"Needs Survey" under the Governmental Commission on the Projects for ODA Overseas Economic Cooperation in FY2012

Summary Report

Republic of South Africa, India, Vietnam, and Malaysia

Use of products and technologies related to purification and treatment of water to improve wastewater and sewage treatment systems

March, 2013

Mitsubishi Research Institute, Inc.

Abstract

Introduction

Technologies for purification and treatment of water can be roughly divided from a viewpoint of: (1) supply of clean water and service water / sewage treatment and direct purification, (2) large-scale infrastructure / small-scale or distributed plants, and (3) government (public) demands / private demands. All these technologies have been highly developed in Japan through the process of solving water contamination problems represented by specific pollution problems caused by companies, etc. In the field of small-scale or distributed sewage treatment plants among them, small- and medium-sized enterprises play a key role in production of plants and equipment, maintenance, etc. However, management resources to explore overseas markets, in particular developing country markets, are insufficient.

On the other hand, in the countries targeted in this needs survey (i.e., the Republic of South Africa, India, Vietnam, and Malaysia), where industrialization and urbanization are progressing owing to rapid economic development, large quantity of pollutants are flowing into rivers, canals, and lakes because industrial and domestic wastewater treatment facilities have not been deployed or operated appropriately, and water contamination is in a serious situation mainly in expanding urban areas and the areas surrounding them. In addition, flood damage occurs every year caused by lack of wastewater / sewage treatment plants, which brings about hygiene problems such as the diffusion of contagious diseases due to sewage water immersion during flood. There is the fear of the escalation of water contamination hereafter following further rapid economic development, population growth, and the progress of urbanization.

Therefore, it is expected that the sophisticated water purification / treatment technologies of Japanese small- and medium-sized enterprises contribute to solving the above problems, provide a platform for economic development in consonance with the environment of developing countries, and significantly contribute to reducing poverty.

Against the background of the above situations, compatibility between the assistance to developing countries by ODA and the overseas business development of Japanese small- and medium-sized enterprises was investigated in this needs survey. Considering the progress situation of national projects and ODA projects having already been implemented in the targeted countries, we checked the products and technologies of small- and medium-sized enterprises participating in Kanto Area Environmental Technology (water treatment field) Proliferation Conference, Yokohama Water Business Conference, and Water Business Members Saitama against the situation. Then, we considered packaged and systematic promotion of the projects including the suitable products and technologies of them, and performed investigations and analyses contributing to their introduction into the targeted countries with the aim of utilizing the technical cooperation, etc., of the private company proposal type.

Specifically, the following four items were investigated and analyzed for four countries (the Republic of South Africa, India, Vietnam, and Malaysia) targeted in this survey:

1. Discription of the current situation and development needs of the concerned development issues in the surveyed countries
   - Problems in development and needs in the country

- Products and technologies of small- and medium-sized enterprises which are expected to be used for solving problems in development

2. Feasibility analysis of use of the products, technologies, etc., of Japanese SMEs (small-and medium-sized enterprises) in ODA projects
   - Proposal of new ODA projects and related support menus using the products, technologies, etc., of Japanese SMEs
   - Contribution to solving problems in development (introduction scale of specific products and technologies, etc.)
3. Possible applicability of the SME's products and technologies to the future ODA projects
4. Possibility and problems of business development by utilising the SME's products and technologies in the surveyd countries

From the next page the outline of the overall result of this survey is described along with the summary of “Direction of Business Development of Japanese Small- and Medium-sized Enterprises Responding to the Needs for Purification and Treatment of Water” based on examination for each country targeted in the survey.

Concerned Development Issues

- Low access chance of residents to safe water because water supply systems are undeveloped or poor
- Living environment deterioration and water source pollution because night soil / domestic wastewater treatment facilities such as sewage lines are undeveloped
- Poor governance (including technologies and knowhow) for operation and maintenance of large-scale water and sewage treatment facilities
- Environment deterioration due to use of large quantity of water and insufficient wastewater treatment in key industries contributing to employment in each country

Products and Technologies of Enterprise

- Community type compact and simple water purification module
- Automatic water pressure controller, water meter
- Water leakage detection / pipe restoration technologies for water supply and sewerage systems
- Non-open cut jacking method to lay down water supply and sewerage lines
- New coagulation settling agent (for water supply facilities)
- Small-scale / distributed wastewater treatment equipment such as septic tanks
- Engineering service including restoration of existing industrial wastewater treatment facilities, etc.

