THE INTRODUCTION OF SUSTAINABLE MATERIALS MANAGEMENT

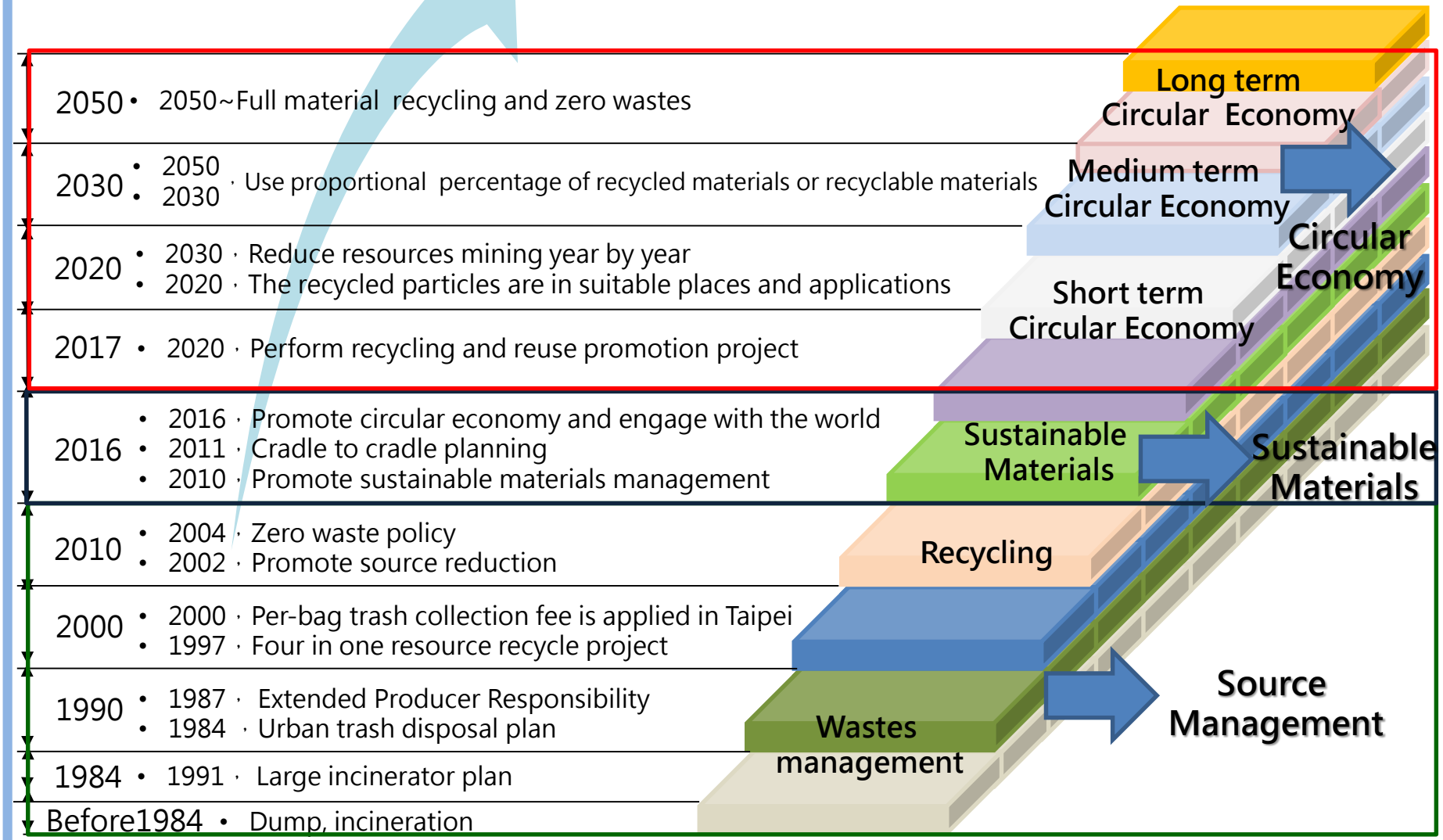
FOR DUMMIES

Past：Source Management

Present：Sustainable Materials

Future：Circular Economy

Foreword: The development of environmental work



Past Performances : Source Management

Environmental Protection Administration (EPA) successively promote source reduction measures of general wastes since 2002, including volume reduction measures of one time use products such as restrict uses of shopping plastic bags, disposable tableware, plastic trays and packaging box, promote the volume reduction of beverage cups , restrict product excessive packaging, ban plastic microbeads.

Current Promotion：Sustainable Materials

Wastes are considered resources wrongly placed and should be valued, comprehensively planned and continuously recycle

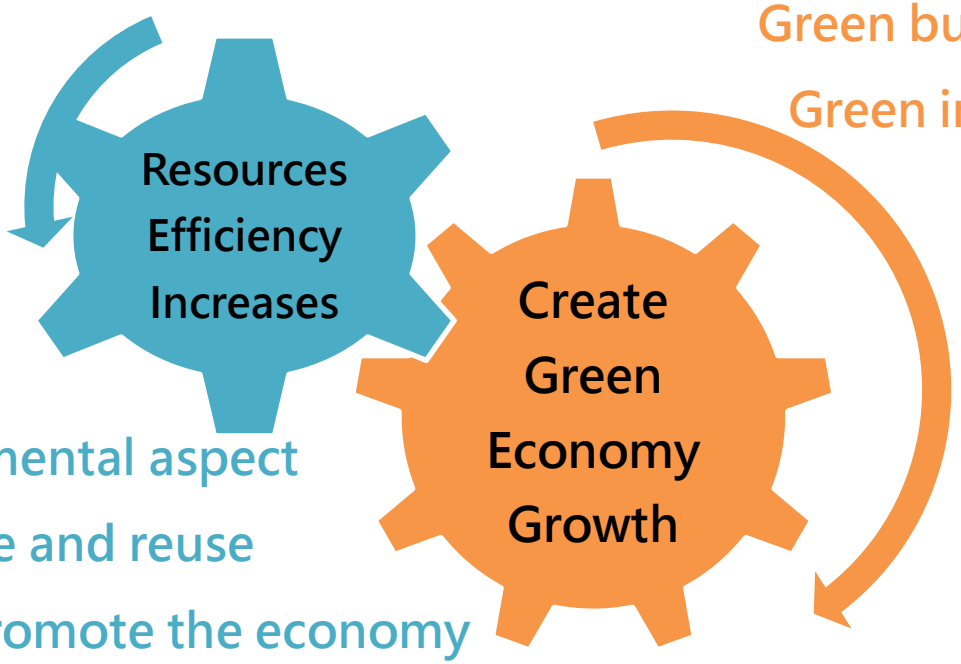
Beside wastes, it is expanded to each resources and materials used. If planning is comprehensively done, efficient and recycled, then the resources can play its maximum efficiency while reduce environmental loads, it is multiple benefits with one attempt.

