Low-Carbon City Planning Tools

U.S. DEPARTMENT OF ENERGY | Energy Efficiency & Renewable Energy

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城市需要生态低碳发展

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%

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PARIS2015
CONFÉRENCE DES NATIONS UNIES SUR LES CHANGEMENTS CLIMATIQUES
COP21·CMP11

Beijing Cities Summit June 2016

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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

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ENERGY FOUNDATION
能源基金会

What is a Low Carbon City?
什么是低碳城市?

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

- 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

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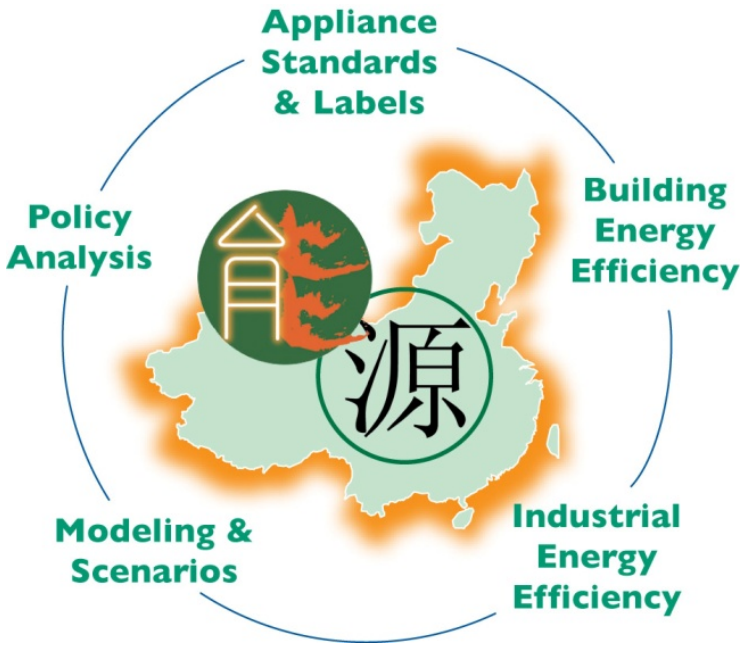
4 Cities Tools

- **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

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

All of these tools require DATA

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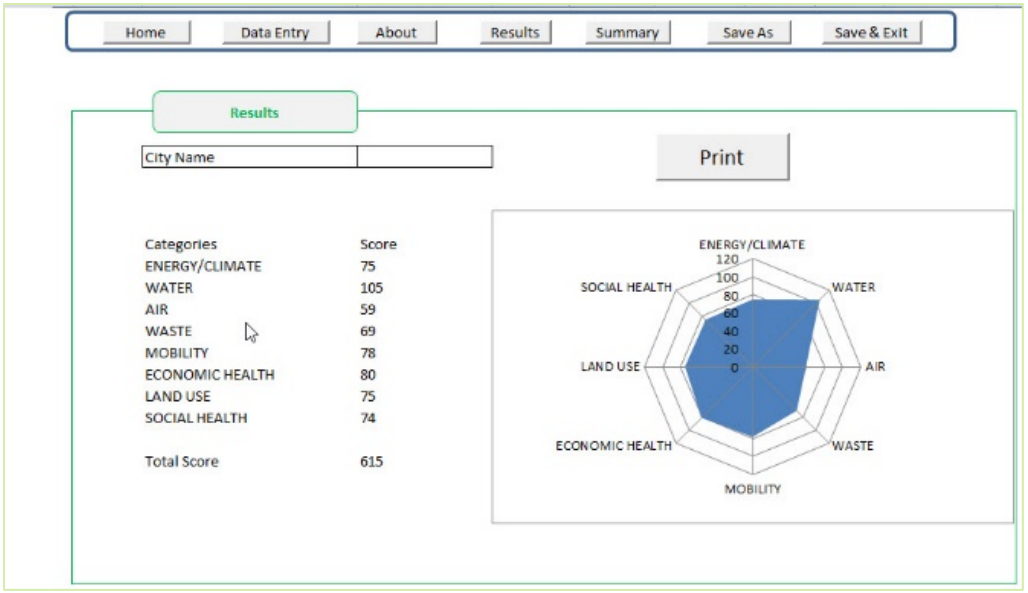
Examples of inputs needed (BEST)