Proposed ODA Projects and Expected Impact

- Technical cooperation projects are preformed assuming the collaboration of small- and medium-sized companies having water leakage detection technologies and Japanese water supply operators (concerned authorities of municipalities). Effective for efficient use of water resources by reducing non-revenue water and improvement of management of water supply business.
- For the non-open cut underground jacking method to lay down water supply and sewerage lines, places where the method should be applied are checked within areas for which we created a master plan, and technical cooperation projects are performed. Effective for early development of the pipe networks.
- Engineering service for restoration of existing wastewater treatment facilities developed by Japanese ODA projects in fishing ports is performed as technical cooperation projects. A model (best practice) of fishing ports (many fishing ports exist in the targeted countries) is established, and a training site is created.
- In cooperation with the Ministry of Rural and Regional Development, etc., of a targeted country, small-scale or distributed domestic wastewater treatment equipment such as septic tanks is introduced as a model, coordinating Japanese technical cooperation project and the proliferation project of the government of a developing country. The introduction may be expanded to other regions having similar water environment problems.

Future Business Development of Enterprise

- Products and technologies for which there are needs in the targeted countries, such as community type compact and simple water purification modules, and water leakage detection / pipe restoration technologies, are introduced as models in new ODA projects, etc.
- By exhibiting products at local exhibitions, etc., Japanese small- and medium-sized companies perform and expand distributorship agreements with a local company, production licensing, OEM, and O&M support.

◆Problems in development and needs in the Republic of **South Africa** and possible use in ODA projects, etc., of the products and technologies of Japanese SMEs

		Assumptions and points to be discussed in each field						
		Water supply				Sewage (night soil / domestic wastewater) treatment		Industry drainage treatment
		Measures against non-revenue water	Sophisticated water treatment		Local water supply	Measures against water leakage	Energy saving	AMD (acid mine drainage) treatment
		Measures against water leakage	Water treatment membrane	Seawater desalination	Remote monitoring / remote operation			
1	Problems in development and needs in the country	・Non-revenue water ratios are as high as 40% - 50%. The biggest cause of the high ratios is the aging of water pipes. Not only water leakage from public pipes but that in buildings is a problem. ・The needs for water leakage monitoring are high. Aging pipes must be restored. For water leakage in buildings, it is needed to reduce it by automatically controlling water pressure.	・Water quality in water sources such as dams and rivers are deteriorating. ・Needs for safe water treatment are growing on the other hand.	・The needs are growing in coastal small villages in particular since lack of water resources becomes increasingly serious. (Other related persons say the possibility of introduction is low in South Africa due to high costs.)	・Engineers tend to be unwilling to stay in the countryside. Even if simple water supply facilities are introduced there, they often fail due to inappropriate operation and maintenance. ・Needs are high for equipment with which simple water supply facilities can be monitored and operated appropriately without the engineers.	・Pipelines are aging and water leakage is a problem.	・Needs are growing for energy saving sewage treatment methods due to rise in power prices. ・Some companies operating sewage treatment facilities are considering the introduction of MBR.	・Untreated wastewater including heavy metals is discharged, which causes environmental pollution.
	Products and technologies of small- and medium-sized companies which are expected to be used for solving problems in development	・Water leakage monitoring ・Pipeline maintenance (non-open cut method) ・Water pressure control equepment	・Water treatment membrane	・Seawater desalination technology ・Water treatment membrane	・Remote operation software ・System using cellular phones, etc.	・Water leakage monitoring ・Pipeline maintenance (non-open cut method) ・Water pressure control equepment	・Energy saving sewage treatment technology ・Energy saving type MBR ・Power generation	・Reverse osmosis membrane ・Other technologies to surely remove harmful substances included in mine wastewater
2	Proposal of new ODA projects using the products, technologies, etc., of small- and medium-sized companies	・Provide equipment for training through ODA (private-public initiative grass-roots grant aid). ・Technical cooperation projects / expert dispatch projects / trainee acceptance projects	・Proliferation and advertising of Japanese water treatment technologies through expert dispatch projects / trainee acceptance projects	・Proliferation and advertising of Japanese water treatment technologies through expert dispatch projects / trainee acceptance projects	・Provide equipment for training through ODA (private-public initiative grass-roots grant aid). ・Technical cooperation projects / expert dispatch projects / trainee acceptance projects	・Provide equipment for training through ODA (private-public initiative grass-roots grant aid). ・Technical cooperation projects / expert dispatch projects / trainee acceptance projects	・Technical cooperation projects / expert dispatch projects / trainee acceptance projects	・Technical cooperation projects / expert dispatch projects / trainee acceptance projects
	Contribution to solving problems in development (introduction scale of specific products and technologies, etc.)	・Improve NRW ratio.	・Improve quality of water supply	・Measures against water shortage	・Improve local water supply environment.	・Prevent environmental pollution caused by water leakage from sewage piping.	・Improve sewage treatment. ・Measures for energy saving	・Improve environment ・Reduce health risks.
3	Measures for effective linkage with existing ODA projects (draft)	・Training programs of JICA	・Training programs of JICA		・Various project for village water supply	・Training programs of JICA	・Training programs of JICA	・Linkage with the water and sanitary improvement project (pilot project) in Emalahleni district, Witbank, South Africa, through grass-roots grant aid
4	Problems in participation of small- and medium-sized companies	・Since direct order acceptance is difficult in the case of business that provides service, finding an appropriate partner is needed. ・Human resources who can be dispatched for trainings should be secured in small- and medium-sized companies.	・It is difficult for small- and medium-sized companies to engage since large facilities are mainly used for water treatment membranes and seawater desalination plants.		・Since human resources who know both water treatment and IT need to be secured, it is difficult for small- and medium-sized companies to independently secure them to perform business.	・Since direct order acceptance is difficult in the case of business that provides service, finding an appropriate partner is needed. ・Human resources who can be dispatched for trainings should be secured in small- and medium-sized companies.	・It is difficult for small- and medium-sized companies to contribute to energy saving / new energy technologies for plant construction since large facilities are mainly used there.	・It is difficult for small- and medium-sized companies to contribute to technologies for plant construction.

