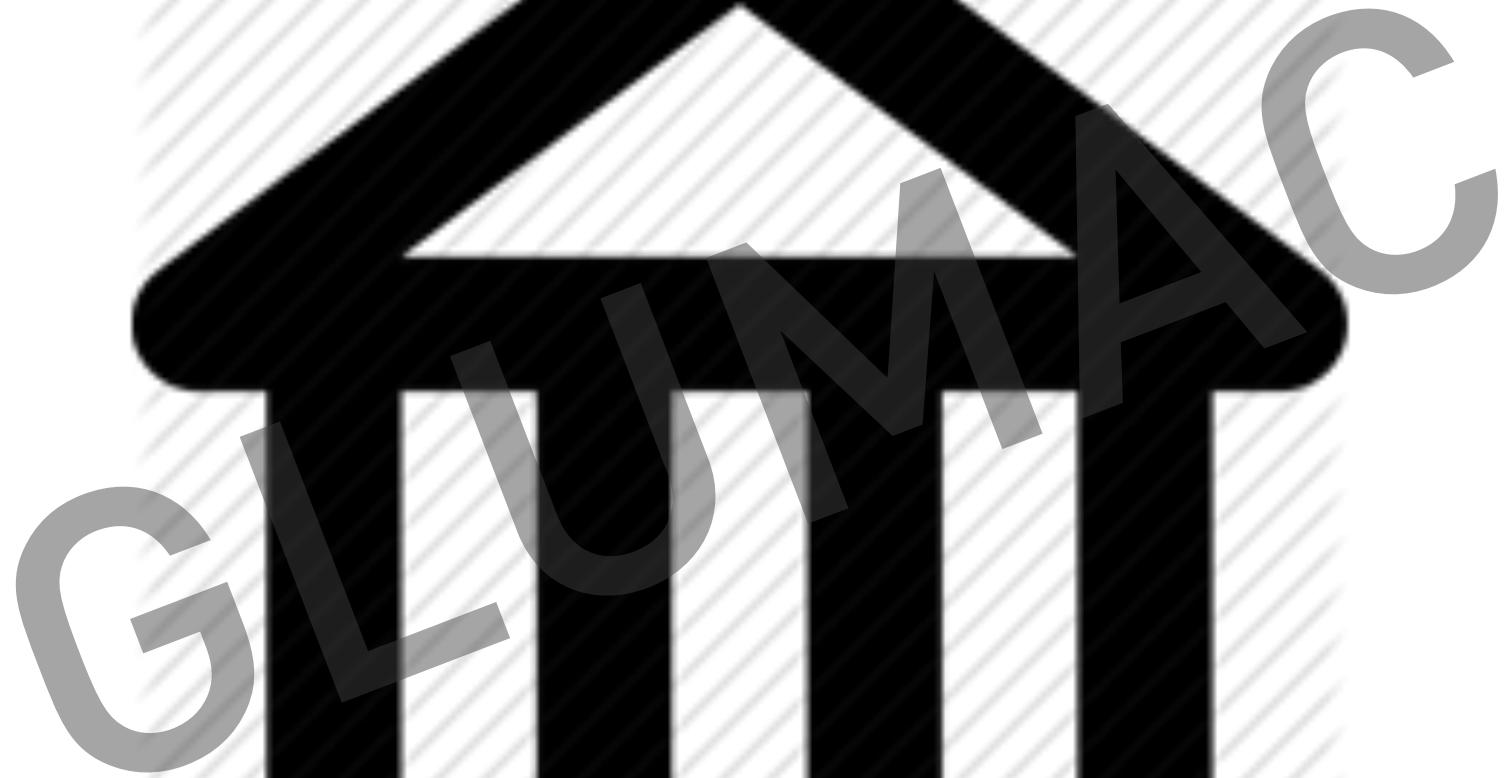


Pathways for Fossil Fuel Carbon Emissions to 2100

Source: IPCC 2013, Representative Concentration Pathways (RCP); Stockholm Environment Institute (SEI), 2013; Climate Analytics and ECOFYS, 2014.

Note: Emissions peak and cumulative carbon budgets are for fossil fuel CO₂–only emissions.





GYM AC

Government Policy of Green Building

Fundamental Principle of 《 Ministry of Housing and Urban-Rural Business's "Thirteenth Five Year Plan" 》

- Urban development should be green, intensive, conservation, efficient, convenient and highlight the characteristics.
- Construct green city. Develop green buildings and materials.
- Vigorously strengthen the building energy efficiency.
- Build sponge, smart city and low carbon eco city.

Maintain Target of 《 Ministry of Housing and Urban-Rural Business's "Thirteenth Five Year Plan" 》

- Building energy efficiency standards will gradually improve:
 1. the **energy efficiency standards** implemented in **new building** will be **20% higher** than that of the "Twelfth Five Years Plan".
 2. The average heating energy consumption per unit area of residential buildings in the north is more than 15%, and the proportion of urban renewable energy in the construction area is steadily increasing.
 3. Part of the new building energy efficiency level to achieve synchronization with the international advanced level.
- The amount of green building will increase significantly.
 1. At the end of 2020, **the proportion of green building promotion of new buildings will be more than 50%**, and **the proportion of green building materials will be more than 40%**.
- **Technology support** will enhance.



CHINA SETS HEALTH AS TOP PRIORITY

健康与福祉 纳入中国战略规划

“健康中国2030”规划

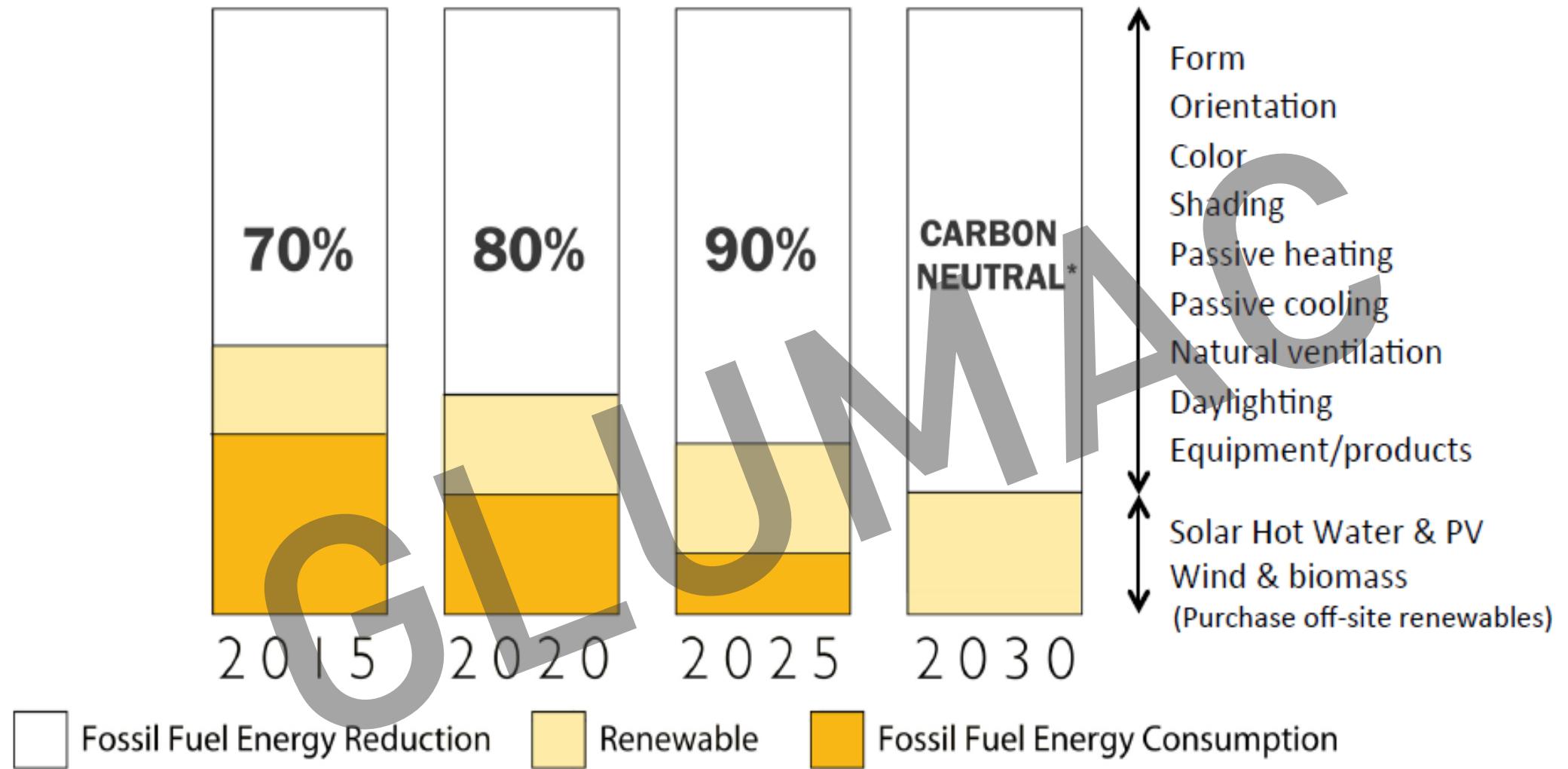
2016年10月25日由国务院发布的“健康中国2030”规划，总共包括29章，从健康的生活环境到健康饮食，从积极活跃的生活方式到全面提高民众心理健康等诸多方面，推出了促进全社会各阶层大众健康运动的战略规划。

WELL与“健康中国2030”规划

拥有共同的路径和目标



“健康中国2030”规划



The 2030 Challenge

Source: ©2010 2030, Inc. / Architecture 2030. All Rights Reserved.

*Using no fossil fuel GHG-emitting energy to operate.

