



Transforming Waste into Value

Investment Opportunities and Strategic Approaches in the
Pacific Island Countries Waste Management Sector

2024



Acknowledgments

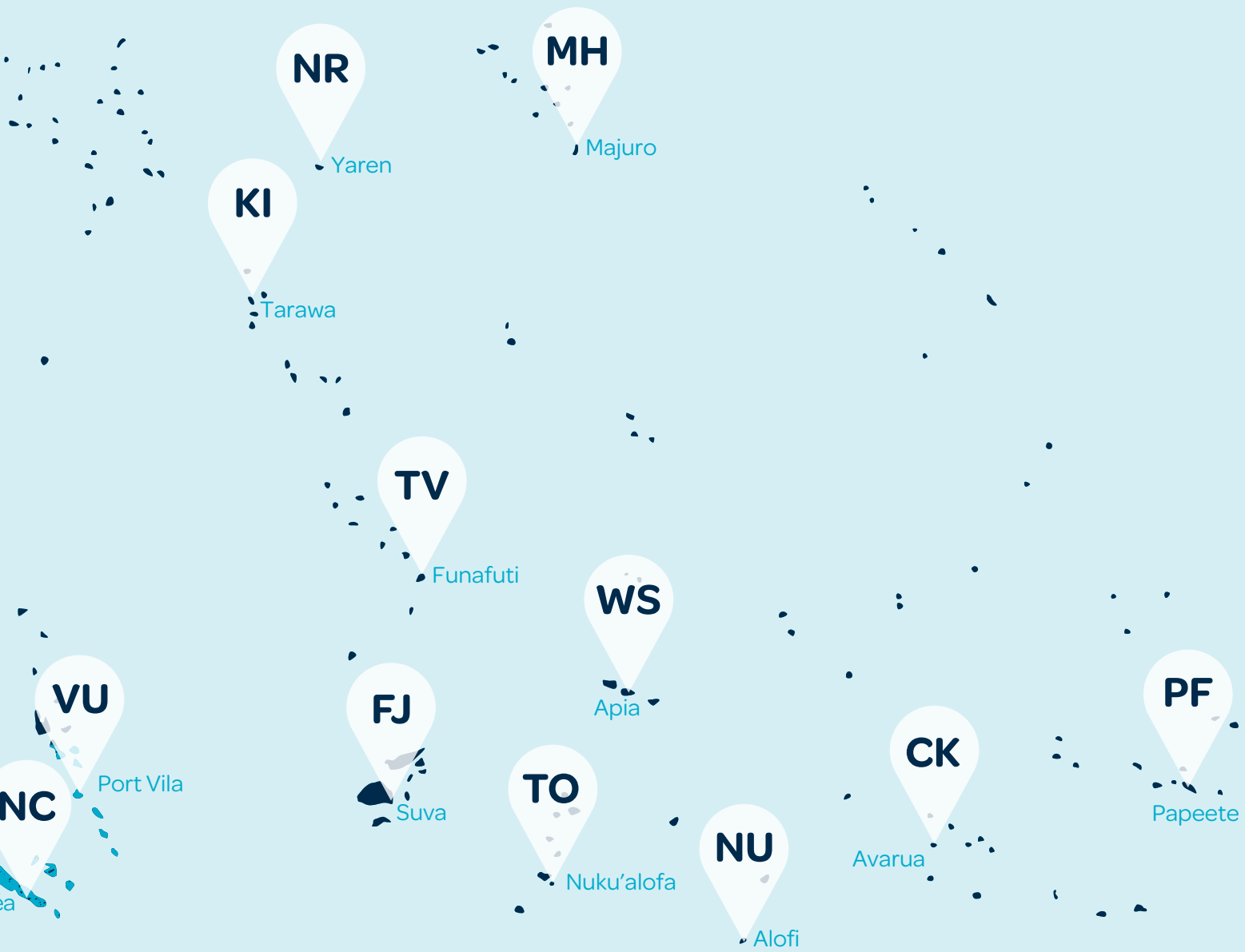
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Map of the 16 Pacific Island Countries (PICs), Australia, and New Zealand

AU	Australia	NZ	New Zealand
CK	Cook Islands	PF	French Polynesia
FJ	The Republic of Fiji	PG	The Independent State of Papua New Guinea
FM	The Federated States of Micronesia	PW	The Republic of Palau
KI	The Republic of Kiribati	SB	Solomon Islands
MH	The Republic of the Marshall Islands	TO	The Kingdom of Tonga
NC	New Caledonia	TV	Tuvalu
NR	The Republic of Nauru	VU	The Republic of Vanuatu
NU	Niue	WS	The Independent State of Samoa



1. Executive Summary

This study provides a comprehensive overview of the waste management landscape across Pacific Island Countries (PICs), highlighting the unique challenges these nations face due to their geographic isolation, economic constraints, and environmental vulnerabilities. Waste management practices vary significantly across the region, with considerable disparities between urban and rural areas, and between larger, more developed nations and smaller, more isolated islands.

Key Challenges in Waste Management:



Geographic Dispersion & Isolation:

The vast, scattered nature of the islands makes logistics difficult and increases transportation costs for waste disposal and recycling. Remote islands struggle with high operational costs and limited access to recycling facilities.



Organic Waste & Agricultural Waste Management:

While organic waste forms a major portion of waste in rural areas, urban regions face difficulties in implementing formal composting systems. The region is exploring anaerobic digestion and composting, but investment and infrastructure remain limited.



Infrastructure and Resource

Limitations: Many PICs rely on open dumps and lack basic environmental safeguards. The limited infrastructure and technical expertise impede the development of modern waste management solutions, with significant environmental and health risks.



Hazardous Waste & E-Waste

Management: E-waste is increasingly problematic, with improper disposal methods, such as burning, releasing harmful toxins into the environment. Few PICs have formal e-waste recycling programs. Similarly, medical waste management is inadequate in remote areas, posing significant health risks.



Municipal Solid Waste (MSW)

Management: Waste collection systems are often underdeveloped, particularly in rural and outer islands. Larger nations like Fiji have formal systems in urban areas, but smaller nations face irregular collection and reliance on unsustainable disposal methods, such as ocean dumping and open burning.



Marine and Coastal Waste

Management: Plastic pollution is a growing concern, exacerbated by poor waste management and the region's proximity to the ocean. While countries like Vanuatu and Palau have introduced plastic bans, enforcement remains a challenge. Marine litter management is hindered by limited regional coordination and infrastructure.

Beyond specific investments relevant to each of the PIC's needs, the study explores best practices for structuring financial models in the waste management sector, highlighting strategies for attracting investment and fostering sustainability. These approaches include:

Blended Finance: Combining concessional finance (e.g., grants, low-interest loans) with private capital to reduce investment risks and attract diverse funding sources. This approach aligns with sustainable development objectives by making projects more attractive to private investors while ensuring environmental and social goals are met.

Equity Investments: Encouraging private equity participation helps align investor interests with long-term project success. It fosters ownership, balances risk, and ensures that investors are committed to sustainability.

Public-Private Partnerships (PPPs): In areas where governments lack the capital or expertise for large-scale infrastructure, PPPs combine public oversight with private sector efficiency, ensuring effective resource sharing, risk management, and innovation. The Build-Operate-Transfer (BOT) model is also a viable option, facilitating private investment in infrastructure development while ensuring long-term public control.

Risk Sharing and Mitigation: To attract private investment, financial instruments like guarantees, insurance, and performance-based incentives can mitigate risks such as delays, cost overruns, or operational shortfalls, making projects more attractive to backers.

Sustainable Financial Models: Emphasizing revenue diversification (e.g., energy sales, recycling) and life cycle cost analysis can enhance financial resilience and ensure long-term sustainability. These models reduce reliance on single revenue streams and provide a clearer financial outlook for investors.



Policy and Regulatory Support: A stable, transparent policy environment is crucial to reducing uncertainty and encouraging investment. Governments should implement clear regulatory processes, incentive structures, and reforms to streamline project execution.

Recommendations for Structuring Investment: Structuring multi-tiered investments that balance risk and reward, utilizing blended finance to absorb high-risk elements, and ensuring local capacity building and technology transfer are essential for long-term success. Public-private collaboration and transparent governance are key to fostering sustainable waste management solutions.

The study emphasizes the potential for waste management investments in PICs to generate both financial returns and environmental benefits. The sector faces challenges such as geographic isolation and limited resources but offers substantial opportunities for impact investors, the Pacific diaspora, and traditional capital sources. Strategic investments in recycling, waste-to-energy, and organic waste management can transform the sector into a driver of sustainable growth, environmental resilience, and improved community well-being.

Government support, blended finance mechanisms, and policy incentives play a vital role in de-risking investments and making the waste management sector in the Pacific Islands an attractive, sustainable, and profitable opportunity. By leveraging these resources, PICs can address urgent waste management needs while promoting economic development and sustainability.

In conclusion, Pacific Island Countries face a complex and varied waste management landscape shaped by geographical, economic, and infrastructural constraints. While some of the larger nations have made notable advances in developing formal waste management systems, smaller nations struggle with basic waste disposal and recycling infrastructure. Regional cooperation, along with investments in sustainable waste solutions, is critical to improving waste management across the Pacific Islands. Efforts must focus on enhancing infrastructure, promoting recycling, and developing locally adapted solutions to address both organic and hazardous waste challenges.

2. Context and Purpose of the Study

The study aims to provide a comprehensive overview of the investment landscape for waste management in Pacific Island Countries (PICs), aimed at equipping investors with critical insights to navigate and capitalize on emerging opportunities in this sector. The study addresses the unique challenges faced by PICs, such as geographic isolation, limited infrastructure, and high costs, which complicate effective waste management. It also emphasizes how these challenges can be reframed as investment opportunities that contribute to sustainable economic development.

Key sections of the study outline the current state of waste management in PICs, the drivers of waste generation, and the role of public and private sectors. The analysis includes potential investment opportunities such as recycling, waste-to-energy projects, and public-private partnerships (PPPs) that leverage global best practices and innovative technologies to address local constraints. Additionally, it presents various financial models—including blended finance and climate finance—that can be tailored to small island economies, helping to unlock the capital required to develop sustainable waste management infrastructure.

The study also provides a detailed risk assessment, covering areas like regulatory challenges, political instability, and financial constraints, and offers strategic recommendations for risk mitigation. By implementing these strategies, investors can achieve a balanced risk-return profile while contributing to the region's

environmental sustainability and long-term economic growth.

The study was developed through in-depth research and consultations with stakeholders in all the geographies covered. This included online conversations and on-the-ground presence in Solomon Islands and Vanuatu. Further consultations were held on the margins of the Clean Pacific Round Table hosted in Tuvalu in August 2024, as well as the Climate Week held in New York City in September 2024.