◆Problems in development and needs in **India** and possible use in ODA projects, etc., of the products and technologies of Japanese SMEs

		Assumptions and points to be discussed in each field					
		Water supply	**Sewage (night soil / domestic wastewater) treatment**			**Industry drainage treatment**	
		Measures against non-revenue water	**Pipeline construction**	**Sewage treatment**		**Observance of effluent regulations**	**Tannery**
		Water leakage detection	**non-open cut method**	**Nitrogen removal**	**Efficient treatment**		**Improve biological treatment before RO**
		Karnataka State Bangalore	**TamilNadu State Tirupur**	**Karnataka State Bangalore**	**Throughout the country**	**Karnataka State**	**Ranipet (near Chennai)**
1	Problems in development and needs in the country	・Non-revenue water ratio is about 40% currently. Five persons for water leakage detection is finding leakage at a pace of 120 cases/month. Since detection is difficult due to noise and vibrations by high road traffic, effective detection methods are required. (Detection techniques are needed first, although construction after detection is also needed.) ・Methods based on 24 hours water supply are not appropriate since water supply time is limited (about 4 hours / 2 days).	・There is a project of developing sewage pipelines in a wide area (160km2, 0.1 million people). Needs for efficient technologies exist, not limited to existing open cut methods. ・Since road traffic is always high over the whole area in India, pipeline construction by open cut methods is difficult. There are needs for methods to efficiently construct pipelines under adverse conditions.	・Although Bardenpho process is adopted in treatment plants in Bangalore, nitrogen and phosphorous removal performance is not sufficient. Low cost treatment methods that do not discharge sludge are demanded. (A concern is costs for chemicals added.)	・Needs for energy saving because of unstable power supply in urban areas such as Bangalore and Chennai, and needs for space saving treatment methods because of the limitation of land areas are growing. ・Securing grounds for treatment plants is difficult because of land shortage, which is a common problem in urban areas.	・There is a problem in the system to develop companies which achieve industrial effluent standards ・There are standards, but regulation and enforcement are not sufficient. (Efforts of private companies are relatively better conditions)	・Strict wastewater treatment is demanded by the ZLD (Zero Liquid Discharge) policy (in particular, tanning, paper and pulp, fiber, etc.) ・A problem is treatment of a concentrate including chrome, which is specific to tanning (it is stacked within the site currently). ・Reduce loads of RO process by biological treatment before RO treatment.
	Products and technologies of small- and medium-sized companies which are expected to be used for solving problems in development	・Detect water leakage by the techniques of leakage detection experts (listening by man, correlation equation, mechanical sound detection). ・Contribute to ability development of staff of the waterworks department for finding the location of water leakage. * Example of companies: Water Technical Service (belonging to Yokohama Water Business Conference)	・Use knowhow of companies having a non-open cut jacking method. * Example of companies: Yasuda Engineering (belonging to Yokohama Water Business Conference)	・Using materials promoting biological treatment, cost reduction is expected by reducing use of chemicals and sludge treatment. * Example of companies: NET Corporation, and Polytec Japan (belonging to Yokohama Water Business Conference)	・Technologies are demanded that contribute to compact (small installation space) and highly energy saving treatment methods. * Example of companies: Polytec Japan (belonging to Yokohama Water Business Conference)	・There is a problem in the system to develop companies which achieve industrial effluent standards ・Japan has a history where both municipalities and companies discharging wastewater made efforts for pollution prevention by concluding a pollution prevention agreement between them. This mechanism may be introduced in India.	・Although sophisticated treatment has been introduced for realizing ZLD, there is room for improvement in pretreatment before RO treatment. Reductions of RO treatment loads and the concentrate are expected by introducing technologies using biological treatment. * Example of companies: NET Corporation, and Polytec Japan (belonging to Yokohama Water Business Conference)
