

Keynote Speech 2

Perspectives of Socio-Economic System Innovation: Messages from BSS Project

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We heard shortly ago from Michael Kuhndt an international perspective of what businesses can do for a sustainable society, and especially he spoke of poverty problems and social problems in developing countries. We heard about some business models in which businesses are trying to do something about environmental problems via markets and profitability. And, he spoke about what sort of roles that business is playing in a sustainable society. My presentation will be about our research project -- the BSS project that looked at business for a sustainable society over the past three years -- and what sort of new business models must be developed. I want to bring all of that together under the single perspective of how we should connect and develop the research results of our BSS project.

Right now, our researchers are summarizing their work in the BSS project and we hope to announce reports to everyone sometime in March,

so I will be giving an interim report today.



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Within an international context, today's theme of "sustainable consumption and production" began, as you well know, at the Earth Summit (United Nations Conference on Environment and Development) of 1992. From that came Agenda 21, which spelled out thoughts and ideas on changing economic activities and consumption and production patterns, which have a serious impact on the environment. In order to study how to change those production and consumption patterns into sustainable systems, the Johannesburg Summit of 2003 came out with a ten-year framework of programs on sustainable consumption and production for developed countries to promote. Moreover, the Marrakech Process that Michael Kuhndt spoke about earlier added activities that support developing nations via international cooperation.

Of course, the Kansai Research Centre should

basically propose business models that enable sustainable consumption and production, that is to say, a sustainable society, by making policy proposals to Asia. Today, however, I would like to report results from research into Japan.

While international plans and projects are underway for sustainable production and consumption, former Prime Minister Koizumi of Japan, as you know, reported at the 2004 G8 Summit in Sea Island, USA, Japan’s launch of a 3R Initiative as an international contribution and the holding of regular annual meetings since 2005.

2. Sustainable Production and Consumption (Domestic)

- 2000 Fundamental Law for Establishing a Sound Material-Cycle Society
- 2003 Fundamental Plan for Establishing a Sound Material-Cycle Society
→ Johannesburg “10 Year Framework “
- 2005- 3R Initiative

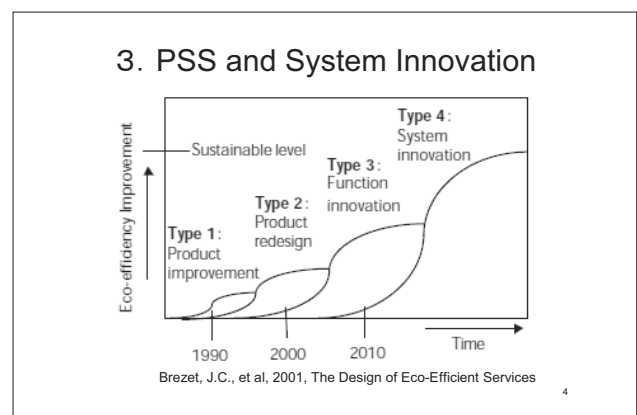
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Japan has adopted a Fundamental Plan for Establishing a Sound Material-Cycle Society in 2003 to materialize the program of sustainable consumption and production set forth in the Fundamental Law for Establishing a Sound Material-Cycle Society enacted in 2000. This Fundamental Plan is a 10-year plan starting in 2000 and ending in 2010, therefore Japan used it as the framework plan at the Johannesburg Summit. As you already know, this Fundamental Plan targets about twice the resource productivity, about twice the cyclical use rate and about half the final disposal volume. And, as I mentioned earlier, since 2005, conferences on the 3R Initiative have been held on the international level given the nation’s experience with these activities.

Along these lines, the issue of reducing envi-

ronmental load in economic activities today lies basically on the supply side -- production. Given that, amongst the various types of economic activities, environmental load is the highest in production activities. The Ministry of the Environment and the Ministry of Economy, Trade and Industry are implementing programs to reduce the environmental load of business by promoting policies on environmental business and environmental management, which you would hear later.



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Definition of System Innovation

System Innovations for Sustainability:
a set of innovations that provide a service in a novel way or offer new services, involving a new logic (guiding principle) and new types of practice, and giving rise to a step change in several of the dimensions of sustainability

M. Weber, et al., 2006, *System Innovations in Innovation Systems*, Chapter 35 of “Perspectives on Radical Changes to Sustainable Consumption and Production”, Proceedings of SCORE Workshop April 2006

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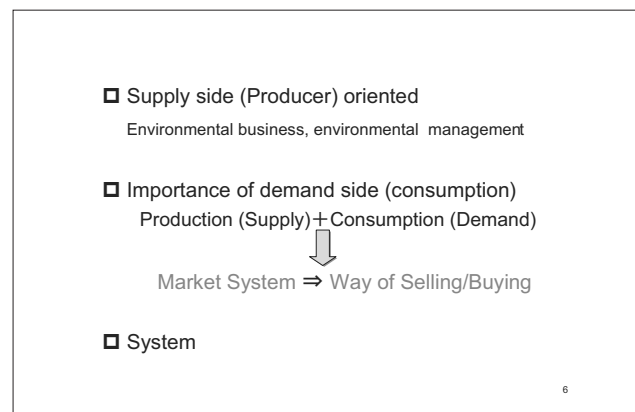
In that, they are promoting, first and foremost, product improvements shown here as Type 1 and product redesign shown here as Type 2, which is referred to as “design for the environment,” or DfE. At the center of our research is the application of innovation to production and production processes aimed at simultaneously reducing environmental load little by little not

just on the supply side but also on the demand side, by changing how products are sold on the market, or, in other words, by changing market systems to low environmental load. To do that, it is necessary to revolutionize how products are sold and purchased, and supply also services and functions as opposed to selling products. That is the function innovation of Type 3 here, at which stage environmental load is reduced in new ways, that being to sell services and functions rather than products. In engineering terms, our research looked at dematerialization that enables environmental load reduction and resource conservation, while still ensuring economic activity.

This same research has been done in Europe and the USA since about the mid 1980s. Europe promoted research into mainly Product Service Systems (PSS), while the USA delved into function innovation as a business model known as “servicizing.” Accordingly, research is transitioning from the function innovation of Type 3 to the system innovation of Type 4. Core research is starting to look at what new systems can be applied to current market systems, or, in other words, how to change our socio-economic systems. From the viewpoint of current research, it is a considerable jump to go from function innovation to system innovation. They say a revolution is needed to move to the next stage.

