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## **New Energy Development in Low-Carbon City**

**(Presentation for EST Plenary Session 5 the Provisional Programme)**

**Final Draft**

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This presentation has been prepared by Mr. Haifeng Lu, Global Forum on Human Settlements for the Tenth Regional EST Forum in Asia. The views expressed herein are those of the author only and do not necessarily reflect the views of the United Nations.

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# New Energy Development in Low-Carbon City

--Recommendation from International Green Model City Initiative

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March 15 2017  
Vientiane

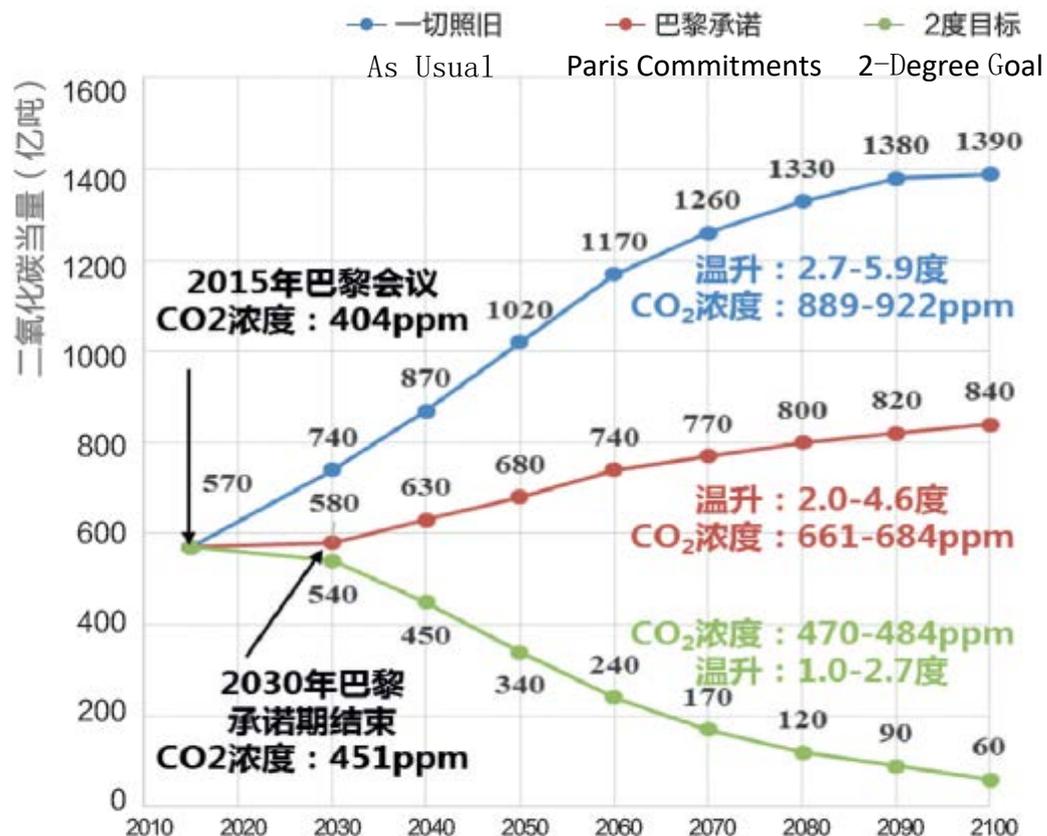
## *International Green Model City*

A Greener and Low-carbon City Initiative

The goal of Paris Agreement on Climate Change:  
At the end of the century, the global average temperature will be controlled to rise by not more than 2 ° C, compared with the pre-industrial level.

In order to achieve the target , the global greenhouse gas emissions must be cut by about 15 billion tons by 2030, and controlled at 42 billion tons by 2100 (the last data come from the report by United Nations Environment Programme).

