
*Waste management in the context of achieving a resource-efficient economy -
Case of China's circular economic approach
to resource efficiency and waste management*

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Chinese Academy of Sciences

2010.3.18



Regulations and Policies on WM

Regulations and Policies	Issue Date	Issuing Division
Management Measure on Prevention of Environmental Pollution Caused by Electronic Waste	2007/09/27	SEPA
Management Measure on Urban Waste	2007/04/28	MOC
Management Measure on Prevention of Environmental Pollution Caused by Electronic and Information Industry	2006/02/28	MII, NDRC, MOCCom, China Customs, SAIC, GAQSIQ, SEPA
Stipulate on Urban Construction Waste Management	2005/03/01	MOC
Management Measure on Franchise of the Municipal Public Utility Industry	2004/03/19	MOC
Policy on Technology of Prevention of Pollution Caused by Waste Battery	2003/10/09	SEPA, NDRC, MOC, MOST, MOCCom
Opinion on Accelerating Marketization in the Municipal Public Utility Industry	2002/12/27	MOC
Opinion on Promoting Industrialization of Urban Sewage and Garbage Treatment	2002/09/10	SDPC, MOC, SEPA
Notice on Charging Urban Waste Treatment Fee and Promoting Industrialization of the Waste Treatment Industry	2002/06/07	SDPC, MOF, MOC, SEPA

Figure 1: MSW collected, safe disposal, and safe disposal rate from 1986 to 2006 in China

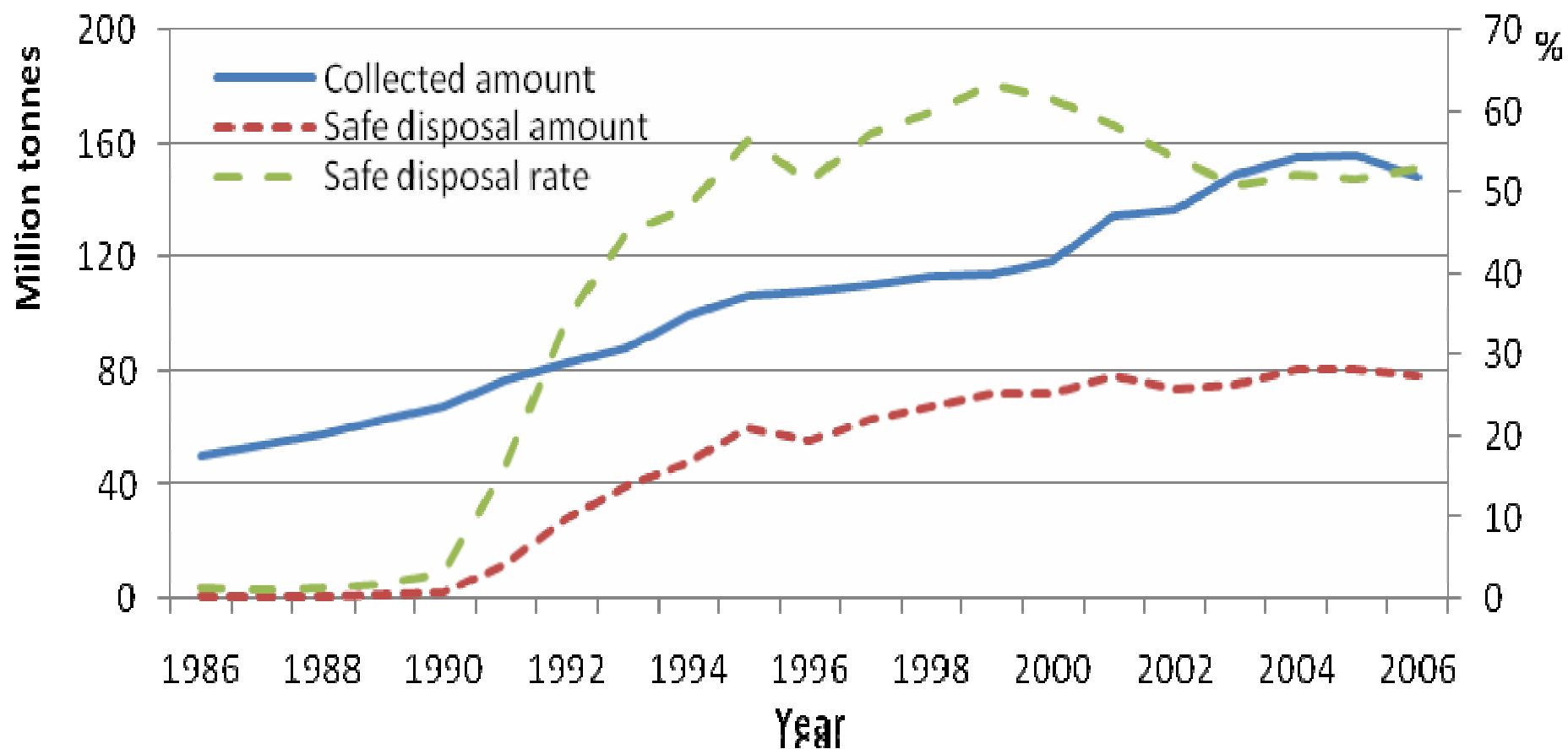


Figure 2: The trend of MSW collected, urban population, and GDP from 1979 to 2006

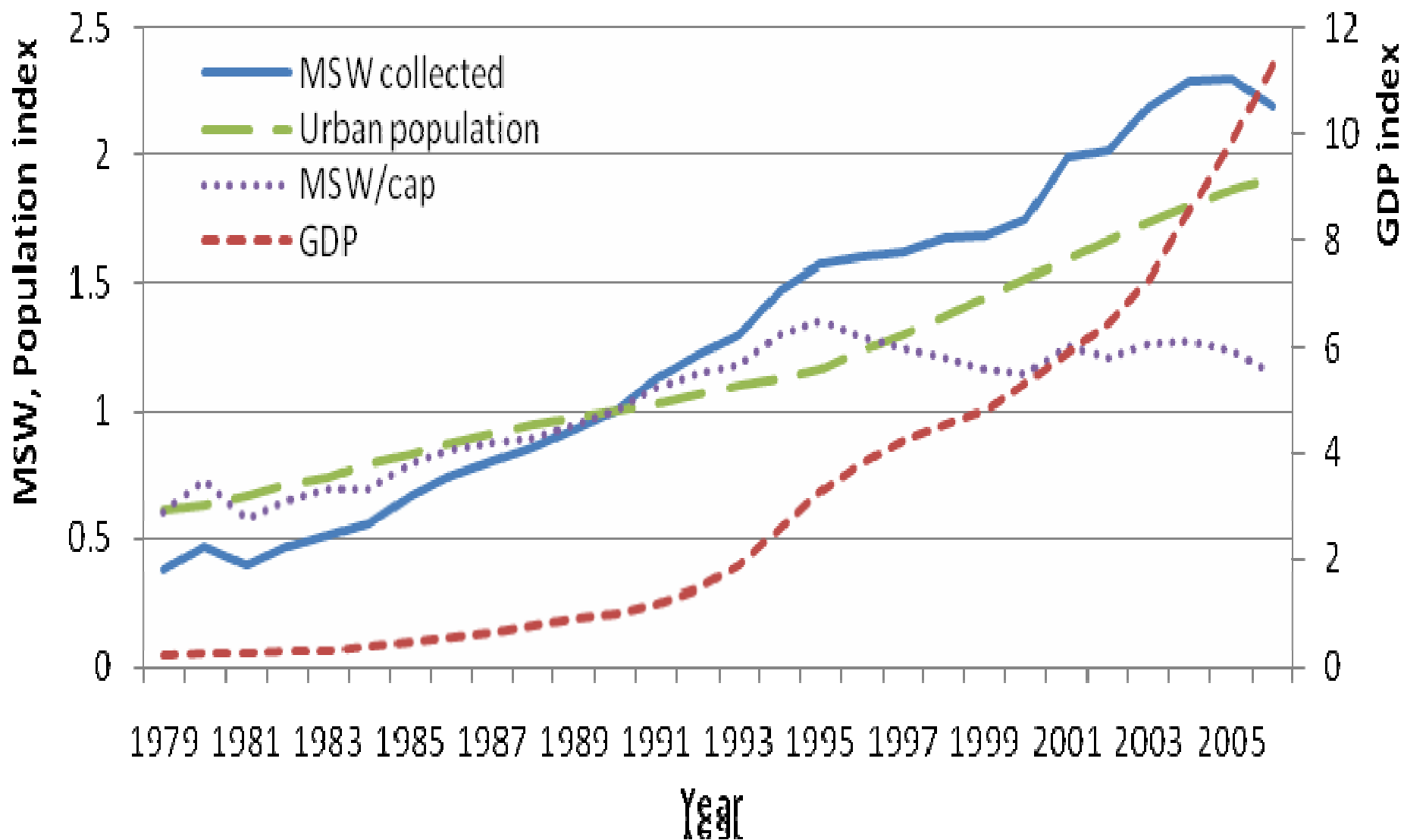
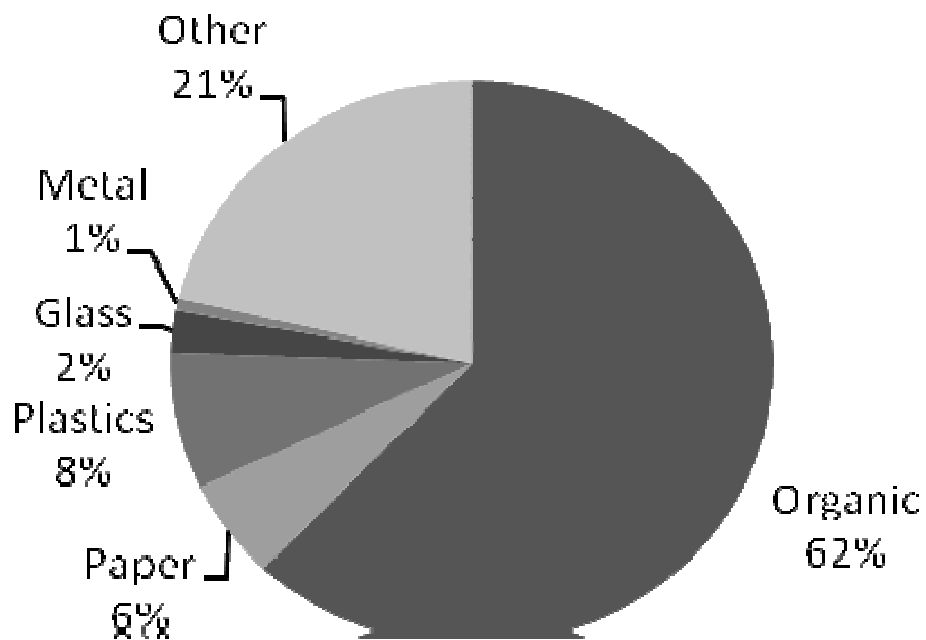
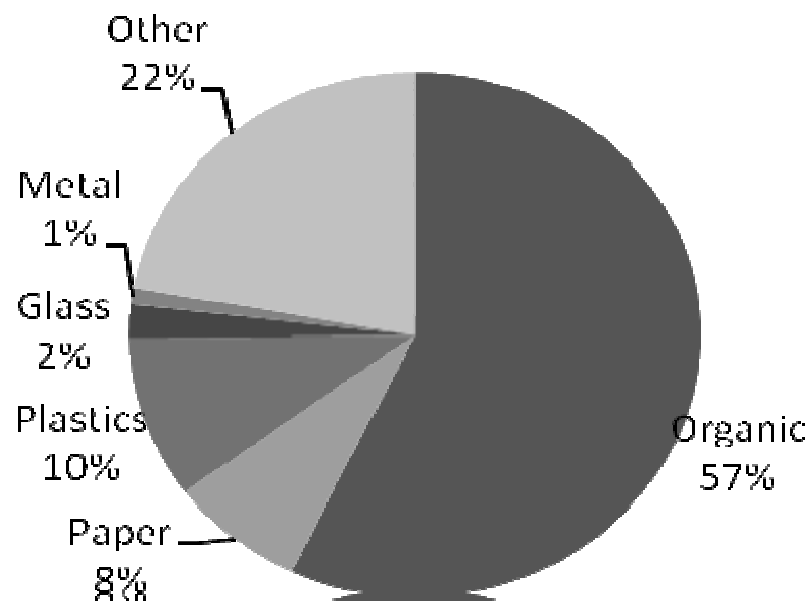