Two noted persons by the name of Abernathy and Clark gave a straightforward representation of this by classifying innovation into categories. According to them, there are four innovation categories, drawn from dual vertical axes for current markets and current customers, and the development of new market relations and customers, and dual horizontal axes for current technologies and new technologies. If, in the current market, current customers are partnered with current technologies, the only direction is to gradually improve the environment and develop

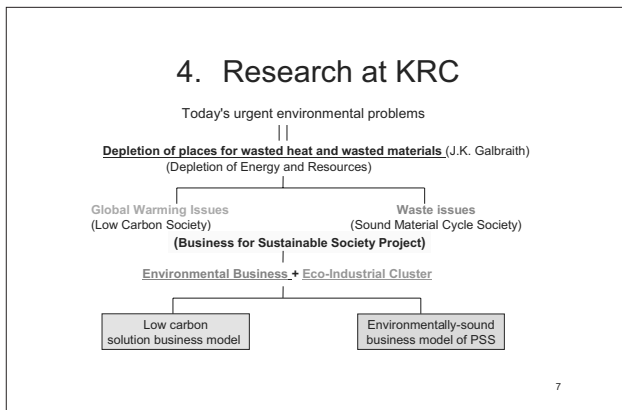
new business. Using existing technologies to build new customer relations or create new markets is, in a certain sense, tantamount to a niche market. This is not the big jump I was talking about earlier, therefore it will not play that big of a role. In contrast to that, supplying new technologies to current markets and current customers is, in a certain sense, tantamount to technological innovation, but it won’t work. System innovation is about how to create new markets and find new customers for new technologies. This is an important part of system innovation. Abernathy and Clark classified it as the creation of an architectural market. For this reason, as I said earlier, research must not delve solely into the supply side, but also include the demand side. As one area of basic research for bridging this divide, we have studied potential business models that will accompany this function innovation.



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As I just explained, system innovation is defined as the creation of markets that provide new products and services that can radically change society to a new dimension. And, it is important to create new logic and practices for that market. In our research, we sampled and identified new business models that accompany function innovation.

Two environmental problems that require



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urgent address at the beginning of the 21st century are global warming and waste. With global warming, it is a question of stopping it all together or trying to stabilize climate change. Later today, Mr. Kamagata of the Ministry of the Environment will explain various policies, but in order to build a low carbon society, it is up to industry and business to build new business models and develop markets. As for the other major problem, the question is how to build a recycling-oriented society that can deal with waste. Later today, Dr. Ikeda of the Ministry of Economy, Trade and Industry will speak about individual policies.

This Business for Sustainable Society (BSS) project looked for ways for industry and business to contribute to solutions to the urgent problems of global warming and waste, and what sort of business models were needed to enable those contributions. To do this, we not only looked at business models of individual companies but also business for wide areas and communities. One of these was the environmental business. This did not focus on not only markets but also on ways to develop environmental community business in today's socio-economics. Mr. Yasuhiro Kanda will talk about this later today.

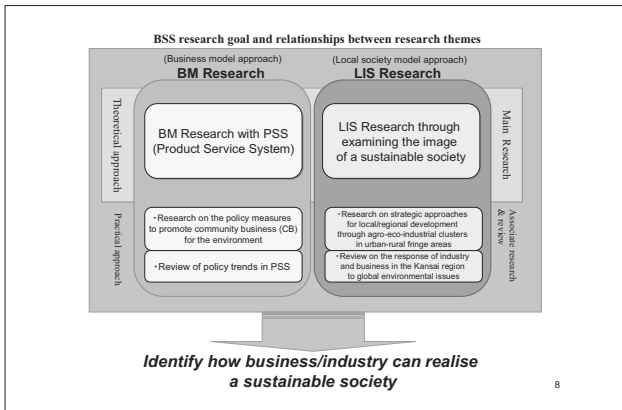
As for eco-industrial clusters that served as the theme for our International Workshop last autumn, everyone knows about Japan's eco-town

policy. Dr. Ikeda will speak about this later, but Japan's eco-towns are industrial parks that try to reduce environmental load mainly of the manufacturing industry. However, when considering development in Asia, the manufacturing industry is not always the focal point. Still yet, the core is the primary industries of agriculture, forestry and fishery. Nevertheless, these industries are in gradually decline and, as rural populations migrate to urban areas along with an economic development, various employment problems are arising. Therefore, when thinking along the lines of eco-industrial clusters in Asia, we did case studies in Vietnam, Thailand and India to identify the potential of Asian eco-towns at the point of interface, that is to say, the boundary between agricultural villages and urban areas, and mountainous regions and urban areas. Our research is looking at what business and industrial activities have been geographically developed outside of market areas.

One of the main subjects to be talked about today will be how to reduce CO₂ emissions for a low carbon society and how to build business models that fix global warming. Mr. Yusuke Matsuo is researching this. Another business model that we have researched is Product Service Systems (PSS) that aim to reduce waste, minimize environmental load and conserve resources. As a part of that, it is very important to sample and identify current business models in Japan and determine what is available for application to new systems.

As I have pointed out, we have two primary research themes. One researches PSSs and similar business models that focus on waste problems and dematerialize resources, in order to find ways to contribute to a sustainable society. The other, written here, looks at how resulting environmental load, especially CO₂ can be dealt with

in community models.



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- International Workshop 2004 on "Business and the Environment"
"Environmentally-sound Business Model - Potential of PSS for Sustainable Production, Consumption and Supply Chain" (16 November, 2004)
- International Symposium 2004 on "Business and the Environment"
"Prospective Directions of Sustainable Society - Roles and Possibilities of Industry, Technology and Community" (17 November, 2004)
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- International Symposium 2005 on "Business and the Environment "
" Environmental Business for Regenerating Local Society " (3 February, 2006)
- International Workshop 2006 on "Business and the Environment "
" Eco-Industrial Clusters Leading to Sustainable Local Development of Asia Experiences of India, Thailand, Viet Nam and Japan " (26 October, 2006)

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These results are announced every year at International Symposiums and Workshops that we have staged. Here at the bottom is one I mentioned earlier: an International Workshop on “Eco-Industrial Clusters Leading to Sustainable Local Development of Asia” headed up by Senior Policy Researcher Dr. Anbumozhi and held just last autumn. Last year, we conducted and shared research into the environmental business for regenerating local society and, the year before that, PSS and sustainability visions and the environmental business, for the purpose of fomenting exchange amongst developed countries.

Therefore, to begin with, I would like to talk about the research we promoted that focused on the solution business for global warming.

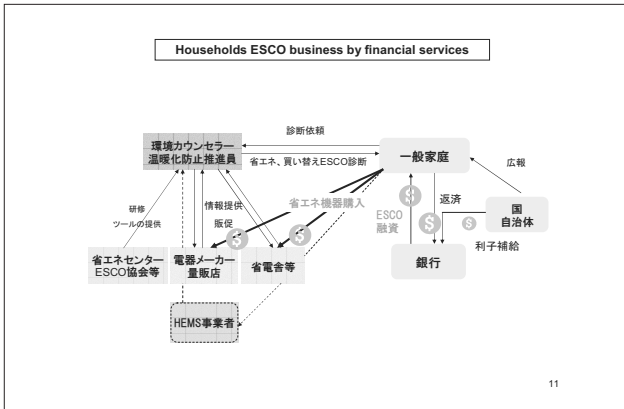
5. Low Carbon Solution Business Model

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When we thought about sustainable social systems and global warming, the severity of the situation came to mind, given that the Stan Report, James Lovelock’s The Revenge of Gaia and Al Gore’s “An Inconvenient Truth” are widely known. We also thought about whether Japan can attain sustainable development using the current business-as-usual approach; sustainability in the year 2100 cannot be achieved without reducing CO₂ emissions by 50%, which actually needs to be reduced by 80%. Keeping in mind to a certain degree that it cannot be achieved, we began thinking about what technologies and social systems could lower environmental load and enable us to attain sustainability.

