

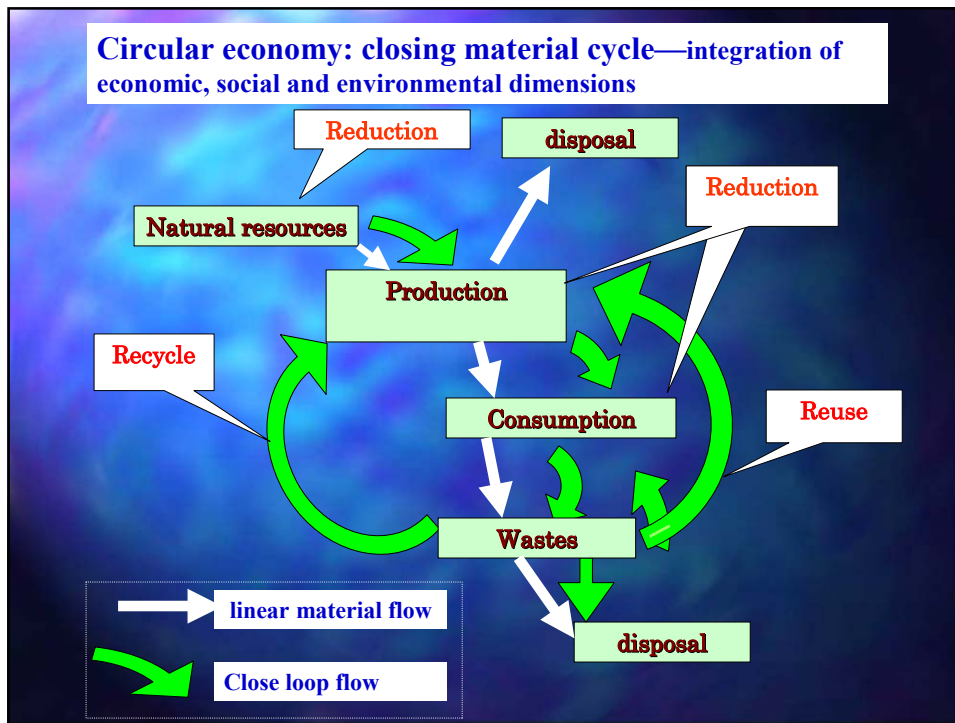
# Circular Economy in China: *Current Practice and Prospect*

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## Outline

1. Circular economy: *international perspective*
2. Circular economy: *Chinese perspective*
3. Current practice and prospect
4. Challenges to development of circular economy



## 1 international perspective: *Germany*

Circular economy essentially originated from “garbage economy” (Reduction, recycle, reuse and disposal), and then extended to 3R of materials in industrial sectors in the 1990s.

1. Before the 1970s: garbage dumped or land-filled
2. 1972: issuance of the Law of Waste management—shut down the dumpsites and started by incineration
3. After oil crisis: electricity and heat generation from the incineration.
4. 1986: revised the Law and made effort in reduction and reuse.
5. 1996: issued the Circular Economy and Waste Management Law (KrW/AbfG)
  - *Rebuild German garbage disposal system and applied extended responsibility to producers*

the percentage of reused garbage to the total generated raised to 50% in 2000, from 15% in 1990

Domestic garbage	Percentage collected (%)	Percentage reused (%)
Organic garbage	50	96
Waste paper and cardboard	87	100
Glass	78	100
Metal in wrappage	65	100
Plastic and paper wrappage	75	97
Cell	35	100
Automobile cell	95	100
Tire	94	98
Textile	70-80	70-80

