

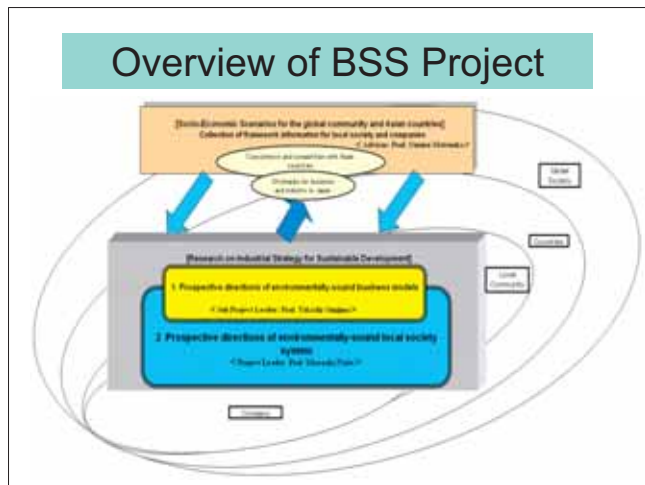
Introduction

Prospective Directions of Environmentally-sound Local Society Systems & Local Development

Project Leader, Business for Sustainable Society Project
 IGES Kansai Research Centre
 Masaaki Naito

Ladies and gentlemen, I am Masaaki Naito, leader of this very important project. I will today be giving you a brief introduction to the project. Let me begin by saying that the overall project stands on two big pillars (Slide 1).

I would like to start with a general image of the overall project. As you can see in this slide, the main area is in



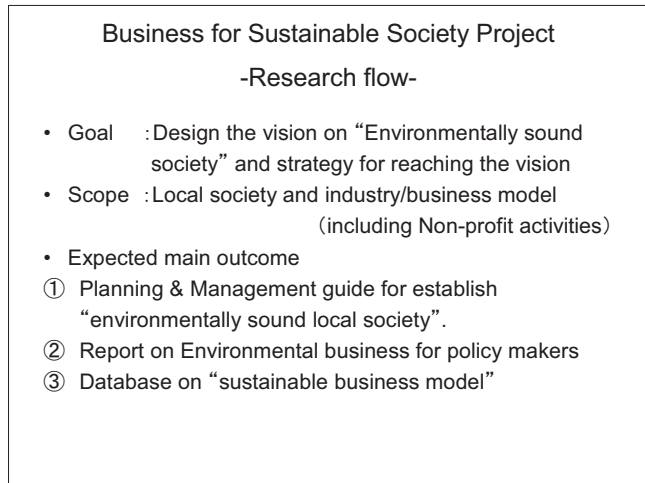
(Slide 1)

the bottom half of this picture, if you would. We are directly involved with the area of "Research on strategy for sustainable society and industry". This is subdivided into two parts. One is research into environmentally-sound business models that is looking for new business models built on "software" schemes for society. The other delves more into hardware and is searching for new technologies and how to develop local communities to use these technologies. You may have heard terms such as *eco town*, *eco city* and *eco village*. This aspect of our research is looking at how to build such kinds of things. Also, in addition to those two research themes, other long-term research is going on into verifying an outlook on the future. This element is here because, when thinking of comprehensive strategies for the eco business or local systems, various external and surrounding circumstances must be taken into consideration. We all know that the reason why research is needed into global

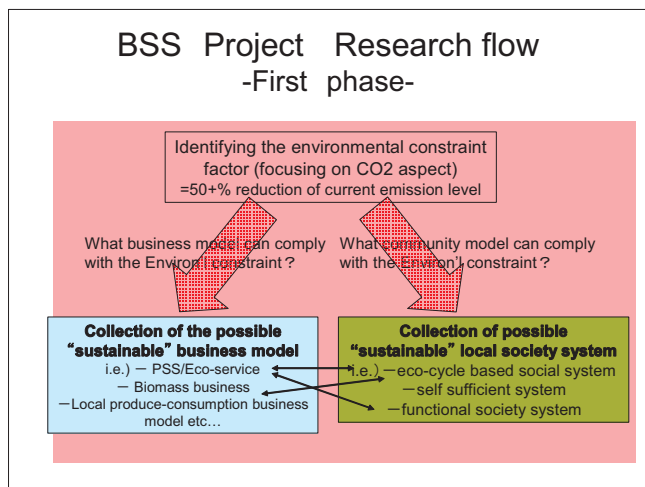
environment strategies is because the global environment is in danger. Nevertheless, if we barreled ahead without knowing how endangered the planet is, things would not go well and it could even put us in a situation where we cannot take effective measures for stopping a catastrophe. This is the reality we live in. Therefore, it is important that we accurately understand the state of environmental limitations as an external condition when we go forward with our work. With this kind of recognition as a backdrop, our sub theme is how to grasp "long-term outlooks and long-term policies".