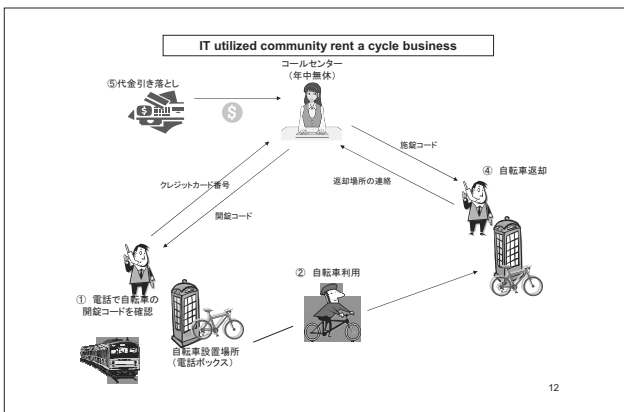
For starters, we used simulations to hypothesize technologies of low environmental load and created some visions from there. Then, we pinpointed a few global warming solution businesses to fill the gaps. Within that, the energy issue is something that needed dealing with, so we raised six business models. When it comes to energy, models must be built for the home sector, for the transportation sector and obviously for the energy supply sector.

One proposal that came forth for the home sector was “household ESCO business by financial



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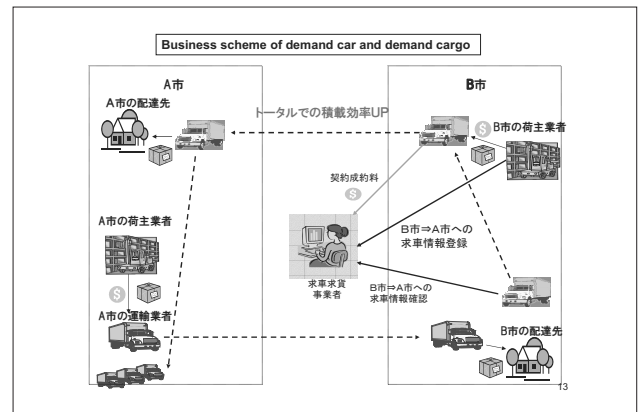
services”. Many ESCO business models for industry have been seen to date, so there is a pretty good market. As I will show you later, ESCO projects are being studied and implemented from a PSS perspective because of their potential. The idea here is to promote this in the home, and how to introduce energy-saving equipments to general household is an issue. Because it will be expensive no matter which they choose, efforts will be needed to diffuse this model. The truth of the matter is that several banks are shaping this business model into something feasible.



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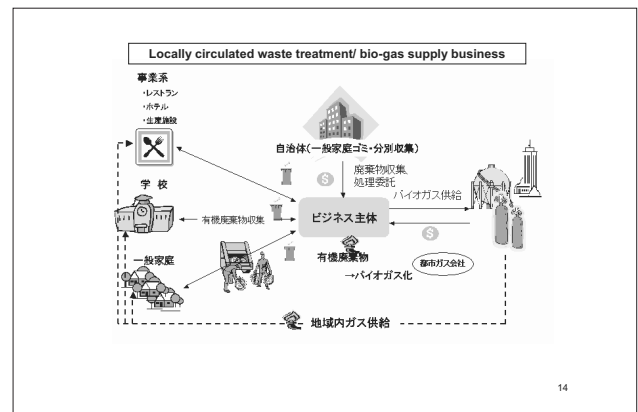
The second business model is for the people transportation sector and logistical transportation sector. A meaningful system for people to move about traffic is the community rent-a-cycle business. It proposes a way to provide low envi-

ronmental impact bicycles between public transportation and one’s home. This business model is your typical “bicycle rentals” or “call-for-cycles” business, but it proposes an IT connection. To develop this model for Japan, a joint study group with Hanshin Railway and Hankyu Railway is looking to tailor the model further and little by little put it to use.



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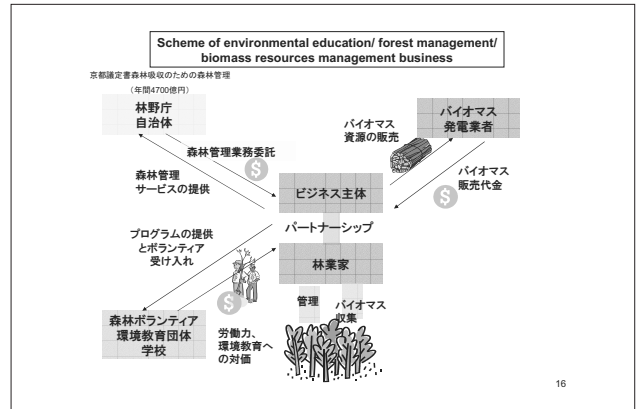
For the logistical transportation sector, a “business scheme for on-demand car and on-demand cargo” has been proposed. It matches shippers and deliveries on-demand in order to enhance loading efficiency. By enhancing loading efficiency, it should be possible to reduce vehicle traffic.



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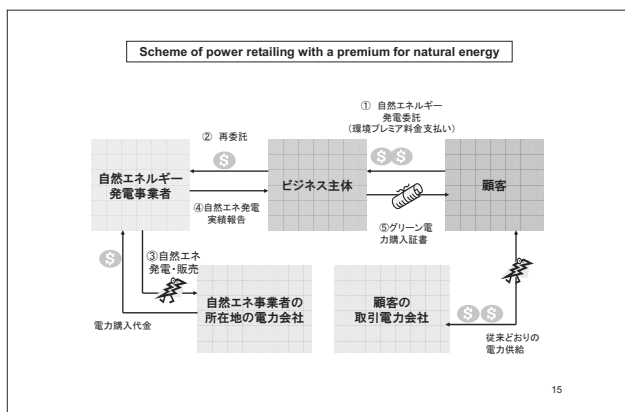
Three proposals have been raised for the energy supply sector. The first is to convert waste into biogas, so, after waste is collected, it

is converted into biogas instead of incinerating or burying as is usually done. As you probably know, used tempura oil is refined into bio-diesel fuel in Kyoto city, but the glycerine by-product is a serious issue standing in the way of wide-spread development. Biogas is a good solution to this glycerine issue. By injecting glycerine into raw waste, eight time more methane gas than usual is produced. Using these principles, a comprehensive biomass business can be created by making bio-diesel from used tempura oil and fermenting methane gas by injecting into raw waste the glycerine that is generated in the bio-diesel process. In Kyoto, the municipal government is spearheading this project, but a council was launched into a consortium for developing and supplying biogas. With this as a reference, research continues into what business can do with this idea.



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In each of these cases, both the household ESCO business and personal transportation of the community rent-a-cycle system assume, rental, leasing and IT are the pretext. With the car and cargo on-demand business, the recycling business that converts waste into resources and wood biomass business of resource management, the business aims to reduce environmental load via CO₂ reductions, but they are in fact PSS or servicizing concepts, as well. Amongst the low carbon businesses, servicizing concepts show signs of growth potential.



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The second is a power retailing scheme with a premium for natural energy. This business model guarantees the supporting power generation performance needed to do business while emphasizing green power certification.

The third is a wood biomass business that manages biomass resources from wood waste by promoting environmental education and forest management.