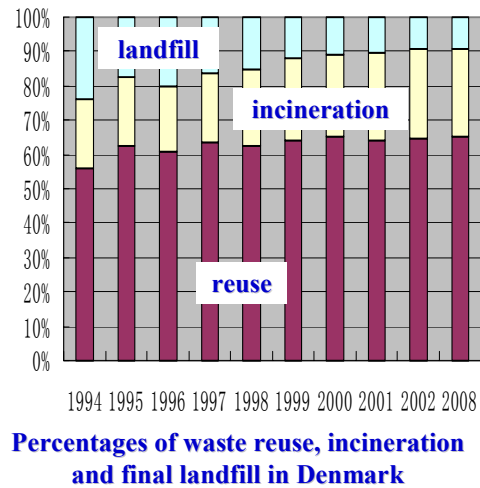
## 1 international perspective: *Japan*

**Likewise, building “circular/recycling society” in Japan also is also motivated by waste issue and aims at reforming the traditional patterns of social end economic development.**

- Domestic wastes: 50 million Tons; industrial wastes: 400 million Tons; 1 Kg domestic wastes per capital per day.
- 1. Incineration but lack of capacity of final landfill.
  - Industrial wastes: by 2000, the landfill capacity nationwide can sustain for 3.9 years, and Tokyo area, 1.2 years;
  - Domestic wastes: nationwide---12.2 years ; Tokyo area—11.2 years
- 2. Root-causes: massive production, massive consumption and massive disuse/disposal.
- 3. Since 2000, issued 1 basic law for promotion of building circular society, governmental green purchase, and 7 special laws related to different wastes reuse.

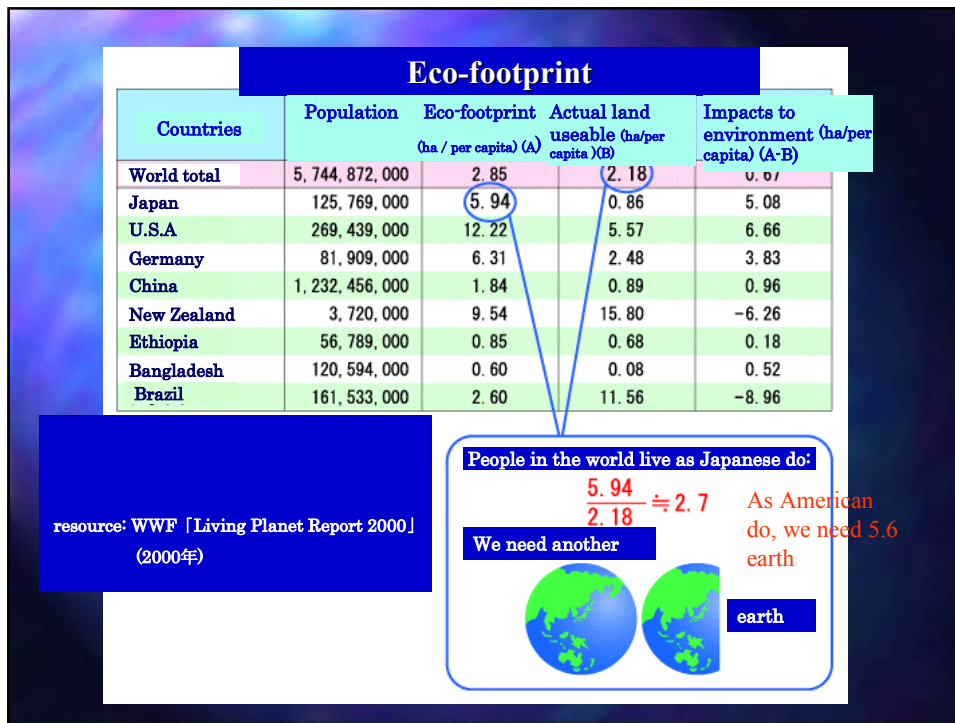
## 1. international perspective: *others*

- No terminology of circular economy in other developed countries, but 3R of wastes have been a focus in their agendas of EP and SD activities
- Cleaner production and eco-industrial park are significant initiatives in promotion of sustainable industries.



