

Republic of Palau
Independent State of Papua New Guinea
Republic of the Marshall Islands
Federated States of Micronesia

Republic of Palau,
Independent State of Papua New Guinea,
Republic of the Marshall Islands,
Federated States of Micronesia
Preparatory survey for construction of venous
physical distribution system
by the transport of recyclable
(BOP business promotion)
Final Report, Abridged Edition

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Preparatory survey for construction of venous physical distribution system by the transport of recyclable (BOP business promotion)

Summary

1. Introduction

1-1. Background

This research studies the feasibility of the automobile recycling business in Palau, Papua New Guinea, Micronesia, and the Marshall Islands, examining the construction of a business model that includes contributing to the local BOP level. It began during the process of considering starting a used car sales business as a new Palau-based development project in Oceania. The problem of the dumping of scrap cars in the research target region came to our attention. We came to think that not just used car sales but also the vehicle recycling business might be feasible as businesses. The recycling of scrap cars incorporates environmental protection and improvement. Because we therefore felt that broad-based and detailed research was necessary, we applied for JICA's grant, which brought us this opportunity to engage in this survey. The Final Report takes a business perspective to examine feasibility, profitability, and so on in detail and to offer proposals.

1-2. Overview and objectives of the target business

The business targeted in this research on constructing a business model is the carrying out of scrap car collection based in Palau, with manufacture and processing of scrap and other products and their sale in Palau, Papua New Guinea, Micronesia, and the Marshall Islands in a so-called venous physical distribution business.

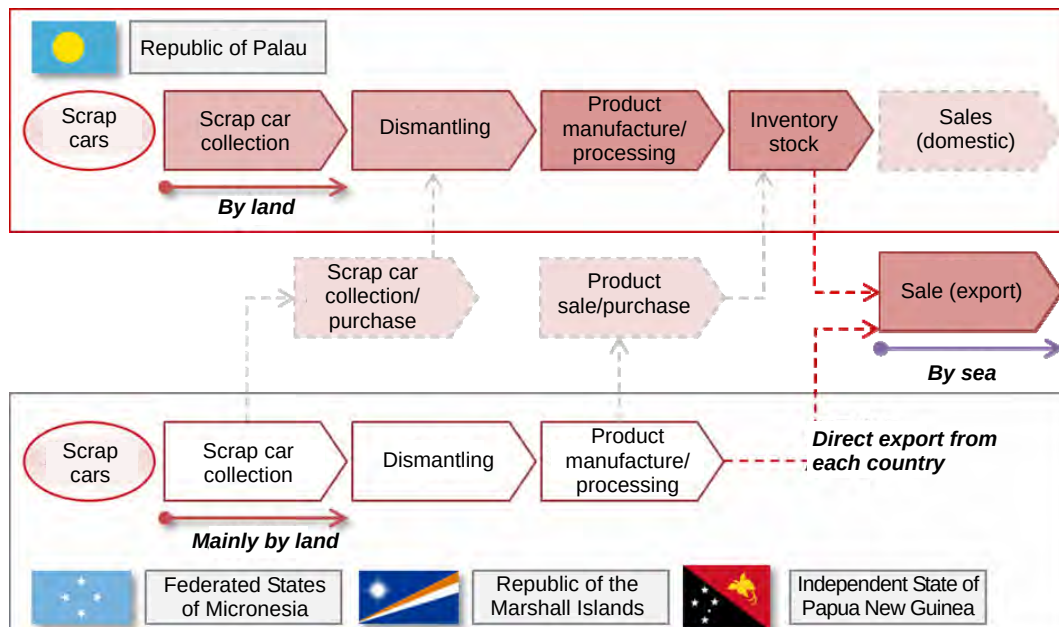
In the target region at this time, appropriate methods for the disposal of scrap cars have not been established. The impact on pollution of the environment is a concern. Most people working in disposal are foreign workers.

Under these circumstances, business was considered with its benefits to the BOP level in mind. Scrap car dismantling requires many workers, so it can create jobs. It is a meaningful business that can contribute to the environment. This time, commercialization focused on scrap products manufacturing was examined, but there are many other products that can be reused, so businesses that expand the scope of benefits to the BOP level were also considered.

The report considers employing the envisioned BOP level, with benefits in terms of employment opportunities and education. In terms of the environment, adoption of disposal methods that will lead to environmental improvement in the target region is considered.

It is predicted that in the manufacture of scrap products for export at dismantling plants, quality control technology will take root at the BOP level and contribute to the environment.

Example of a scheme to transport end-of-life vehicles and recycled products (if recycling of scrap cars is implemented in target countries)



1-3. Content

In performing this research, basic data were collected from four countries, Palau, Papua New Guinea, Micronesia, and the Marshall Islands, conditions were confirmed, and interviews with relevant government agencies and private-sector companies were carried out. At the same time, basic data were collected in Japan as well. Those data were comprehensively analyzed, and issues in terms of profitability and execution were derived. In addition, calculation of profit and loss was carried out premised on detailed business operation in order to find investment efficiency.

Additionally, regarding one of the major objectives, benefit to the BOP level, benefits accompanying commercialization and benefits that might be generated by the project were assumed, and the effects of this commercialization on each country were calculated.

From this research, one must judge that the hurdles for commercialization are too high unless some additional steps are taken. Based on the premise that the project will actually be implemented, an attempt at investigation and quantification based on calculation of the economics was made.

1-4. Conclusions about feasibility of the recycling business

The principal purpose of this research is the commercialization of a venous physical distribution business based in Palau within and among the target countries. The conclusion is that that would be difficult to accomplish. The reasons are as follows. Inadequate and poorly run registration and scrap car systems make an accurate grasp of the number of scrap cars difficult. Appropriate recycling of

scrap cars is not facilitated due to inadequate legal frameworks. Scattered scrap car disposal sites lead to high charges for marine transport. Weak IT infrastructure makes it difficult to construct a recycled parts business. Figures are uncertain due to undeveloped statistics. Those are the main hurdles. Additionally, if Japanese companies are involved, costs related to environmental protection (CFC treatment costs, scrap tire disposal facilities, etc.) in order to carry out business locally may seem excessive in local eyes, forming a barrier to participation.

Although there are many hurdles, a simulation of the possibility of commercialization in terms of economic calculation was run for Palau and Papua New Guinea as a model case. It is hoped that it can be used as a reference for commercialization.

2. Research target region

Palau, Papua New Guinea, the Marshall Islands, and Micronesia

Reasons for selecting the region for research

- In order to construct a venous physical distribution business based in Palau, they are Palau's neighbors.

- Like Palau, those countries face issues related to scrap cars.

- Those countries import used Japanese vehicles.

The four countries were selected based on the above reasons. *Some reasons do not apply to the Marshall Islands.

Overview of target countries

The target countries, first, each comprise multiple islands. Palau has over 300 islands, and Papua New Guinea has over 700 of various sizes. The Marshall Islands comprise 5 coral islands and 29 coral atolls. Micronesia has over 600 islands.

Looking at total land area, Papua New Guinea boasts the largest area, at 46,200 km². With the Marshall Islands the next largest at 700 km², its preeminence is clear.

In terms of population as well, Papua New Guinea is the largest of the target countries, at 7 million. It is followed in order by Micronesia, Palau, and the Marshall Islands. As for population trends in recent year, Papua New Guinea has the highest growth rate. The other three countries have been growing only slightly in recent years.

English is used as an official language in each of the target countries, but they also have indigenous languages.

Each of the countries has a tropical climate. The average temperature throughout the year is warm at 27–28°C. Each country also has a rainy season and a dry season.

Geography of target countries

	Area	Average temperature	Capital	Languages
Palau	488 km ²	28°C	Melekeok	Palauan, English
Papua New Guinea	46,200 km ²	27°C	Port Moresby	English, Tok Pisin
the Marshall Islands	180 km ²	27°C	Majuro	Marshallese, English
Micronesia	700 km ²	27°C	Palikir	English, 8 indigenous languages

Sources: created by Yano Research Institute based on Ministry of Internal Affairs and Communications, "World Statistics" and Ministry of Foreign Affairs website

Population trends in target countries

	2007	2008	2009	2010	2011
Palau	20,118	20,228	20,346	20,472	20,609
Papua New Guinea	6,396,300	6,549,300	6,703,400	6,858,300	7,013,800
the Marshall Islands	52,487	52,880	53,396	54,038	54,816
Micronesia	110,092	110,367	110,676	111,064	111,542

Source: World Bank website

In each of the target countries, productivity in major industries is not high. Each depends on imports of consumer goods. With the exception of Papua New Guinea, each runs a constant trade deficit. Their economies are therefore characterized by heavy dependence on financial assistance based on their Compact of Free Association with the United States (Compact money), and a mixture of a monetary economy and a closed economy.

Papua New Guinea's rate of economic growth is higher than the other countries'. Underlying this are its rich natural resources. Minerals account for about 80 percent of its exports. Additionally, production and export of LNG (liquefied natural gas) is projected to begin around 2014. This is expected to become an engine of further economic growth.

In Palau, the tourism industry is the main source of income. Government policies therefore emphasize the development of tourism infrastructure. Fishing is another major industry. The sale of fishing rights to foreign ships and the export of seafood are sources of income.

In the Marshall Islands, agriculture accounts for 16 percent of domestic production. Although the scale is not large in global terms, it is an important industry there. Meanwhile, in recent years, China's Shanghai Deep Sea Fisheries Company constructed and opened a tuna processing plant in the Marshall Islands. This is expected to generate much employment and become a major industry.

In Micronesia, fisheries are a major industry. They account for about 10 percent of national income. Fees paid by fishery companies engaged in inshore fishing and the export of marine products are also major sources of income.

Target country GDP (nominal)

Unit: 100 million dollars

	2007	2008	2009	2010	2011
Palau	1.6	1.7	1.6	1.7	1.8
Papua New Guinea	63.4	80.0	81.1	97.1	129.2
the Marshall Islands	1.5	1.5	1.5	1.6	1.7
Micronesia	2.6	2.6	2.8	2.9	3.1

Source: World Bank, IMF

Per capita GDP (nominal) in target countries

Unit: dollars

	2007	2008	2009	2010	2011
Palau	7,953	8,404	7,864	8,304	8,734
Papua New Guinea	991	1,221	1,210	1,416	1,842
the Marshall Islands	2,858	2,837	2,809	2,961	3,101
Micronesia	2,362	2,356	2,530	2,611	2,779

Calculated from target countries' GDP and populations

Economic trends in target countries

	GNI	Per capita GNI	Total trade value	Major trade items
Palau	150 million US dollars (*1)	7,250 US dollars (*1)	Export: 11.8 million US dollars Import: 130.3 million US dollars (*2)	Export: seafood Import: machinery & equipment, fuel, metals, foodstuffs
Papua New Guinea	10,390 million US dollars (*1)	1,480 US dollars (*1)	Export: 15,257 million kina Import: 9,344 million kina (*3)	Export: gold, oil, copper, palm oil, coffee, wood Import: rice, meat, tires & tubes, paper products
Marshall Islands	210 million US dollars (*1)	3,910 US dollars (*1)	Export: N/A Import: 67.7 million US dollars (*4)	Export: marine products, copra products Import: foodstuffs, machinery & vehicles, manufactured goods
Micronesia	320 million US dollars (*1)	2,900 US dollars (*1)	Export: 16.2 million US dollars Import: 142.7 million US dollars (*5)	Export: fish (tuna), betel nuts Import: foods & beverages, fuel & machine oil, machinery

*1: 2011, World Bank *2: 2008, Asian Development Bank *3: 2010, Asian Development Bank

*4: 2006, Marshall Islands Government statistics *5: 2007, FSM international trade statistics

Source: Ministry of Foreign Affairs

Economic overview of target countries

	Economic overview
Palau	Palau is heavily dependent on Compact money. In recent years, aid from Taiwan has increased. The construction industry, commerce based on the import of foodstuffs and consumer goods, and the tourism industry are the major industries. There is a high reliance on foreign workers in those industries. More than half of Palauans are government employees. As for tourism, there are direct flights from Japan, South Korea, and Taiwan. In 2012, 118,754 tourists visited the country. Industries such as manufacturing, agriculture, fishing, and mining are underdeveloped, but in the fishing industry, foreign fishing companies mainly from Taiwan have obtained operating rights in Palauan waters and export tuna to Japan, Taiwan, and China. As for foodstuffs, although there are taro and cassava production and an inshore fishing industry, most meat and so on has to be imported from the US mainland.
Papua New Guinea	Papua New Guinea has achieved positive economic growth since 2003. The improvement in economic activity has been led by the export sector, reflecting production increases and price rises in mining industry and non-mining industry products and favorable weather conditions. The favorable exports were coupled with decreased imports and fiscal tightening by the government, bringing about stabilization of the exchange rate, lower inflation, and increased foreign currency reserves. Within the country, growth in private sector activity and employment are visible. Additionally, production and export of LNG (liquefied natural gas) is projected to begin around 2014. This is expected to become an engine of further economic growth.
Marshall Islands	The Marshall Islands have a mixture of a monetary economy and a traditional closed economy. Domestic productivity is low, and most daily necessities have to be imported. The trade balance is consistently a deficit. Sixty percent of government appropriations come from financial assistance provided by the US based on their Compact of Free Association. The government is working to foster the private sector and reform the economic structure with the objective of economic independence.
Micronesia	Micronesia has a mixture of a monetary economy and a traditional closed economy. Domestic productivity is low, and most daily necessities have to be imported. The trade balance is consistently a deficit. The economy is basically propped up by economic aid from the US through the Compact. As part of its effort to achieve economic independence, it has begun economic reforms with cooperation from international organizations such as the Asian Development Bank (ADB). It is working to stabilize national finances, privatize government corporations, improve the investment environment, and develop the private sector.