6. Environmentally-Sound Business Model of PSS

The first thing we thought of in applying this PSS business model was to define it. This slide gives the definition set forth by the Dutch government. Considering that there was something wrong with this definition, we did some research

Product service systems & allied business models

- Product Service Systems are:
 - “a marketable set of products and services capable of jointly fulfilling a user’s ‘need’” *

The definition requires... a combination of products and services AND

That this combination can be offered for sale

BUT

The definition does not assume or require that PSSs are environmentally superior or that they result from a particular innovation process

*Policy Document on Environment and Economy, Government of the Netherlands

Traditional PSSs: Rent-a-car sento • coin laundry

“New” PSSs: car-sharing Chemical management • electronics leasing & takeback

Our focus

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and defined product service systems and servicing in a new PSS-Servicizing business model.

Product service systems & allied business models

- Performance-based “pure services”
 - Waste management
 - Energy services
 - Logistics management
- Recycling/remanufacturing-based business models
 - The introduction of a collection or re-processing service at end-of-life allows a waste to be transformed to a new product.
 - E.g., collection of food waste + composting → compost

called PSSs by some researchers, but the lack of a product creates an awkward fit with the PSS definition

OLD MODEL
End-of-life → disposal
for example: waste food → incineration

NEW MODEL
End-of-life → collection → new production process → new product
For example: waste food → collection → composting → vegetables & compost

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Already, servicing and PSS businesses, such as those shown here, have been developed even though they were not based on the previous definition, so we thought of eliminating them from the study. However, some researchers call them PSS, yet they generally do not fit the PSS definition. But, let me just reiterate that meaning: a “pure service” based on performance such as waste management and recycling, ESCO energy service. As energy itself is not a product, it doesn’t fall within sophisticated combinations of products and services. But we plan to include it in our categories by redefining it as PSS.

On recycling business models, this definition also includes businesses that do recycling of some

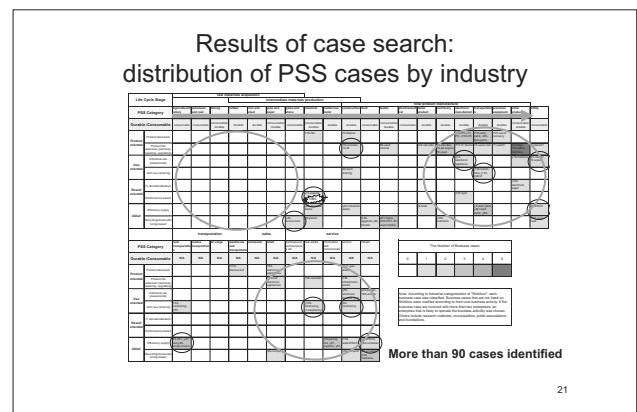
sort by adding new manufacturing processes to discarded resources.

Categorization of PSSs & allied business models

PSSs	Service in addition to product	Product oriented	Product take-back	Take-back Reuse & recycle
	Service substituting product	Use oriented	Product life extension	Extended guarantees Repair services Upgrading
		Result oriented	Individual use	Leasing Renting Sharing Pooling
Allied Business Models			Joint use	
			IT dematerialization Performance-based	
			Efficiency supply	Logistics Efficiency service E-commerce Matching
			Recycling & remanufacturing	

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After that, we attempted to categorize things in diverse ways as shown here and then studied business models in Japan to see which actually exist and fit into these categories. Literature surveys were the basic approach, and about 90 cases were identified.

A product lifecycle starts with a resource segment, then is manufactured and, then, the farther one goes in this direction, it nears consumption. This is close to a B-to-B business model, while this one is close to a B-to-C model. What is very peculiar here is that, in Japan, the manufacturing stage of the B-to-B business model is actually developed as a PSS. In comparison to that, business models centered on materials or, more specifically, PSS business models for chemical manage-

ment or resource management services, are not done like in the West.

Nonetheless, looking back over these three years, several business models that did not appear anywhere in literature at first have gradually sprung up in Japan. This is how we were able to get a picture of the PSS development in Japan.

In any case, as you well know, the original PSS model is not meant to reduce environmental load. Consequently, we had to identify amongst them green PSSs that reduced environmental load by conserving resources or working with waste. These are called “green PSSs” or “green servicizing.” Our job is to identify these business models and provide support in some way by finding a link to system innovation.

To identify these business models, we examined the business characteristics and features of 90 cases that were launched as original PSS, for the potential for reducing environmental load. To identify the business in general, driving factors and barriers for the PSS as a business success, business performance as indicated by earnings made from the introduction of the PSS model, customers, market information and so forth, we selectively surveyed and interviewed the businesses. We scored these businesses and selected 25 green PSSs.

Looked at firstly in terms of business profile, the performance-oriented PSS models such as ESCO, third party logistics and water conservation services grew each unto itself and developed a considerably large market. However, because of a shortage of specialized human resources, future growth is not expected.

With PSS models that involved product rentals or leasing, we actually looked at the Home Appliance Recycle Law and several other laws and regulations. As for the existence or non-existence of a regulatory system, if one complies with the system, OK, but if one violates the system, then

business could conceivably lose market share. Accordingly, with a business mindset aimed at capturing market share and drawing customers, and by observing the regulatory system, the product rental and lease market has come to be. Moreover, through our research, we have discovered that servicizing and PSS businesses that have foreseen potential regulations and taken steps prior to those regulations ever coming to be have emerged in Japan.

Another Japanese characteristic that differs from other countries is that, if such businesses attain a discrete level of success, what was started by the parent company is eventually spun off as a subsidiary. In Europe and the USA, and particularly in the USA, PSS models are basically outsourced and the general practice is for a capable specialist to create and pioneer the market while the parent company watches performance. However, our analyses showed that, in Japan, the business is started within the company and, only after it is established as a successful business, is it spun off as a subsidiary.

We, therefore, scored this business style for its reduction of environmental load in comparison to business-as-usual practices in order to analyze the sustainability of the PSS models. From the analyses of sustainability and business characteristics, we ultimately focused on seven categories by selecting green PSS models that balanced both the environment and economics.

Of these seven categories, the three performance-based business areas I mentioned earlier as having future potential – namely, ESCO, third party logistic and water conservation services -- have been partly outsourced and have started to develop considerable markets on their own. Furthermore, their future potential in our country is believed high. Nonetheless, as I mentioned earlier, one obstacle to future market growth that we encountered was the shortage of human

resources for these fields.

Another conclusion we made was the reason why these three performance-based PSS models were growing in Japan was that all three actually reduced costs and increased earnings while also reducing environmental load. These three models can be judged PSSs that have attained eco-efficiency on a balance of the environment and economics.



Unfortunately, any further promotion of these businesses must deal with the shortage of human resources and promotional strategies. In short, because they are performance-based, they must guarantee their performance. What provisions should they make and what business models should they create in the event they cannot guarantee performance? And, what kind of policy support should be provided? As a part of this research, we are looking at the tax code as to whether ordinary tax rates should be applied to profits off of PSS efforts or whether rates should be set lower in order to encourage business of low environmental load.