If sustainable material management is performed well, recycling efficiency can be increased and set a good basis for circular economy.

- **Sustainable Materials Management**
- **Resource Efficiency**
- **Circular Economy**

Environmental work promote the increase of resources use efficiency, the materials is recycled effectively to create new business opportunities and become the pusher and friend of economic growth and no longer act as interrupter.

Circular Economy



Economy aspect

Green business opportunities

Green industry and market

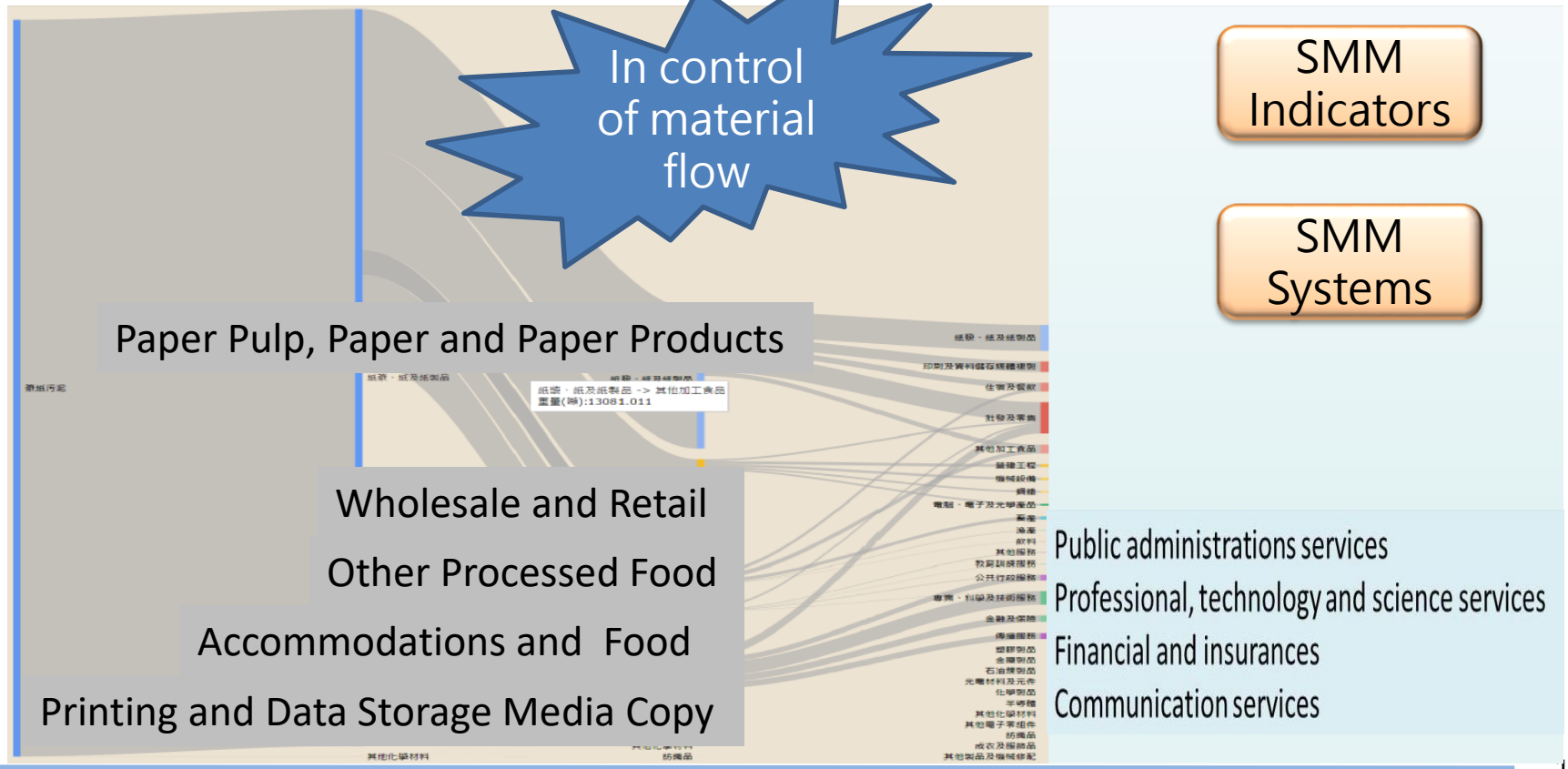
Environmental aspect

Recycle and reuse

New industry promote the economy

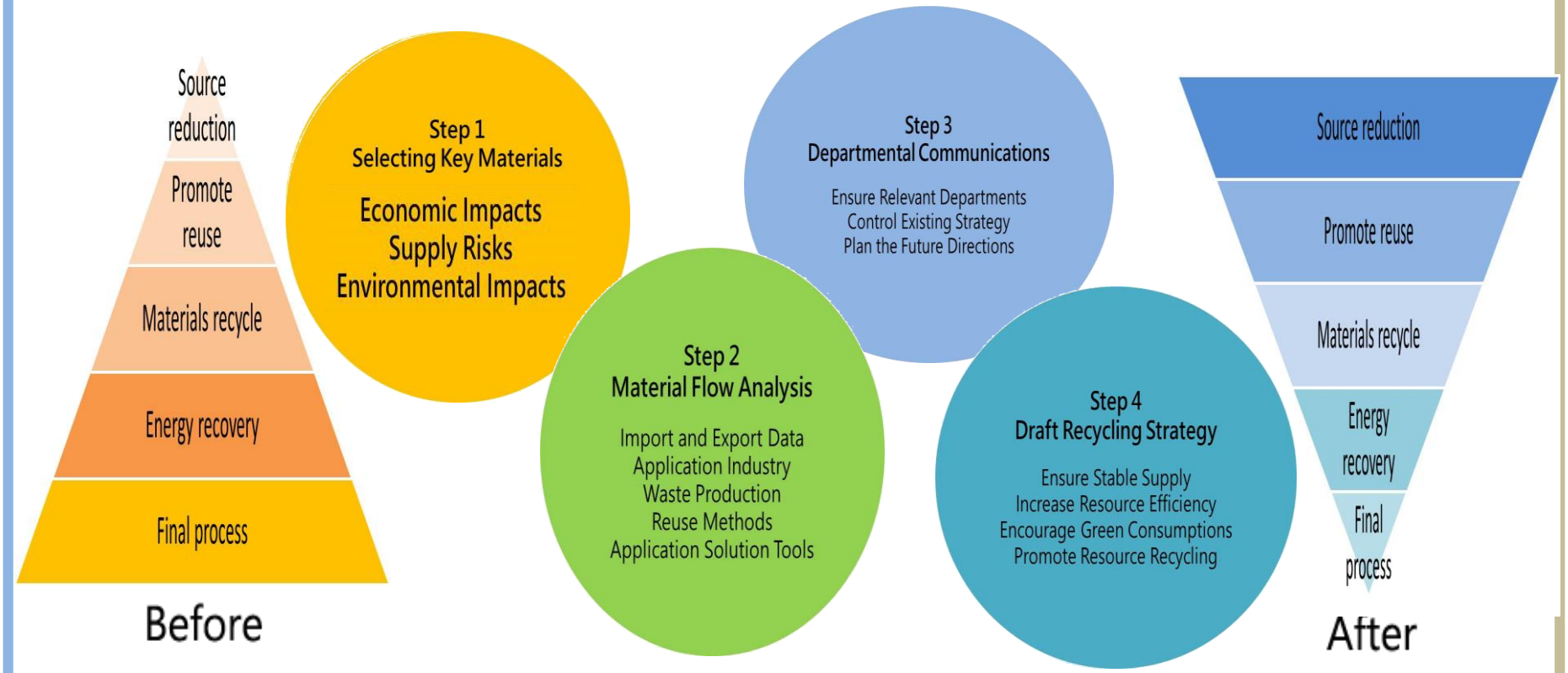
It is necessary to have effective tools ！

