Panel Report 3

Environmental Business for Regenerating Society: Environment at the Center of Urban Development and Industrial Revitalization

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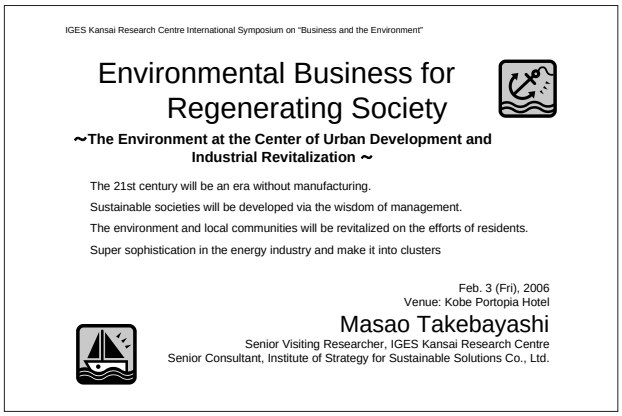
1 Introduction

Today, I will be speaking about the eco-business centering on energy.



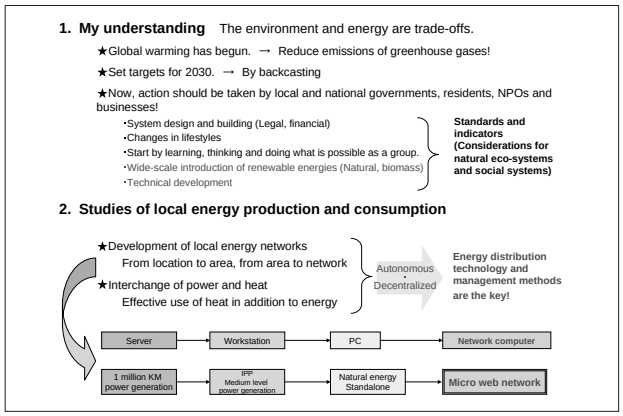
Slide ①

I foresee 21st century Japan in an age of minimal production of hardware. More so than on the hardware itself, the formation of a sustainable society depends on knowledge ware and software for "managing" multiple connected pieces of hardware.

The national and local governments are saddled with immense debt to the tune of ¥8 trillion. Then the regeneration of society via the environmental business will necessarily be spearheaded by the efforts of residents as opposed to relying on government.

The energy industry that I place at the core of this is the heart of all life and industrial activities. As for how it will be used, there is energy produced by high level techniques and sophisticated hardware such as fuel cells for example, which compose various components put together with hi-tech, nevertheless the "super intensification and clustering of the energy industry" will become important issues for Japan. This will be the core of my report today.

2 Sustainable Society and Management



Slide ②

To begin with, the term "environment" is very broad, but the way I see it is that "the environment and energy are the front and back of the same thing. "With Japan said to be only 4% self-sufficient in energy needs, I would like to talk about energy management with reference to how energy is positioned, how it is used and produced, and what the energy industry is.

Global warming has already begun. We must significantly reduce the emissions of greenhouse gases. The prediction is that, unless we reduce emissions by 70% -- and not by 6% -- in 2050, life and industry may come to an end. Accordingly, if we project back-

wards from a target year of 2030 to identify what to do today, we naturally will come up with various kinds of industries.

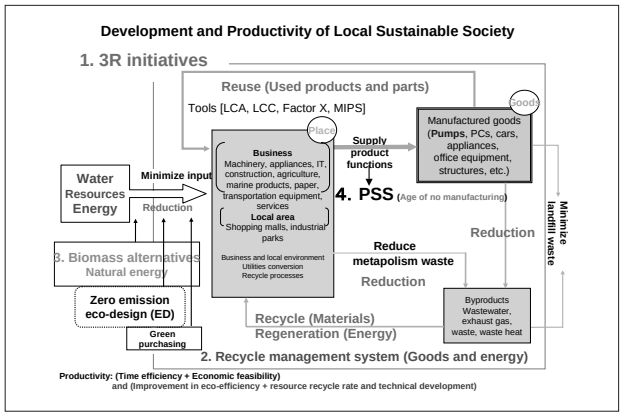
We have come to the point today that residents, NPOs, businesses, and local and national governments must come together and do something. The individual can start by changing his/her lifestyle, and learning and thinking about the environment and energy. And, we should introduce renewable energies (natural energy and biomass) in great amounts. Of course, before all of that, energy conservation is essential, so while conserving energy on the one hand, we should be widely introducing renewable energies on the other. The national and local governments must develop an energy framework and must design and build systems to enable this. In Germany, laws allow power enterprises to buy wind power at ¥150 per kW and solar power at ¥80 per kW. This may be difficult for Japan to do, but this fixed price system has fueled strong growth in the wind power and solar panel industries. Japan used to be the largest producer of solar panels, but they have since been passed by Germany. This is because of ¥80 pricing for generated solar power.