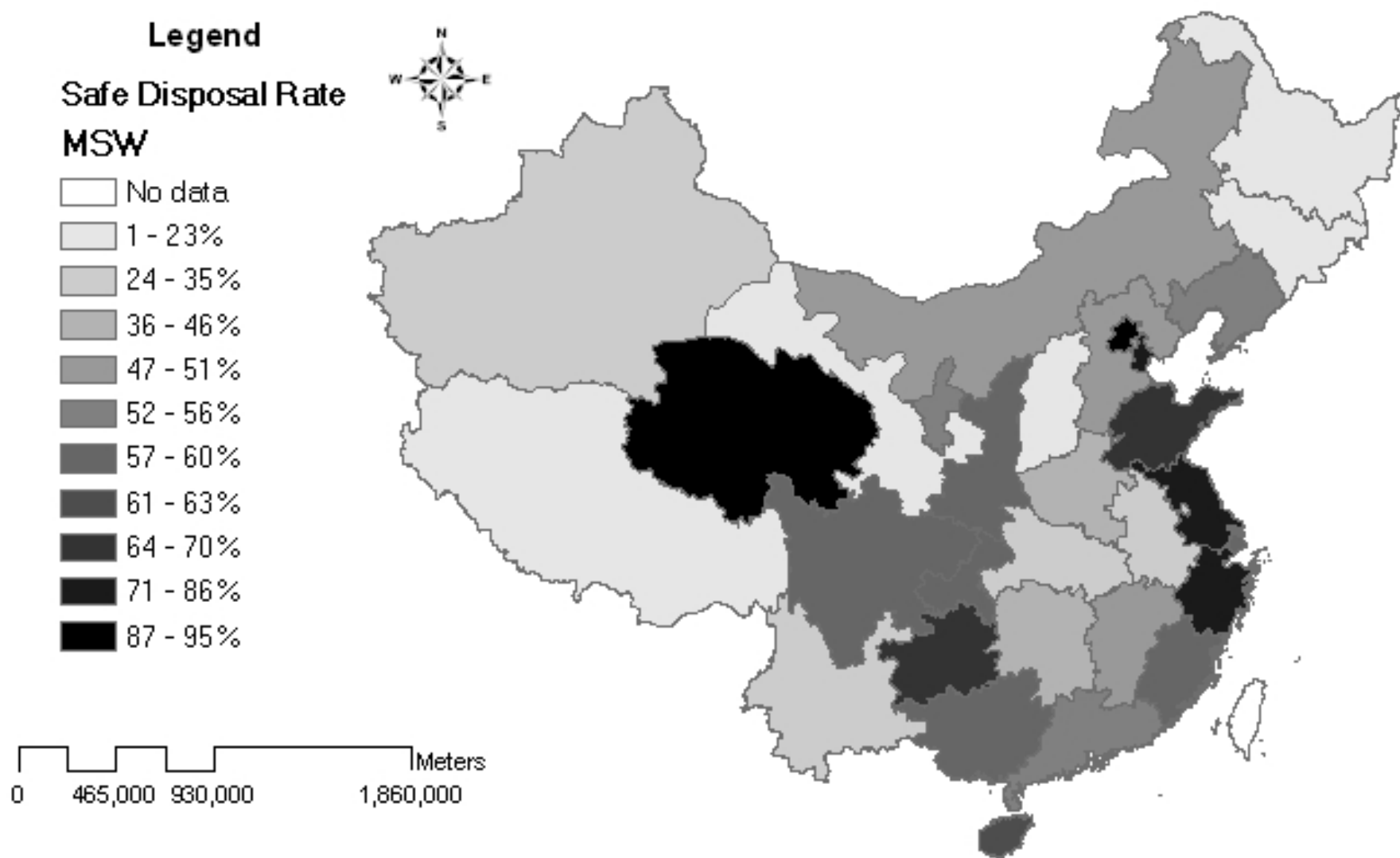
Figure 3: Waste composition in China

MSW Composition in 1996¹



MSW Composition in 2000²







China ' s new target on CO₂ reduction

The State Council announced on Nov.26 that China is going to reduce the intensity of carbon dioxide emissions per unit of GDP in 2020 by 40 to 45 percent compared with the level of 2005.

“A voluntary action” taken by the Chinese government “based on our own national conditions” and a major contribution to the global effort in tackling climate change.

The index of carbon dioxide emissions cuts, announced for the first time by China, would be “a binding goal” to be incorporated into China's medium and long-term national social and economic development plans.

The panda standard, the first voluntary standard to be created specifically for the Chinese market, was founded by CBEEEX (The China Beijing Environment Exchange) and BlueNext; and co-founded by CFEX and Winrock.



Potential action plans

The government would devote major efforts to developing renewable and nuclear energies to ensure the consumption of non-fossil-fuel power accounted for 15 percent of the country's total primary energy consumption by 2020.

More trees would be planted and the country's forest area would increase by 40 million hectares and forest volume by 1.3 billion cubic meters from the levels of 2005.

More funding would be invested into the research, development and industrialization of technologies for energy saving, and into energy efficiency, clean coal development, renewable energies, advanced nuclear energies, and carbon capture and storage.

Laws, regulations and standards would be formulated and fiscal, taxation, pricing and financial measures would be introduced to manage and monitor the implementation of those laws and regulations.

China would expand cooperation with foreign countries in raising its capacity to cope with climate change and import low-carbon and environment-friendly technologies.



Regional demands on CO₂ Reduction

9

A decision support system on promoting low carbon economy is needed, which integrates different models and databases;

Carrying capacity based policy scenario analysis;

Regional CO₂ emission reduction strategy;

Key recycling technologies;

Key energy saving technologies and equipment;

Training service.



Key recycling technologies

Sludge treatment;

Waste paper recycling;

Waste rubber recycling;

Waste plastic recycling;

Waste wood reprocessing;

Discarded electronic appliances treatment;

Waste solvent recycling;

Water purification;

Waste battery treatment;

Discarded automobile treatment.



Developing Eco-city under such a Background

Low carbon-oriented EIC;

Close collaboration with the surroundings;

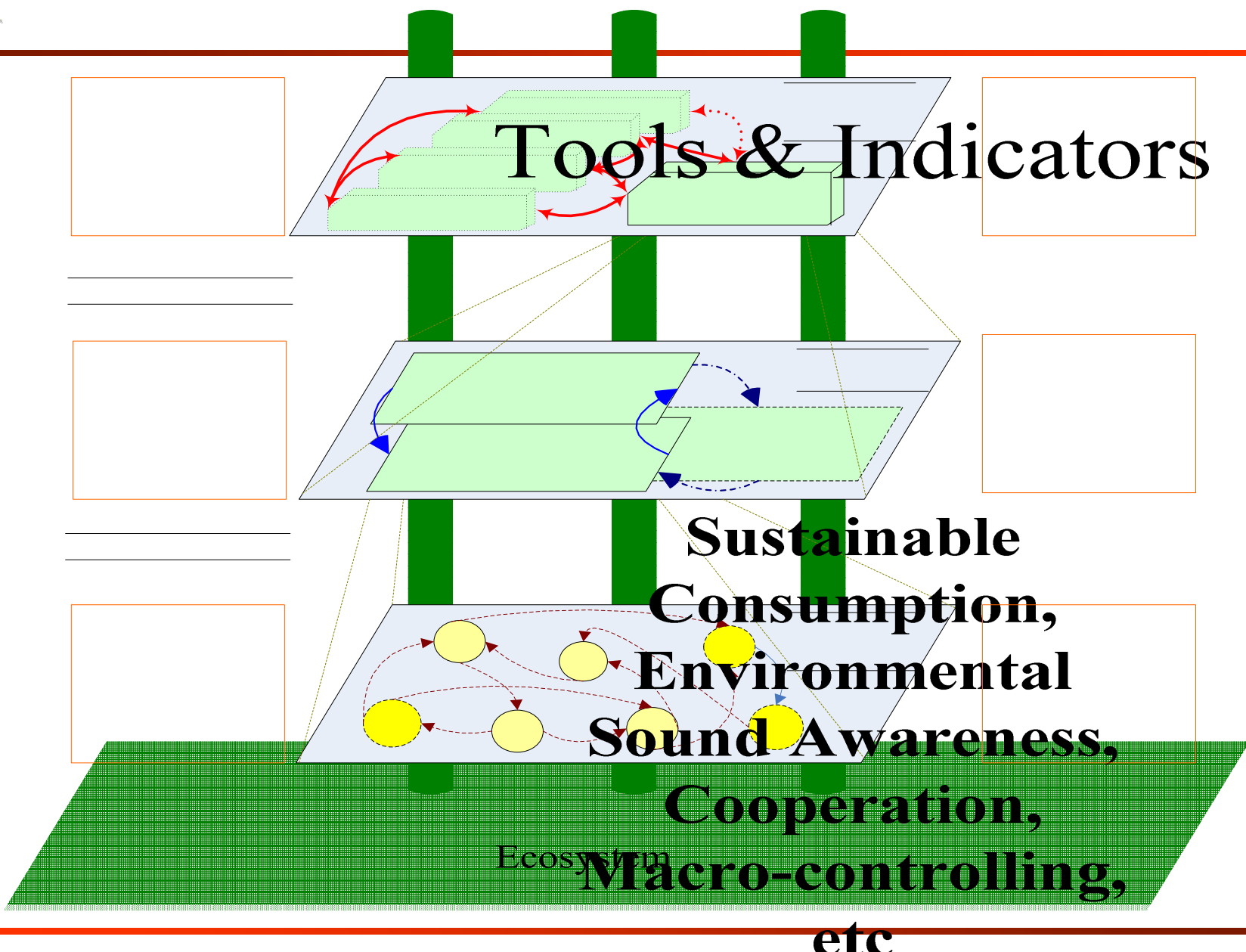
From industrial symbiosis to urban symbiosis;

Optimizing energy structure;

Energy saving should be prioritized;

Promoting low carbon products—carbon footprint of products;

Promoting low carbon production.