2	Proposal of new ODA projects using the products, technologies, etc., of small- and medium-sized companies	・Dispatch experts through technical cooperation projects. ・Accept trainees. ・Demonstrate water leakage detection in a demonstration area (pipeline length of about 10km). ・Support JV participation of local operators in public procurements (contract negotiation, equipment transport, partner cooperation, etc.).	・Expert dispatch / trainee acceptance / technical cooperation projects ・Expert dispatch to investigate causes and consider countermeasures / lecturers to hold management knowhow trainings / pilot projects to investigate causes and introduce countermeasures	・Expert dispatch / technical cooperation projects ・Expert dispatch to consider measures for wastewater treatment / pilot projects to introduce and verify measures for wastewater treatment ・Have a view of transverse development of similar projects through the pilot.	・Expert dispatch / technical cooperation projects ・Expert dispatch to consider measures for wastewater treatment / pilot projects to introduce and verify measures for wastewater treatment ・Have a view of transverse development of similar projects through the pilot.	・Proposal of a wastewater treatment technology depending on industry (factory).	*(B to B, mainly)* ・Expert dispatch / technical cooperation projects ・Expert dispatch to consider measures for wastewater treatment / pilot projects to introduce and verify measures for wastewater treatment ・Have a view of transverse development of similar projects through the pilot.
	Contribution to solving problems in development (introduction scale of specific products and technologies, etc.)	・Existing projects: contribution to water leakage reduction -> service level improvement (introduction of water leakage detection equipment, education of usage of equipment, contract to water leakage detection service using equipment)	・Improve development speed. ・Accomplish project results early.	・Improve treatment quality. ・Reduce treatment costs.	Realize efficient treatment by introducing a medium that promotes biological treatment based on a basic treatment method (SBR).	・Promotion of measures and activities of private companies against pollution of public water areas.	・Promotion of local industries ・Improvement of ambient water quality ・Observance of environmental regulations
3	Measures for effective linkage with existing ODA projects (draft)	・Linkage with the water and sewerage projects of Bangalore City ・Linkage with the equipment exhibition at the water service operation and maintenance expert training of JICA (November, 2012 at Yokohama) ・Application to grass-roots projects with Yokohama City (participation in areas other than water leakage)	There is no existing ODA.	・Grasp local needs from existing projects or cases to which existing grass-roots projects contributed. ・Grasp local needs through cooperation with volunteer dispatch projects.		There is no existing ODA. ・Propose a grass-roots project with a municipality having an experience of pollution, and support operation of policy aspects such as conclusion of a pollution prevention agreement with a company discharging a pollutant.	・The urban infrastructure development project of Tamil Nadu State is supporting water and sewerage development in local cities.
4	Problems in participation of small- and medium-sized companies	・Water leakage detection is not ordered alone in general. It is mostly ordered as part of a blanket project. Therefore, JV with a principal contractor needs to be established, and ability development for it is required.	・Since it is difficult to continue sewage works by charge receipts, which is different from water supply, positive investments is less apt to be made. Public funds such as subsidies must be infused for active investments. ・On a long-term basis, it is needed to create a strategic project development image considering relationships with the whole sewage service, not only the jacking method.	・For better problem solving and technical proposal, not partial water treatment technologies but technologies covering the whole system are needed. ・It is desirable to establish a cooperation system with large companies.	・There are technologies that meet the needs, such as energy saving type MBR (membrane bioreactor), but small- and medium-sized companies are not related to them very much. ・Due to cost problems, these sophisticated technologies are not considered to be introduced in India for the present. (Introduction of MBR is limited to Cubbun Park in Bangalore, etc.)	・Because a pollution prevention agreement is a mechanism, not a concrete substance, it is difficult for a small- or medium-sized company alone to introduce it. ・It is needed that measures to involve a small- or medium-sized company as a source of a mechanism and a specific supporting technology are considered by a municipality mainly.	・For better problem solving and technical proposal, not partial water treatment technologies but technologies covering the whole system are needed. ・It is desirable to establish a cooperation system with large companies.