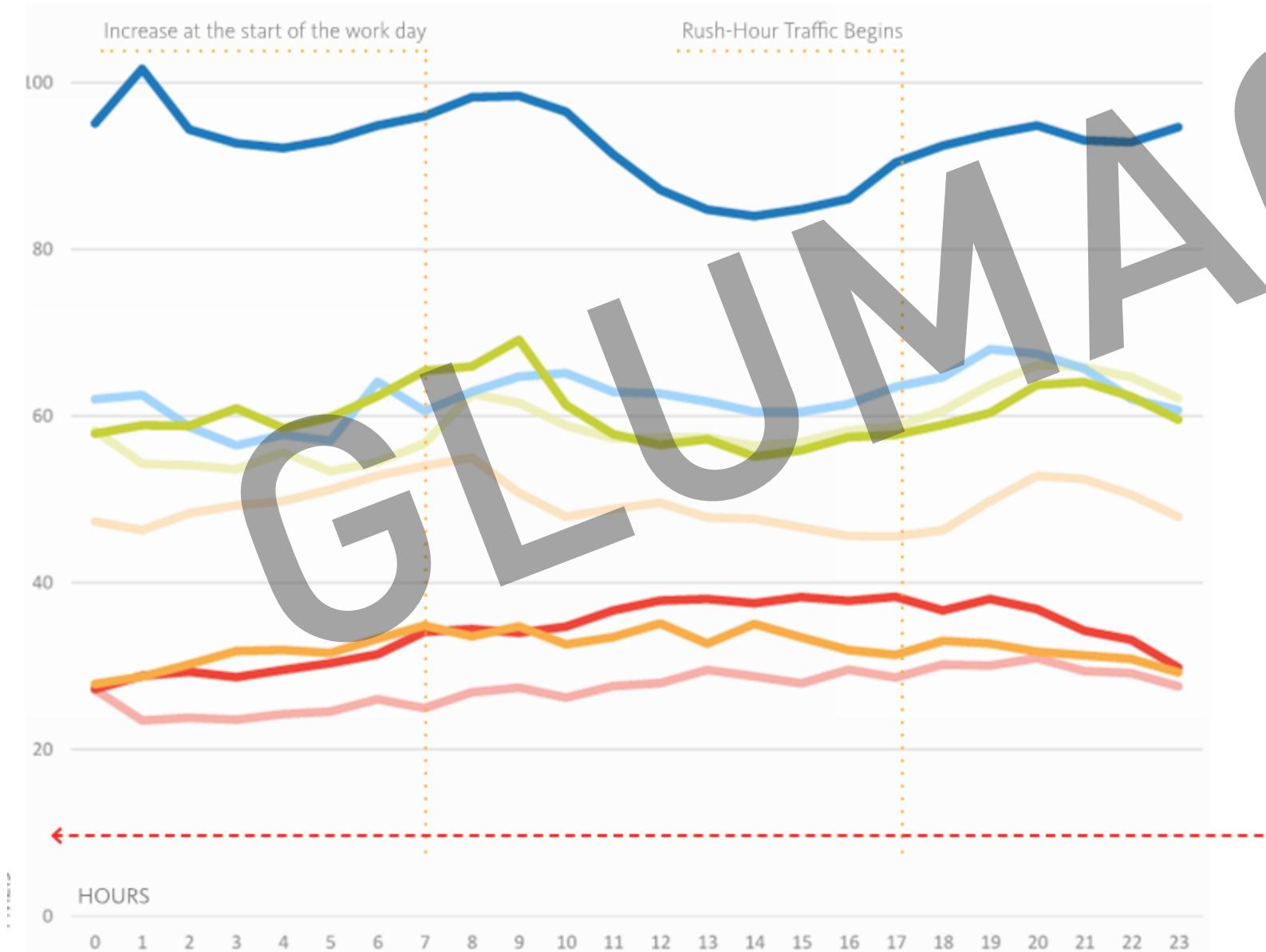




GLUNAC

SEASONAL 24hr DAILY AVERAGES

Shanghai – PM2.5 Daily Pollution Data Collection



Daily Average

The data reveals winter months to be most intensive for PM2.5 and summer months to be least.

- 2012 Spring
- 2013 Spring
- 2012 Summer
- 2013 Summer
- 2012 Fall
- 2013 Fall
- 2012 Winter
- 2013 Winter

World Health Organization:
Annual Mean for Max Exposure

**If PM2.5 index increases from 25 to 200,
the average daily mortality rate will grow
by 11%.**

- Chinese Academy of Engineering Zhong Nanshan

Who's Running Dry?

Provinces, Autonomous Regions and Municipalities

BIG PICTURE

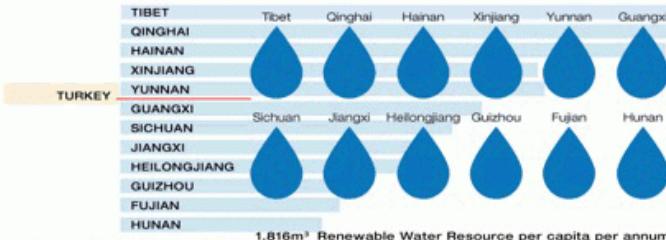
SCARCITY

© 2011 China Water Risk
In collaboration with Unison Creative



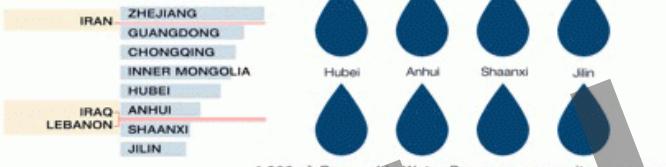
CLICK ON EACH REGION to see the Renewable Water Resource and Water Use per capita per annum and to discover pertinent background for each location.

Safe 12



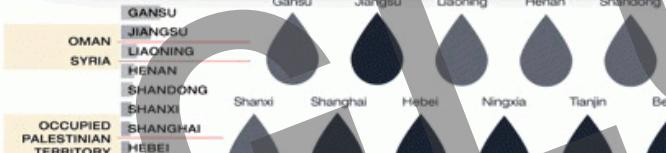
1,816m³ Renewable Water Resource per capita per annum

At Risk 8



1,000m³ Renewable Water Resource per capita per annum

Dry 11



Deficit 6

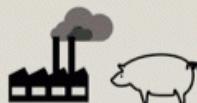
The Deficit 6 are regions where annual renewable water use per capita is greater than annual renewable water resources per capita. They are a part of the Dry 11 and all suffered a water deficit on a per capita basis in 2008 and 2009.

LESS WATER THAN THE MIDDLE EAST

19 OUT OF THE 31 PROVINCES, AUTONOMOUS REGIONS AND MUNICIPALITIES HAVE LESS WATER THAN THE NATIONAL AVERAGE.

19 out of 31 areas

The annual renewable water resources per capita of these 19 are less than that of some Middle Eastern countries.



These 19 account for:
84% of total industrial output
= RMB 55 trillion
67% of total agricultural output
= RMB 6 trillion

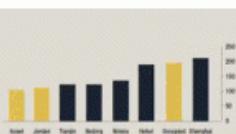


Shandong, Jiangsu, Henan, Hebei, the top 4 producers of agricultural output, each have less water per capita than Iraq.



USE > RESOURCE

The national water use per capita per annum of 448m³, but 6 regions are running an actual deficit, where they are using more water than they have.



Beijing, Tianjin, Ningxia, Hebei and Shanghai have around 25m³ more or less Renewable Water Resources per capita than Palestine, Jordan and Israel.