A Low Carbon Eco-city Model

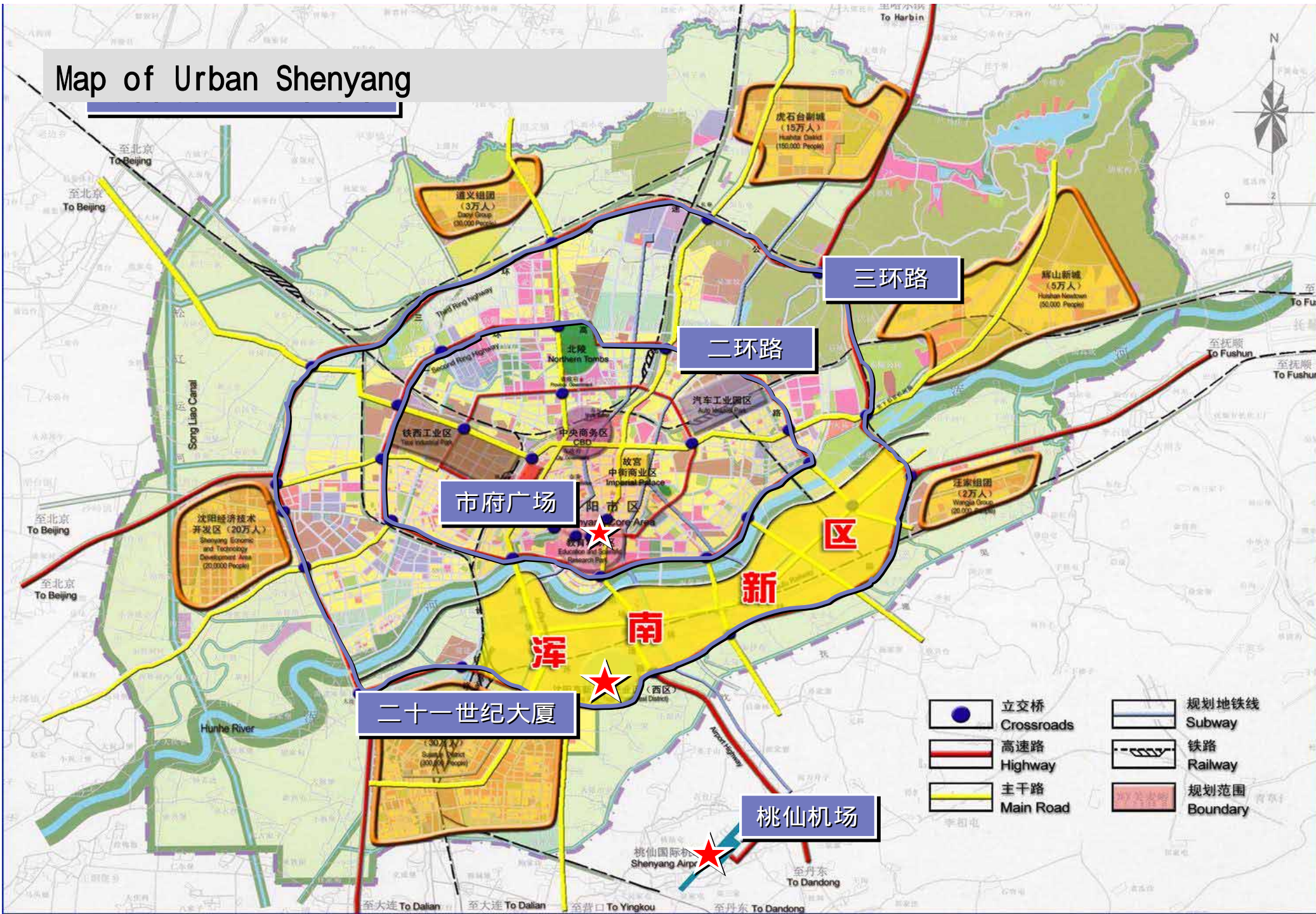
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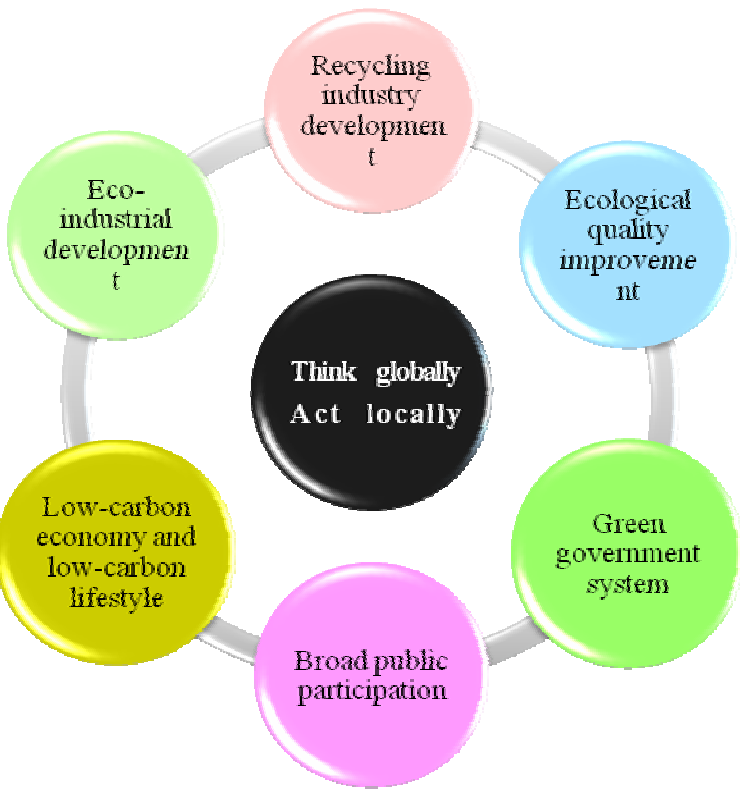


Map 1 Location of Shenyang City in China



Map of Urban Shenyang



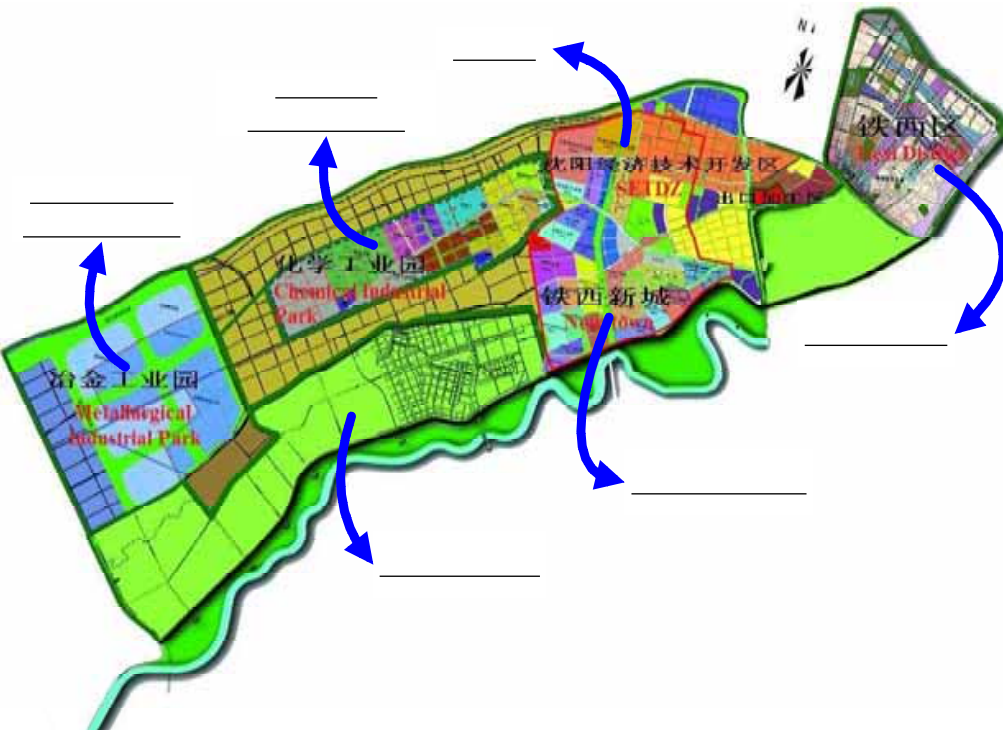


“5+1”

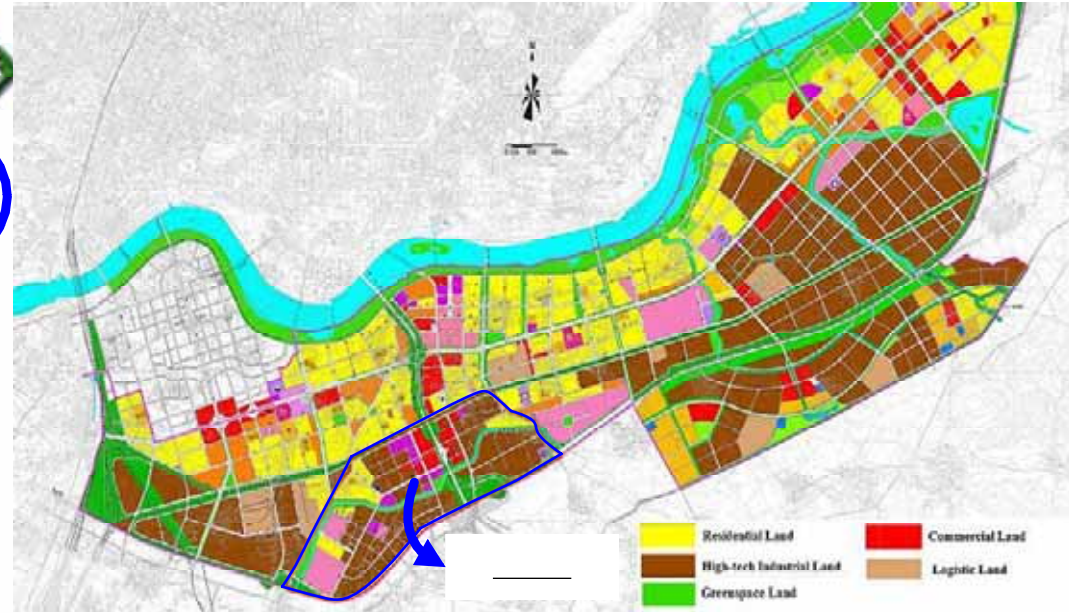
Action

1. The capital of Liaoning Province;
2. The largest heavy industrial city in China;
3. Total population : 7.6 million;
4. GDP in 2008: 56.7 billion USD;
5. EU cleaner production project: 100 million RMB as revolving fund for CP promotion in Liaoning;
6. Nominated by the central government as the only national environmental construction model city in 2009;
7. Shenyang-Kawasaki circular economy collaboration was selected as the Sino-Japan environmental protection agreement in 2009;





Map of SETDZ



Map of SHTZ

SETDZ

Chemical



To pursue synergies in resource utilization, improve waste management, and build up market mechanism towards a recycling-based society

To improve the public participation in environmental conservation, and increase public-private partnership

visions

To establish a feasible circular economy model for other cities in.



联合国环境规划署生态城中国项目
UNEP ECO-TOWN PROJECT

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- 联合国环境规划署(UNEP)
- 联合国环境规划署环境技术中心(ETC)
- 日本国立环境研究所(Nies)
- 沈阳市政府
- 沈阳市环保局

项目背景

联合国环境规划署环境技术中心实施的“生态城”项目是“城市规划与环境管理相结合的综合示范项目”。“生态城”建设力争取在一个区域的循环环境系统,实现清洁生产、产业间的资源循环利用,从而达到“零排放”的目标。

“生态城”项目是在日本川崎市开发实施,川崎市作为传统重工业城市,在“生态城”项目的支持下,降低了能耗与获得的热量,并逐步改变,逐步实现新的飞跃。由于在日本已经有的经验和推广,联合国环境规划署在亚洲的发展中国家选择一独特的城市区域作为“生态城”项目的建设,2009年8月12日,联合国环境规划署与沈阳市政府签署合作开发协议,将沈阳市作为“生态城”项目在中国的试点,项目定于8月启动,历时3年完成。沈阳市成为世界上唯一的“生态城”项目试点。7月10日,中国科学院应用生态研究所与联合国环境规划署的协议书,在编号为1597号的文件中,正式达成协议为“沈阳生态城”项目的技术负责方,沈阳“生态城”项目进入实施阶段。

资料下载

- 培训材料4-生态产业团(2009-11-20)
- 培训材料3-企业社会责任(2009-11-20)
- 培训材料2-绿色生产(2009-11-20)
- 培训材料1-绿色管理(2009-11-18)

新闻

- 2009-12-07 中国打响“低碳城市”城市发展理念普及战
- 2009-12-07 哥本哈根会议今天开幕,四种可能前景预测
- 2009-12-07 专家称中国减排代价巨大,户千家超将减排1122元
- 2009-11-23 深惠强等将完成生态城地区创建
- 2009-11-04 沈阳成为联合国生态城项目中国唯一示范城市
- 2009-11-03 2009年“东北生态论坛”在沈阳举办

参与者

- UNEP
- 中国科学院应用生态研究所
- 中国沈阳 SHENYANG ECO
- 沈阳市环境保护局

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联合国环境规划署生态城中国项目
UNEP ECO-TOWN PROJECT

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LINKS

- Chinese Academy of Sciences(CAS)
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- United Nations Environment Programme(UNEP)
- International Environmental Technology Centre (IETC)
- National Institute for Environmental Studies of Japan(NIES)
- Shenyang Municipal Government
- Shenyang Environmental Protection Bureau

BACKGROUND

The eco-town project sponsored by United Nations Environment Program(UNEP), International Environmental Technology Center(IETC) is an project combined urban planning and environmental management. Construction of Eco-town project contains industrial industries, and is conducive to the promotion of the rational distribution of resource use, waste management, environmental protection and coordination between the industrial and economic development and realize the production process, inter-industry recycling of resources. Since 12, 2009, Shenyang Economic and Technological Development Zone, Shenyang Hi-Tech Park have been formalized as zones for "eco-town" projects by United Nations Environment Program(UNEP), the project was officially launched in June and last for three years. Shenyang became unique the "ecological demonstration town" in China. July 10, Institute of Applied Ecology, Chinese Academy of Sciences, received the agreement from the United Nations Environment Program, Institute of Applied Ecology has been authorized as Technical Advisor for "ecological demonstration of Shenyang City". The "eco-city" project come into the implementation phase.

