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Abstract

In this paper, we attempt to identify the reasons behind the differences in environmental policy between Japan and other developed countries, particularly the US. Japan's environmental policy is unique in that voluntary approaches have been taken to reduce total emissions. This strategy is quite different from the traditional approach of heavy-handed regulation. In Japan, voluntary approaches are conducted through negotiations with polluters. The idea behind this type of voluntary approaches is that the government can induce polluters to abate emissions voluntarily by using light-handed regulations and the threat of heavy-handed regulations. The light-handed regulation is quite effective especially when it is costly to introduce heavy-handed regulations, although the negotiations are difficult to conduct when the number of stakeholders is large. To strengthen our analysis, we provide some examples of Japanese environmental policies which are successful and the ones that are not.

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Political Economy of Voluntary Approaches: A Lesson from Environmental Policies in Japan*

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Abstract

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1. Introduction

Fish fell in a river of clear water, and longs for that murky rice-paddy pond is a song sang by Japanese citizens in the 18th century, when Councilor Sadanobu Shirakawa Matsudaira –whose middle name reads as a clear-water river in Japanese– swept away his predecessor Councilor Okitsugu Tanuma –whose last name reads as a rice-paddy pond– along with his corrupted politics that heavily authorized merchant guilds and government monopolies. It is not widely known that, then and now, there is a phobia for "clear water" in the sentiment of Japanese society.

It is as such, not widely known that environmental policies in Japan have relied more on a voluntary approach than in the United States (US) or European countries who have tried to adopt more market-oriented mechanisms, such as the emission trading schemes or emissions taxes. The US implemented an SO_2 emissions trading program in 1995 to mitigate the damage caused by acid rain. In the 1990s, a carbon tax was initiated by several European Union (EU) countries, including Denmark, Finland, the Netherlands, Sweden, Norway, and the United Kingdom (Andersen 2010). The regulation of emission sources of CO_2 through emissions trading schemes has increased since the establishment of the EU Emissions Trading Scheme (ETS) in 2005.

Japan also has imposed pollution charges in the past, however, it is not for the sake of efficiency. The country suffered from severe air pollution due to increasing emissions of SOx and NOx in the 1960s and 1970s. A sulfur charge was imposed, not to efficiently reduce total emissions but rather to finance a compensation program for the victims of air pollution. At the same time, a quantity control regulation based on a voluntary approach was also implemented. Matsuno (1997a, 1997b) showed that quantity control was more effective at reducing the total amount of emissions than the pollution charge. In other words, the pollution charge was not set at a sufficiently high level to reduce emissions. Japan's Voluntary Emissions Trading Scheme (JVETS) may be another example of market-based instrument for greenhouse gasses (Kimura and Tuerk 2008), however, it is a voluntary program, not a cap-and-trade scheme.

In this paper, we attempt to identify the reasons behind the differences in environmental policy between Japan and the US. Why have Japanese environmental policies heavily relied on standard or voluntary abatement programs? Why are there a growing number of market-based programs represented by emissions trading schemes in the US, even though most of the country's regulations are still command and control? Answers to these questions can be found in the differences in the policy-making process between Japan and the US. In particular, we focus on the degree of involvement of polluters in policy making.

In the US, by and large environmental policies have been implemented through top-down decisions by the government. The influence of polluting firms on the regulations to be implemented is limited or at most indirect when compared with Japan. Thus, the government can apply traditional environmental policies represented by emission taxes, emissions trading schemes, and command and control. We call such policies heavy-handed regulations because they are usually accompanied by heavy monitoring and enforcement. To

lower the transaction costs associated with more direct command and control, governments in the western hemisphere have tried to use the market mechanism to allocate emission quotas among polluting firms.

Instead of swaying its policy within the domain of the traditional, heavy-handed regulations, Japan uses more bottom-up, voluntary approaches to avoid high transaction costs of command and control. In Japan, polluting firms or a representative organization of the industry to be regulated are usually invited to be members of a council called "*Shingi-kai*" in Japanese, which is an advisory board on environmental laws or regulations. These councils offer an opportunity for the Ministry of Environment (MOE) to negotiate with and convey its intent to polluting firms. This intent includes standards and/or targets as well as the MOE's degree of determination to introduce heavier-handed regulations. Japan's environmental policies are likely to use voluntary approaches because heavy-handed regulations incur heavier cost implications not only to the regulator but also to polluting firms.

If the government chooses a voluntary approach and to negotiate with a polluting industry, it induces firms to abate emissions voluntarily by threatening to impose heavy-handed regulations in the form of market-based instruments. Voluntary approaches are composed of light-handed regulations and voluntary action. The former is a type of quantity control with a standard for total emissions. This approach is different from command and control because the emission target can be attained through the polluters' voluntary effort, without immediate penalty for not meeting the target. The latter does not even include a standard for total emissions. It is a completely voluntary abatement in the face of the potential threat. The advantage of the voluntary approach is that it is politically easier to introduce and less costlier to administer, compared with heavy-handed regulations. However, when the number of polluting firms is very large and there are no dominant firms who act as an intermediator for the industry, the government might fail to effectively communicate with the firms and to control their incentive to deviate through the threat and thus their total emissions.

If the government chooses not to negotiate with polluting firms in the policy-making process and introduces heavy-handed regulations, then it faces strong resistance from the polluting industry, which fears that government will opt for the policies based on economic instruments to avoid high transaction cost, as in western nations. Once these policies are introduced firms' profits will be inevitably reduced even lower than in the case of quantity control, while the government can take advantage of the efficient mitigation of emissions.

Environmental economists are familiar with comparisons among heavy-handed regulations as represented by emission taxes, emissions trading schemes, and command and control. However, the idea of utilizing more voluntary approaches as an effective environmental policy could provide a new paradigm. The idea goes a long way in Japan where a stagnant set of stakeholders forms a closed circle in each relevant industry.

In the next section, we explain how the environmental laws or regulations are formulated in the two countries. In Section 3, we contrast the traditional heavy-handed regulations to the voluntary approaches. In Section 4, we evaluate several voluntary-based environmental policies in Japan. Section 5 concludes.

2. The Policy-Making Process

In this section, we compare the process of policy making in Japan with that in the US, focusing on the involvement of polluting firms in the process.