- 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



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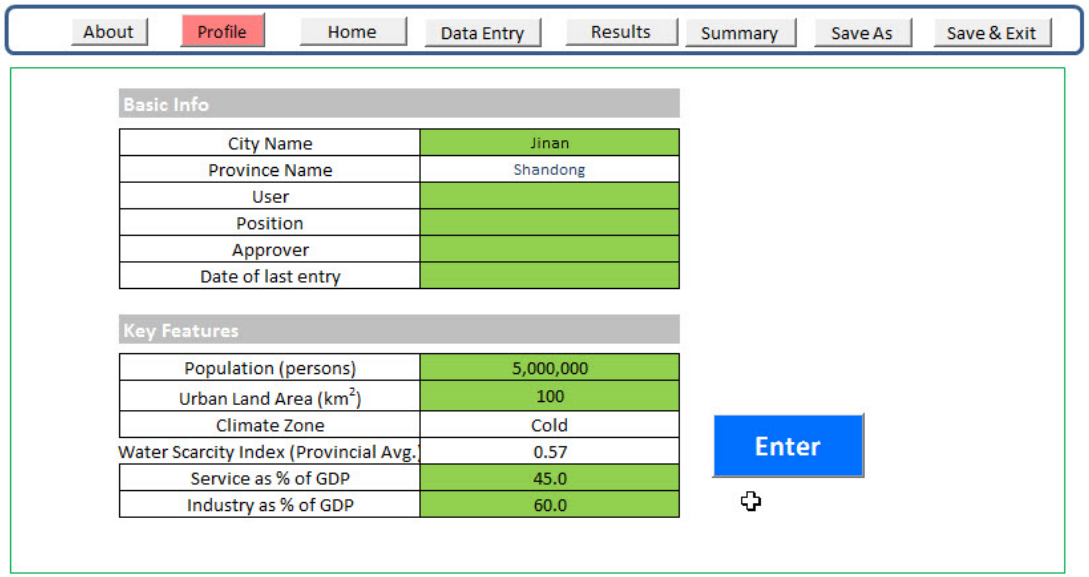
“精英城市”低碳生态城市评估工具 ELITE Cities: Tool at a Glance



城市概况 **Profile**

Indicator name	Units	Benchmark	Actual Value	Score
CO2 Intensity	tons/capita/year	2.19	3	73
Residential Building Energy Intensity	kWhe/m2/year	88	100	88
Public Building Electricity Intensity	kWh/m2/year	70	80	88
Share of Renewable Electricity	% of total electricity purchased	20%	10%	50
Municipal Water Consumption	liter/cap/day	52.1	60	87
Industrial Water Consumption	liter/annual 10,000 RMB	80.5	90	89
Wastewater Treatment Rate	% of total waste water	100%	100%	100

结果与综述 **Results and Summary**

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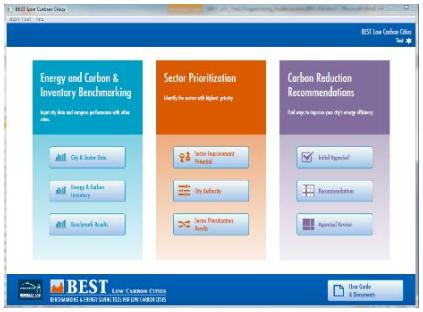
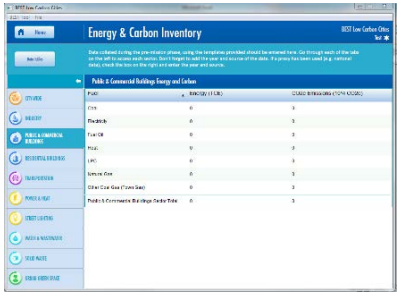
BEST Low Carbon Cities: Functionality Highlights