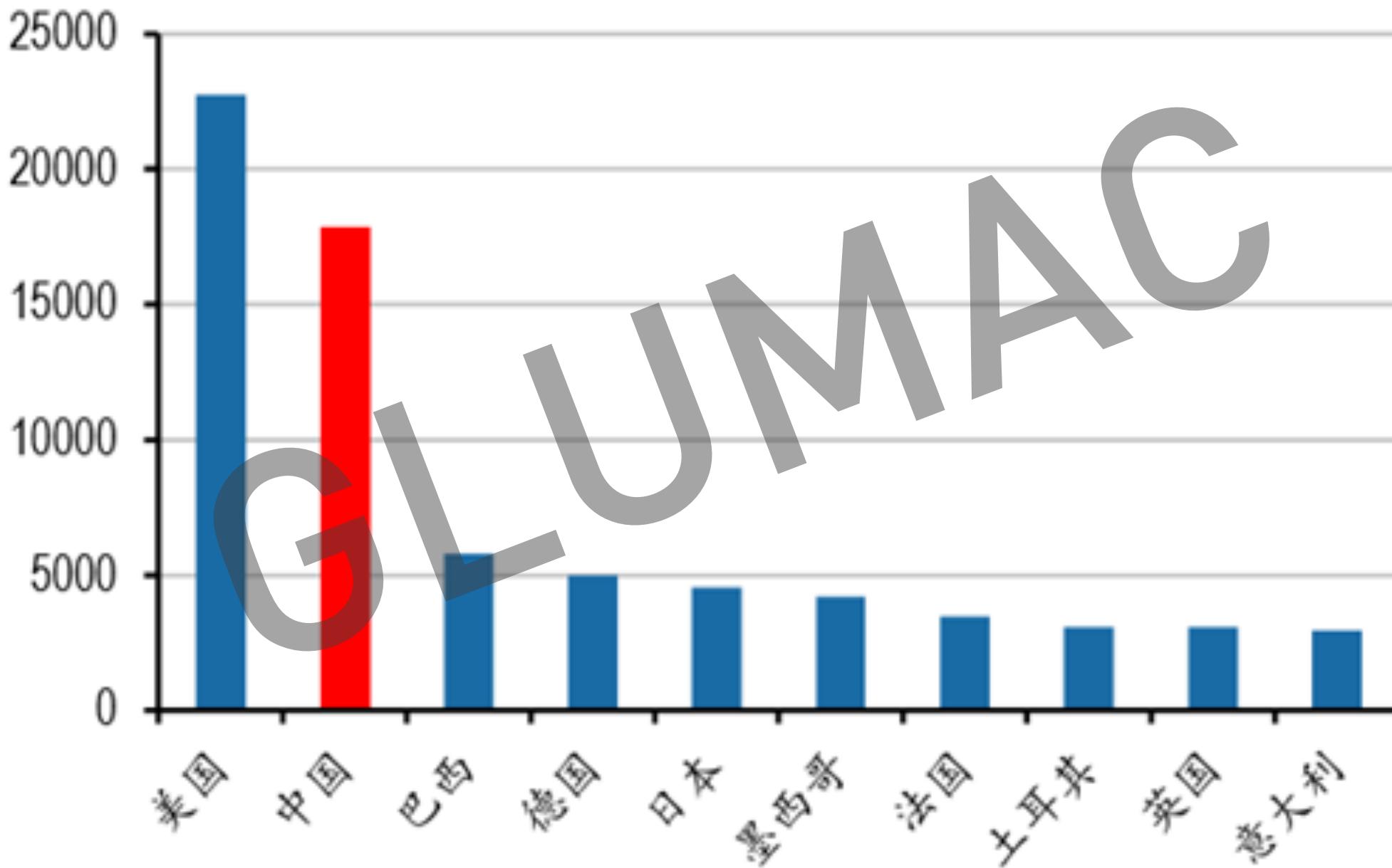
GUINAC



GLUMAC

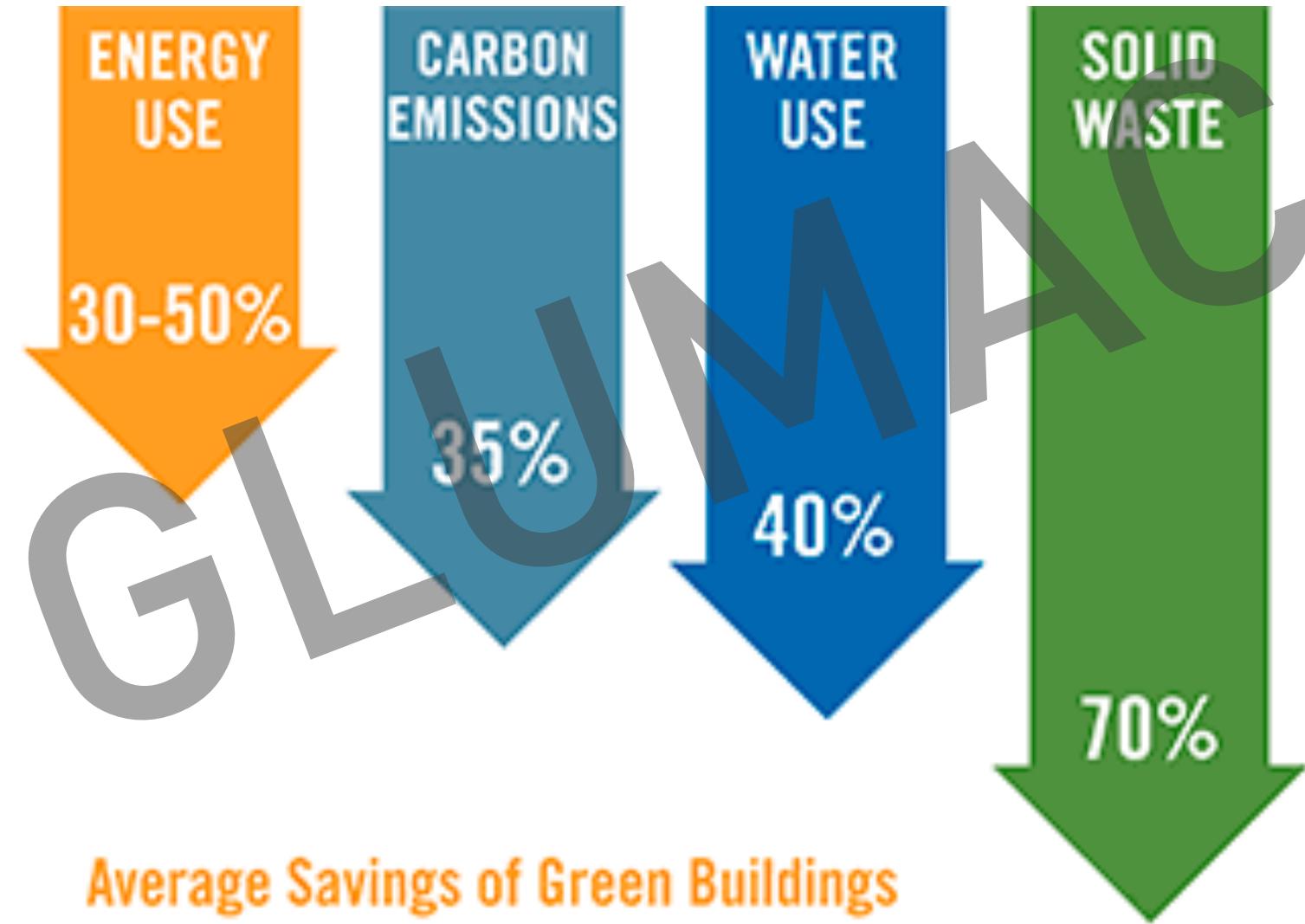
GLUMAC



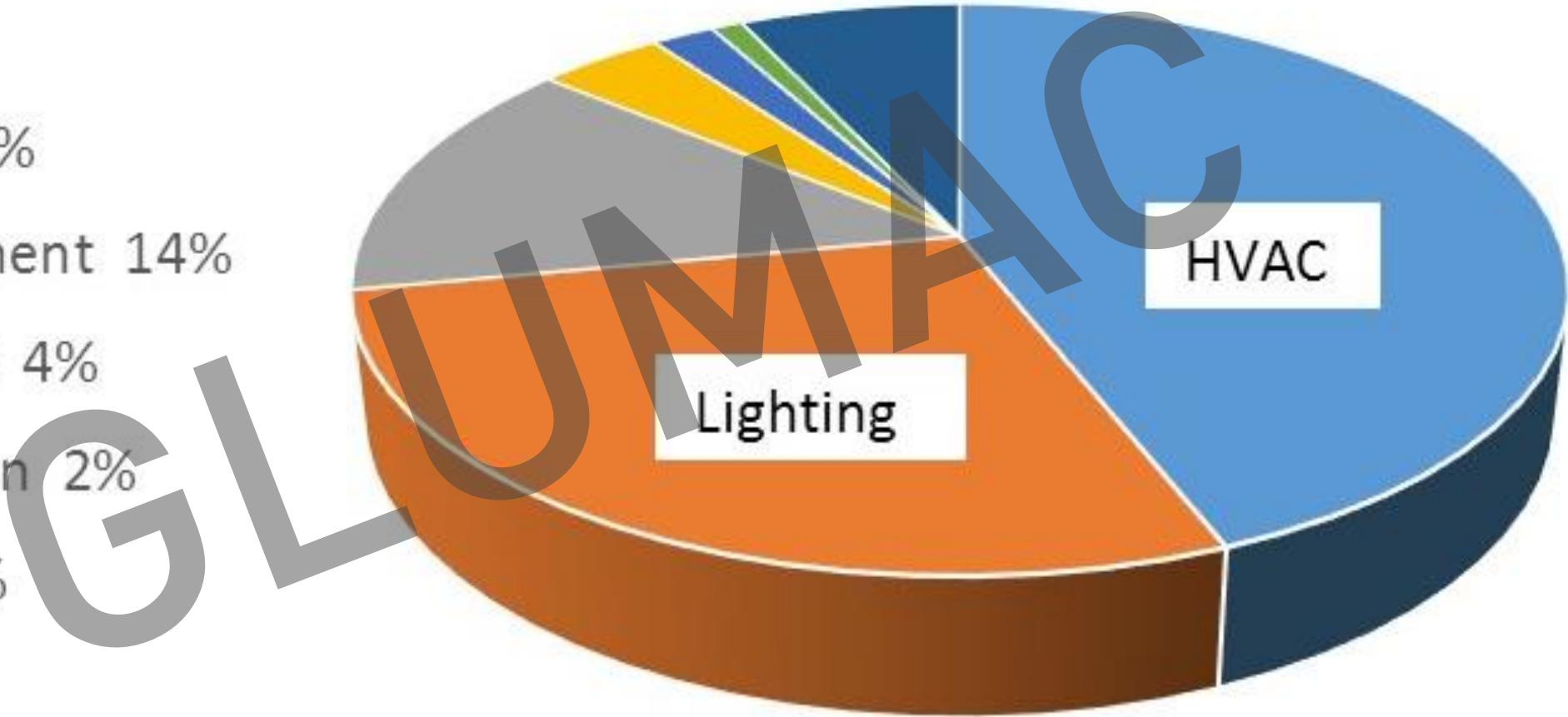




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- HVAC 44%
- Lighting 28%
- Ofc. Equipment 14%
- Water Heat 4%
- Refrigeration 2%
- Cooking 1%
- Other 7%





UNAC



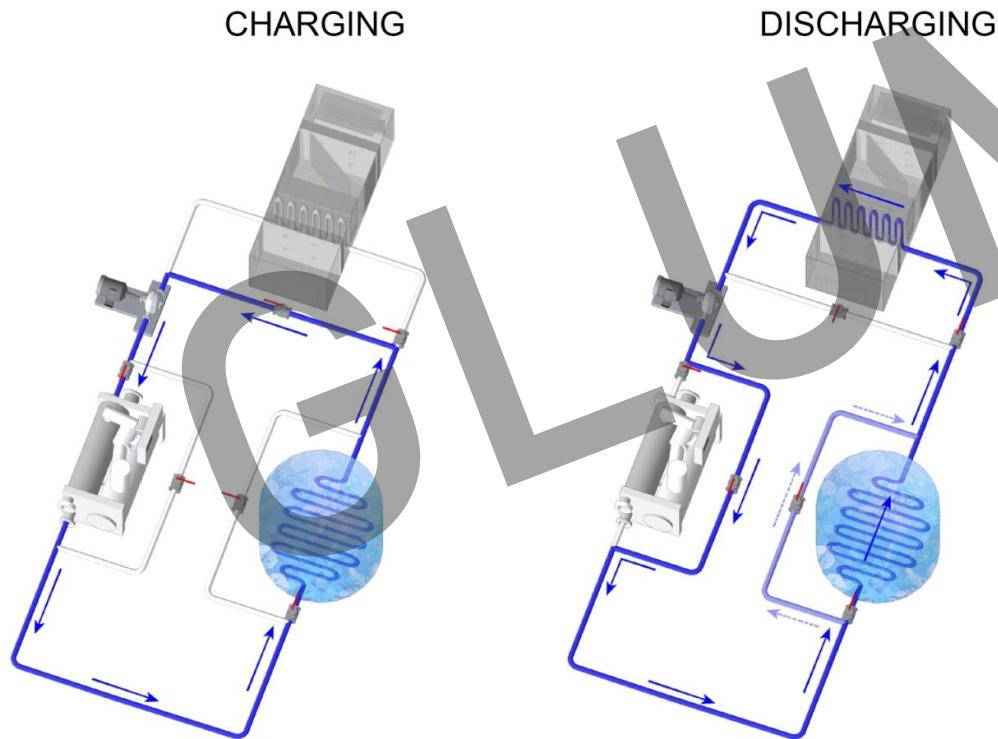
- Ice make and storage at night and provide 35% of the building cooling load during the day
- Ice will be melt and cool the glycol solution during the day and provide cooling to the building
- The cooling tower runs more effectively at night as the temperature is low
- Reduce the peak load for power and air-conditioning units
- Save 30% of electricity
- The peak power price in summer is 4:1
- **Payback period: 5 years**



Sustainable Strategy-Central Plant

50% Ice Storage System

4 LEED Points Contribution



	Off-Peak	Normal	Peak
Summer Rate (RMB/KWH)	0.285	0.749	1.202
Winter Rate (RMB/KWH)	0.350	0.714	1.167

SHANGHAI ELECTOU RATE

Sustainable Strategy Summary

High Performance Façade

- Roof, Wall and Glass

High Efficiency Central Plant

- High Efficiency Chillers
- Water to Water Heat Pump
- Ice Storage
- Water side Economizer
- VFD Pump

Air Side System

- Under Floor Supply System
- Heat Recovery AHU/PAU
- Air Side Economizer
- VFD Fan
- Smart Building Control System