2.1. The case in the US

Let us begin with the case of the US as a benchmark. In the US, the idea for a bill can come from a variety of sources, including the Senate, a committee, or even polluting firms or lobbyists. In what follows, we focus on the case of a legislator who submits a bill.

Having some idea of a bill, the legislators try to write the bill with the help of their legislative assistants and the members of the Office of Legislative Counsel, but help from the relevant departments is limited at this stage. Once a bill is finalized and submitted to the Senate or the House of Representatives, the President of the Senate or the Speaker of the House of Representatives must refer it to an appropriate committee. There are 108 standing committees in the US Congress, such as the Energy and Natural Resource Committee and the Environment and Public Works Committee in the Senate and the Resource Committee in the House of Representatives.

A committee is not obligated to discuss all bills that have been submitted. Rather, most of the bills sit on a shelf and are gradually scrapped. The chairman of the committee decides whether a bill should be discussed. Once the decision is made, the committee (often together with a subcommittee) that has been appointed thoroughly discusses the bill in public hearings and mark-ups. In a public hearing, the advantages and disadvantages of the bill are carefully considered. This stage is a useful opportunity to gather other important information to revise the bill based on the testimony provided at the public hearing. During the testimony, committee staffs often invite polluting firms and citizens affected by the pollution as well as experts such as university professors and administrative staff, e.g., from the EPA, to make particular arguments that they want to express. These hearings are the most important opportunity for lobbying firms to make their interests known. After the public hearing, the next step is the mark-up. During the mark-up process, the bill is checked sentence by sentence, and the committee staff drafts a final version of the bill.

Although bills are submitted by legislators, the EPA has significant discretion regarding how to interpret the legislation because the bills are often not very specific as to the detailed requirements of a particular regulation. Most environmental regulations are devised by the EPA under authorizing pieces of legislation (Clean Air Act, Clean Water Act, etc.). The legislation provides the mandate and the broad goals to the EPA and the EPA does the regulating.

The polluting firms or industries to be regulated are provided an opportunity to comment on and influence the form of the regulations. One such group is a committee created under the Federal Advisory Committee Act

(FACA) that is expected to provide advice to the EPA administrator. The committee members include scientists, public health officials, businesses, citizens, communities, and representatives of all levels of government. In addition to the committee created under FACA, industries can influence regulations through notice-and-comment regulations under the Administrative Procedure Act (APA) and through informal and formal listening sessions between the regulators and affected stakeholders. In the US, the courts also have an important role in reviewing the constitutionality of legislation or regulations. Regulated entities can appeal to the courts to modify or overturn the regulations. However, it should be stressed that such opportunities are not created as a means to negotiate with the EPA and that the EPA is dedicated to open government and citizen participation. All committee meetings and the committee reports must be open to the public.

In general, the regulatory process in the US can be characterized by transparency and public involvement. The ex ante evaluation of regulations, including cost-benefit analyses, is obligatory in the creation of laws or regulations that affect a wide range of businesses and citizens with an economic impact exceeding one hundred million dollars, and public comment has played an important role for decades. Compliance with public comments and regulatory impact analysis requirements are monitored by the responsible parties, including the Office of Information and Regulatory Affairs (OIRA), which is part of the Office of Management and Budget (Greenawalt 2015).

2.2. The case in Japan

Japan's decision-making process for environmental policies is unique but not widely known; a couple of institutional issues make it difficult to grasp the decision-making process. There are two types of environmental laws in Japan. The first is lawmaker-initiated legislation (similar to the US). However, only a few laws have been produced by this process due to the limited resources of lawmakers in Japan. Most environmental laws have been created with advice from councils or "*Shingi-kai*", which are similar to the committees in the US. This type of law is called a "Cabinet Act". Although each "*Shingi-kai*" is established by order of the Minister, lawmakers have very limited involvement in discussions in "*Shingi-kai*". Instead, the ministry staffs write the draft of the bill based on the discussions. The role of legislative assistants and members of the Office of Legislative Council in the case of the US is covered by the staff of the ministry in the case of Japan. In that sense, the Ministry of the Environment (MOE) in Japan has much more influence than does the USEPA.

"*Shingi-kai*" seem to be rather more similar to FACA committees in the US, which are administered by the EPA. However, there are differences. First, the "*Shingi-kai*" associated with environmental regulation differ in that most of them are administered by both the MOE and the Ministry of Economy, Trade and Industry (METI).

The largest difference, however, is the involvement of polluting firms and lobbyists in the policy-making process. Polluting firms play an important role in "*Shingi-kai*", although they are ostensibly led by experts in

the field (typically university professors). While in most cases a representative organization that has control over the industry to be regulated is invited to be a member of the "*Shingi-kai*", dominant companies in the industry often play a role. Therefore, polluting firms have the opportunity to negotiate with the two ministries that organize the "*Shingi-kai*" to gain influence over the environmental regulation that is being enacted. Note that one of the ministries, METI, is likely to support them. In addition, a Cabinet Act-type bill must be authorized by all of the cabinet members before it is submitted to the Diet. This unanimous decision rule in the Cabinet makes the lobbyists working in favor of the industry more powerful in the policy-making process. The worst case for the MOE is that the bill is scrapped due to opposition by METI. For this reason, most environmental regulations are led by both the MOE and METI. Thus, the influence of polluting firms in the policy-making process in Japan is much larger than that of the US.

Greenawalt (2015) noted that the Japanese regulatory process was characterized by a lack of transparency and public involvement. The image of the lack of transparency reflects the fact that a "*Shingi-kai*" is an important place where a lobbyist who represents the industry to be regulated can negotiate with the MOE with assistance from METI. Poor transparency and public involvement have been mitigated by several reforms, including a requirement for public comments enacted in 2006 and a requirement for a regulation impact analysis that has been in effect since 2007. Greenawalt (2015) argued that these reforms are not effective, and agencies appear to be reluctant to use them in the policy-making process.

We can summarize this section as follows. In Japan, polluting firms or the industry are likely to be involved in the policy-making process, and they can directly influence the environmental policies to be implemented, while their influence is limited, or at least indirect, in the US. As we will see in the next section, the degree of involvement of polluting firms in the policy-making process is critical, and it will determine which policy is likely to be adopted – price-based mechanisms as represented by emission taxes and emissions trading schemes, or voluntary approaches.