PROFILE

- Sci-Design (in Chinese)(2009-12-07)
- Sci-Industrial Parks (in Chinese)(2009-12-07)
- Corporate Social Responsibility (in Chinese) (2009-12-07)
- Cleaner production (in Chinese) (2009-12-07)
- Twelve(2009-11-20)
- Renewable Shengas(2009-11-20)
- Policies of Green GDP(OH)(2009-11-20)
- H2O Trilateral Project in Guanchang, Tielin City (2009-11-20)
- Sci-system Management (2009-11-20)
- Industry management in China (2009-11-20)

NEWS

- 2009-12-07 UN climate change conference coasts as world eyes global warming deal
- 2009-12-07 EU calls 20% emissions reduction target "leaver" on others
- 2009-12-07 UNEP urges world to seal the deal in Copenhagen
- 2009-12-07 Countries gear up for showdown in Copenhagen, talks
- 2009-12-07 Northeast Asian Eco-Forum
- 2009-12-07 Eco-economic zone to be set up in Shandong

PARTNER

- UNEP-United Nations Environment Programme
- National Institute for Environmental study
- shenyang government
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EMS和EMAS 介绍

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环境政策工具

中国科学院沈阳应用生态研究所

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A Brief Overview of Environmental Management Systems (EMS) and ISO 14001

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Textile Industry

供应链管理

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清洁发展机制(CDM)

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Task Training and Awareness Raising

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-可持续发展模式

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企业清洁生产审核
Cleaner Production Audit

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Urban Circular Economy Simulation System for Technologies and Policies

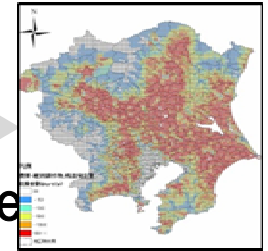
GIS Database for Environmental and Socio-economic Resources Distribution

socio-economic statistics

monitoring data

satellite information

- Compiling process among heterogeneous data system
- Multi scale framework design for cities and regions
- Identification of spatial and time-series resolution level



Policy Options Social Technologies

1. Solid waste collection and separation system
2. Scale of circulation area region
3. Transformation policies of land use and industrial structure

Social technology functions

Spatial Analysis by Model Application

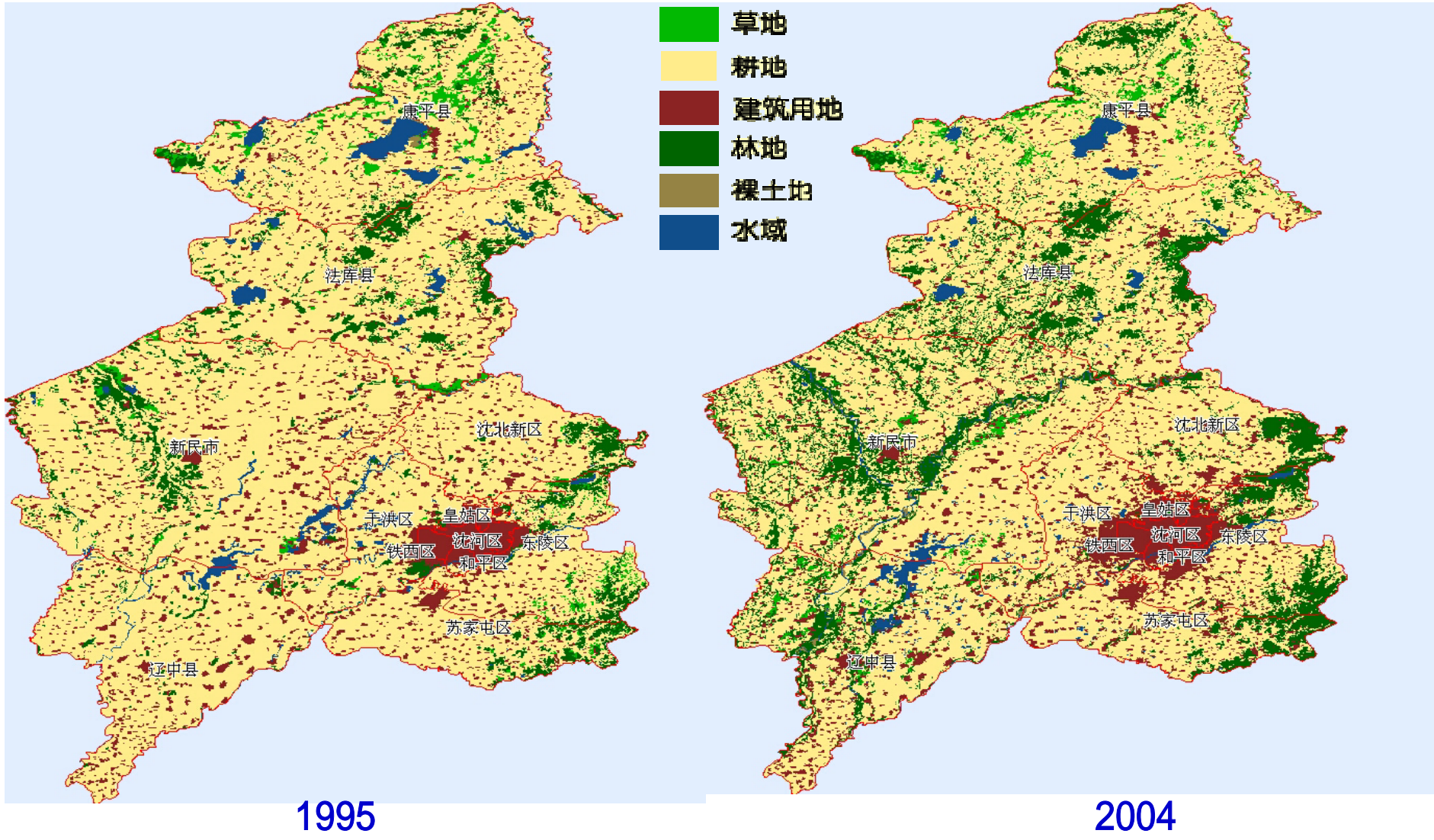
Urban and Policy Scenario Planning

Env. Technology Option

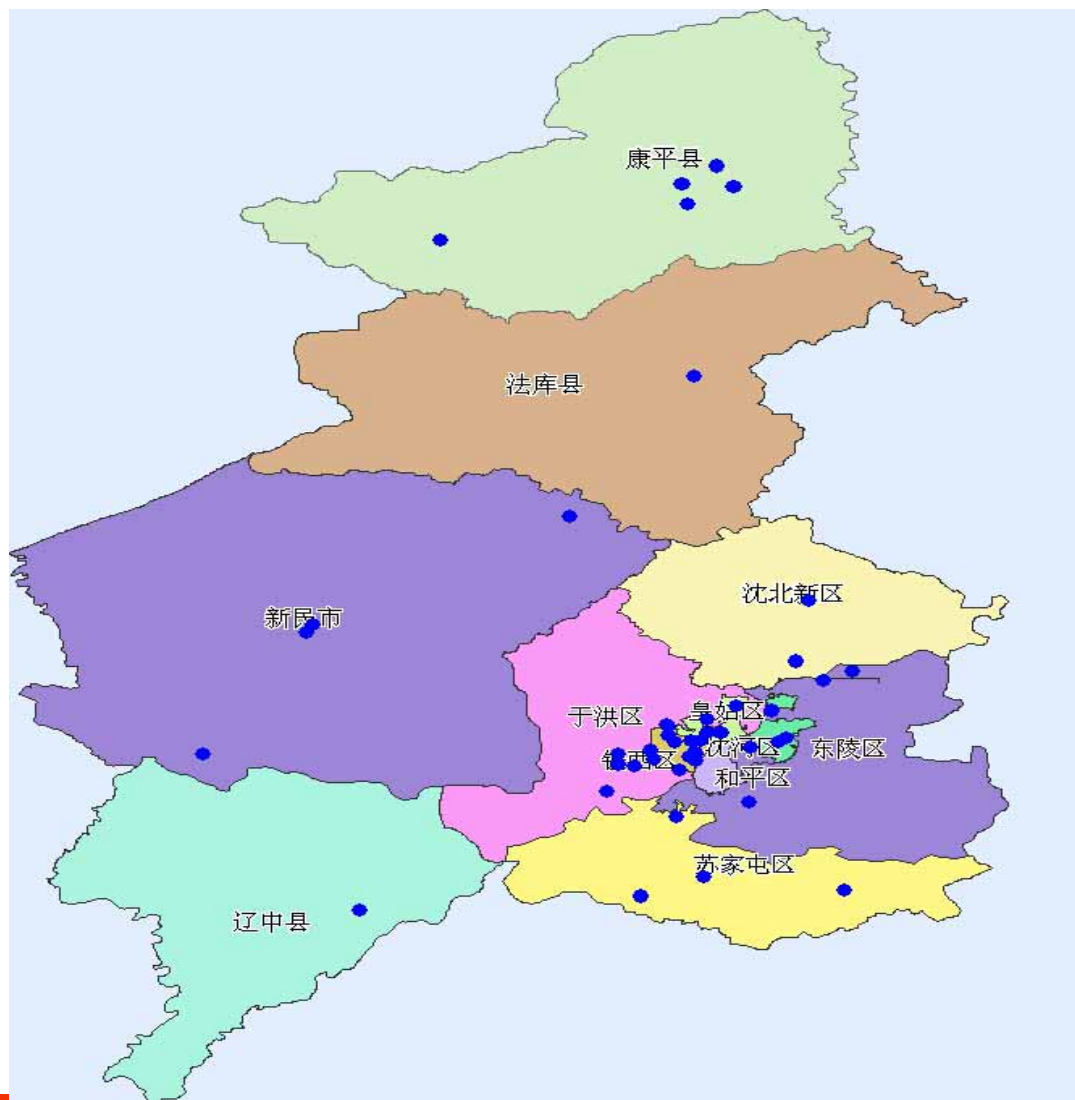
1. Material conversion tech
2. Energy conversion tech.
3. Wastewater treatment tech.