### Prediction of Global Carbon Emissions in 2100



>> 数据来源: Science

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The cities consume about 70% of the world's energy, of which the carbon emissions account for about 70% of the total emissions in the world. In view of this, increasing the energy efficiency, developing new energy sources and building low-carbon cities are the only way to achieve the goal of Paris Climate Agreement and the 2030 Sustainable Development Goals (SDGs).

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## II. Comparison of New Energy Sources (1)

Type	Advantages	Disadvantages	Remarks
<b>Solar Energy</b>	Found everywhere, it can be directly developed and utilized. It's characterized with clean; renewable, inexhaustible, flexible installation and the integration with buildings. Its cost decreases year by year. Its power generation cost is expected to be reduced to the level of thermal power generation by 2025.	Greatly affected by geographical and climate factors, instable, larger lighting and heat accumulation area required; the lower existing efficiency, the higher cost; the solar cell production generates pollution and consumes a lot of energy.	Worth vigorous promotion, especially solar water heaters, which are featured with lower cost, mature technology and better energy efficiency.
<b>Biomass Energy</b>	Product diversity: with liquid ethanol and diesel, solid prototypes and gaseous biogas, is the only large-scale alternative to oil, coal and natural gas; can produce low sulfur fuel and can also generate electricity and heat; raw material diversity: including specific plants, crop stalks, trees, animals and their excreta, domestic waste and organic wastewater; circulation: all of its substances can enter the earth's biological cycle and reduce environmental pollution, with more mature technology adopted.	Characterized with lower plant energy conversion efficiency, a lot of land required; small-scale utilization; unstable raw material supply and higher organic moisture content.	Worth vigorous promotion

## II. Comparison of New Energy Sources(2)

<p><b>Wind Energy</b></p>	<p>A kind of clean energy, better environmental benefits, renewable, never exhausted; shorter infrastructure construction cycle, flexible installed scale, smaller land occupation; its power generation cost closest to that of thermal power, and will be flat with or lower than that of the thermal power generation by 2025.</p>	<p>Affected by the geographical and climate factors, unstable and uncontrollable; makes noise pollution; and has an impact on birds.</p>	<p>Worth vigorous promotion, especially the breeze power generation (its construction cost similar to that of the traditional wind turbine, but marked with lower installation and maintenance cost, longer service life, lower wind speed requirements, and longer operating time per year)</p>
<p><b>Geothermal Energy</b></p>	<p>Green, renewable, higher thermal efficiency, lower heat loss in the entire transmission process, higher stability, relatively stable temperature of geothermal resources throughout the year; ground source heat pump system can provide heating, cooling and domestic hot water services and achieve the multi-purposes; longer service life of the heat exchange system; the convenient room temperature adjustment make users comfortable.</p>	<p>The use site restriction: a well must be dug underground; higher one-time investment price; complex system, and more difficult installation; the excessive use of it can lead to soil temperature imbalance, thus affecting the surrounding ecology.</p>	<p>Restricted promotion</p>

### II. Comparison of New Energy Sources (3)

<p><b>Nuclear Energy</b></p>	<p>Intensive energy, high power, very convenient transportation and storage; stable power generation costs, relatively cleaner power generation process, with no air pollution and carbon dioxide emissions.</p>	<p>In addition to the risk of nuclear leakage, there are no long-term and valid treatment measures for radioactive nuclear waste generated by the power generation. In case of leakage, it can do great harm; more serious hot pollution and huger investment costs; the construction of a nuclear power plant easily leads to political disputes.</p>	<p>Prudent promotion and development</p>
<p><b>Water Vapor Energy</b></p>	<p>In a large quantity, inexhaustible, clean and environmentally friendly and renewable; a water vapor heat pump is more energy-conserving than air source heat pump, the combination of the cooling, heating and hot water-supplying functions; its initial investment and operating cost is lower than that of the conventional central air conditioning system; its system can also filter haze particles to make clean indoor air.</p>	<p>In addition to the insufficient social awareness of it, it also needs technical improvement.</p>	<p>Worth vigorous promotion</p>

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Wind power and solar PV generation

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Committed to Sustainable Cities and Human Settlements for all

In the Group of Twenty , the power generation capacity of other renewable energy sources than hydropower stations represented 8% of the total power generation in 2015. The ratio in Germany reached as high as 36%.