3. Negotiation with polluters: the origin of voluntary approaches

The social optimum can be attained either by price-based or quantity-based controls. The former includes emission taxes and emission trading schemes, and the latter typically refers to command and control. These policies assume strong governance that enables heavy monitoring and enforcement by the government, thereby we call them heavy-handed regulations.

However, they are not equivalent in terms of firms' profits. At the socially optimal price and quantity, polluting firms enjoy larger surplus under command and control than under emissions tax, because there are no payments from the firms to the government. Even in the case of emission trading schemes, unless all the emissions permits are assigned to polluting firms for free their surplus will be lower than in the case of

command and control. If all permits are to be auctioned, the profits sink to those under the emission tax. (see Appendix for more detailed discussion). While efficiency can be attained by either method, polluting firms are not indifferent between these policies; they prefer quantity controls over other price controls.

There seems to be a conflict of interest here, as the government prefers price controls to command and control that entails high transaction costs. However, there are successful cases of quantity regulation once we go beyond the above-mentioned textbook examples of heavy-handed regulations. Such cases include voluntary approaches and are depicted as light-handed regulations in Figure 1.

Heavy-handed regulations are by and large top-down, as the government does not necessarily negotiate with polluters when implementing them. More voluntary approaches instead call for a close dialogue between the government and polluters when designing a policy to induce polluting firms to abate their emissions voluntarily. Thus, the government allows firms to intervene in the policy-making process to protect their profits while implicitly threatening them with the possibility of imposing heavy-handed regulations.

A voluntary approach is likely to rely on quantity controls, which polluters prefer to price controls, and are therefore referred to as light-handed regulations. Moreover, polluting firms are more willing to accept emissions reduction targets that are set through negotiation. In some cases, the total emissions reduction can then be allocated among polluters according to their own voluntarily defined rules. Light-handed regulations are quantity controls that are politically easier to introduce compared with command and control because they avoid high transactions costs for the government while allowing firms to protect their profits. The government can take even more voluntary approach by removing any emissions standard. This scheme is characterized as voluntary action.

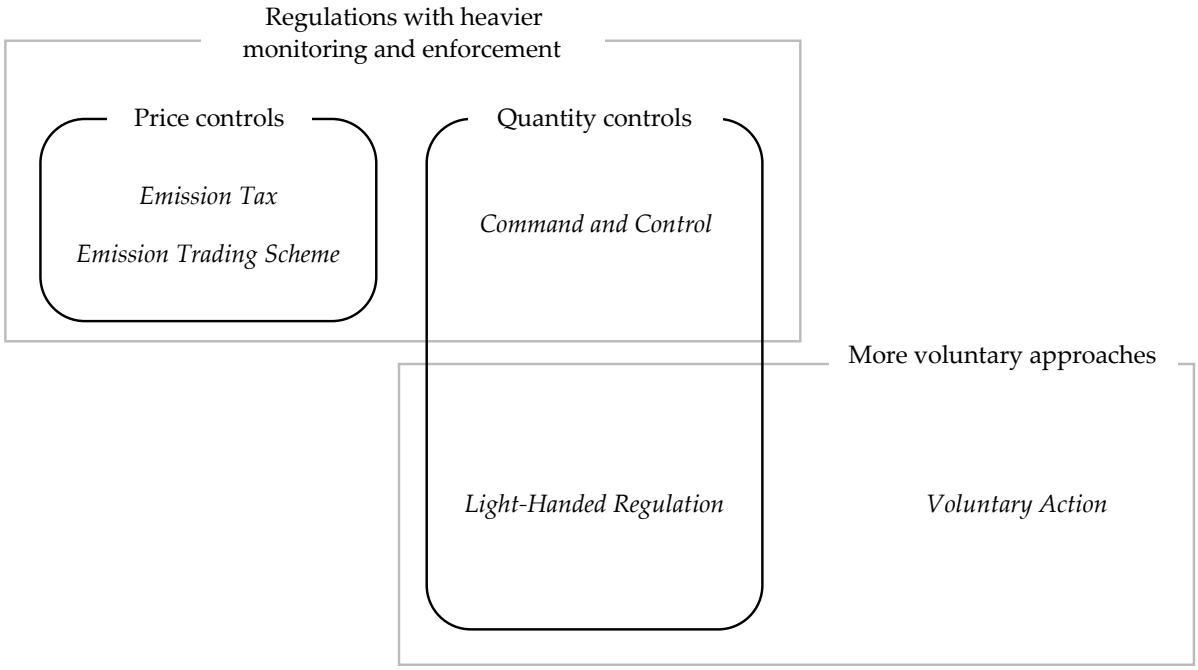

Figure 1

Polluters, once they understand that they are now facing a threat posed by the government and have no choice but to give up a portion of the maximum laissez-faire profit, they have an incentive to lobby for voluntary action or light-handed regulation and to avoid heavy-handed regulation, particularly an emissions tax. Indeed in a theoretical framework some researchers show that heavy-handed regulation can be used as a threat to induce polluters to reduce emissions voluntarily (for example, see Segerson and Miceli (1998), Maxwell, Lyon, and Hackett (2000), Glachant (2007), and Fleckinger and Glachant (2011)).

Recall that in Japan, polluting firms are offered an opportunity to directly negotiate with the government in designing an emissions abatement policy, while their influence on policy making is limited in the US. This difference demonstrates that the Japanese government views negotiation with polluting firms as an effective policy option. This voluntary approach works effectively when the number of polluting firms is small, so each firm does not have an incentive to deviate, and if necessary, it is still manageable to allocate emission quotas among them. If a large number of firms are operating in the industry, the transaction costs associated with negotiation will inevitably increase, and the efficient allocation of emission quotas among all of the firms may be implausible. Consequently, the government might fail to control pollution, leading to excessive emissions. However, even in such a case, the government may still be able to negotiate with a representative organization that has control over the polluting firms in the industry. The government can engage in discussions with the organization and leave the allocation of emission quotas among polluters in the hands of that organization.

Once the government moves in the opposite direction – not negotiating with polluters in the policy-making process and introducing heavy-handed regulation – it will face strong resistance from polluters. The

government can opt for command and control over the profits of polluting firms. However, this approach will often incur prohibitively high transaction costs associated with allocating emission quotas among firms because this type of regulation requires private information about the marginal profit of each polluter. Consequently, the government must rely on the market mechanism to allocate emission quotas among the firms. It is for this reason that price-based mechanisms represented by emissions taxes and emissions trading schemes are more likely to be introduced in the US and European countries. Lobbying by polluting firms becomes more intense because they rationally anticipate that the implementation of either an emissions tax or an emissions trading scheme will soon be implemented. Once the government succeeds in introducing either an emissions tax or an emissions trading scheme, the government can enjoy the advantage of efficiency in allocating emissions among polluters. Thus, the total emissions reduction can be performed efficiently.