## 1. international perspective: general

**In a word, initiatives of circular economy in developed countries focus on waste issue caused by post-industrialized society, after most of industrial pollution and urbanization-oriented pollution have been resolved. Then the initiatives extend to industrial sector and ultimately aim to changing traditional patterns of production and consumption.**



## 2. Chinese perspective

### Three motivations/purposes for advocating circular economy:

- To resolve compound environmental problems needs integrated strategies to essentially reform the traditional patterns of economic growth and social development.
- As a result of Chinese strategic evolution in environmental protection.
- To achieve the goals of all-round well-off society strategy and promote new model of industrialization.



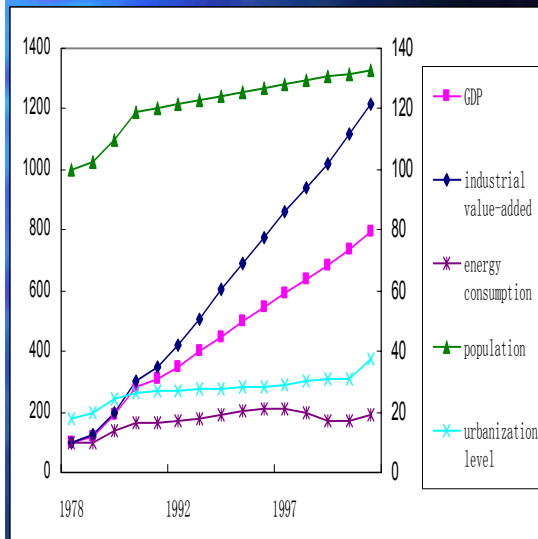
## 2 Chinese perspective

### A. Compressed/shortened industrialization/urbanizations and compound environmental problems

1. **Industrialization:**
  - European and American developed countries—150-200 years;
  - Japan—around 100 years;
  - new industrializing economies—50 years around;
  - *China—will be less than 50 years*
2. **Urbanization:**
  - 20 years from 1978 to 1999, urbanization level raised by 12%;
  - European industrialized countries took 50 years in late 19<sup>th</sup> century, with same growth.
  - Urbanization level: 37% in 2003, 46% in 2010; 55% in 2020.

### Social and economic achievements and their implications for environment :1978--2001

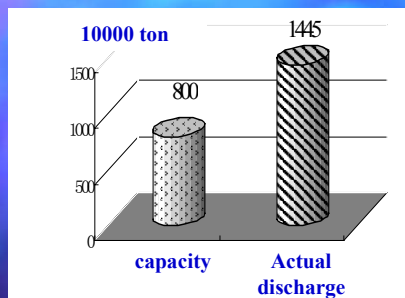
- GDP growth at 9.5% annually in last 23 years from 1978 to 2001;
- Per capital GDP—1000 US\$ around at present.
- As compared to 1978, in 2001:
  - GDP increased by 6.9 times;
  - Industrial value-added, by 11 times;
  - Energy consumption, by 1.3 times;
  - Urbanization level, by 20%;
  - Population, by 300 million.