Source: Ministry of Foreign Affairs

3. Overview of the automobile registration by country

3-1. Total number of annual vehicle registrations by country

- Highly accurate statistics are not available from any of the countries.

(Registrations in Palau increased almost sevenfold in five years; there are no statistics for the Marshall Islands from 2007 on, etc.)

→ The figures below should be considered approximations only.

Trends in automobile registrations

Unit: vehicles

	2008	2009	2010	2011	2012
Palau	574	614	864	2,024	4,001 ^(*1)
Papua New Guinea ^(*2)	129,800	120,500	131,300	—	—
the Marshall Islands ^(*3)	—	—	—	—	—
Micronesia	7,188	7,609	7,586	—	—

*1: Statistics through October 21, 2012

*2: Papua New Guinea: research by the Japan Automobile Manufacturers Association

*3: The Marshall Islands have not collected statistics since 2007.

The number of registrations in 2006 (in Majuro) was 2,268.

A dash (—) means no data were available.

3-2. Predicted quantity of scrap cars by country

- Statistics on the numbers of new registrations and vehicles owned cannot be considered accurate.

→ Therefore, in light of the large numbers of Japanese vehicles imported into the target countries, the number of new registrations was calculated from the state of local automobile sales based on the number of new and used vehicles exported from Japan.

→ Survival rates (the percentage showing the number of vehicles with initial registrations that were registered again during the year in question) were therefore estimated from the local status of use of automobiles and multiplied by the number of vehicle registrations to calculate the number of end-of-life vehicles generated.

- Estimates of the number of end-of-life vehicles generated in 2012 are shown in the table below. Papua New Guinea had the most, with 5,659.

Estimated number of end-of-life vehicles generated in target countries (2012)

Unit: vehicles

	Passenger cars	Trucks & buses	Total
Palau	466	52	518
Papua New Guinea	2,311	3,348	5,659
the Marshall Islands	96	86	182
Micronesia	834	133	967

Source: Itochu Enex estimate

4. Overview of the scrap cars and waste disposal by country

4-1. Regulations on end-of-life vehicles and disposal methods for wastes from automobiles

- None of the target countries have laws and regulations regarding the recycling of end-of-life vehicles.

→ End-of-life vehicles are often dumped.

State of end-of-life vehicle dumping

	State of end-of-life vehicle dumping
Palau	• On the islands of Koror, Babeldaob, Arakabesang, and Malakal, which are connected by road, end-of-life vehicles are collected free of charge for disposal, so there is no dumping of automobiles. • On outlying islands such as Peleliu, transport to disposal sites is problematic in terms of means and cost, so end-of-life vehicles are abandoned on private land rather than being properly disposed of. Because of space considerations, some vehicles are dumped on the roadside.
Papua New Guinea	• End-of-life vehicles are dumped on roadsides just off trunk roads (Engines, which have some value, are removed, leaving scrap cars bodies.) • Because of the problem of ownership, as long as they do not become road hazards, they are not collected and are left alone.
Marshall Islands	• Most end-of-life vehicles are stored on private land. • Because of space considerations, some are abandoned on roadsides or in vacant lots. (There is a collection mechanism through MIVA for dumped vehicles.)
Micronesia	• Most end-of-life vehicles are stored on private land. • Some dumping of vehicles on vacant lots or other people's land is also seen. (Because ownership of dumped vehicles cannot be confirmed, they are left untouched.)

Source: Itochu Enex research

- Regulations and disposal methods concerning waste from end-of-life vehicles being recycled are as follows

→ Except in the Marshall Islands, there are regulations on lead-acid batteries. They are commonly collected for export.

→ In Papua New Guinea, waste oil is poured into sewers, but in the other countries, it is collected in drums at a final disposal site.

→ CFCs are regulated in Palau, the Marshall Islands, and Micronesia based on the Montreal Protocol and are to be handled in Papua New Guinea according to that country's Environmental Act 2000. However, the majority in each country is released into the atmosphere.

- There are no regulations regarding airbags or scrap tires in any of the countries. Most are dumped at final disposal sites.

Current disposal methods and regulations concerning waste from vehicles

	Palau		Papua New Guinea	
	Environmental laws and regulations	Current disposal methods	Environmental laws and regulations	Current disposal methods
Lead-acid battery	Regulated under the EQPA	The EQPA covers collection of acid. Subsequently, exported to Taiwan, etc.	Regulated under the Environmental Act 2000	Some are collected for a fee and exported to Australia, etc. The rest is dumped at final disposal sites.
Waste oil	Regulated by the EQPA Handled based on the Basel Convention	Collection by the EQPB. Storage in tanks. Export to the Philippines is planned.	Regulated under the Environmental Act 2000 Handled based on the Basel Convention	Turned over free of charge to businesses that use it as fuel Poured into sewers Other (termite prevention, herbicide, export [Vietnam])
CFCs	Handled based on the Montreal Protocol Regulated under the EQPA*	Automotive CFCs are released into the atmosphere in almost all cases. Those from refrigerators, etc., are collected and reused.	Regulated under the Environmental Act 2000	Automotive CFCs are almost all released into the atmosphere. Mixed with liquid and poured into sewers
Airbags	No regulation	Stocked by service shops Dumped at final disposal sites	No regulation	Stocked by service shops Dumped at final disposal sites
Scrap tires	No regulation	Dumped at final disposal sites	No regulation	Those in better condition are reused. Collection by collectors, with dumping at final disposal sites Provided free of charge to individuals who use them for flowerbeds, swings, etc.

EQPA: Environmental Quality Protection Act

EQPB: Environmental Quality Protection Board

	Marshall Islands		Micronesia	
	Environmental laws and regulations	Current disposal methods	Environmental laws and regulations	Current disposal methods
Lead-acid battery	No regulation (The Littering Act 1982 prohibits unlawful dumping of automobiles and their parts.)	South Korean vendor takes them, export	Title 25 (FSM Environmental Protection Act)	Lead is sometimes used for fishing sinkers.
Waste oil	No regulation (The Littering Act 1982 prohibits unlawful dumping of automobiles and their parts.)	Stored in drums at final disposal sites, etc.	Pohnpei Environmental Protection Act and other state laws	Stored in drums at final disposal sites, etc.
CFCs	All CFCs are to be handled in accordance with the Montreal Protocol.	CFCs from end-of-life vehicles are not treated.	All CFCs are to be handled in accordance with the Montreal Protocol.	CFCs from end-of-life vehicles are not treated.
Airbags	No regulation (The Littering Act 1982 prohibits unlawful dumping of automobiles and their parts.)	Dumped at final disposal sites	No regulation	Dumped at final disposal sites
Scrap tires	No regulation (The Littering Act 1982 prohibits unlawful dumping of automobiles and their parts.)	Dumped at final disposal sites	No regulation	Dumped at final disposal sites or used by individuals in flowerbeds, etc.

- Various issues related to the establishment of a Recycling Law in the future are found in the target countries (table below).

Potential for establishment of recycling laws

	Current status and issues, etc.
Palau	• At this time, there is no concrete move towards establishment of an automobile recycling law, but it was felt that people in government have sufficient interest in developing an automobile recycling system. • The biggest issue is lack of information and knowledge. → Expectations are high for the provision of information and suggestions to the government from Japan, which already has a recycling system.
Papua New Guinea	• Transport costs are high, and private scrappers find no benefit in end-of-life vehicle recycling. • Local governments cannot be expected to bear the costs, so it is necessary to build a compulsory national-level recycling framework, including user cost-bearing. → Expectations are high for information sharing from Japan and other developed nations.
Marshall Islands	• Although there is some awareness of the need for a Recycling Law, at this time, there are no resources such as knowledge and funding for automobile recycling. → Achievement will be difficult without outside support.
Micronesia	• Although there is some awareness of the need for a Recycling Law, at this time, there are no resources such as knowledge and funding for automobile recycling. → Achievement will be difficult without outside support.

4-2. State of automobile recycling and reuse

4-2-1. Disposal methods for end-of-life vehicles

- The processing facilities of scrappers who dismantle end-of-life vehicles are poor, so parts are removed from engines, suspensions, and so on by hand.
 - Some Micronesian businesses have nibblers.
- Scrap car bodies are cut with burners or crushed in presses for more efficient transport.

End-of-life vehicle disposal methods

	Disposal methods
Palau	• Dismantling by hand (parts are collected from engines, suspensions, etc.) • Iron and aluminum are sorted by hand. • Gas burners or electric saws are used to cut scrap car bodies into pieces of about 1 meter, which are then crushed in small presses. • Wire harnesses are collected with their covers and connectors intact.
PapuaNew Guinea	• Dismantling by hand (parts are collected from engines, suspensions, etc.) • Scrap car bodies are cut in half and then crushed in presses. • Aluminum is refined in melting furnaces. • Wire harness covers are burned off and the copper is collected.
Marshall Islands	• Dismantling by hand (parts are collected from engines, suspensions, etc.) • Iron and aluminum are sorted by hand. • Wire harnesses are collected with their covers and connectors intact. • No catalyst collection (unaware of inclusion of rare metals) • Scrap car bodies are cut with burners.
Micronesia	• Dismantling by hand (parts are collected from engines, suspensions, etc.) • Chuuk scrappers have nibblers. • Wire harnesses are collected with their covers and connectors intact. • Scrap car bodies are crushed in presses.

*Facilities and disposal methods vary by scrapper.

Source: Itochu Enex research

4-2-2. Volume of recyclable scrap and state of recycling

- Collected recyclable scrap is basically iron, aluminum, and copper.
- Calculation of the volume of recyclable scrap generated by end-of-life vehicles according to the raw materials composition of one automobile yields the results shown in the table below.
 - Because with dismantling by hand that does not include processing such as fragmenting, sorting may be inadequate, and because of differences such as catalysts containing platinum not being collected in the Marshall Islands, the actual volume of metals collected may differ from that noted.
 - Although it is well-established from the perspective of resource recycling, there are still issues facing moves towards more advanced recycling.
- As for where recyclable scrap is sent, scrappers in Palau and Micronesia are mainly Chinese and send it to China, Taiwan, etc.
- In Marshall Islands as well, Chinese vendors come to buy it and export it to China, Taiwan, etc.

- Papua New Guinea exports it mainly to Indonesia, for geographical reasons.

Estimated volume of recyclable scrap (2012)

	Palau	Papua New Guinea	Marshall Islands	Micronesia
Number of end-of-life vehicles	518 vehicles	5,659 vehicles	182 vehicles	967 vehicles
Iron	354.8 t	3,876.4 t	124.7 t	662.4 t
Aluminum	40.1 t	438.6 t	14.1 t	74.9 t
Copper	5.2 t	56.6 t	1.8 t	9.7 t
Catalysts (platinum group)	1.5 kg	16.3 kg	0.5 kg	2.8 kg

Iron, aluminum, copper: Estimates calculated from raw materials composition of ordinary and compact passenger cars

Catalysts (platinum group): Estimates calculated from materials of the National Institute for Materials Science

Source: Itochu Enex estimate

State of recycling of recyclable scrap in target countries

		State of recycling of recyclable scrap
Palau	Iron	• Exported to Taiwan and China
	Aluminum	• Exported to Taiwan and China
	Copper	• Exported to China (wire harness covers and connectors are not collected)
	Other	• Catalysts: Exported to Taiwan as catalysts Exported as stainless steel scrap • Scrap car bodies: Exported to China and Taiwan • Lead batteries: Exported to Taiwan
PapuaNew Guinea	Iron	• Exported to Indonesia, India, China, Thailand, etc.
	Aluminum	• Exported as aluminum ingots after refining (slag is also exported)
	Copper	• Exported to China (wire harness covers are burned off)
	Other	• Catalysts: Exported as stainless steel scrap • Lead batteries: Exported Reused (acid reused as cleanser) • Scrap car bodies: Exported to Indonesia, India, China, Thailand, etc.
Marshall Islands	Iron	• Exported to South Korea, etc.
	Aluminum	• Exported to China and Taiwan
	Copper	• Exported to China and Taiwan (wire harness covers and connectors are not collected)
	Other	• Catalysts: Not collected • Lead batteries: Exported to South Korea, etc. • Scrap car bodies: Exported to South Korea, etc.
Micronesia	Iron	• Exported to China, etc.
	Aluminum	• Exported to China, Taiwan, Singapore, etc.
	Copper	• Exported to China, etc.(wire harness covers and connectors are not collected)
	Other	• Catalysts: Exported to China, etc. • Lead batteries: Exported to South Korea, etc. • Scrap car bodies: Stored on-site Exported to Taiwan, etc. Landfilled

Source: Itochu Enex research

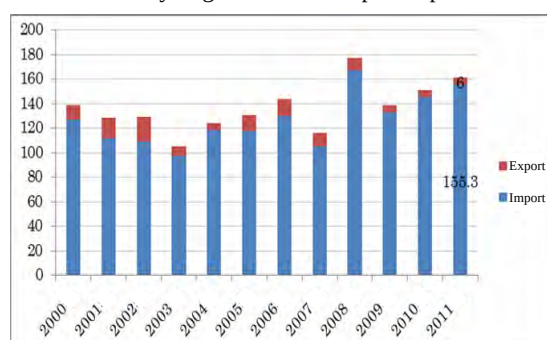
5. Distribution infrastructure and maritime traffic networks in Pacific islands

5-1. Distribution infrastructure of Pacific nations

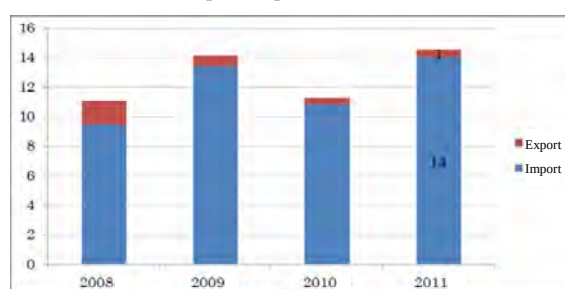
5-1-1. Trade volume of the survey target countries of the Pacific region

In order to grasp the international distribution infrastructure of the survey target countries, trade values and trends were first confirmed. Among the four countries' trade values, Papua New Guinea's trade statistics for 2011 were imports 62.27 million US dollars and exports 70.50 million US dollars, totaling 132.77 million US dollars. That is much larger than the other three nations. Palau and the Marshall Islands have large differences between the sizes of their import values and their export values.