To summarize this section, the government can choose either to negotiate or not to negotiate with polluting firms in the policy-making process. The former and the latter lead to voluntary approaches and price-based mechanisms, respectively. However, there is a trade-off between them. If the former is chosen, it is comparatively easy to reduce emissions, while industries may fail to reduce emissions efficiently and the transaction cost is high when there are too many firms to be regulated. Conversely, if the government chooses the latter option, the government can reduce emissions efficiently. However, it is difficult to introduce a price-based policy due to strong resistance from industries.

If the number of stakeholders is large, voluntary approaches are more likely to fail. This result is consistent with the famous proposition advocated by Ostrom (1990), who shows that the users of natural resources can develop self-governing institutions that can address the overuse of the common-pool resources (CPR). She also notes that having a larger number of participants in a CPR increases the difficulty of organizing, agreeing on the rules, and enforcing the rules (Ostrom et al. 1999).

In the next section, we review several environmental policies in Japan. The first, noise alleviation, is a successful example of light-handed regulations, while the fourth, regarding fishery management, and the last, which concerns packaging recycling, are failed examples of the same category. The second example of climate change and the third of toxic releases are successful examples of voluntary action.

4. Examples

4.1 Noise alleviation in high-speed rail transport as a polar case of light-handed regulation in Japan

In addition to the standards for air, water, and soil quality, the MOE has announced standards for noise levels in different circumstances, including for rail and air transport. These standards are

guidelines rather than minimum requirements in the sense that transport operators are encouraged to treat them as a target. In the case of the *Shinkansen*, a high-speed rail (HSR) in Japan, projected levels are 70 dB in residential areas and 75 dB in commercial/industrial areas.[12] These standards were first introduced in 1975 following the Cabinet's approval, when the HSR system was owned and operated by Japan National Railways (JNR), a state-owned cooperative.

When privatized in 1987, JNR was divided geographically into six private companies, each being a regional monopoly. With their high entry barriers, the inter-city high-speed transport markets are essentially oligopolistic, if not monopolistic, for relevant city pairs in Japan. This approach apparently enables the regulating authority to oversee a limited number of incumbent transport service providers through the use of effective light-handed regulation.

Today, private railway operators provide HSR service between Tokyo and Fukuoka via Osaka using the same train cars.[3] These train cars are designed to reach a maximum speed of 350 km/h. Arguing that noise is a major obstacle to increasing the operational speed of the *Shinkansen*, Wakabayashi et al. (2008) estimated that the overall noise from the *Shinkansen* trains running at top speed increases by 1 dB for every 10-15 km/h increase in speed. Mainly because of this noise standard, the operators suppress the maximum speed to 270 km/h between Tokyo and Osaka, where the residential density is higher, and to 300 km/h beyond Osaka, where the residential density is lower. It is worth noting here that these private operators precisely react to the 5 dB difference in the standard by voluntarily adjusting the maximum speed.

Quantity regulations – either light-handed or heavy-handed – have a lower cost implication to the producer than price interventions such as taxation or other market-based instruments. This relief in cost could generate room for more production than that under optimal price regulation unless the quantity regulation is imposed on the output directly. In the current case, what is controlled is the noise and not the output, for instance, passenger kilometers. However, with an oligopolistic supply distortion present, the regulator overlooks the need for further suppressing output after announcing the noise standards described above.[4]

4.2 Climate Change

Japanese domestic climate policy during the first commitment period of the Kyoto Protocol can be characterized by

[1] These levels are unregulated, voluntary targets.
[2] See Kikuchi (1988) for a summary. For air transport, the standards are 57 dB in residential areas and 62 dB in commercial/industrial areas, and the standards were announced in 1973.
[3] These operators are JR Central and JR West, and the train cars are JR Central's 500 series and 700 series and its variations.
[4] The price is regulated; however, it is based on the cost declared by the train operators.

voluntary corporate actions. Specifically, the Japanese Business Federation, or *Keidanren*, the largest and most comprehensive business association, was engaged in the Voluntary Action Plan (VAP). The VAP comprises emissions targets and commitments by each industry association (Arimura 2015). Each industry association was free to set either absolute targets or intensity targets. For example, the Federation of Electric Power Companies (FEPC), the industry association of the power industry, set an emission intensity target of 0.34 kg-CO_2/kwh (Wakabayashi & Sugiyama, 2007).

Was the VAP effective during the first commitment period of the Kyoto Protocol? Among 14 industries with absolute targets, 13 of them reduced their emissions to below the 1990 level. Likewise, of the 10 industries with intensity targets, 6 improved their carbon intensity[5]. Overall, the industrial and energy-conversion sectors reduced their annual emissions from 2008 to 2012 by 12.1% compared with the 1990 levels[6]. Thus, the VAP has been an overall success in controlling emissions either in absolute terms or with intensity targets.

The VAP has been examined from other perspectives as well. Sugino and Arimura (2011) found that industries with absolute targets are more likely to invest in energy efficiency technology than those with relative targets. Wakabayashi and Arimura (2016) found that the VAP encouraged small- and medium-size companies to set voluntary emissions targets.

Not all industries, however, achieved their target. The power industry made an effort to achieve its target by investment in energy efficient technology as well as the purchase of approximately 270 million tons of certified emissions reduction credits from Clean Development Mechanisms. As a consequence, the power industry appeared to achieve its target until the Great East Japan Earthquake occurred in 2011. The emissions intensity dropped from 0.373 kg-CO_2/kwh in 2008 to 0.350 in 2010. The intensity, however, rose to 0.470 or above in 2011 and 2012 due to the shutdown of nuclear power plants following the earthquake (Figure 2). Consequently, the power industry failed to achieve its target.

There are at least three potential problems with the VAP. The first is the stringency of the emissions targets. In essence, the VAP is a quantity control mechanism in which polluters choose the pollution level. As such, the target is likely to be less stringent than the socially optimal level. In fact, even when a carbon tax was introduced in 2012, the amount was 289 yen per CO_2 ton, which was insufficient for sizable emissions reductions unless the revenue was used to subsidize emissions reductions. Thus, the involvement of major emitters in the climate policy-making process through *Shingi-kai* leads to a less than socially desirable level of regulation.

