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# *Extended Producer Responsibility in Japan*

-- Introduction of "EPR" into Japanese waste policy and some controversy --

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In this paper, first I would like to explain current situation on how "Extended Producer Responsibility" (hereinafter called as EPR) has been introduced into Japanese waste policy. The Container and Packaging Recycling Law (CPRL), Electric Household Appliance Recycling Law (EHARL) and End of Life Vehicle discussions are introduced. I will also discuss in the first chapter cost benefit analysis by METI (Ministry of Economy, Trade and Industry) on the CPRL as well as importance of collection ratio taking EU proposal of WEEE and Japanese EHARL as examples. Then in Chapter 2, I will discuss several controversial issues on EPR. These issues have been controversial not only in Japan but also through discussions at various OECD meetings and workshops on EPR.

## Chapter 1. Current situation in Japan

In the past decade the Japanese parliament enacted many environmental regulations as well as revisions of existing laws. There are 17 most important enactments/revisions. Among them, surprisingly, 10 are on waste-related ones. The fact reflects Japanese general public's consciousness on this issue. There are two laws based on EPR idea; The Container and Packaging Recycling Law (CPRL) and The Electric Household Appliance Recycling Law (EHARL). Also basic idea of EPR is reflected in The Basic Law for Establishing the Recycling-based Society. In addition, new law on ELV (end-of-life vehicle) will be introduced shortly. As shown in OECD (2001), one of the features of EPR policy is "*the shifting of responsibility (physically and/or economically; fully or partially) upstream toward the producer and away from municipalities*"(p. 9). In most OECD countries municipalities are responsible for treatment of household waste (general waste), therefore EPR policy is basically aimed at household waste. However, an idea of EPR will be extended to be included in forthcoming Japanese ELV law, though in most cases ELVs in Japan are classified as industrial waste. Situation is quite the same in ELV directive of European Union (Directive 2000/53/EC). In this chapter I will explain briefly two EPR related laws (CPRL, EHARL) and discussions how to deal with ELVs.

### (1) The Container and Packaging Recycling Law (CPRL)

CPRL took effect in 1997 for PET (*polyethylene terephthalate*) bottles and glass wastes then expanded to paper and plastic container and packaging wastes in 2000. It is the first law in Japan reflecting EPR idea. Under the law municipal responsibility has been partially shifted to "producers" ("producer" means container and packaging users/manufacturers in this law). Municipalities have to collect containers and packaging separately and to carry them to storage points. Then PRO (producers responsible organization) on behalf of producers will ask recyclers to recycle them. Another feature of this law is the fact that participation of municipalities to this scheme is voluntary. There are around 3200 municipalities in Japan. Among them participating number of municipalities varies by wastes, for example from 331 for paper containers and packaging to 2600 for glass bottles. Producers have to recycle wastes collected by

municipalities or wastes corresponding to recyclers' capacity to recycle, whichever less. Take for example PET bottles. Notwithstanding almost all collected wastes are recycled thanks to increasing capacity of recyclers, ratio of recycled waste, though rapidly raising, is still 31.8% in 2000. This means producers bear the cost of recycling less than one third of PET bottles they supplied to market. However, as voluntary participation of municipalities to this scheme is increasing steadily, demand for recycling capacity increases proportionately. There is a good reason for us to expect recycling ratio will also increase continuously in future.

## (2) Cost benefit analysis of CPRL

In December 2000, METI (at that time called MITI) submitted its first cost benefit analysis based on 1998 data to its committee. This is, I believe, the first cost benefit analysis with regard to Japanese environmental laws. The result is shown in table 1. As it is clearly shown, both in case 1 and case 2 cost exceed benefit. In 2001, METI analyzed using 1999 data just to obtain almost same result; cost exceeds benefit again. Does this mean that the enactment of CPRL is a mistake? I do think it will be premature to judge whether it will be black or white. METI argues in their first analysis that, considering raising disposal fees in future due to shortage of disposal sites and other factors, benefit will exceed cost in a long run. Though I highly appreciate effort of METI for its challenge, there are several points to be noted or improved. They are;

- 1) As described above, this law became effective in 1997 and situation is changing year by year (for example, recycling ratio is rising every year). Also in 1998 and 1999, paper and plastic containers and packaging have not been subject to the law. We should hold our judgment until we will have enough data on all kinds of waste.