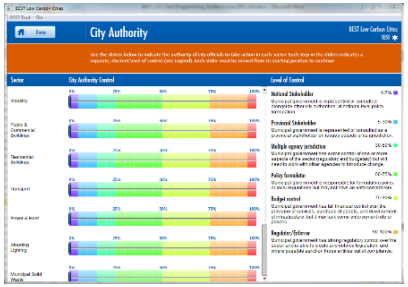
- Quickly assess local energy use and energy-related CO_2 emissions via 35 Key Performance Indicators across eight sectors
  - industry, buildings, transportation, power and heat, street lighting, municipal solid waste, water and wastewater, urban green space
- Identify the sectors with the greatest energy saving and CO_2 emissions reduction potential
  - along with corresponding sector-specific policy strategies for action
- Applications for:
  - sector prioritization
  - policy recommendation
  - decision-making attributes

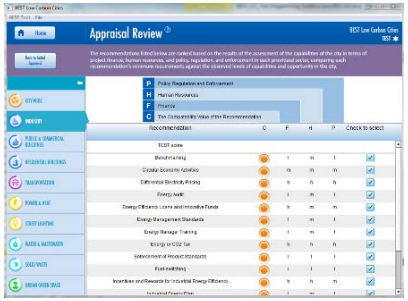
“最佳城市”低碳城市评估及政策建议工具

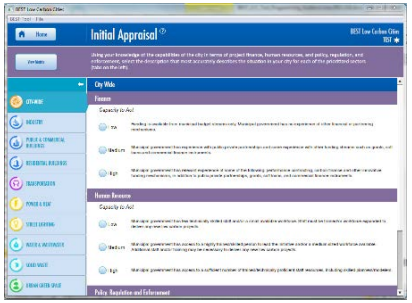
BEST Cities: Benchmarking and Energy Saving Tool for Low Carbon Cities

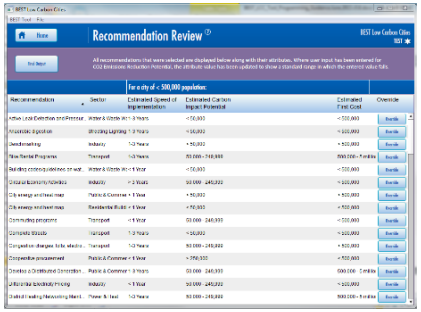


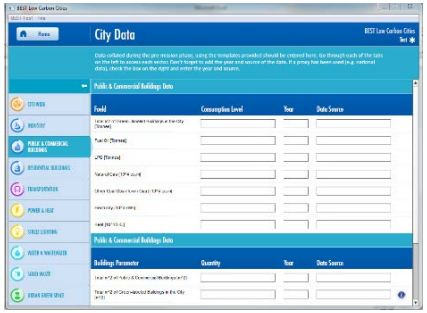


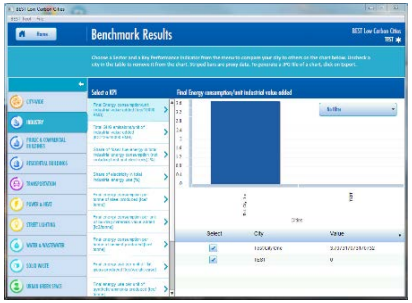


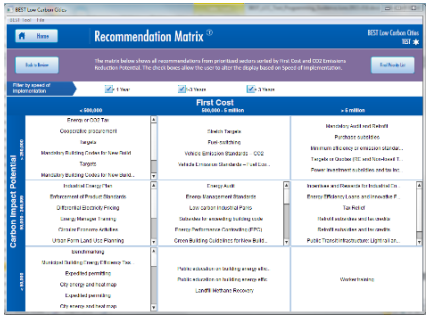












数据输入
Data Entry

对标
Benchmarking

优先排序
Prioritizing

政策建议
Policy Metrics

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GREAT 工具可以做些什么？What can the GREAT tool do?

GREAT工具可以帮助地方政府完成以下这些目标：The GREAT tool can help local governments to complete the following goal/milestones.