The general structure is as you see here (Slide 2). As for the research flow, the objective is as shown in the slide. The essence of our strategy research is in building a vision of an environmentally sound society and how to attain that vision. We want to be as specific as possible in projecting this strategy. We debated at great length over the scope, but since our research is based in the Kansai, although we of course want to project a vision of the entire country, we decided to set the scale on the local community. What we are doing is looking at the relations of industry and business activities to the local community. The main outcome, which cannot be considered specific at this present time, is as shown in the slide. For example, one general idea is a "guidebook on eco-friendly systems".

This slide shows how we divided up research plans into phases (Slide 3). I won't go into great detail, but let me



(Slide 2)

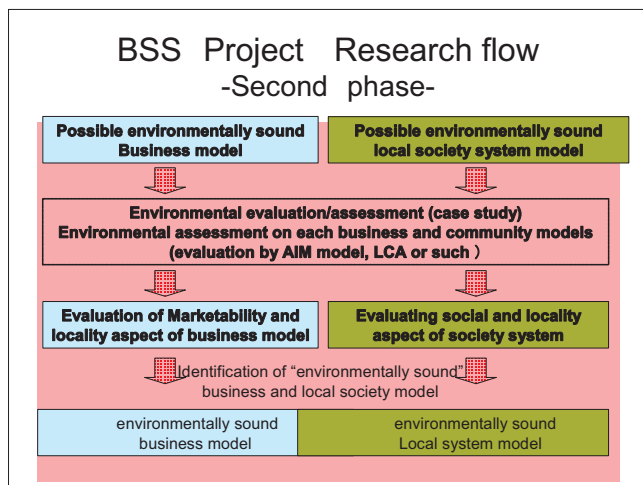


(Slide 3)

just say a word on each phase. First phase will quantitatively identify as best possible how environmental constraints will be imposed in particular as global environmental limitations. To help us go about this new field of research with targets in mind, we decided to begin by identifying concrete numerical targets for "reducing CO₂ emissions by 50% or more of the 1990 level by the year 2050." There are certainly other choices than this, but we started with this figure for various reasons.

In any case, there is a lot talk about doing good for the environment and there is a lot of research and debates going on, but with that kind of approach, it is extremely hard to know when and what magnitude of improvement should be achieved. We see this as the most significant problem of current research approaches. This research of ours will first announce this pretext, namely environmental limitations and magnitude of required improvement, and share it as a basis for debate. So, even if there is criticism and arguments about environmental limitations, it's all right. In the very least, we want to clearly set our targets. To attain this target, we will break up into groups to discover sustainable business models, technologies and local development. Within all that, there are some very strong relationships.

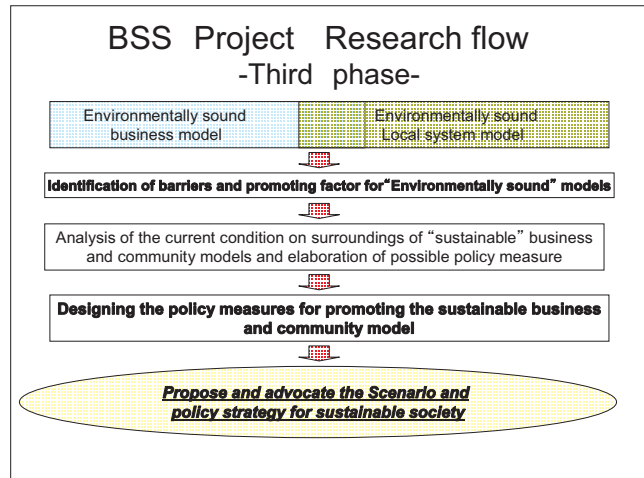
As for the second phase (Slide 4), unless the quantitative analysis, it is not known how well the numerical target I mentioned earlier will be attained by environmental business models or technologies, therefore the first step in second phase is to verify to what point environmental load has been reduced by identified promising business models or local technologies. Fortunately, since we are tied up with a group that has an Asian environmental model called AIM, which is one of the best models on the world, we would be able to conduct quantitative analyses which may not be possible in other projects. Then, after the environmental assessment, analysis must be conducted with marketability in mind because being good for the environment is one thing, but if it is not marketable or is unaccepted by the local area,



(Slide 4)

it's pointless. So, we want to look at the total of the environment, market and local appropriateness, and seek out a harmony between the community and business.