◆Problems in development and needs in **Vietnam** and possible use in ODA projects, etc., of the products and technologies of Japanese SMEs

		Assumptions and points to be discussed in each field										
		Water supply				Sewage (night soil / domestic wastewater) treatment		Industry drainage treatment				Purification of rivers and lakes
		Small-scale water treatment	Quality manegement of water supply	Measures against non-revenue water	Use of ICT	Small-scale wastewater treatment	Sludge treatment	Port and seafood processing facilities wastewater treatment	Public industrial complex wastewater treatment	Craft village wastewater treatment	Improve management ability	Purification of Hoi An Thu Bon River
1	Problems in development and needs in the country	・In a new farming village development project propelled by the Ministry of Agriculture and Rural Development, safe water supply in farming villages and suburban areas is a matter to be realized. ・There are many districts in suburban areas and farming villages to which tap water has not been supplied, and mini purification plants of about 120 are needed hereafter in the suburb of Ho Chi Minh City.	・Measures against salt in water sources in the coastal area, deterioration of water quality by rust of house's water pipes ・Supply of water that is drinkable as it is	・Non-revenue water ratio is 20% or higher in areas where aging pipes have not been replaced sufficiently. There is a problem in water leakage detection technologies. (However, model projects, etc., have been propelled in the survey for promoting cooperation of small- and medium-sized companies and in Sawaco.)	・Although toll collection systems have been introduced in some big cities, inefficient toll collection systems are used and customer databases have not been developed even in regional hub cities such as Da-nang City.	・There are areas where no future sewage line development plan exist and wastewater is discharged without treatment not only in rural areas but in urban areas. ・There is a problem of odor caused by wastewater lines.	・Even if there are septic tanks, sludge treatment technologies have not been developed well. Therefore, maintenance is insufficient and the tanks do not exert their effect.	・Although there are facilities, they are not operated well. The system needs to be reexamined. (Da-nang, Vung-tau) ・There are ports where wastewater treatment facilities have not been constructed.	・There are industrial complexes where treatment facilities have not been constructed.	・In the country there are about 3,000 craft villages (fiber, dyeing, food processing, etc.) discharging wastewater without treatment. ・Positioned as a prioritized sector for which countermeasures should be taken in the national environmental protection strategy.	・Although environmental regulations and regulation systems including environmental police have been developed considerably, inspection of water quality cannot keep pace with them.	・Pollution of rivers in a major sightseeing area in Hoi An City, middle of Vietnam, is serious. ・Purification of rivers having been polluted by wastewater from mainly the private sector (restaurants, lodging facilities, and other domestic wastewater)
	Products and technologies of small- and medium-sized companies which are expected to be used for solving problems in development	・Small-scale purification plants (Meiwa Kogyo Co., Ltd) ・Sale to water supply operators, and promotion of PPP projects in cooperation with local companies (Hawaco, Pernam)	・Small-scale water supply facilities, inexpensive seawater desalination facilities, water pipe cleaning technology [Toshi Kougyou, Co., Ltd] ・Sale to and cooperation with water supply operators	・High quality iron pipes, piping technique, permanent automatic pipe monitoring equipment [Water Technical Service, Co., Ltd] ・Sale to and cooperation with water supply operators	・Development techinologies of ICT system [Akira Group, Azbil Coporation] ・Sale to water supply operators	・Products and maintenance of combined treatment type septic tanks in cooperation with local companies (manufacturers, urban drainage companies, etc.) [Daie Industry, Co., Ltd] ・Sale to developers and cooperation with local FRP manufacturers	・Sludge treatment technologies [AMCON, Inc., Ishigaki, Co., Ltd] ・Sale to septic tank manager	・Restoration and maintenance of wastewater treatment facilities in cooperation with local companies (Sanicon, etc.). [Santoku Joka Kogyo, Ltd] ・Technology consulting for facilities managers, facilities restoration engineering	・Construction and maintenance of wastewater treatment facilities [Santoku Joka Kogyo, Ltd] ・Sale to and cooperation with managers of industrial complexes	・Products and maintenance of wastewater treatment facilities including septic tanks in cooperation with local companies (Green Tech, WASEN, etc.) [Santoku Joka Kogyo, Ltd] ・Sale to manufacturers	・Water quality inspection technique [Saitama-ken Environmental Analysis & Research Association] ・Cooperation with local government organizations	・Direct water purification technologies for small flow volume rivers, lakes, etc. [Intelligence Station] ・Cooperation with local government organizations