The use and flow of resources and materials is a very complicated relationship, that can be controlled through material flow analysis. By building SMM indicators and SMM systems to assist in gradual control of circulations across the country.



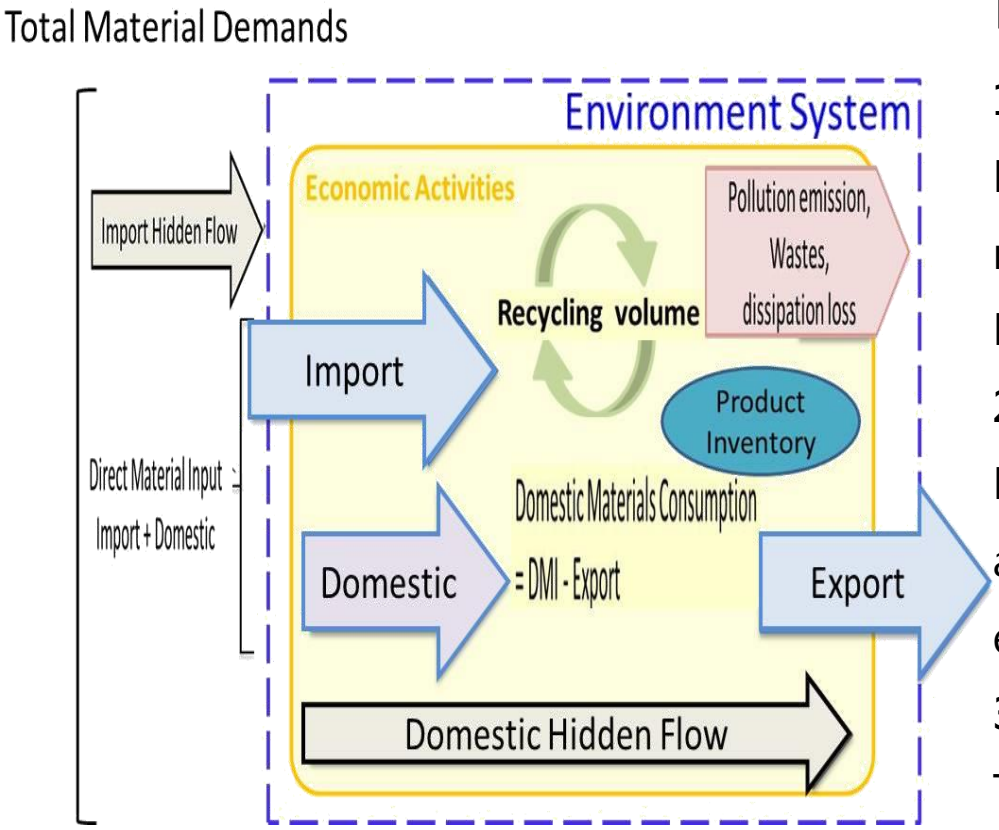
How to use SMM tools to increase resource efficiency

After having SMM indicators and SMM systems, we can use the concept of material flow to treat Taiwan as a system, inspect its input and outputs, then set the recycling strategy to increase resource efficiency through discussions within the department.



SMM Tools-Indicators

Regularly produce national levels of material flow indicators, review resources input and uses.