Ultimately, this study aims to serve as a roadmap for investors looking to make impactful and profitable investments in the waste management sector of PICs. With the right strategic approach, waste management in the Pacific can transition from a liability to a lucrative asset class, positioning PICs as leaders in sustainable development within the global investment community. The study is designed to serve as a valuable resource for project development, partnership formation, and deal structuring within the waste management sector in PICs.

The study seeks to:

- » Identify and analyze the unique waste management challenges in PICs, such as geographic dispersion, limited infrastructure, and the impacts of rapid urbanization and economic development.
- » Present an overview of current waste management practices, waste generation patterns, and the roles of key stakeholders across the region.

- » Highlight investment opportunities and development prospects within the sector, including recycling, waste-to-energy projects, integrated waste management systems, and innovative financial models.
- » Assess financial, legal, and operational risks associated with waste management investments in PICs and propose strategies for effective risk mitigation and enhanced investment returns.
- » Introduce innovative financing models, such as blended finance, public-private partnerships, and climate finance, tailored to the unique context of PICs.
- » Provide strategic recommendations for local, regional, and international investors, policymakers, and development partners to foster sustainable waste management solutions and advance the Sustainable Development Goals (SDGs) in the region.

By offering this assessment of the waste management landscape and investment potential in PICs, this study is intended to guide investors in making strategic, impactful, and sustainable investments that contribute to the long-term development of the region.

3. Structure of the Study

The study is structured into four main parts, each designed to provide a comprehensive understanding of the waste management landscape in Pacific Island Countries, as well as to outline investment opportunities and strategic recommendations. Each part builds upon the previous one, enabling readers to gain insights from contextual analysis to specific investment strategies and policy recommendations. Below is a detailed overview of each part:

Part 1: Context and Analysis

This section provides an in-depth review of the current waste management practices and challenges faced by PICs. It includes a thorough examination of general waste management issues such as geographic isolation, resource limitations, and the diverse economic and environmental conditions affecting waste management in the region. It also delves into specific types of waste—such as municipal solid waste, organic waste, hazardous waste, and marine waste—highlighting unique constraints and opportunities for each category. This part concludes with an analysis of regional variations and a detailed look at waste generation patterns, exploring the drivers behind waste generation and the impact of factors such as urbanization, population growth, and economic development.

Part 2: Investment Opportunities and Financial Models

This section focuses on identifying and evaluating the investment potential within the waste management sector in PICs. It examines various market-driven opportunities, such as recycling and resource recovery, waste-to-energy projects, and integrated waste management systems. The section also explores the potential of public-private partnerships (PPPs) to address funding gaps and strengthen waste management infrastructure. Additionally, it introduces innovative technical solutions and global best practices that can be adapted to the Pacific context. The part concludes with an overview of financing models tailored to the small island economies of PICs, including blended finance, climate finance, and community-based funding approaches.

Part 3: Risk Assessment and Strategic Recommendations

This part addresses the key risks and barriers that hinder investment in the waste management sector in PICs, such as financial constraints, political and economic instability, and corruption. It provides a detailed risk assessment framework to help investors and stakeholders understand the challenges and develop risk mitigation strategies. The strategic recommendations presented here focus on designing resilient waste management systems, promoting policy and regulatory reforms, and leveraging financial tools to reduce investment risks. The section also explores how improved waste management systems contribute to achieving the Sustainable Development Goals (SDGs), particularly in areas such as poverty alleviation, health and well-being, clean water and sanitation, and sustainable economic growth.

Part 4: Investor Perspectives and Concluding Remarks

This final part captures insights from investors with experience in the Pacific waste management sector. It includes discussions on market potential, regulatory environments, operational challenges, and the role of local partnerships in driving sustainable investments. Investor perspectives on technology and innovation, financing, and returns provide valuable guidance for new entrants to the sector. The section also offers lessons learned from previous investments and advice for navigating the unique landscape of the Pacific islands. The study concludes with a summary of key findings and recommendations for moving forward, emphasizing the potential impact of improved waste management systems on overall sustainability and the achievement of development goals in PICs.

4. Overview of Current Waste Management Practices in Pacific Island Countries

The waste management landscape in Pacific Island Countries is shaped by unique geographic, economic, and environmental conditions. The region's remoteness, susceptibility to natural disasters, and limited land availability present significant challenges to the effective management of waste. Moreover, the diversity in economic development, population distribution, and infrastructure creates varied waste management practices across the Pacific Islands.

General Waste Management Challenges in PICs

Geographic Dispersion and Isolation

The Pacific Islands' geographical isolation and scattered nature across a vast ocean make logistics and coordination complex. Waste management in remote islands often faces high transportation costs, especially in transferring waste between islands. Small land masses limit the available space for landfills, and the remote location restricts access to regional recycling facilities and waste processing plants.¹

Infrastructure and Resource Limitations

Infrastructure limitations across PICs significantly impact waste management. Many countries still rely on open dumps, which lack basic environmental protections such as leachate control and gas capture systems. For example, Vanuatu's Bouffa Landfill and many other dump sites in smaller islands pose major health and environmental risks. Additionally, recycling facilities and hazardous waste treatment centers are sparse, and

limited technical expertise hampers the introduction of modern waste management solutions.²

Municipal Solid Waste (MSW) Management in PICs

Collection Systems

Waste collection systems vary significantly between urban and rural areas in PIC. Larger countries like Fiji and Papua New Guinea have formal municipal waste collection systems in urban centers, managed by local governments or contracted private companies. However, in rural and outer island areas, collection systems are irregular or non-existent. These regions face additional challenges due to a lack of funding, infrastructure, and logistical support, leading to issues such as illegal dumping and open burning of waste.³

Example: In Vanuatu, waste collection in Port Vila relies on the sale of designated waste bags, which fund collection services.⁴ However, this system often breaks down due to inadequate funds, leading to incomplete coverage and waste buildup, particularly in peri-urban areas.

Transportation Challenges

Transportation of waste in PICs is expensive and inefficient due to the fragmented geography. Waste often needs to be transported over long distances, sometimes by boat, which significantly increases operational costs. This is further exacerbated by the lack of waste collection vehicles and unreliable fuel supply.

Example: In Kiribati and Tuvalu, waste often accumulates due to logistical barriers, and local governments struggle to transport waste to centralized disposal facilities. This leads to the overreliance on unsustainable waste disposal methods such as dumping in the ocean or burning.

Disposal Practices

Landfilling remains the most common waste disposal method in PICs, though many sites lack environmental safeguards. Open dumps are prevalent, particularly in smaller nations like Kiribati and Tuvalu, where the absence of landfill liners, leachate management, and gas collection contributes to environmental pollution. Example: Fiji's Naboro Landfill stands as a rare example of a sanitary landfill in the region, incorporating methane capture and leachate management systems. This contrasts with the open dumps used in most PICs, where inadequate management leads to severe environmental degradation and health risks.

Recycling Efforts

Recycling in PICs is generally limited to informal efforts. While some urban areas have recycling programs, they are small-scale and face logistical challenges, including the high cost of exporting recyclables and the lack of local recycling markets. Additionally, the absence of incentives like Container Deposit Schemes (CDS) limits recovery efforts across the region.

Example: In Samoa, the implementation of a CDS has helped increase the collection of beverage containers

for recycling. However, in countries like Papua New Guinea and Vanuatu, recycling efforts remain primarily informal and are driven by private sector initiatives rather than comprehensive national strategies.⁵

Organic Waste Management

Composting Practices

Organic waste forms a large portion of the waste stream in PICs, reflecting the region's agrarian economies. While composting practices are common in rural areas, where traditional methods are used to process organic waste, urban areas struggle with proper organic waste management due to the lack of formal systems.

Example: Fiji has initiated programs to develop large-scale composting in urban areas like Suva and Lautoka, mostly supported by the Japanese cooperation under the JPRISM program, but rural areas still rely on traditional composting methods. In Tonga, JPRISM promoted community-led composting efforts that have begun to show promise addressing organic waste at the local level.⁶

Agricultural Waste Management

Agricultural waste, such as crop residues and animal manure, is often left to decompose in fields or burned, contributing to greenhouse gas emissions. There is growing interest in using anaerobic digestion technology to convert this waste into biogas, but investment remains limited.

Example: In Samoa, small-scale anaerobic digestion projects are under

consideration as a sustainable solution for managing agricultural waste while generating energy. However, the infrastructure and technical expertise needed for widespread adoption are still lacking across the region.

Hazardous Waste Management

E-Waste Management

The growing prevalence of e-waste in PICs, driven by increasing access to electronic devices, poses a significant challenge. E-waste is often improperly dismantled or burned, releasing toxic substances into the environment. Few countries in the region have formal e-waste recycling facilities.⁷

Example: In Fiji and Papua New Guinea, limited pilot programs have been introduced to tackle e-waste collection and recycling, but the absence of a regional e-waste management strategy hampers progress. Most e-waste is still exported for recycling, increasing costs.

Medical Waste Management

Medical waste management is inadequate in many PICs, particularly in remote and outer islands. Hospitals and clinics often lack the infrastructure to safely handle infectious and hazardous waste, leading to unsafe disposal methods like open burning or dumping in landfills.

Example: Vanuatu and Solomon Islands face ongoing challenges in managing medical waste, particularly sharps and infectious materials. Regional programs, including those supported by the World Health Organization (WHO), are helping to improve medical waste

management, but gaps remain in rural areas.⁸

Marine and Coastal Waste Management

Plastic Pollution

Plastic pollution in the marine environment is a major issue across PICs. Single-use plastics, such as bags, bottles, and packaging, frequently enter the ocean, exacerbated by poor waste management practices and ocean currents bringing marine debris from other regions.

Example: Vanuatu and Palau have implemented bans on single-use plastics, becoming leaders in tackling plastic pollution in the region. However, enforcement remains a challenge, and plastic waste continues to accumulate in coastal areas, threatening marine ecosystems and tourism.