(Table 1) Cost/Benefit Analysis of Japanese packaging recycling law (1998)

	Parties concerned	Items of costs and benefits	Unit Million Yen	
			Use existing disposal site (Case 1)	Construction of New disposal site (Case 2)
Cost (A)	Producer	Recycling cost	3,543	3,543
	Local Gov.	Collection cost	10,473	10,473
	(Total)		(14,016)	(14,016)
Benefit (B)	Local Gov.	Reduced expense due to reduction of wastes	1,945	9,209
	Society	Conservation of natural resources	4,491	4,491
	(Total)		(6,437)	(13,700)
Net cost (A) - (B)			7,579	316

1) Only data on PET bottles and glasses are analyzed (in 1998, paper and plastic containers and packaging were not subject to the CPRL).

2) Case 1 is the case where existing disposal site can still have room for packaging waste even without introduction of CPRL. Whereas case 2 is the case where construction of new disposal site will become necessary if CPRL will not be introduced. This explains huge difference between case 1 and 2 of benefit of local government.

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2) There are several points to be considered.

- Raising trend of disposal fees, as METI pointed out, should be taken into account.
- Reduction of adverse environmental effect should be added as benefit. By reducing demand for virgin materials, environmental degradation through extraction of virgin materials can be reduced. Also through recycling activities, CO2 emissions during manufacturing process will be reduced and power consumption will be saved, which will again lead to reduction of CO2 emissions through power generation. Of course it is very hard to calculate value of environment. However there are several methods of calculation (such as CVM etc.).
- Benefit accruing from energy (electricity) savings due to recycling should be included into calculation.

Until after these points taken into consideration, we have to wait to draw conclusion whether the introduction of CPRL has been beneficial to the society or not. But it should be stressed that this analysis by METI is a valuable contribution toward establishing cost benefit analysis methodologies for any environmental laws.

### (3) The Electric Household Appliance Recycling Law (EHARL)

In April 2001, EHARL took effect and responsibility of treating wastes of four electric household appliances (refrigerators, washing machines, air conditioners and TVs) have been shifted from local governments to producers. Retailers also bear responsibility to transport wastes to producers' stock-points after receiving them from final users. The feature of this law is that consumers should pay treatment (recycling) fees when they return them to producers (mainly through retailers). Consumers are notified of the treatment fees when they purchase these goods. This system is cited as another form of EPR in OECD (2001). Recycling fees announced by producers are 2400 yen for washing machines, 2700 yen for TVs, 3500 yen for air conditioners and ¥4600 for refrigerators<sup>1</sup>. Though there are a few exceptions, all leading manufacturers charge the same amount. One of the characteristics of EPR is that it provides incentives for producers to make efforts to reduce their recycling cost in order to set their recycling fees less than their competitors. With this respect, it is desirable that fees are not set at a uniform level. What happened in fact is that Matsushita Electric Industrial Co., Ltd. (the price-leader and brand owner of "Panasonic") first set the fees and all others followed. It is not as a result of conspiring in which case they should be accused of breaching the Anti Trust Law. Another point to be noted is that, unlike producers of containers and automobiles, most of leading manufacturers of electric appliances newly set up recycling facilities by themselves (16 new recycling plants have been set up so far throughout Japan).

### (4) Importance of collection rate (comparison of EU proposal and EHARL)

Material recycling target rates are set by EHARL as 50% for refrigerators and washing machines, 55% for TVs and 60% for air conditioners (In the law, "recovery" targets are also set, but they are the same as material recycling targets). In EU, directive on Waste Electrical and Electronic Equipment (WEEE) has been proposed and now at the final stage. It is rather hard to compare Japanese EHARL and WEEE as the

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<sup>1</sup> In addition, consumers have to pay transportation fees by retailers to producers' stock-points. These fees vary by retailers.

former applies only to four appliances while the latter applies to more than 80 items in 10 categories. However when we compare just four items that are subject to EHARL, it is apparent that WEEE material recycling/reuse target rates are higher (75% for refrigerators, washing machines and air conditioners, 65% for TVs. Please refer to table 2 below). Does this mean that recycling target rates are really higher in EU than in Japan? To answer this question, it is necessary to consider the following points.