China plans to make the non-fossil energy account for 20% of the total energy consumption by 2030, when the carbon dioxide emissions will also reach the peak.

## Distributed Power Generation:

1. The solar and micro-wind energy building integration technology allows each building to produce energy for power generation.
2. The ground source heat pumps or water vapor heat pumps may be used to provide heating, cooling and hot water services for buildings.
3. Various organic wastes in cities are treated in an anaerobic way to generate biogas for fuel or power generation.
4. Straws, trees, special crops and others are utilized for energy production or power generation.

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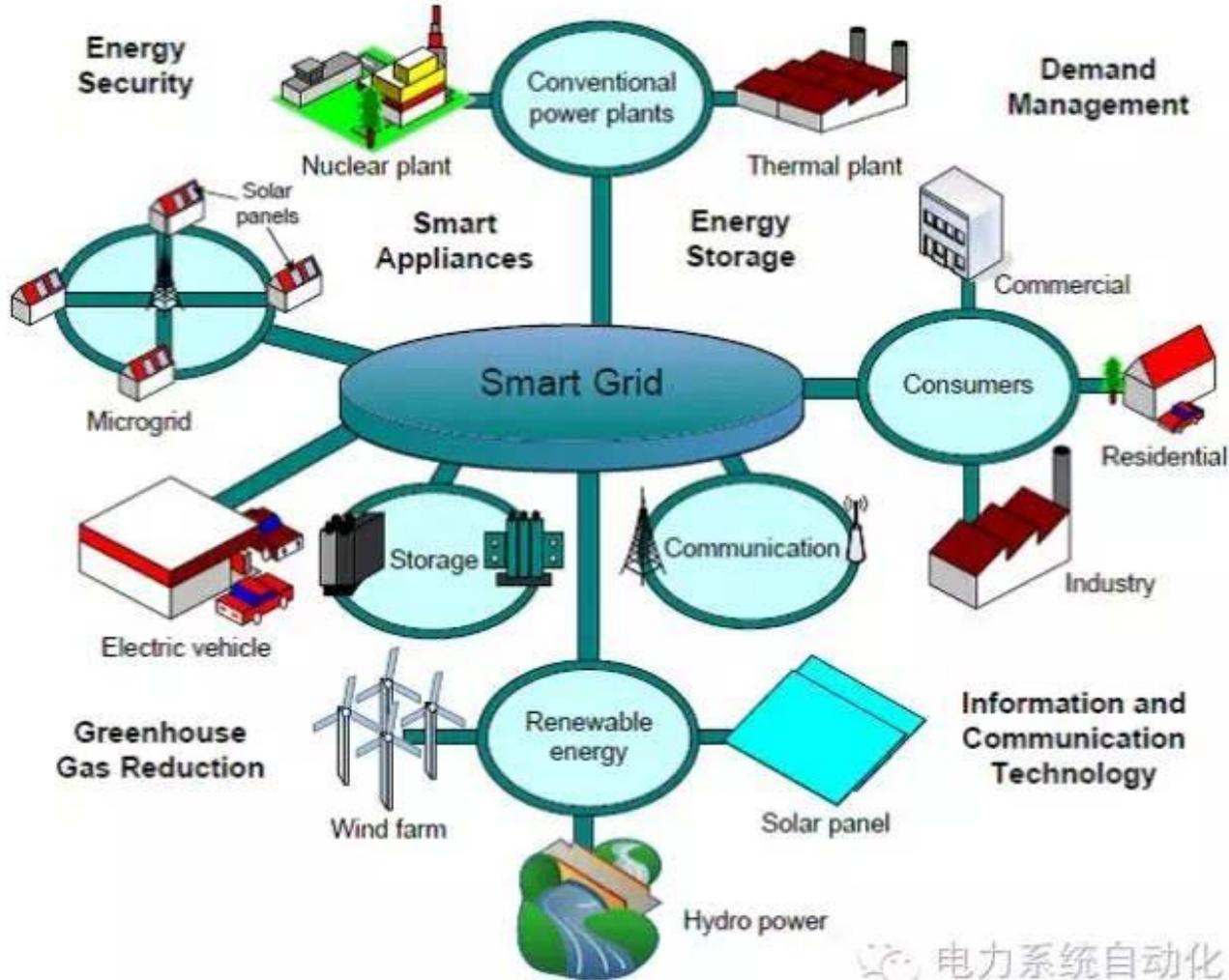
**Low emission Building** in Dezhou city, Shandong Province, China, Total floor area is 75 thousands square meters. It is biggest solar office buiding around the world.