Marine Litter Management

Efforts to address marine litter in PICs range from community-led beach clean-ups to national policies banning specific types of plastic products. However, these efforts are often undermined by a lack of infrastructure and regional coordination to tackle marine debris that crosses international waters.⁹

Example: Fiji, through partnerships with the United Nations, has initiated programs to reduce marine litter, but limited funding and infrastructure hamper large-scale efforts. Regional cooperation remains key in addressing marine debris effectively.¹⁰

5. Regional Variations in Waste Management Practices

General Overview of Regional Variations in Waste Management Practices

Waste management practices across Pacific Island Countries are shaped by a range of factors, including geographic isolation, population size, economic development, and local environmental conditions. These variations create unique challenges and opportunities in different countries. While larger, more economically developed nations like Fiji have made significant progress in developing formal waste management systems, smaller, more isolated islands such as Kiribati and Tuvalu continue to rely heavily on informal and traditional waste disposal methods. Below is a closer look at how waste management practices vary across the region.¹¹

Fiji: A Regional Leader in Waste Management

As one of the most developed PICs, Fiji has established relatively advanced waste management systems compared to its neighbors. Urban centers like Suva and Nadi have formal waste collection services, and the government has implemented a National Solid Waste Management Strategy, which aims to reduce waste, encourage recycling, and improve disposal methods. Fiji has successfully adopted policies to phase out single-use plastics and promote plastic recycling, supported by international development assistance.¹²

Fiji is also home to one of the region's few sanitary landfills, the Naboro Landfill, which adheres to environmental standards by incorporating waste segregation,

leachate collection, and methane capture. The landfill serves as a model for other PICs and helps to minimize environmental impacts. Recycling initiatives are growing, particularly for plastic and metal waste, but face logistical challenges in rural areas. Fiji's efforts to introduce waste-to-energy solutions are also underway, reflecting the country's commitment to sustainable waste management.¹³

Vanuatu: Struggling with Urban and Rural Disparities

Vanuatu illustrates the disparity in waste management between urban and rural areas that is common in PICs. In Port Vila, the capital, waste collection is managed by the local government, which sells designated waste disposal bags that fund the collection process. However, the country faces significant challenges due to limited resources, poor infrastructure, and underfunded services, leading to inefficiencies in waste collection, particularly in peri-urban and rural areas. Vanuatu's waste disposal mainly relies on open dumps, such as the Bouffa Landfill, which lacks comprehensive environmental controls.¹⁴

Additionally, the reliance on imported goods, particularly plastic packaging, has exacerbated the waste management crisis in Vanuatu. A ban on single-use plastics was implemented in 2018, making Vanuatu one of the first PICs to take such measures. While this policy has made progress in reducing plastic waste, enforcement challenges remain, especially in more remote islands. Informal recycling efforts, driven by private initiatives, are gaining traction

but still operate at a relatively small scale.¹⁵

Papua New Guinea: A Complex Waste Landscape

Papua New Guinea (PNG), the largest and most populous of the Pacific Island nations, has a highly varied waste management landscape, with significant differences between urban and rural areas. In urban centers like Port Moresby and Lae, formal waste collection services exist, but these are often limited by financial constraints, irregular collection schedules, and insufficient infrastructure. Open dumps are the predominant form of waste disposal, and illegal dumping is a persistent issue due to the lack of enforcement of environmental regulations.¹⁶

Rural areas, where a significant portion of the population lives, face even greater challenges. Waste is often disposed of through burning or dumping in rivers, which leads to widespread environmental degradation and water contamination. PNG's waste management infrastructure is underdeveloped, with limited recycling facilities and no modern sanitary landfills. However, the government has started to focus on developing sustainable waste solutions, including exploring the potential for waste-to-energy projects and expanding recycling programs in urban areas.¹⁷

Samoa: Progress Amid Constraints

Samoa has made notable progress in waste management, particularly in urban areas like Apia, where waste collection services are relatively

efficient. The Tafaigata Landfill serves as the main disposal site, but it faces capacity issues and environmental concerns due to the lack of proper leachate management systems. To address these issues, the Samoan government has introduced several initiatives, including a National Waste Management Policy, which focuses on reducing waste generation, increasing recycling, and improving landfill management.¹⁸

Samoa has also implemented a Container Deposit Scheme (CDS), which has increased the collection and recycling of beverage containers, showing that financial incentives can effectively boost recycling rates. However, rural areas still struggle with limited waste collection services, and many residents resort to traditional methods such as burning waste or dumping it in nearby water bodies.¹⁹

Kiribati and Tuvalu: Informal Waste Management in Isolated Nations

The small island nations of Kiribati and Tuvalu face some of the most

severe waste management challenges in the Pacific due to their geographic isolation, limited land area, and lack of infrastructure. Both countries rely heavily on informal waste disposal methods, such as open burning and unregulated dumps. In Tarawa, the capital of Kiribati, there are some formal waste collection services, but these are limited by financial and logistical constraints. As a result, much of the waste generated by the population ends up in open dumps or in the ocean, contributing to severe environmental degradation.²⁰

Recycling is virtually non-existent in these countries due to the high cost of shipping recyclables to other markets. Waste from imported goods, particularly plastic and electronic waste, poses an increasing problem, with little capacity to manage these waste streams. The remoteness of these islands also limits access to international assistance, making it difficult to develop and maintain effective waste management systems. However, small-scale community-led initiatives are emerging, particularly in composting organic waste, as

these countries seek locally adapted solutions.²¹

Tonga: Emerging Waste Management Solutions

Tonga is taking steps towards improving waste management through international partnerships and the implementation of new strategies. The country's Tapuhia Landfill is a modern facility serving Nuku'alofa and surrounding areas, with some capacity for leachate management and waste segregation. Recycling efforts are also increasing, particularly for plastic waste, driven by the introduction of community-led recycling programs supported by international aid.²²

Tonga has recognized the importance of reducing waste generation and increasing recycling rates, with recent government policies encouraging waste reduction at the source. However, waste collection in rural and remote areas remains a challenge, with limited access to formal services leading to the continued use of informal disposal methods.²³



6. Analysis of Waste Generation Patterns in PICs

Waste Composition and Trends

Municipal Solid Waste Composition

Waste composition in the Pacific follows similar trends to most other regions. Organic waste accounts for the largest share, although it is often used as animal feed in rural areas and poses a larger issue in urban areas with lower livestock rates. Green waste is often burned, creating air quality issues. Low collection and recycling rates increase the risk of plastic entering the environment. Global efforts to reduce plastic pollution highlight the need to reduce plastic consumption and increase recovery rates.²⁴

Organic Waste

Organic waste, including food scraps, yard trimmings, and agricultural residues, typically constitutes the largest portion of the municipal solid waste (MSW) stream in PICs. This reflects the region's agrarian-based economies and traditional diets, which generate significant amounts of biodegradable waste. In urban areas, the lack of source separation practices often leads to the mixing of organic waste with other types of waste, complicating efforts to compost or otherwise process it sustainably.²⁵

Plastics

The proportion of plastics in the waste stream has been increasing steadily in PICs, driven by the widespread use of single-use plastic products and packaging. This trend is exacerbated by the importation of consumer goods, which often come in plastic packaging. The low recycling rates and lack of

facilities for processing plastic waste mean that much of this plastic ends up in landfills or the ocean, contributing to the growing problem of marine plastic pollution.²⁶

Paper and Cardboard

Paper and cardboard waste is also a significant component of the MSW stream, particularly in urban areas and in commercial sectors. While some recycling of paper and cardboard occurs, particularly in larger PICs, the overall recycling rate remains low, and much of this material is landfilled or burned.²⁷

Glass and Metals

Glass and metal waste, such as beverage containers and food cans, are less common but still present in the waste stream. These materials are often collected by informal recyclers and exported for recycling, but the lack of consistent collection and processing infrastructure limits the effectiveness of these efforts.

E-Waste and Hazardous Materials

E-waste, though still a smaller portion of the overall waste stream, is growing rapidly due to increasing access to electronic devices in the region. Hazardous materials, including batteries, paints, and chemicals, are also present in the waste stream, posing significant environmental and health risks if not properly managed.²⁸

Waste Generation Rates

Urban vs. Rural

Waste generation rates in PICs tend to be significantly higher in urban areas compared to rural areas. Urban centers, with their higher population densities and more developed commercial activities, generate larger quantities of waste, including higher proportions of non-biodegradable materials. In contrast, rural areas, which often rely more on subsistence farming and have lower levels of consumption, generate less waste overall, though the waste management practices in these areas are often informal and environmentally harmful.²⁹

Seasonal Variations

In many PICs, waste generation rates fluctuate seasonally, particularly in areas heavily reliant on tourism. During peak tourist seasons, the influx of visitors leads to a sharp increase in waste generation, particularly of single-use plastics, food waste, and packaging materials. This seasonal variation can strain waste management systems that are already under-resourced and struggling to cope with the baseline level of waste generation.

Drivers of Waste Generation

Population Growth

The population of PICs is growing rapidly, particularly in urban centers, where migration from rural areas is common. This population growth is a major driver of increased waste generation, as more people living in

closer proximity leads to higher overall consumption and waste production.

Urbanization

The trend towards urbanization in PICs is accelerating, with more people moving to cities in search of better economic opportunities and services. This urbanization leads to increased consumption of packaged goods and other products that generate waste, as well as greater pressure on existing waste management infrastructure.³⁰

Economic Development

Economic development in Pacific Island Countries, while bringing numerous benefits, has also led to a substantial increase in waste generation, particularly non-biodegradable waste. This increase is closely tied to rising incomes, expanded retail markets, urbanization, and industrial growth.³¹

Rising Incomes and Increased Purchasing Power

Economic development in PICs has led to higher income levels, enabling households to purchase a wider range of goods than before. With more disposable income, consumers

are increasingly buying processed and packaged products, many of which come with non-biodegradable packaging. This shift from traditional, locally sourced products to imported goods significantly contributes to the volume of waste, as these products are often wrapped in plastics, metals, and other materials that are not easily decomposable.³²

Expansion of Retail and Consumer Markets

The economic growth in PICs has also led to the expansion of retail markets, including supermarkets and other retail outlets. This expansion increases the availability and variety of consumer goods, particularly those that are imported and heavily packaged. The growth in retail encourages consumerism, as more products are available to more people, leading to a direct increase in waste generation. This is particularly noticeable in urban areas where access to such goods is more prevalent.³³

Urbanization and Shifts in Consumption Patterns

As economic development drives urbanization across PICs, there is a corresponding shift in lifestyle and consumption patterns. Urban

residents, who typically have higher incomes and less time, tend to prefer convenience-oriented products, which are often processed and packaged for easy use. This trend towards convenience results in higher consumption of single-use products, significantly increasing the amount of non-biodegradable waste. Urban areas, therefore, become hotspots for waste accumulation, challenging the waste management infrastructure that may not be adequately developed to handle the increased load.