(Table 2) Comparison of recycling target rates

	EHARL	EU directive proposal
Refrigerators, Washing machines	50%	75%
Air conditioners	60%	75%
TVs	55%	65%

- 1) There is an important difference of the definition of “recycling”. In EU, any physically recycled materials are deemed as “recycled”. Whereas in Japan, only recycled materials being sold or taken back by somebody free of charge are counted as “recycled”. In other words, if the recycled materials have minus value, they are not deemed as “recycled”. As a matter of fact, substantial portion (i.e. around 75% in one leading Japanese electric appliance manufacturer's case) of plastic waste from four electric household appliances are physically recycled. However because these wastes do not have positive value and electric manufacturers have to pay to recyclers who use them as materials, these are not counted as "recycled" in Japanese law. Taking this difference into account, recycling targets of EU proposal should be higher than Japan. However this is not enough to explain the difference of target rates, from 10% for TVs to 25% for refrigerators and washing machines.
- 2) Second points to be considered is that the way of setting recycling targets is quite different between EU and Japan. First I will explain how the targets are set in Japanese law. Basic philosophy is that target rates should be set so as to improve recycling rates, should consider technology level, should be the ones that can be achieved throughout Japan, and should consider receptivity of consumers who pay recycling fees at the time of returning end-of-life electric appliances. Based on this idea, taking into consideration of a) average life time of the goods (approximately 10 years), b) composition of recyclable materials (iron, copper and aluminum and glass in case of TVs)<sup>2</sup>, and c) possible yield (80%) of each recyclable materials. Then figures are rounded up to become recycling target rates. On the contrary, in EU, these rates are ambitiously set at a higher level based on the best experience of several pilot projects. Most famous among them is called "Apparatour" tried in Eindhoven (a home town of Phillips) in the Netherlands. To sum up, Japanese way of setting recycling targets is so-called "bottom-up" and EU style may be called "top-down"
- 3) Thirdly what we should bear in our mind is that recycling rate merely means a portion of recycled material (by weight) against collected waste. This rate shows nothing about what portion are recycled against total volume of waste (collected and uncollected inclusive). What we really need

<sup>2</sup> As explained previously, though substantial portion of plastic wastes are recycled, this is not counted as "recycled" because their value are negative.

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is the portion of recycled material against total volume of waste. In this paper we call this rate as "real" recycling rate. This rate can be obtained by the following formula.

$$\text{Real recycling rate} = \frac{\text{Collected weight}}{\text{Total waste (collection rate)}} \times \frac{\text{Recycled weight}}{\text{Collected weight (recycling rate)}}$$

Therefore, in order to obtain real recycling rate, it is absolutely necessary to know collection rate. In EU (2000), it is described that generation of WEEE in 1998 was 6 million tons. There exist another estimation on generation of WEEE in EU member countries, according to which total weight is estimated as about 7.4 million tons (Joachim Lohse et al, 1998). On the other hand, collection target set by EU proposal is minimum 4kg per person per annum. Total population of EU member countries is around 370 million, therefore total weight of collection of WEEE will be around 1.5 million tons. This means collection target in EU proposal is between 20% (1.5/7.4) to 25% (1.5/6.0). If we multiply recycling target rates of the proposal to the above estimated collection rates, we will have "real" recycling rates in EU. They are somewhere between 13% (20% x 65%) to 19% (25% x 75%). By using same formula, it is easy to obtain the collection target rates of Japan where "real" recycling rates will become same as EU proposal. Before calculation, we have to come back to the difference of definition of recycling rate between EU and Japanese law. Bearing this in mind, we have obtained three different figures. In case 1, we neglect the difference of definition between EU and Japanese recycling rate. In case 2, we assume there is 10% difference between them. This means Japanese definition of recycling is 10% stricter than that of EU. In case 3, we assume the difference is 15%. Results of calculations are as follows; 26% (13%/50%) to 32% (19%/60%) for case 1, 22% (13%/60%) to 27% (19%/70%) for case 2, and 20% (13%/65%) to 25% (19%/65%) for case 3. If Japanese collection rates are same as these corresponding figures, "real" recycling rates should be the same between EU and Japan. Japanese law has just become effective in April 2001 therefore enough data to know actual collection rates are not available at this moment. However from the web site information of Japanese Ministry of Environment, total numbers collected at the end of October is around 5 million units. Though numbers vary by month<sup>3</sup>, it would be reasonable to estimate the total figures in 2001 (from April to March next year) will reach at around 8 million units or over. On the other hand total annual figure of four electric appliances waste that is subject to EHARL is estimated as around 20 million units. This means that collection rate will be at least 40%. This figure being correct, "real" recycling ratio in Japan will become much higher than in Europe as long as four electric appliances are concerned.