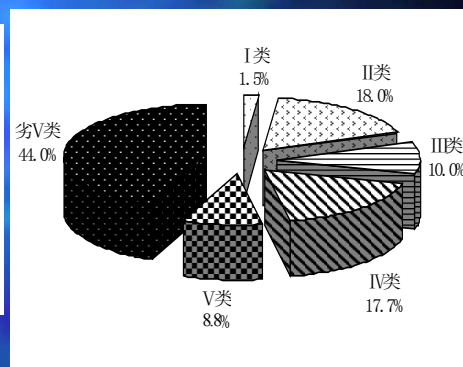
## 2. Chinese perspective

### Compound environmental problems:

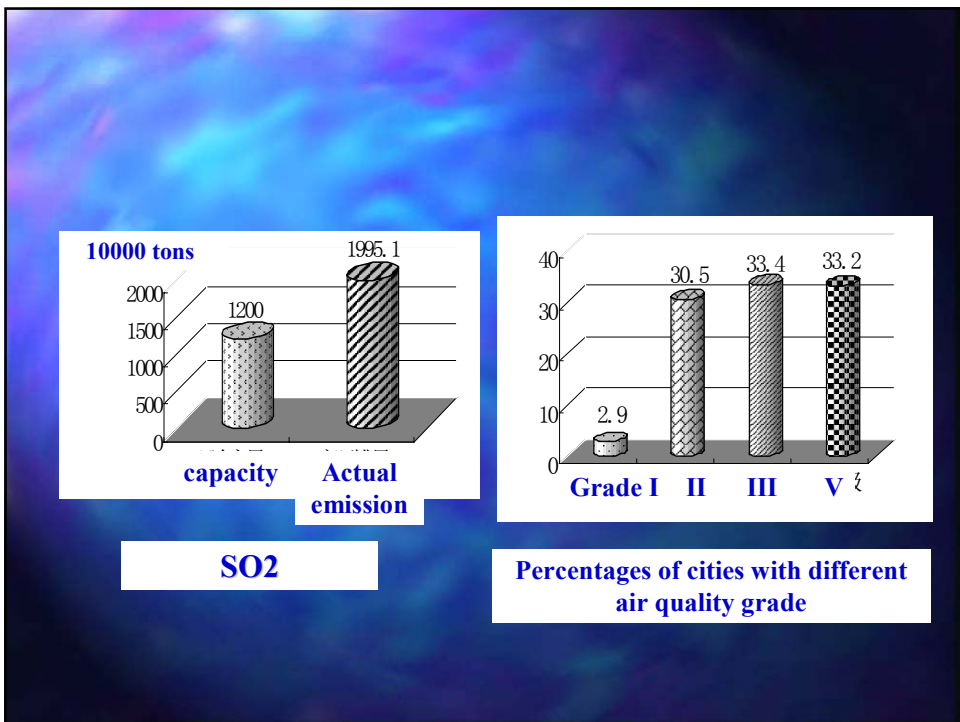
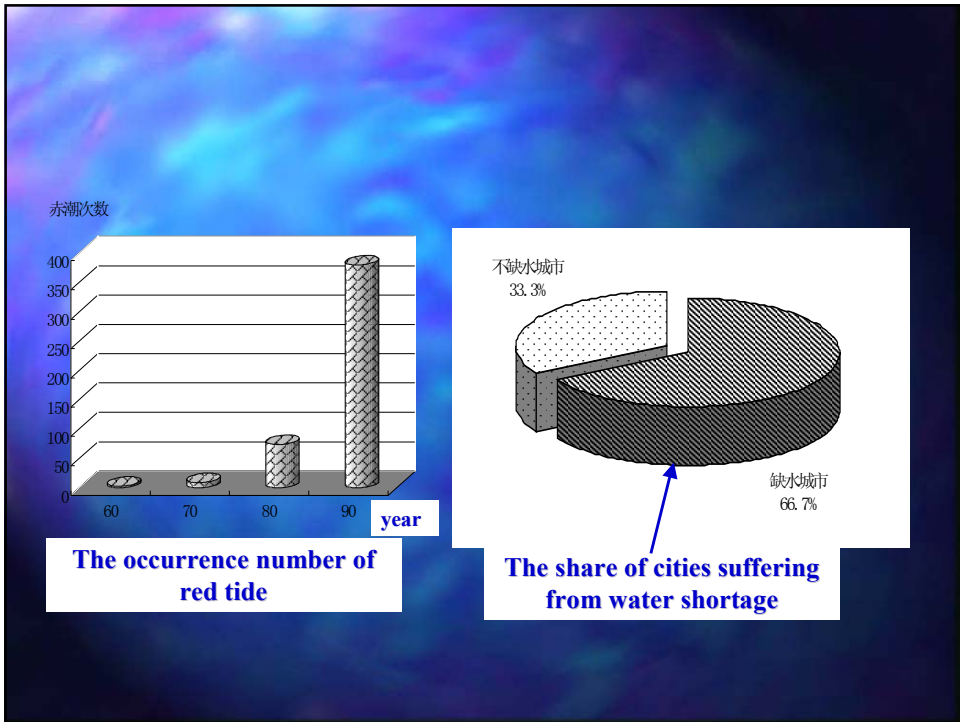
- industrial pollution,
- urban related pollution,
- ecological degradation,
- new environmental issues, and
- global environmental issues.