Material Flow Figure

Material flow indicator：

1. Direct Material Input（DMI）：

Refer to the need of a country to input materials, including domestic Production and import

2. Resource Productivity（RP）：

Divide DMC* or DMI with GDP to analyze domestic material use efficiency

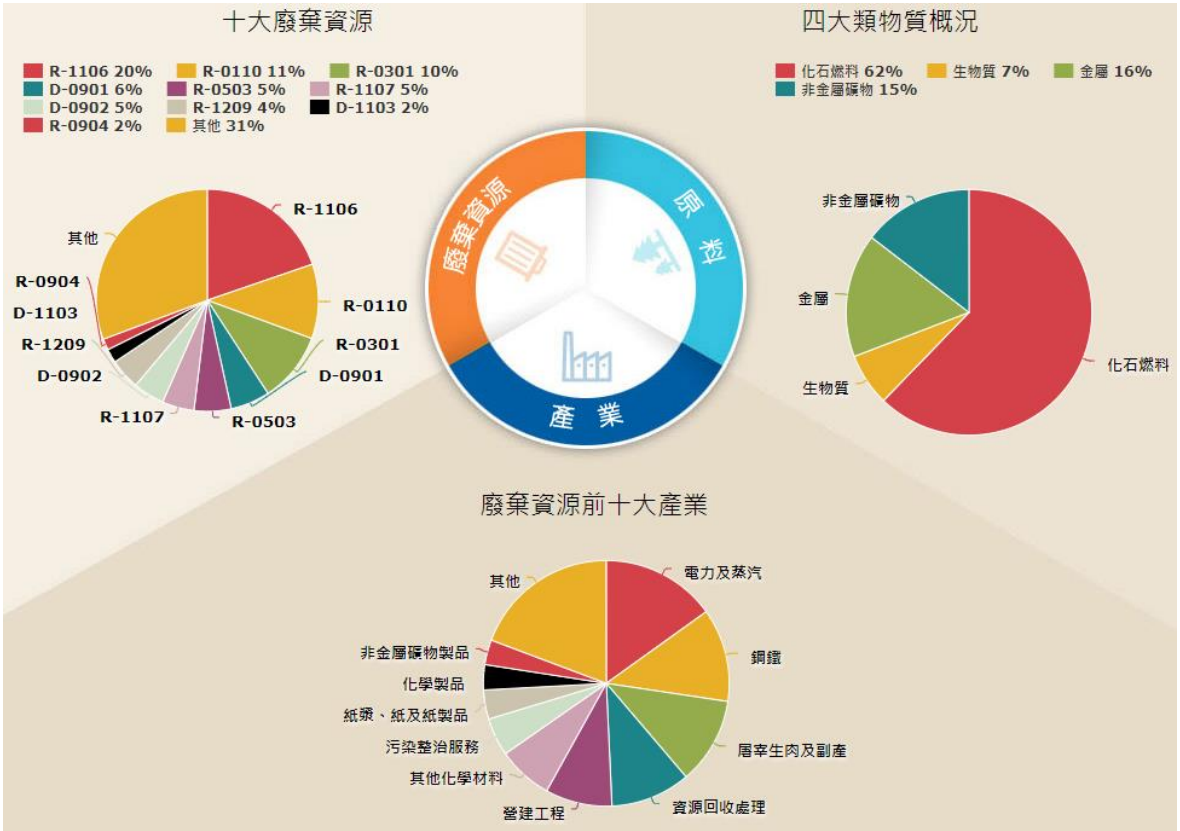
3. Cyclical Use Rate（CUR）：

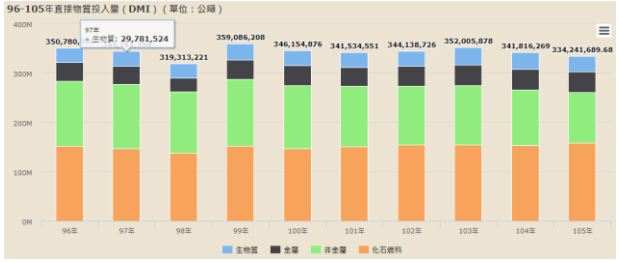
The indicator that evaluate how a Country recycle and reuse

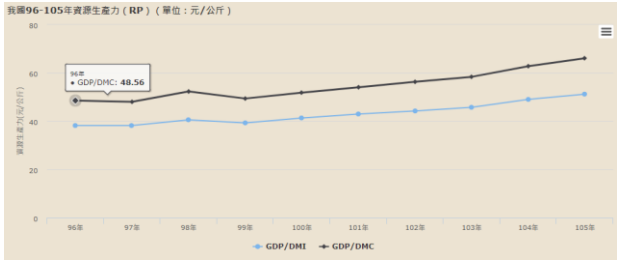
*Note DMC=DMI-export

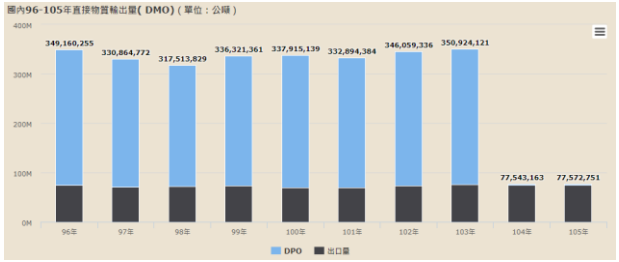
SMM Tools –System

Display the general conditions of key raw materials, industry and waste resources while update the trends of latest national level material flow indicators. Through system website, we can learn about import and export data and wastes productions. Government and relevant departments can control material supply and draft relevant recycling strategy.