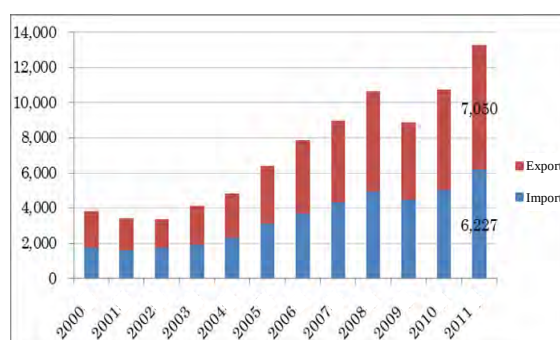
Trends in survey target countries' import/export value



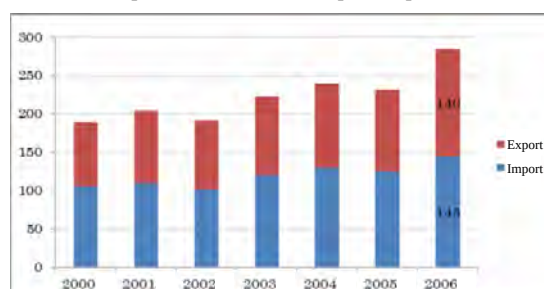
Trends in Palau's import/export value



Trends in the Marshall Islands' import/export value



Trends in Papua New Guinea's import/export value



Trends in Micronesia's import/export value

Source: Created by Itochu Enex from World Bank Databank 2013 and materials from each country's statistical bureaus

Unit: million US dollars

5-1-2. Transportation means and methods of recycled auto parts

Scrap car/vehicle recyclables are transported by automobile carriers, by container ships, and by conventional vessels specializing in break bulk cargo. The ships used by various shipping companies are divided by type into full container vessels, automobile carriers (Ro-Ro ships), multipurpose vessels that transport both containers and automobiles, and break bulk vessels (conventional vessels)

that carry bulk cargo. When vehicles are transported by container, they are loaded into containers at the export site, transported by sea on full container vessels, and unloaded from the containers at the import destination. With Ro-Ro ships or multipurpose vessels, vehicles are loaded directly onto the ship and unloaded by driving under their own power. There is thus no loading and unloading of containers. Ro-Ro ships are most often the choice when vehicles are transported, but container ships will be used when the destination is a port that cannot service Ro-Ro ships.

There are several possible methods for transporting recyclable resources.

When transporting by container vessel, recyclables are loaded into containers and sent to the export destination. It is necessary to attempt to reduce transport costs per ton of recyclables by making maximum use of container capacity and transportable weight. If scrap cars are loaded as-is into containers, only one or two scrap cars can be transported per six-meter container (total weight about 1–1.5 tons). In contrast, if scrap cars are crushed in a press, 20–22 tons (about 27–29 end-of-life vehicles) can be transported in one container. Containers can be booked in quantities as small as one container.

When transporting by conventional vessel, unlike the case with container vessel transport, one cannot simply reserve the minimum required space. When there is liner service by conventional vessel, a minimum cargo volume must be reserved (about 1,000–2,000 tons, depending on the company and the route). When there is no liner service, a ship with a gross tonnage class of around 5,000–8,000 tons must be chartered. Unless there is that volume of scrap cars and/or scrap iron to load, transport costs will be enormous. If a chartered ship calls at additional ports to add cargo, port fees must be added. Because there are no conventional vessel liners in the research target region, if bulk transport of recyclables must be considered, it is necessary to examine conditions such as the volume that can be collected in each area, the ports of collection, and the delivery destination.

Currently, all scrap exports from Palau and Papua New Guinea is carried out using container vessels. Scrap car bodies to be loaded into containers are cut with burners or cutters and then crushed in presses before loading.

5-1-3. Major international ports in target countries

1) Palau

Malakal Commercial Port in Koror is the sole international port in Palau, at which domestic and foreign freighters and fishing ships and international cruise ships call regularly.

2) Papua New Guinea

In Papua New Guinea, the state ports corporation, PNG Ports Corporation Limited, controls 23 ports. Of those, it operates 16 port facilities. While it does not operate the other 7, they are operated by private-sector companies. Lae Port, Port Moresby Port, Madang Port, and Kimbe Port are the

major ports handling Papua New Guinea's international trade. Lae Port is in a strategic location for New Guinea Island including the Momasa region and the Highland region. Lae Port is necessary infrastructure for import/export industries. It is essential for the efficient movement of people and cargo between Papua New Guinea and the outlying Island Provinces and under-populated areas. Lae Port serves as the gateway to world markets for Lae, Papua New Guinea's industrial and commercial heart, and for the resource-rich Highland Province.

3) Major ports of Micronesia

Micronesia's major ports are Yap Port, Colonia Harbor, Chuk Port, Pohnpei Port, and Kosrae Port.

4) Major ports of the Marshall Islands

The Marshall Islands' major port is Majuro Port. In addition to Majuro Port, there are Ebeye Port, Kwajalein Port, Jaluit Port, and Enewetak Port. Of those, Majuro Port, Ebeye Port, and Kwajalein Port have docks suitable for international freighters. Jaluit Port and Enewetak Port have port facilities for domestic transport only.

5-1-4. Condition of port facilities, status of operations, cargo handled, and operating companies in major international ports

1) Palau

As noted above, Malakal Port in Koror is Palau's only international port. It has materials and equipment for handling container vessels. It has two docks. They are 160 and 150 meters long, and the water at each is about 8 meters deep. However, the channel to Malakal Port is only 7.2 meters deep in its shallowest spots, so fully-loaded medium and large vessels may not be able to put in. Belau Transfer and Terminal Company, a private-sector company, operates Malakal Port. Storage space at the port is limited. One may suppose that if one or two ships are docked, all the space will be taken. There are no port cranes, so all cargo is unloaded by ship's cranes.

2) Papua New Guinea

Port Moresby Port is the major port of the capital city. It handles freighters such as full container vessels and Ro-Ro ships, including both ocean-going and domestic ships. The largest ship that has ever put in there was 229 meters. Storage space is small and limited. The cargo handled by the port increases every year. Expansion of the international docks and the storage space is considered necessary, but because the port is located in Port Moresby's city center, expansion is difficult. Because of the lack of storage space, storage fees in the port are extremely high. Port work fees have also risen sharply. Cargo volume has increased along with economic growth, leading to congestion in port work, customs clearance procedures, and storage space. Currently, two to three days of ship

congestion is occurring. There have also been cases of container contents and of whole containers being stolen, so upgrading security is an important issue.

Lae Port boasts the highest volume of cargo handled of any port in Papua New Guinea. Lae Port has road access to the western Highlands region and plays a large role in domestic distribution in northern Papua New Guinea. The port has no large cranes, so ship cargo handling operation is all performed using ship's cranes, mobile cranes, and forklifts. As for storage, there are 14,600 square meters of indoor storage and 39,000 square meters of open-space storage. Docks 1–3 can handle passenger ships, automobile carriers, etc.

3) Marshall Islands

Majuro includes Delap Dock, which specializes in international shipping, and Uliga Dock, which specializes in domestic ships and inshore fishing vessels. Delap Dock is about 310 meters long, with a water depth of about 11.5 meters. There is storage space of 200 × 200 meters. In addition to container storage space, there are a shed for copra to be exported and a machinery repair shop. There is no equipment for port gantry cranes or mobile cranes, so cargo handling operation is performed using ship's cranes. Nighttime cargo handling operation is generally not performed. The port operator is Majuro Stevedore and Terminal Co., a private-sector company.

Uluga Dock specializes in domestic ships. Uliga Dock is 199 meters long, with a water depth of 10 meters. It is used mainly by domestic ships sent by the Marshall Islands Shipping Corporation (MISC) and by domestic fishing vessels. MISC also procures the personnel and equipment for cargo handling operation and performs it. The dock is not equipped with cranes or the forklifts needed for cargo handling operation. When a ship enters or departs, the ship owner or operating company arranges for the workers and equipment needed for loading and unloading. There is no storage space. The dock is not suited for use by international shipping.

4) Micronesia

At Pohnpei Port, all ownership and management of the port falls under the jurisdiction of the Port Authority, which is directly under the Department of Transportation, Communication, and Infrastructure. It commissions the Federated Shipping Company, a private-sector port enterprise, to operate the port. Pohnpei Port has a dock that is about 320 meters long with a water depth of around 11 meters, and another dock that is 104 meters long. Almost all international freighters that call use the 320-meter dock. There is storage space of 120 × 100 meters. In addition to container storage space, there are a shed for export cargo and a machinery repair shop. There are no port gantry cranes or mobile cranes, so cargo handling operation is performed using ship's cranes. The port operator, FSC, performs port work, and part of the dock is leased and used by Caroline Fisheries Corp.

Chuuk Port is located on the east coast of Chuuk State. There is deep water almost up to the dock, so there is little hindrance to port entry by international shipping. However, high waves sometimes interfere with port work (by rocking ships). Additionally, there is no security fence. Thirty-five percent of the port's space is taken up by abandoned scrap cars, containers, scrap, and so on, and cannot be used.

Yap Port is located on the Colonia Peninsula, in Tamil Harbor. It is currently operated by the Bureau of Public Works. The Yap State government is planning to have jurisdiction for port work transferred from the Bureau of Public Works to a newly established agency, the Yap State Port Authority. The port has two 129-meter docks and two 29-meter docks. There is a container yard of about 1,500 square meters. Waab Stevedoring Company, a private-sector company, operates the port under a lease agreement with the Yap State government.

5-1-5. Shipping companies with liner to ports in major countries

Two shipping companies, Kyowa Shipping Co. and Mariana Express Lines (MELL) operate liners to Palau, the Marshall Islands, and Micronesia. Both companies have service that calls twice per month. Kyowa Shipping specializes in the transport of automobiles and containers. It handles most vehicles that come from Japan. MELL specializes in container shipping. It transports most of the scrap that moves from Palau, the Marshall Islands, and Micronesia to Asia except for Japan.

Until the second half of 2012, Matson operated its own liner to Palau, the Marshall Islands, and Micronesia, but in December 2012, it began borrowing space on a Kyowa Shipping ship with service from Guam to Micronesia. It announced that subsequent service would be provided using a Kyowa Shipping ship. Sales, booking, and agency service have not been integrated and are still performed under the Matson name.

In addition to transport service between the Pacific, Asia, and Australia, MELL added a new service linking the US West coast with the Micronesia area beginning December 15, 2012. The new "Micronesia Express Service" provides weekly ships linking the Pacific islands of Majuro, Pohnpei, Chuuk, Yap, Palau, and Saipan with the Port of Oakland and the Port of Tacoma.

Major world container vessel and automobile carrier liners other than the two companies above serve Papua New Guinea. Swire Shipping, Maersk, CMA CGM, NYK, MOL, and Pacific Forum Line are the main companies providing liner service to Papua New Guinea.

Kyowa Shipping's service to Palau is called "Saipan, Guam / Micronesia Service." It makes the rounds from South Korea and Japan to Saipan, Guam, Micronesia, the Marshall Islands, and Palau. The ships on that route are the *MV Pacific Condor* and the *MV Kyowa Cattleya*.

List of shipping service by region

Service details	Ship names	Frequency of calling at Palau	Liner ports
Saipan, Guam, and Micronesia	<i>MV Pacific Condor, Kyowa Cattleya</i>	Every 2 weeks	Pusan/Kobe/Nagoya/Yokohama/Saipan/Guam/Ebeye/Kwajalein/Majuro/Kosrae/Pohnpei/Chuuk/Yap/Koror (Malakal)
Papua New Guinea and Australia	<i>Kyowa Rose, Kyowa Orchid</i>	Every 2 weeks	Pusan/Moji/Chofu/Kobe/Nagoya/Yokohama/Rabaul/Lae/ Port Moresby/Townsville

Ship information

<i>MV Pacific Condor</i>	<i>Kyowa Cattleya</i>
Ship type: general-purpose freighter Year built: 1999 Overall length × breadth: 117 meters × 20 meters Gross tonnage: 8,483 tons, deadweight tonnage: 8,635 tons Speed record (maximum/average): 14.8 / 14.4 Country of registration: Panama Call sign: 3FQO9 Ship identification number: 9216339,	Ship type: automobile carrier Year built: 1995 Overall length × breadth: 117 meters × 20 meters Gross tonnage: 7,945 tons Speed record (maximum/average): 13.6 / 13.3 Country of registration: Panama Call sign: 3FEW5 Ship identification number: 9124926,

MELL's head office is a Singapore company with liners to the Pacific region. The ships used are mainly full container vessels. Palau recyclers such as Palau Waste Collection and Sang Masang use MELL's service to export recyclables overseas.