**COD**



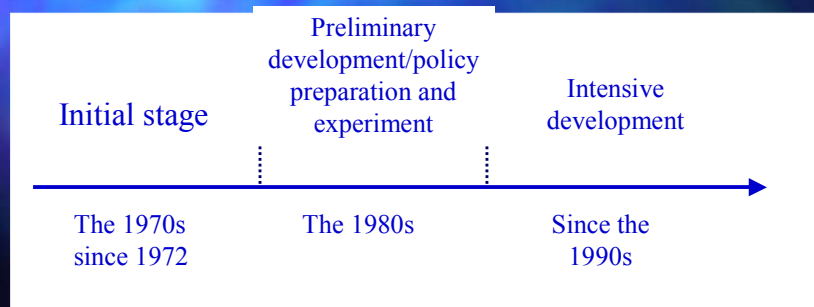
**Water qualities in seven rivers**





## 2. Chinese perspective

### B. Evolution of Chinese environmental strategies: from the isolated to the integrated in dealing with environmental protection and economic development



## 2. Chinese perspective

1. **1970s:**
  - Industrial pollution control at the end-of-the-pipe;
  - Comprehensive utilization of industrial wastes, including waste water, gas and solid
2. **1980s:**
  - Began to reconsider the limitation of the end-of-the-pipe strategy;
  - Set environmental protection as a national basic policy;
  - General guidelines: among economy, urban/rural, and environment, synchronize their planning, implementation and development; and give same importance to economic benefits, social benefits and environmental benefits.
  - Basic principles in pollution control: prevention first, and integration of prevention and abatement.

*Yet, no essential changes in practices.*

## 2 Chinese perspective

### 3. 1990s

- (1) Take SD as a national strategy;
- (2) Change the traditional patterns of economic growth;
- (3) strategic restructure of economic development;
- (4) Win-win principle of conserving environment while economic

#### Booming

- *promote co-benefits between economic restructure and pollution control;*
- *set up successful cases in coordinated development between environment and economy;*

- (5) Very positively political position on environmental protection
- (6) Environmental protection as a core target in the strategy of building all-round well-off society in new century