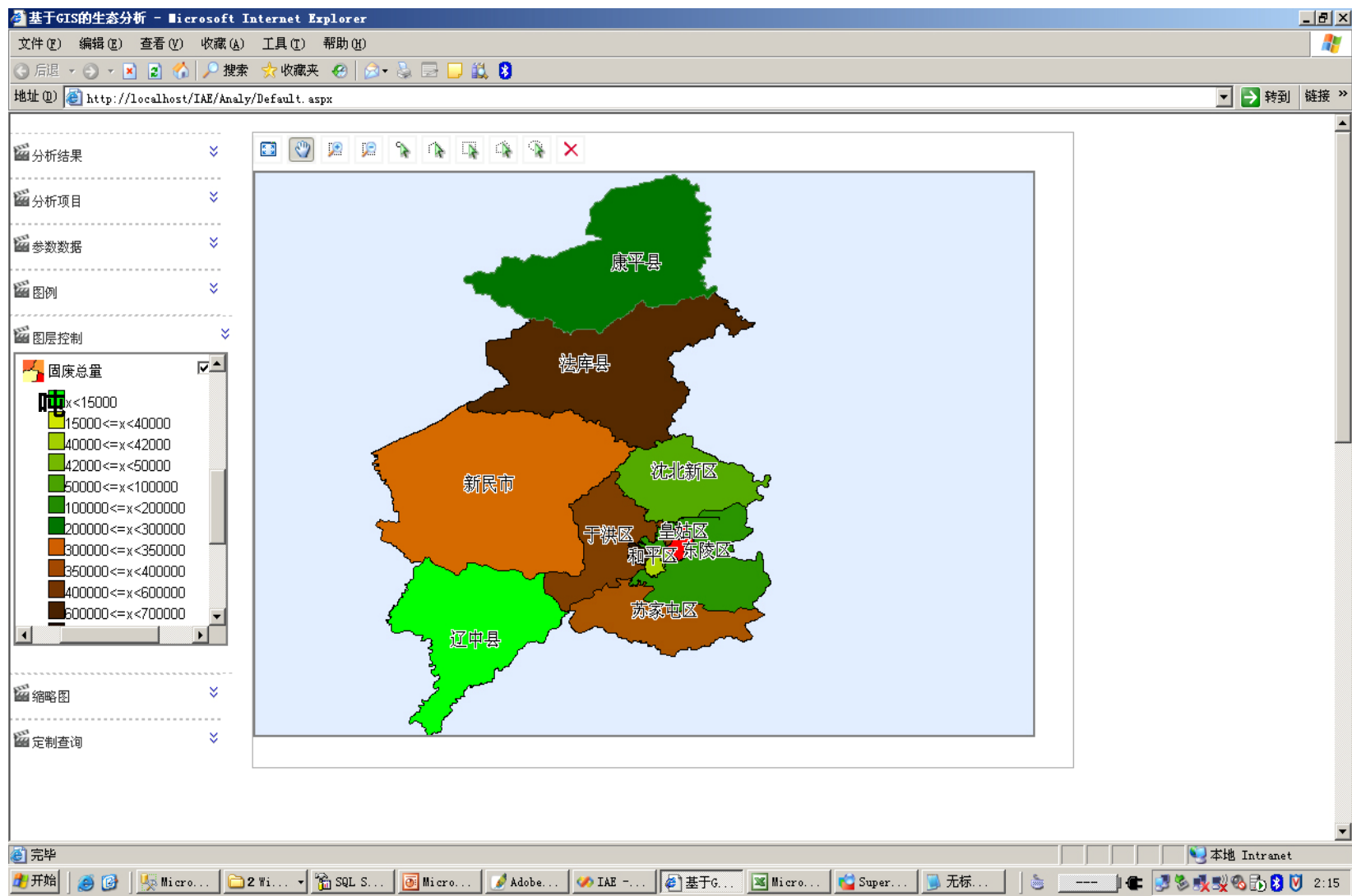
Conversion technology production functions

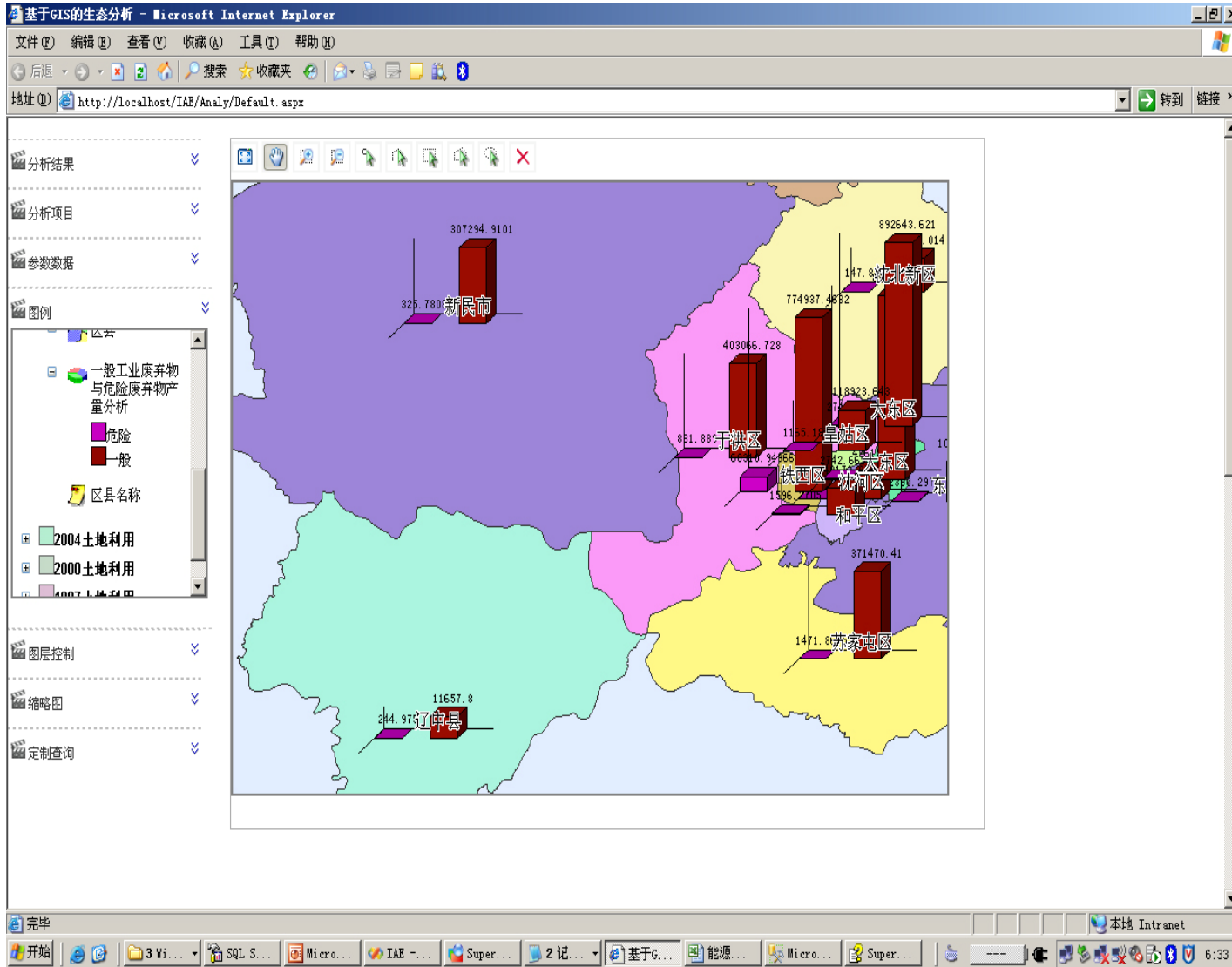
Evaluation(CO2, Resource, Cost-benefit , socio-env. Indicators)

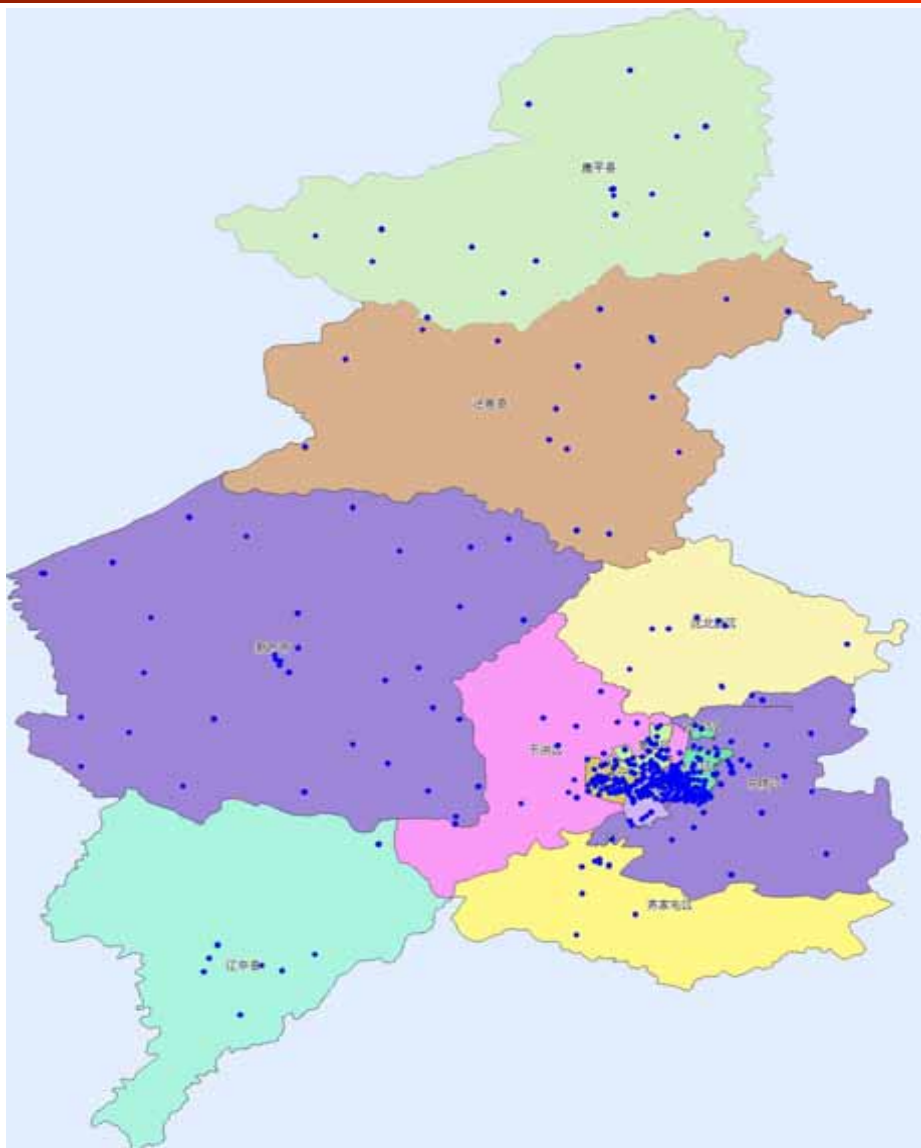


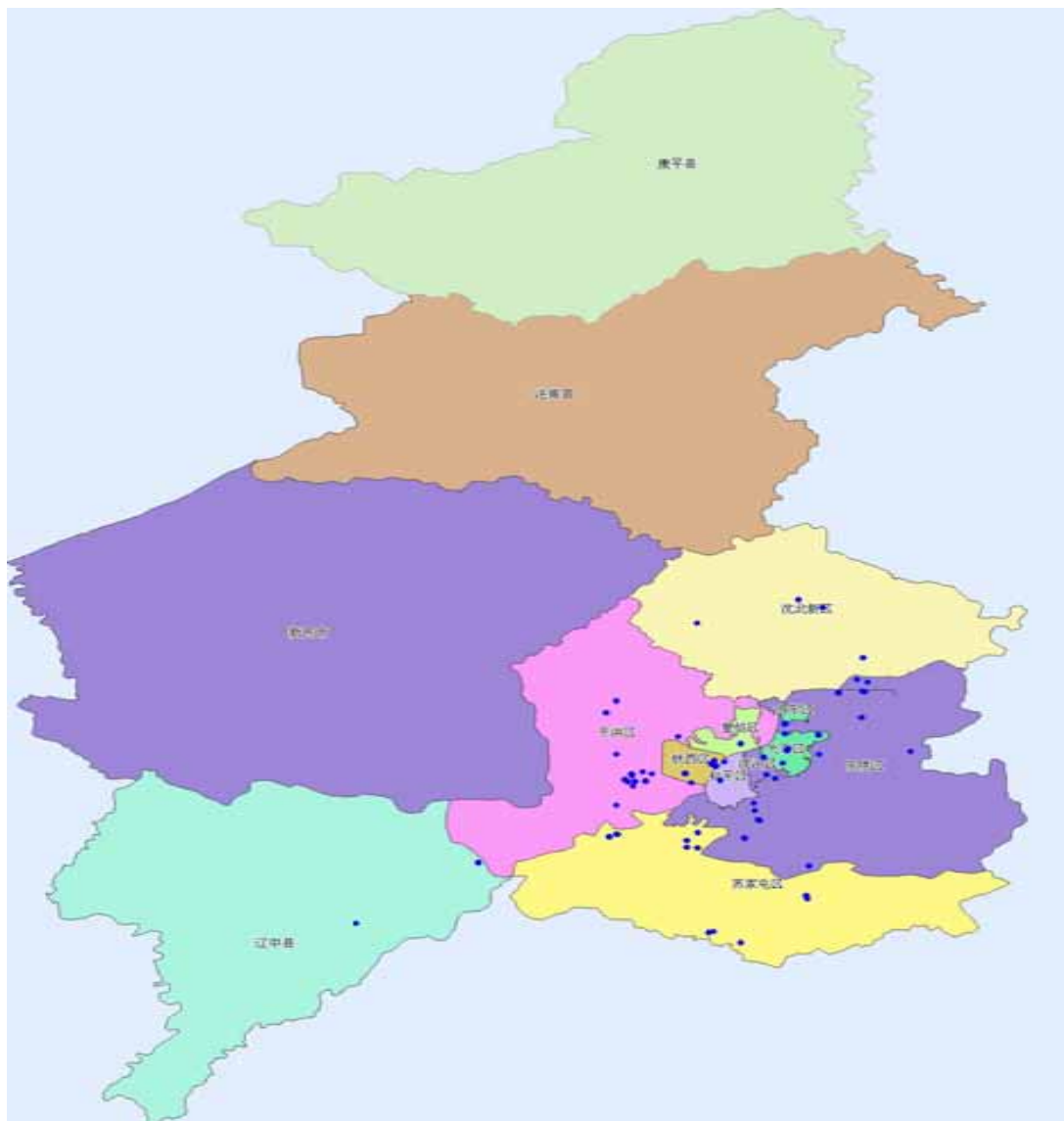
Spacial location of large solid waste generators with a total amount of over 10,000 tons