Industrial Growth and Increased Product Availability

Economic progress in PICs is also marked by the growth of industrial activities, including manufacturing and importation of goods. This industrial growth results in greater product availability, offering consumers more choices, many of which are packaged in non-biodegradable materials. The increased importation of goods, driven by better trade links and higher consumer demand, leads to more waste, both from the products themselves and their packaging. Additionally, industrial processes generate waste that further adds to the burden on local waste management systems.³⁴



7. Investment and Development Prospects for Waste Management in the Pacific Islands

Market-Driven Opportunities

The Pacific Island Countries are facing mounting challenges in waste management due to increasing waste generation, limited landmass, and underdeveloped infrastructure. These challenges, combined with growing environmental concerns, create a fertile landscape for innovative and market-driven investment opportunities. Key areas include recycling, waste-to-energy (WtE) projects, integrated systems, public-private partnerships (PPPs), technological advancements, and behavioral change initiatives.³⁵

Recycling and Resource Recovery

Recycling in PICs remains underdeveloped, yet the demand for investment is growing. Countries such as Fiji, Vanuatu, and Samoa have initiated small-scale recycling programs targeting materials like PET bottles and aluminum. Local entrepreneurs in these countries are spearheading collection and export initiatives, shipping recyclables to larger markets like Australia and New Zealand.³⁶

In smaller nations such as Tuvalu, Kiribati, and Nauru, recycling remains informal, with a lack of structured systems. Establishing Material Recovery Facilities (MRFs) in locations like Niue and the Cook Islands can formalize these efforts, reduce landfill dependency, and address environmental concerns. These

facilities can also support upcycling ventures, turning plastic waste into construction materials or consumer goods. For example, a business model leveraging 3D printing technology for building materials can integrate circular economy principles, ensuring both economic and environmental benefits.

Investors might also consider initiatives like incentivized recycling schemes—offering payments for recyclables—or partnerships with global brands committed to extended producer responsibility (EPR), such as Coca-Cola's PET recycling initiatives in the region.

Waste-to-Energy Projects

WtE technologies present a dual benefit for PICs: sustainable waste

management and renewable energy production. These solutions are particularly attractive in countries like Fiji, where landfill capacity is nearing exhaustion, and energy costs are among the highest globally. Biogas systems, like those under consideration in Fiji, convert organic waste into clean energy while also producing bio-fertilizers.³⁷

In Papua New Guinea and Tonga, discussions about building incineration plants highlight opportunities for larger-scale projects. These systems can process municipal solid waste and convert it into electricity or heat, offsetting the reliance on imported fossil fuels.

Smaller nations, such as the Cook Islands and Palau, can benefit from



modular WtE systems designed for their lower waste volumes. These systems offer scalability, enabling islands to adapt their capacity as waste streams fluctuate. Coupled with carbon credit schemes or green energy subsidies, WtE projects offer promising returns on investment for forward-thinking financiers.

Integrated and Fragmented Waste Management Systems

Integrated systems represent a transformative approach to waste management, covering the entire waste lifecycle—from collection and sorting to processing, recycling, composting, and disposal. This comprehensive methodology ensures the minimization of waste sent to landfills, maximizes resource recovery, and reduces environmental impacts.

Integrated systems provide a blueprint for sustainable waste management in the Pacific. By addressing collection inefficiencies, prioritizing material recovery, and modernizing disposal practices, these systems ensure a circular economy approach. Such investments not only improve environmental outcomes but also create economic opportunities through job creation and resource optimization.

The success of integrated waste management depends on collaboration across sectors, sustained investments, and community engagement, ensuring that solutions are both practical and inclusive.

However, waste systems across the region are often fragmented, characterized by inconsistent collection services, inadequate infrastructure, and a lack of integration across various stages of waste management.

Many islands rely on informal or community-led initiatives to manage waste, leading to inefficiencies and gaps. For instance, urban areas might benefit from semi-organized collection services, while rural and

remote communities are often left to dispose of waste through open burning or dumping. Additionally, small populations and dispersed settlements make it financially challenging to establish centralized waste processing facilities.

Despite these challenges, fragmented systems also offer opportunities for targeted investments. Addressing specific gaps, such as waste collection in underserved areas or creating small-scale recycling hubs, can drive meaningful improvements. Moreover, integrating innovative technologies and forming public-private partnerships (PPPs) can help transform fragmented systems into more cohesive and sustainable solutions.

For example, the fragmented waste services in Samoa, the Solomon Islands, and Palau highlight significant opportunities for investment. Public-private partnerships can streamline these systems by combining government oversight with private sector efficiency. For example, integrating advanced waste management technologies like pyrolysis (for plastic waste) or anaerobic digestion (for organic waste) into municipal systems can significantly improve outcomes.

A shift toward holistic waste management is essential for PICs to safeguard their fragile ecosystems, minimize environmental degradation, and promote public health. Investing in coordinated and inclusive systems is a key step toward achieving these outcomes.

Public-Private Partnerships (PPPs)

PPPs are emerging as a key mechanism for funding and operating waste infrastructure in the Pacific. Countries like PNG are already exploring private-sector involvement in urban waste collection and recycling services. Solomon Islands, Micronesia, and Marshall Islands are also considering PPP models for setting up recycling facilities and waste-to-energy plants. These partnerships de-risk

investments for the private sector, foster technological innovation, and help local governments overcome funding and operational challenges.³⁸

Hybrid PPPs, where international organizations like the Global Environment Facility (GEF) or Green Climate Fund (GCF) co-finance projects, mitigating financial risks. For instance, these models could fund recycling centers equipped with AI-based sorting technologies or scalable WtE plants.

Despite their potential, PPPs in PICs face barriers such as regulatory hurdles, weak institutional frameworks, and limited local expertise. These challenges can be mitigated through:

- » **Clear Policy Frameworks:** Establishing transparent regulations and policies that incentivize private sector participation.
- » **International Partnerships:** Leveraging development agencies to provide technical assistance and initial funding.
- » **Community Involvement:** Engaging local communities in the planning and implementation of PPP projects to ensure buy-in and relevance to local needs.

PPPs represent an opportunity for addressing waste management in PICs. By leveraging financial, technical, and operational strengths across sectors, PPPs can create scalable, sustainable, and locally relevant waste management systems. Such collaborations not only address immediate infrastructure needs but also contribute to long-term environmental and economic resilience in Pacific Island communities.

Technology and Capacity Building

Adopting new technologies to modernize waste management is a growing priority across PICs. Countries like Fiji and Samoa have implemented GPS-based systems for optimizing waste collection routes, while Cook Islands and Niue are testing mobile

apps to track waste generation and management.³⁹

Capacity-building programs, such as J-PRISM II and PacWaste Plus, offer training in waste sorting, composting, and hazardous waste management to local waste managers in countries like Kiribati, Tuvalu, and Palau. These programs highlight the importance of developing a skilled workforce capable of managing modern waste technologies, providing an excellent opportunity for investors to fund technology transfer and educational initiatives.

Technological innovation is essential for transforming PICs' waste systems. Advanced tracking and route optimization technologies implemented in Fiji and Samoa have already yielded cost savings and operational improvements. Emerging tools, like mobile apps for waste tracking or blockchain systems for material traceability, offer new investment frontiers.

Capacity-building programs such as Japan's J-PRISM II and the EU's PacWastePlus provide critical training in waste segregation, hazardous material handling, and recycling practices. Scaling these programs with investor support could create a workforce capable of implementing and maintaining modern waste management technologies.

Behavioral Change and Consumer Education

Behavioral change and consumer education are foundational to effective and sustainable waste management in Pacific Island Countries (PICs). The unique cultural contexts, reliance on imported goods, and small-scale economies of these islands necessitate tailored approaches that address not only waste practices but also consumption patterns. Shifting mindsets and behaviors is crucial to reducing waste generation at its source and ensuring the success of broader waste management systems.

Success Stories in Behavioral Change

Vanuatu and Samoa: These countries have implemented robust public awareness campaigns alongside impactful policy measures like single-use plastic bag bans. Vanuatu's initiative significantly reduced plastic waste by encouraging businesses and consumers to adopt alternatives such as reusable bags. Similarly, Samoa's community-led education programs highlight how grassroots engagement can foster widespread adoption of sustainable practices.

Palau's Eco-Pledge: Palau's innovative "Eco-Pledge," required of all visitors, underscores the importance of tourism in waste management. This pledge not only raises awareness among tourists but also aligns their behaviors with local conservation goals, encouraging reduced waste generation and responsible disposal.

Marshall Islands: Community-driven programs in the Marshall Islands promote composting and recycling. Local women's groups and schools play an active role in these initiatives, demonstrating the power of community leadership in changing waste practices.

Technical Infrastructure and Solutions

The Pacific Island Countries face significant challenges in managing waste due to their geographic isolation, small economies, and limited infrastructure. Addressing these challenges requires innovative technical infrastructure and solutions that consider the unique needs of each country. The following subsections outline areas ripe for development and investment.

Solid Waste Management

Solid waste management is a pervasive issue across PICs, where most waste is either landfilled or burned, leading to environmental and health concerns.

Decentralized Recycling Hubs:

There is an urgent need for scalable

and accessible recycling facilities. Larger nations like Papua New Guinea (PNG) and Fiji require regional processing centers that can sort and recycle plastics, metals, and paper efficiently. Smaller island nations like Nauru and Micronesia benefit from localized solutions tailored to their lower waste volumes.

AI-Driven Sorting Systems:

Implementing artificial intelligence in sorting waste can significantly improve the efficiency of recycling processes. These systems can segregate waste by material type, enabling better recovery rates and reducing contamination.

Scalable Composting Units:

Composting organic waste offers an immediate and low-cost solution for managing food and agricultural residues. Countries like Samoa and Vanuatu can adopt scalable composting technologies to handle organic waste, reducing the volume of waste sent to landfills while generating valuable compost for agriculture.

Investment in waste processing infrastructure not only addresses environmental concerns but also creates employment opportunities and supports a circular economy in the region.

Hazardous Waste Management

Hazardous waste, including medical, chemical, and industrial waste, is a critical issue due to its potential harm to both human health and ecosystems.

Specialized Treatment Plants:

Developing hazardous waste treatment plants can transform waste management practices in Solomon Islands, Tonga, and Kiribati, where current systems are inadequate. These facilities should handle chemical neutralization, medical waste sterilization, and safe disposal of industrial residues.

Secure Landfills: Properly engineered landfills with leachate management and waste encapsulation technologies are essential for handling hazardous materials. Vanuatu's model for medical

waste treatment can serve as a benchmark for replication across other PICs.

Regional Cooperation: Hazardous waste management could benefit from regional approaches, where centralized facilities serve multiple countries, reducing duplication of infrastructure and costs.

E-Waste Management

The growing use of electronic devices in PICs has led to a surge in e-waste, with limited capacity to manage or recycle it effectively.

Recycling Centers: Establishing dedicated e-waste recycling centers in Solomon Islands and Kiribati can enable proper dismantling, material recovery, and safe disposal of electronic components.

Extended Producer Responsibility (EPR): Partnerships with global technology companies can encourage the adoption of EPR programs, where manufacturers take responsibility for the end-of-life management of their products. Countries like Vanuatu and Tonga can benefit from such collaborations.