Electrical System

- LED Lighting
- Occupancy Sensor
- Daylighting Sensor
- Battery Solution

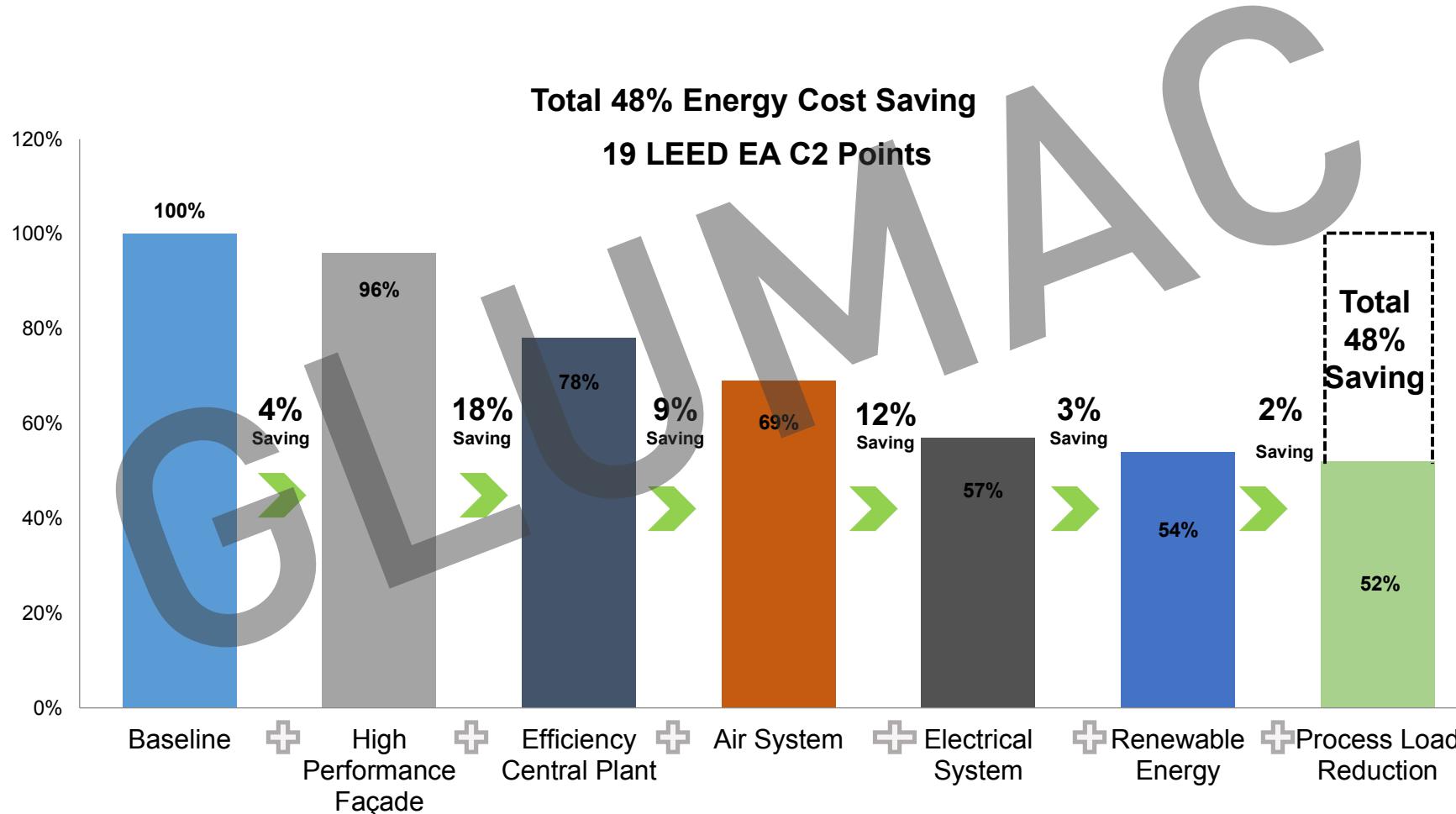
Renewable Energy

- PV

Process Load Reduction

- High Efficiency Elevator
- Energy Star Appliances
- CO Sensor

Energy Saving by Category



Sustainable Strategy-Facade

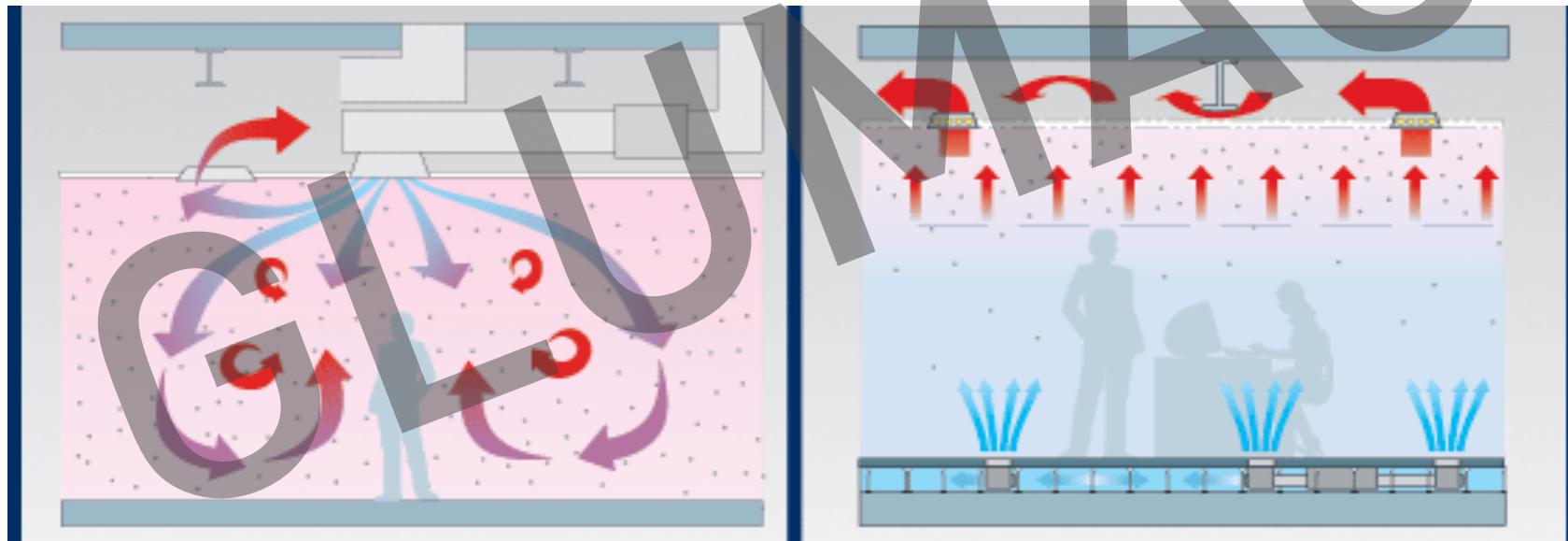
2 LEED Points Contribution

	ASHRAE Baseline	JCI Asia Headquarter
Wall	U:0.5 W/m ² .K	U: 0.4 W/m ² .K
Glass	U:3.92 W/m ² .K SC: 0.29	U:2.0 W/m ² .K SC:0.35
Roof	U:0.273 W/m ² .K	U:0.138 W/m ² .K
Skylight	U:3.92 W/m ² .K SC:0.27 To be Confirmed by KWP	U:2.5 W/m ² .K SC:0.3

Sustainable Strategy-Air Side System

Under Floor Supply with Flex System

2.5 LEED Points Contribution



Conventional System

Under Floor Supply System

Sustainable Strategy-Electrical System

LED Lighting Fixture

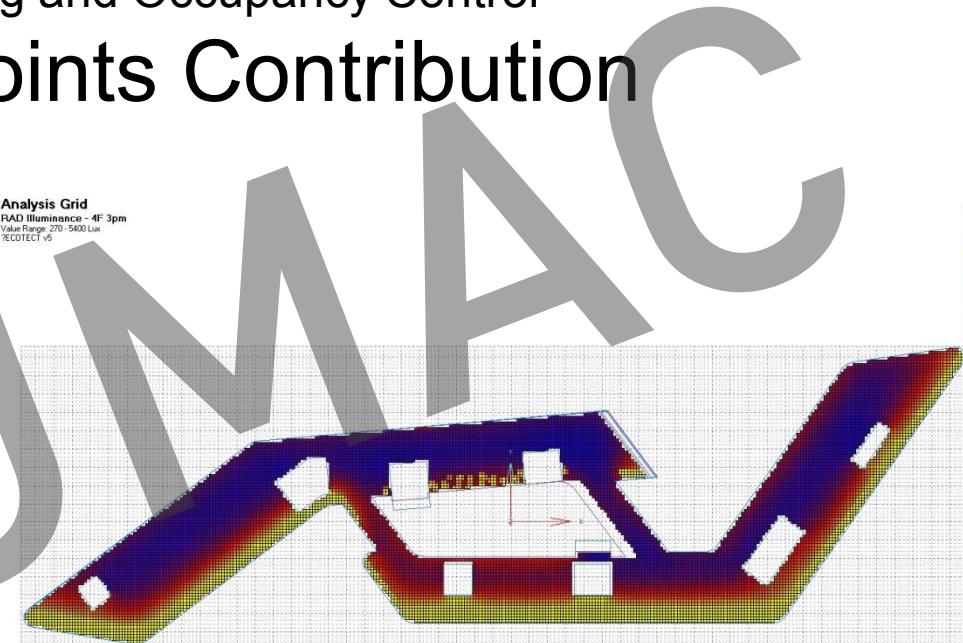
3 LEED Points Contribution



	ASHRAE Baseline	JCI Asia Headquarter
Office	12 W/m ²	7 W/m ²
Conference Room	14W/m ²	8.4W/m ²
Lobby	14W/m ²	7 W/m ²
Canteen	15 W/m ²	5.8 W/m ²
Show Room	11 W/m ²	4 W/m ²

Sustainable Strategy-Electrical System

Daylighting and Occupancy Control
2LEED Points Contribution



Sustainable Strategy-Process Load Reduction

Energy Star Serve and Elevator
1 LEED Points Contribution



UNMAC



G



ANC

We know there's a demand, why
isn't every building adopting
sustainable design?



即将开幕



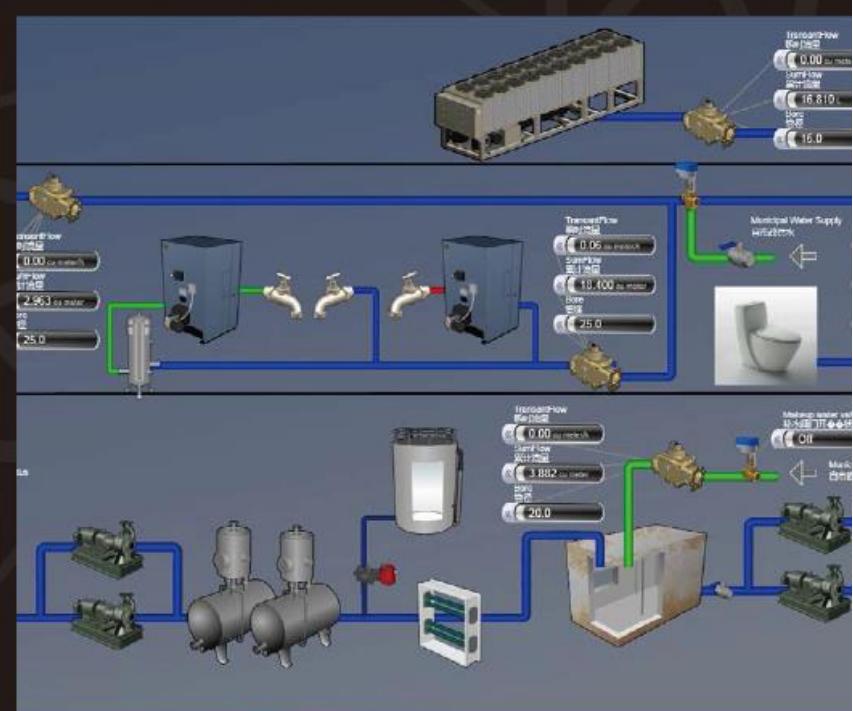
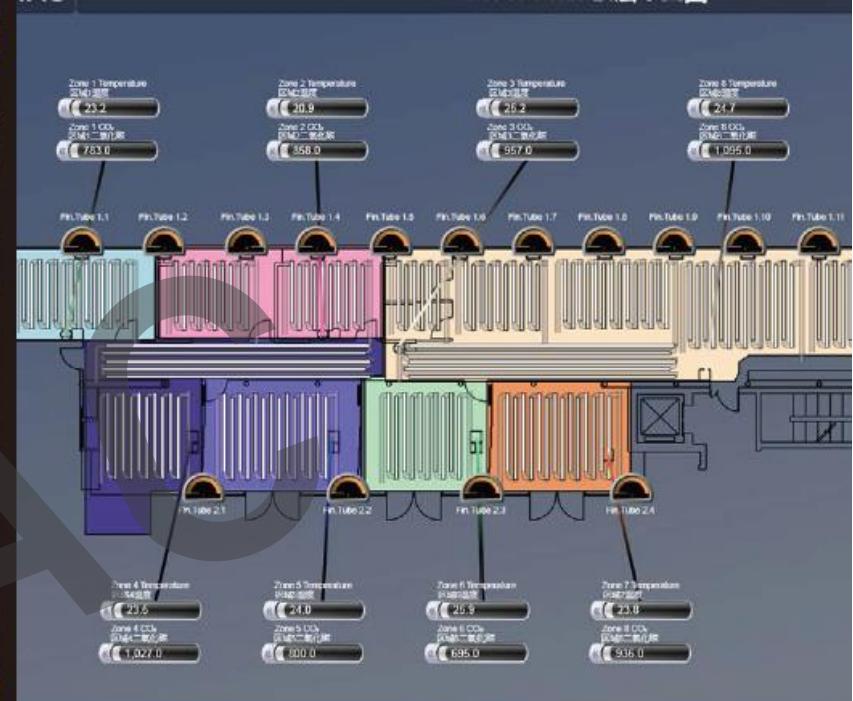




Building Management System

6+

- Integrated Systems management
- Cooling & heating, ventilation& filtration, rainwater, domestic water, power, security...
- Live feedback
- Spontaneous response
- Remote control access from phone app
- multiple wireless temperature and CO₂ sensors