Nonetheless, we need to think a little bit more as to whether or not cost alone is a sufficient measure. If renewable energies and biomass are used, it is necessary to think of various elements and their combinations such as natural eco-systems, social systems and local culture. We need to transform the society into thinking of measures and standards in these kinds of terms.

Next, "local energy production and consumption" will become more necessary. Take Kobe Port Island for example; one might think that energy cannot be produced in Port Island, but energy can be recovered from wind and tidal currents, sunlight, small hydroelectric plants, waste incinerators and sewerage treatment plants. Under this thought, several small power plants could be built on the Port Island. Energy would be produced as best possible in Port Island and consumed there as well. Moreover, this kind of local energy network will be needed. What's more, not just electric power but heat as well have to be effectively utilized. With IT as advanced as it is today, it should be sufficiently possible to connect and automate all of these small power plants. This will become a type of independent decentralized energy grid. The distribution technology and management technology for this kind of system will be extremely important in the future.

As shown here at the bottom of the slide, by connecting a large computer to a workstation, connecting the workstation to a personal computer and connecting many personal computers, the network acts like a super computer. In this same fashion, Kansai Electric Power Company - for example - would not endlessly draw 1 million kW of power from Tsuruga, but a micro-web network would be built of supplies of a few thousand kW to 100,000 kW from IPPs (Independent Power Producer) and medium size power plants, and 3 kW supplies of stand alone and natural energy-driven home generators. Because it is micro in size, if small power plants of a few kW to 1,000 kW are all connected, it gets to be rather interesting and environmental load can be reduced. The plants would be connected like a spider's web.

3 Building Sustainable Local Societies and Social Productivity



Slide ③

Thinking along these lines, the building of a sustainable society is closely linked to the eco-business.

On the far left of this slide are water, resources and energy, but this water, resources and energy are supplied to living and industrial "markets", and the businesses and communities at the center of the slide conduct various activities with them.

As a result of these activities, businesses produce a variety of products such as pumps, personal computers and automobiles. At the top of the slide, used products and parts are "reused" and returned to the "markets". In this process, thoughts may raise as to whether recycling is better or reuse is better, which will require various tools such as LCA (Life Cycle Assessment), LCC (Life Cycle Cost), Factor 4 and Factor 10. This kind of composition will be necessary in as far as possible.

When reuse is not available, there appear byproducts other than the pumps, personal computers and automobiles from the "markets". Moreover, in the production process, metapolistic waste appears. Accordingly, wastewater, exhaust gas, solid waste and waste heat are generated as byproducts, indicated in the lower right-hand corner of the slide.

From here on into the future, materials will be recycled and, when that cascading is not possible, these materials will either be gasified or incinerated to generate power. Heat supply will be adopted in a regenerative form.

The first thing is that the government claims the keyword of "3R Initiative". The input of water, resources and energy is to be reduced. If something cannot be reused, then it should be reduced to minimize landfill. The means are reuse, recycling and reduction. This is the first and foremost point.

There is a complicated flow to undertaking this 3R Initiative. The concept of a "circulatory management system" is necessary to count the inflow and outflow of materials and understand energy flows. In addition, in order to reduce the input of water, resources and energy, ideas and knowledge are needed. In this regards, as shown in the lower left-hand corner of the slide, we need to convert to renewable biomass and use more natural energies.

In these times where manufacturing is the norm, it is important to undertake activities with zero emissions and eco-design in mind from the very beginning. And, by buying green products when making purchases, we can get closer to a sustainable society.