In the third phase, we want to incorporate all of these things into an actual community (Slide 5). It would be great if we could actually materialize these business



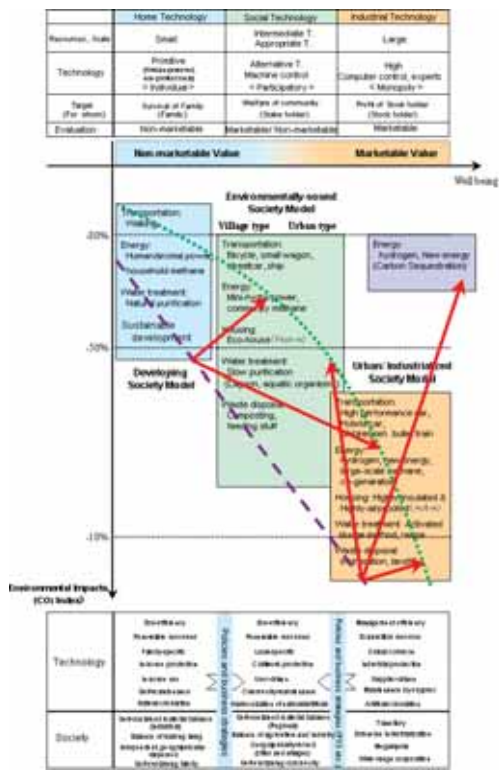
(Slide 5)

models and local systems, but given the limited amount of time and other restrictions, this is unlikely. Therefore, plans are to select a target area and run simulations there. We have received tentative offers to host the project from various communities. We will select from them the place that is best suited for modeling and work with them to get the project rolling.

This figure categorizes some technologies for an eco-friendly society (Slide 6). It is kind of small and hard to see, so I will break down the content and talk about it a bit later. It suffices to look at this now for the close linkage of the three categories.

In a nutshell, this table shows how to categorize the technologies are categorized (Slide 7). On the far right of this table is that which Japan, America and other industrially advanced nations have today. It is big, advanced and businesses wield it via market principles. In contrast to this, that on the left side of the table takes the form of family labor in developing nations and any of the areas around the world that are even less developed than that, of which there are many. The reason why we raise both of these here is that we see a new harmonic society with technology that is either in-between these two technological realms or a union of both. (This in-between technology could be called "intermediate technology".) We call it "locally appropriate technology" here in the table. However, in fact, we discussed a name for this technology the other day with several experts from overseas, but there is still more we need to think about. It seems wise not to use terms like *intermediate technology* or *alternative technology* without careful consideration, but whatever the case, that technology does not exist unto itself, as it is created within a tight

Three Types of Technology and Society



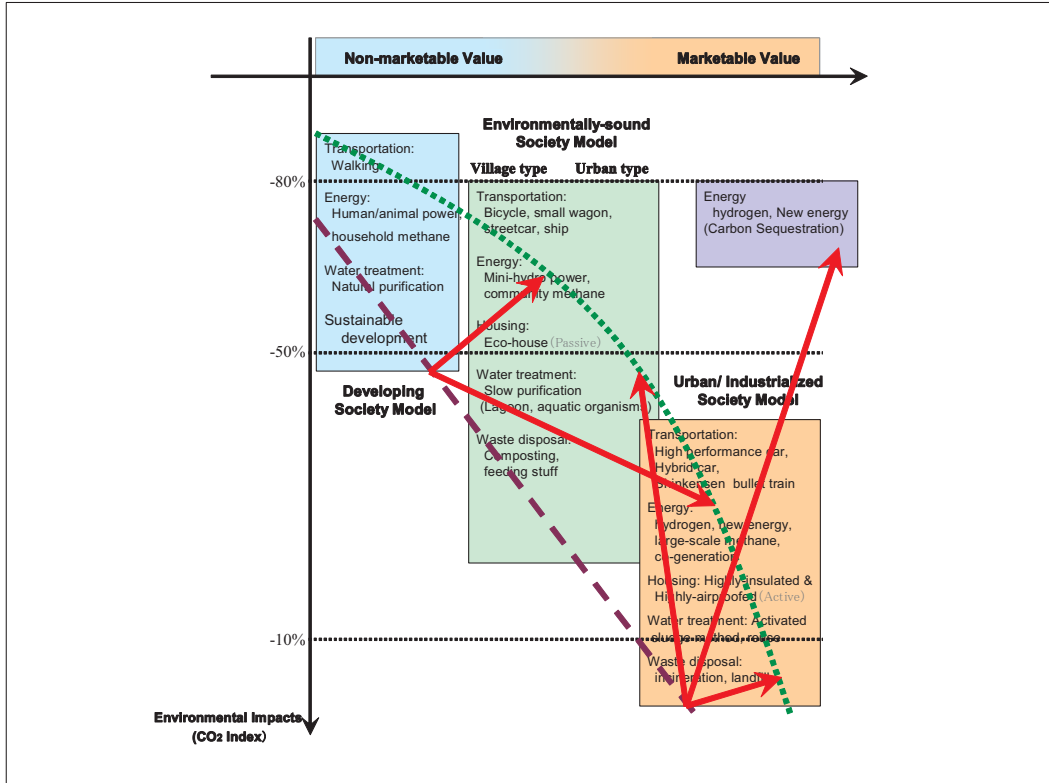
(Slide 6)