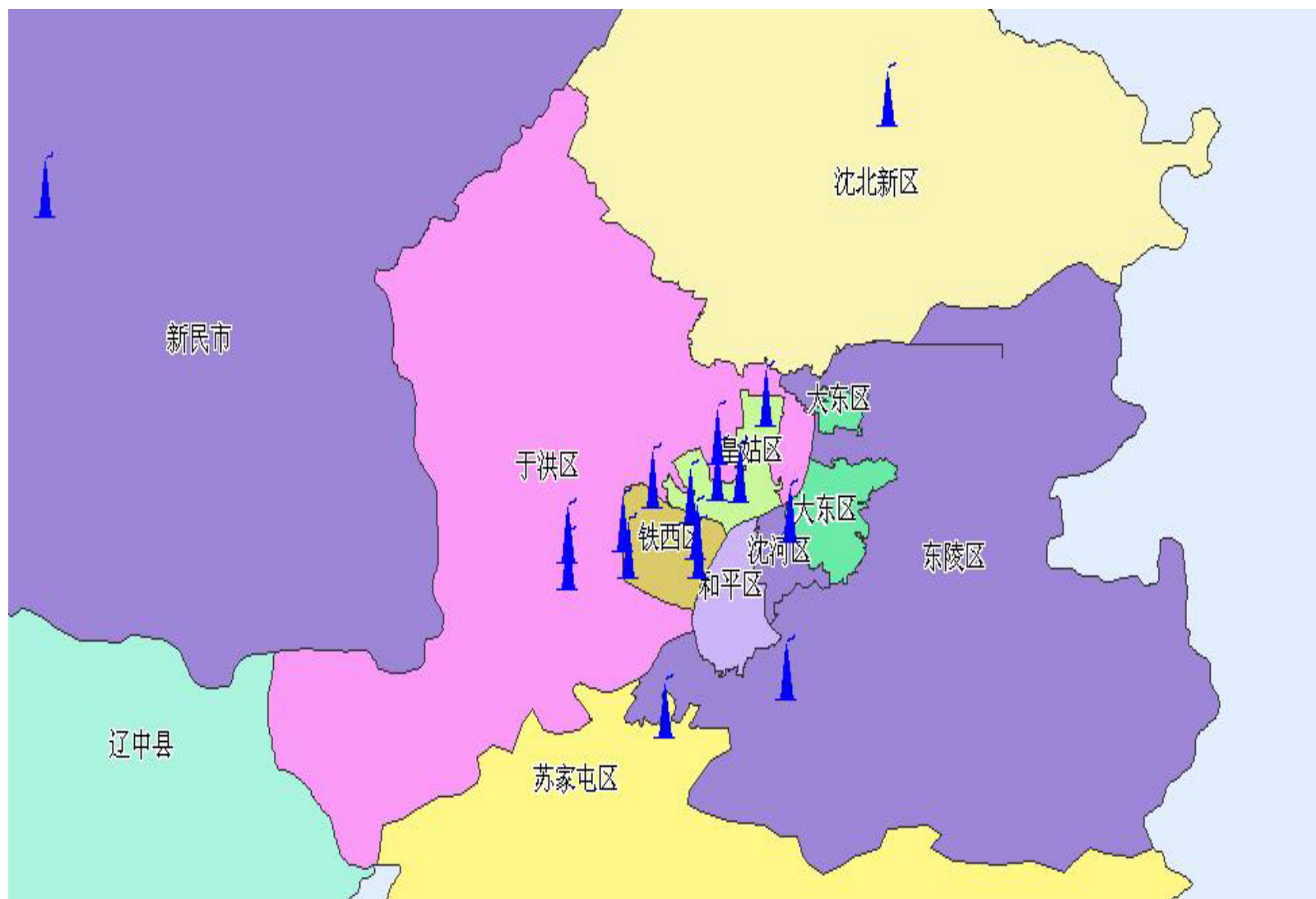


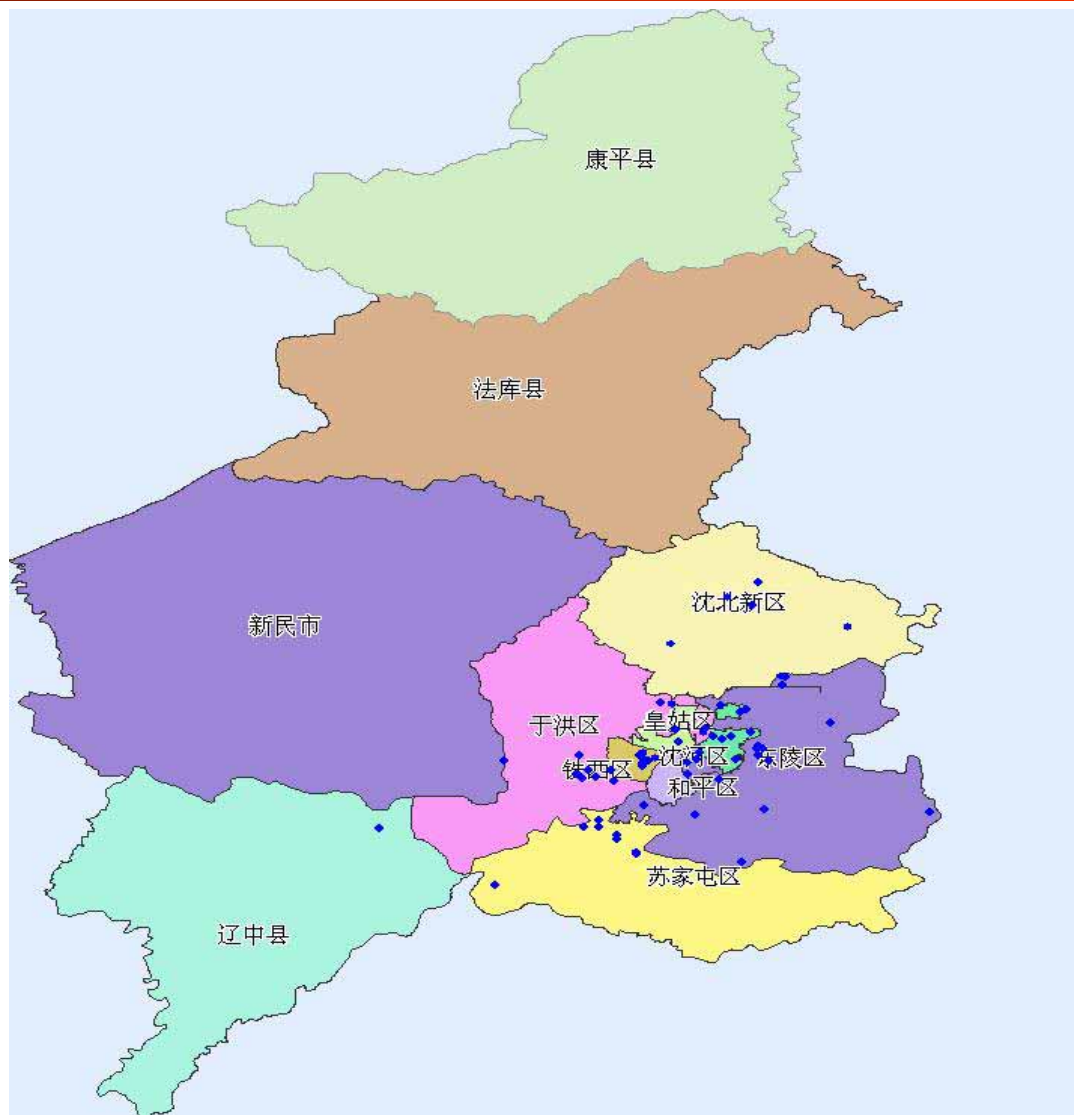




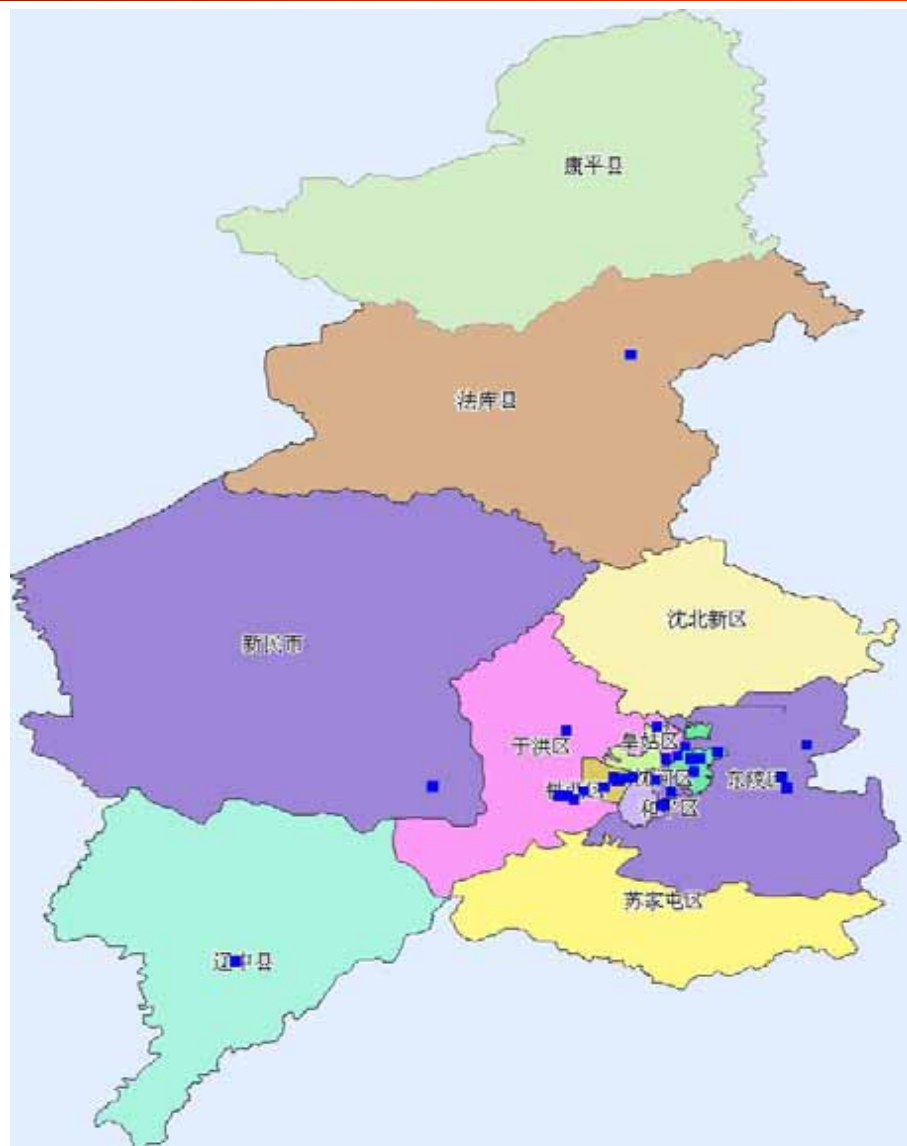












2006 IPCC Software for National Greenhouse Gas Inventories - gengyong - [Worksheets]

Application Database Inventory Year Worksheets Reports Quality Control Export/Import Administrate Window Help