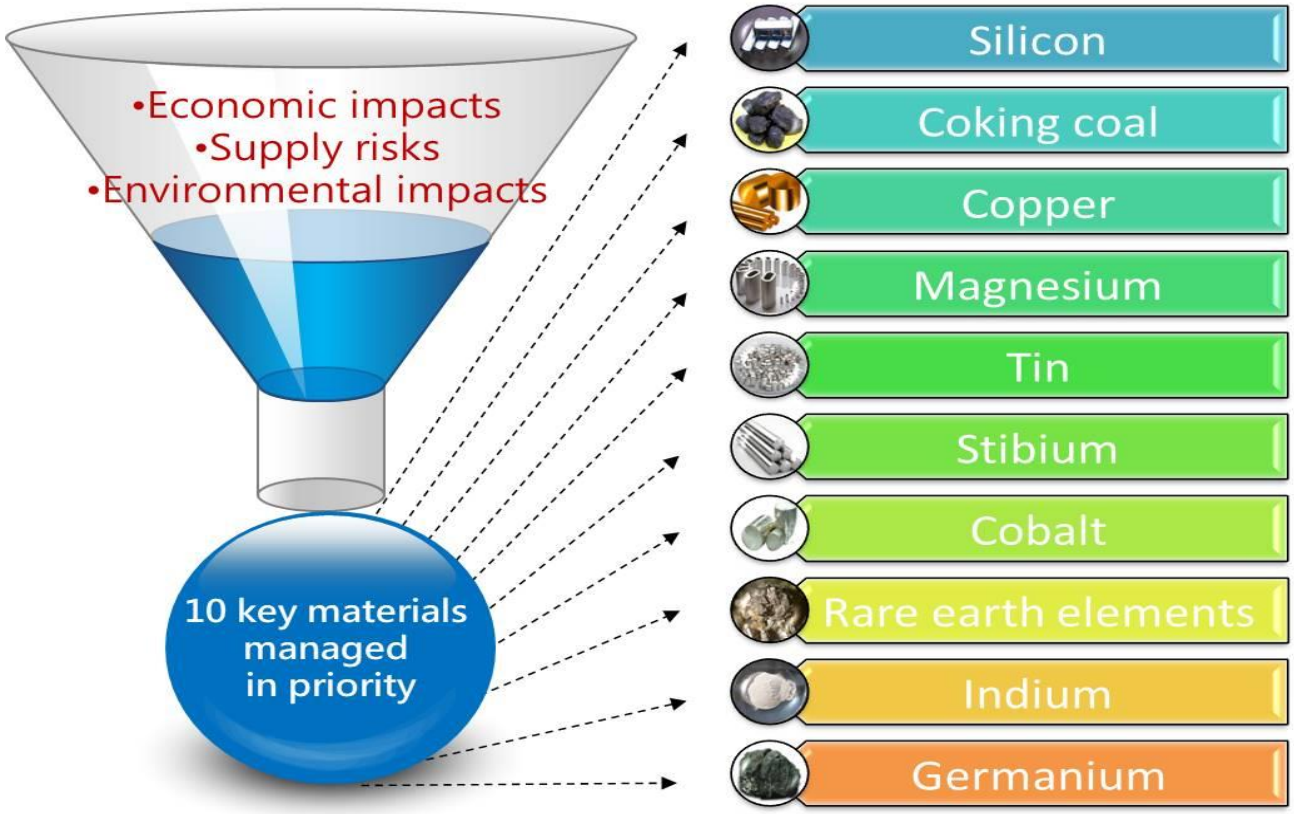






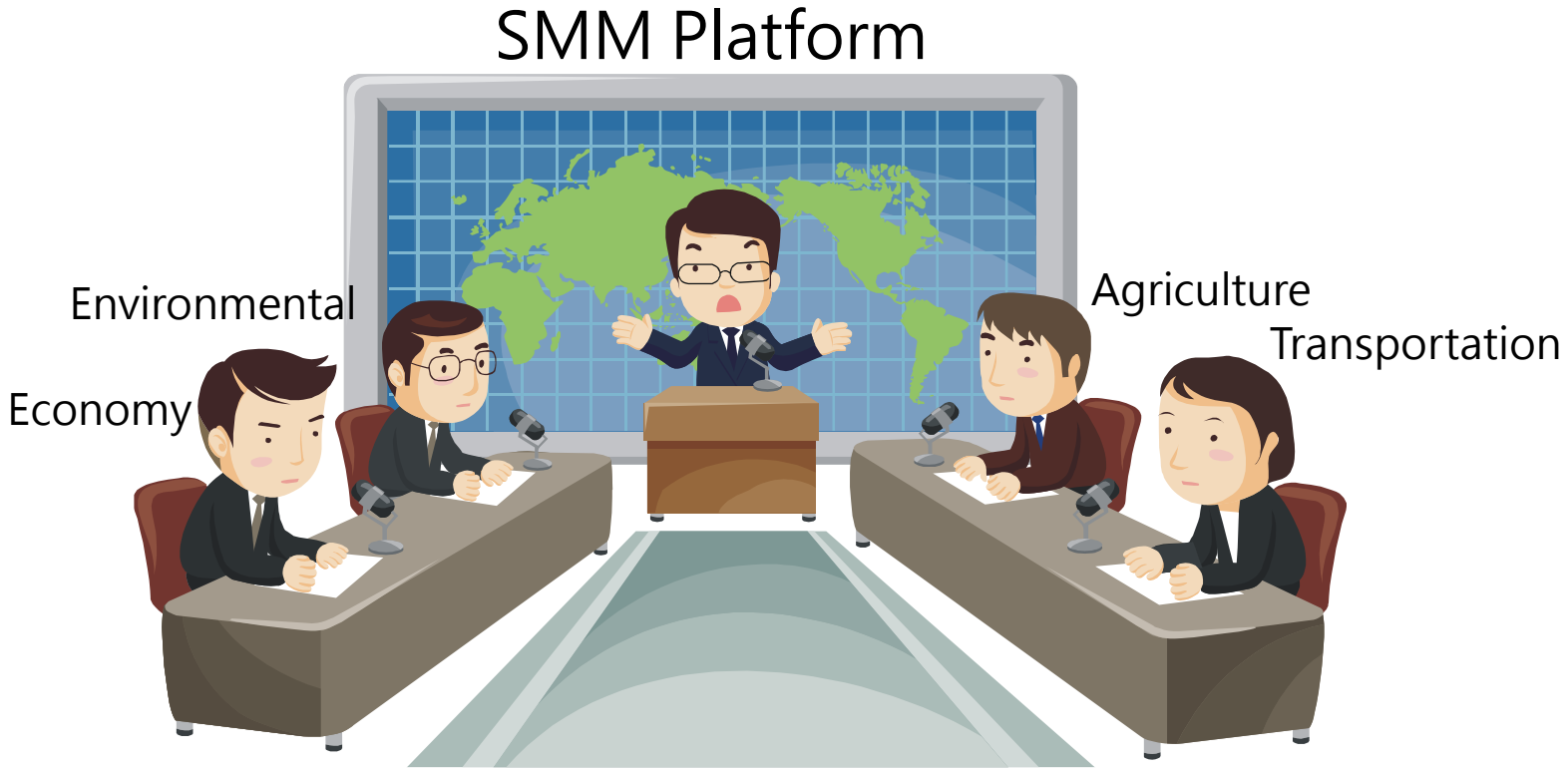
Use SMM tools to build environmental oriented ten key materials

