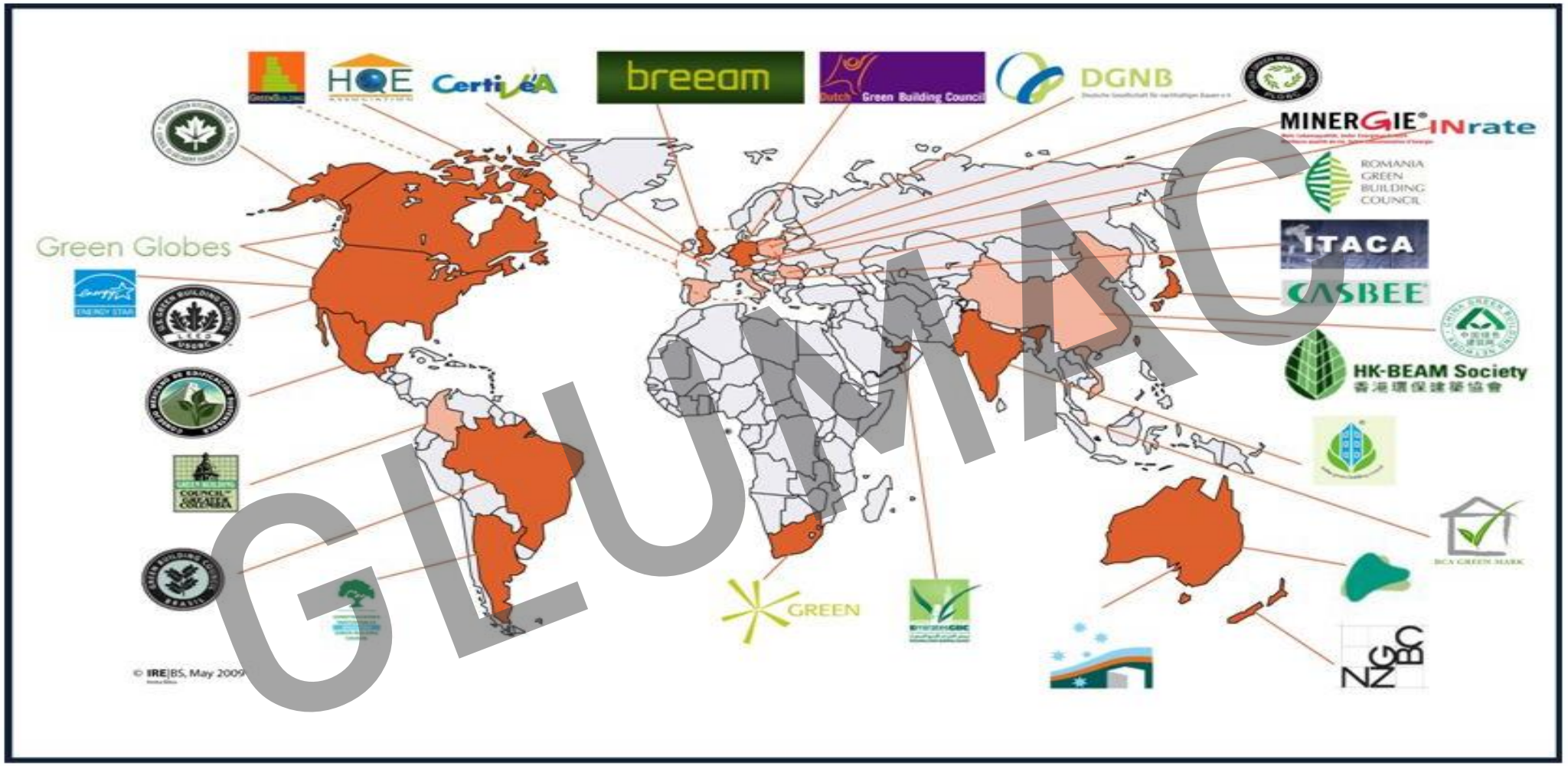
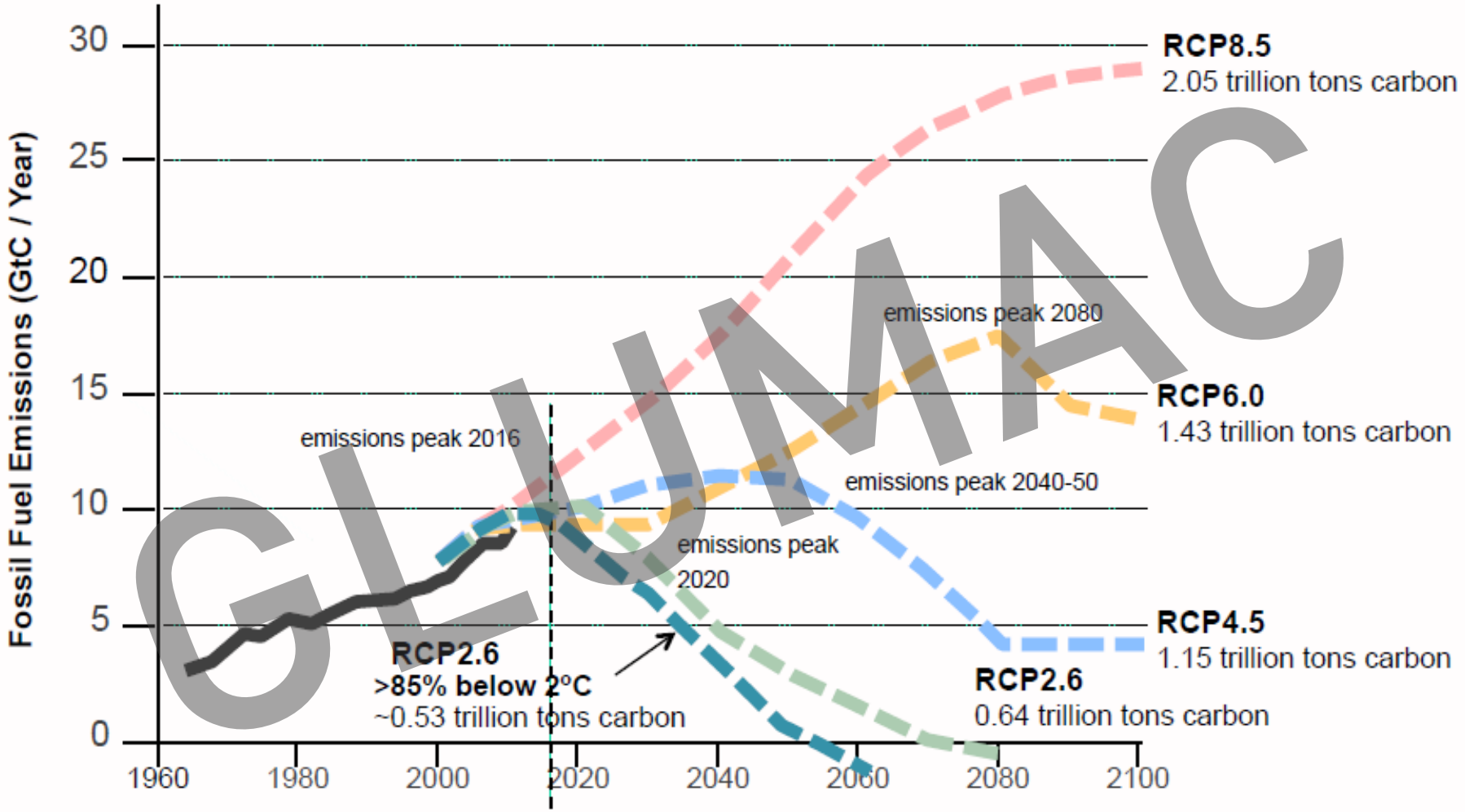


Why is Sustainable Design More and More Demanding?


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.
architecture 2030


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.
architecture 2030


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.