IPCC 2006 Categories

- 1 - Energy
 - 1.A - Fuel Combustion Activities
 - 1.A.1 - Energy Industries
 - 1.A.1.a - Main Activity Electricity and Heat Production
 - 1.A.1.a.i - Electricity Generation
 - 1.A.1.a.ii - Combined Heat and Power Generation
 - 1.A.1.a.iii - Heat Plants
 - 1.A.1.b - Petroleum Refining
 - 1.A.1.c - Manufacture of Solid Fuels and Other Energy Industries
 - 1.A.1.c.i - Manufacture of Solid Fuels
 - 1.A.1.c.ii - Other Energy Industries
 - 1.A.2 - Manufacturing Industries and Construction
 - 1.A.2.a - Iron and Steel
 - 1.A.2.b - Non-Ferrous Metals
 - 1.A.2.c - Chemicals
 - 1.A.2.d - Pulp, Paper and Print
 - 1.A.2.e - Food Processing, Beverages and Textiles
 - 1.A.2.f - Non-Metallic Minerals
 - 1.A.2.g - Transport Equipment
 - 1.A.2.h - Machinery
 - 1.A.2.i - Mining (excluding fuels) and Quarrying
 - 1.A.2.j - Wood and wood products
 - 1.A.2.k - Construction
 - 1.A.2.l - Textile and Leather
 - 1.A.2.m - Non-specified Industry
 - 1.A.3 - Transport
 - 1.A.3.a - Civil Aviation
 - 1.A.3.b - International Aviation

Fuel Combustion Activities

Worksheet: Energy
 Category: Fuel Combustion Activities
 Subcategory: 1.A.1.a.i - Electricity Generation
 Sheet: CO2, CH4 and N2O from fuel combustion by source categories - Tier 1

Data

Fuel Type: Liquid Fuels Uncertainties for Liquid Fuels Conversion Factor Type: MCV GCV

Fuel	Energy Consumption			CO2		CH4	N2O		Remark
	A Consumption (Mass, Volume or Energy Unit)	B Conversion Factor (TJ/unit)	C Consumption (TJ) (C=A*B)	D CO2 Emission Factor (kg CO2/TJ)	Z Amount Captured (Gg CO2)	F CH4 Emission Factor (kg CH4/TJ)	G CH4 Emissions (Gg CH4) G=C*F/10 ⁶	H N2O Emission Factor (kg N2O/TJ)	
Crude Oil	800 Gg	42.3	25380	73300		3	0.07614	0.6	0.015228
Jet Gasoil	1200 Gg	44.3	53160	70000		3	0.15948	0.6	0.031896
Jet Kerosene	300 Gg	44.1	13230	75000		15	0.19845	3	0.03969
Naphtha	2700 Gg	44.5	120150	73300		3	0.36045	0.6	0.07209
Orimulsol	1600 Gg	27.5	44000	77000		3	0.132	0.6	0.0264
Aviation	700 Gg	50	35000	70000		3	0.105	0.6	0.021

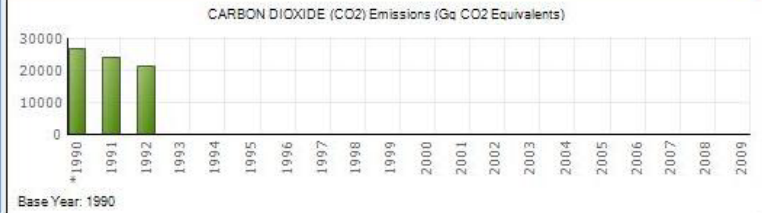
Notation Key: Confidential (C) Delete selected Save current row

Worksheet remarks

Worksheet remark for 1.A.1.a.i - Electricity Generation: rgfh hgfh

1.A.1.a.i - Time Series

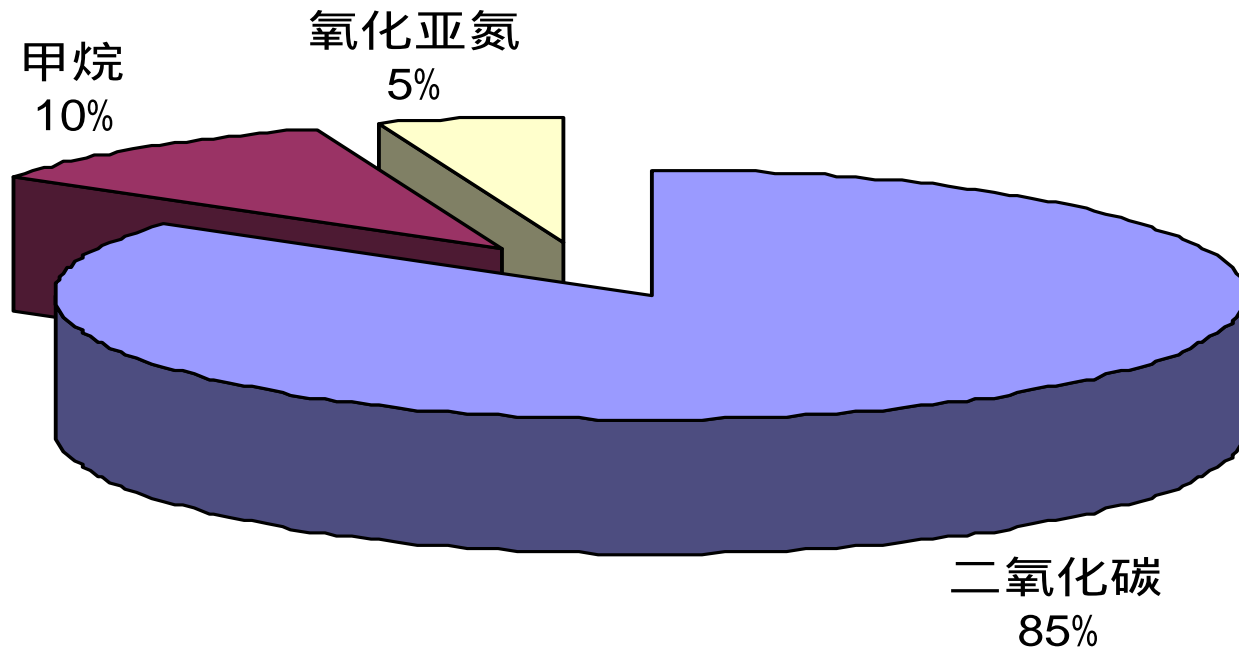
CARBON DIOXIDE (CO2) Emissions (Gg CO2 Equivalents)



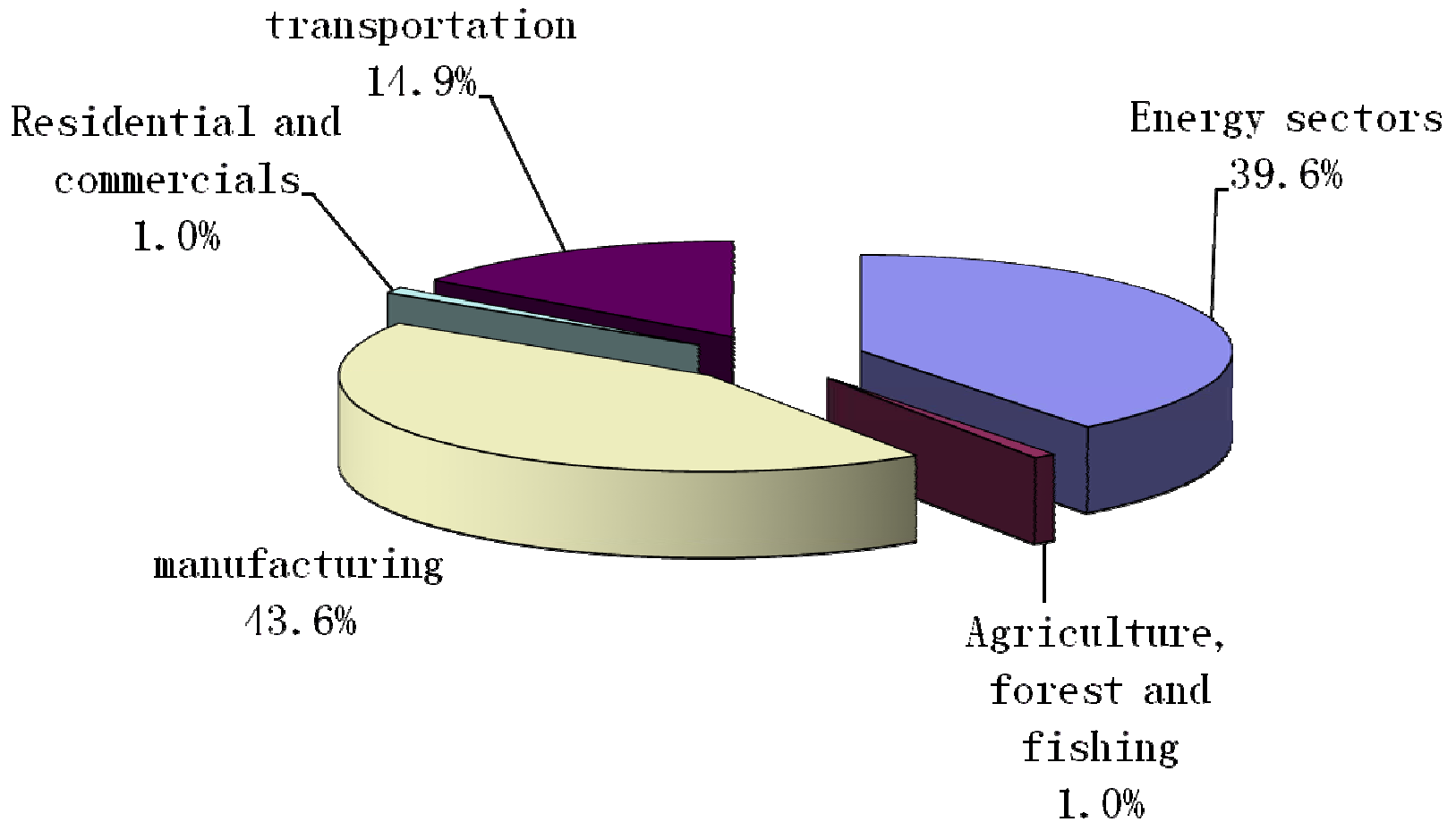
Base Year: 1990

Gas: CARBON DIOXIDE (CO2)

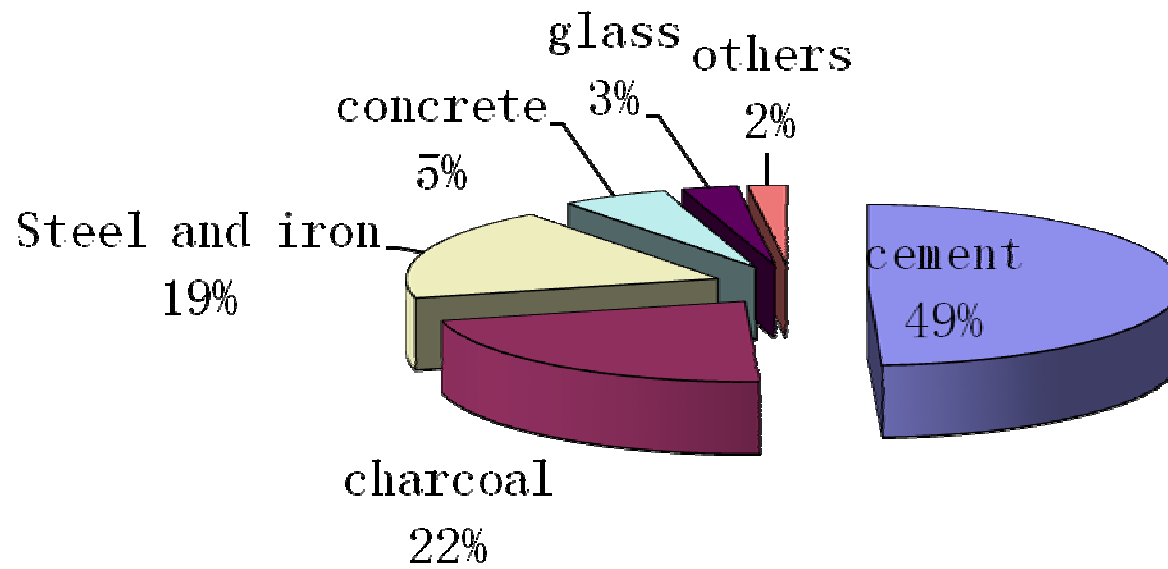
Inventory Year: 1992 Base Year: 1990 CO2 Equivalents: SAR GWPs (100 year time horizon) Database file: C:\Program Files\IPCC2006Software\data\ipcc2006.mdb