2	Proposal of new ODA projects using the products, technologies, etc., of small- and medium-sized companies	・Technical cooperation project, non-profitable ・Technical cooperation expert dispatch ・Pilot projects	・Technical cooperation project, technical cooperation expert dispatch	・Technical cooperation project, technical cooperation expert dispatch	・Technical cooperation project, technical cooperation expert dispatch ・Pilot projects	・Technical cooperation project, technical cooperation expert dispatch, non-profitable ・Provision of facilities and expert dispatch	・Technical cooperation project, technical cooperation expert dispatch, acceptance for training ・Provision of facilities and expert dispatch	・Technical cooperation project, technical cooperation expert dispatch ・Expert dispatch	・Technical cooperation project, technical cooperation expert dispatch ・Provision of facilities and expert dispatch	・Technical cooperation project, technical cooperation expert dispatch ・Provision of facilities and expert dispatch	・Technical cooperation project, technical cooperation expert dispatch, acceptance for training	・Technical cooperation project, technical cooperation expert dispatch
	Contribution to solving problems in development (introduction scale of specific products and technologies, etc.)	・About several hundred to several thousands housing units are targeted. ・Safe water supply, improvement of supplied water quality ・In the suburb of Ho Chi Minh City, for example, improvement of water access of 2 million people	・In urban areas, several tens of thousands of housing units are targeted. ・Improvement of supplied water quality	・In urban areas, several tens of thousands of housing units are targeted. ・Reduction of non-revenue water ratio	・Several tens of thousands of housing units are targeted. ・Improvement of management efficiency	・Several tens of housing units are targeted. ・Improvement of public health and ambient water quality	・Several units of septic tanks ・Improvement of public health	・All factories are targeted. ・Improvement of ambient water quality	・All factories are targeted. ・Improvement of ambient water quality	・All (small-sized) factories are targeted. ・Improvement of ambient water quality	・Treated water of the private sector such as factories in industrial complexes are targeted. ・Improvement of ambient water quality	・Thu Bon River ・Improvement of public health and ambient water quality, big influence on tourism
3	Measures for effective linkage with existing ODA projects (draft)	・Comprehensive development of water supply environment linking with local development, living environment improvement projects, and poverty area small-scale infrastructure development projects (yen loan)		・Succeeding subject to the survey for promoting cooperation of small- and medium-sized companies performed this fiscal year		・Water purification improvement program for organic matters (grass-roots technical cooperation) ・Ho Chi Minh City wastewater management ability development project (technical cooperation)		・Implementation as a restoration case in the Vung-tau Cat Lo Fishing Port development project.			Nationwide water environment management ability factory project (technical cooperation)	
4	Problems in participation of small- and medium-sized companies	・Since it is assumed a small budget, must work to reduce product cost suburbs, rural areas are in high demand. In addition, since the demand for coordination with the local community, need to find a local partner	・Japanese SMEs alone is potentially difficult for rich-salt water treatment	・When considering the cooperation with several programs that have already been implemented, it is necessary to coordinate with various stakeholders, SMEs alone is likely to be difficult	・Since it is required based on the existing water reatment system, there is a high possibility as it is difficult to bring the technology of Japan, companies need to find a local partner	・Since expertise is needed when installing septic tanks, it is necessary to find a reliable local partner company that performs production, sales, installation, etc., of septic tanks.	・Need to find a local partner companies to share maintenance technology, know-how	・There is a need to respond in the form of reviewing the existing wastewater treatment system must be tailored to local conditions held products and technologies, and cooperation with local partners is essential	・It requires to sell industrial park management companies, SME alone is difficult possibility	・For individual plants are small, it is very difficult to fund for several waste treatment systems, and it must be coordinated with local government agencies	・Not only for enhancement of technology, it is also necessary to support of capacity building for engineers with expertise, and it must be must be coordinated with local government agencies	・Not only directly purify rivers that are polluted, it is necessary to proceed in parallel improvement of the pollution that causes. ・it must be must be coordinated with local government agencies.