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

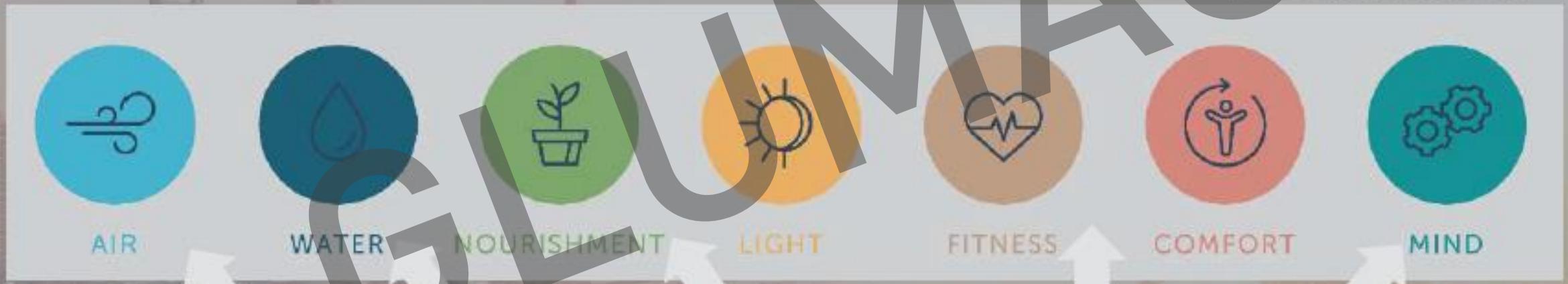
健康与福祉 纳入中国战略规划

“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

WELL 建筑标准



洁净空气

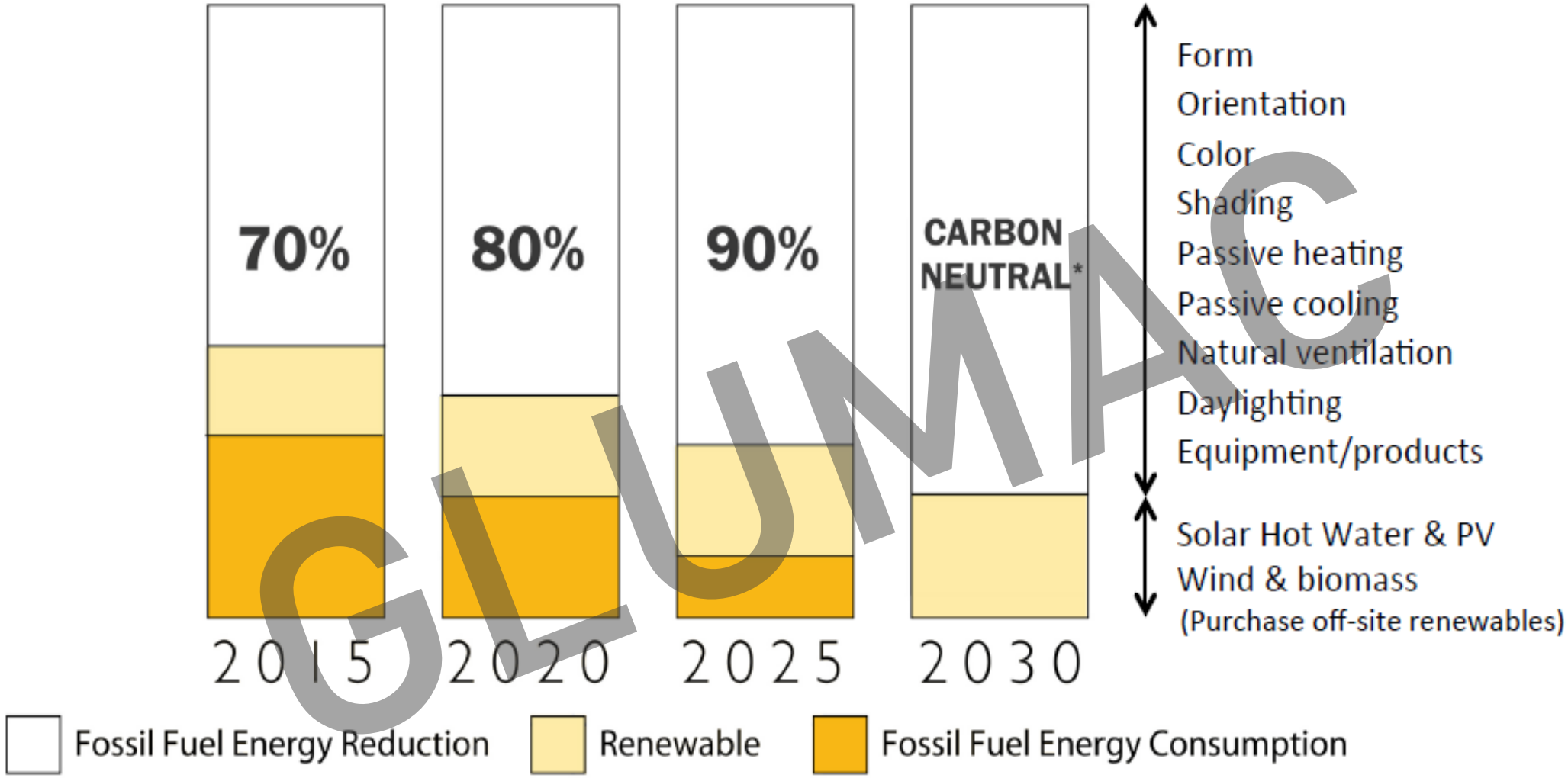
干净水源

健康膳食

运动锻炼

心理健康

“健康中国2030”规划

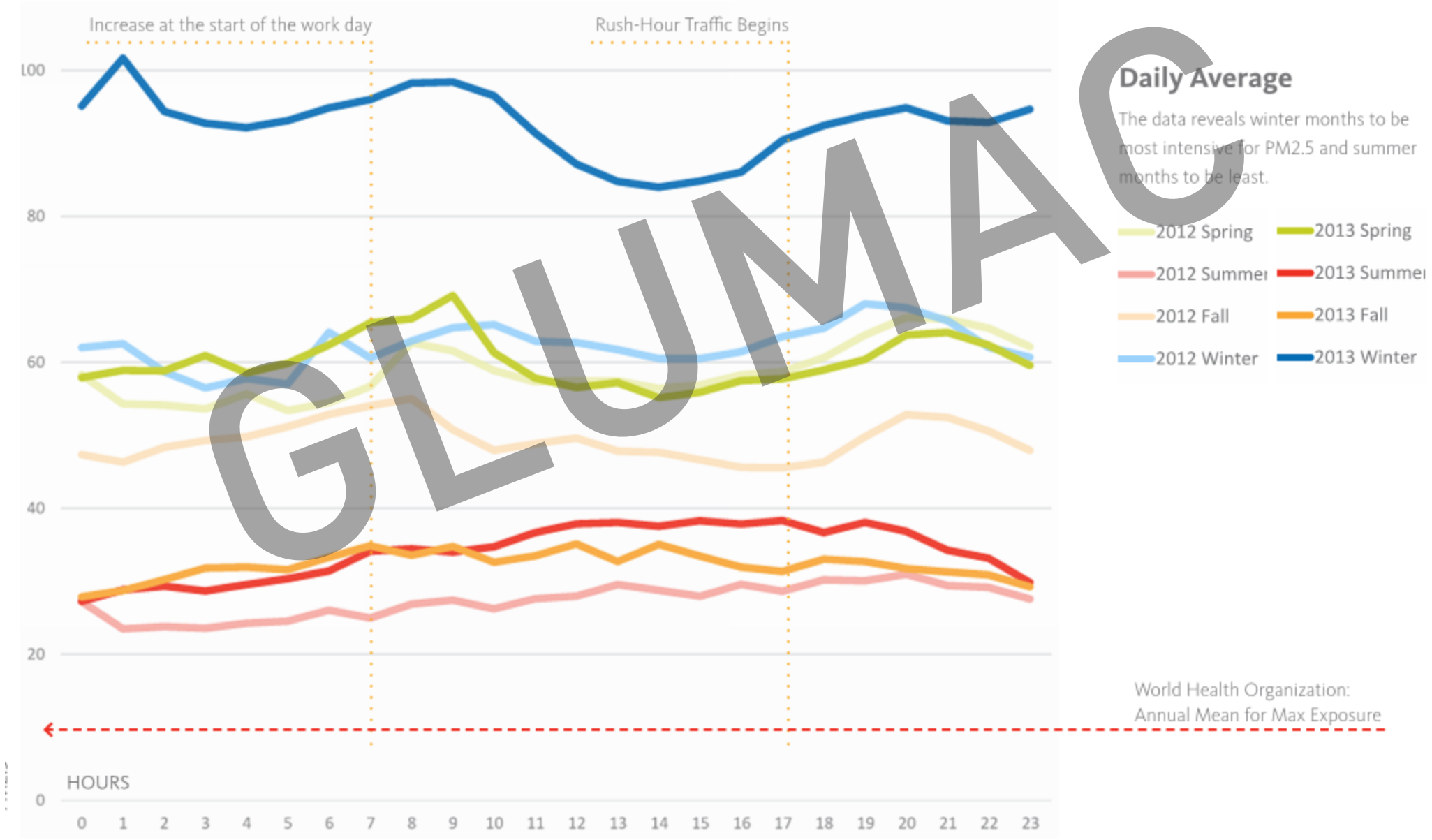


The 2030 Challenge

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

SEASONAL 24hr DAILY AVERAGES

Shanghai – PM2.5 Daily Pollution Data Collection



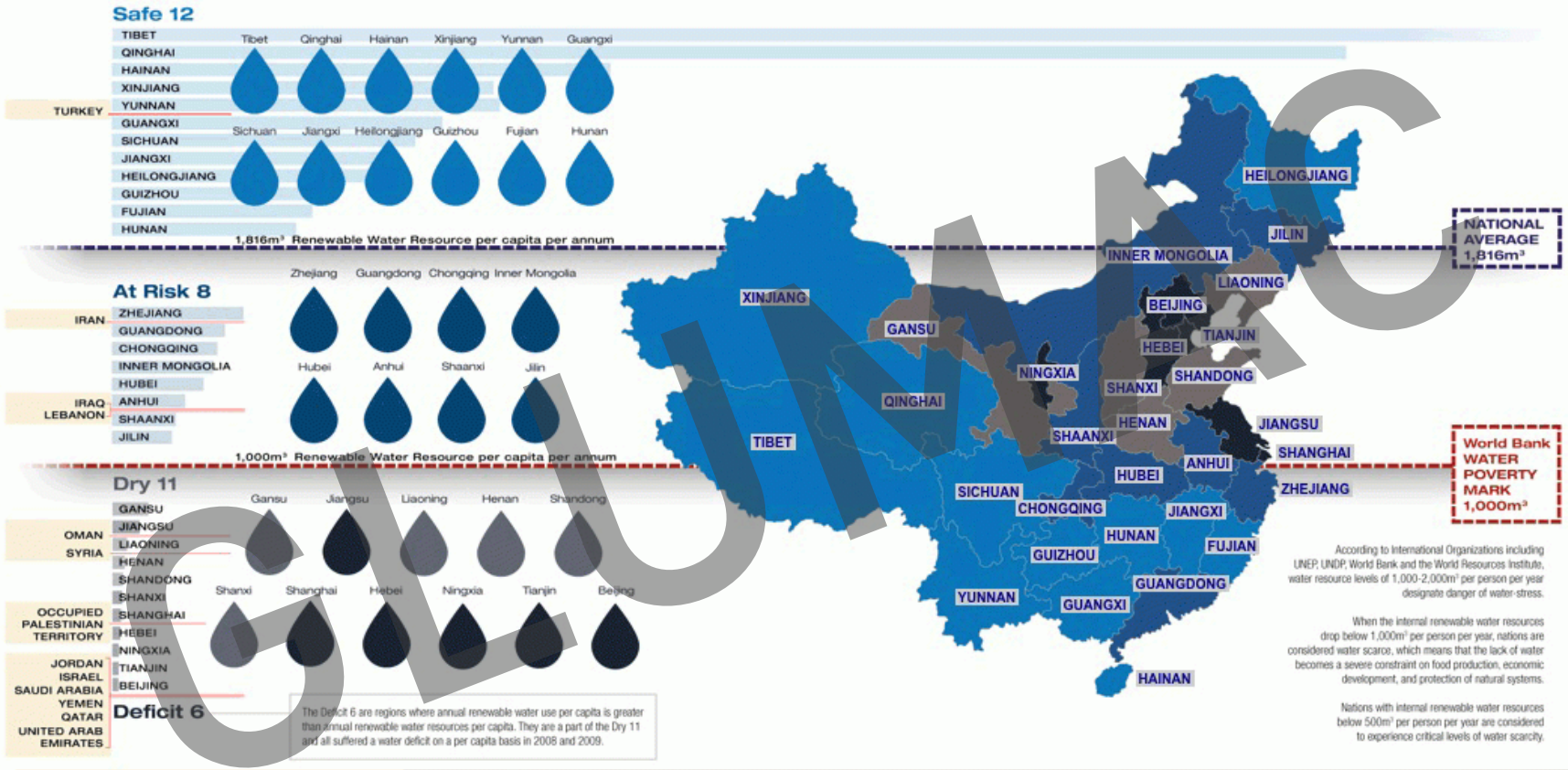
If PM2.5 index increases from 25 to 200, the average daily mortality rate will grow by 11%.

- Chinese Academy of Engineering Zhong Nanshan