Taiwan refer to the management systems of advanced countries and cooperate with domestic situations to establish key materials, select 10 more important materials based on "economic importance", "supply risks" and "environmental impacts", then use SMM tools for material analysis to solve the limited natural resources in Taiwan and issues of industry materials highly relying on imports.



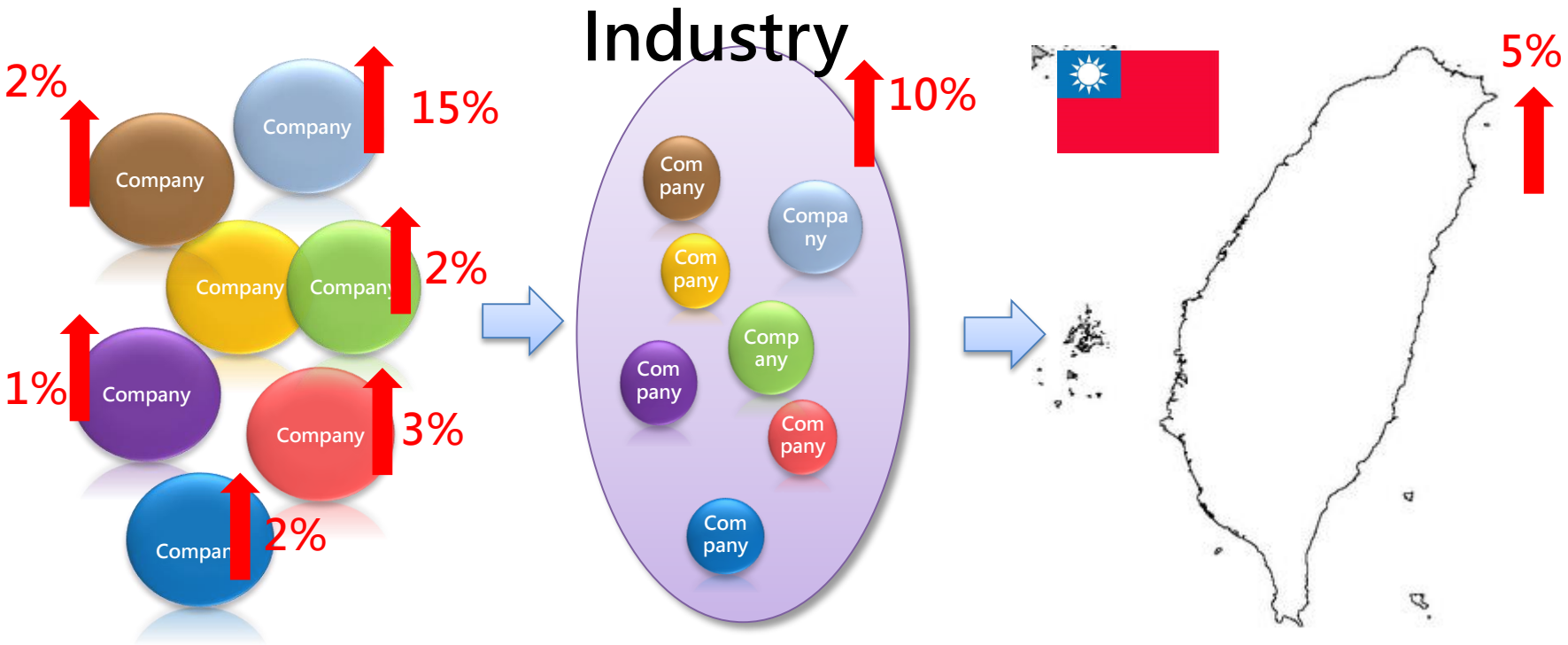
How to manage ten major key materials of environment

Taiwan can build cross departmental cooperation platform or relevant system by Central government and relevant departments, promote sustainable materials management, implement sustainable uses of resources from various aspects.



Comprehensively manage the efficiency of ten major key materials of environment

Raise material use efficiency, thus increase industry productivity and bring forward the economical growths.