Public Awareness and Collection Programs: Investment in education

campaigns and accessible e-waste collection points can reduce informal disposal and channel materials into proper recycling systems.⁴⁰

Waste-to-Energy Technologies

WtE technologies offer dual benefits by addressing waste disposal and providing renewable energy, making them highly attractive for PICs.

Small-Scale Biogas Plants: For islands like Tonga and Palau, biogas plants that process organic waste can meet local energy demands and reduce reliance on imported fuels.

Modular Incineration Systems: Scalable incineration technologies, particularly for Fiji, Samoa, and PNG, can convert non-recyclable municipal waste into electricity while addressing landfill overflow issues.

Resource Recovery Innovations: Vanuatu is exploring technologies to convert agricultural residues into biogas and compost. Expanding such initiatives can simultaneously address organic waste management and support sustainable agriculture.

These technologies can be tailored to the scale and resources of individual islands, ensuring practical and cost-effective implementation.⁴¹

Reducing Waste Generation at the Source

Preventing waste generation is a long-term solution to waste management challenges and presents opportunities for innovation and investment.

Biodegradable Alternatives:

Vanuatu's plastic ban has catalyzed innovation in eco-friendly packaging, offering a blueprint for other nations to follow. Biodegradable products made from local materials like banana leaves or coconut husks can reduce dependence on plastics.

Sustainable Manufacturing:

Encouraging local industries to adopt sustainable manufacturing practices, such as producing refillable containers or repairable products, can reduce waste while creating new economic opportunities.

Product Redesign: Investment in companies that focus on waste-efficient product design, such as modular electronics or reusable packaging, can address waste issues at their root.

By integrating waste prevention technologies with consumer education, PICs can achieve significant reductions in waste generation, supporting both environmental and economic resilience.



8. Global Innovations and Models for Adoption

The waste management challenges faced by Pacific Island Countries demand solutions informed by successful global practices. Drawing on lessons from countries that excel in managing waste can provide a roadmap for tailored implementation in the Pacific context.

Advanced Recycling Technologies

Countries like Sweden and Germany lead the world in recycling rates, thanks to sophisticated sorting systems powered by AI and robotics. These systems can efficiently separate recyclable materials from waste streams, drastically reducing contamination and improving recovery rates.⁴²

Scaling Down for PICs: Smaller and modular versions of these technologies can be customized for PICs, where waste volumes are comparatively lower. Such systems could be piloted in hubs like Fiji or Papua New Guinea before expanding to smaller islands like Tuvalu or Niue.

Economic and Social Impact:

Introducing these technologies can create new jobs in machine operation and maintenance while boosting material recovery for export, aligning with circular economy principles.

Zero Waste and Waste Minimization Strategies

The San Francisco Zero Waste Initiative serves as a benchmark, having reduced landfill contributions by 80% through a combination of robust recycling programs, composting, and policies banning non-recyclable materials.⁴³

Policy Frameworks for PICs: PICs can adapt similar policies tailored to local contexts, such as bans on

single-use plastics or incentives for businesses adopting zero-waste practices. Vanuatu's single-use plastic ban is a foundational step in this direction.

Community Participation:

Building awareness and community involvement is key. Programs modeled after San Francisco's outreach campaigns could help PICs integrate zero-waste practices at the household and community levels.

Decentralized Waste Management Systems

Decentralized waste management models, such as those implemented in India, can be effective in reducing the need for long-distance waste transport, especially for remote islands in the Pacific.⁴⁴ By addressing waste at the source and promoting localized solutions, it reduces reliance on large-scale infrastructure.

Applicability to PICs: In remote islands, decentralized systems can manage waste within communities, eliminating the high costs of transporting waste to centralized facilities.

Local Innovation: Village-level composting units, community-based recycling hubs, and waste segregation programs can empower local populations while improving efficiency.

Waste-to-Bioenergy and Anaerobic Digestion

Denmark has pioneered biogas plants that convert organic waste into renewable energy using anaerobic digestion. These plants produce biogas for electricity and heat generation while generating nutrient-rich compost as a byproduct.⁴⁵

Scalable Solutions for PICs: Modular biogas plants can be deployed in countries like Tonga or Palau, where organic waste constitutes a significant proportion of total waste.

Dual Benefits: These systems provide both sustainable waste management and renewable energy, reducing dependence on imported fuels and lowering greenhouse gas emissions.

Public-Private Partnerships (PPPs) in Waste Management

Countries like Singapore and Japan have successfully implemented PPPs for efficient waste management. PICs can adopt similar models to improve waste management infrastructure and attract private investments.⁴⁶

Application in PICs: Similar partnerships could involve private entities in waste collection, processing, and energy recovery while ensuring government oversight for regulatory compliance.

Co-Financing Models: Collaborations between local governments, private investors, and international donors such as the Green Climate Fund can share costs and risks, making projects more viable. For example, PPP-funded recycling centers equipped with advanced technologies could address the recycling gaps in countries like Kiribati and Samoa.

9. Innovative Financing Models for Waste Management

Pacific Island Countries face distinctive challenges in funding waste management systems due to their geographical isolation, small economies, and high upfront costs. To address these barriers, innovative financing mechanisms are leveraging a mix of public, private, and philanthropic resources to make waste management initiatives viable and sustainable.

Overcoming Financial Barriers in Small Island Economies

Small island economies in the Pacific often encounter unique financial barriers when developing waste management systems due to high capital costs, geographic isolation, and limited revenue potential from small populations. These factors hinder the attractiveness of such projects to traditional private investors. To address these challenges, innovative financing models that combine public, private, and philanthropic resources are emerging. Blended finance and climate finance are becoming increasingly relevant approaches to overcome these financial barriers in Pacific Island Countries (PICs).⁴⁷

Blended Finance and Climate Finance⁴⁸

Blended finance combines concessional or philanthropic funding with private capital, making projects more attractive by mitigating investment risks. This is especially critical in the Pacific, where upfront costs for infrastructure like waste collection systems, recycling centers, and waste-to-energy projects are prohibitively high. Blended finance integrates public funding from governments and

multilateral institutions with private investments, thus de-risking projects and incentivizing participation from commercial investors.

Tailored Blended Finance Structures: Blended finance structures are customized to address specific waste management challenges in PICs. For example, in Vanuatu, blended finance has supported small-scale community recycling initiatives. Public grants funded initial infrastructure, while private investments scaled up operations, resulting in a sustainable waste management ecosystem that supports local economic development.

Key Providers of Blended Finance in the Pacific: Organizations at the forefront of providing blended finance to enhance

waste management systems across PICs include:

- » International Finance Corporation (IFC)
- » Green Climate Fund (GCF)
- » Asian Development Bank (ADB)
- » Bilateral Aid Agencies such as DFAT (Australia) and MFAT (New Zealand)
- » Philanthropic Foundations like the Bill & Melinda Gates Foundation and The Packard Foundation



Climate Finance for Waste Management

Climate finance is a growing resource for improving waste management in Pacific Island Countries (PICs), particularly for projects that align with global climate goals by reducing emissions and enhancing resilience. For example, initiatives like the Fiji Integrated Waste Management System utilize such funding to modernize waste handling while addressing climate risks.⁴⁹

Projects that lower methane emissions through landfill improvements, waste-to-energy technology, or composting can qualify for support from entities like the Green Climate Fund (GCF). These initiatives also often deliver secondary benefits, such as economic development through job creation and environmental protection by mitigating risks like water contamination.

However, access to climate finance remains challenging for PICs, requiring capacity building and partnerships to streamline proposal development. There is significant potential for regional collaboration and hybrid financing models, combining public funds with private investment, to scale effective waste management solutions across the region.

Innovative Financing for Community-Based Solutions

Innovative financing mechanisms are increasingly supporting grassroots waste management initiatives in Pacific Island Countries (PICs). Blended finance, which combines public, private, and philanthropic capital,

plays a pivotal role in enabling small-scale, community-driven projects. For instance, in Tuvalu and Kiribati, grants from international donors and philanthropic organizations have funded initiatives such as localized recycling hubs and organic composting programs. These programs not only address waste challenges but also foster economic empowerment by creating jobs within communities, reducing dependency on foreign aid.⁵⁰

Microfinance solutions are another promising avenue, offering small loans to local entrepreneurs for eco-friendly waste management ventures like waste repurposing or sustainable packaging. Such models encourage community ownership and build local capacity while addressing critical environmental concerns. Expanding access to these financial tools could amplify their impact, particularly in rural and remote island settings where traditional funding channels may not reach.

Role of Public-Private Partnerships (PPPs)

Public-private partnerships (PPPs) are proving vital for enhancing waste management infrastructure and services across PICs. In Vanuatu and Tonga, private companies have partnered with local governments to establish and manage recycling facilities, leveraging private-sector efficiency and innovation. These partnerships have enabled the introduction of modern waste sorting technologies and the formalization of waste collection systems, significantly reducing environmental harm.

In Fiji, PPPs have been explored to modernize landfill operations and develop waste-to-energy (WtE) plants, which address both waste disposal and energy needs. Such collaborations allow governments to share financial risks while benefiting from the expertise and resources of private entities. Furthermore, international financial institutions and development agencies often co-finance PPP projects, ensuring their viability and alignment with sustainability goals.

For successful implementation, PPPs in PICs must balance profit motives with environmental and social priorities. Transparent frameworks, equitable risk-sharing agreements, and community engagement are essential to ensure that partnerships deliver long-term benefits to both the environment and local populations. Strengthening regional networks to share best practices could also help smaller PICs replicate successful PPP models tailored to their specific needs.⁵¹

10. Key Stakeholders in the Waste Management Sector in PICs

Commercial Waste Management Companies

Large Multinational Corporations

Major global waste management firms, such as Veolia and SUEZ, have started exploring opportunities in PICs due to their expertise in large-scale waste-to-energy projects, advanced recycling technologies, and integrated waste management solutions. These firms typically collaborate with local governments and international donors to implement cutting-edge technologies like material recovery facilities (MRFs) and smart waste collection systems, especially in larger nations like Fiji and Papua New Guinea (PNG).

Regional and Local Companies

Local firms play a crucial role in PICs by leveraging their understanding of the local culture, geography, and regulatory frameworks. Companies like Waste Management Fiji and EnviroWaste Samoa focus on basic waste collection, landfill management, and small-scale composting or recycling. These companies often face logistical challenges but have developed tailored solutions, such as community collection points and localized recycling initiatives that cater to smaller and more remote islands like Tuvalu and Kiribati.