Who's Running Dry?

Provinces, Autonomous Regions and Municipalities

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.



LESS WATER THAN THE MIDDLE EAST

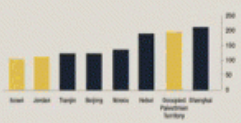
19 OUT OF THE 31 PROVINCES, AUTONOMOUS REGIONS AND MUNICIPALITIES HAVE LESS WATER THAN THE NATIONAL AVERAGE.

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.

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.



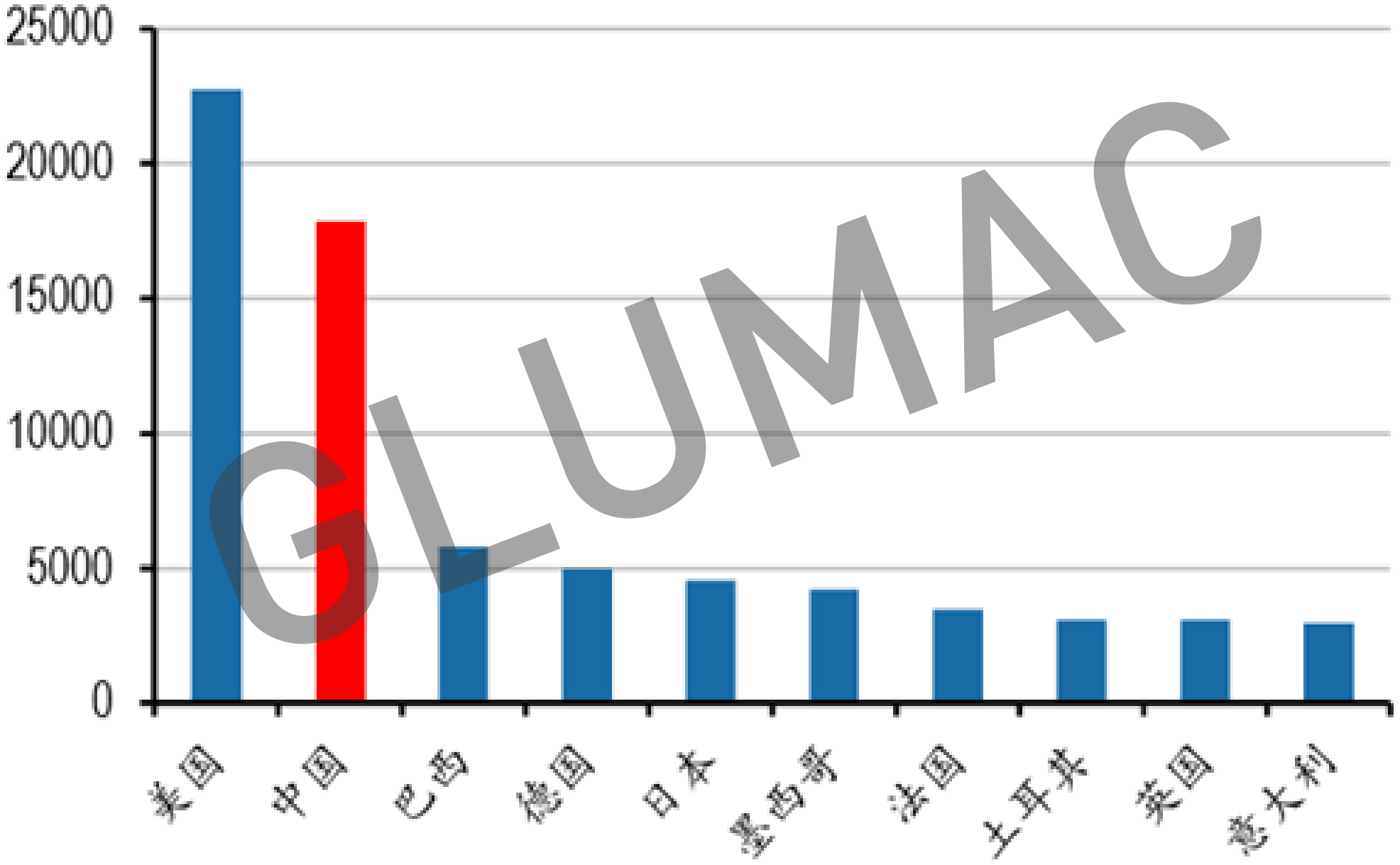
Beijing, Tianjin, Ningxia, Hebei and Shanghai have around 25m³ more or less Renewable Water Resources per capita than Palestine, Jordan and Israel.