Ships for Palau are called the "Australia-Naha Service." They visit Australia, Taiwan, Naha, Saipan, Guam, and Palau, in that order.

List of shipping service by region

Shipping company/service	Ship names	Frequency	Service
Australia and Micronesia	<i>Mell Sudong</i> , <i>Mell Springwood</i> , <i>Mell Singapore</i>	2 times per month	Sydney/Melbourne/Brisbane/Kaohsiung/Guam/Ebeye/Majuro/Kosrae/Pohnpei/Chuuk
Australia, Naha, Guam, Saipan, Yap, and Koror	<i>Mell Springwood</i> , <i>Mell Sudong</i> , <i>Mell Singapore</i>	2 times per month	Sydney/Melbourne/Brisbane/Kaohsiung/Naha/Saipan/Guam/Yap/Koror

The ships serving Palau are the *Mell Springwood* and the *Mell Sudong* described below.

Ship information

Mell Springwood	Mell Sudong
Ship type: full container vessel Year built: 2011 Overall length × breadth: 161 meters × 25 meters Gross tonnage: 16,137 tons Speed record (maximum/average): 16.6 / 16.4 Country of registration: Antigua and Barbuda Call sign: V2FE8 Ship identification number: 9517422, MMSI: 305655000	Ship type: full container vessel Year built: 2011 Overall length × breadth: 161 meters × 25 meters Gross tonnage: 15,636 tons Speed record (maximum/average): 16 / 13.2 Country of registration: Cyprus Call sign: 5BEV3 Ship identification number: 9431343, MMSI: 209323000

Japanese shipping companies with liner service to Papua New Guinea are Nippon Yusen Kaisha (NYK), Mitsui O.S.K. Lines (MOL), and Kyowa Shipping. The two companies other than Kyowa Shipping operate only automobile carriers to Papua New Guinea. Other shipping companies operating container vessels from Papua New Guinea are Swire Shipping, Maersk Line, and NewPac Line.

List of service from Papua New Guinea by shipping company

Shipping company	Major destinations	Service details	Frequency
Ocean-going ships			
MOL	Japan, Asia, and Australia	Automobile carrier	Once per month
NYK	Japan, Asia, and Australia	Automobile carrier	Once per month
Kyowa Line	Japan, Asia, and Australia	Automobiles, container	Twice per month
Maersk	Europe, Asia, and Australia	Container	Twice per month
Swire Shipping	Asia and Europe	Container	Twice per month
CMA CGM	Europe, Asia, and Australia	Container	Twice per month
Pacific Forum Line	Australia and New Zealand	Container	Once or twice per month
New Pacific Line	Asia	Container	Once or twice per month
Domestic ships			
Bismark Maritime	Lae, Port Moresby, Madang, and Wewak	Container, bulk	Twice per month
Consort Express Lines	Major domestic ports and ocean-going ships to Australia	Container, bulk	Twice per month

5-2. Logistics costs

Ocean freight:

Marine transport costs are influenced by cargo volume (weight, volume, type, etc.) in the service region, size of ship used, competition among shipping companies, speed of port operations, etc. However, the most important element is cargo transport demand (cargo volume). This research made established the following points.

- **Cargo volume:** Cargo volume for the northern Pacific region is far less than it is for major markets in East Asia and so on. For a shipping company, when market scale (cargo transport demand) is small, ocean freight must cover ship operation costs, so unit prices (container, ton, or vehicle) for ocean freight become higher.
- **Regional characteristics:** There are no ports in the northern Pacific region that serve as hubs for the consolidated collection and dispatch of cargo. Shipping company service routes must therefore touch at many ports to unload cargo, so port usage fees increase and are added to ocean freight.
- **Large differences between import volume and export volume:** When the outbound and inbound cargo volumes handled by a shipping company are similar, income is obtained on both legs of a round trip, keeping ocean freight in check. In the research target region, however, the volume of export cargo is much less than it is in other regions, causing ocean freight to rise.
- **Underdeveloped port facilities and inefficient port operation:** Underdeveloped port facilities, port work that takes too long, and inefficient port operation make ship cargo handling operation take much longer than it does in more up-to-date ports. Additionally, because port lighting has not been developed, nighttime loading cannot take place. Furthermore, work does not generally take

place on holidays. Today, these things add to operating costs such as dock usage fees, which are then tacked onto the cost of ocean freight.

- Other elements that affect ocean freight include marine fuel (heavy oil) prices and currency fluctuations.

Inter-island ocean freight:

Because inter-island trade of goods in the target region is extremely limited, shipping companies have generally not developed inter-island service. In the case of inter-island transport via Guam or other distant hubs, ocean freight is set at high prices (70–80 percent of ocean freight from each port to East Asia, or even the same price in some cases). If inter-island transport takes place without crushing in presses at each location, and scrap automobile bodies are loaded as-is in containers or onto automobile carriers, because the volume is so large, ocean freight will be seven to nine times higher on a weight basis.

Transport from outlying islands:

In the survey target countries, marine transport service linking main islands and outlying islands is very limited. Marine transport from an outlying island therefore requires charter of a small ship (about 500–1000-ton class). Furthermore, collection and transport require arrangement from the main island of materials, equipment, and personnel for transport and cargo handling operation on the outlying island. Those things are expensive, so such an effort appears to be very uneconomical.

Market sizes are limited in the survey target countries. For local domestic transport in Palau, large companies often have their own logistics divisions, and handle import/export and management of their own cargo, from arranging for trucks to customs clearance procedures. In Papua New Guinea, because there are a relatively large number of cases of energy resource development, some international logistics companies have entered the country. The potential for future market expansion is unclear, but without major capital investment, logistics costs are skyrocketing. Each country's land transport costs and ocean freight costs will vary depending on negotiations with vendors over country, cargo volume, destination, etc., but on an approximate basis, major costs are as follows.

Logistics costs of survey target countries (approximate basis)

Loading port	Unloading port	Container type	Domestic trucking costs (US dollars)	Customs costs (tax not included US dollars)	Export port costs (US dollars)	Ocean freight (US dollars)
Malakal	Yokohama	20' DV	300	50	400	3,200
Port Moresby	Sydney	20' DV	800	400	400	2,800
Majuro	Yokohama	20' DV	300	70	200	2,600
Pohnpei	Yokohama	20' DV	300	100	400	3,000

6. Current state and trends of social infrastructure

6-1. Current state and trends of infrastructure such as electricity, roads, and water

The electricity situation in Palau is such that there is still an approximately 10-minute power outage about once every six months. As for transportation infrastructure, most road and bridge maintenance depends on aids from the US, Japan, and other countries.

In Papua New Guinea, the electric power infrastructure has many blackouts, so when establishing a company there, it is necessary to install a generator that can operate independently. Electricity charges are very high.

In the nation's transportation infrastructure of its 19,600 km of roads, only 3.5 percent is paved. Limiting this to the region targeted by this project, in addition to improving the state of domestic transportation, it is necessary to consider developing and improving the quality of roads and other transportation infrastructure.

In the electrical infrastructure of the Marshall Islands, power is generated mainly using diesel fuel. As for transportation infrastructure, in the capital, Majuro, a 48-km paved road linking the ends of the island has been developed. The island of Majuro is the only place in the country with such extensive paved roads.

In Micronesia, the electric power infrastructure includes power plants in each state, but there are many power outages. As for transportation infrastructure, roads are owned, managed, and maintained by state governments rather than the Federated government. The state governments do not adequately maintain the roads, and degradation of the paving is an issue.

6-2. Trends in internet communications infrastructure

Internet communications has been spreading and expanding in the target countries in recent years. However, since each of the target countries is an island nation, undersea communications cables connected to nearby countries (Guam, Australia, etc.) are necessary in order to ensure an adequate communications zone. Compared with continental areas and other regions, the telecommunications cost burden on end users is high. All of the target countries except Palau have finished laying undersea communications cables.

Internet dissemination rates in target countries

Unit: %

	Palau	Papua New Guinea	Marshall Islands	Micronesia
Internet dissemination rate (2011)	28.5%	2.0%	9.7%	20.8%
Domestic providers, etc.	PNCC Telecommunication charges are very high (about 30,000 yen/month)	National company Telikom and more than 10 others such as Digicel and DATA	NTA only Wi-Fi is disseminated inside the city of Majuro	FSM Telecom Generally prepaid Wi-Fi is disseminating
State of undersea cable laying	In planning	Placed October 2009 (between Sydney-Port Moresby and Guam-Madang)	Placed March 2010 (via Guam)	Placed March 2010 (via Guam)
Communications environment	Via satellite, very slow	Unable to connect perhaps once or twice per week	No serious telecommunications issues	There are delays inside Micronesia

Source: Itochu Enex research

6-3. Introduction of IT systems in the development of this business

Results of field test of internet telecommunications environment to foreign country from target countries (measured in 2012 and 2013)

	Palau	Papua New Guinea	Marshall Islands	Micronesia
International telecommunications environment *1	Satellite telecommunications	Undersea telecommunications cable	Undersea telecommunications cable	Undersea telecommunications cable
Telecommunications speed test (results of accessing Japan via internet)	611–928 ms	305–329 ms	91–162 ms	1,453–2,047 ms
Evaluation of results	Large delay	Relatively good	Good	Large delay
State of delay	Large delay to connection point outside country			Large delay from field to connection point in Pohnpei
Supposed cause of delay	Inadequate bandwidth to foreign country via satellite telecommunications			Limited bandwidth inside Micronesia (inside Pohnpei), etc.

Source: Itochu Enex research

*1: The international telecommunications environment refers to the physical environment for internet telecommunications with the target country's capital and with a foreign country. Because the target countries are mainly islands, the telecommunications environment can vary depending on location within the country.

Assuming the above, reference values for the procurement costs of IT systems required for this project were calculated.

The processing performance required of the IT system will vary depending on the number of scrap cars handled in the operation of this project, the level of the recycling products targeted (scrap, rebuilt core, or recyclables, etc.), and so on. Scenarios in which general spreadsheet software (Excel,

etc.) would be adequate for processing and in which new specialty application software would have to be developed were envisioned.

Premised on the same IT system operating for at least three years, if a daily average of no more than 1,000 rebuilt core recycled parts are handled, general spreadsheet software would likely be adequate for use.

Comparison of envisioned IT systems necessary for this project

Comparison category	Simple system (commercially available Excel)	Specialty application (proprietary development)
Cost of system adoption	About 600,000 yen	About 3–4 million yen
Maximum amount of data that can be registered	1.04 million pieces of data (1,000 registrations/day in 3 years operation)	About 500 million pieces of data (assuming a 500 GB hard drive)
Ease or difficulty of use	Excellent Easy	Good Mastering of unique application required
Real-time sharing in multiple regions	Fair Sharing by email, etc.	Excellent Automatic sharing by the application

7. Current conditions and future trends in the investment and business environments

7-1. Political and economic situation

In Palau, the domestic economy is heavily dependent on financial assistance mainly from the USA, Japan, Taiwan, and China. Especially because of financial support from the USA based on the Compact of Free Association, a living standard higher than that of the Philippines or other countries in the Micronesia region is maintained. As for domestic industry, service industry (tourism) accounts for about 83 percent of GDP. Various government agencies are taking an active stance on the fostering of domestic industry.

In Papua New Guinea, although capital intensive, export-oriented, resource development of oil and natural gas is underway, about 85 of the people live at a near-subsistence level. Economic dualism is an important issue. Politics is fragile compared to neighboring countries. Processes for implementing policies and regulations and a lack of human resources with competence for those tasks are major issues.

In the Marshall Islands, the national economy, like those of Palau and Micronesia, depends heavily on financial assistance from the USA through the Compact of Free Association. The core of the domestic economy is mainly agriculture (for subsistence or domestic consumption). The main industries are the manufacture of handicrafts and the processing of tuna. Recent years have seen investment in a tuna processing plant and the black pearl industry. Along with the tourism industry, this has been a source of job creation.

In Micronesia, the national economy is basically dependent on the Compact of Free Association with the USA. The economy is formed mainly by agriculture and fishing, especially subsistence. In order for economic growth and the development of private sector businesses to take place, establishment of flexible a land use system and easing of regulations on foreign investment are considered necessary. The Federated government is lobbying the state governments to review their policies on foreign investment and land use.

7-2. Policies and legal frameworks regarding foreign investment in general

In the target countries, as in many developing nations, in accordance with plans to foster the nation's industries and grow its economy, there are policies to promote foreign investment. On the one hand, they have a stance of actively accepting investment in fields in accordance with policies to foster domestic industry and technologies that cannot be covered domestically, while on the other hand, they also protect domestic industries by regulating competition with domestic companies.

In addition, in each country there are remnants of traditional systems of land ownership. In order for foreign capital to participate and develop businesses, it is necessary to secure land use rights

(land rental) through the building of relationships with local influential persons and through negotiation.