relationship to the local society. In contrast to that, the technology on the far right is not like this as it generally has universal qualities to it.

	Home Technology	Social Technology	Industrial Technology
Resources, Scale	Small	Intermediate T. Appropriate T.	Large
Technology	Primitive (Human-powered, non-professional) <Individual>	Alternative T. Machine control <Participatory>	High Computer control, experts <Monopoly>
Target (For whom)	Survival of Family (Family)	Welfare of community (Stake holder)	Profit of Stock holder (Stock holder)
Evaluation	Non-marketable	Marketable/ Non-marketable	Marketable

(Slide 7)

By the way, Japan is at present on the far right of the figure (Slide 8). Here, there are three arrows. The short one that points to the right indicates the direction of solving problems with incremental technological advances or the so-called "business as usual" approach. As already recognized by government or the like, It is very hard to solve environmental problems in this way. The arrow that rises strongly to the right marks the direction of a complete switch to a hydrogen-fueled society. I have heard that there are efforts with this to cut CO₂ emissions by 80%. Although what we are proposing does not necessarily negate these two approaches, we are of the thinking that it is important to search for a new direction, that indicated by the arrow that points



(Slide 8)

to the upper left of the figure or, in other words, grows towards locally appropriate technology. Incidentally, there are two red arrows coming from the far left on upside. These suggest, not to aim for a quick jump from developing nation to industrialized society or urban development model, but to head towards the center model, the environmentally sounds model. In short, our intention is to strategically propose moving from both directions. This is how we have conceived the three categories. Because of the time restriction, I will forgo the details of each.

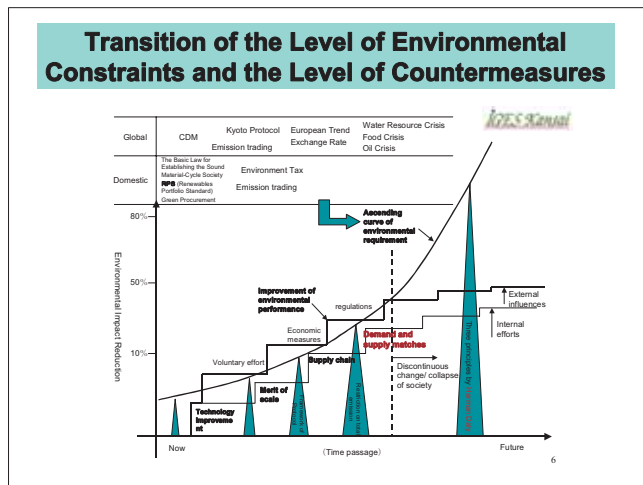
This table uses some of the keywords to organize the whole picture of how the software and hardware are related in the previously mentioned business model and how to move towards the "desired, environmentally sound society" in the middle (Slide 9). We will spend the next three slides studying whether this will go well or not.