Coach the companies to increase materials use efficiency

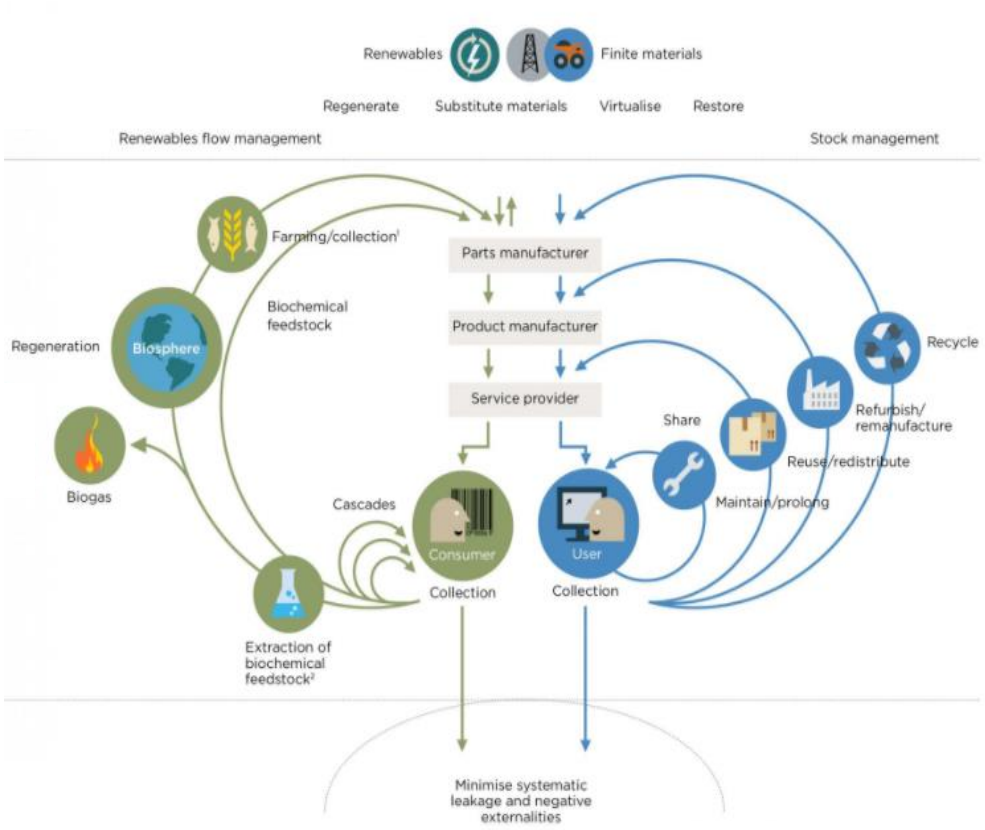
Increase in materials use efficiency of industry chain

Increase of material use efficiency for Taiwan

Future goal：Circular Economy

WHAT IS "CIRCULAR ECONOMY" ?

- Circular economy is about "recover and renewal ", separate the linear economy into two recycling systems of biological recycling and industrial recycling.
- In biological cycle, product is made by biodegradable raw materials and can return to biological cycle through anaerobic digestion and composting.
- Industrial recycle use resources efficiently through processes of maintenance, upgrading and remanufacturing and maximized the product lives.



CIRCULAR ECONOMY BUSINESS PATTERN

Purchase "service "instead of "product"

The initial investment from first purchase can be saved while continuously enjoying convenient maintenance, repairing and upgrading services. Example: Xerox printers rental services. From the environmental perspective, the life cycle of product is extended, number of resources recycling is reduced while increase the resource use efficiency.

Sharing Economy

- For products that not frequently used, owner can lease such product out in exchange of benefits. Example: uber, airbnb.

Other new business pattern

- IOT with driverless car can completely change the outlook of transportation industry in future.

Data sources:
1.EPA https://www.epa.gov.tw/mp.asp?mp=epamob
2.EPA, friendly earth_ the outline of circular economy lesson

SUCCESSFUL CASES IN TAIWAN

Data sources: The Liberty Times.
http://news.ltn.com.tw/news/politics/breakingnews/1674327

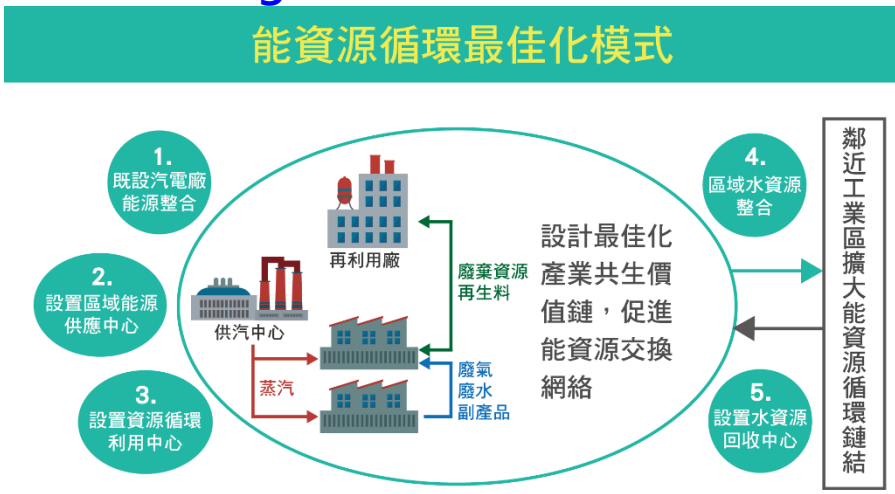
Data source: Gogoro
https://store.gogoro.com/tw/scooter?model=gp2

Data source: Ricoh
http://www.cwholesale.com/ricoh

Data source: Uber
http://www.letsintern.com/blog/steer-ahead-with-a-business-analysis-internship-at-uber/

SUCCESSFUL CASES IN TAIWAN

The energy and resource integration demo of CSC



Data source: https://n.yam.com/Article/20160817845462

Solartech refine waste electronic product into gold

Data source: http://www.truney.com/products/solar-aul201-gold-coin-10g.html

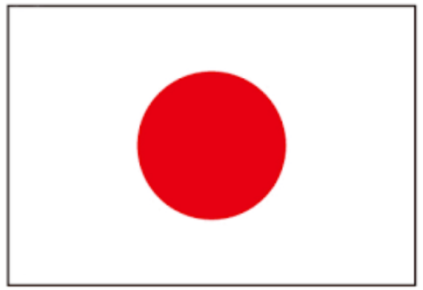
Miniwiz recycle plastics to make sunglasses

Data source: https://www.slashgear.com/miniwiz-re-view-is-a-sunglasses-created-from-recycled-dvds-cds-23398697/

ORD recycle PET bottles to make into jerseys

Data source: http://www.masterhands.com.tw/event.aspx?id=201406300107426687

SUCCESSFUL OVERSEA CASES -JAPAN



- Since the land in Japan is mountainous, the landfill spaces for wastes are not easy to obtain and the natural resources are deficient, and its business cultures focus on divisions of labor and other factors, Japan is aware of the importance of circular economy.
- One of the applications of used mobile phones in Japan is to male medals for 2020 Tokyo Olympic! Use the metals from recycled electronics to make medals and has reduced the budget to 517.3 Billion NTD by last year, this is part of the circular economy.