In Palau, policy on foreign investment follows the Foreign Investment Master Plan (which went into effect in 1993) by the Foreign Investment Board (FIB) and is becoming systematic. However, lack of personnel and the impact of the presidential election seem to be causing delay. Participation by foreign capital currently requires 1) securing the necessary number of people (at least three), 2) registration of a company inside Palau, 3) approval by the Foreign Investment Board, and 4) obtaining business licenses from the national and state government.

Papua New Guinea has an open investment system and a policy of actively facilitating foreign investment that contributes to domestic economic development and national prosperity. Partnerships with local capital from Papua New Guinea are promoted, but in almost every case, 100-percent foreign-owned companies are also approved. Until 1997, local capital of at least 51 percent was required for corporate registration, but today that has been eased so that if an employee has been resident in the country for at least six months, establishment of a corporation is possible. There are also government incentives available depending on the type of business participated in. Because of factors such as inflation and deteriorating public safety in recent years, the cost of establishing a foreign-capitalized company is generally higher than in neighboring countries due to the cost of office rental, in-house power generation equipment, telecommunications, security, and so on.

In the Marshall Islands, the Ministry of Finance has a sector that handles foreign investment applications and approvals. Foreign-capitalized businesses must obtain a license from the Foreign Investment Board (FIB) as well as obtaining permission for a business license from the state government.

Issues related to foreign capital participation in the Marshall Islands include land problems (because land is owned and managed by the same family for many generations, for foreign capital to participate and open for business, agreement on use of land for a certain period must be obtained through contact and negotiation with landowners), and government control of major industries (in domestic industries where scale is expected, such as the airline industry and the information and communications industry, there is little room for participation by foreign capital).

In Micronesia, the policy is to encourage the participation of foreign capital and technology when it will contribute to the development of the domestic economy. Foreign capital participation requires application and registration to the national Department of Resource & Development or a state government. There are no laws restricting participation by foreign capital in particular. However, promotion of domestic employment, provision of job training to employees, and joint ventures with Micronesians are encouraged as requirements for the endorsement of foreign capital. After application and registration with the federated government, business license application and registration with the government of the state in which the enterprise will be formed are necessary.

7-3. State of target markets

In the target countries, Palau can be considered economically developed. In Papua New Guinea, the Marshall Islands, and Micronesia, there are dual economies with large gaps between the monetary economies that have developed in urban areas and the closed economies that still remain in provincial and rural areas.

Comparison of total population and urban versus rural population percentages in target countries

	Palau	Papua New Guinea	Marshall Islands	Micronesia
Population (2011)	20,609	7,013,800	54,816	111,542
Population growth rate	0.60%	2.10%	0.70%	0.40%
Urban population percentage	46%	13%	68%	22%

Sources: World Bank website, NRI, The National Research Institute, Better Managing the Performance and Condition of Pacific Towns and Cities

Wage standards in target countries

	Palau	Papua New Guinea	Marshall Islands	Micronesia
Average wage standards	Palau citizens: about 500 US dollars/month Filipinos: about 250–350 US dollars/month	1.5–2.5 US dollars/hour (3–5 kina)	About 300–350 US dollars/2 weeks	Public sector: about 7,870 US dollars/year Private sector: about 3,580 US dollars/year
Minimum wage	Palau citizens 2.50 US dollars/hour	13.07 US dollars/week	2 US dollars/hour	1.75 US dollars/hour
Labor-related systems and regulations		1978 Employment Act	1986: Minimum Wage Act 1990: Protection of Resident Workers Act	
Other	Only citizens of Palau are covered by the minimum wage	Labor unions are negotiating for a raise to 26.35 US dollars/week	Four procedures must be followed before hiring foreign workers	Foreign workers must register as skill holders

Sources: Asian Development Bank report, Pacific Islands Investment Guide 2012, and Itochu Enex research

7-4. Social and cultural environments (cultural acceptability, social influence, etc., of target businesses)

In Palau, the people generally have a favorable impression of Japanese people. Japan is Palau's biggest donor country next to the USA. Many people are proficient in Japanese due to the Japanese occupation during World War II. Members of the Palau government have high expectations for support from Japan through ODA in terms of technology. Because diving and the tourism industry are major industries, there is high awareness of environmental policies.

In Papua New Guinea, export-oriented mining industries that have grown remarkably in recent years and the agriculture, forestry, and fisheries industries that account for one-third of gross domestic product are seen as the core domestic industries. Although there is a policy of fostering the tourism industry over the long term, compared with Palau, where tourism is a major industry, the priority is low.

On the other hand, the high unemployment rate in urban areas is worsening, and job creation has become a major issue. The Department of Commerce aims to expand the employment coverage of small and medium businesses from the current 10–15 percent to 20 percent in 2030 and 50 percent in 2050.

In the Marshall Islands, in terms of national employment skills, because of a lack of grounding in math and science, most positions requiring technical skills are filled by Filipinos and other foreign workers. A system is widely seen in which the tops of most organizations are filled by locally influential figures or Americans, with middle management and technical positions filled by Filipinos, and the manual labor positions below them held by Marshallese.

The population structure of Micronesia skews young, with 60 percent of the population under 21, and 37 percent under 15. With the shift to a monetary economy progressing, job creation is a major issue. As for the state of employment forms and incomes, a common situation resembles that of the Marshall Islands, with locally well to do families and influential persons owning and running businesses, technically skilled Filipinos in technical and management positions, and ordinary Micronesians employed as laborers.

In all of the survey target countries, people with technical skills and outstanding personnel tend to study abroad and find employment overseas without returning home, or find employment in major international firms and move overseas. It is necessary to provide better domestic opportunities for such people.

Along with job creation issues, construction of this business model has the potential to contribute to the provision of employment and income opportunities.

Unemployment rates in target countries

Unit: %

	Palau	Papua New Guinea	Marshall Islands	Micronesia
Unemployment rate	4.1%	2.8%	30.9%	22.0%
Percentage of workers who are salaried	94.5%	(unknown)	71.3%	63.6%
Survey year	2005	2000	1999	2008

Sources: Extracted from Asian Development Bank report / Pacific Studies Series, Sustainable Health Care Financing in the Republic of Palau, Statistical Yearbook FSM 2008

8. Business model proposals and preconditions for feasible recycling business

8-1. Scope for consideration of business models

8-1-1. Scope of works to be included in the business model

It is assumed that the vehicle recycling business, which is the focus of this survey, will involve the following work processes.

Processing work in the recycling of scrap cars and the scope of business modeling

No.	Process	Details, considerations in business modeling, etc.
1)	Collection	Collection purchasing, carry-in purchasing, contracted collection *This business involves collection purchases and purchases based on carry-in by the owner. It is assumed that cooperation with outside businesses in the form of contracted collection from locations that are distant from recycling centers will take place as required.
2)	Receipt and registration	Receipt and registration of used vehicles by recycling and processing facilities
3)	Removal of hazardous parts, etc.	Removal and processing of CFC, oil, airbags, etc.; chipping of scrap tires
4)	Rebuilt core production	*To be discussed later: It is expected that production of recycled parts and rebuilt parts will be difficult.
5)	Scrap materials production	*Assuming that products will be sold in the Japanese market, technical consultation and facilities expenditure will be required to satisfy acceptable specifications for the Japanese market in order to prevent recurring complaints.
6)	Press processing	
7)	Packaging	
8)	Container loading	Loading into containers for ocean transport of recycled products (rebuilt cores and scrap materials)
9)	Customs clearance procedures	*It is assumed that these processes will be handled by an ocean transport business.
10)	Transport	

It is assumed that use of contracted collection to an external business for a portion of the collection of item 1) will generate income opportunities for ordinary citizens (in particular, members of impoverished classes, unemployed persons, etc.) that are outside the scope of employment provided by the main business. (*Details are provided in “12. Development effects and potential contribution for BOP.”)

8-1-2. Geographical coverage for collection of end-of-life vehicles

The scope of end-of-life vehicle collection covered in this report is limited to regions where the generation of end-of-life vehicles is assumed to be particularly centralized in the target countries. Specifically, this scope is limited to the following. In Palau: Koror State and Airai State, which are undergoing the greatest economic development and urbanization in the country, and their surrounding regions (including Ngerekebesang Island and Malakal Island); in Papua New Guinea: the Port Moresby region, which is experiencing the most economic development in the country and

therefore expected to see growing vehicle use; and in the Marshall Islands and Micronesia: the Majuro Island and Pohnpei Island, where the countries' respective capitals are located and which are seeing the greatest increase in both population and vehicle use.

In general, transport of end-of-life vehicles within the targeted countries will be limited to that capable of being handled by land transport. Expenditure for domestic ocean transport is not anticipated.

8-1-3. Recycled products to be included in the business model

Recyclable items of value from end-of-life vehicles include scrap metal (iron, aluminum, copper, etc.), materials (catalyst, scrap tires, etc.), rebuilt cores (materials and parts used in manufacture of rebuilt parts), recycled parts, rebuilt parts, and reuse products.

Recycled products included in the business model study of this report

	Study item	Consideration
Scrap metal (Iron, aluminum, copper)	◎	Study of cooperation and cooperative frameworks with local businesses is required.
Catalyst	◎	Revenue-earning can be improved with appropriate processing and sales.
Rebuilt cores	○ (Next step)	Study of sales of components (rebuilt cores), rather than assembled rebuilt cores, to rebuilt parts manufacturers from a medium- to long-term perspective.
Scrap tires	◎ (*No earnings)	Chipping to be implemented from the standpoint of environmental improvement. Study of approaches to generate earnings (including collaboration with government) as a highly public business for the future.
Recycled parts and rebuilt parts	× (Future scrap)	Judged difficult given the model years of end-of-life vehicles in the target countries.
Reuse products	× (Future scrap)	Judged to have low marketability given the vehicle types and model years of end-of-life vehicles in the target countries.

8-1-4. Scope of ocean transport and business scheme

The collection of end-of-life vehicles in one location will entail ocean transport costs that are several times higher than the market price for scrap metal. This will eliminate all possibility of business profitability. Consequently, it is assumed that only recycled products having value that can match ocean transport costs will be shipped by ocean transport, and that, as a basic approach, efforts will be made to realize scrap car processing and recycling within the target countries.

Moreover, if scrap car processing and recycling in the target countries is deemed feasible, it is assumed that a scheme focused on overall business management only, with exports made directly from each region to market countries (without transport of semi-finished products or interim transport), will be employed.

8-2. Examination of business model proposal

8-2-1. Business model proposal 1: Vehicle recycling business in Palau

A) External environment and considerations for project realization

As was mentioned previously, several vehicle recycling businesses exist in Palau. Moreover, it is thought that Palau has the facilities and unit processing capacity needed to process the number of end-of-life vehicles that are produced there. However, business is not always conducted in an efficient and comprehensive manner, as collection is limited to certain regions (and based on requests from users, etc.) and scrap metal and catalyst are only sold to Taiwan and South Korea. On the other hand, the recycling business in Palau alone is quite small, and in the case of Koror State, collection and export of end-of-life vehicles are already being practiced and thus the problem of end-of-life vehicles has largely been resolved.

To secure the volume of end-of-life vehicles identified in this survey as effective in business modeling, it is assumed that collection will be made together with areas around Koror State where abandoned vehicles are commonly seen. At the same time, given that collection of end-of-life vehicles and scrapping are already being practiced by local businesses in Palau, there is a need to study support for introducing and expanding the appropriate processing of CFC and other materials as well as scrap tire processing by developing a recycling system (which does not currently exist) in collaboration with existing businesses as a step toward generating anticipated effects. It may also be necessary to consider future collection from Angaur Island and Peleliu Island, where the problem of abandoned end-of-life vehicles remains.

B) Examples of business model

It is estimated that the existing local businesses' share of processing is approximately 70%. As for the remaining market (30%), in developing the end-of-life vehicle recycling business based on this survey, it is assumed that the business will aim to capture a two-thirds share of the market of vehicles thought to be collectable in the areas around Koror. This will mean that the business will handle approximately 20% of the calculated number of end-of-life vehicles that are produced in Palau.

For the next business step, it is assumed that earnings will be realized from rebuilt cores using the same distribution network and recycling fees from a recycling system to be developed in collaboration with the government. However, it is thought that separate measures will need to be considered if actual profits are to be achieved. It is assumed that a recycling base will be developed near Koror, which is Palau's main city, and that end-of-life vehicles mainly from Koror State

(including Ngerekebesang Island and Malakal Island), Airai State, and other regions will be transported primarily by land.

Volume, price, and associated estimated costs of recyclable scrap in Palau (market share of 20%)

	Nationwide production of recycled products	Volume targeted for collection in this business model	Sales price for the Japanese market
Number of end-of-life vehicles	518	104	-
Iron	354.8 t	71.0 t	21,300 yen/t
Aluminum	40.1 t	8.0 t	105 yen/kg
Copper	5.2 t	1.0 t	280 yen/kg
Catalyst (platinum group)	1.5 kg	0.3 kg	
	518 parts	103.6 parts	3,500 yen/part
Rebuilt cores	5,180 kg	1036 kg	400 yen/kg
Purchasing cost	10 USD/vehicle		
Contracted collection cost	10 USD/vehicle		
CFC treatment	350 USD/60 vehicles		
Export/shipping cost	197 USD/t		
Management	1.0 persons	Salary (annual) 8,400 USD	
Recycler	3.0 persons	Salary (annual) 4,800 USD	
Utility costs	1,000,000 yen/year		
Land rental	1,200,000 yen/year		
Consulting fees	6,000,000 yen/year		
Initial investment (required facilities)	71,145,000 yen	Depreciation period for equipment and facilities	8.0 years
Market share	20.0%	Yen exchange rate	100 yen/USD

Sources: Prepared based on Nikkan Shikyo Tsushinsha Co, Ltd. (market prices of iron, aluminum, and copper scrap indices) and data of Itochu Enex Co., Ltd.

