Low-Carbon City Planning Tools
Cities today... 城市占……
• ...cover **2%** of the earth’s surface 地球表面积的2%
• ...contain **50%** of the world’s population 世界人口的50%
• ...consume **75%** of global energy 能源消费的75%
• ...produce **80%** of GHG emissions 温室气体排放的80%
DOE China Cities Engagements

1. Mayors Exchange (with MOHURD)
   
   Trained more than 80 Chinese city mayors and senior officials about sustainable city development and related tools, policy and technologies

2. Eco-Cities Collaboration (with MOHURD)

3. Sustainable Energy in Business Districts (SEBIZ)
   
   http://www.cleanenergyroadmap.com/about/sebiz/

4. Low-Carbon Cities (with NDRC)
LBNL China Energy Group: team and collaboration

团队及合作

U.S. DEPARTMENT OF ENERGY

ENERGY FOUNDATION

Energy Efficiency & Renewable Energy
What is a Low Carbon City?
什么是低碳城市？

- Lack of specific definition 缺乏低碳城市定义
- Lack of indicator system 缺乏低碳城市的指标体系
- Lack of guidelines on how to design and implement a low carbon plan 缺乏设计和执行低碳城市规划的指导方针
- Lack of assessment and policy recommendation tools tailored for local cities 缺乏适用于地方城市的低碳评价和政策推荐工具

http://www.arborday.org/trees/treeguide/TreeDetail.cfm?ItemID=1092
4 Cities Tools

• ELITE Cities
  – Eco and Low-carbon Indicator Tool for Evaluating Cities

• BEST Cities
  – Benchmarking and Energy Saving Tool for Low Carbon Cities

• GREAT
  – Green Resources & Energy Appraising Tool

• URBAN-RAM
  – Urban Form Rapid Assessment Model

Check out: https://china.lbl.gov/research-projects/low-carbon-urban-development
## Tools Overview

<table>
<thead>
<tr>
<th>Tool</th>
<th>Distinctive</th>
<th>Training Time</th>
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</thead>
<tbody>
<tr>
<td>ELITE</td>
<td>Calculates benchmarking score for cities against their goals or vs. other cities in China.</td>
<td>Half a day</td>
</tr>
<tr>
<td>BEST</td>
<td>Provides sector-specific policy recommendations and strategies for action.</td>
<td>One day</td>
</tr>
<tr>
<td>GREAT</td>
<td>Evaluates future projections and scenario analysis for different options moving forward (2020, 2030).</td>
<td>One month or more</td>
</tr>
<tr>
<td>Urban-RAM</td>
<td>Takes into account embodied energy.</td>
<td>In-depth</td>
</tr>
</tbody>
</table>

All of these tools require DATA
Examples of inputs needed (BEST)

- Primary energy consumption per capita
- GHG emissions per capita
- GDP per capita
- Public buildings energy intensity
- Industrial Carbon Intensity (GHG emissions/unit of industrial value added)
- Share of green buildings
- Share of District heating supplied by cogeneration facilities
- Length of rail and bus lines in city area
- Percent of trips by walking and bicycling
- Energy intensity of Wastewater treatment
- Municipal solid waste disposed per capita
- Urban Green Space per capita
ELITE Cities: Functionality Highlights

• Calculates an overall score by which cities’ performance compares against benchmark performance goals as well as ranked against other cities in China

• Measures progress on 33 key indicators chosen to represent priority issues within 8 primary categories:
  – Energy and climate, water, air, waste, mobility, economic health, land use, and social health

• Useful and effective for local and higher-level governments
“精英城市”低碳生态城市评估工具 ELITE Cities: Tool at a Glance

city概况 Profile

<table>
<thead>
<tr>
<th>基本信息</th>
<th>Jinan</th>
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<tbody>
<tr>
<td>省份</td>
<td>Shandong</td>
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</table>

<table>
<thead>
<tr>
<th>关键特性</th>
<th>5,000,000</th>
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</thead>
<tbody>
<tr>
<td>城市人口 (人)</td>
<td>100</td>
</tr>
<tr>
<td>城市气候</td>
<td>Cold</td>
</tr>
<tr>
<td>水资源紧缺指数（省平均值）</td>
<td>0.57</td>
</tr>
</tbody>
</table>
| 服务业占GDP比例 | 45.0%
| 工业占GDP比例 | 60.0%

结果与综述 Results and Summary

- CO2强度
- 居民及建筑能耗
- 工业及服务业市场化程度
- 市政及工业用水量
- 废水处理率
BEST Low Carbon Cities: Functionality Highlights

• Quickly assess local energy use and energy-related CO₂ emissions via 35 Key Performance Indicators across eight sectors
  – industry, buildings, transportation, power and heat, street lighting, municipal solid waste, water and wastewater, urban green space

• Identify the sectors with the greatest energy saving and CO₂ emissions reduction potential
  – along with corresponding sector-specific policy strategies for action

• Applications for:
  – sector prioritization
  – policy recommendation
  – decision-making attributes
“最佳城市”低碳城市评估及政策建议工具
BEST Cities: Benchmarking and Energy Saving Tool for Low Carbon Cities

数据输入
Data Entry

对标
Benchmarking

优先排序
Prioritizing

政策建议
Policy Metrics

U.S. Department of Energy
Energy Efficiency & Renewable Energy
The GREAT tool can help local governments to complete the following goal/milestones:

- Develop the city’s GHG inventory
- Future energy and emission projection baseline generation
- Scenarios generation
- Evaluate the impact of different policies
- Help to set targets and develop action plans and target allocation
• Shed light on the magnitude and sources of a city’s embodied energy and carbon footprint
  – Buildings, Transportation, Infrastructure, Personal spending, Waste disposal

• Tested and evaluated by Chinese researchers in Suzhou, Shanghai
Challenges and future plans