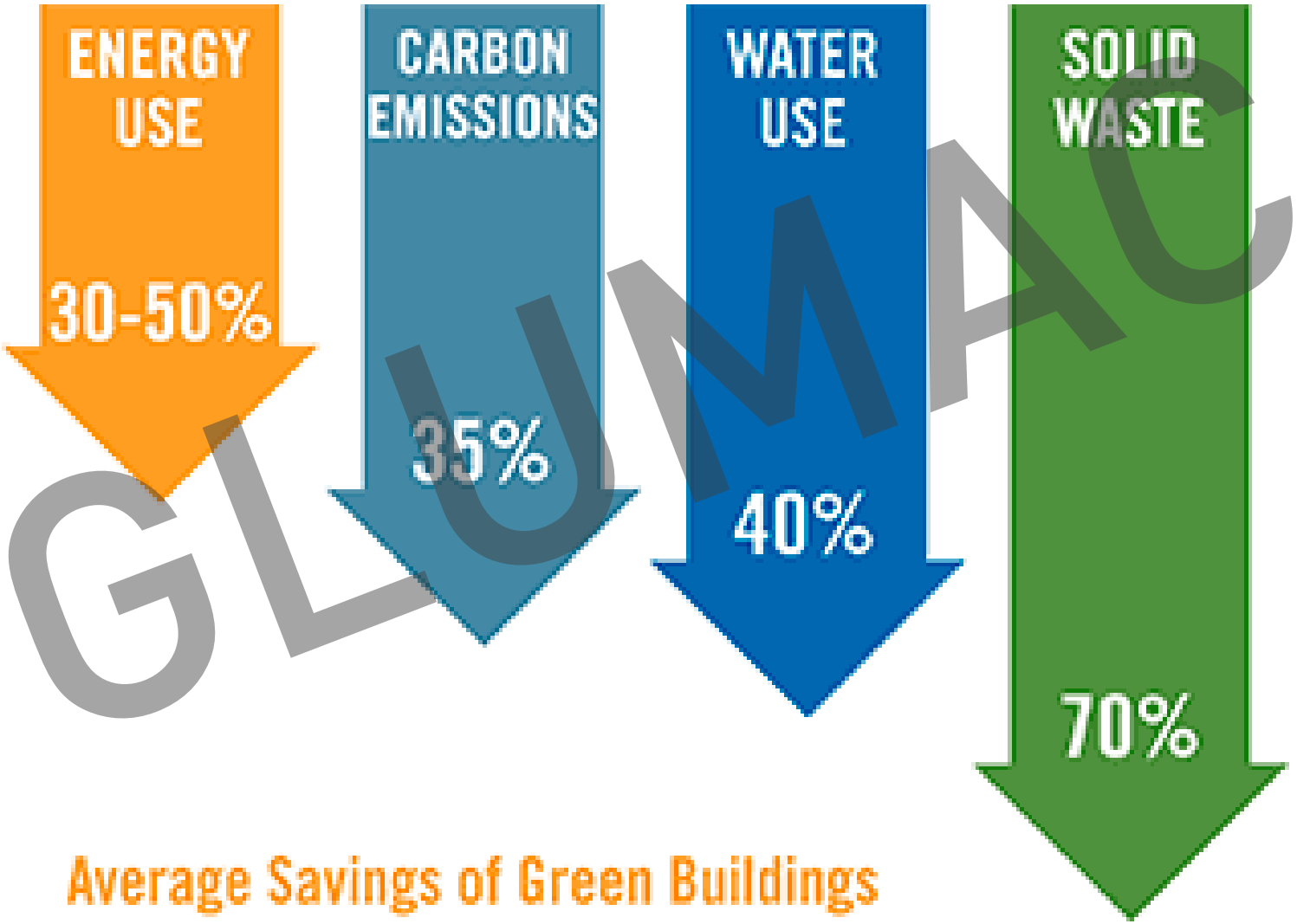
CHINAWATER RISK

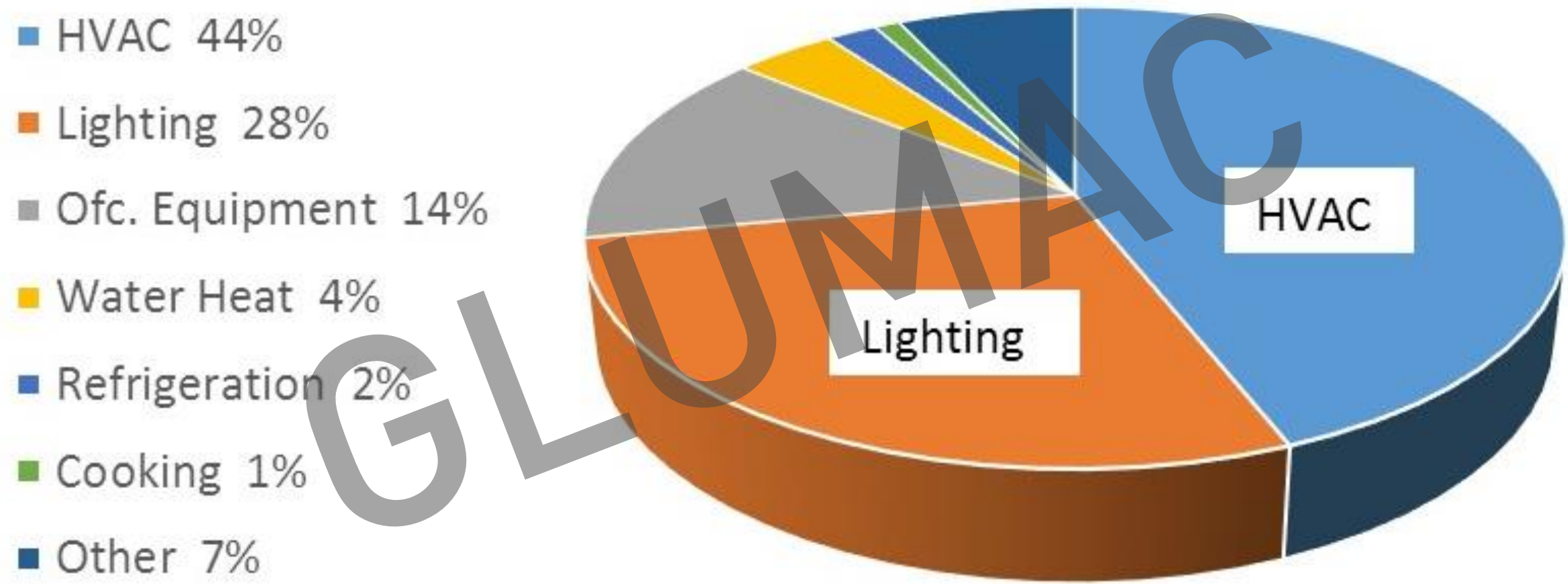
SOURCES
National Bureau of Statistics of China, China Statistical Yearbook 2010;
FAO IRWR per capita per annum;
AQUASTAT 2009


GLUMAC


GLUMAC




ENERGY USE
30-50%
CARBON EMISSIONS
35%
WATER USE
40%
SOLID WASTE
70%
Average Savings of Green Buildings