Moreover, for these PSS models to create markets more effectively, they need to target urban areas where businesses and population concentrate. Because the markets are larger, the PSS business has a better chance at being successful.

In contrast, this has not always been effective for PSS models aimed at product rentals and

maintenance. For the rental business to exist, given that it is ultimately a secondary or used product market, products must be durable, but the design-for-the-environment initiative that reduces inherent environmental load while enhancing durability is not working. In product rental PSSs, durability enhancement is hindering product redesign.

Also, customers on the whole have yet to understand PSSs. To foment understanding with customers, beneficiaries and the demand side in general, greater public relations on the total cost approach and policy are needed.

Moreover, as I said earlier, often PSS models are spun off as subsidiaries; they are not developed through outsourcing in Japan. Nevertheless, public procurements have started using private finance initiatives or PFI, outsourcing and outside contracting. In this area, public procurements and open bidding need to prioritize models of low environmental load by encouraging greater environment-friendly bidding within PFIs. From actual interviews, it was learned that those kinds of contracts are not currently used or the contracted period is too short.

Accordingly, when casting our thoughts towards systems and regulations, environment-friendly PSS businesses that reduce environmental load through business must be developed in order to aggressively promote outsourcing and green procurement. We are just now identifying businesses for a future sustainable society. We will include in our final reports policy proposals that will suggest how to further develop these possibilities.

What I have presented today are just tentative conclusions. Thank you for your attention.

IGES International Symposium on
Business and the Environment

2007.1.17

(FYI; Translated by Secretariat)

Perspectives of Socio-Economic System Innovation

- *Messages from BSS Research Project* -

Acting Project Leader, Business for Sustainable
Society (BSS) Project, IGES Kansai Research Centre
(Professor, Doshisha University)

Takashi Gunjima

Slide ①

1. Sustainable Production and Consumption (International)

- 1992 Earth Summit (UNCED), Rio de Janeiro (Brazil)
“Agenda 21”
Changes in Production and Consumption Patterns
- 2002 Johannesburg Summit (WSSD), Johannesburg
(South Africa)
“10-Year framework of programmes on
sustainable consumption and production patterns”
“Marrakech Process”
- 2004 G8 Summit, Sea Island (USA)
“ 3R Initiative”

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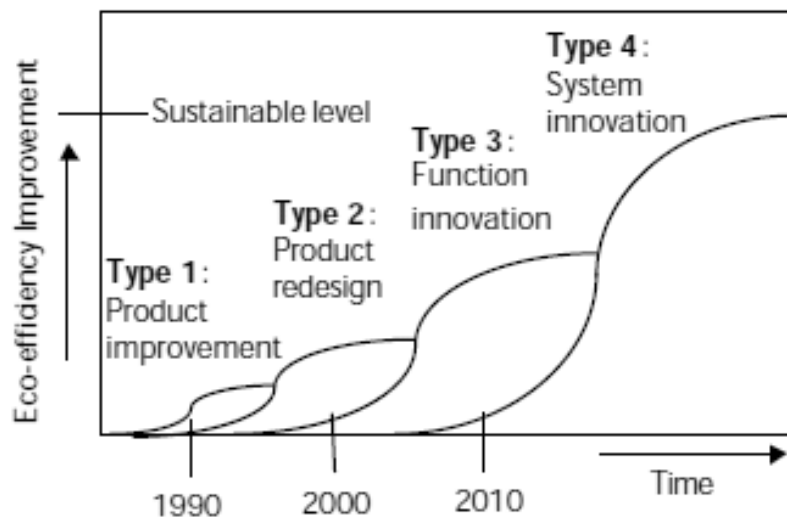
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- 2005- 3R Initiative

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Slide ③

3. PSS and System Innovation



Brezet, J.C., et al, 2001, The Design of Eco-Efficient Services

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Slide ④

Definition of System Innovation

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a set of innovations that provide a service in a novel way or offer new services, involving a new logic (guiding principle) and new types of practice, and giving rise to a step change in several of the dimensions of sustainability

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❑ Supply side (Producer) oriented

Environmental business, environmental management

❑ Importance of demand side (consumption)

Production (Supply) + Consumption (Demand)



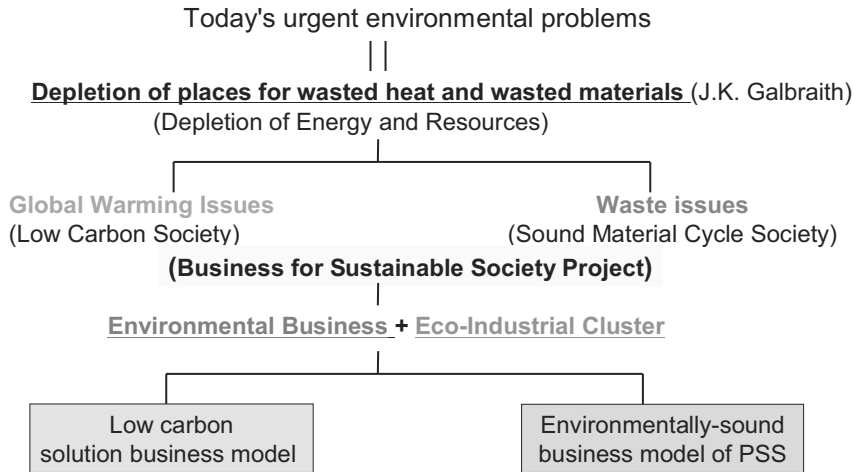
Market System ⇒ Way of Selling/Buying

❑ System

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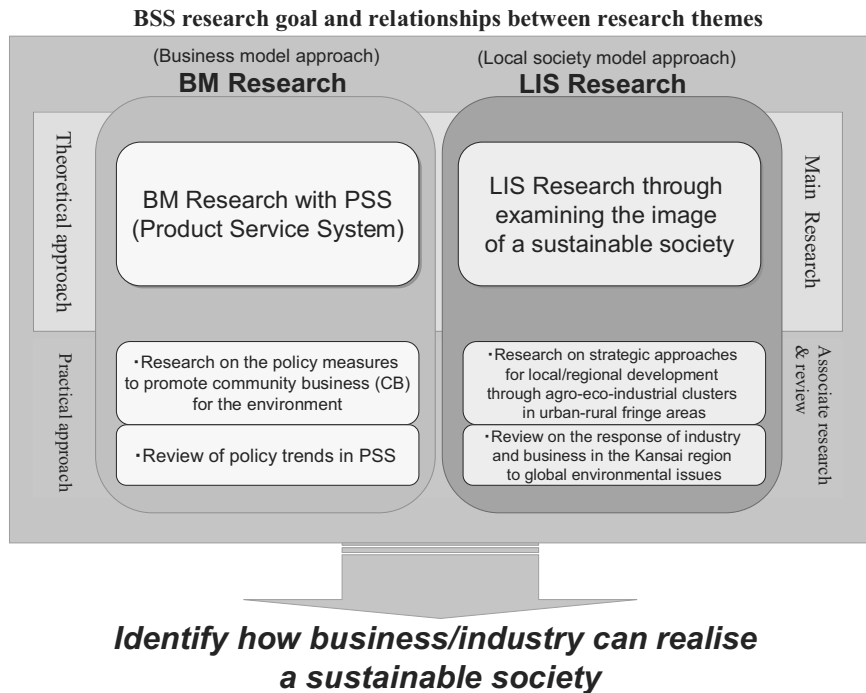
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4. Research at KRC