Vehicle recycling business estimates for Palau (market share: 20%)

Unit: 1,000 yen

	Scrap metal and catalyst sales	Rebuilt core sales*	*Introduction of appropriate recycling system**
Scrap sales (total)	2,645	2,645	2,645
Iron	1,511	1,511	1,511
Aluminum	842	842	842
Copper	291	291	291
Catalyst (platinum group)	363	363	363
Rebuilt core sales		414	414
Recycling fees			1,036
Total sales	3,007	3,422	4,458
Purchasing costs	104	104	104
Contracted collection charges	104	104	104
Management costs (personnel costs)	840	840	840
Scrap costs (personnel costs)	1,440	1,440	1,440
CFC treatment costs	604	604	604
Export/shipping cost	1,576	1,597	1,597
Utility costs, etc.	1,000	1,000	1,000
Land rental	1,200	1,200	1,200
Consulting fees	6,000	6,000	6,000
Depreciation	8,893	8,893	8,893
Other			
Operating profit	-18,754	-18,360	-17,324

*Rebuilt core: When for sales of core parts to rebuilt parts manufacturers (starter, alternator, transmission, etc.)

**Development of recycling system: Based on the assumption that a legal system for recycling of scrap cars is realized and a government subsidy of 100 USD per processed end-of-life vehicle is provided

The following are premises upon which the business estimations were made:

- Number of end-of-life vehicles and scrap volume: Based on the estimations of page 14.
- Scrap iron sales price: Set at 21,300 yen/ton after subtracting shredder costs (10,000 yen/ton) and 3,000 yen/ton in domestic transport cost from Yokohama from the regular purchase price of 34,300 yen/ton announced by Japan's iron and steel companies (price of Shredder A at the Utsunomiya Plant announced on April 5, 2013), which was used as a base point.
- Scrap aluminum and copper sales price: Set at 105 yen/kg and 280 yen/kg, respectively, based on the market price announced by Nikkan Shikyo Tsushinsha Co, Ltd.
- Catalyst: Recycled sales value set at 3,500 yen per end-of-life vehicle
- The average amount of rebuilt core producible from one end-of-life vehicle was set at 10 kg, and the sales price for 1 kg of rebuilt core was set at approximately 400 yen/kg after averaging multiple types.

- The recycling fee following introduction of the Recycling Law was set at 100 USD per vehicle.
- Based on local interviews, the purchase price per end-of-life vehicle was set at 10 USD and the collection cost/contracted collection cost was set at 10 USD (in the case of carry-in purchasing, the carry-in fee + purchase price was set at 20 USD).
- Export/shipping cost to the Japanese market was set at 197 USD per 1 ton (see Chapter 7 section 7-9 “Logistics costs”).
- The salary of management personnel was set at 8,400 USD/year after considering the average salary of Palauan at the management level.
- The salary of recyclers was set at 4,800 USD/year after considering the minimum wage of Palauan.
- Rebuilt core production and tire shredding were assumed to be conducted as part of a series of recycling processes.
- The cost of one CFC tank for the processing of 60 end-of-life vehicles (350 USD) was estimated for proper CFC treatment (waste oil processing and scrap tire processing were estimated in recycle work costs).
- Utility costs in recycling business operation were set at 1,000,000 yen/year after considering local prices.
- The amount of land required to establish a recycling facility was set at approximately 300 *tsubo*, (**tsubo* = 3.3 m²) and rent was estimated at 1,200,000 yen/year after using local examples as a reference.
- Based on the assumption that one consultant would be required to provide guidance and transfer technologies to support the recycling business (e.g., know-how in dismantlement, scrap product production, etc.), consulting cost was set at 6,000,000/year.
- Equipment required for the vehicle recycling business was assumed to have a total cost of 71,145,000 yen (initial investment for depreciable property), which included a forklift (6,000,000 yen), safety loader truck (6,000,000 yen), compact simple press (15,000,000 yen), tire shredder (20,000,000 yen) and recycling equipment (10,000,000 yen).
- Of initial equipment costs, products valued at 100,000 yen or less (total of 3,110,000 yen) were converted into first-year expenditure and miscellaneous expenditure of 3,000,000 yen (including office equipment, a simple IT system, etc.) was set as first-year miscellaneous expenditure, making a total of 6,110,000 yen.
- The period of depreciation for capital investment for the business was set at an average of 8.0 years (excluding the above-mentioned first-year expenses of 3,110,000 yen).
- The project’s recycling volume vis-à-vis the total number of end-of-life vehicles in Palau was set at 20%.
- The yen-to-USD exchange rate was set at 100 yen to 1 USD.

C) Issues and measures for creation of successful business:

As one premise for study toward the business’s viability as a private enterprise, it was assumed that IRR of a certain level (including business profitability) can be secured for new investment in Palau.

If an IRR of 15% in seven years after the start of business in Palau is assumed, the following

scenario for business profitability can be studied as a business viability model for realizing this IRR.

Conditions for commercialization

1. Business modeling is envisioned in the form a local government corporation to make capturing a 60% market share possible (the market size required to secure a 15% IRR in seven years following the start of business to achieve profitability as a condition for business viability after taking the following into account).
2. Equipment needed as startup equipment can be used without charge (government assistance).
3. Technical support-related consulting can be received without charge (use of government assistance, JICA Senior Volunteers Program, etc.)
*This assumes personnel dispatches for technical transfer as well as technical education and human resources development for recycling of scrap cars through linkage with JICA's Senior Volunteers Program, etc.
4. Tanks necessary for CFC treatment can be procured through government assistance that covers 75% or more of tank cost (government assistance).
5. Government assistance can be received to cover the entire amount of land rental (government assistance).
6. Rebuilt core production is implemented.
7. A local government-led a recycling system is underway (100 USD per vehicle).

Estimates for the viable recycling business model for Palau (market share: 60%)

Unit: 1,000 yen

	Scrap metal and catalyst sales	Rebuilt core sales	Introduction of appropriate recycling system
Scrap sales (total)	7,934	7,934	7,934
Iron	4,534	4,534	4,534
Aluminum	2,526	2,526	2,526
Copper	874	874	874
Catalyst (platinum group)	1,088	1,088	1,088
Rebuilt core sales		1,243	1,243
Recycling fees			3,108
Total sales	9,022	10,265	13,373
Purchasing costs	311	311	311
Contracted collection charges	311	311	311
Management costs (personnel costs)	840	840	840
Scrap costs (personnel costs)	1,920	1,920	1,920
CFC treatment costs	453	453	453
Export/shipping cost	4,729	4,790	4,790
Utility costs, etc.	1,000	1,000	1,000
Land rental	0	0	0
Consulting fees	0	0	0
Depreciation	0	0	0
Other			
Operating profit	-542	640	3,748

- The number of recycling workers is set at 4.0 after considering a one-person increase in response to the number of processed vehicles.

IRR estimates for the viable recycling business model for Palau (market share: 60%)

Unit: 1,000 yen

Total sales	Scrap and catalyst only	Rebuilt core sales	Introduction of appropriate recycling system
Capital and total investment	-10,000	-10,000	-10,000
1st year	-6,652	-5,470	-2,362
2nd year	-542	640	3,748
3rd year	-542	640	3,748
4th year	-542	640	3,748
5th year	-542	640	3,748
6th year	-542	640	3,748
7th year	-542	640	3,748
IRR	—	-26%	16%

- Capital at the beginning of the business is assumed to be 10,000,000 yen.
- A total of 6,110,000 yen comprised of products valued at 100,000 yen or less from among initial equipment costs (total of 3,110,000 yen) and miscellaneous expenditure of 3,000,000 is set as first-year expenditure.

Existing private enterprises that are engaged in this business in Palau are 1) family operations that do not consider investment efficiency, 2) employers of low-wage foreign laborers, 3) not practicing appropriate recycling processes (treatment of CFC, airbags, scrap tires, etc.), or 4) not thinking about compliance. If the vehicle recycling business of this survey is to be conducted in a manner that includes contributions by private enterprises of developed countries to the target countries, then it goes without saying that those enterprises will make their business decisions about whether to enter the business in Palau only after evaluating profitability and business viability based on investment effectiveness. Moreover, given that one of the objectives of this business will be maximizing “benefits for local citizens,” it is important to consider job creation for local citizens, not foreign laborers. Furthermore, appropriate processes (treatment of CFC, airbags, scrap tires, etc.) as well as compliance are essential.

The business estimates and IRR estimates were made as rough calculations toward business modeling that meets all of these conditions. The business need not necessarily be completely dependent upon collaboration with JICA or ODA support to be viable. The premises used in the business estimates (each cost item, etc.) and IRR toward business modeling can be adjusted to meet levels of business profitability. And if promising measures that are outside government assistance become available, the result will be less government assistance or even possibilities for private-sector business modeling. Specific approaches here could include reduced initial investment, donation of machinery and equipment, lower expenditure through use of used equipment, adjustment of business profit levels, and use of the “semi-public sector” approach. Such conditions for business modeling are also applicable to other countries as well.

8-2-2. Business model proposal 2: Vehicle recycling business in Papua New Guinea

A) External environment and considerations for project realization

Although there are scrap businesses operating in Papua New Guinea, none are specialists in the recycling of scrap cars. Abandoned scrap cars are commonly seen in the country, and thus appropriate scrap car collection and processing are becoming important challenges for the government. At the same time, with Papua New Guinea's economic growth of recent years has come the frequent availability of ocean transport by large vessels to many countries, including Australia. In fact, Papua New Guinea enjoys the most convenient ocean transport of all the target countries. There is ample room to consider possibilities for entering this business in Papua New Guinea, which is expected to see growing automobile imports in the future.

However, regions thought to generate end-of-life vehicles in Papua New Guinea—namely the Port Moresby region, the Lae region, and the Highlands region—are separated from one another due to a lack of land routes. Consequently, considerations include a limited number of end-of-life vehicles that can be recycled if it is assumed that recycling will take place at one site, and comparatively high interim transport costs to the recycling business base. To pave the way toward business entry at the local level, it will be important to consider not only the use of systems that offer favorable treatment to overseas investors but also infrastructure and public safety measures. At the same time, while there is high need for job creation to secure local employment opportunities on one hand, there is also need for education and human resources development that improves skills and employment ethics on the other.

B) Examples of business model

It is estimated that the existing local businesses' share of processing is approximately 40%. As for the remaining market (60%), in developing the vehicle recycling business based on this survey, it is assumed that the business will aim to capture a one-third share of the market. This will mean that the business will handle approximately 20% of the calculated number of end-of-life vehicles that are produced in Papua New Guinea. Based on the results of a national study and local study, the development of a recycling base near the capital of Port Moresby, which is particularly expected to see economic growth and corresponding growth in the number of end-of-life vehicles, is established as a premise. It is further assumed that land transport will be the primary form of transport for end-of-use vehicles from the areas around Port Moresby (the Lae region and Highlands region are excluded).

After exports of scrap metal and catalyst by the vehicle recycling business are realized, it is assumed that the next step will be to achieve earnings from rebuilt cores using the same distribution network and recycling fees from a recycling system to be developed in collaboration with the

government. However, it is thought that separate measures will be needed if actual profits are to be achieved. However, it is thought that separate measures will need to be considered if actual profits are to be achieved.

Volume, price, and associated estimated costs of recyclable scrap in Papua New Guinea (market share of 20%)

	Nationwide production of recycled products	Volume targeted for collection in this business model	Sales price for the Australian and Japanese markets
Number of end-of-life vehicles	5,659	1,132	-
Iron	3,876 t	775.3 t	19,440 yen/t
Aluminum	439 t	87.7 t	105 yen/kg
Copper	57 t	11.3 t	280 yen/kg
Catalyst (platinum group)	16 kg	3.3 kg	
	5,659 parts	1,131.8 parts	3,500 yen/part
Rebuilt cores	56,590 kg	11,318 kg	400 yen/kg
Purchasing cost	20 USD/vehicle		
Contracted collection cost	30 USD/vehicle		
CFC treatment	350 USD/60 vehicles		
Export/shipping cost	220 USD/t		
Management	1.0 persons	Salary (annual) 5,500 USD	
Recycler	10.0 persons	Salary (annual) 2,500 USD	
Utility costs	2,000,000 yen/year		
Land rental	2,400,000 yen/year		
Consulting fees	6,000,000 yen/year		
Initial investment (required facilities)	71,145,000 yen	Depreciation period for equipment and facilities	8.0 years
Market share	20.0%	Yen exchange rate	100 yen/USD

Sources: Prepared based on Nikkan Shikyo Tsushinsha Co, Ltd. (market prices of iron, aluminum, and copper scrap indices) and data of Itochu Enex Co.