Having said that, I would like to make it clear that it is not my intension to compare both systems and conclude which is better. Items of electrical and electronic equipment that are subject to the law are quite different and EU proposal include restrictions of the use of hazardous substances in electrical and electronic equipment. Instead what should be stressed here is the importance of knowing collection ratio.

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<sup>3</sup> It should be noted that figure in April is an unusual one. Before April, municipalities took back free of charge or at a minimum fee. However after April consumers have to pay when they ask, for example, retailers to take back. Therefore consumers purchased new electric appliances and threw out old ones before April 1. Hence collected figures are very small in April.

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## (5) End of Life Vehicle (ELV) Recycling

In 2001, discussions had been concentrated on what ELV recycling law should be. Unlike household electric appliances, ELV in Japan had been recycled through market mechanism and the Government had not intervened to promote recycling. ELV had market value and dismantlers and shredders were willing to accept them. However since 1997, international steel scrap price have continuously fallen down. In addition, disposal fees of shredder dust have been raised rapidly due to shortage of landfills. The former means, for shredding companies, decrease of revenue, and the latter, increase of cost. Under the situation, value of ELV has become negative and shredders began to ask dismantlers to pay money for receiving ELV from them. For the same token, dismantlers ask collectors/distributors to pay money for receiving ELV from them. These are the background of increasing illegal dumping and inappropriate treatment of ELVs. To avoid these as well as to solve shortage of landfills and attain recycling target ratio of ELVs by shifting certain responsibilities to producers, EPR policy is going to be introduced in Japan. This will be the first case where EPR concept is to be applied to non-household wastes.

The basic idea is to have ELV positive value. For this purpose manufacturers (and importers) will be asked to receive automobile shredder dust from shredders free of charge. This will reduce shredders' expense substantially therefore it will be expected they will no longer ask dismantlers to pay money for shredding. Secondly manufacturers will pay money to dismantlers etc. for any expense incurred to remove CFCs and airbags. By doing so appropriate treatment would be ensured. Then these expenses by manufacturers will be billed to buyers at the time of purchase. This is a rough sketch of Automobile Recycling Law that would be proposed shortly.

So far I have discussed laws on particular wastes that have EPR idea behind them. However there is one basic law where EPR concept is reflected therein; Law for promotion of effective utilization of resources. Under this law, producers of personal computer, when used for commercial purpose, are required to take back and recycle them. Now discussions have almost finished how to do on PC for personal use.

## Chapter 2. Controversy on EPR

In chapter 1, I have reviewed current EPR situation in Japan. In this chapter I would like to discuss several controversial points with respect to EPR. As I have pointed out at the beginning these points are controversial not only in Japan but also at OECD discussions.

### (1) EPR and PPP (Polluter Pays Principle)

Relationship between EPR and PPP has been confusing at OECD discussions. The situation changed again and again before OECD guidance manual for governments on EPR finally published in March 2001. Before discussing the relationship of two concepts, I would like to confirm what PPP means. The PPP is an economic principle defined as "*the principle to be used for allocating costs of pollution prevention and control measures to encourage rational use of scarce environmental resources and to avoid distortions in international trade and investment*". It continues "*this principle means that the polluter should bear the expenses of carrying out the above-mentioned measures decided by public authorities to ensure that the environment is in an acceptable state. In other words, the cost of these measures should be reflected in the cost of goods and services which cause pollution in production and/or consumption*" (OECD 1972).