[5] P2 in the VAP Follow-Up Report: https://www.keidanren.or.jp/policy/2013/101_honbun.pdf.
[6] http://www.keidanren.or.jp/en/policy/2013/101.pdf.

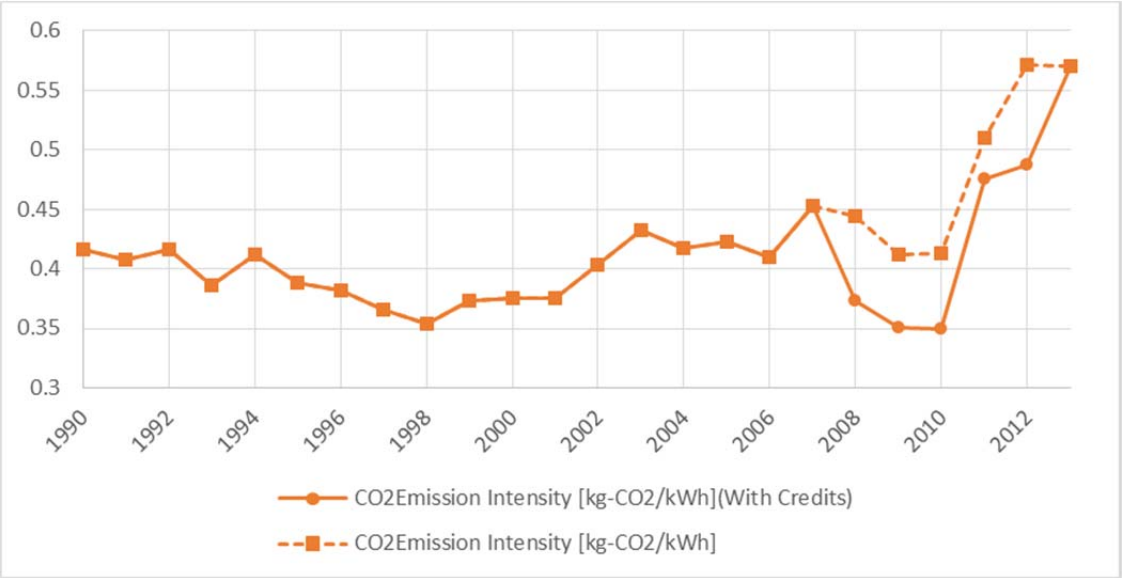

Figure 2. Transition of CO_2 Emission Intensity of Federation of Electric Power Companies of Japan

Second, it is not clear whether the target was achieved in an efficient way because no mechanism in the VAP promotes the equalization of marginal abatement costs across industries or across firms in the same industry. Thus, the cost of the emissions reduction by the VAP may have been higher than what economic instruments such as an emission trading scheme (ETS) or an emissions tax could have achieved. As in the EU or US, an ETS has been a policy option in Japan. In the discussion on the international framework of the post-Kyoto period, the Japanese MOE tried to introduce a Cap and Trade Scheme (C&T) in 2010 and formed a subcommittee on an ETS under the Council of Global Environmental Issues. With representatives from energy-intensive sectors taking part, the subcommittee faced objections from industry stakeholders and failed to introduce C&T.

Finally, because the VAP is a voluntary emissions reduction by a member firm in each industry association, it can be viewed as the voluntary provision of a public good of emissions reduction. Some of the success of the VAP can be attributed to the fact that a small number of major firms account for a large portion of the emissions from each energy-intensive industry. For example, in the steel and iron industry associations, only three firms accounted for more than 90% of the emissions in 2013. In the electricity market, Japan had 10 independent retail markets, and ten major power companies monopolized each regional market. Given the concentrations in emissions within a limited number of firms, agreements on voluntary targets were relatively easy for these industries. If the number of firms in a market increases, firms will have more incentives to free ride in emissions reduction.

After the earthquake in 2011, however, the Japanese government decided to deregulate the retail market of the power industry in the residential sector in 2016. In the first round, more than 40 companies announced entry into the market. FEPC and the new entry firms jointly announced a voluntary target of 0.37 kg-CO_2/kwh. The expansion in the number of power companies under deregulation is likely to increase the difficulty of

achieving voluntary commitments. There appears to be room for an ETS to play a role in the competitive market because the voluntary target commitments may be weaker, given the increase in the number of firms in the power industry.

A limited number of polluters has been a key aspect of the policies for the transportation sector and the home appliance sector. The Top Runner program (Arimura 2015) represents this feature. In this program, the regulator sets efficiency targets for various products ranging from automobiles to electrical appliances, such as air conditioners or refrigerators. Each producer works together with METI and agrees upon the target efficiency level. Kimura (2012) found that the program successfully improved the energy efficiency of the products.

4.3 Pollutant Release and Transfer Register System in Japan

Unlike the Toxics Release Inventory (TRI) program in the US, which was launched in 1986 as part of the provisions of the Emergency Planning and Community Right-to-Know Act (Hamilton 1995), and consequently known afterward as a new regulatory instrument using information disclosure (Konar and Cohen 1997), the Japanese Pollutant Release and Transfer Register (PRTR) system was created in 1999 and enacted in 2001 in response to the OECD Council on PRTR Implementation in 1996 (OECD, 1996).

Following Article 8 in Chapter 19 of Agenda 21 in 1992 (UNCED, 1992)[7], a prototype of the Japanese PRTR system was built voluntarily by the industry. The Japan Chemical Industry Association (JCIA) conducted the first survey on PRTR programs in the US and Europe and developed the first trial emissions inventory of 13 chemicals in 1992, followed by an inventory of 28 carcinogenic substances in 1993. Based on the results and the experience gained, an emissions inventory guideline and manual were created, and 259 chemical substances were designated for a long-term target in 1994. In spite of the voluntary efforts of the chemical industry to pursue a more comprehensive system, the MOE tried to introduce a PRTR system. However, there was strong opposition to the MOE's decision in the industry. The Japan Business Federation, or *Keidanren,* which represents all industry in Japan, including the chemical industry, claimed that the PRTR pilot project led by the MOE was a hasty decision because the designated chemical substances should be selected by the industry, and the disclosure of the emissions inventory should be carefully implemented through a well-established risk communication strategy. In particular, the *Keidanren* was concerned that disclosure of the emissions inventory might hurt the reputation of the industry and even individual companies. The MOE accepted the criticism and instead encouraged *Keidanren* to voluntarily undertake a PRTR emissions inventory in collaboration with the 38 industry member associations in 1997 for the same

[7] Article 8 states that the principle of the right of the community and of workers to know those [chemical] risks should be recognized. However, the right to know the identity of hazardous ingredients should be balanced with industry's right to protect confidential business information. Industry initiatives on responsible care and product stewardship should be developed and promoted.

designated substances in the MOE pilot project, which continued annually until 1999. The number of participating associations and their member firms increased from 1997 to 1999, and the total reported amount of emissions was estimated to cover more than 80% of the total national emissions.