Government Agencies and Public Sector Organizations

National and Local Governments

Government bodies, including ministries of environment and local

municipal authorities, are responsible for setting and enforcing waste management policies. In larger nations like Fiji and Vanuatu, these agencies have established National Waste Management Strategies that aim to reduce reliance on landfills and promote recycling. However, governments in smaller island nations, such as Niue or Nauru, face resource constraints and often rely on donor funding to develop waste infrastructure.⁵²

Environmental Protection Agencies

These agencies, like the Fiji Environment Management Authority (FEMA) and Samoa's Ministry of Natural Resources and Environment (MNRE), ensure compliance with waste management laws and push for the adoption of sustainable practices. They are often involved in launching public awareness campaigns and encouraging community participation in recycling and proper waste disposal.

Non-Governmental Organizations (NGOs) and Community Groups

Environmental NGOs

NGOs such as Live & Learn Environmental Education and the Pacific Islands Conservation Initiative are actively involved in waste management projects across PICs. These organizations typically focus on education campaigns, community-driven recycling programs, and advocating for policies to ban single-use plastics, such as those recently enacted in Vanuatu and Samoa. They also partner with local governments and private companies to create

sustainable waste management models.

Community-Based Organizations

Grassroots organizations, particularly in smaller island communities like Tonga and Palau, focus on waste reduction, recycling, and composting initiatives at the household level. These groups often foster a culture of sustainability through local engagement, with programs such as plastic recycling drives or community composting projects, which are vital to addressing waste in remote areas where formal collection systems are limited.

Industry Associations and Collaborative Platforms

Industry Associations

Associations like the Pacific Islands Private Sector Organisation (PIPISO) bring together stakeholders from across the waste management sector to promote sustainable practices. They play a critical role in advocating for public-private partnerships (PPPs) and sharing best practices across the region, encouraging more robust participation in waste management efforts by local businesses and entrepreneurs.

Collaborative Platforms and Initiatives

Multi-stakeholder collaborations, such as the Pacific Regional Infrastructure Facility (PRIF) and Cleaner Pacific 2025, provide platforms for governments, NGOs, private sector players, and donor agencies to work together on waste management challenges. These

partnerships help pool resources and technologies for regional solutions, particularly in small island states where waste management resources are scarce.

Research and Educational Institutions

Research institutions, such as The University of the South Pacific (USP), play an essential role in advancing waste management through research, data collection, and capacity-building programs. Universities partner with government agencies and international bodies like the Asian Development Bank (ADB) to conduct studies on waste management technologies, local waste generation patterns, and the economic viability of recycling or WtE solutions in PICs.

International Organizations and Donor Agencies

International agencies, such as the United Nations Development Programme (UNDP), the World Bank, and regional organizations like the Secretariat of the Pacific Regional Environment Programme (SPREP), are heavily involved in funding, technical assistance, and project development in the waste sector. Programs like the EU PacWaste Plus and the J-PRISM II (Japan's Pacific Regional Initiative on Solid Waste Management) offer vital support for capacity-building, infrastructure development, and the

introduction of sustainable waste technologies.⁵³

Equipment and Service Providers

Service providers are crucial for equipping waste management systems in the Pacific. Companies offer waste-to-energy technologies, while others supply essential equipment like garbage trucks, compactors, and sorting machinery. Many local operators in PICs rely on international providers to supply equipment needed for waste collection and processing, especially for hazardous waste disposal and modern recycling facilities.

11. Waste Management Investment Opportunities in Specific PICs



COOK ISLANDS

Current Context

The Cook Islands are made up of 15 islands and atolls that cover a total area of 237 km². A combined coastline of 120 km is spread over 2,000,000 km² in the Polynesian region of the mid-Pacific Ocean. The islands consist of two main groups – the Northern Cook Islands and the Southern Cook Islands. Avarua is the country's capital city, with the largest population, and is located on the island of Rarotonga. In 2016, the estimated resident population – including short term visitors – was 19,400. Approximately 2,900 live in rural areas, with the remainder living in the capital of Avarua on Rarotonga.⁵⁴

The Cook Islands is facing growing waste management challenges driven by its reliance on tourism (54% of gross domestic product in 2012) and the increasing volume of waste generated by both residents and visitors. Approximately 70% of the country's population lives on the main island of Rarotonga, and tourism accounts for 54% of the Cook Islands' GDP. This heavy reliance on tourism puts immense pressure on existing waste management systems, which are already struggling to keep pace with rising waste volumes. To protect the pristine environment, which is a cornerstone of the local economy, the government has set an ambitious goal of achieving zero waste. This initiative aligns with national efforts to promote sustainable development and create opportunities for investment in innovative waste management solutions.⁵⁵

Key Investment Areas

Waste-to-Energy Solutions

As the Rarotonga landfill nears its capacity, there is a critical need for alternative waste disposal solutions. Investment in waste-to-energy facilities offers a promising opportunity to address the island's waste challenge while providing a source of renewable energy. A feasibility study has already been conducted for a WtE plant on Rarotonga, although further assessments are needed to confirm its viability. Such a facility could significantly reduce the volume of waste going to landfills, while helping the island reduce its reliance on imported energy sources.⁵⁶

Recycling and Resource Recovery

The Cook Islands currently lacks a well-developed recycling system, and the majority of recyclable materials such as aluminum cans, PET bottles, and glass are exported to New Zealand. Investment in local recycling facilities or the establishment of a comprehensive recycling program could create a more cost-effective solution and reduce environmental impact. Potential initiatives include the development of materials recovery facilities (MRFs), glass crushing plants for local use, and expanded composting programs.⁵⁷

Public-Private Partnerships in Waste Collection and Management

Waste collection services on Rarotonga are currently provided by private operators under contracts with the Ministry of Infrastructure Cook Islands (ICI). Investors can explore opportunities for PPPs to further enhance waste collection, management, and disposal services. For example, upgrading existing facilities or developing new infrastructure such as transfer stations could help improve waste logistics and reduce operational costs.⁵⁸

Development of a New Sanitary Landfill or Advanced Waste Treatment Facility

Given the limited land availability on Rarotonga and the nearing capacity of the current landfill, investment in the development of a new sanitary landfill or an advanced waste treatment facility is urgently needed. A thermal waste destruction facility without energy recovery is also being considered as a viable alternative. Either option would offer improved environmental outcomes compared to the current practice of landfilling combined with open burning.⁵⁹

Hazardous and Medical Waste Management

The current facilities for hazardous and medical waste management in the Cook Islands are outdated and lack adequate emissions control. Investment in modern incineration facilities or other appropriate technologies for handling hazardous waste can support environmental protection and public health.⁶⁰

Innovative Financing Mechanisms for Recycling and Waste Minimization

There is potential to introduce innovative financing mechanisms to support waste minimization and recycling activities. Options such as a container deposit scheme for aluminum and PET beverage containers or an advance disposal fee for selected imported items can provide sustainable funding sources for waste management programs. Establishing a dedicated trust fund to cover the costs of waste export and processing is another strategy being considered.

Regulatory and Institutional Support

The National Solid Waste Management Strategy (2013-2016) outlines policy objectives and targets for improving waste management in the Cook Islands. The strategy includes measures such as stricter enforcement of environmental regulations and the consolidation of waste management responsibilities under a single entity to reduce fragmentation among agencies. These initiatives create a more supportive environment for investment in the waste management sector.

Strategic Considerations for Investors

Investing in the waste management sector in the Cook Islands offers significant opportunities to contribute to sustainable development while achieving positive economic returns. Key areas for investment include waste-to-energy facilities, recycling programs, PPPs, and advanced waste treatment solutions. With strong government support and a focus on achieving a "zero waste" goal, the Cook Islands is well-positioned to attract private capital and foster sustainable growth in the waste management sector.⁶¹

FEDERATED STATES OF MICRONESIA

Current Context⁶²

The Federated States of Micronesia (FSM) is located in the western Pacific Ocean and comprises over 600 islands, with a total land area of 701 km² and a combined coastline of 6,112 km. The total population of the

FSM island group was 102,624 in 2010 with approximately 4,600 living in its capital Palikir on the island of Pohnpei.⁶³

FSM faces increasing challenges in managing solid waste, particularly as waste volumes grow and environmental standards become more stringent. FSM's four states—Chuuk, Kosrae, Pohnpei, and Yap—vary in their waste management capabilities, with Kosrae and Pohnpei leading the way in terms of infrastructure and system development. Combined, these two states serve a population of over 40,000 people and are actively seeking to improve their solid waste management (SWM) through enhanced facilities, public-private partnerships, and the adoption of innovative solutions.

Rapid urbanization and economic development, especially in Kosrae and Pohnpei, are putting increasing pressure on existing waste management systems. Environmental degradation from unmanaged waste disposal is becoming a critical issue, posing risks to public health, marine ecosystems, and tourism—one of FSM's key economic sectors. As such, there is a pressing need for improved waste collection, recycling, and disposal systems.

Investment in FSM's SWM sector offers significant potential, particularly in Kosrae and Pohnpei, where there is a strong interest in modernizing waste management through private sector involvement, public-private partnerships (PPPs), and the introduction of advanced waste processing technologies. The FSM government is also working to update its regulatory framework to better support sustainable waste management practices, which presents opportunities for international investors to play a role in shaping the future of waste management in these islands.

Key Investment Areas⁶⁴

Development of Centralized Waste Disposal Facilities

The existing dumpsites in both Kosrae and Pohnpei are inadequate, leading to environmental degradation and health risks. The central dumpsite at Dekehtik, Pohnpei, poses a significant environmental threat due to its location near mangrove areas and leaching into the marine environment. Investment is needed to develop a new

sanitary landfill with advanced waste management technologies to address these concerns. A well-designed facility would not only reduce environmental impact but also create a sustainable, long-term waste disposal solution for the state.

Expansion of Waste Collection Services

Waste collection services in the FSM are limited, particularly in rural municipalities. In Kosrae, for example, only two of the four municipalities have regular waste collection services. Extending these services through investments in new collection vehicles, waste bins, and infrastructure could improve coverage, enhance efficiency, and reduce illegal dumping. Investors can explore opportunities to partner with municipal authorities to establish sustainable waste collection systems, leveraging the “user pays” principle to ensure cost recovery.