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From this definition, it is quite clear that "polluter" should pay cost of pollution prevention and control measures. Let us examine how OECD interprets this principle and its relationship with EPR. Then I will point out what are wrong with OECD discussions on EPR.

1) Wanderings of OECD discussions

OECD (1998) describes this relationship as "*Many OECD countries — in accordance with the Polluter Pays Principle (PPP) — are taking measures to expand private sector (corporate) responsibility ----- This approach of Extended Producer Responsibility (EPR) is aimed at ---*" (p. 2). This means that under EPR concept, producers will be held responsible as polluters under PPP.

However in OECD (1999) there are following expressions; "The polluter pays principle and facility specific pollution prevention policies have not been sufficient in creating incentives for producers to address basic choices of materials and product designs which influence life cycle environmental impacts of products. EPR, on the other hand, can create such incentives and influence the reduction of life cycle impacts of the products. Similarly the polluter pays principle is not particularly suitable or applicable for situations where the product itself becomes the pollutant in a subsequent life cycle stage, where the product embodies significant pollution from earlier life cycle stages, or where the use of the product create pollution indirectly" (p. 12, emphasis by the author). From these sentences, it is quite clear that PPP will not be applied to pollution by wastes.

There are, however, contradictory expressions in OECD (2000b) with this respect. For example, in page 19 it says "One reason governments are looking for new policy mechanisms like EPR is that the Polluter Pays Principle and facility-specific pollution prevention policies have not created sufficient incentives to stimulate producers to choose materials and product designs that would reduce environmental impacts of products over the life cycle". But in page 12 of the same document, it describes that PPP's application in the context of EPR may be expressed as "Producers of products should bear responsibility for the environmental impacts of their products from upstream activities inherent in the selection of materials for the products, impacts from manufacturer's production process itself, and downstream impacts from the use and disposal of products." This means that producers are responsible not only for pollution during processing and manufacturing but also for pollution even after the end of products' lifecycle. This contradicts clearly with the previous sentences mentioned above.

Then in OECD (2000a), following expression appeared; that is, "Within the context of EPR, the extension of the producer's responsibility could explicitly lead to a substantial internalization of social costs (externalities) for treatment and disposal. It could also implicitly correct other environmental impacts along the life cycle, not currently reflected in the product price" (p. 10). This expression with the deletion of word "externalities" in the bracket finally remained in the Guidance Manual for Governments (OECD 2001 p. 17-18).

2) What' wrong with OECD discussions

There are two points that should be mentioned. First one is what does pollution mean, and next one is who are polluters.

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First I would like to clarify what does pollution mean. From economic viewpoint, pollution means externality. When one's interest being suffered by (or benefit from) some phenomenon not through market, we call the situation that externalities exist. On waste issues, there are three main problems to be tackled with. They are efficient use of natural resources, shortage of landfills and environmental pollution. Among these, first two are not externalities. When natural resources become scarce, prices of them raise. When there is shortage of landfills, disposal fees raise. In this sense, landfill is a kind of "resource" (same as oil) from economist's view. EPR is a policy tool mainly in the field of municipal wastes. When it comes to pollution caused by wastes, it is mainly industrial waste we should pay careful attention. To sum up, pollution (or externalities) prevention is not the main target of EPR. As PPP is the principle under which "*the cost of these (pollution prevention) measures should be reflected in the cost of goods and services which cause pollution in production and/or consumption*" (OECD 1972), it does not have anything to do with EPR except when wastes cause environmental pollution.