- 制定城市的温室气体排放清单 Develop the city's GHG inventory
- 建立未来能耗和排放的基线情景 Future energy and emission projection baseline generation
- 建立多种情景 Scenarios generation
- 评估不同政策的效果 Evaluate the impact of different policies
- 帮助制定目标和制定行动方案;目标分解 Help to set targets and develop action plans and target allocation

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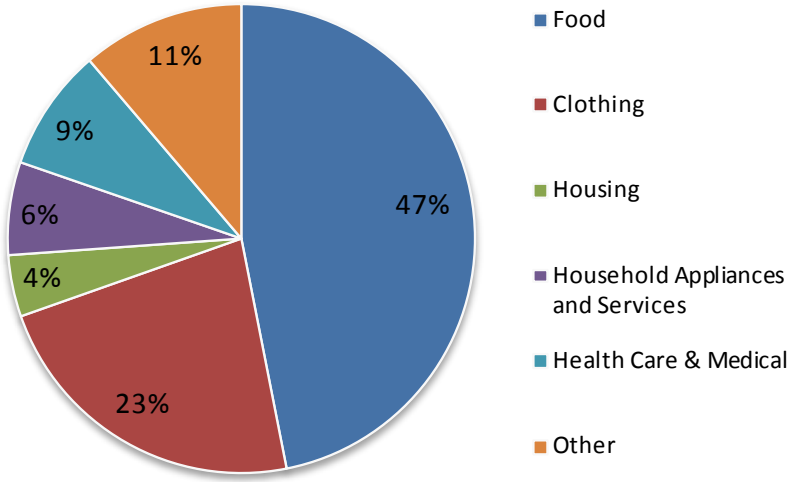
Urban RAM Functionality Highlights

- 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




收入与支出

收入(每年)	< ¥20000	¥20001 < ¥40000	¥40001 < ¥60000	¥60001 < ¥100000	>¥100000
占总住户数量的百分比(%)	15.51	42.02	23.81	14.17	4.49
支出 (元)	5378.00	7676.25	10840.25	15813.38	25172.00
食品 (%)	48.55	41.20	36.59	31.57	25.70
衣服 (%)	8.39	10.65	11.30	10.33	8.58
住房 (%)	4.17	5.62	6.42	6.22	6.58
家用电器与服务 (%)	8.15	7.58	7.29	6.55	5.12
健康保健与医疗服务 (%)	7.04	9.90	11.77	17.38	23.77
其他 (%)	23.70	25.05	26.84	27.98	30.25

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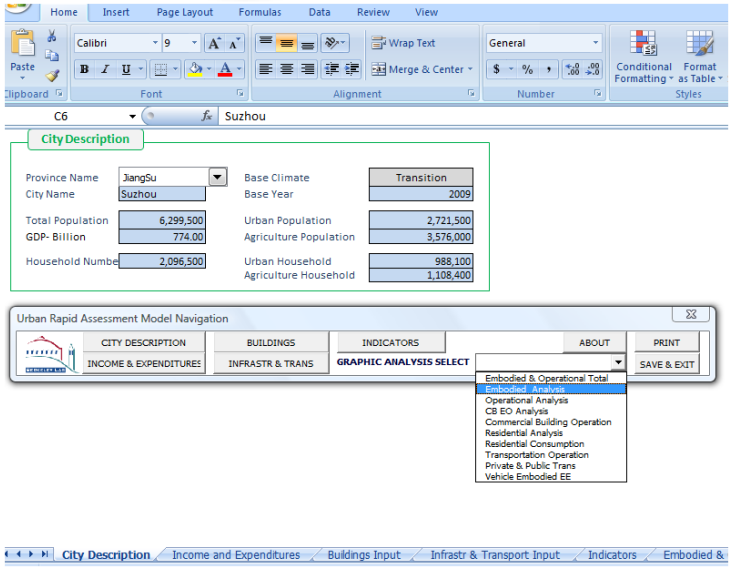

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Challenges and future plans