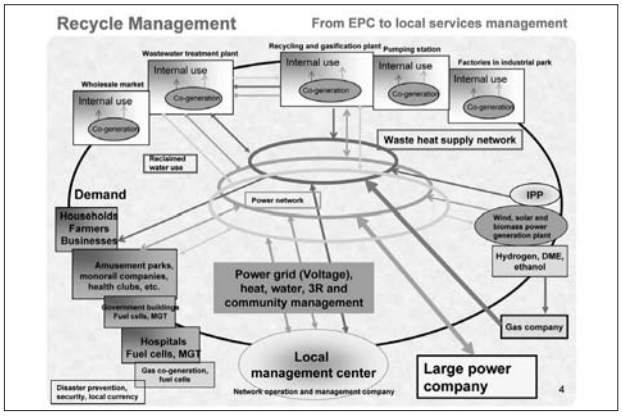
At the beginning of my report, I stated that "the 21st century would be an age of minimal production", but many materials will be used and reused, and the concepts of PSS (Product Service System) and servicizing at the center of the slide will also be important.

Until now, businesses have emphasized labor efficiency and economic performance, but in addition to this, environmental efficiency and resource recycle rate will have to be considered when developing technology and management systems. It will be important to discover business opportunities within the keywords of "3Rs", "circulatory management", "biomass alternative (renewable energy use)", and "PSS".

4 Energy Management and Urban Development in Kanazawa-ward, Yokohama City

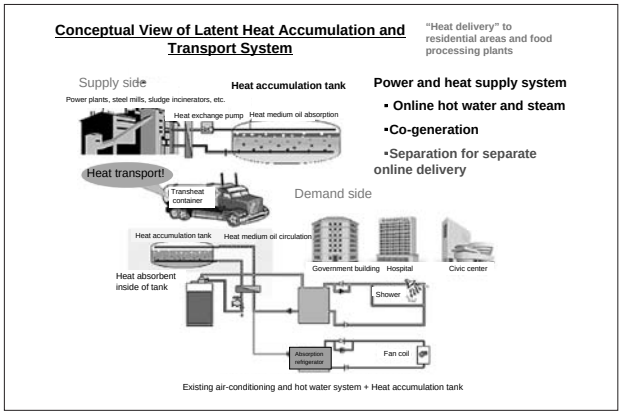
I am currently involved in community management activities of Kanazawa-ward, Yokohama City. The industrial park is about 200 hectares in area and, in spite of many vacant lots, there are 900 businesses. There is an incinerator and a sewerage treatment plant that treats about half of the sludge of Yokohama's 3.6 million people. This kind of facility has the materials for producing energy, therefore power and heat generation are possible. Using the level differences between water tanks of the sewerage treatment plant, a small hydroelectric plant can be built. Moreover, wind power can be generated because of its coastal location. A single large factory can occupy 10 to 15 hectares; therefore a large solar power generation system can be built on the roof. These kinds of projects are shown in the next slide.

Here, if there is electric power, warm water and a sewerage treatment plant, reclaimed water can be produced. A large company of the likes of Tokyo



Slide ④

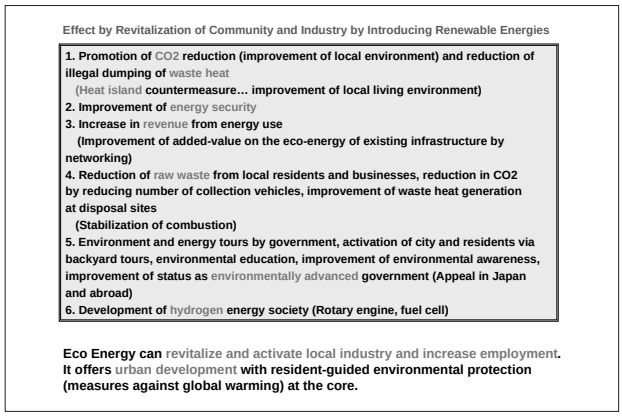
Electric Power Company or Tokyo Gas would spearhead the business, but as shown in the slide, energy would be obtained from various sources including small power plants, IPPs, wind power, solar power, small hydroelectric plants and biomass power, and passed on to users. This will require management technology for simultaneously collecting and supplying a constant amount of energy across 200 hectare area, but because IT is advancing, it should be possible in this age and time.



Slide ⑤

In this way, power and heat can be exchanged without using much fossil fuel. Because pipeline costs come into play with heat supply, heat would be supplied offline. For example, heat could be supplied from an incinerator to a hospital or heat could be delivered to the hospital by loading chemicals such as sodium acetate into a tanker truck, storing the generated heat there and then delivering it to the hospital. These kinds of services are starting up around the world and already several examples are known. The day is near that this will come to Japan, too.