Vehicle recycling business estimates for Papua New Guinea (market share: 20%)

Unit: 1,000 yen

	Scrap metal and catalyst sales	Rebuilt core sales*	*Introduction of appropriate recycling system**
Scrap sales (total)	27,452	27,452	27,452
Iron	15,071	15,071	15,071
Aluminum	9,211	9,211	9,211
Copper	3,170	3,170	3,170
Catalyst (platinum group)	3,961	3,961	3,961
Rebuilt core sales		4,527	4,527
Recycling fees			11,318
Total sales	31,413	35,940	47,258
Purchasing costs	2,264	2,264	2,264
Contracted collection charges	3,395	3,395	3,395
Management costs (personnel costs)	550	550	550
Scrap costs (personnel costs)	2,500	2,500	2,500
CFC treatment costs	6,602	6,602	6,602
Export/shipping cost	19,235	19,484	19,484
Utility costs, etc.	2,000	2,000	2,000
Land rental	2,400	2,400	2,400
Consulting fees	6,000	6,000	6,000
Depreciation	8,893	8,893	8,893
Other			
Pretax profit	-22,426	-18,148	-6,830

*Rebuilt core: When for sales of core parts to rebuilt parts manufacturers (starter, alternator, transmission, etc.)

**Development of recycling system: Based on the assumption that a legal system for recycling of scrap cars is realized and a government subsidy of 100 USD per processed end-of-life vehicle is provided

* Premises for calculation that are other than those mentioned below are as provided previously.

- Scrap iron sales price: Set at 19,400 yen/ton for the Australian market by assuming a price that is approximately 80% of the price for the Japanese market.
- Based on local interviews, the purchase price per end-of-life vehicle was set at 20 USD and the collection cost/contracted collection cost was set at 30 USD (in the case of carry-in purchasing, the carry-in fee + purchase price was set at 50 USD).
- The export/shipping cost for the Australian market was set at 220 USD/ton (see Chapter 7 section 7-9 “Logistics costs”).
- The salary of management personnel was set at 5,500 USD/year after considering the average salary of Papua New Guineans at the ordinary management level.
- The salary of workers was set at 2,500 USD/year after considering the minimum wage of Papua New Guineans.

- Utility costs in recycling business operation were set at 2,000,000/year after considering local prices.
- The amount of land required to establish a recycling facility was set at approximately 700 *tsubo*, and rent was estimated at 2,400,000 yen/year after using local examples as a reference.
- The project's recycling volume vis-à-vis the total number of end-of-life vehicles in Palau was set at 20%.

C) Issues and measures for creation of successful business

As one premise for study toward the business's viability as a private enterprise, it was assumed that IRR of a certain level (including business profitability) can be secured for new investment in Papua New Guinea.

If an IRR of 30% in seven years after the start of business in Papua New Guinea is assumed based on country risk, price increases, etc., the following scenario for business profitability can be studied as a business viability model for realizing this IRR.

Conditions for commercialization

1. It is possible to capture a 20% share of the market (consider business modeling as a local government corporation if necessary).
2. Equipment needed as startup equipment can be used without charge (government assistance).
3. Technical support-related consulting can be received without charge (use of government assistance, JICA Senior Volunteers Program, etc.)
4. Gas tanks needed for CFC treatment are available without charge (government assistance).
5. Government assistance can be received to cover the entire amount of land rental (government assistance).
6. Rebuilt core production is implemented.
7. A local government-led a recycling system is underway (100 USD per vehicle).

Estimates for the viable recycling business model for Papua New Guinea (market share: 20%)

Unit: 1,000 yen

	Scrap metal and catalyst sales	Rebuilt core sales*	*Introduction of appropriate recycling system**
Scrap sales (total)	27,452	27,452	27,452
Iron	15,071	15,071	15,071
Aluminum	9,211	9,211	9,211
Copper	3,170	3,170	3,170
Catalyst (platinum group)	3,961	3,961	3,961
Rebuilt core sales		4,527	4,527
Recycling fees			11,318
Total sales	31,413	35,940	47,258
Purchasing costs	2,264	2,264	2,264
Contracted collection charges	3,395	3,395	3,395
Management costs (personnel costs)	550	550	550
Scrap costs (personnel costs)	2,500	2,500	2,500
CFC treatment costs	0	0	0
Export/shipping cost	19,235	19,484	19,484
Utility costs, etc.	2,000	2,000	2,000
Land rental	0	0	0
Consulting fees	0	0	0
Depreciation	0	0	0
Other			
Operating profit	1,469	5,747	17,065
Pretax profit	1,469	5,747	17,065
(Corporation tax (25%))	367	1,437	4,266
Profit after tax	1,102	4,310	12,799

IRR estimates for the viable recycling business model for Papua New Guinea (market share: 20%) Unit: 1,000 yen

Total sales	Scrap and catalyst only	Rebuilt core sales	Introduction of appropriate recycling system
Capital and total investment	-30,000	-30,000	-30,000
1st year	-5,008	-1,800	6,689
2nd year	1,102	4,310	12,799
3rd year	1,102	4,310	12,799
4th year	1,102	4,310	12,799
5th year	1,102	4,310	12,799
6th year	1,102	4,310	12,799
7th year	1,102	4,310	12,799
IRR	-29%	-4%	32%

- Capital at the beginning of the business is assumed to be 30,000,000 yen.
- A total of 6,110,000 yen comprised of products valued at 100,000 yen or less from among initial equipment costs (total of 3,110,000 yen) and miscellaneous expenditure of 3,000,000 is set as first year expenditure.

8-2-3. Business model proposal 3: Vehicle recycling business in the Marshall Islands

The number of end-of-use vehicles generated in the Marshall Islands each year is 192, a figure that is much smaller than the other target countries. Given this market size, Japanese private enterprises will find it difficult to consider entering into new business there.

8-2-4. Business model proposal 4: Vehicle recycling business in Micronesia

A) External environment and considerations for project realization

As was mentioned previously, existing vehicle recycling businesses in Pohnpei, Yap, and Chuuk of Micronesia are engaged in collection and scrapping of end-of-life vehicles. If the estimated 967 end-of-life vehicles that are produced each year are considered, it is thought that the Micronesia has the facilities and unit processing capacity needed to process the number of end-of-life vehicles that are produced there.

On the other hand, each state has its own independent system, and there is a geographical challenge in that generated end-of-life vehicles are dispersed across multiple islands. Given these factors, it appears that the number of collectible end-of-life vehicles envisioned for a vehicle recycling business is about the same or smaller than that of Palau. If Pohnpei Island, which is the capital of Micronesia and has the largest population, were established as the target region for business modeling, it is estimated that approximately 60% (roughly 580 vehicles) of all of Micronesia's end-of-life vehicles envisioned for collection can be targeted.

Like the Marshall Islands, almost all end-of-life vehicles are stored or abandoned in people's yards in order to obtain parts, even if the vehicle itself does not run. In studying rebuilt core

production, it must be considered that earning revenue from high-quality parts will be difficult. This difficulty comes from the fact that, at the time of collection, the cars will have been exposed to the elements for several years (assumed to be 5 or 6 years or more) since becoming broken or reaching their end of life and their parts have either been removed or are deteriorating, and given the years of the vehicle models for which market demand for rebuilt cores and recycled parts exists.

Moreover, each of Micronesia's state governments are independently planning and developing vehicle registration and waste disposal systems as a step toward introduction of new automobile recycling laws. However, it is thought that actualization of a recycling law throughout all of Micronesia will be more difficult than in the other target countries, and efforts to implement a system will likely take many years.

B) Examples of business model:

Based on the assumption that business modeling will take place in the capital region of Pohnpei, it is estimated that the Pohnpei has a 60% share of the total number of end-of-life vehicles that are generated in Micronesia. It is estimated that the existing local businesses' share of processing in the Pohnpei region is roughly half (approximately 30% of the national total). In developing the vehicle recycling business based on this survey, it is assumed that the business can capture a one-half share of the remaining share (approximately 15% of the calculated number of end-of-life vehicles that are produced in Micronesia). It is assumed that collection will take place via land transport on the capital island of Pohnpei; Yap, Chuuk, and other islands and regions outside of Pohnpei, are excluded.

It is thought that, if export/shipping costs and capital investment are considered, achieving a profit with the envisioned project scale and operating format alone will be difficult.

Like the Marshall Islands, almost all end-of-life vehicles are stored or abandoned in people's yards in order to obtain parts, even if the vehicle itself does not run. In studying rebuilt core production, it must be considered that earning revenue from high-quality parts will be difficult. This difficulty comes from the fact that, at the time of collection, the cars will have been exposed to the elements for several years (assumed to be 5 or 6 years or more) since becoming broken or reaching their end of life and their parts have either been removed or are deteriorating, and given the years of the vehicle models for which market demand for rebuilt cores and recycled parts exists.

Volume, price, and associated estimated costs of recyclable scrap in Micronesia (market share of 15%)

	Nationwide production of recycled products	Volume targeted for collection in this business model	Sales price for the Japanese market
Number of end-of-life vehicles	967	145	-
Iron	662.4 t	99.4 t	21,300 yen/t
Aluminum	74.9 t	11.2 t	105 yen/kg
Copper	9.7 t	1.5 t	280 yen/kg
Catalyst (platinum group)	2.8 kg	0.4 kg	
	967 parts	145.1 parts	3,500 yen/part
Purchasing cost	10 USD/vehicle		
Contracted collection cost	10 USD/vehicle		
Export/shipping cost	190 USD/t		
CFC treatment	350 USD/60 vehicles		
Management	1.0 persons	Salary (annual) 7,870 USD	
Recycler	3.0 persons	Salary (annual) 4,000 USD	
Utility costs	1,000,000 yen/year		
Land rental	1,200,000 yen/year		
Consulting fees	6,000,000 yen/year		
Initial investment (required facilities)	71,145,000 yen	Depreciation period for equipment and facilities	8.0 years
Market share	15.0%	Yen exchange rate	100 yen/USD

Sources: Prepared based on Nikkan Shikyo Tsushinsha Co, Ltd. (market prices of iron, aluminum, and copper scrap indices) and data of Itochu Enex Co.

Vehicle recycling business estimates for Micronesia (market share: 15%)

Unit: 1,000 yen

	Scrap metal and catalyst sales	Rebuilt core sales*	*Introduction of appropriate recycling system**
Scrap sales (total)	3,703	-	3,703
Iron	2,116	-	2,116
Aluminum	1,180	-	1,180
Copper	407	-	407
Catalyst (platinum group)	508	-	508
Recycling fees		-	1,451
Total sales	4,211	-	5,662
Purchasing costs	145	-	145
Contracted collection charges	145	-	145
Management costs (personnel costs)	787	-	787
Scrap costs (personnel costs)	1,200	-	1,200
CFC treatment costs	846	-	846
Export/shipping cost	2,129	-	2,129
Utility costs, etc.	1,000	-	1,000
Land rental	1,200	-	1,200
Consulting fees	6,000	-	6,000
Depreciation	8,893	-	8,893
Other		-	
Operating profit	-18,134	-	-16,684

*Rebuilt core: When for sales of core parts to rebuilt parts manufacturers (starter, alternator, transmission, etc.)

**Development of recycling system: Based on the assumption that a legal system for recycling of scrap cars is realized and a government subsidy of 100 USD per processed end-of-life vehicle is provided

*Premises for calculation that are other than those mentioned below are as provided previously.

- Scrap iron sales price: Set at 21,300 yen/ton after subtracting shredder costs (10,000 yen/ton) and 3,000 yen/ton in domestic transport cost from Yokohama from the regular purchase price of 34,300 yen/ton announced by Japan's iron and steel companies (price of Shredder A at the Utsunomiya Plant announced on April 5, 2013), which was used as a base point.
- Based on local interviews, the purchase price per end-of-life vehicle was set at 10 USD and the collection cost/contracted collection cost was set at 10 USD (in the case of carry-in purchasing, the carry-in fee + purchase price was set at 20 USD).
- The export/shipping cost to the Japanese market was set at 190 USD/ton. (see Chapter 7 section 7-9 "Logistics costs")
- The salary of management personnel was set at 7,870 USD/year after considering the average salary of Micronesians at the management level.

- The salary of recyclers was set at 4,000 USD/year after considering the minimum wage of Micronesians.
- Utility costs in recycling business operation were set at 1,000,000 yen/year after considering local prices.
- The amount of land required to establish a recycling facility was set at approximately 300 *tsubo*, and rent was estimated at 1,200,000 yen/year after using local examples as a reference.
- The project's recycling volume vis-à-vis the total number of end-of-life vehicles in Palau was set at 15%.
- The yen-to-USD exchange rate was set at 100 yen to 1 USD.

8-2-5. Business model proposal 5: Multinational vehicle recycling business in Palau and Papua New Guinea

A) External environment and considerations for project realization

Looking at multinational vehicle recycling business, at the time that vehicle recycling business modeling is realized at multiple points in addition to in the countries studied thus far—namely, Palau, Papua New Guinea, the Marshall Islands and Micronesia—it is thought that efficient export management that considers global market prices and demand for scrap materials, rebuilt cores, etc., will become possible by promoting recycling, stock, and export management from one of these bases or Japan. Moreover, a supporting effect can be expected from the development and utilization of experience and know-how in other areas as part of efforts to develop recycling systems and diffuse education systems.

With regard to multinational business modeling, this report presents model estimates for Palau and Papua New Guinea, which are thought to have the highest business feasibility among the targeted countries and strong promise from the standpoint of local economic development. To realize multinational vehicle recycling business, it is thought that a vehicle recycling business should be first developed in either Palau or Papua New Guinea. Then the next step would be to promote expansion of the business to other regions.

B) Examples of business model:

The following estimates are provided as references for a multinational business model for Palau and Papua New Guinea, which are thought to hold possibilities for study of business and profit feasibility based on multiple premises. They are presented based on the country-specific studies and premises discussed thus far.