Now we turn to second point; who are polluters. Even in OECD Guidance Manual for Governments (OECD 2001), it seems that producers of wastes be deemed as polluter in a broad sense. It is my guess that this interpretation came from following sentence, that is "*on the grounds of economic efficiency and administrative convenience, it is occasionally appropriate to identify the polluter as the economic agent playing a decisive role in the pollution, rather than the agent actually originating it*" (OECD 1992, 1.2 first paragraph). In my view, this is quite wrong. What this means is that, on the grounds of economic efficiency and administrative convenience, it is appropriate to nominate any economic agent as polluter even if it is not causing pollution. It is impossible to accept this view. We do not call a person not polluting himself as "polluter". EPR is an excellent tool of waste policy and its essence is to shift responsibility of treatment of wastes from municipalities to economic agent that has "controllability to the life cycle of the product". To attain environmentally desired situation cost effectively, responsibility should be shifted to producers not because they are polluters but because they have controllability on their products (In this respect, producer does not necessarily mean manufacturers automatically. Distributors, wholesalers or any body in the product chain can become "producer" if they have controllability on the products).

There is another reason why we do not call producers as polluters. Just take simple example of washing machine. Consumers may enjoy benefit of using it for say 10 years until it may have been broken down. Then he/she will throw it away. In this case is a manufacturer of the washing machine polluter? Nobody will say yes.

In conclusion, it is unnecessary to bring in PPP in EPR discussion. PPP is nothing to do with EPR. Producers assume responsibility of treatment just because they have "controllability" on the products life cycle.

## (2) When to pay recycling fees (pre-payment vs. post-payment)?

In EU, directives on containers/packaging wastes and ELV as well as proposed WEEE all assume recycling (treatment) fees to be included in the products price. This system is called as "internalization" of social cost (however, as I have explained earlier, because I do not think EPR is the tool to internalize

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"externality", I will use "add-on" (to the price) scheme in this paper). On the contrary, in Japan, whether to adopt add-on scheme or not has continuously been one of the most important controversy. In this paper the other way of payment is called as "post-payment". This means consumers pay recycling fees at time of discharging end-of-life products. Actually in EHARL post-payment method is adopted (but consumers do not know exact amount of fees to be charged at time of discharge. Instead current fees to be charged in discharging old end-of-life products are shown). On the contrary, it is most likely that add-on method will be introduced in draft ELV law. In this case two payment methods coexist in Japan.

1) Net burden of consumers and producers

In Japan there was (and still now, is) argument that producers bear recycling cost in pre-payment method and consumers bear the cost in post-payment method. This is completely wrong.

As I have already discussed this matter theoretically rather in detail, and this is not the main point I would like to emphasize in this paper, I urge readers to refer to my paper that was submitted to OECD workshop on EPR (Yamaguchi, M. 1999). Here I will only draw conclusion of my paper.

- Regardless of the scheme (whether it be pre-payment scheme or post-payment scheme), the net burden will be borne by both the producers and consumers, and moreover, the portion of burden between producers and consumers in both cases are the same.
- Regardless of payment methods, recycling cost will be shared by both the producers and the consumers, provided that portion will depend on the price elasticity of supply and demand.

2) Pros and Cons of both systems

In reading through the OECD Guidance Manual for Government on EPR (OECD 2001), though the manual admits Japanese post-payment system of EHARL as EPR (refer to footnote 4 of page 18), it seems that it prefers add-on method to post-payment method. However it is my opinion that discussions in the Manual on the payment methods are not broad and deep enough. There are many aspects (pros and cons) with respect to both methods. I will show various criteria for policy makers when they decide which scheme to be adopted.

So far I have explained two methods of payment. But strictly speaking, there are two ways in add-on method. They are pre-payment method (where producers charge fees, at the time of sales, to recycle the products they sell) and pension style method (where producers charge fees, at time of sales, to recycle returned end-of-life wastes). In this paper the former is called as "pre-payment" scheme and the latter is called as "pension style" scheme.

In autumn 2001, I have interviewed various people who are responsible to either European Union or member countries' policy making on waste related issues and asked the reason why in Europe they preferred pre-payment scheme. Most of them told me it is because they wanted to avoid illegal dumping of wastes. It is true for this purpose pre-payment scheme is better than post-payment scheme. If we have to pay recycling fees when we return end-of-life products, we may fall into temptation to dump them illegally to avoid payment of fees. Though I agree illegal dumping is one of important social issues, this is not the only criterion (and as far as I know, no reliable statistics are available on illegal dumping of WEEE or ELV in EU, Germany, the Netherlands and Japan).