To handle this, a "local management center" will be necessary. The local area could possibly be widely industrialized. By applying IT and managing transportation such as bus-on-demand, car sharing, park-and-ride and joint shipping, it is possible to reduce greenhouse gases by a considerable amount across 200 ha area. Also, IT makes disaster prevention, security and crime prevention possible. Furthermore, within all of this, large greenhouses like the one Mr. Akaike mentioned could be built and local money could be used to keep them working. The money earned from production could be spread around to heated pools, etc. Managing operations like this has all sorts of merits.



Slide ⑥

Management as I just described can greatly reduce greenhouse gases. It will also prove effective against the heat island phenomenon because various forms of waste heat, which includes also illegal dumping, can be wisely utilized offline. Moreover, from the perspective of energy security, with oil prices at $60 to $70 a barrel, the management structure shown two slides back becomes a viable and interesting possibility.

Also, wind and solar power are very expensive to produce. To generate 1 kW of power, it costs about ¥20 for a large wind farm, about ¥30 to 40 for a small wind farm and about ¥60 for solar power. Given that home users buy power at about ¥22 per kW, the cost is very high. However, the cost could gradually come down if a system like was mentioned about Germany

earlier would fix a high purchase price for power, because this would promote and spread the industry. The point here is how long people can wait until this system is realized and how much they can cooperate to build it.

As indicated by the item 4 of this slide, everyone can cooperate in reducing raw waste and, if methane fermentation is used, the generated gas can be used not only for power generation but also as a fuel for methane vehicles. Compact methane-driven cars are running in Yamada Town (now Kotori City), Chiba Prefecture. It is also possible to run forklifts on methane gas. But, it is expensive. To reduce costs, everyone's knowledge inputs and cooperation becomes essential.

5 Summary

To introduce renewable energies, we need to think up new schemes. If people act, at ¥1 per person per day, that's ¥365 per year per person. If the 1 million people of Kobe can cooperate, they can collect about ¥400 million. If we can add this to widespread subsidies from the Ministry of the Environment for solar power systems, systems capable of generating 1,000 to 1,500 kW a year can be installed. That can reduce greenhouse gas emissions greatly. And, a coordinator who can manage all of this will be important. Planning is needed and institutions like IGES Kansai Research Centre can become a knowledge database center for the environment and energy. It will be very important for the future to create a council like the Environment and Energy Councils of Kobe and Hyogo Prefecture, gain the participation of residents and NPOs, and jointly promote activities.

IGES Kansai Research Centre International Symposium on "Business and the Environment"

Environmental Business for Regenerating Society

～The Environment at the Center of Urban Development and Industrial Revitalization ～

The 21st century will be an era without manufacturing.

Sustainable societies will be developed via the wisdom of management.

The environment and local communities will be revitalized on the efforts of residents.

Super sophistication in the energy industry and make it into clusters

Feb. 3 (Fri), 2006
Venue: Kobe Portopia Hotel

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Slide ①

1. My understanding The environment and energy are trade-offs.

★Global warming has begun. → Reduce emissions of greenhouse gases!

★Set targets for 2030. → By backcasting

★Now, action should be taken by local and national governments, residents, NPOs and businesses!

- System design and building (Legal, financial)
- Changes in lifestyles
- Start by learning, thinking and doing what is possible as a group.
- Wide-scale introduction of renewable energies (Natural, biomass)
- Technical development

Standards and indicators (Considerations for natural eco-systems and social systems)

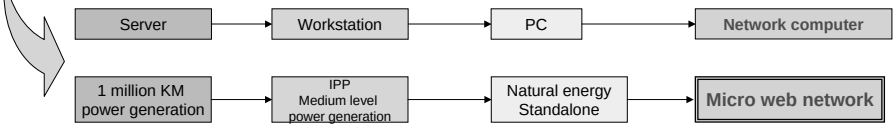
2. Studies of local energy production and consumption

★Development of local energy networks
From location to area, from area to network

★Interchange of power and heat
Effective use of heat in addition to energy

Autonomous · Decentralized

Energy distribution technology and management methods are the key!