The 2007 GHG emission components in Shenyang

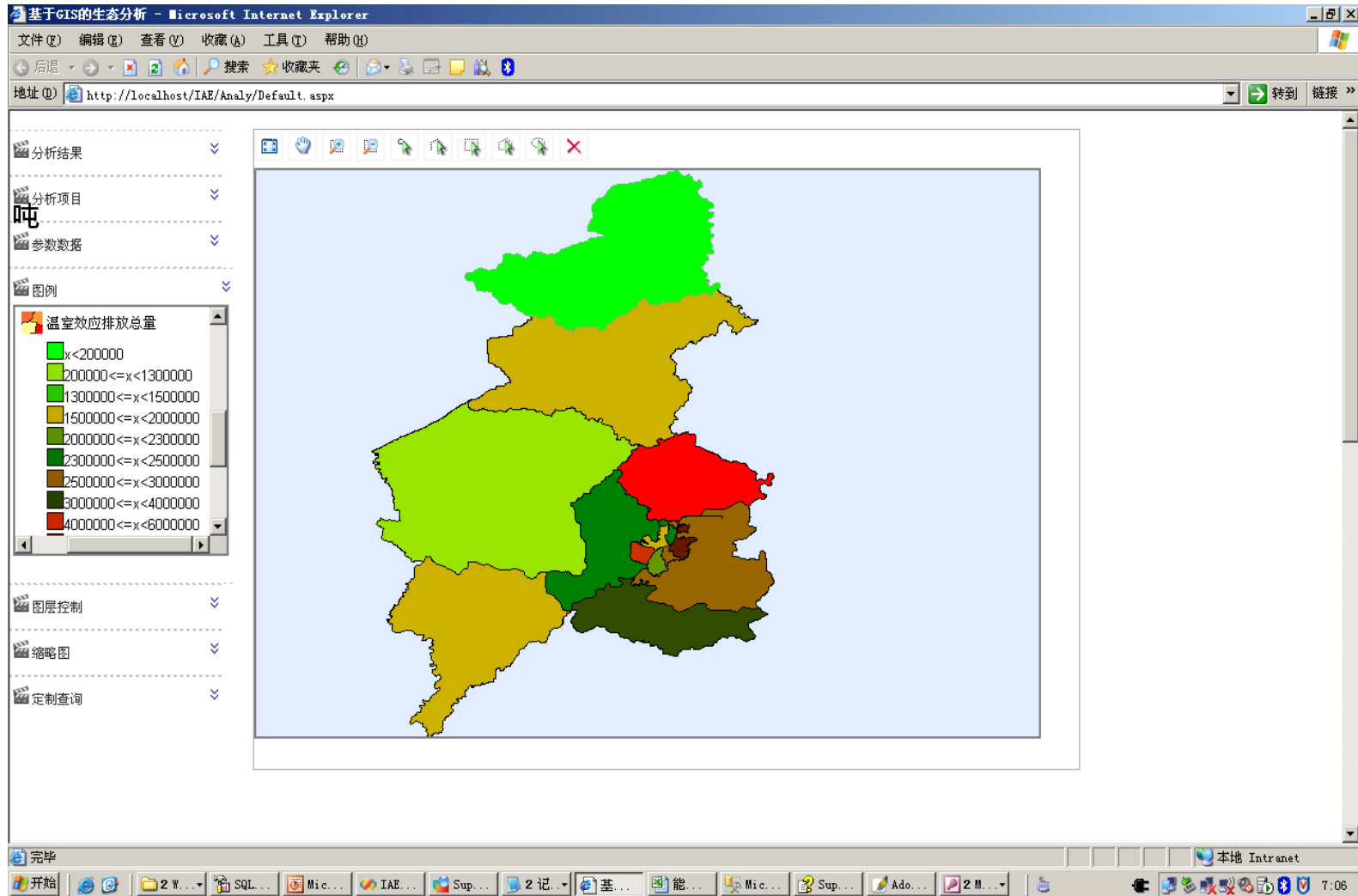


CO2 emission from different sectors

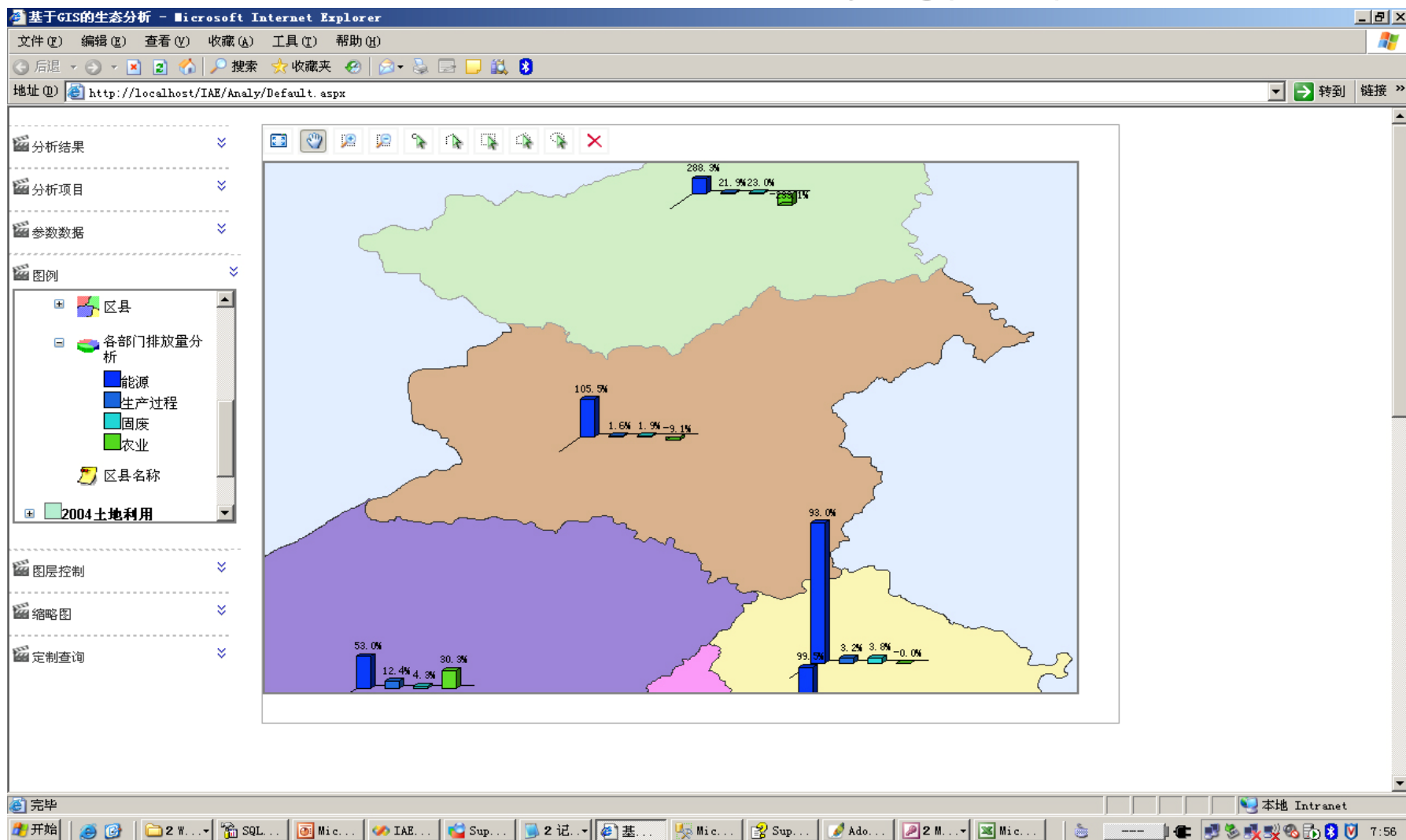


CO2 emission from different industrial sectors

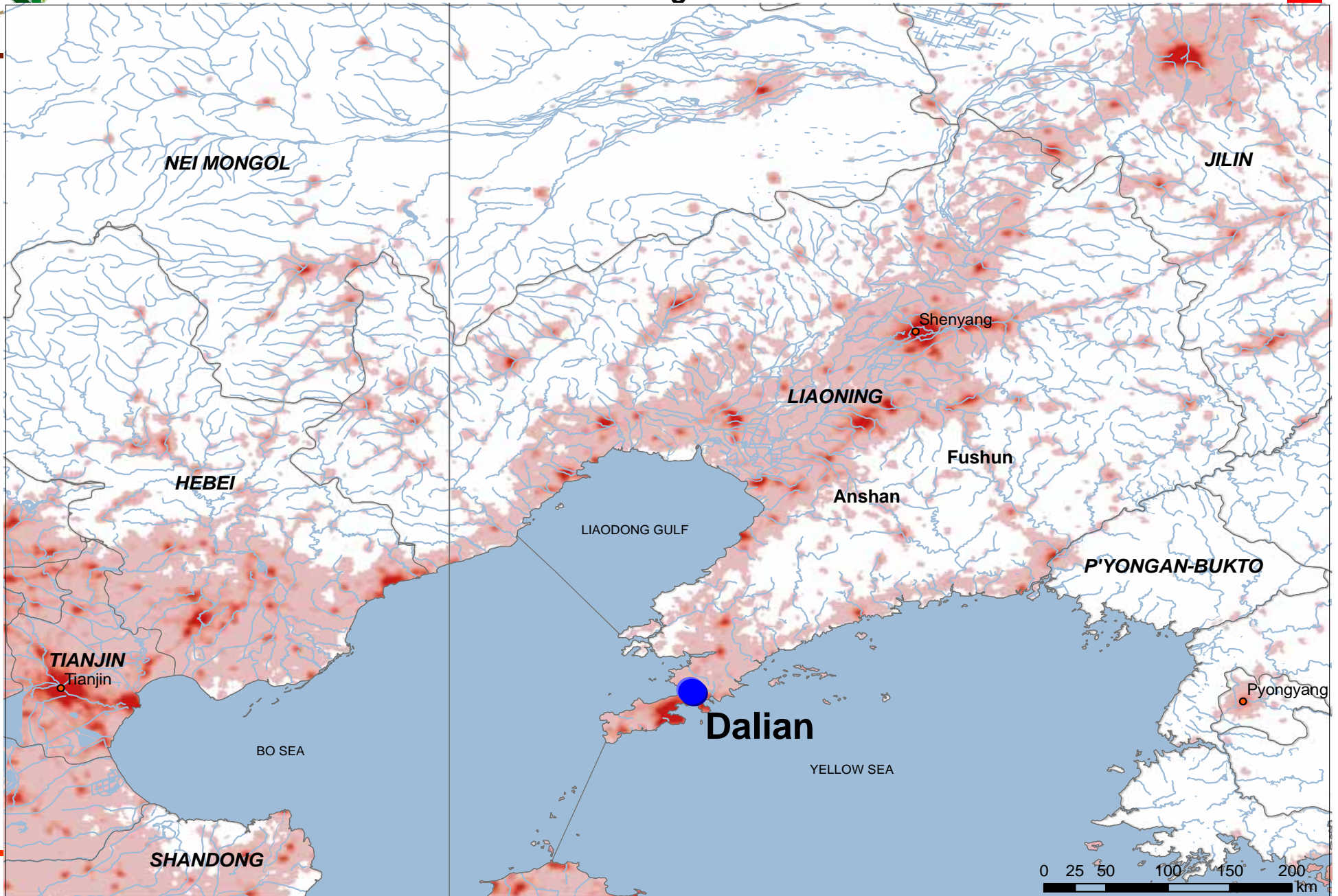
Distribution of SHENYANG GHG in 2007



GHG Emission of each district in Shenyang(2007)



Liaoning



Thank you !