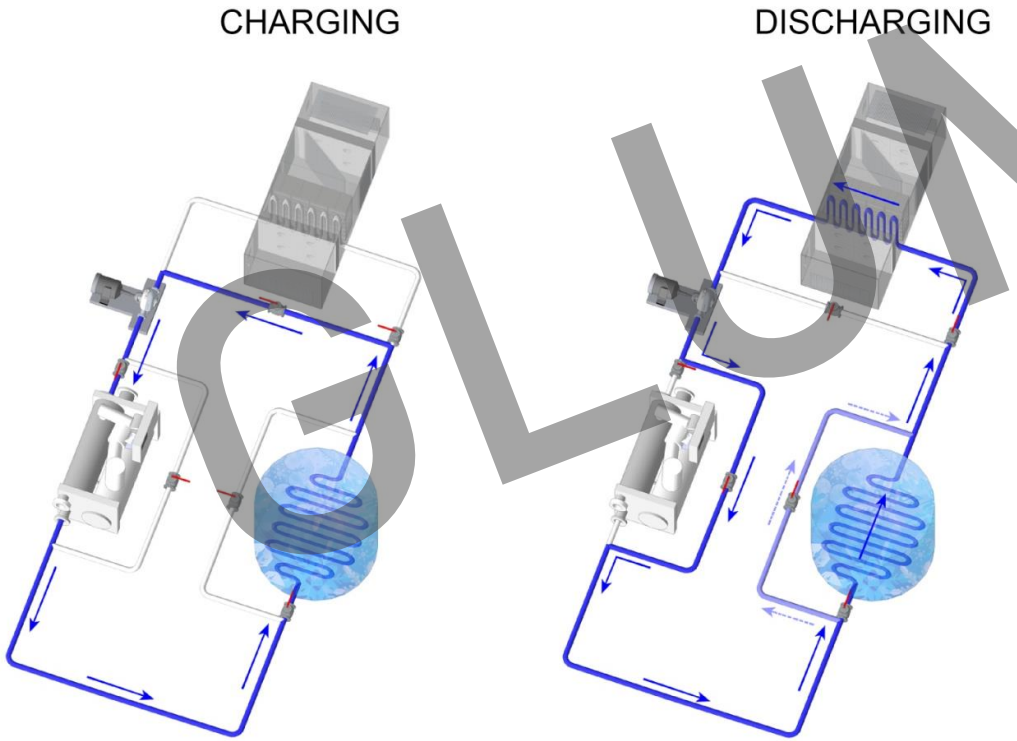

HVAC 44%
Lighting 28%
Ofc. Equipment 14%
Water Heat 4%
Refrigeration 2%
Cooking 1%
Other 7%
HVAC
Lighting

- 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 ELEC TOU 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

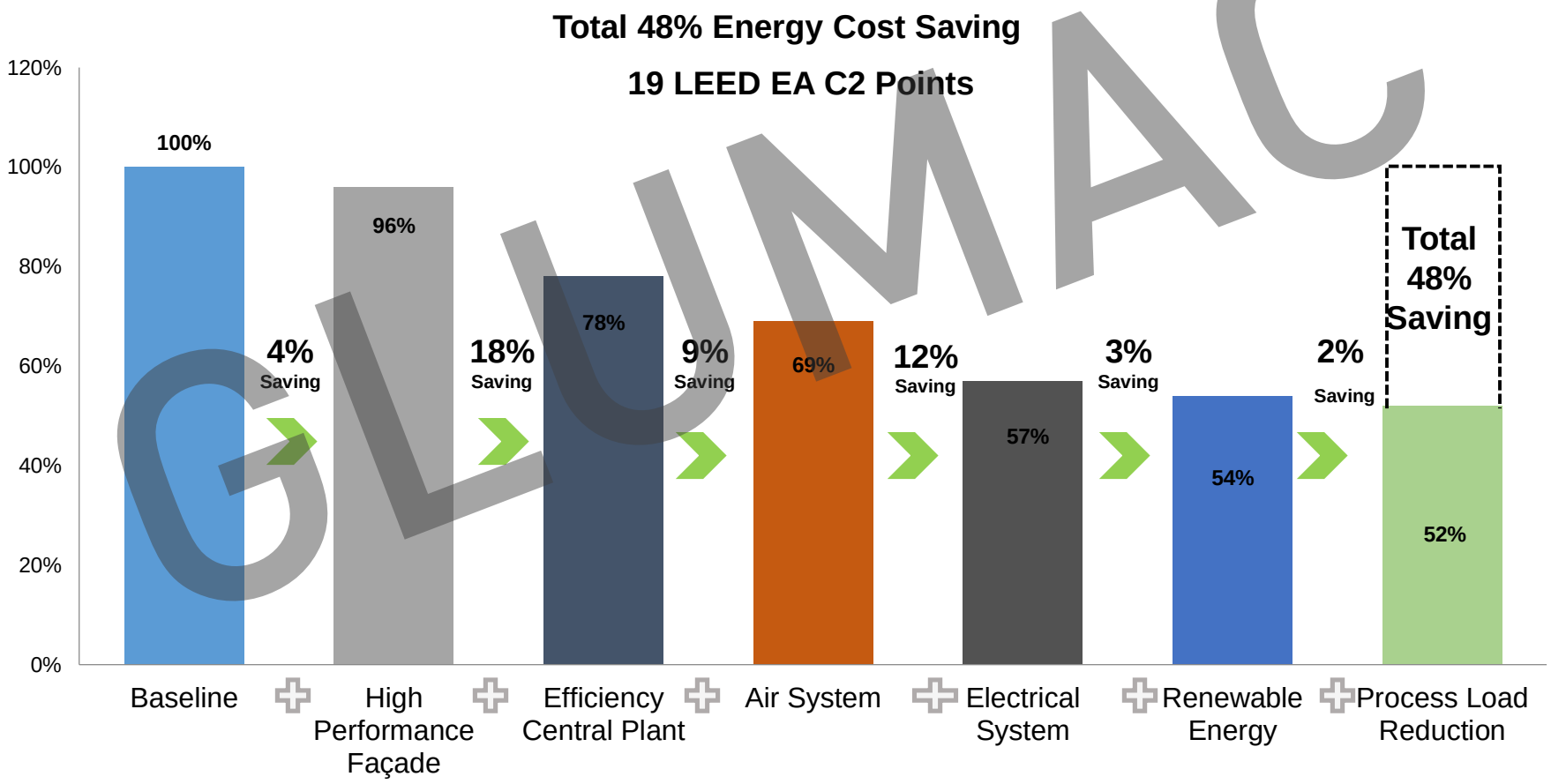
Air Side System
- Under Floor Supply System
- Heat Recovery AHU/PAU
- Air Side Economizer
- VFD Fan
- Smart Building Control System

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

Renewable Energy
- PV

Process Load Reduction
- High Efficiency Elevator
- Energy Star Applicances
- CO Sensor