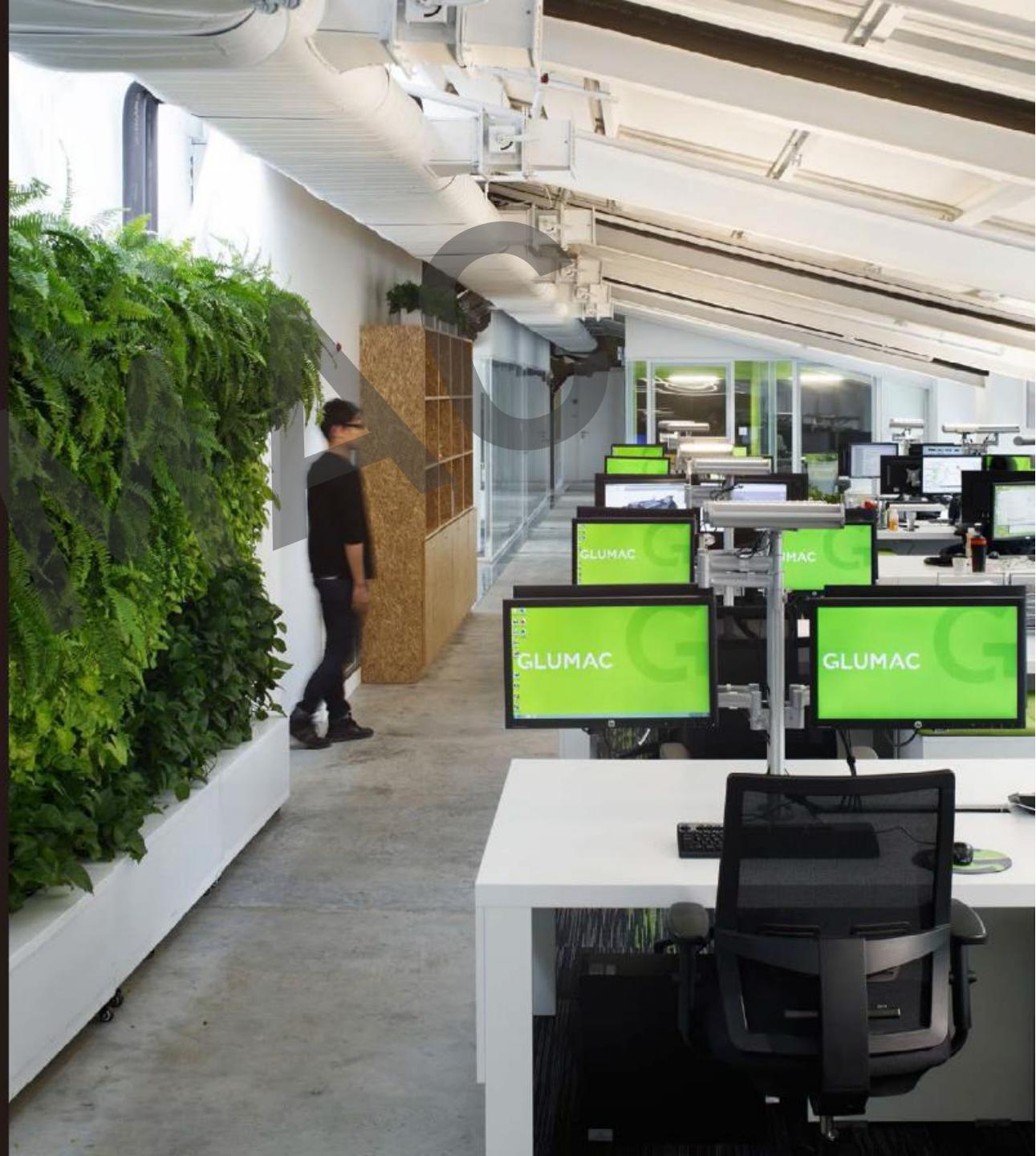
GREEN WALL

100%

- Natural vertical garden
- Contributes to Indoor air quality
- Human scale

GLUWAAC





GLUMAC

Net Zero Water

500_{m³}

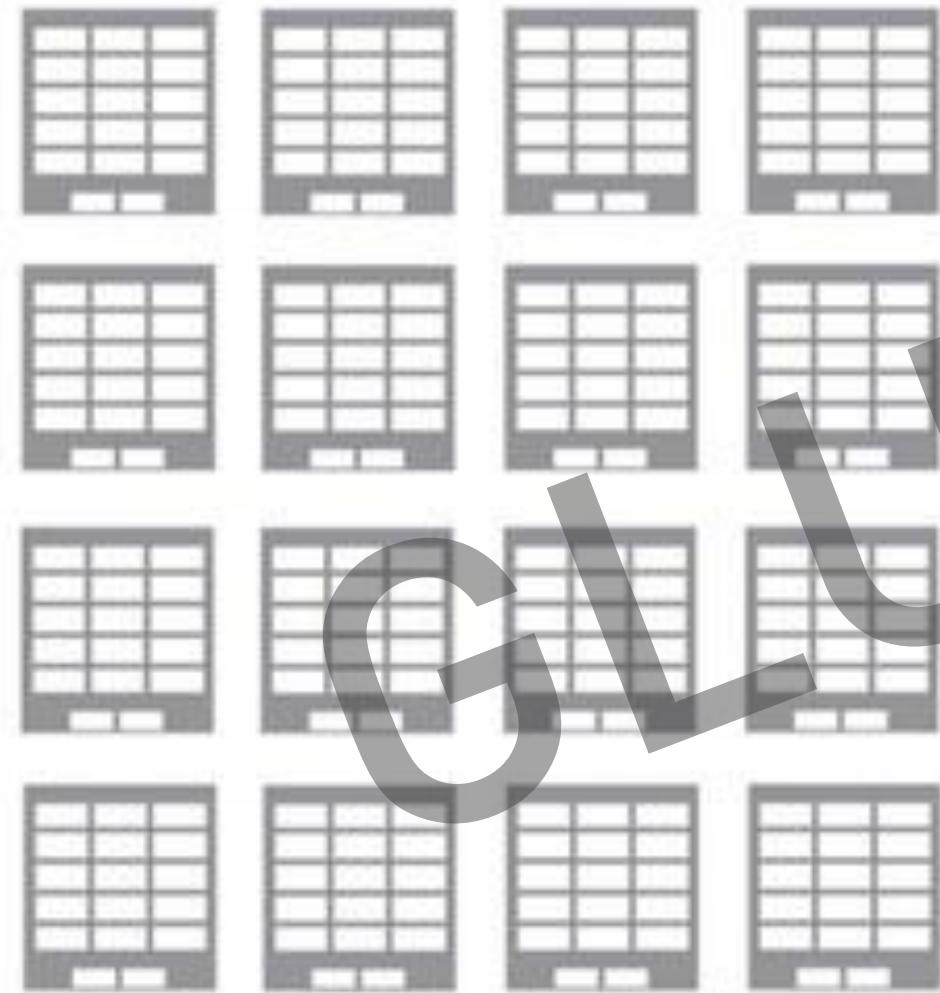
- Rainwater harvesting, non-chemical treatment
- Solar-powered sensor faucet
- 0.2 L composting toilet
- Net positive +



GLUNAC

What are the Future Demands?

Total number =
5,500,000

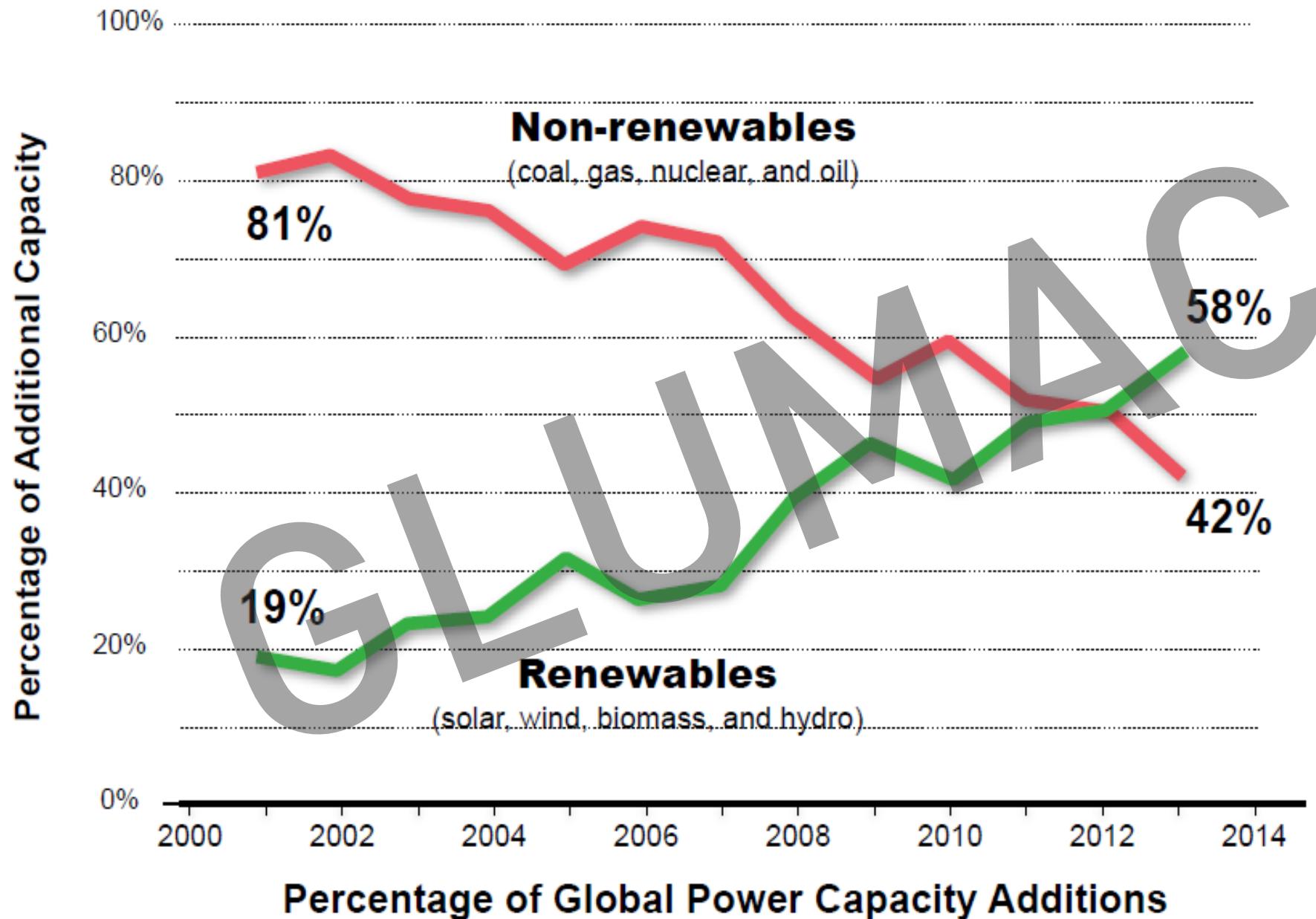


Green Building certified =
30,000 (end of 2014)