Waste-to-Energy and Alternative Waste Treatment Solutions

The FSM's reliance on imported fossil fuels and the environmental challenges posed by existing waste disposal methods create a compelling case for waste-to-energy projects. Investments in small-scale WtE facilities or other alternative waste treatment technologies such as anaerobic digestion could provide dual benefits of waste management and renewable energy generation. A previous feasibility study indicated potential for such a project in Pohnpei, though more detailed data is needed to confirm viability.⁶⁵

Recycling and Resource Recovery Programs

Recycling initiatives are currently limited and fragmented across the FSM. The Kosrae Island Resource Management Authority (KIRMA) operates a beverage container recycling program, but broader investment in recycling facilities and materials recovery systems is needed. Potential projects include setting up material recovery facilities (MRFs) to handle aluminum, plastics, and glass, and establishing local recycling enterprises to reduce the need for exporting recyclables.⁶⁶

Public-Private Partnerships (PPPs) for Waste Management Operations

PPPs can play a crucial role in managing waste collection, landfill operations, and recycling initiatives in the FSM. Pohnpei's central dumpsite is already operated under a PPP model, with the state government subsidizing private operators. Similar models can be explored for expanding waste management services in other states, particularly in Kosrae, where the government is considering outsourcing collection services due to capacity constraints.

Development of Hazardous Waste and Medical Waste Treatment Facilities.

Existing facilities for hazardous and medical waste in FSM are outdated and lack proper emissions control. Investment in modern, small-scale incinerators or specialized treatment facilities can address this gap, ensuring that hazardous waste is managed safely and effectively. Such facilities could serve multiple states, creating a centralized solution for hazardous waste management in the FSM.⁶⁷

Regulatory and Institutional Support

The FSM's National Solid Waste Management Strategy (2010-2014) provides a framework for improving waste management across the country. The strategy aims to implement an integrated SWM system that minimizes environmental and public health impacts. Although state laws govern SWM, institutional fragmentation and overlapping responsibilities remain significant challenges. Addressing these through clearer policy mandates and improved coordination can create a more supportive environment for private sector investment.⁶⁸

Strategic Considerations for Investors

The FSM's waste management sector presents numerous investment opportunities, particularly in the development of new waste facilities, expansion of collection services, recycling programs, and the adoption of waste-to-energy solutions. Investors can play a key role in supporting sustainable development and environmental protection in the FSM, while benefiting from the growing demand for improved waste management infrastructure and services. By leveraging government

support and adopting innovative financing models, such as PPPs, private investors can help transform the FSM's waste management landscape and contribute to a cleaner, more sustainable future for the Pacific region.

FIJI

Current Context

Fiji is an archipelago of more than 332 islands and 500 islets, of which 110 are permanently inhabited. Located in the Melanesian region of the Pacific, the country has a land area of 18,333 km², with a combined coastline of 1,129 km. The two major islands of Viti Levu and Vanua Levu account for approximately 87% of the country's population, of which 75% live on Viti Levu's coastline, either in Suva, Nadi, or Lautoka.⁶⁹

Fiji's solid waste management (SWM) sector presents a wealth of investment opportunities, driven by growing waste volumes, changing regulations, and an increased focus on sustainable development. In Suva City, the capital, approximately 65-68 tons of waste are generated daily, with over 80% of it being organic waste, primarily food and market waste.

The rising volume of waste, particularly organic material, poses both challenges and opportunities. Innovative waste solutions, such as organic waste composting, waste-to-energy technologies, and recycling infrastructure, can not only address the immediate waste management needs but also align with Fiji's broader sustainability objectives, such as reducing greenhouse gas emissions and promoting circular economy practices.

Investment in Fiji's SWM sector offers potential economic returns through the development of efficient waste processing systems, job creation in recycling and waste management industries, and contributions to the country's environmental and social sustainability goals.

Key Investment Areas

Waste-to-Energy and Organic Waste Treatment

With a high proportion of organic waste, there is substantial potential for investment in waste-to-energy projects and composting facilities. Establishing small-scale biogas or anaerobic digestion plants can convert organic waste into renewable energy, reducing Fiji's dependence on imported fossil fuels and addressing waste management challenges.⁷⁰

Recycling and Resource Recovery

Recycling activities in Fiji are currently limited and largely depend on informal arrangements. Investments in recycling facilities and resource recovery technologies can help process materials such as paper, cardboard, plastics, and metals. Partnerships with local councils and private companies can foster the development of a more structured recycling industry, providing economic value and reducing the strain on landfills.

Public-Private Partnerships (PPPs)

There are opportunities for PPPs in the management and operation of waste collection, transportation, and landfill services. For instance, Suva City contracts private sector operators for waste collection in certain sectors and green waste management. Investors can explore potential collaborations with municipal authorities to develop new waste infrastructure, such as the proposed transfer station in Nasinu, which aims to optimize transportation and waste processing costs.

Expansion and Modernization of Naboro Landfill

The Naboro landfill, serving the Greater Suva Area, is operated under a PPP framework. The government has allocated funding for its expansion, creating an opportunity for investors to engage in landfill management and waste treatment projects. Implementing advanced technologies for leachate management and emissions control can enhance the environmental performance of the landfill.⁷¹

E-Waste and Hazardous Waste Management

The current waste management system lacks specific guidelines for e-waste and hazardous waste treatment. Investment in specialized facilities for the collection, treatment, and disposal of electronic waste, expired drugs, and other hazardous materials can fill a critical gap, supporting both environmental protection and public health.

Regulatory and Institutional Support

The Government of Fiji has been proactive in strengthening its waste management framework through policies such as the Environmental Management Act and the National Solid Waste Management Strategy. There are plans to introduce additional regulations to control plastic use and establish a container deposit scheme for recyclable materials. These policy measures create a supportive environment for investment and innovation in the waste management sector.⁷²

Strategic Considerations for Investors

Investing in Fiji's waste management sector offers a compelling blend of economic potential and environmental impact, making it an attractive prospect for both financial and impact-driven investors. Understanding the local context, regulatory environment, and key investment enablers is crucial to maximize value and mitigate risks. These strategic considerations provide a framework for effectively navigating Fiji's waste management landscape, and leverage Public-Private Partnerships (PPPs) and Donor Support.

The Government of Fiji has demonstrated a commitment to collaborating with the private sector and international donors to improve waste management infrastructure. Engaging in PPPs can reduce capital outlays, share risks, and provide access to government-backed incentives and subsidies. Investors should consider aligning their projects with existing government priorities and donor initiatives, such as the Asian Development Bank's funding for landfill development and recycling programs. This alignment can increase project feasibility and secure additional funding support.

FRENCH POLYNESIA

Current Context⁷³

French Polynesia's solid waste management (SWM) sector faces unique challenges and opportunities, driven by its geographically dispersed islands, limited waste infrastructure, and increasing waste generation, particularly from tourism and urban growth. Tahiti, the largest island, generates a significant portion of the waste in French Polynesia, with a daily production rate of approximately 150 tons of waste, including organic material, plastics, and household waste.

Due to its remote location and logistical challenges, French Polynesia has historically struggled with efficient waste management. However, this context creates substantial investment opportunities in modernizing waste collection, treatment, and recycling systems. Investment in French Polynesia's SWM sector aligns with the government's focus on sustainability, environmental protection, and reducing the environmental impact of tourism.

Investment in this sector offers both economic returns and environmental benefits, especially through innovative waste management practices that address the challenges posed by limited land space and the high cost of transporting waste between islands.

Key Investment Areas

Waste-to-Energy and Organic Waste Treatment

Given the large proportion of organic waste in the waste stream, there is a strong case for developing waste-to-energy projects and composting facilities. By investing in anaerobic digestion plants or biogas systems, organic waste can be transformed into renewable energy, providing an alternative to costly imported fuels and offering a sustainable waste management solution for islands like Tahiti and Moorea.⁷⁴

Recycling and Resource Recovery

French Polynesia has limited infrastructure for recycling, with most recyclable materials exported to other regions for processing.

There is significant potential for investment in local recycling plants for materials such as plastics, paper, and metals. Developing a robust recycling industry could reduce transportation costs, create local jobs, and contribute to the circular economy by reintroducing processed materials into the local supply chain.⁷⁵

Public-Private Partnerships

The local government in French Polynesia is open to public-private partnerships to improve waste management infrastructure. For example, private sector collaboration can be essential in enhancing waste collection services, landfill operations, and the construction of transfer stations. Engaging in PPPs could provide investors with opportunities to share risks while tapping into government incentives aimed at improving the overall waste management system.⁷⁶

Landfill Modernization and Management

French Polynesia's main landfill, located near Papeete in Tahiti, faces capacity and environmental challenges. There is scope for investment in expanding landfill capacity and modernizing its operations to include leachate treatment, methane capture, and emissions control technologies. Such projects not only align with environmental goals but can also be financially viable through energy generation and material recovery.⁷⁷

E-Waste and Hazardous Waste Management

With increasing reliance on electronics and modern technology, e-waste is becoming a significant issue in French Polynesia. Investment in specialized collection, recycling, and disposal facilities for electronic waste and hazardous materials such as batteries, medical waste, and chemicals can address a critical gap in the waste management system. This area also presents opportunities to partner with international organizations focused on environmental protection and public health.⁷⁸

Regulatory and Institutional Support

The government of French Polynesia has implemented several policies to support improved waste management. These include environmental laws that regulate

waste disposal, recycling incentives, and the push for plastic reduction, which has been bolstered by a recent ban on single-use plastics. Further regulatory improvements, such as container deposit schemes, are being considered to enhance the island's waste management framework, providing a supportive environment for investors focused on sustainability.⁷⁹

Strategic Considerations for Investors

Investing in French Polynesia's waste management sector presents a unique opportunity to achieve both economic returns and environmental impact, though the geographic isolation and dispersed islands require a tailored approach. Localized solutions, such as island-specific composting, recycling, and waste-to-energy systems, are essential to overcoming logistical challenges and reducing transportation costs. Public-private partnerships offer a pathway to minimize risks and capitalize on government and donor-backed initiatives for waste infrastructure development.

The tourism industry, which generates significant waste, presents an additional area of opportunity for sustainable waste management practices. Solutions aimed at resorts and hotels, such as eco-friendly waste reduction and recycling programs, align with the sector's increasing emphasis on sustainability. Technological innovation is also key, with investments in biogas plants, modern recycling facilities, and advanced waste treatment systems supporting French Polynesia's goals of reducing landfill use and energy dependency.

KIRIBATI

Current Context⁸⁰

Kiribati is located in the Micronesia region of the central Pacific Ocean. The country's 33 coral atolls and islands are dispersed among the three groups that form Kiribati, which are the Gilbert, Line, and Phoenix islands. Covering a land area of 810 km², the island groups are spread over approximately 3,500,000 km² in the Central Pacific Ocean. The nation's capital is South Tarawa, situated on the Gilbert Island group. Approximately

50% of Kiribati's population of 110,136 live in its capital, South Tarawa.⁸¹

Kiribati faces profound solid waste management challenges due to its geographic dispersion across 33 atolls, limited infrastructure, and resource constraints. South Tarawa, the capital and home to nearly half of the country's population, is a key area of focus for waste management improvements. Rapid urbanization in South Tarawa has led to significant increases in waste generation, overwhelming the existing waste management systems, which primarily rely on open dumping and burning of waste. These methods contribute to environmental degradation, including pollution of coastal areas and groundwater, and pose serious public health risks.