Lastly, one thing I want to say is that, particularly for businesspeople, the greatest point of interest is how to look squarely at the eco business and make money in a market economy. But, I must admit that, in its present state, that is very difficult. Why is that? This slide attempts to explain that (Slide 10). Without a

Technology	Eco-efficiency Renewable resources Family-specific In-house production In-house use Self-maintenance Natural circulation	Policies and business strategies	Eco-efficiency Renewable resources Local-specific Craftwork production User-driven Community-maintenance Harmonization of natural/artificial	Policies and business strategies (PSS etc.)	Management efficiency Exhaustible resource Global common Industrial production Supplier-driven Maintenance by supplier Artificial circulation
	Self-contained material balance (Individual) Balance of making living Independent, geographically-dispersed Self-sustaining family		Self-contained material balance (Regional) Balance of agriculture and industry Geographically-mixed (cities and villages) Self-sustaining community		Transitory Extensive industrialization Megalopolis Wide-range cooperation

(Slide 9)

doubt, our society is the result of continuous technological improvement and internal efforts. In business, if the technical, structural and, as an external factor, economic systems change, that marketability changes as well. For example, the debate over an environment tax has to do with the changes to this economic system. It is important



(Slide 10)

to know when and how the economic system will change. Moreover, in the face of changes to the economic system, direct environmental regulations will likely become stiffer. It is foreseen that a CO₂ reduction of certain percent could have sufficient legal strength to be imposed in the future. Within all of that, we want to accurately predict when and where the eco business will establish an economic base and start moving as a market. If this prediction is accurate, I could instantly start up in some business and make a lot of money before telling everyone, but needless to say, the task is difficult. But, without it, most of our research would be meaningless. This prediction of long-range outlook is a complimentary theme in which we will search for a correct understanding of what, when and in what form external changes will occur and how the resulting legal and economic restrictions will be imposed on business and industry, by fully utilizing the global model AIM I spoke of earlier.

So, this is what our research looks like as a whole. I myself am in charge of the hardware side research. The software side, that is to say, the business systems will be presented by Sub-Project Leader Prof. Gunjima.

Thank you for your kind attention.

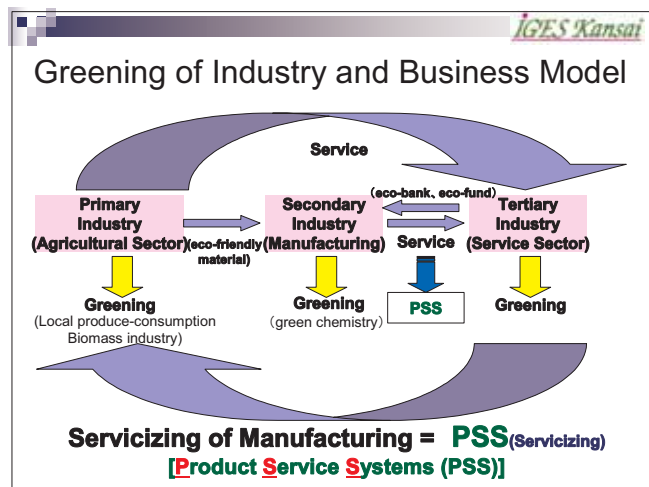
Introduction

Prospective Directions of Environmental Business and the Potential of PSS (Product Service Systems)

Sub Project Leader, Business for Sustainable Society Project (BSS)
 IGES Kansai Research Centre
 Takashi Gunjima

Professor Naito has already spoken about the project as a whole. And, the project has only just begun, therefore rather than report on results, I would like to talk about the research we plan to do from here out.

The business world stresses the environment by its economic activities, yet it is necessary for the business world and the individual companies that comprise it to start thinking now about what sort of role they should play in building a sustainable society (Slide 1). What have caught the attention of many who come underneath this demand



(Slide 1)


are the various forms of eco-business. The eco-business has emerged in many corners of the primary, secondary and tertiary industries in order to reduce their own environmental loads as well as to jointly reduce environmental load between them. Particularly, secondary industry or manufacturing generates a heavy environmental load in the production and consumption of materials and products, which is why our research focuses on recent efforts in the secondary industry to reduce this environmental load via changes to sales systems, that is to say product service systems (PPS) or, as they say in the USA, "servicizing". We want to assess these product service systems. In our work, we will study PSS models that reduce environmental

load and PSS models that promote local sustainability within a framework of regional development. Though noteworthy PSS models are likely to come up in the panel discussion, the models that appeared during new socio-economic structural changes basically do not target a reduction in environmental load into itself. Accordingly, PSS is not just a bunch of business models that reduce a reduction in environmental load. Therefore, we must screen a lot of PSS models out there and select those that in fact reduce environmental load. Also, we have recently been screening PSS models for those that enhance local sustainability. Let me reiterate that a business does not introduce a PSS model in order to reduce its environmental load or enhance the sustainability of the local community. Put differently, since PSS models are applied for other reasons than the environmental load of a business, we have to identify those that reduce environmental load or contribute to local sustainability so that we can go ahead with our research.