0.6%



Figure 1. Total US Building Stock vs. LEED Certifications, End of 2014



Source: Architecture 2030, International Renewable Energy Agency

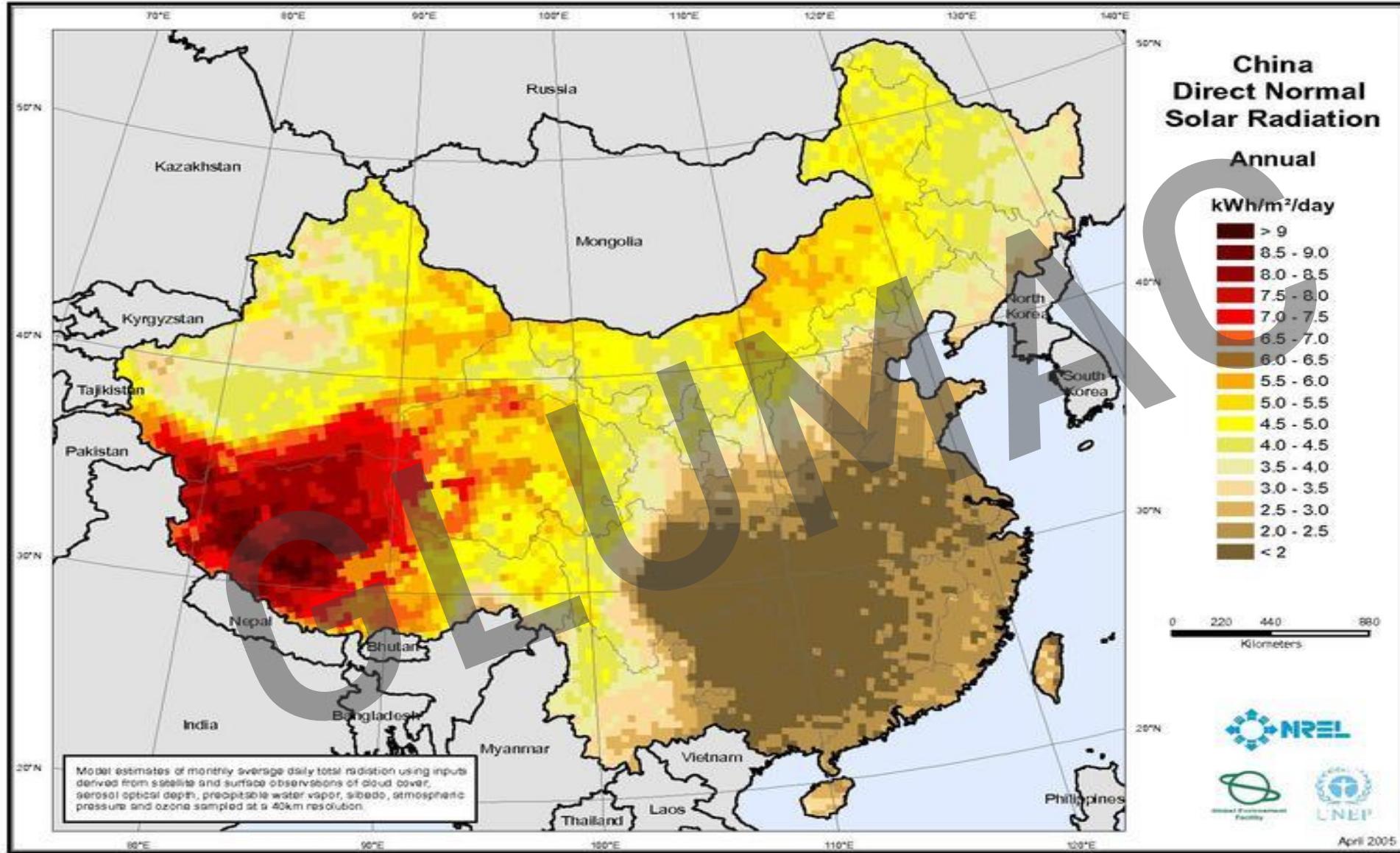
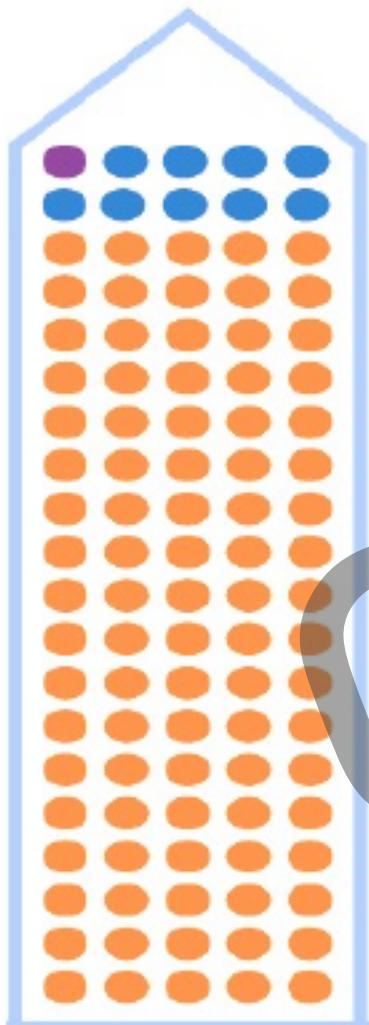


Figure 10-11: Annual Solar radiation distribution (source:
National Renewable Energy Laboratory (NREL))

Invest in *People* for Return on Investment



Energy: 1% Annual Cost

Rent | Operations: 9% Annual Cost

Salary | Benefits: 90% Annual Cost

¹Knoll Workplace Research "What's Good for People, Moving from Wellness to Well-Being", Kate Lister 2014

²Studies include those conducted by organizations including Harvard Business Review, World Economic Forum and the American Journal of Health Promotion,

Image courtesy of World Green Building Counsel Report "Health, Wellbeing & Productivity in Offices"



BIOPHILIC DESIGN





BIOPHILIC DESIGN

Reduced
Absenteeism

Lower Stress
Levels

Higher Staff
Retention

Decreased
Presenteeism

Higher
Revenues/Profits





Value of Green Building Certification

Lynn Fan
August 2017



**PROVEN
PROVIDER™**

ABOUT US



BEE was born out of the realization that a large knowledge gap exists between engineering and design teams introducing sustainable solutions and the construction teams in charge of bringing these solutions to life.

At BEE we aim to bring together the design and engineering know-how with construction expertise and materials specialization to provide the missing link that enables a project to truly achieve its sustainability goals.

BEE's ultimate goal is to offer sustainability services that greatly improve your project's social, environmental, and economic impact - thus making the venture a quality investment.

OUR SERVICES



Multidisciplinary Green Building Consulting:

- Building Simulations
- Green Building Consulting & Certification Services
- Testing & Commissioning
- Health & Wellness Solutions
- Social Sustainability

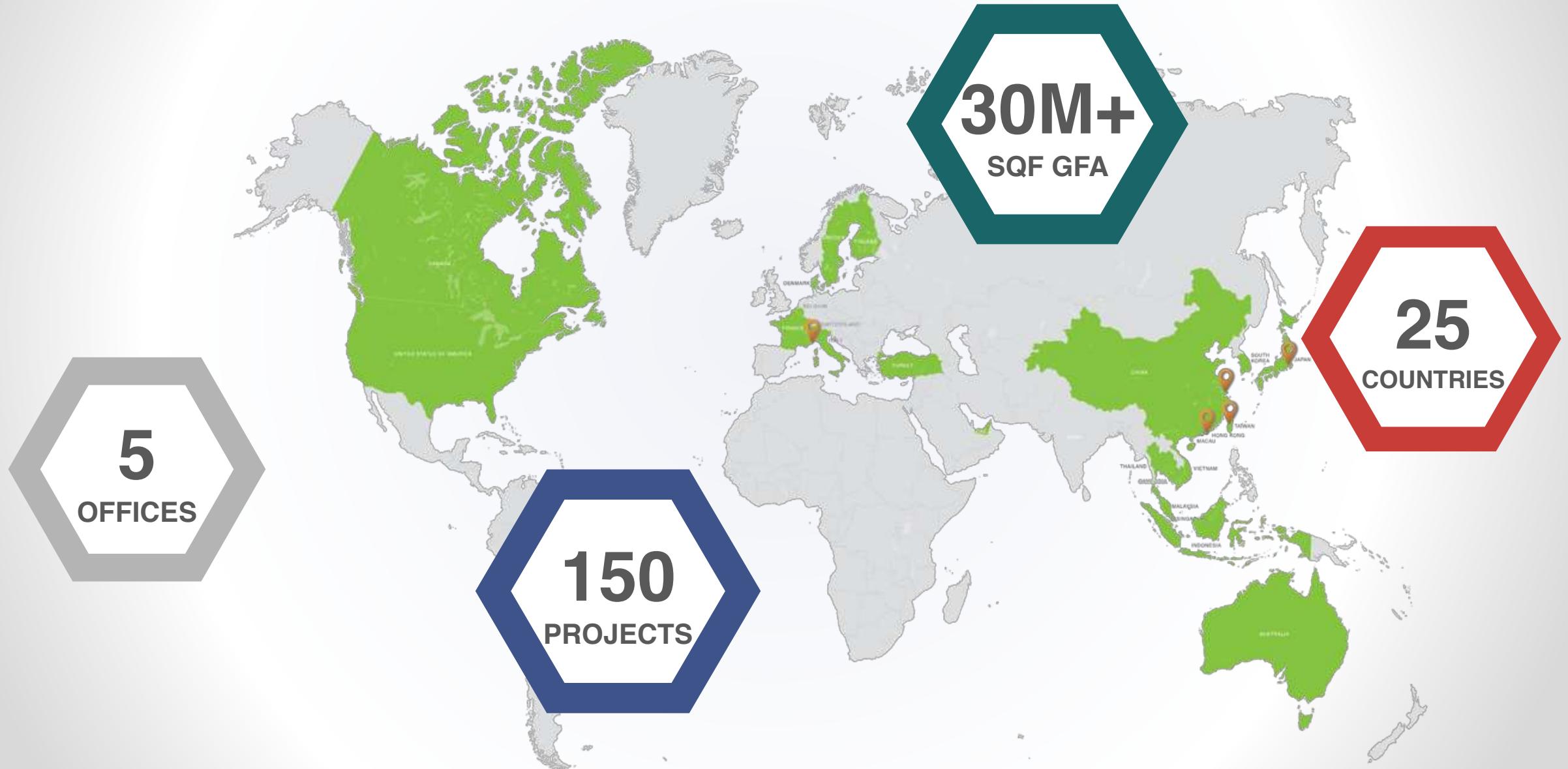
Intelligent Building Management:

- Cloud-Based Real-Time Operational Management

Green Materials Solutions & Trading:

- Product Procurement & Quality Control
- Cloud-Based Materials Management

PROJECT LOCATIONS WORLDWIDE



OUR CLIENTS



We are responsible for over **30 million square feet** of built space



Interface®



Hines



JONES LANG
LASALLE®



Avenues
THE WORLD SCHOOL



MIU MIU



GUCCI

上海证券交易所
SHANGHAI STOCK EXCHANGE

中国金融期货交易所
China Financial Futures Exchange

中国证券登记结算有限责任公司
CSDC China Securities Depository and Clearing Corporation Limited

United Family Healthcare
和睦家医疗



DECATHLON



Ermenegildo Zegna

OFFICINE PANERAI

RIMOWA®
Germany since 1898

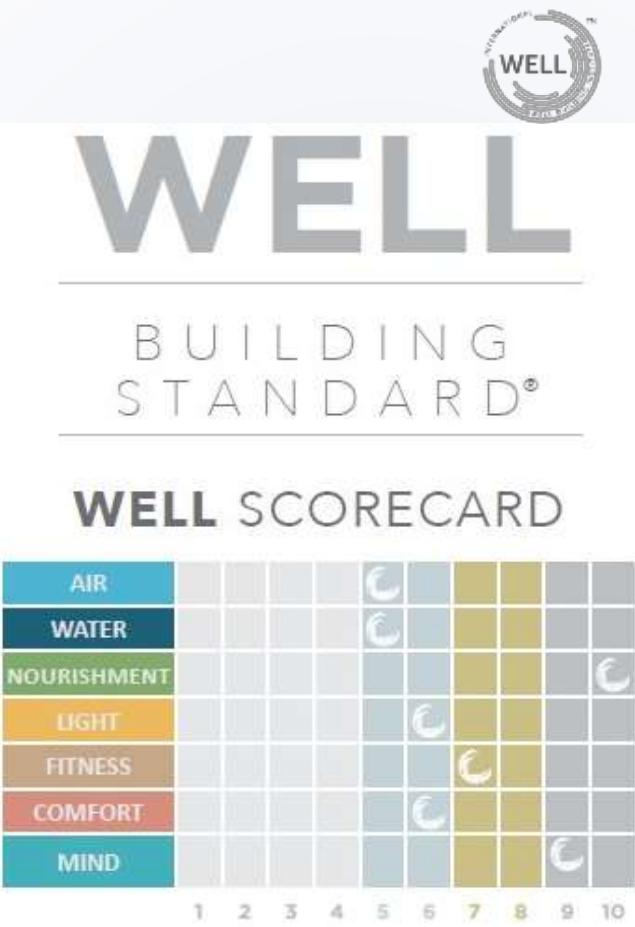
Salvatore Ferragamo

SHIMIZU CORPORATION
SHMZ



GREEN BUILDING CERTIFICATION

BUILDING LABELS



NUTRITION LABELS

Nutrition Facts
Serving Size 1/2 cup (115g)
Servings Per Container About 4

Amount Per Serving	Calories from Fat 130
Calories 250	% Daily Value*
Total Fat 14g	22%
Saturated Fat 9g	45%
Cholesterol 55mg	18%
Sodium 75mg	3%
Total Carbohydrate 26g	9%
Dietary Fiber 0g	0%
Sugars 26g	
Protein 4g	
Vitamin A 10%	Vitamin C 0%
Calcium 10%	Iron 0%

* Percent Daily Values are based on a 2,000 calorie diet.

USDA Organic
Gluten Free
Non-GMO Project Verified
Kosher
Vegan

TRIPLE BOTTOM LINE



PEOPLE SPEND 90% OF THEIR TIME INDOORS



PLANET

Buildings consume **41%** of energy and produce **33%** of greenhouse gas emissions.

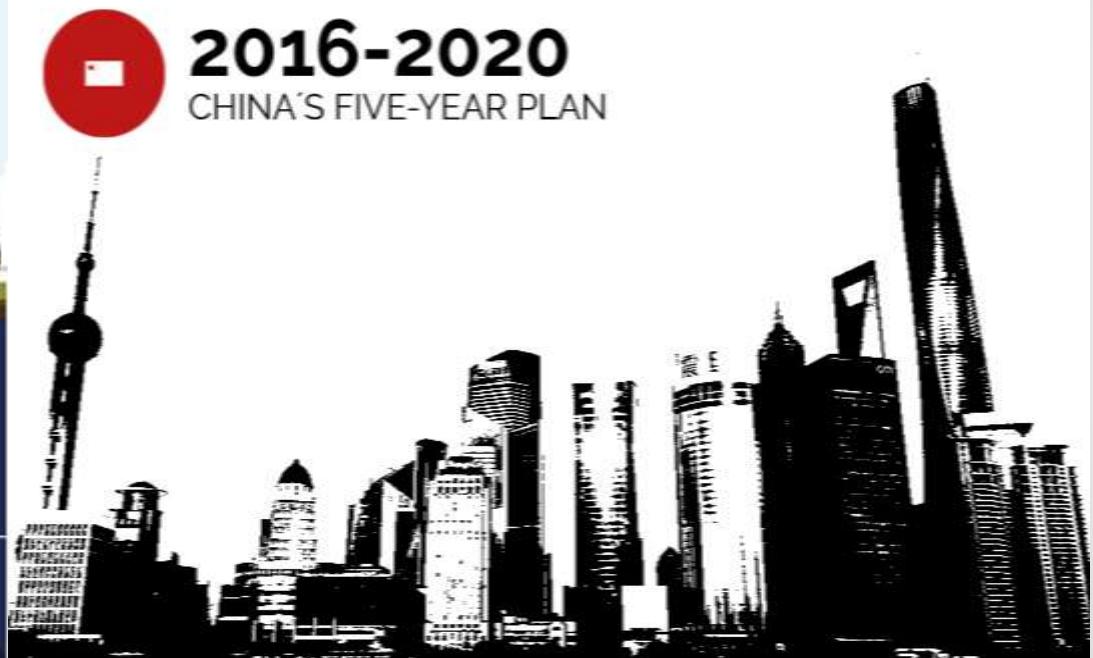
PROFIT

Green construction will create more than **3.3 million** jobs and **\$190.3 billion** in labor earnings by 2018 in U.S.

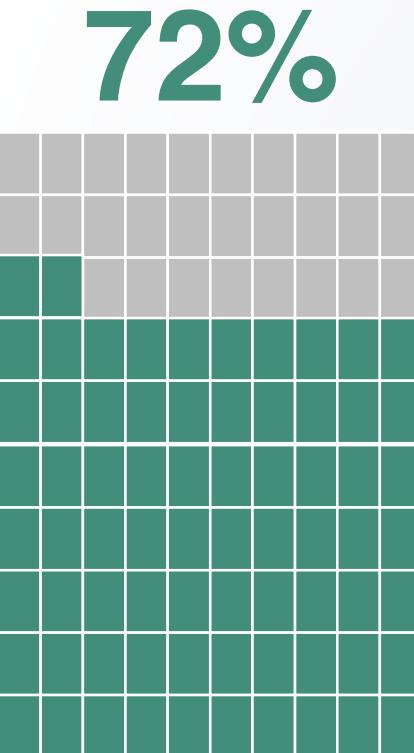


Source: U.S. Green Building Council

INITIATIVES

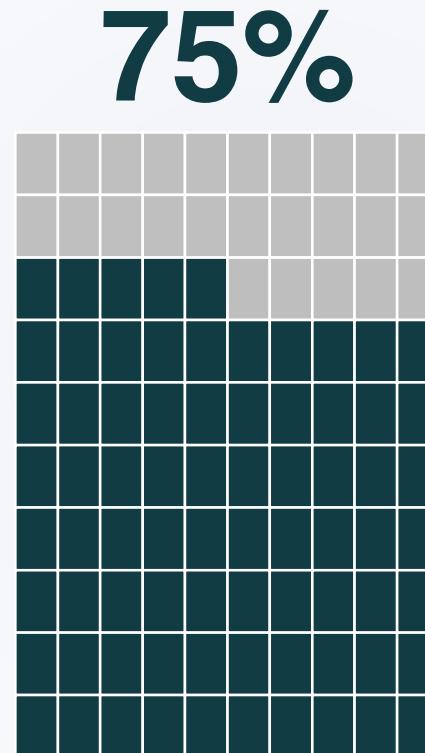


CUSTOMER DEMAND



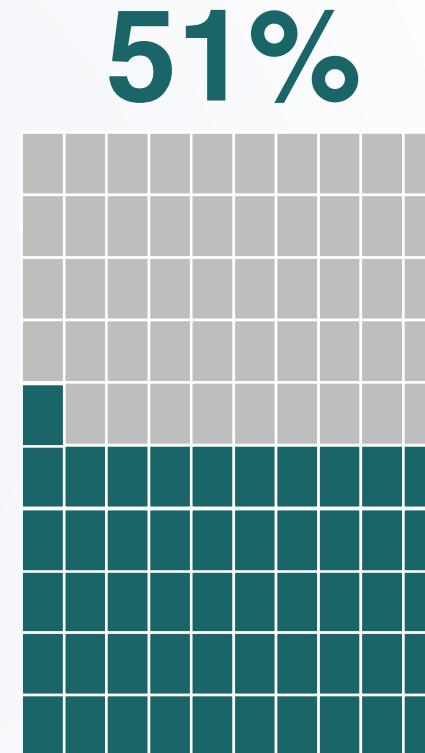
GENERATION Z
(15-20)

72% willing to pay more
(55% in 2014)



MILLENNIALS
(20-35)

75% willing to pay more
(50% in 2014)



BABY BOOMERS
(55-72)

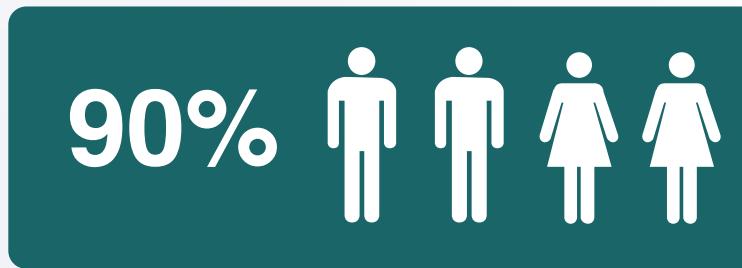
51% willing to pay more
(44% in 2014)

COST BENEFIT



Staff accounts for 90% of operating costs

Doubling the health level of an office can double productivity.



10% increase in productivity pays for rent



BENEFITS



COST

Operation Cost Reduction
Property Value Increase



HEALTH

Occupants Health Increase
Guest Experience Increase



ENVIRONMENT

Resource Consumption Reduction
Waste and Emission Reduction



BRANDING

Brand image Improve
Customer loyalty Improve



TALENT RETENTION

Satisfaction Increase
Retention Increase



MARKET

Recognition Increase
Competitiveness Increase

VISUALIZING BENEFITS





Cost Saving
? %



Health Increase
? %



Value Increase
? %



REALTIME MONITORING



WATCH



Current Performance

Heart Rate, Body Temperature, etc.



Activity

Steps, Sports, etc.



Connect

Upload Data to iCloud



Analyze

Analyze Health Condition



Solution

Recommendations

BUILDING MONITORING SYSTEM



Hardware



Air Monitor

Install on the ceiling or the wall



HVAC



Lighting



Plug Loads



Other (IT, Façade,
Elevator, etc.)