Energy Saving by Category



Sustainable Strategy-Facade

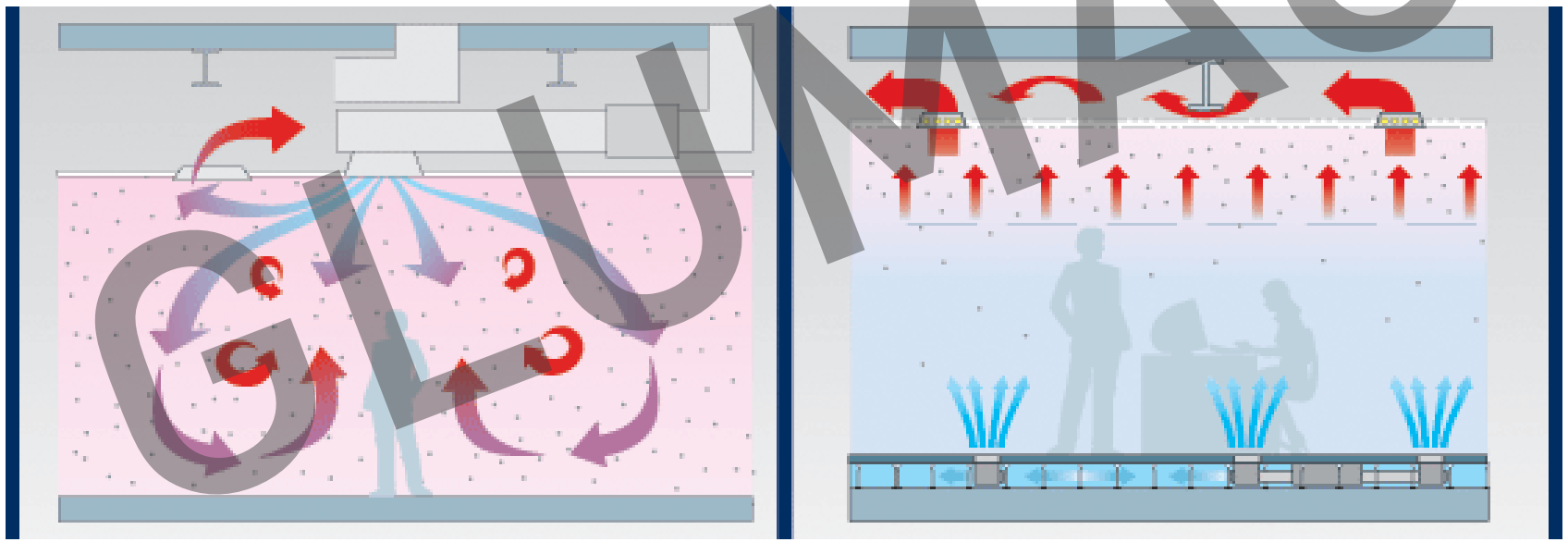
2 LEED Points Contribution

	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

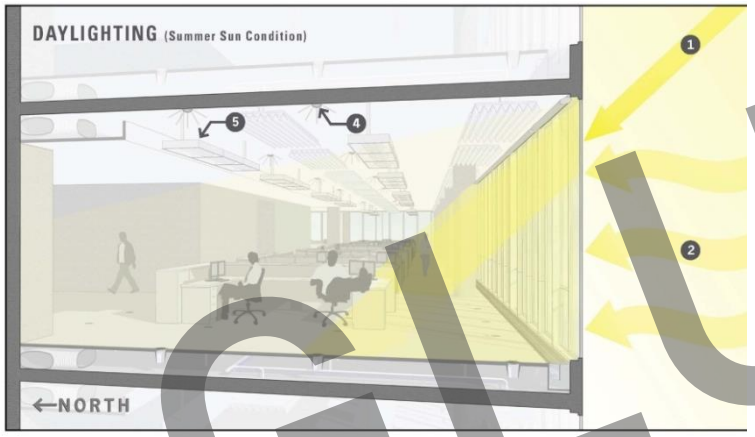
3 LEED Points Contribution

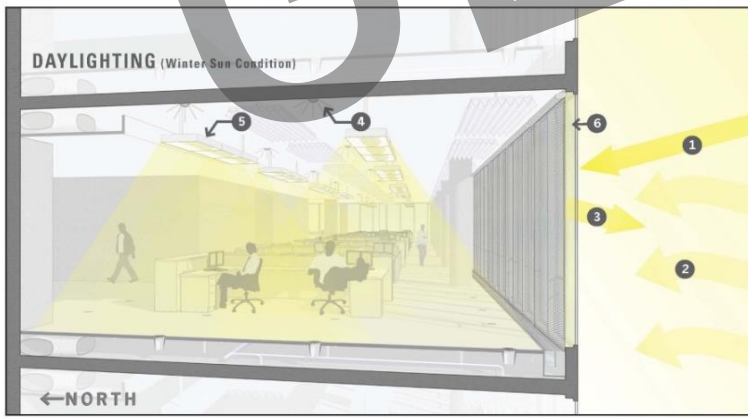
	ASHRAE Baseline	JCI Asia Headquarter
Office	12 W/m^2	7 W/m^2
Conference Room	14W/m^2	8.4W/m^2
Lobby	14W/m^2	7 W/m^2
Canteen	15 W/m^2	5.8 W/m^2
Show Room	11 W/m^2	4 W/m^2