## 2. Chinese perspective

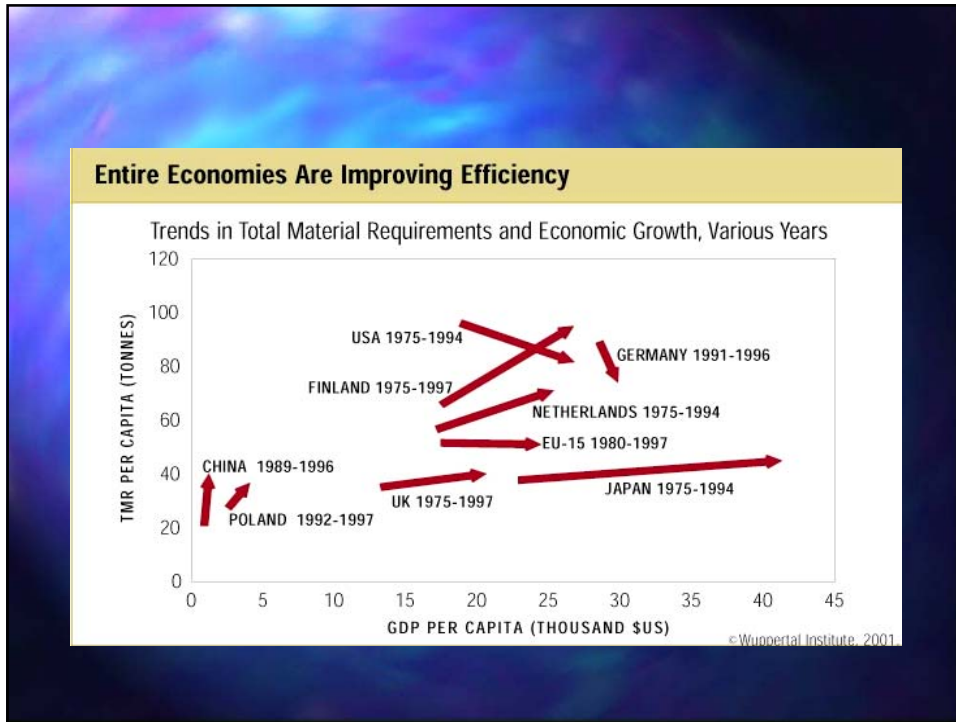
### C. All-round well-off society

#### 1. Goal 1:

- Fourfold GDP by 2020, against 2000;

#### 2. Goal 4:

- Increase in capacity of sustainable development;
- Improvement in ecologic environment;
- Significant raise in efficiency of resource use;
- Promotion of harmonious relationship between human and nature;
- In a word, the whole society should move towards such a civilized road as well-developed economy, rich life and sound ecologic environment.



	Population	GDP/per
2000	1.2 billion	US\$800
2020	1.6 billion	US\$3000

- *the building of well-off society will produce 4-5 times of impacts on environment, against the current situation.*
- *the solution is to raise the eco-efficiency of economic activities by 4-5 times and much more, if the current situation of environment would be improved.*

## 2. Chinese perspective

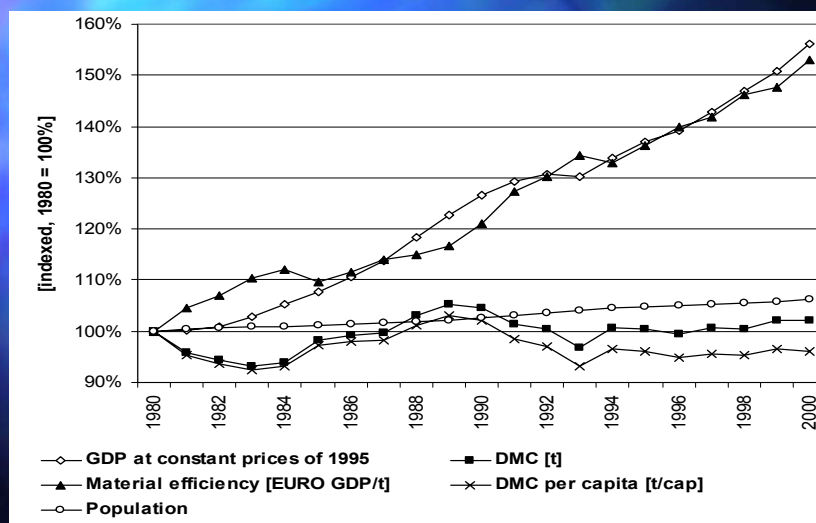
### Criteria for new road of industrialization:

- Much more scientific-and-technologic-oriented;
- Good economic benefits;
- Low resources input/consumption;
- little pollution;
- Full use of human resources.

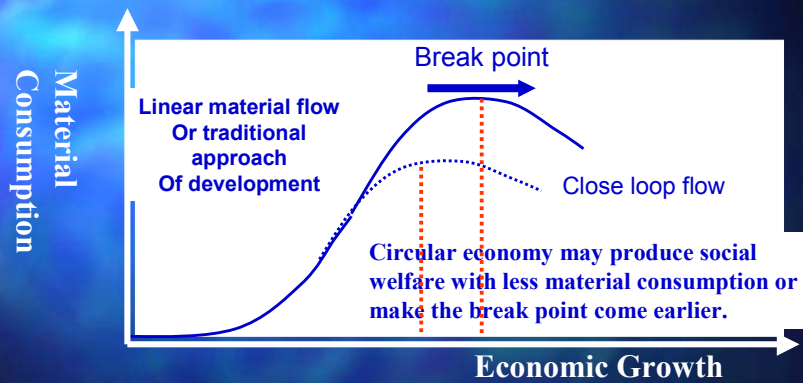
*Therefore, in order to resolve compound environmental issues, achieve the goals of building the all-round well-off society, and meet the criteria of new road of industrialization, Chinese national government has strong interests in promoting development of circular economy.*