Volume, price, and associated estimated costs of recyclable scrap in Palau and Papua New Guinea (market share of Palau: 60%; market share of Papua New Guinea: 20%)

	Nationwide production of recycled products	Volume targeted for collection in this business model
Number of end-of-life vehicles	6,177	1,443
Iron	4,231 t	988.2 t
Aluminum	479 t	111.8 t
Copper	62 t	14.4 t
Catalyst (platinum group)	18 kg	4.2 kg
	6,177 parts	1442.6 parts
Rebuilt cores	61,770 kg	988.2 kg

Sources: Prepared based on Nikkan Shikyo Tsushinsha Co, Ltd. (market prices of iron, aluminum, and copper scrap indices) and data of Itochu Enex Co.

Vehicle recycling business estimates for Palau and Papua New Guinea (market share of Palau: 60%; market share of

Papua New Guinea: 20%)

Unit: 1,000 yen

	Scrap metal and catalyst sales	Rebuilt core sales*	*Introduction of appropriate recycling system**
Scrap sales (total)	35,386	35,386	35,386
Iron	19,606	19,606	19,606
Aluminum	11,737	11,737	11,737
Copper	4,043	4,043	4,043
Catalyst (platinum group)	5,049	5,049	5,049
Rebuilt core sales	0	5,770	5,770
Recycling fees	0	0	14,426
Total sales	40,435	46,205	60,631
Purchasing costs	2,574	2,574	2,574
Contracted collection charges	3,706	3,706	3,706
Management costs (personnel costs)	2,230	2,230	2,230
Dismantling costs (personnel costs)	4,420	4,420	4,420
CFC treatment costs	453	453	453
Export/shipping cost	23,964	24,275	24,275
Utility costs, etc.	3,000	3,000	3,000
Land rental	0	0	0
Consulting fees	0	0	0
Depreciation	0	0	0
Other	0	0	0
Operating profit	87	5,547	15,707
Pretax profit (PNG only)	1,469	5,747	17,065
Corporation tax (25%, PNG only)	367	1,437	4,266
Profit after tax	-280	4,110	15,707

*Rebuilt core: When for sales of core parts to rebuilt parts manufacturers (starter, alternator, transmission, etc.)

**Development of recycling system: Based on the assumption that a legal system for recycling of scrap cars is realized and a government subsidy of 100 USD per processed end-of-life vehicle is provided

*Premises for calculation are as provided in previous sections.

- One manager is stationed in Palau to manage the multinational business.

IRR estimates for the viable recycling business model for Palau and Papua New Guinea (market share of Palau: 60%; market share of Papua New Guinea: 20%) Unit: 1,000 yen

Total sales	Scrap and catalyst only	Rebuilt core sales	Introduction of appropriate recycling system
Capital and total investment	-40,000	-40,000	-40,000
1st year	-12,500	-8,110	3,487
2nd year	-280	4,110	15,707
3rd year	-280	4,110	15,707
4th year	-280	4,110	15,707
5th year	-280	4,110	15,707
6th year	-280	4,110	15,707
7th year	-280	4,110	15,707
IRR	-	-14%	25%

*Premises for calculation are as provided in previous sections.

C) Issues and measures for creation of successful business

Looking at issues and measures for creation of successful business, the following approaches and system development items are established as premises that are in addition to those mentioned in business models (1) and (2).

- Introduction of a real-time management system between Palau and Papua New Guinea (or Japan)
 - The capability to provide multinational management that comprehends the collection and recycling of end-of-life vehicles in Palau and Papua New Guinea, inventories of scrap metal and other items, and market prices is desired from the standpoints of business supervision and efficiency in both countries.

9. Potential for collaboration with JICA

9-1 Collaboration in assisting the adoption of automobile recycling systems and other government-controlled systems

- Support for the introduction of automobile recycling laws through JICA-local government collaboration
 - The targeted countries lack know-how and experience in introducing automobile recycling systems as a means of dealing with scrap cars, whose numbers are growing each year. Thus, support implemented in collaboration with the JICA Senior Volunteers Program and other schemes to develop legal systems in a manner matched with personnel dispatches is expected to make a major contribution toward this end.
- Support for the planning, design, and introduction of automobile recycling systems (public corporations, etc.) through JICA-local government collaboration
 - Like the public waste disposal corporations that were set up in Palau and other countries, support for the study, organization, and establishment of implementation frameworks in collaboration with the JICA Senior Volunteers Program and other schemes is expected to help realize the above-mentioned automobile recycling laws.
 - In addition, support for technical transfer to and education of local staff to implement appropriate recycling processes will likely be needed following framework establishment.

9-2 Collaboration for the development of management systems through financial assistance

- Provision of facilities and capital support needed for recycling business through ODA
 - In the surveyed countries of Palau, Papua New Guinea, and Micronesia, used cars exported from Japan have a large market share. which may justify an idea of ODA through JICA because with attention to initial investment for facilities needed for the recycling of scrap cars, ODA support could be provided to build facilities and supply equipment free of charge through collaboration with JICA.
- Provision of equipment and capital support needed to operate and sustain recycling business through ODA
 - In the implementation and operation of scrap car recycling, ODA support to subsidize use of necessary land and provide recycling equipment (e.g., gas tanks needed for CFC treatment) will play an important role in terms of long-term business viability.

9-3 Collaboration in education and technical assistance

- Introduction of systems for environmental education and recycling education in collaboration

with JICA, local governments, and educational institutions

- Introduction of practical training in higher education (and particularly technical education), development of management-level human resources, and provision of employment opportunities remain issues to be resolved in each of the target countries.
 - ✧ It is hoped that support for the provision of environmental education programs and educational systems associated with scrap car recycling.

9-4. Potential collaboration with other support programs

- Support for cooperation among Pacific Ocean island countries by J-PRISM, etc.
 - Tackling this issue as a core theme in a JICA-led program can promote understanding and sharing of inter-island cooperative frameworks and successful examples. This will facilitate efforts to build more efficient cooperative frameworks.
 - Advancements in studies of more effective frameworks, waste disposal processes, and the sharing of knowledge and know-how will become possible through information-sharing and collaboration with the J-PRISM program, which is a project that promotes surveys on waste management.

10. Development effects and potential contribution for BOP

10-1. Job creation

Regarding job creation, the following target demographic groups and population numbers are assumed to be potential beneficiaries of government measures and policies that tackle issues concerning recycling of scrap cars (an issue all of the target countries are currently grappling with), political and economic trends, and industrial development as well as of business based on this survey.

Degree of contribution to job creation in the target countries (estimated)

	Palau	Papua New Guinea	Marshall Islands	Micronesia
Poverty situation	Almost none	Major issue in urban and outlying regions	Disparities exist (however, poverty does not lead to starvation, etc., due to the large-family tradition)	Disparities exist (however, poverty does not lead to starvation, etc., due to the large-family tradition)
Unemployment rate	4.1%	2.8%	30.9%	22.0%
Population (people)	20,472	6,732,000	61,963	111,000
Unemployed population (people)	839	188,496	19,147	24,420
Job creation needs	Insufficient job opportunities for middle and high school graduates (Palau Community College, etc.); drain of talented human resources to other countries	Job creation for the unemployed in urban areas; drain of talented human resources to other countries	Insufficient job opportunities in urban areas and for middle and high school graduates; drain of talented human resources to other countries	Insufficient job opportunities in urban areas and for young people and college graduates; drain of talented human resources to other countries
Benefitting demographic groups	Young people who have received middle and high school education	Unemployed people in urban areas	Unemployed people in urban areas; young people who have received middle and high school education	Unemployed people in urban areas; young people who have received middle and high school education
Generated job opportunities (No. of people)	Approx. 5 Management: 1 Workers: 4	Approx. 11 Management: 1 Workers: 10	Approx. 3 Management: 1 Workers: 2	Approx. 5 Management: 1 Workers: 4
Generated job opportunities (Annual salary [1,000 yen])	2,760	3,050	1,665	2,387

Source: Data of Itochu Enex Co., Ltd. and estimates

At the same time, in the interest of generating opportunities for more advanced employment in the recycling of scrap cars, opportunities to find work that makes use of possessed skills and experience

in the current vehicle recycling business could be provided to employed people.

Employees engaged in recycling of scrap cars in the target countries (estimated)

	Palau	Papua New Guinea	Marshall Islands	Micronesia
Vehicle recycling businesses (No. of companies)	4-6	4-8	1	4
Management (people)	4-10	4-12	1-2	4-6
Workers (people)	45-60	300-600	38	40-45

Sources: Data of Itochu Enex Co., Ltd. and estimates based on interviews

10-2. Provision of income opportunities

In addition to the regular employment discussed above, it is thought that income opportunities can be created for ordinary citizens (in particular, the impoverished classes and unemployed) through the collection of end-of-life vehicles. Although actual effects will depend on the circumstances in regions in which end-of-life vehicles are illegally dumped and regions in which automobile purchases are common, the purchasing of end-of-life vehicles by scrap car recycling businesses in response to requests for appropriate processing of such vehicles by ordinary citizens and consumers as well as contracted collection to processing sites could provide income opportunities for more members of the public.

Degree of contribution to creation of income opportunities in the target countries (estimated)

	Palau	Papua New Guinea	Marshall Islands	Micronesia
No. of end-of-life vehicles targeted by this business	311	1,132	46	484
Purchase price (USD)	10	20	10	10
No. of purchases (target)	311	1,132	46	484
Contracted collection charges (USD)	10	30	10	10
No. of contracted collections (target)	155	566	23	242
Total No. of beneficiaries of created income opportunities	466	1,698	68	725
Amount of created income opportunities (USD)	4,662	39,613	683	7,253

Source: Data of Itochu Enex Co., Ltd. and estimates

The topic of reuse products is not included in the initial scope of business modeling. However, the production of reuse products with materials from end-of-life vehicles by local citizens (in particular the impoverished classes and unemployed) is possible and can be expected to create new income opportunities.

10-3. Provision of recycling technologies and expertise

In the targeted countries, support (and the effects of such support) implemented in collaboration with the JICA Senior Volunteers Program and other schemes to develop legal systems in a manner matched with personnel dispatches is expected to make a major contribution toward study and introduction of automobile recycling laws in partnership with local governments. Moreover, given the need for programs providing education on the environment and recycling as progress is made toward legal system development, it can be expected that support for the provision of education and technologies from Japan, a country with a strong track record in these areas, will make a significant contribution to environmental education programs and education systems pertaining to scrap car recycling.

Creation of opportunities to provide recycling technologies and expertise in the target countries (estimated)

	Specific description
Establishment of a recycling system	♦ Survey of recycling systems in developed countries ♦ Planning and study of implementation systems in the target countries ♦ Consensus-building toward system execution ♦ Study and formulation of operational processes and organizational frameworks for system realization
Execution and operation of a recycling system	♦ Collection and management of a recycling tax ♦ Evaluation and selection of business entities and distribution of recycling fees ♦ Survey and management of work quality at targeted business entities ♦ Provision of information to and communication with recycling business entities
Education for and diffusion of an appropriate recycling system	♦ Preparation and provision of education and on-the-job training for workers engaged in management and operation of the appropriate recycling system ♦ Preparation and provision of education programs at vocational schools, etc. ♦ Provision and upgrade of education programs
Diffusion and education concerning environmental protection	♦ Preparation and provision of programs concerning government schemes and systems for reducing environmental burden, including an appropriate recycling system ♦ Provision and upgrade of education programs

Source: Data of Itochu Enex Co., Ltd. and estimates

10-4. Effects on promotion of tourism industry

With a decrease in automobiles and diffusion of appropriate waste disposal, including scrap car processing, improved processing methods and reduced landfill waste volume in Palau's M-Dock can be expected. At the same time, environmental burden on the surrounding region and ocean will be lowered by steps to prevent sewage discharge and improve odors.

All of the target countries are blessed with some of the world's pre-eminent natural environments, and these environments attract many tourists and divers from Japan and other countries. Thus, it can be expected that such this business will have a long-term effect in terms of future expansion of the tourism industry.

For example, the number of foreign tourists that visited Palau in 2012 reached 118,754. Most of these tourists came from Japan, Taiwan, the United States, Canada, Guam, and the Philippines. Tourism is an important industry in Palau. The positive environmental protection effects that the business will generate will contribute to this industry's development and produce beneficiaries through further job creation.

The target countries are places where tourists can enjoy beautiful natural settings and diverse marine life, and their scuba diving points and other tourist spots attract numerous divers each year. Protecting these valuable tourist resources will likely lead to development of tourism infrastructure (such as hotels, airports, and roads) and, further, tourism development to meet diverse small-scale tourism demand in Europe, the United States, and Asia.

10-5. Improvement of social and economic standards

The implementation of appropriate processing of end-of-life vehicles and scrap tires in the target countries will also contribute to long-term improvement in living standards for their populations. This is because, among other effects, it will help prevent the spread of dengue fever and malaria by mosquitoes that reproduce in abandoned scrap tires as well as fires from scrap tires. Moreover, the establishment of laws and introduction of educational systems that were described above should help improve knowledge and awareness of waste disposal problems and environmental measures among all target country citizens. It is thought that ripple effects from these steps could reach beyond the recycling of scrap cars to include recycling from other products (e.g., empty cans, PET plastic bottles, home electronics, etc.) based on nationwide awareness of waste disposal and education on environmental protection and recycling in middle and high schools.