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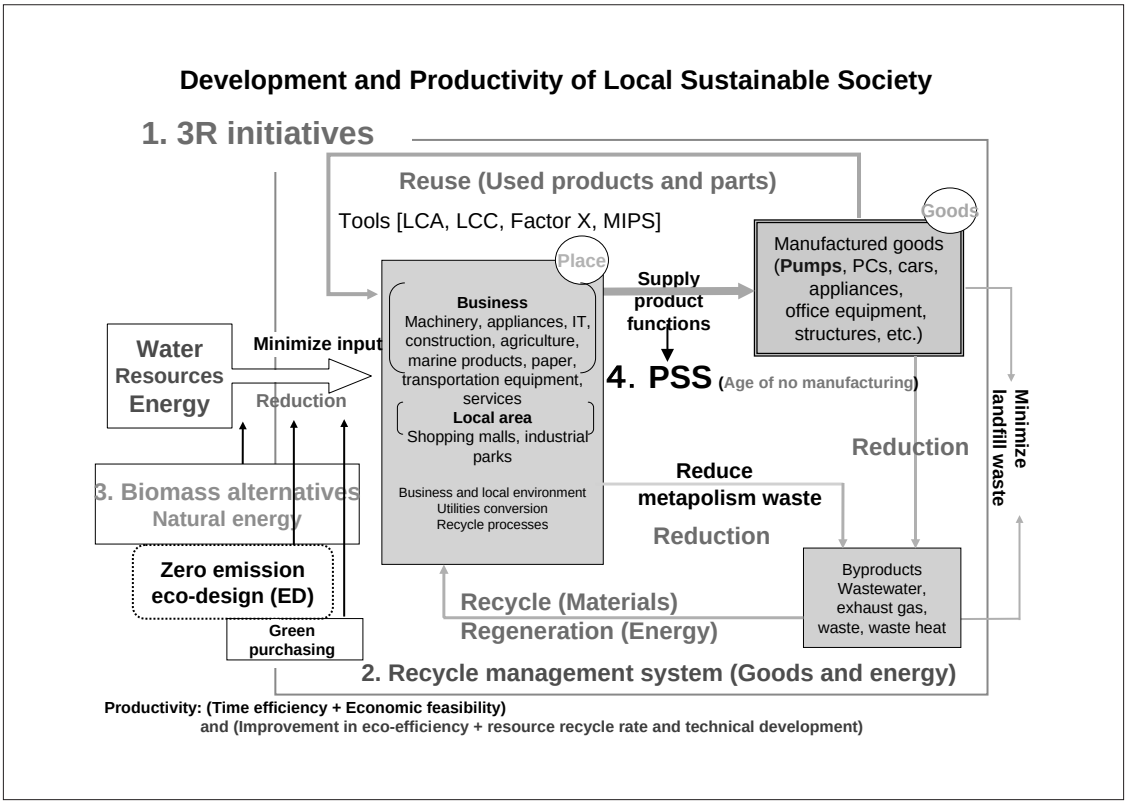