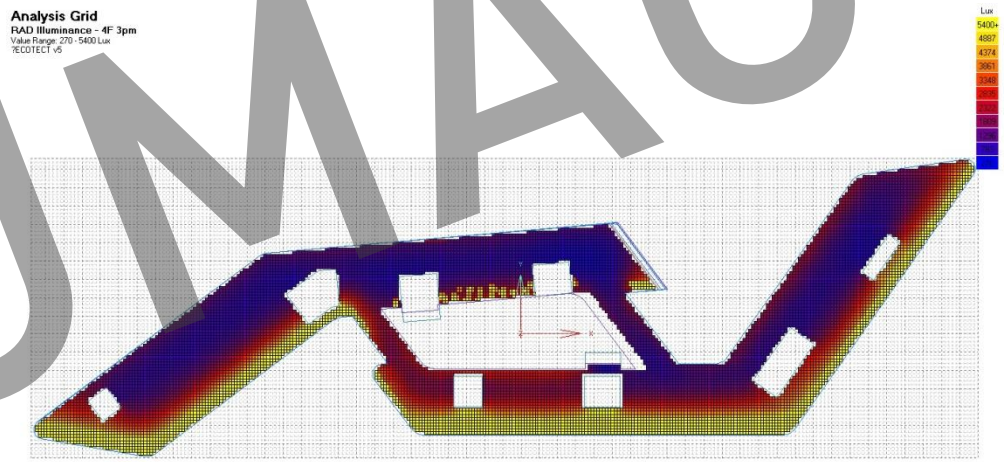
Sustainable Strategy-Electrical System

Daylighting and Occupancy Control

2LEED Points Contribution







Sustainable Strategy-Process Load Reduction

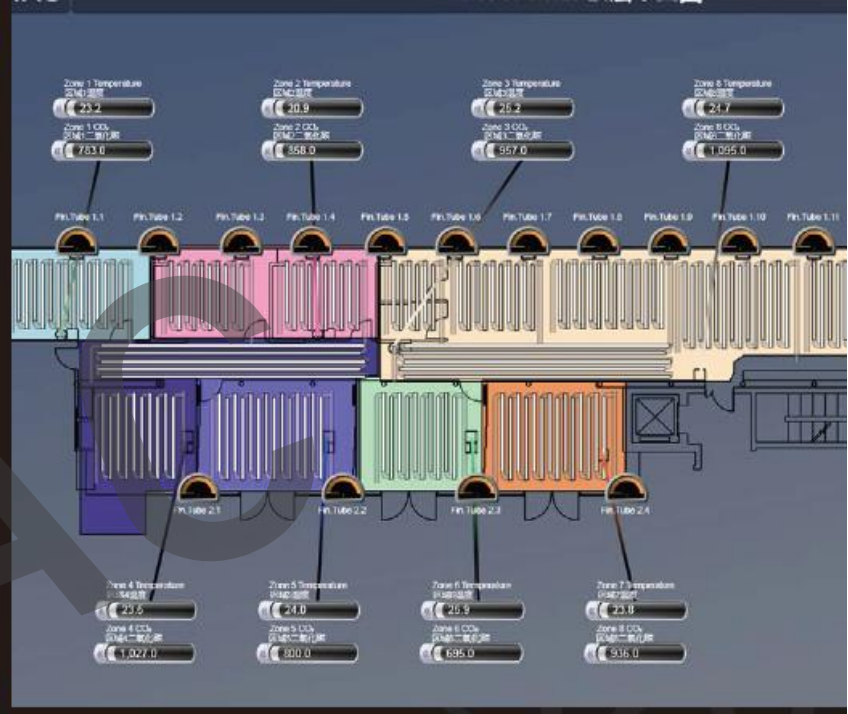
Energy Star Serve and Elevator

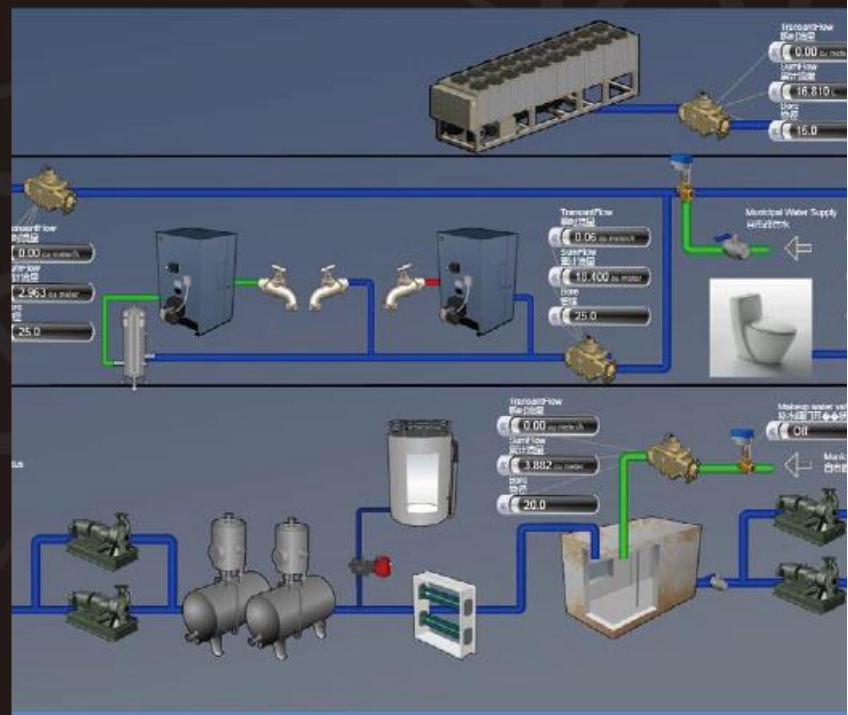
1 LEED Points Contribution

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


将开幕

Building Management System





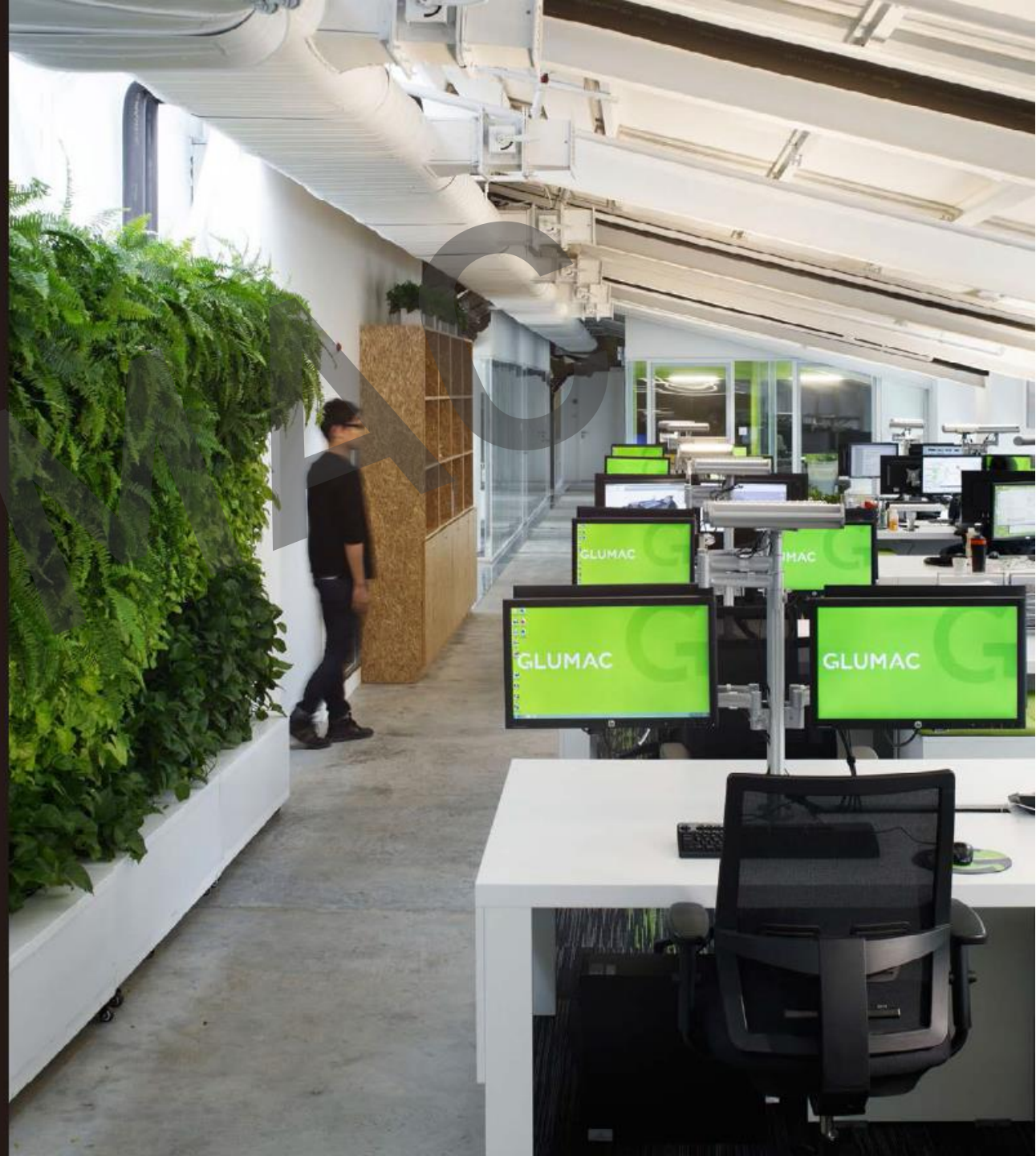
6+

- 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 CO_2 sensors

GREEN WALL

100%

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


GLUMAC
GLUMAC

Net Zero Water

500 m^3

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

What are the Future Demands?

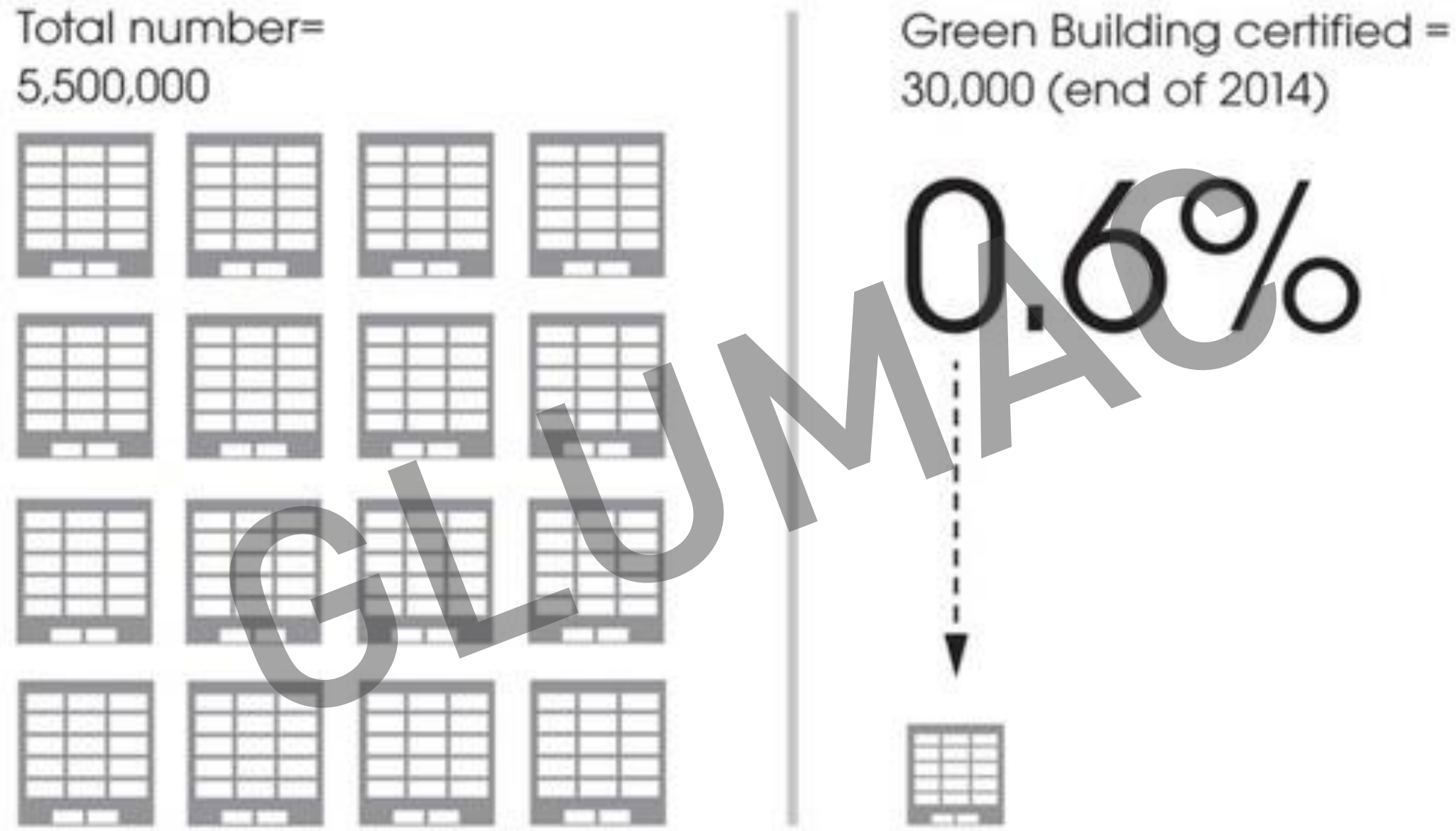
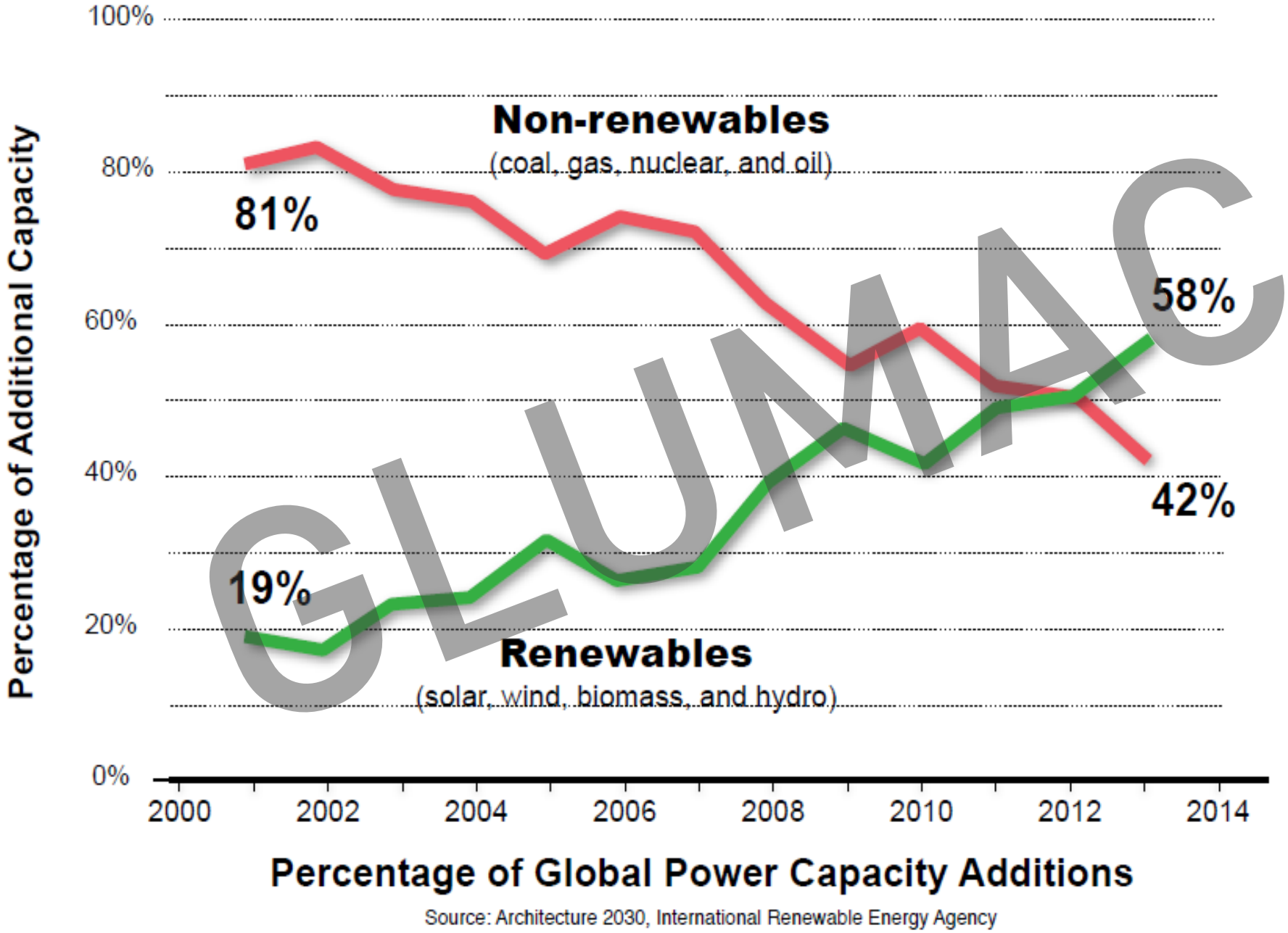