◆Problems in development and needs in **Malaysia** and possible use in ODA projects, etc., of the products and technologies of Japanese SMEs

		Assumptions and points to be discussed in each field							
		Water supply				Sewage (night soil / domestic wastewater) treatment			Industry drainage treatment
		Measures against non-revenue water		Alternative to coagulation settling agent	Small-scale water treatment	Small-scale wastewater treatment		Awareness-raising	Palm oil refinery wastewater treatment
		Water meter	Drainage water control			Clarification tank	Purification using plant		
		Throughout the country	Selangor State	Throughout the country (peninsula, mainly)	Throughout the country (remote areas)	Sabah State Sarawak State	Sarawak State	Sabah State	Throughout the country (Sabah State, mainly)
1	Problems in development and needs in the country	・Non-revenue water ratio is as high as 30% nationwide. The biggest cause of the high ratios is the aging of water pipes, and the inexactness of water meters is pointed out as another factor. ・There are needs for water meters that can measure flow volume exactly.	・As the causes of high NRW ratio, in addition to the aging of water pipes and the inexactness of water meters, waste of treated water due to the mismatch between the incoming water quantity and the water distribution quantity from water purification plants is pointed out as a problem in Selangor State. ・There are needs for knowhow of appropriate water distribution control.	・There is an environmental regulation on coagulation settling agents (containing aluminum). Although large-scale treatment facilities respond to it by drying and storing aluminum containing sludge within their premise, some small-scale facilities cannot respond to it and merely discharge it. Under the situation where the demand of observing environmental regulations is increasing, the needs for coagulation settling agents not containing aluminum are growing.	・Supplying treated water throughout the country is considered to be a policy target. ・Areas where treated water is supplied are increasing. However, remote areas, indigenous people residential areas, etc., have areas where treated water has not been supplied, and the needs for compact and simple water treatment equipment are high.	・Septic tanks (night soil treatment only) are mostly used with the exception of central sewage treatment plants in urban areas and small-scale wastewater treatment plants. ・Maintenance of septic tanks such as removal of sludge is not performed sufficiently. ・Domestic wastewater is discharged without treatment (a grease trap only, etc.), which is a cause of water pollution in rivers, etc. The needs for combined treatment type septic tanks are high.	・Technical improvement of small-scale wastewater treatment is considered. ・In particular, purification methods using plants corresponding to climate and natural features are investigated, and the needs for existing study results and related knowledge are high.	・The government considers that awareness-raising on the sewage field should be promoted mainly among children who are responsible for the future generation, and has begun to develop a program for sewage education. The needs for related fields are high.	・Palm oil plantation is being rapidly developed. ・Wastewater treatment in oil refinery is insufficient, which is a cause of pollution of rivers. ・Under the situation of growing palm oil plantation, the needs for wastewater treatment is growing.
	Products and technologies of small- and medium-sized companies which are expected to be used for solving problems in development	・Electronic meters / exact mechanical meters (example of companies: Aichi Tokei Denki Co., Ltd) ・Supply to water supply operators	・Knowhow of water distribution control (example of companies: Nihon Suido Sekkei, Co., Ltd, municipalities) ・Cooperation with water supply operators (business is expanded to other states if there are needs.)	・Coagulation settling agents not containing aluminum (example of companies: Naoji Yakuhin, Co., Ltd) ・Supply to water supply operators	・Small-scale water treatment facilities for remote areas (sand filtration, etc.) (example of companies: Meiwa Kogyo, Co., Ltd) ・Supply to the Ministry of Rural and Regional Development and local municipalities (B to G)	・Combined treatment type septic tanks, sophisticated treatment septic tanks (example of companies: Daie Industry, Co., Ltd)	・Knowhow of construction of purification sites using plants ・Provision of knowhow to investigation projects	・Environmental education / awareness-raising programs (municipalities) ・Provision and development of environmental education programs (B to G)	・Wastewater treatment facilities (example of companies: Santoku Joka Kogyo, Ltd) ・Supply to developers of wastewater treatment facilities