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Production, Consumption and Supply Chain" (16 November, 2004)
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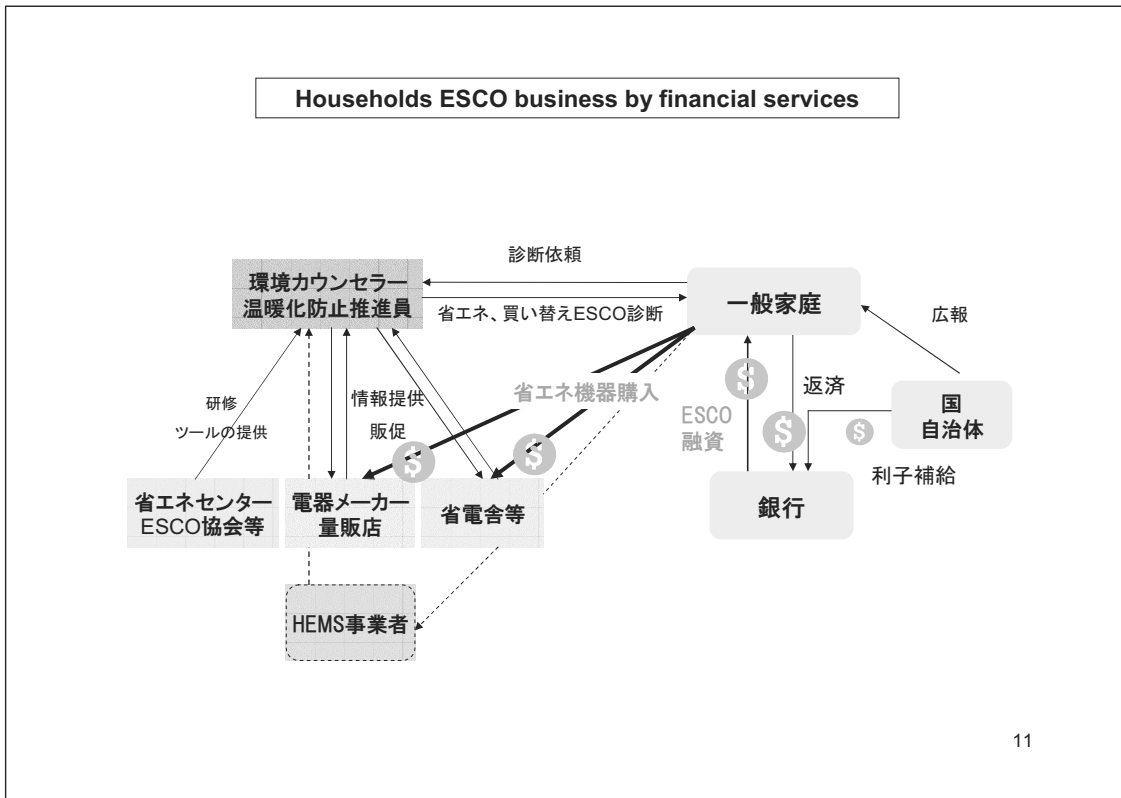
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5. Low Carbon Solution Business Model