The reason that PSS models are of interest is that a lot of precursor research has come from an environmental perspective. Though much will be added to this later in the panel discussion, PSS model research was pioneered in the EU by Oksana Mont and Raimund Bleischwitz and has produced marvelous results. Also, on the USA stage, Mark Stoughton has produced forerunning results in "servicizing". In Japan, forward-looking research is being done by Ryoichi Yamamoto, who will be speaking today, and the first case studies into servicizing and PSS in the Kansai area are being conducted by the Global Environment Forum-KANSAI.

These researches into PSS have produced very important results. The actual environmental business models that resulted from prior research first led to eco products, namely products with lower environmental load (Slide 2). Undertakings that followed looked not at products but production processes to reduce environmental load.

Research led to applications in clean production, cleaner production, closed systems



BSS Project
"Study on Environmentally Sound Business Model" (1)
Topic/Focus

- Greening of Products = Eco-friendly Product
- Greening of Production Process = Clean Production
- Greening of Economic System = **PSS** (or **Servicizing**)
⇒ Shifting from an Economic System of Selling "Goods" to Selling "Service" or "Function" through PSS.

(Slide 2)

and closed production. Though all of these efforts helped to reduce environmental load, a new supply-demand system is needed to make further reduction. One such possibility is a new transaction scheme for purchases and sales, which could greatly reduce environmental load even more. This is where PSS is being proposed. Basically, our research is delving into system innovation that aims to reduce environmental load and enhance local sustainability by using PSS to convert economic systems based on selling products into models that sell services and functions.

In the EU and USA, several PSS models have been reported to reduce environmental load, whereas here in Japan, we have not even begun to screen to see what kind of models might reduce environmental load or enhance local sustainability, so we are still somewhat unorganized (Slide 3). Therefore, in going about our research, we plan to

BSS Project
“Study on Environmentally Sound Business Model” (3)
Methodology

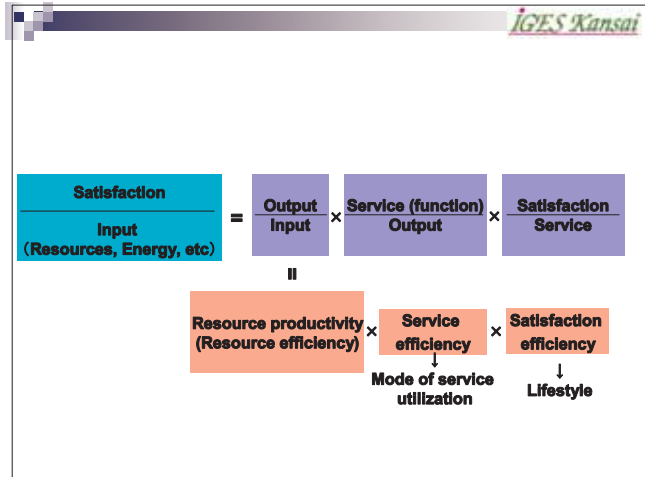
1. Collecting PSS cases (Japanese PSS cases)
2. Screening collected cases of PSS with respect to:
 - (1) Reduction in environmental burdens
 - (2) Local Sustainability
3. Examining the cases with respect to: (1) Marketability, (2) Reduction in environmental burdens, and (3) local sustainability.
 - (1) Examining the marketability of the cases (examining Non-commercial / profitable PSS)
 - (2) Measuring the improvement in the environmental burdens
 - (3) Measuring local sustainability
4. Analyzing PSS cases
 - (1) Analyzing the factors for success and failure
5. Recommending for stakeholders

(Slide 3)

refer to the forerunner case studies of Professor Yamamoto as well as other literature, collect information on PSS models in Japan and screen these models to identify which reduce environmental load or enhance local sustainability. After that, we will quantitatively analyze the selected PSS models for marketability problems, whether they in fact reduce environmental load or not, and whether they enhance local sustainability or not. What we have realized here is that, though PSS models must be studied for their marketability as a business model, they could be viable as a project even without great earnings by perhaps changing the market scheme or social scheme or doing something via governmental support. In other words, there are surely PSS models that can be promoted without going into the red. Accordingly, in our research, we want to look at PSS models that can be established within market economics as well as PSS models that can be established within the social economics that Peter Harper will be talking about later. Then, we want to measure these PSS models to see whether or not they actually reduce environmental load or enhance local sustainability. Through this process of screening and analysis, we want to assess several selected PSS as case studies of industries or businesses that have

introduced PSS. We will also focus on factors that promote and obstruct PSS. We will examine the social infrastructure for establishing PSS by analyzing the factors that favor PSS aimed at reducing environmental load and enhancing local sustainability as well as the impediment factors that prevent cases of excellent environmental load reduction but little chance of market launch from coming to fruition. By identifying the promotional and impediment factors in the hardware of social infrastructure and the software of networks, partnerships and cooperation, we want to propose which PSS models are actually useful towards reducing environmental load and enhancing local sustainability.