## Smart Micro-grid:

Smart Micro-grid refers a small-scale distribution system able to achieve intelligent management, consisting of distributed power supply, power load, power distribution facilities, energy storage devices, monitoring and protection devices, and others, which is divided into net-shaped micro-grid and independent micro-grid, and is able to achieve self-control and self-management, and transit the excess power to the public grid.

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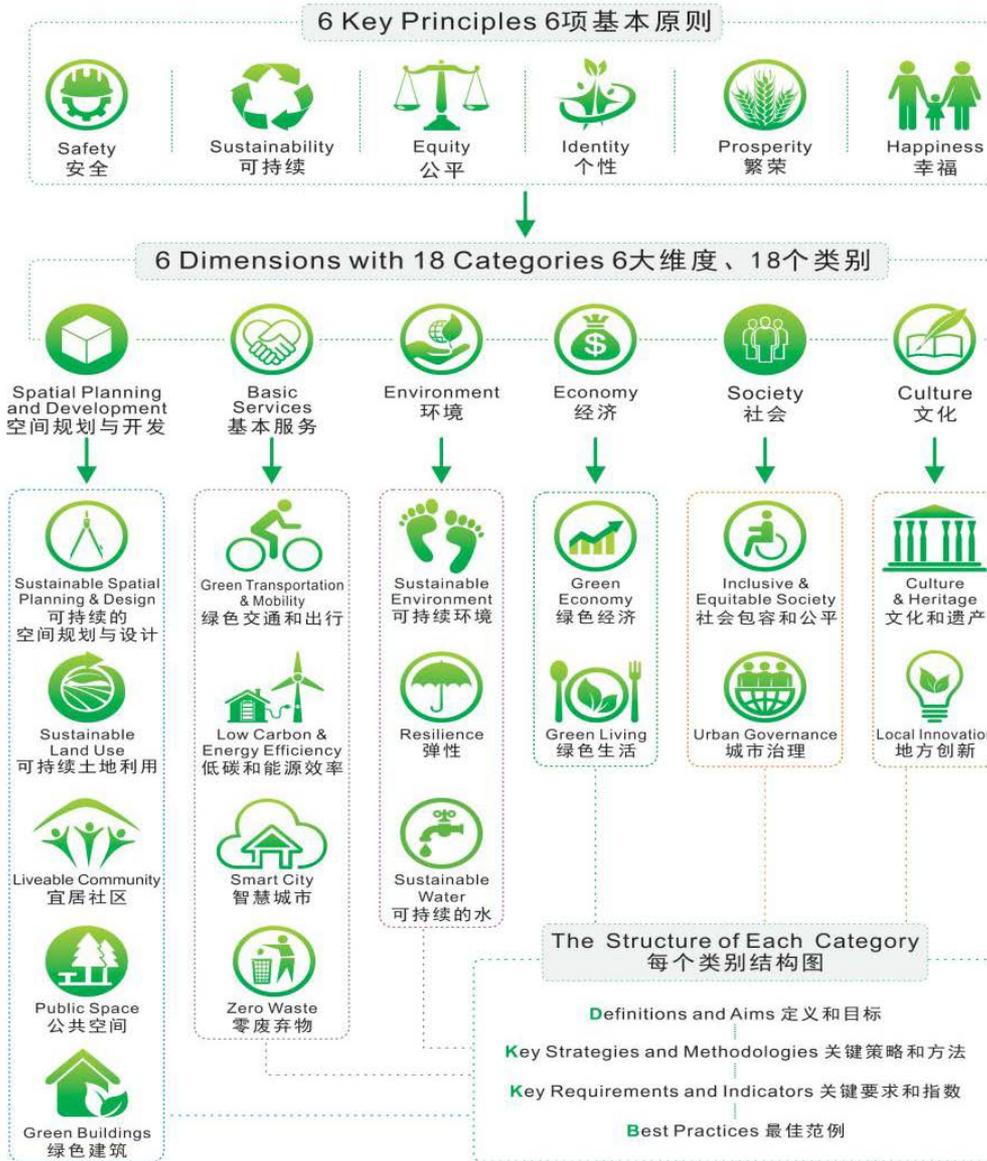