Based on these well-performing voluntary actions led by *Keidanren*, the Act on Confirmation, among others, of the Release Amounts of Specific Chemical Substances in the Environment and Promotion of Improvements to the Management Thereof was introduced as legislation in 1999, mandating designated plants to report an emissions inventory of designated chemical substances to the national government annually. Given the concerns of the industry, however, the emissions inventory data of each plant are to remain unpublished unless they are requested in accordance with the country's official information disclosure system.

One can see that the Japanese PRTR system is a combined case of light-handed regulation and voluntary action, while the TRI is a combined case of information disclosure and voluntary action. In 1996, the MOE committed itself to introducing a PRTR system in Japan. It was a sufficiently clear message and gave the industry an incentive to build the system voluntarily. Note that one of the reasons that the negotiations between the MOE and industry were successful was that the MOE talked not with each firm or each industry but with the *Keidanren*, which has control over the entire industry. Another reason for the successful negotiations was that the MOE and METI have joint jurisdiction over the Japanese PRTR system. METI mediates between the two and contributes to building a trusting relationship.

Figure 3 suggests that the Japanese PRTR introduction has been generally successful in its early stages, with evidence showing that 33% of the total emissions and transfers were reduced from 2003 to 2009. Although negative reactions of investors regarding the polluting firms in the PRTR system were not evident in Japan's market due to the absence of firm-level media coverage (Ferraro and Uchida 2007), firms increased their pollution abatement investments (Hibiki and Managi 2010). Under well-motivated voluntary actions through responsible care, product stewardship and corporate environmental management, the PRTR provided an opportunity for firms to retain detailed information on the flows of chemical substances based on their own initiative (Frondel et al. 2007; Fujii et al. 2011,).

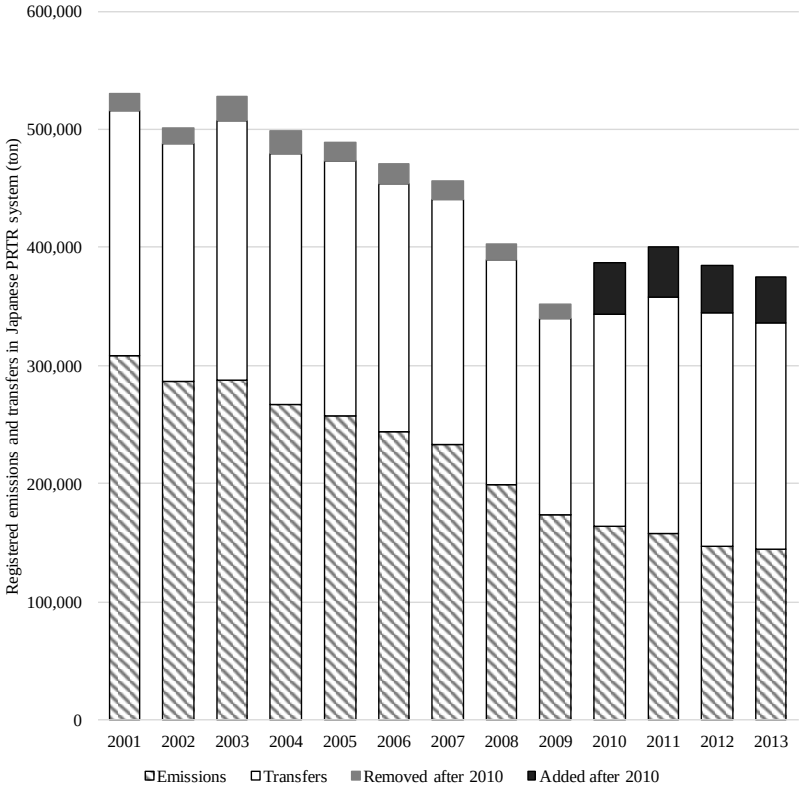

Figure 3: Total registered emissions and transfers under the Japanese PRTR system

Note 1: 354 chemical substances were originally designated in 2001, 73 chemical substances were removed ("Removed after 2010") and 5 chemical substances were aggregated with other substances. Thus, 276 chemical substances were continuously designated between 2001 and 2013 ("Emissions" or "Transfers"). In addition, 186 chemical substances ("Added after 2010") were added in 2010; therefore, the current designated chemical substances total 462.
Note 2: Smaller plants with aggregate inputs of designated substances of less than 5 tons per year were exempted in 2001 and 2002, and thereafter, the amount for exemption was reduced to 1 ton per year to cover smaller plants.
Note 3: The medical and health industry was included in 2010.

Source: Ministry of Environment

4.4 Fishery Management

To preserve fish stocks, the government must develop rules that are acceptable to all fishermen, such as Individual Transferable Quotas (ITQ). ITQs can be resold to those who want to buy them in the market. As of 2008, 148 major fisheries around the world had adopted this system. The first country to adopt ITQs was New Zealand in 1986. In the US, there are 15 catch share programs that allow individual fishermen to harvest a fixed amount of fish. Two such programs use ITQs (the Mid-Atlantic Surfclam and Ocean Quahog ITQ, introduced in 1990, and the South Atlantic Wreckfish ITQ, which began in 1992). Overall, the 15 programs have been successful in improving economic efficiency, ending the race to fish, and reducing fishing capacity (Brinson and Thunberg 2013).

So far in Japan, no fishery is managed using ITQs. Japanese coastal fisheries are managed by fishery cooperative associations (FCAs), whose members are fishing households and small fishing companies.