Please refer to table 3. This table shows pros and cons for each methods of payment by each

(Table 3) Comparison of pre and post payment

	POST-PAYMENT	ADD-ON PAYMENT	
		PRE-PAYMENT	PENSION STYLE
Constrain to throw away	Yes	No	No
Design for recyclability	(Yes)	Yes	No
Historical waste	Yes	No	(Yes)
Orphan product	Yes	No	Yes
Reduction of disposal volume	Yes	No	No
Equity	Yes	Yes	No
Prevention of Illegal dumping	No	Yes	Yes
Secure volume for recycling facility	No	Yes	Yes
Payer and beneficiary of cost	Same	Same	No
Calculability of treatment cost	Yes	No	Yes
Bankruptcy of producers	(Yes)	No	(Yes)
Fee collection cost	High	Low	Low
Adaptation to technology innovation	Yes	(Yes)	Yes
Social and political feasibility	Yes	(Yes)	(Yes)
Will difference between volume of generation and collection of waste become problem?	No	Yes	No

criterion. In addition to prevention of illegal dumping, "pre-payment" and "pension style" payments are superior to post-payment scheme in fee collection cost aspect. However when it becomes necessary to collect and recycle historical waste (waste of product which had been sold before EPR law became effective), post-payment and pension style scheme are superior to pre-payment method. But when we consider fluctuations of producers' market share, pension style scheme may face some difficulties. This happened in Japan with regard to ELV recycling fee discussions. Suppose company A had enjoyed large market share 10 years ago but now the share is small. Under this situation, if EPR law with pension style fee payment is introduced, the producer has to recycle many cars to be returned while number of cars they sell is small. The producer has to charge large amount of money to recycle many returned cars. The producer will find itself in a disadvantageous position because they have to charge higher recycling fees than their competitors, even if recycling cost for each car is the same. This is the reason the word "yes" is in bracket for coordinate axis of historical waste and pension style method.

There are other aspects where post-payment is better than pre-payment. First of all, calculability of recycling fees. Under pre-payment scheme, especially for durable products such as electric appliances or automobiles, how producers can accurately calculate recycling fees in ten years thereafter when they sell products today? There are various factors affecting future recycling fees. They are technology innovations, fluctuations of disposal fees, price of natural resources etc. It is almost impossible to estimate them correctly. Second point is difference between volume of

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generation and collection of waste. As discussed earlier, collection ratio under proposed directive of WEEE in EU is estimated around 20-25%. However this is merely estimation. It is quite natural for producers to charge full recycling cost on top of their product price. On the other hand, under post-payment method, producers charge reasonable fees that are just enough to cover recycling cost. In the latter case it will be consumers to suffer. It is quite strange that, in Japan, consumer representatives argued for pre-payment and producers backed post-payment.

There are many other aspects to be considered. One of them is that what will happen when producers go bankrupt under pre-payment method. What I would like to emphasize here is that, in choosing method of payment of recycling fees, not only illegal dumping but many other elements should be taken into account. The most important factor in deciding method is what criteria as mentioned in table 3 are important for that particular society that is going to introduce EPR policy.

### Epilogue, Limitations of EPR

I highly appreciate EPR as an innovative tool toward waste reduction as well as promotion of recycling by shifting responsibility from municipalities to producers. However we have to note that EPR does not solve all problems with regard to wastes. Most important one among them is that EPR is not effective to create market for recycled materials. Even if this tool is quite effective to promote recycling, unless market for recycled material is secured, recycling activities will encounter fatal obstacles. Therefore another policy for creating demand for recycled materials, such as green public procurement and recycled content requirement, should be introduced simultaneously.

Finally, it is time for us to change our life style. When we purchase goods, we do so in order to enjoy utilities (or performance) of them. For this purpose we can expect the same utilities not by purchasing them but by leasing them. If we lease, we return them to leasing companies and they will return to producers of them. If we realize this and change our life style to lease oriented ones, collection ratio will surely be increased, and "real" recycling ratio will increase accordingly.

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