Figure 1. Total US Building Stock vs. LEED Certifications, End of 2014



Source: Architecture 2030, International Renewable Energy Agency

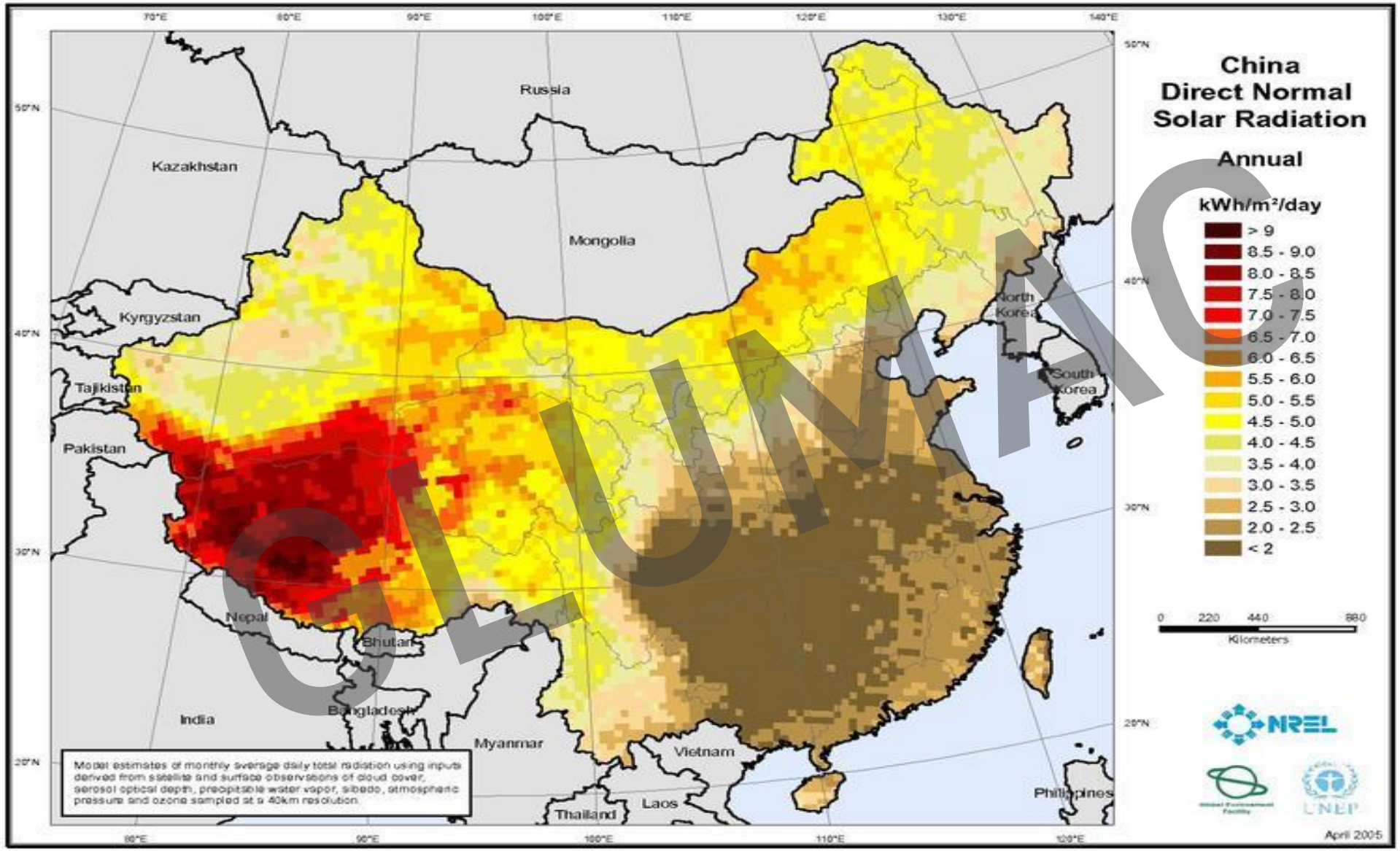
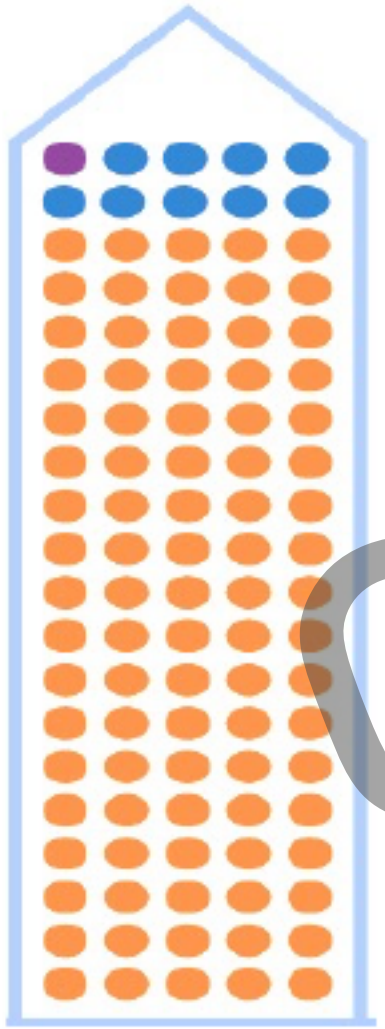


Figure 10-11: Annual Solar radiation distribution (source: National Renewable Energy Laboratory (NREL))

Invest in *People* for Return on Investment



Energy: 1% Annual Cost

Rent | Operations: 9% Annual Cost

Salary | Benefits: 90% Annual Cost

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


Certification Slows
Rise of Energy Efficiency
Net Zero Energy Buildings
Competition
Existing Buildings
The Cloud
Performance Disclosure
Healthy Buildings
Solar Power
Water Conservation
Green Building Megatrends to 2020
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