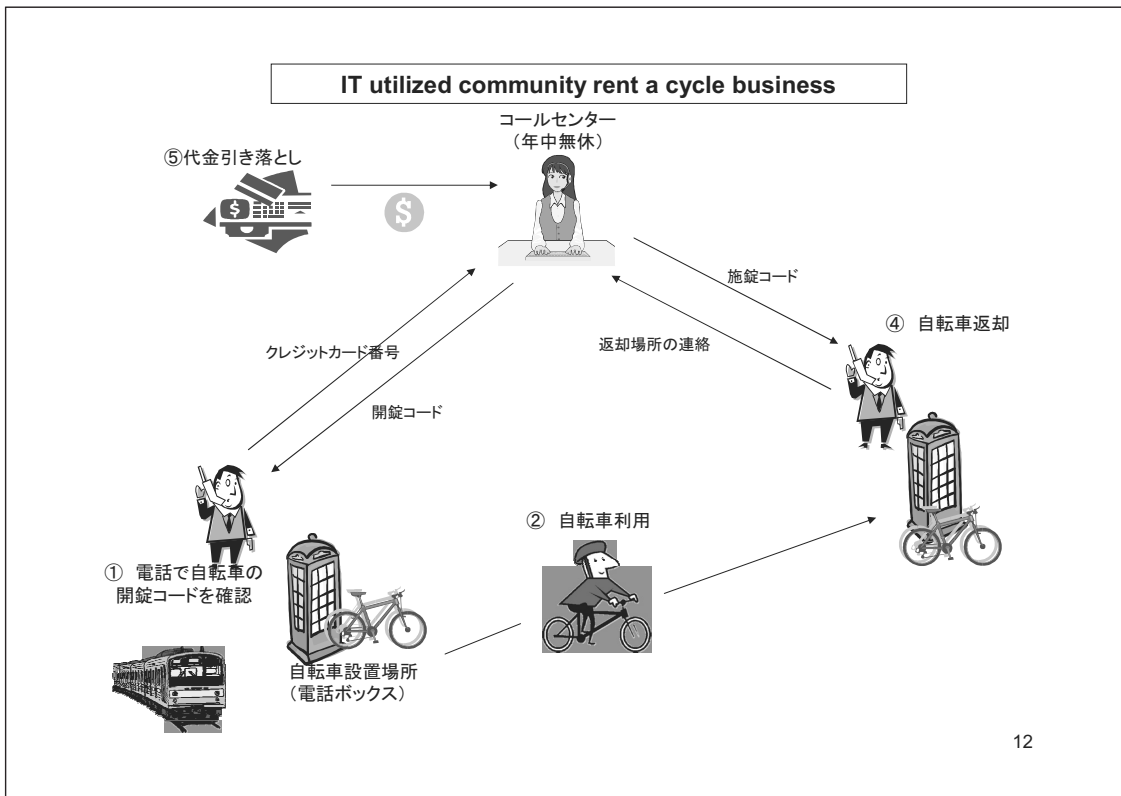
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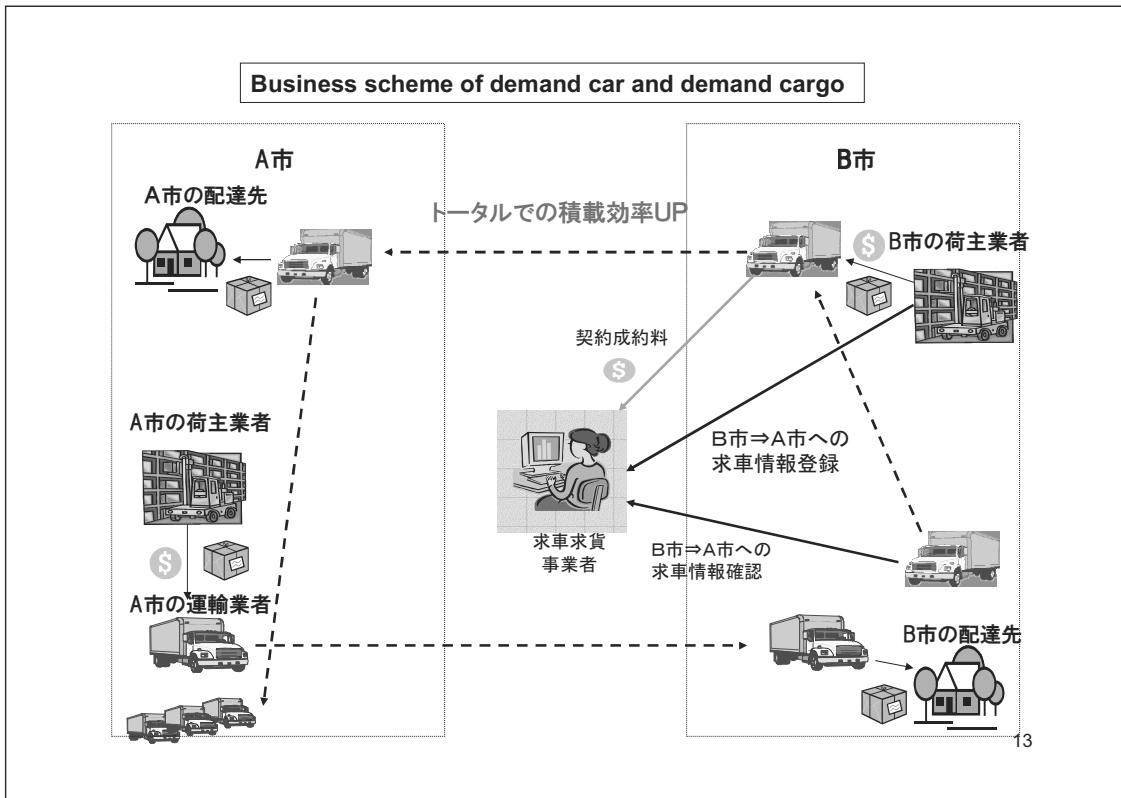
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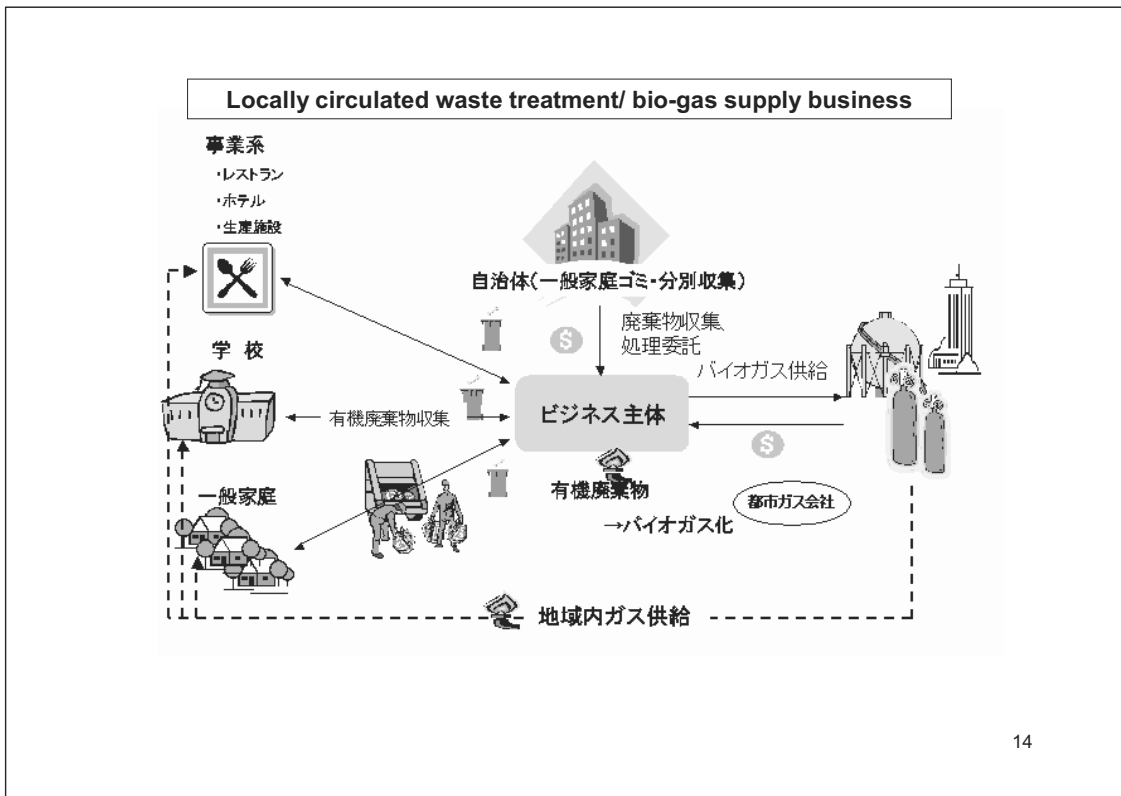


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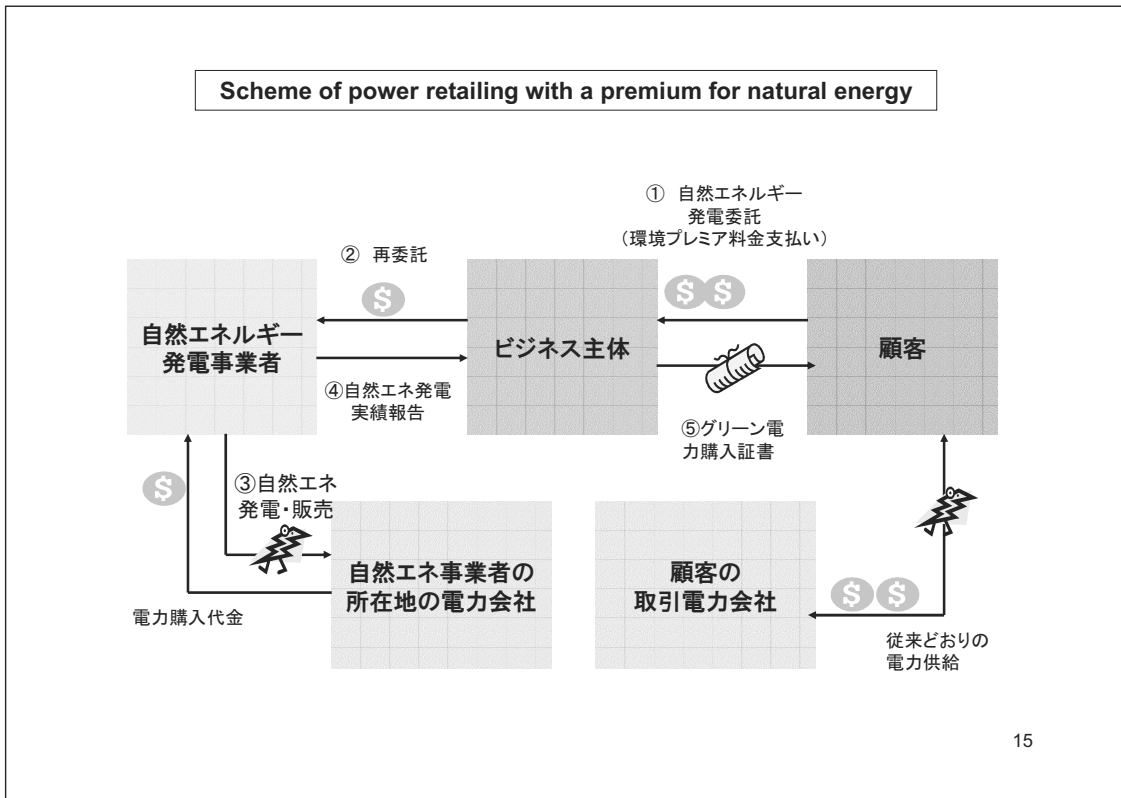
Slide ⑫