Current Transformers

Install in the power distribution panel

Energy Meter

Install in the local electrical room

Software



Cloud-based Management Platform

Access via website and smart phone app



Air Quality



Particulate Matter
Indoor / Outdoor



Chemical Off-Gassing



Carbon Dioxide



Carbon Monoxide



Other (Ex: NOx, O3,
Formaldehyde being added as they
become reliable / available)



Comfort



Relative Humidity



Temperature



Light Intensity (*pilot stage*)



Color Temperature
Circadian (upcoming)



Noise (*pilot stage*)



Resources



Energy /Gas



Water (*upcoming*)



Health

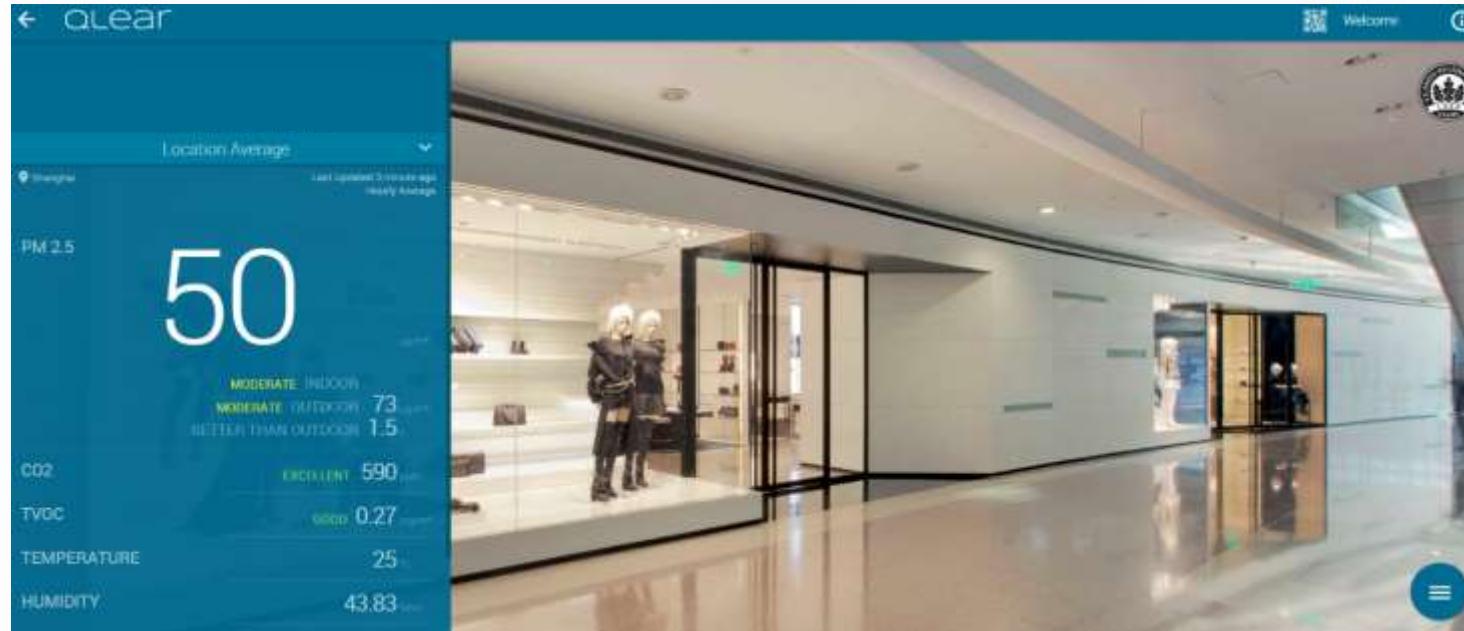


Absenteeism
(*upcoming*)



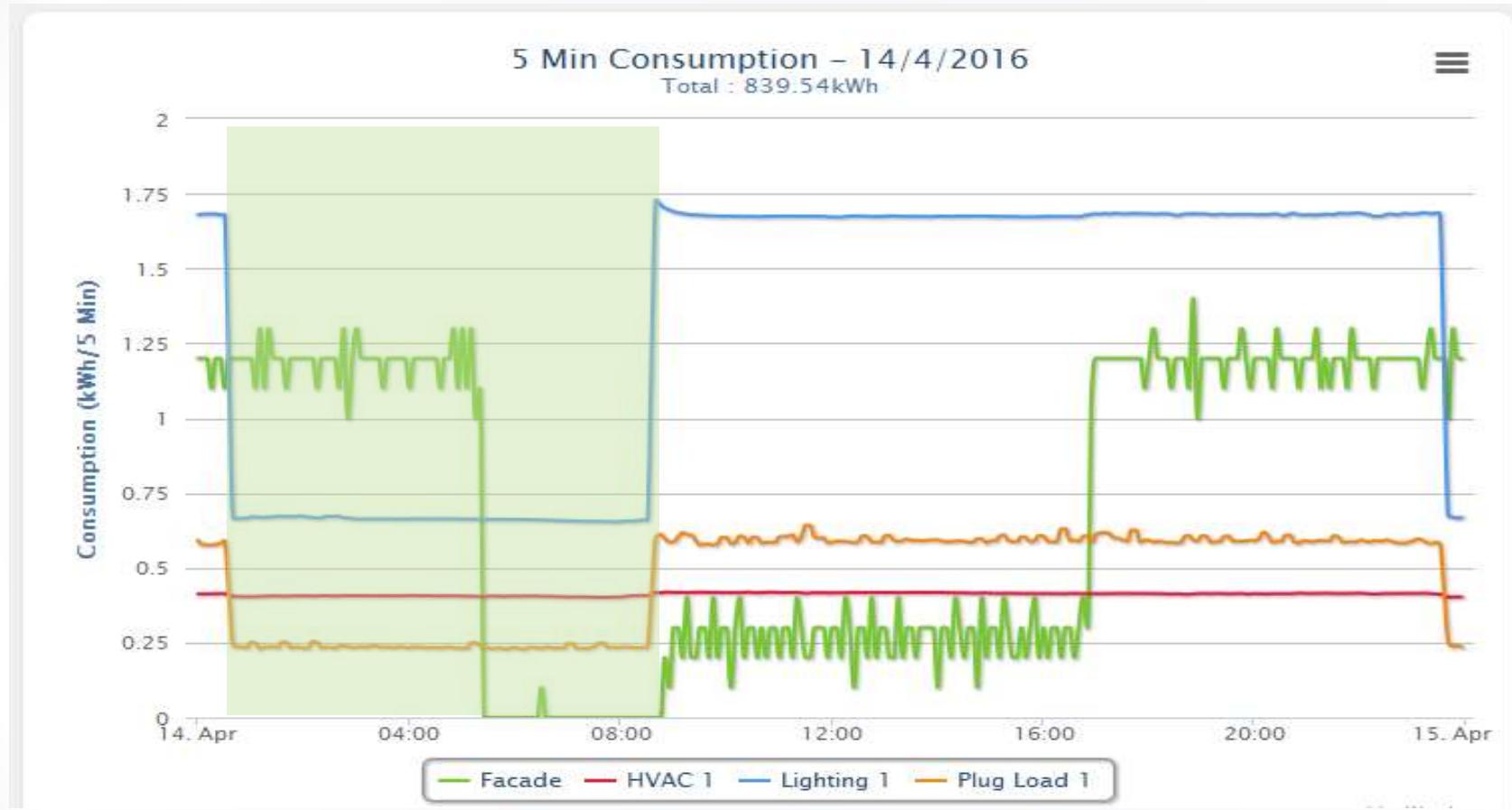
Movement / Fitness
(*pilot stage*)

ENERGY ANALYSIS CASE STUDY



Location: Shanghai, China
GFA: 755 sqm
LEED v2009 CI Retail GOLD

ENERGY ANALYSIS CASE STUDY



1. HVAC is always on
2. Façade lighting exhibits high consumption
3. Lighting units not properly switched off at night

ENERGY ANALYSIS CASE STUDY

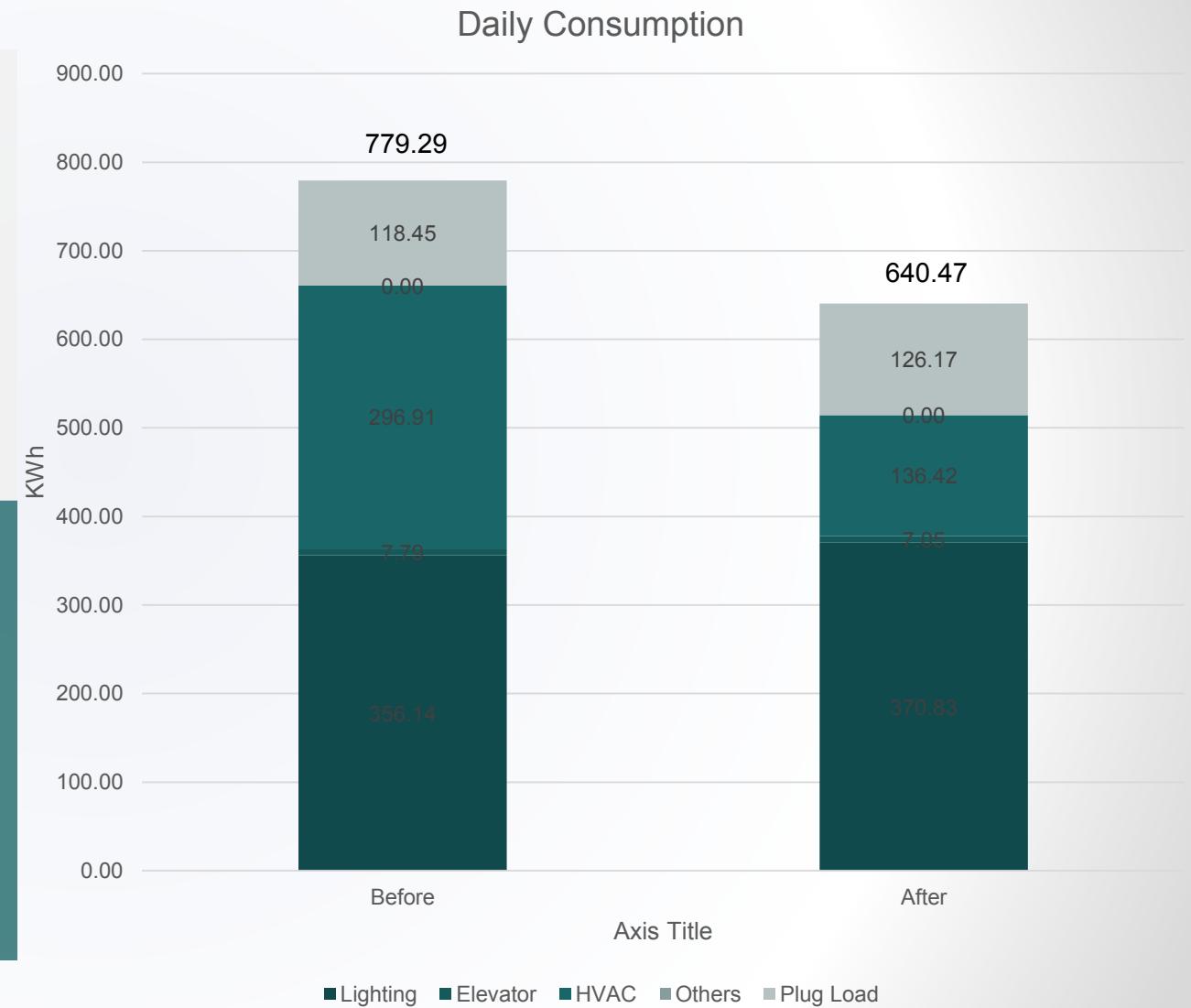


Solution

- ✓ Store operators were unaware of this issue and were alerted accordingly
- ✓ The store switched off their HVAC 1 System properly every night

Result

- ✓ HVAC Energy Consumption decreased from 296.91 kWh/Day to 136.42 kWh/Day
- ✓ Total Energy Consumption decreased from 779.29 kWh/day to 640.47 kWh/day.



INTEGRATED SYSTEM



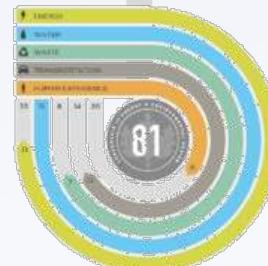
Intelligent
Building
Management



LEED v4



CHINA 3 STAR



ARC



WELL



RESET



1950–2016

Zaha Hadid

I don't think that
architecture is only about
shelter...

It should be able
to excite you,
to calm you,
to make you think.



“Sourcing sustainably makes business sense....designing sustainably makes GLOBAL sense.”

CHINA I HONG KONG I TAIWAN I JAPAN I ITALY

5/F, Hong Land Commercial Building, 1359 Zhonghua Rd., Laoximen, Shanghai, 200010 P.R.C. China
Unit 2702, 27/F, The Centrium, 60 Wyndham Street, Central, Hong Kong

web: www.bee-inc.com

blog: www.bee-inc.com/blog