Fishing rights, which are similar to territorial use rights for fishing (TURFs), are granted to FCAs by the government, and they are protected by the law. Coastal fishery management in Japan is characterized as being co-managed by fishermen based on FCAs and TURFs (Uchida and Makino (2008)). The co-management of coastal fisheries is implemented through fishery management organizations (FMOs), most of which are also members of FCAs and engage in enforcement of mutually agreed upon rules on fishing grounds. Since the 1980s, they have been incorporated into policy by the Japanese Fisheries Agency. The number of FMOs has been increasing and numbered 1,608 in 2003 (Uchida and Makino 2008). Thus, the influence of fishermen on policy, including through TACs, is very strong, and it is enhanced by TURFs, which are protected by law. Thus, the Japanese Fisheries Agency has allowed fishermen to manage the fisheries and has supported them. Sarker et al. (2015) called Japan's coastal fisheries management system "state-reinforced self-governance".

Has fisheries management in Japan been successful? Some experts endorse Japan's fishery management system as community-based resource management, and there are a few successful examples, such as Sand Eel Fishery in Ise Bay. Makino (2011). As a whole, however, it must be recognized that the system has failed to manage the fisheries. Figure 4 shows that the fish catch in Japan has been decreasing since 1990, mainly because of overfishing, although the establishment of a 200-mile limit might improve the situation.

The TAC was set for just 8 species in 1997 after Japan ratified the United Nations Convention on the Law of the Sea (UNCLOS) in 1996. In addition, the TAC has been set at a sufficiently high level, which is larger than the actual catch. For example, the TAC for Japanese jack mackerel was 220,000 tons in 2011, while the actual catch was 152,000 tons. The TAC should have been much stricter because the actual catch has been declining due to overfishing. As a consequence, there are too many small fishermen; most of them are households, and they have been suffering from decreasing income. Excess investment and overcapacity have reached remarkable levels (Higashida). Yagi and Managi (2011) showed that overcapacity in the Japanese fisheries industry was estimated to be 3 billion dollars in 2003.

When the Japanese Fisheries Agency generates a draft of a TAC, the agency negotiates with fishermen organizations. The allocation of TACs to each fisherman is also determined by organizations such as FMOs and their parent FCAs (Makino 2011). There are many fishermen organizations in Japan, which implies that no organization has control over all fishermen. Consequently, the government has failed to set TACs at the proper level for fish stocks to recover, although fishermen recognize the necessity. The government should not negotiate with these organizations and should instead exert leadership by setting TACs itself in cases where there are many stakeholders.

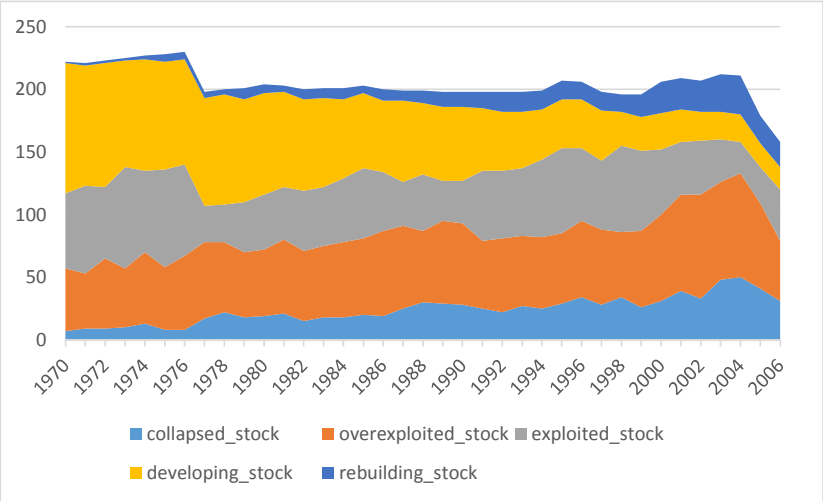

Figure 4: Fish stock in Japan

Note: The method of stock-status plots (SSPs), which was developed by Grainger and Garcia (1996), is used. SSPs are bivariate graphs summarizing the status (e.g., "developing", "fully exploited", and "overexploited"), through time, of the multispecies fisheries of a fished area or ecosystem (Kleisner and Pauly (2015)).

4.5 Containers and Packaging Recycling

Due to the country's small land area and high population density, waste management policy has attracted considerable attention in Japan. In the early 1990s, one of the most significant challenges that Japan faced in terms of waste management was extending the lifetime of landfills. Containers and packaging represented more than 60% of household waste[8] in terms of volume (not weight). The government tried to reduce the amount of plastic bottles and wrappers that are disposed of in landfills by introducing mandatory recycling laws for containers and packaging.

As a result, the Containers and Packaging Recycling Act (CPRA) was enacted as a national law in Japan in 1995; in the US, there is no national law on recycling plastic bottles, and different states have different levels of legislation[9]. Originally, the law was based on the principle of Extended Producer Responsibility (EPR), following Germany. The German Packaging Ordinance enacted in 1991 obliged manufacturers and distributors to take back used and empty sales packages from consumers for free and to recycle them. However, Japan's plan was distorted and completely changed as a result of negotiations between the MOE, METI, and packaging-related industries. Consequently, local governments were burdened with most of the costs associated with the collection and recycling of used packages.

8 http://www.jcpra.or.jp/english/tabid/614/index.php.

9 According to Viscusi et al. (2012), only 7 states have mandatory recycling laws.

However, there were too many stakeholders, including beverage and food manufacturers, the packaging industry, recyclers, and retailers. In addition, there was no dominant organization that could take control of the negotiations with the government. It was quite difficult even for METI, which favors such industries, to interview the stakeholders and lead them to a conclusion. The final draft of the law encouraged (not obliged) local governments to collect packages from consumers and obliged manufacturers and distributers to recycle them. The point is that these private firms are responsible only for a small portion of the cost. According to Hosoda (2008, pp. 53-54), it costs 10 to 30 JPY for a local government to collect an individual bottle from a household. However, the recycling cost that manufacturers and distributors should pay is only 4 to 5 JPY per bottle. Thus, most of the cost is covered by taxes, not by the producers, which is why Japan's CPRA is not considered an EPR-based recycling policy. Distortions are generated, and the market equilibrium consumption differs from the social optimum unless all recycling-related costs, including collection and transportation, are not imposed on either producers or consumers (Shinkuma and Managi 2011). Without an appropriate cost burden, we cannot expect an incentive for the "Design for Environment (DfE)" by producers.