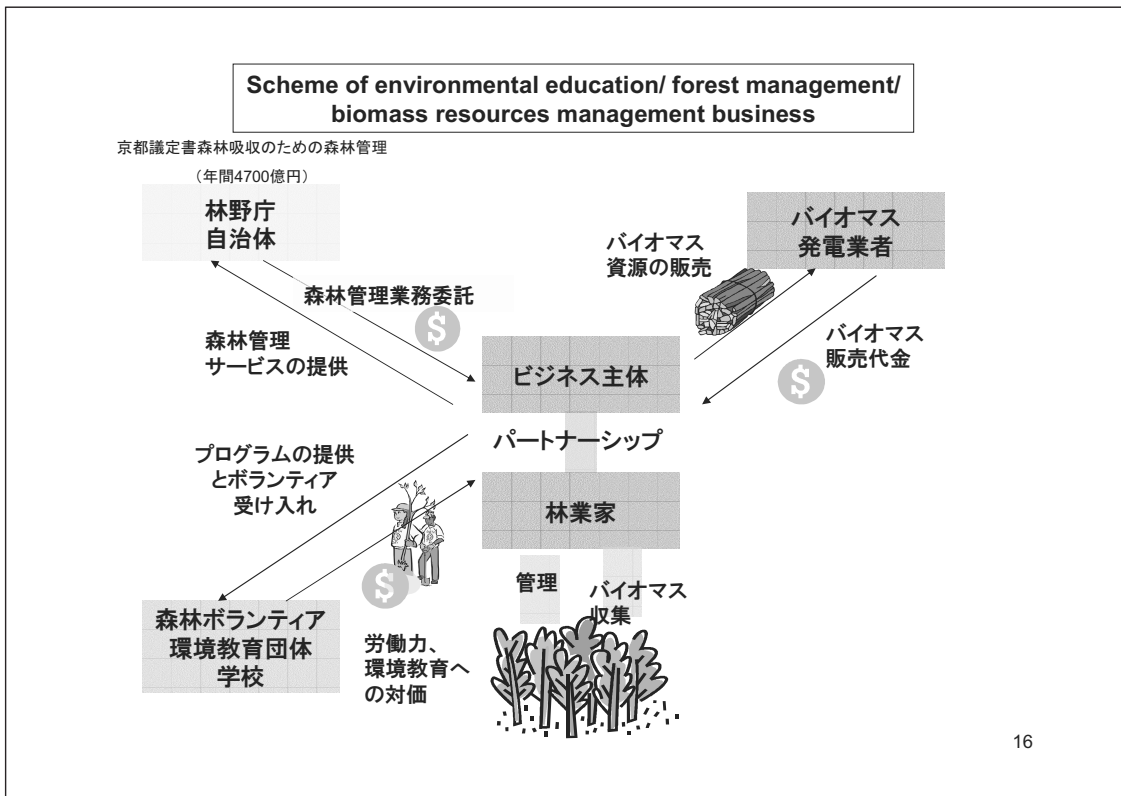
Slide 13



Slide 14



Slide 15



Slide 16

6. Environmentally-Sound Business Model of PSS

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Slide 17

Product service systems & allied business models

- Product Service Systems are:

- “a **marketable set of products and services** capable of jointly fulfilling a user’s ‘need’” *

The definition requires...
a combination of
products and services AND

That this combination can be
offered for sale

BUT

*The definition does not
assume or require that PSSs
are environmentally superior or
that they result from a particular
innovation process*

*Policy Document on
Environment and Economy,
Government of the
Netherlands

Traditional PSSs: Rent-a-car
sento • coin laundry

“New” PSSs: car-sharing
Chemical management •
electronics leasing & takeback

Our focus

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Slide 18

Product service systems & allied business models

- Performance-based “pure services”
 - Waste management
 - Energy services
 - Logistics management
- Recycling/remanufacturing-based business models
 - The introduction of a collection or re-processing service at end-of-life allows a waste to be transformed to a new product.
 - E.g., collection of food waste + composting → compost

called PSSs by some researchers, but the lack of a product creates an awkward fit with the PSS definition

OLD MODEL
End-of-life → disposal

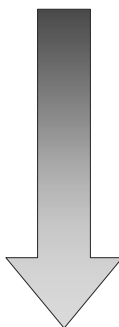
for example:
waste food → incineration

NEW MODEL
End-of-life → collection → new production process → new product
For example:
waste food → collection → composting → vegetables & compost

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Slide 19

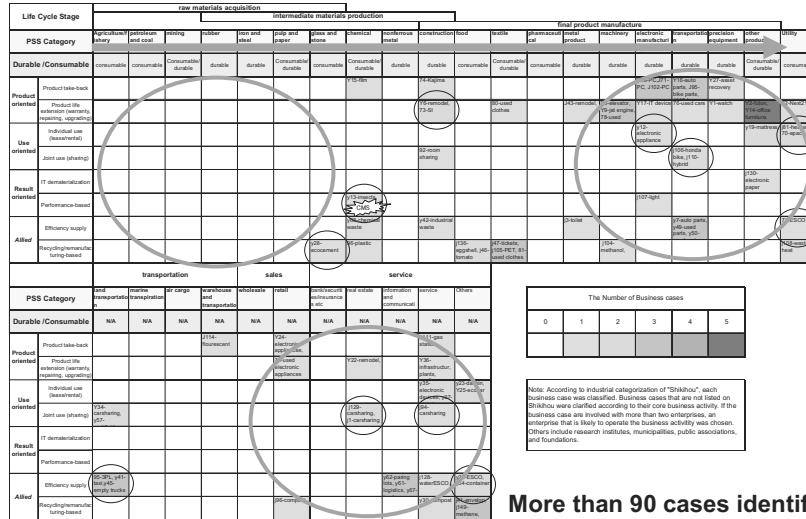
Categorization of PSSs & allied business models

	Service in addition to product	Product oriented	Product take-back	Take-back Reuse & recycle
			Product life extension	Extended guarantees Repair services Upgrading
	Service substituting product	Use oriented	Individual use	Leasing Renting
			Joint use	Sharing Pooling
		Result oriented	IT dematerialization Performance-based	
	Allied Business Models			Efficiency supply
			Recycling & remanufacturing	

1

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Results of case search: distribution of PSS cases by industry



More than 90 cases identified

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