2	Proposal of new ODA projects using the products, technologies, etc., of small- and medium-sized companies	・Technical cooperation project ・Model projects for supplying water meters	・Expert dispatch / trainee acceptance ・Expert dispatch as lecturers of local training / lecturers for trainings in cooperation with municipalities	・Technical cooperation projects / expert dispatch projects / trainee acceptance projects (The projects may become related to the Ministry of Foreign Affairs. There is a possibility of proliferation.) ・Pilot project for alternative coagulation settling agents / management of the pilot project / lecturers for tours of water purification plants using an alternative coagulation settling agent	・Technical cooperation projects / expert dispatch projects ・Model project for introducing sand filtration facilities / control and management of the facilities	・Technical projects / grant-in-aid community development support ・Model projects for introducing septic tanks	・Technical cooperation projects ・Verification and study by experts	・Technical cooperation projects / trainee acceptance projects	*Since B to B is dominant, it may not be incongruous for ODA.* ・ Expert dispatch / technical cooperation projects ・Expert dispatch to examine measures for wastewater treatment / pilot project to introduce and verify the measures
	Contribution to solving problems in development (introduction scale of specific products and technologies, etc.)	・Part of supply areas of water supply operators is targeted (several tens to a hundred and several tens of housing units?) ・Improve NRW ratio. (It is difficult to quantitatively grasp influencing factors other than meters.)	・water storage facilities of water supply operators / those of municipalities ・Improvement of NRW ratio and the efficiency of water supply operation. (It is difficult to quantitatively grasp the contribution of water distribution control.)	・Water purification plants managed by water supply operators ・Observance of environmental regulations / improvement of environment	・Areas where treated water has not been supplied such as mountain districts ・Improvement of public health by supplying treated water	・Resort facilities in islands / public facilities (schools, etc.) in river basins (areas where environment improvement effects are easy to confirm) ・Improvement of ambient water quality	・Test sites for small-scale wastewater treatment facilities ・Improvement of ambient water quality	・Elementary schools / wastewater treatment facilities ・Awareness-raising on environment, improvement of ambient water quality	・Palm oil plantation ・Improvement of ambient water quality
3	Measures for effective linkage with existing ODA projects (draft)			・Succeeding subject to the survey for promoting cooperation of small- and medium-sized companies performed this fiscal year	・Succeeding subject to an existing grass-roots project or grasping of local needs from existing projects ・Grasping of local needs through cooperation with volunteer dispatch projects	・Grasp local needs from existing projects or cases to which existing grass-roots projects contributed. ・Grasp local needs through cooperation with volunteer dispatch projects.	・Knowhow of construction of purification sites using plants ・Provision of knowhow to investigation projects	・Grasp local needs from existing projects or cases to which existing grass-roots projects contributed. ・Grasp local needs through cooperation with volunteer dispatch projects.	・If a study project of the JST scientific and technical cooperation gets on track, it should be newly examined as a succeeding project.
4	Problems in participation of small- and medium-sized companies	・Inexact old water meters are widely used. Judging from the local price of water meters, the product prices need to be put down. Cost reduction in production is required.	・It may be difficult for a small- or medium-sized company alone to manage the whole water distribution system. Collaboration with a municipality is indispensable.	・Even small- and medium-sized companies have a high chance of entering the market if having a sophisticated technology. However, since water purification plants are assets of the government / state, a new product to be introduced must be understood by a local governmental organization, and sufficient coordination and explanation are required for it.	・Areas where the needs for introduction of the products are mountain districts. Since transport costs are high there, product prices must be put down. Therefore, production costs need to be reduced, or product specifications which can be manufactured based on local procurement are demanded.	・Since expertise is needed when installing septic tanks, it is necessary to find a reliable local partner company that performs production, sales, installation, etc., of septic tanks.	・For knowhow of construction of purification sites using plants, a small- or medium-sized company may provide it. However, since knowledge and knowhow of investigation is also needed, collaboration with researchers, etc, is indispensable.	・For educational materials for the environmental education program, etc., a small- or medium-sized company may provide them. However, since knowhow of education is also needed, collaboration with municipalities, educators, etc, is indispensable.	・The needs will not grow unless the regulations on wastewater treatment become effective actually, and palm oil business enterprises come under pressure to take measures. There are potential needs currently, but they have not become actual.