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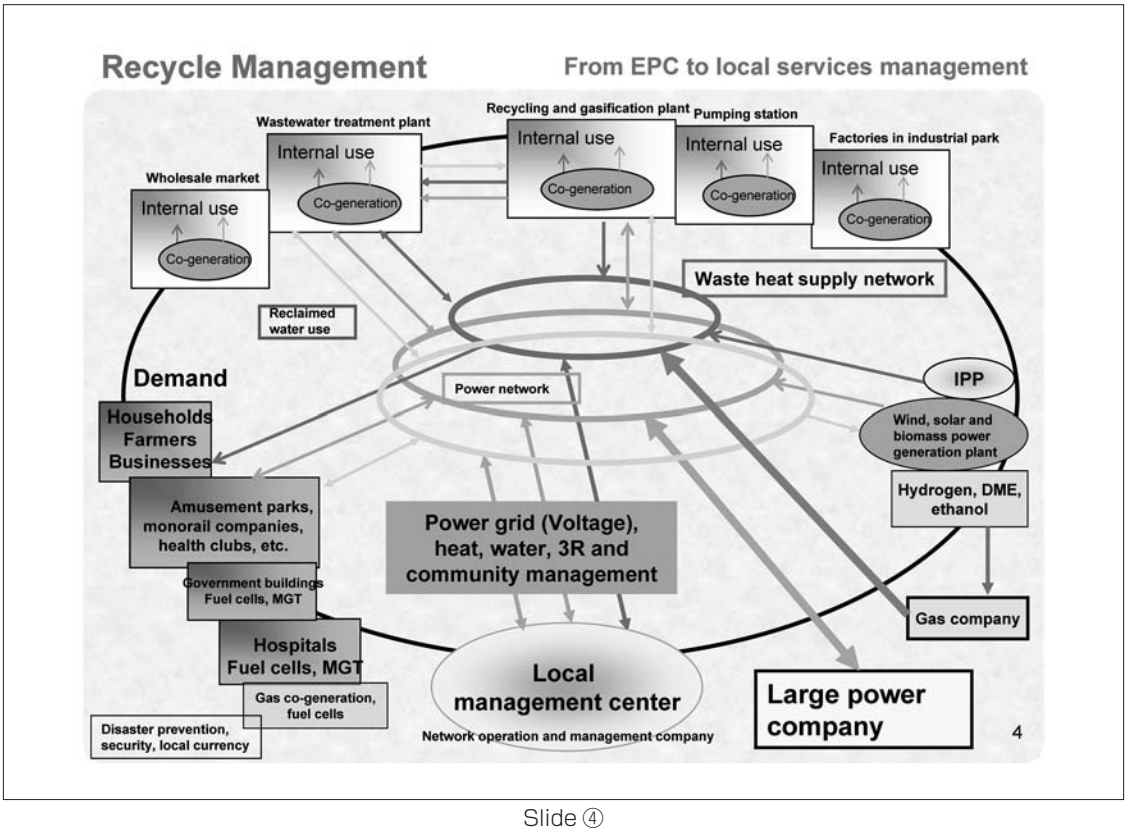
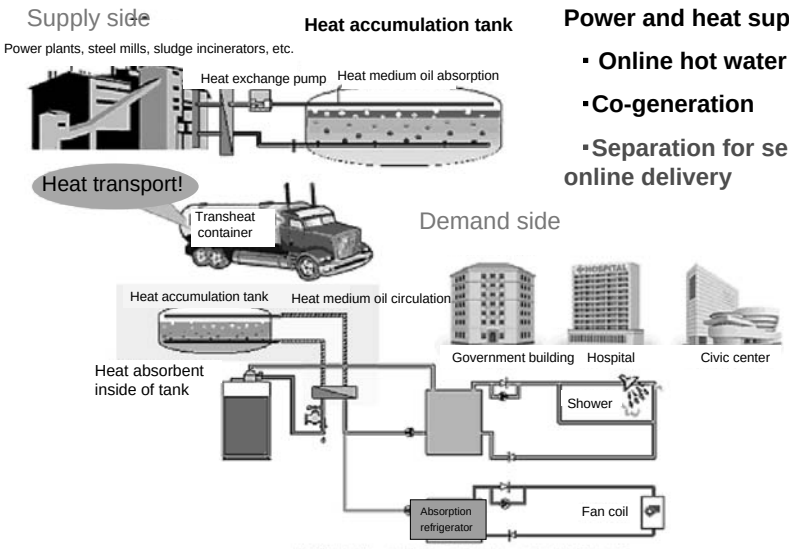


Slide ④

Conceptual View of Latent Heat Accumulation and Transport System

"Heat delivery" to residential areas and food processing plants



Power and heat supply system

- **Online hot water and steam**
- **Co-generation**
- **Separation for separate online delivery**

Existing air-conditioning and hot water system + Heat accumulation tank

Slide ⑤

Effect by Revitalization of Community and Industry by Introducing Renewable Energies

1. Promotion of CO2 reduction (improvement of local environment) and reduction of illegal dumping of waste heat
(Heat island countermeasure… improvement of local living environment)
2. Improvement of energy security
3. Increase in revenue from energy use
(Improvement of added-value on the eco-energy of existing infrastructure by networking)
4. Reduction of raw waste from local residents and businesses, reduction in CO2 by reducing number of collection vehicles, improvement of waste heat generation at disposal sites
(Stabilization of combustion)
5. Environment and energy tours by government, activation of city and residents via backyard tours, environmental education, improvement of environmental awareness, improvement of status as environmentally advanced government (Appeal in Japan and abroad)
6. Development of hydrogen energy society (Rotary engine, fuel cell)

Eco Energy can revitalize and activate local industry and increase employment. It offers urban development with resident-guided environmental protection (measures against global warming) at the core.

Slide ⑥