The Governor of Tokyo. Yuriko Koike take the lead to donate used mobile phone

Left picture: 2020 Tokyo Olympic in Japan is collecting waste electronics to made into medals.
The Governor of Tokyo. Yuriko Koike take the lead to donate used mobile phone.

Source: Kimo News, 2020 Tokyo Olympic in Japan is collecting waste electronics to made into medals.

SUCCESSFUL OVERSEA CASES -HOLLAND

- The Philips lighting equipment from Holland develop new business pattern in order to respond toward circular economy. It change from selling lighting equipment to lighting solution services. Using rental methods, consumers can maintain optimized lighting at anytime and customization according to demands, allowing consumers to receive the most satisfied lighting services.

LUX Light

Data source: https://www.imynest.com/content/43183.html

SUCCESSFUL OVERSEA CASES- UK

- The PAYF Café in UK recycle food that was going to be thrown away, then cooked into delicious meals by famous chefs. Customer pay the meal based on his/her own consumption level and dishes. In addition, fresh food can be exchanged with expiring food allowing the maximum uses of food resources.

Expiring food
Excess food

Data source: http://www.adaymag.com/2014/04/08/uk-cafe-pay-wish-concept.html

SUCCESSFUL OVERSEA CASES-GERMANY

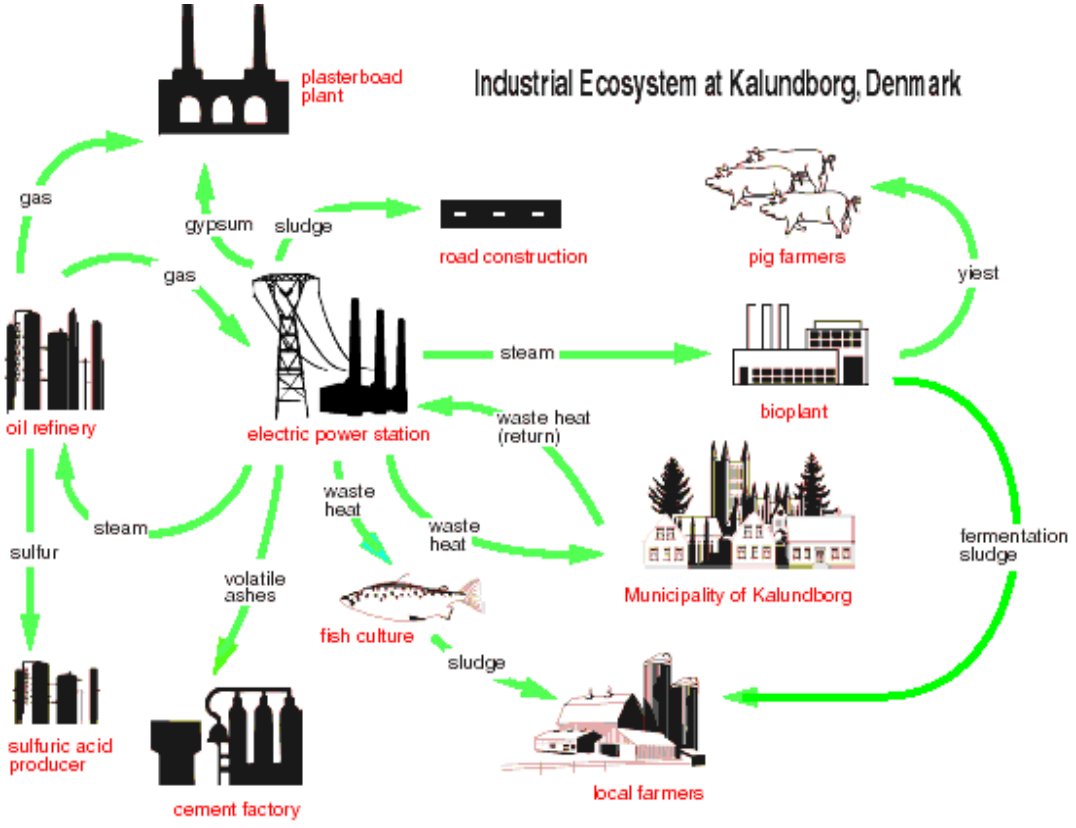
- Evonik from Germany constantly develop and use more ecological friendly materials to product products, then produce products with higher resource efficiency with over 60 years of silicon chemistry technology. Then added the support from professional materials laboratory team to comply with various product demands for customizations.

Data source:
https://www.gupta-verlag.com/news/technology/18775/materials-from-evonik-to-be-used-in-flying-boats
http://inletgrovehs.com/WebStudentsWork/SMITH_ZAKIYA_26049155_final%20project/final%20project/about.html

SUCCESSFUL OVERSEA CASES-DENMARK

- Local vendors form a small but sustainable and circular symbiosis network along the seashore regions and Kalundborg city.
- Complete recovery of waste heat from the factory and provide to at least 90% residential and commercial buildings for applications at Kalundborg city.
- Industrial symbiosis not only promote the energy resources sharing and complementary among different industries and factories but reduce the input of additional raw materials.

The above pictures feature Minister visit **Kalundborg Symbiosis** in 2017 with the team.



Data source: Taiwan Circular Economy Network

CONNECT ACROSS THE WORLD

Developing circular economy has become a trend worldwide with active participations from more and more countries. Taiwan is also an active participant, EPA not only visits European and American countries to learn about the knowledge, but also organizes circular economy international convention regularly in Taiwan and invites various countries to discuss future development and international cooperation.

2014

2017

2016

Conclusions

Taiwan has drafted the circular economy vision, which are three stages of short term, medium term and long term targets. Short term target is using recycled materials in the right position and applications and reduce resource mining year by year; the medium term target is to use a specific proportion of recycled materials or recyclable biomass. Using short term and medium term targets and SMM tools to manage key materials as key stone and expect to implement the circular economy of full recycling materials and zero wastes in the future.