***Is it possible?***

### Population/GDP/Material Efficiency/ Domestic Material Consumption of 15 Nations in EU



## Economic Growth and Environmental Impact ----- Kuznets Curve(1955) and its modification



### 3 Current practice and prospect

Therefore, circular economy concept and practice cover three levels: cleaner production—small cycle, eco-industrial park/industrial symbiosis—medium cycle, and regional cycle.

#### 1. Cleaner production

- A decade experiences in promotion of cleaner production;
- 2002, Cleaner Production Promotion Law;
- Cleaner production auditing in 400 enterprises of 20 industrial sectors in 20 provinces and cities;
- 20 cleaner production centers;
- 10,000 trainees;
- 50,000 enterprises with ISO 14000 series certification
- Several hundreds products with environmental labels



### 3 Current practice and prospect

#### 2. Six eco-industrial park/industrial symbiosis

- **Guigang Sugar Manufacture Park;**
  - Sugar cane land—sugar processing—goeey wastes—alcohol plant—wastes liquid—fertilizer plant—compound fertilizer—land
  - Sugar process—waste cane—paper plant—wastes—cement plant
- **Nanghai Eco-industrial Park**
  - environmental industry and waste reuse industry-oriented
- **Baotou Eco-industrial park**
  - Coal—power generation—electrolytic aluminum—aluminum product processing—reuse of aluminum reuse and recycle;
  - coal—power generation—waste—construction materials
  - Coal—power generation—heat supply;

### 3 Current practice and prospect

#### 2. Six eco-industrial park/industrial symbiosis

- **Shihezi Paper Manufacture Park;**
  - Grass land—paper manufacture—waste water treatment—grass land;
  - Grass land—stockbreeding—livestock products—waste water treatment—grass land—eco-Tour
- **Changsha Huanxin Eco-industrial Park**
  - Agriculture—manufacture and process—environmental industry
- **Lubei Chemical industry Park**
  - Phosph-Ammonia—vitriol oil—cement;
  - Seawater—salt—alkali—heat and power supply
  - Seawater—water use

### 3 Current practice and prospect

#### 3. Regional levels

- **Liaoning Provincial Plan and initiatives in circular economy**
  - Enterprise level:
    - by 2007, 600 enterprises meet the standards of cleaner production;
    - A number of enterprises achieve targets of zero emissions;
    - several big industrial groups build up inter close-material-flow
  - Building up several eco-industrial parks
  - Develop waste reuse industry---create a resource-recycling society
    - by 2010, reused water accounts for 30% of wastewater;
    - Collected garbage ratio by different categories---60%;
    - Collected ratio---80%---in waste battery, household electronic appliance, waste computers, paper, metal, plastic, etc.

### 3 Current practice and prospect

#### 3. Regional levels

- **Guiyang Municipal Plan and initiatives in circular economy for next 20 years**
  - Close Material flow in production system
    - Eco-industry
    - Eco-farming
    - Tourism and eco-services
  - Close material flow in urban infrastructural system
    - Water-flow;
    - Energy---air pollution control
    - Solid waste reuse and recycle
  - Ecological construction system
    - Living environment improvement
    - Green buildings
    - Natural conservation

## 4 Challenges

1. **Low awareness and lack of relevant knowledge and know-how.**
2. **Not all local governments and ministries responsible for economic development pay much attention to promoting circular economy.**
3. **relevant legislation and policies are not in place.**
4. **Technology is always an obstacle hindering the development of cleaner production, eco-industry and waste reuse.**

*Thank you*