All Japanese citizens now have a responsibility to separate containers and packages from household waste, and local governments[10], which are responsible for collecting household waste, are encouraged to provide opportunities to collect those recyclables separately. As of 2014, more than 90% of the local governments had provided separate collection opportunities for containers and packages[11]. Since the implementation of the law in 1995, there has been an upward trend in the household recycling rate in Japan (12% in 1995 to 22% in 2012[12]); however, this figure is much lower than the figure for the US, which was 34% in 2013 (US EPA 2015), and the figure for the UK, which was 44.8% in 2014 (UKDEFRA 2015). This disparity is caused by the reluctance of some municipalities to provide citizens with opportunities to dispose of used packages separately unless the producers incur the cost in accordance with the EPR.

The Regulatory Reform Council (RPC) in the Cabinet Office of the Japanese government recommended a reexamination of the CPRA in June 2013[13]. The RPC criticized the MOE and METI because the ministries had not started a discussion by the deadline[14]. Neither ministry could hold a *Shingi-kai* to discuss the issues because they failed to reach an agreement among the stakeholders in face-to-face negotiations prior to the *Shingi-kai*. Thus, it is apparent that there are too many stakeholders for the CPRA[15]. As of October 2015, a *Shingi-kai* for the CPRA amendment had not been held since September 2014.

10 As of January 2014, there are 1,742 local governments (cities, towns and villages combined) in Japan.

11 http://www.env.go.jp/press/press.php?serial=18064.

12 http://www.env.go.jp/recycle/waste_tech/ippan/stats.html.

13 http://www8.cao.go.jp/kisei-kaikaku/kaigi/publication/130605/item1.pdf.

14 *Nikkei Shimbun, electric version, October 2, 2015.*

15 Hosoda (2008, p. 43) also mentioned there are too many stakeholders for the CPRA in a different context.

5. Conclusion

Japan's environmental policy is unique in that voluntary approaches have been taken to reduce total emissions. This approach is quite different from the traditional approach, or heavy-handed regulation. Voluntary approaches are conducted through negotiations with polluters. The idea behind voluntary approaches is that the government can induce polluters to abate emissions voluntarily by using heavy-handed regulations as a threat. In some circumstances, it is costly to introduce heavy-handed regulations. The emissions permit market requires stringent enforcement and proper monitoring technology. In particular, developing countries could lower their transaction costs by using voluntary approaches.

As shown in several examples in the previous section, voluntary approaches are not always successful. The key issue is the number of the stakeholders with whom the government needs to negotiate. The greater this number is, the more likely voluntary approaches are to fail. One recent notable example of stakeholder involvement is the deregulation of the power industry. In response to the nuclear accidents at Fukushima following the Great East Japan Earthquake, people started to cast doubt on the structure of the industry, i.e. a regulated regional monopoly with vertical integration. In the past decade, the market has been gradually deregulated, however, retail sales to households were still monopolized in each region. Moreover, transmission and distribution were monopolized by ten regional monopolist companies. In discussing the reform of the electric power sector, the government decided to weaken the involvement of the power companies from *Shingi-kai*, which led to the deregulation of the retail market and the separation of transmission and distribution from generation. Thus, less involvement of stakeholders was a key to the swift reform of the industry.

However, this success does not mean that the government should always resort to heavy-handed regulations in a large economy where there are many firms. As we see in some of Japan's environmental policies, voluntary approaches work well if the government can succeed in negotiating with an organization that has powerful control over the firms to be regulated. These experiences in Japan could recommend this approach to authorizing an organization representing each industry to negotiate with the government or even establish such an organization if they it does not already exist. It should be noted, however, that the introduction of meaningful environmental targets may become difficult if the influence of such organizations becomes too strong.

Appendix

Let us denote by *MB* the marginal benefit or profit from emissions to the firms and the marginal environmental cost by *MEC*. Firms' laissez faire emission is such that *MB*=0, while the optimal emission equates *MB* and *MEC*, as represented by q_0 and q^*, respectively, in Figure A. With command and control, the government can directly order polluters to reduce their emissions to the optimal level. Alternatively, the government can choose an emissions tax or an emissions trading scheme, with which the optimal tax and the equilibrium price of emissions permits are represented by t^* and p^*, respectively.

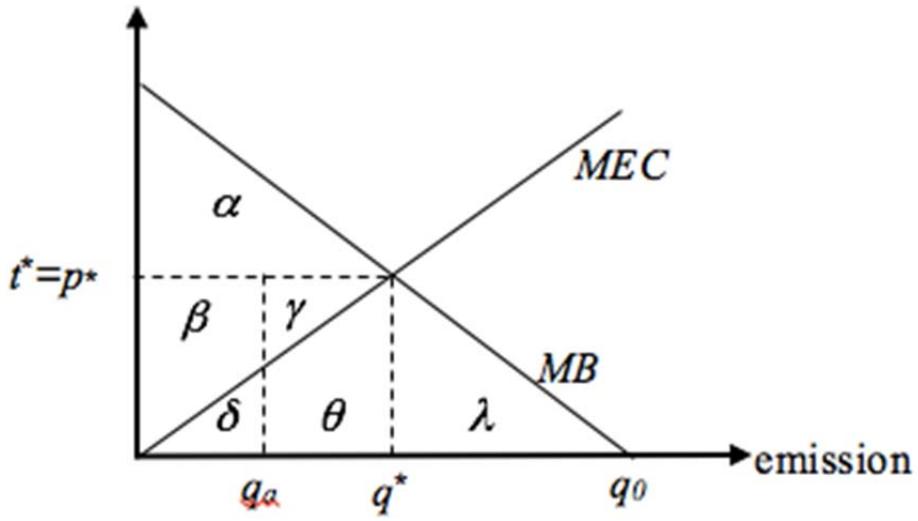

Figure A

The profit of polluting firms under an emissions tax is the area of the triangle represented by α, while the profits under command and control are the entire area below the *MB* curve represented by $\alpha+\beta+\gamma+\delta+\theta$, thus losing only λ from the initial laissez faire equilibrium. An emissions trading scheme is a hybrid of the two. When polluting firms are assigned emissions permits by q_a for free, their profits are calculated as $\alpha+\beta+\delta$.

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