By assessing services and functions rather than the sale of something, the idea of a PSS is basically to increase user satisfaction (Slide 4). However, in this picture, there are several items on the right side, of which resource efficiency on the left has been researched to some degree. But, how do we increase the service per output, called "service efficiency" here in the second item?



(Slide 4)

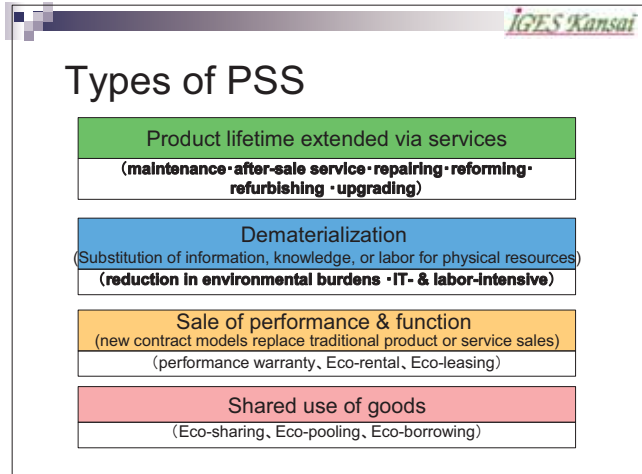
One way is to increase the mode of service utilization or usage rate. In such case, we need to examine ways of usage that increase usage rate such as sharing, leasing and rental. By the way, one sticky thing that is often overlooked with service rate is a rebound effect that occurs by efficiency improvement. Usage amount would be doubled when environmental load is reduced. Therefore, something must be done to prevent this rebound effect from occurring. The key is perhaps service satisfaction (satisfaction efficiency). In other words, what people consider sufficient, their lifestyles and daily behavior influence satisfaction efficiency and this in turn greatly affects service efficiency. Consequently, it is necessary to study the acceptability of PSS and lifestyles of consumers within social and regulatory structures to some degree. If demographic factors come into play, we must study not only the economic efficiency but also the demographics.

These kinds of PSS models can be grouped into several categories (Slide 5). As

best possible, we want to study PSS models in Japan that fall into these categories. Several representative cases, including some from overseas, that fit these categories have already appeared, so we want to look at as many as possible with the core of them being Japanese. Research into Japanese PSS models has only just begun, but we see it as our duty to introduce them overseas.

So, let me summarize our research (Slide 6-7). First of all, our topic of research is to examine the balance between the environmental load reduction (and local sustainability enhancement) and profitability of PSS, or in other words examine the environmental and economic connotations of PSS. If a PSS model is marketable, we will examine the success and failure factors on the demand and supply sides. Of course, even PSS models that are not profitable will be studied, if they have any social significance, as integrated models of environment, economics and culture.

Our second interest is, as

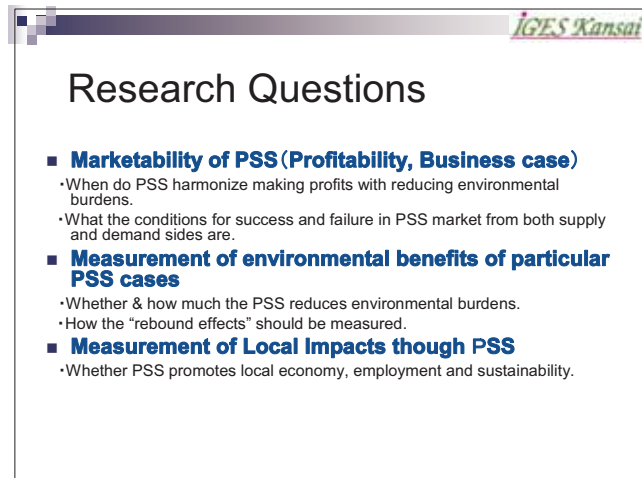


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Types of PSS

Product lifetime extended via services (maintenance · after-sale service · repairing · reforming · refurbishing · upgrading)
Dematerialization (Substitution of information, knowledge, or labor for physical resources) (reduction in environmental burdens · IT- & labor-intensive)
Sale of performance & function (new contract models replace traditional product or service sales) (performance warranty, Eco-rental, Eco-leasing)
Shared use of goods (Eco-sharing, Eco-pooling, Eco-borrowing)