电力系统自动化

## IGMC: Low-Carbon City Initiative:

International Green Model City (IGMC) Initiative is a low-carbon town development program initiated by the Global Forum on Human Settlements (GFHS) and greatly supported by the United Nations, of which the standards are advanced tool for directing and assessing low-carbon urban planning and development, and provides technical approaches and assessment means for the implementation of 2030 Agenda for Sustainable Development and New Urban Agenda at the city level.

The International Green Model City Standards 3.0  
国际绿色范例新城 (IGMC) 标准3.0示意图



## V. Strategy and Measures Proposed by IGMC Initiative to Achieve the Net Zero Carbon City:

1. To develop a comprehensive net zero carbon city action plan
2. To take infrastructure-oriented initiatives to support circulation-type designs
3. To increase the supply of renewable energy and seek distributed power generation for self-sufficiency in local areas, while striving to meet the power supply needs through other renewable energy suppliers
4. To build smart grids, integrate various types of new energy power generation, and improve the overall energy utilization efficiency
5. To reduce the consumption of energy through energy-saving appliances and equipment in the development, transportation, production and construction life cycle

6. To make cleaner production

7. To make sustainable planning and design, including innovating urban design and architectural forms according to the energy and resource conservation performance standards, using the building performance monitoring system, and improving the building energy efficiency

8. To create a comprehensive sustainable lifestyle and public participation initiatives to promote the construction of a net zero carbon city

9. To establish a mathematical carbon model, and carry out carbon offset and carbon credits

10. To provide clean energy for transportation and promote new energy vehicles.

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## Case 1. Sweden • Hammarby Ecological City: Self-circulating Green City



# Case 1. Sweden • Hammarby Ecological City: Self-circulating Green City



The power in Hammarby City comes from waste water treatment ,waste conversion, wood debris power generation, and roof solar panels.

Advanced garbage collection system: garbage pipe suction and three-level recycling contributes to the garbage recovery rate of more than 70% and the household waste conversion rate of up to 95%.

Precipitation collection network and sewage pipe network separation system; sewage power generation and heating.

## Case 2. Dunhuang City, China: to Become a 100% Renewable Energy and Net Zero Carbon City



# Case 2. Dunhuang City, China: to Become a 100% Renewable Energy and Net Zero Carbon City

The goal is to achieve the visions of becoming a 100% renewable energy power city, a 100% renewable energy heating city, a 100% renewable energy transportation city and a 100% renewable energy tourism city by 2020.





-“OBSERVANCE OF“WORLD CITIES DAY 2017”-

## **The 12th Global Forum on Human Settlements & Sustainable Cities and Human Settlements Award Ceremony**

October 2017, UN headquarters New York City

Theme: Effectively Planning and Managing Urban Spatial Development to

Implement New Urban Agenda and SDG 11

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# SCAHS

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SCAHS means the flying wind in Chinese language,  
implying that the wind of the green flies around the world.

**Thanks for watching and welcome to exchange!**

**SCAHS** 🙌 🙌

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