(Slide 5)

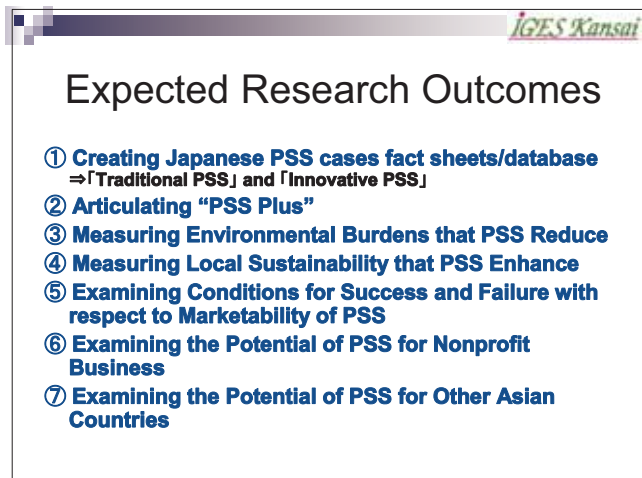


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Research Questions

- **Marketability of PSS (Profitability, Business case)**
 - When do PSS harmonize making profits with reducing environmental burdens.
 - What the conditions for success and failure in PSS market from both supply and demand sides are.
- **Measurement of environmental benefits of particular PSS cases**
 - Whether & how much the PSS reduces environmental burdens.
 - How the "rebound effects" should be measured.
- **Measurement of Local Impacts through PSS**
 - Whether PSS promotes local economy, employment and sustainability.

(Slide 6)



IGES Kansai

Expected Research Outcomes

- ① **Creating Japanese PSS cases fact sheets/database**
⇒「Traditional PSS」 and 「Innovative PSS」
- ② **Articulating "PSS Plus"**
- ③ **Measuring Environmental Burdens that PSS Reduce**
- ④ **Measuring Local Sustainability that PSS Enhance**
- ⑤ **Examining Conditions for Success and Failure with respect to Marketability of PSS**
- ⑥ **Examining the Potential of PSS for Nonprofit Business**
- ⑦ **Examining the Potential of PSS for Other Asian Countries**

(Slide 7)

I said before, to measure the environmental load reducing effect in order to get a quantitative understanding of just how much of a reduction effect there is. What needs to be watched carefully here is a rebound effect, so the question here is how to measure this.

Another area of interest is to enhance the local sustainability of an area. Put differently, we want to see how much of the resources that depend on outside supply can be switched to internal resources and how this boost in self-sufficiency can improve people's living in the area as well as positively affect local employment. The reduction in environmental load does not just benefit the business; for example, a large reduction in waste would minimize the impact on local waste incinerators. This would have the effect of enhancing local sustainability, therefore we want to try measuring that. Through this research, we want to first of all identify what kinds of PSS models are used in Japan and secondly redefine what constitutes a PSS model because, in our gathering of PSS cases, there will be those that differ however slightly from the conventional definition but which are nevertheless extremely important subcategories in terms of environmental load reduction and local sustainability enhancement, as well as those to which the definition does not apply at all. Plus, as I mentioned earlier, we will also study PSS models that exhibit social validity even without being marketed, so as to identify acceptability as a social PSS via establishing of partnerships or networks. We will look at these as issues of social governance. Mr. Bleischwitz will be talking about this later, but there are many examples of this kind of PSS in Europe. The question is whether they can be applied in Japan or not, which we will investigate. Also within our scope of research, we want to examine whether they can be applied in Asia or not.

With the ultimate goal of enhancing the sustainability not only of businesses but societies and communities through our research, we want to expand our sights to also unmarketable PSS models. We want to study PSS models that cannot work in the market economics of Asia but which can be explored from within socio-economic directions. Mr. Harper's presentation will be very useful in this regard. And, we want to offer proposals on public policies and action for supporting PSS that promote this.

So, this is how we want to research ways that PSS and servicizing can support businesses in their efforts to reduce environmental load and enhance local sustainability from within the Business for Sustainable Social Project. Because the environment and economics are basically a trade-off, research has been done into

decoupling the two so that a harmony that does not pivot on a trade-off relationship can be struck between them. We look at this kind of PSS model not just for the environmental and economic values of it, but position it as a social system that integrates the environment, economics and culture and as a direction in regional development.

Thank you for your attention.