The government of Kiribati recognizes the need for a comprehensive waste management system to mitigate these risks and improve sustainability. The estimated investment required to establish such a system is projected to be between USD 20–30 million over the next five years, covering the development of modern waste disposal facilities, enhanced waste collection services, and initiatives to promote recycling and sustainable waste treatment.

Key Investment Areas

Waste Collection and Transportation Systems

Current waste collection systems in South Tarawa are managed by the Betio Town Council (BTC) and Telnainano Urban Council (TUC), with a combined collection capacity of only 6.1 tons per day. Approximately 38% of waste generated is collected by authorities, while 35% is illegally dumped or burned. Investment is needed to enhance collection coverage and improve the efficiency of existing services.⁸²

Extending waste collection coverage and optimizing logistics systems could require USD 3–5 million. This would include purchasing additional waste collection trucks, establishing new waste collection points, and upgrading maintenance workshops. Implementing a centralized collection system with new compacting trucks and waste bins is projected to cost an additional USD 1–2 million.

Landfill Upgrades and Expansion⁸³

There are three main landfill sites in South Tarawa—Betio, Bikenibeu, and Nanikai—all of which face operational challenges such as inoperable leachate pumping systems and lack of temporary covers due to high water tables.

Upgrading these landfill sites with proper leachate management systems, landfill liners, and gas capture technologies is estimated to cost USD 2–4 million. A new, centrally located landfill with higher environmental and operational standards would require an investment of USD 5–7 million. These improvements would reduce environmental contamination, manage hazardous waste more effectively, and create opportunities for waste-to-energy projects using captured methane.

Recycling and Resource Recovery Infrastructure⁸⁴

Recycling activities are minimal, with the Kaoki Maange (Keep Kiribati Beautiful) program being the most successful initiative focusing on aluminum cans, PET bottles, and lead-acid batteries. Additional investment is needed to expand recycling capabilities and establish local material recovery facilities.

Establishing a centralized Material Recovery Facility (MRF) in South Tarawa could cost USD 1.5–2.5 million. Expanding the current program to include electronic waste, vehicle scrap, and bulky items could require an additional USD 500,000–1 million. Enhanced recycling infrastructure would reduce waste entering landfills, create local employment, and generate additional revenue from the sale of recovered materials.

Organic Waste Management and Composting⁸⁵

Organic waste makes up a significant portion of the waste stream in Kiribati. Current initiatives to manage organic waste, such as the Japan International Cooperation Agency's (JICA) home composting project, are not widely implemented.

Developing a centralized composting facility capable of processing 5,000 tons of organic waste annually would require an investment of USD 1–2 million. Community-level composting and biogas initiatives could be

developed at a cost of USD 50,000–100,000 per community.

Hazardous and Medical Waste Management⁸⁶

Medical waste is partially incinerated at Tungaru Hospital, but lack of proper segregation and disposal poses health risks.

Establishing a dedicated hazardous and medical waste treatment facility, including autoclaves and small-scale incinerators, would require an investment of USD 1–3 million. Proper management of hazardous and medical waste would reduce the risk of disease transmission, improve public health, and ensure compliance with international environmental standards.

Strategic Considerations for Investors

Investing in Kiribati's waste management sector offers opportunities to contribute to sustainable development and address pressing environmental and public health challenges. Strategic investments in collection systems, recycling, landfill upgrades, and capacity building can create a resilient and sustainable waste management framework for the country.

REPUBLIC OF THE MARSHALL ISLANDS

Current Context⁸⁷

With a land area of 1,812 km² and a combined coastline measuring 370 km, the Republic of Marshall Islands (RMI) is located in the central Pacific Ocean in the Micronesia region. RMI consists of 29 atolls and 5 islands that are divided into the Ratak (Sunrise) Island Chain and Ralik (Sunset) Island Chain. The population was 53,158 in 2011, distributed across the country's atolls and islands. Approximately 14,352, or 27%, live in rural areas, with the remainder living in either the more urban centers of Majuro and Kwajalein.⁸⁸

RMI faces significant challenges in managing solid waste due to its limited land area, growing population, and environmental vulnerabilities. Waste management is particularly problematic in the two main urban centers, Majuro and Kwajalein (Ebeye),

where the majority of the population resides, leading to high waste generation rates. The country's geographical isolation and lack of infrastructure further complicate efforts to address these challenges. Environmental risks, including contamination and leachate leakage from poorly managed landfills, pose significant public health concerns, making waste management a top priority for sustainable development.

The estimated investment needed for a comprehensive waste management system in the Marshall Islands over the next five years is between USD 15-25 million. Investment in new infrastructure and upgrading existing systems could help mitigate environmental risks and improve waste handling capacity.

Key Investment Areas

Development of New Landfill Facilities⁸⁹

The existing landfill at Jable-Batkan has exceeded its capacity and lacks critical environmental safeguards such as leachate control, posing significant environmental and public health risks.

Developing a new landfill facility with advanced environmental protections and increased capacity is estimated to require USD 5-8 million. Upgrading the existing facility would cost around USD 2-3 million. A new landfill with modern environmental controls would reduce contamination, increase operational efficiency, and support the development of complementary waste management infrastructure.

Waste Collection and Transportation Systems⁹⁰

The Majuro Atoll Waste Company (MAWC) provides collection services to around 2,500 households and 82 commercial customers. However, many areas, especially between the airport and Laura, lack proper collection services.

Expanding waste collection coverage, acquiring new collection vehicles, and developing transfer stations could require an investment of USD 2-4 million. Implementing a user-pays system and tipping fees could help recover costs and improve service delivery. Expanding collection services would reduce illegal dumping and create additional revenue opportunities from service

contracts and user fees, estimated at USD 200,000-400,000 annually.

Recycling and Resource Recovery Infrastructure⁹¹

Recycling initiatives in the Marshall Islands are limited and operate on a small scale, with facilities focusing on aluminum and paper recovery. Establishing a comprehensive recycling system is needed to handle plastics, glass, and e-waste.

Establishing a centralized recycling facility in Majuro could cost USD 2-3 million. Expanding existing programs to include a container deposit scheme could reduce waste entering the landfill and enhance resource recovery. Establishing new recycling facilities would divert significant volumes of waste from the landfill, generate revenue from recovered materials, and create local jobs.

Waste-to-Energy Projects⁹²

The Marshall Islands has explored the feasibility of a waste-to-energy facility in Majuro. While previous studies found the project financially unfeasible, the potential remains for WtE under a Public-Private Partnership (PPP) arrangement.

Developing an 8.5-megawatt WtE generator under a build-operate-transfer (BOT) model is estimated to cost USD 10-15 million. The project would require private sector technical skills and financing. WtE projects could provide a sustainable energy source for the country and reduce waste entering the landfill, contributing to energy security and waste management.

Strategic Considerations for Investors

Investing in the Marshall Islands' waste management sector offers significant opportunities for environmental and economic benefits. Strategic investments in new landfill facilities, expanded waste collection services, recycling infrastructure, and waste-to-energy projects could create a comprehensive and sustainable waste management system. These initiatives would improve public health, enhance environmental protection, and contribute to the country's long-term economic stability.

NAURU

Current Context⁹³

Nauru, a small island nation in the Pacific with a population of approximately 10,200, faces profound challenges in managing its solid waste. The island's limited land resources, coupled with a lack of infrastructure and inadequate financial resources, exacerbate the waste management crisis. These challenges are compounded by the high costs of waste transportation and disposal, as well as the environmental risks posed by improper waste handling, which threaten both human health and the island's fragile ecosystems. Nauru's small size and geographic isolation further constrain its ability to develop sustainable waste management systems without external assistance.

Despite these hurdles, there are significant opportunities for investment in Nauru's solid waste management sector. By leveraging innovative technologies, developing partnerships with international organizations, and securing public-private collaboration, Nauru can implement solutions that improve waste processing, recycling, and disposal systems.

Key Investment Areas

Development and Rehabilitation of Landfills⁹⁴

Nauru has only one municipal landfill, which lacks proper waste management infrastructure, including lining and leachate collection systems. This poses a significant risk of groundwater contamination. Additionally, the landfill is approaching the end of its operational life.

Investment Opportunity: Investors can explore the development of a new landfill site or the rehabilitation of the existing landfill with advanced environmental controls. Such investments would include lining, leachate management systems, and waste compaction technology, ensuring compliance with international environmental standards and minimizing health risks.

Establishment of Waste Segregation and Recycling Facilities⁹⁵

Waste segregation is minimal, and there is no formal recycling system in place. The Nauru Rehabilitation Corporation (NRC) attempts to extract recyclable materials at the landfill, but efforts are constrained by limited staff and equipment.

Investment Opportunity: Establishing materials recovery facilities (MRFs) to enable waste segregation and recycling will reduce landfill pressure and create opportunities for the export of recyclable materials. This could be coupled with community engagement initiatives to promote waste segregation at the household level.

Introduction of Waste-to-Energy Solutions⁹⁶

Nauru lacks any waste-to-energy infrastructure. Burning is often used to reduce waste volume, leading to air pollution and health risks.

Investment Opportunity: Given the high energy costs and reliance on imported fuels, small-scale waste-to-energy plants can be an attractive investment. WtE projects can convert municipal solid waste and other biodegradable waste into electricity, providing an additional revenue stream and supporting the country's energy needs.

Development of Hazardous and Medical Waste Treatment Facilities⁹⁷

Hazardous and medical waste is often disposed of improperly, including being burned at the landfill due to operational challenges with the hospital incinerator.

Investment Opportunity: There is an opportunity to develop specialized hazardous waste treatment facilities to handle medical and hazardous waste safely. Establishing such facilities will mitigate environmental and health risks and align with global best practices in hazardous waste management.

Public-Private Partnership (PPP) Models for Waste Management⁹⁸

Waste management operations are primarily managed by the NRC, but there is no clear

regulatory framework for private sector participation.

Investment Opportunity: Investors can leverage PPP models to bring private sector expertise and investment into waste collection, treatment, and disposal. PPPs can facilitate the introduction of modern technologies and operational efficiencies, ensuring sustainable and effective waste management solutions.

Rehabilitation of Sites Contaminated by Phosphate Mining⁹⁹

Nauru's extensive phosphate mining has resulted in significant environmental degradation and left large areas of the island unusable.

Investment Opportunity: Rehabilitation of mined-out areas for use as waste management or recycling sites presents a dual benefit of environmental restoration and provision of additional land resources for waste management operations. Investors could work with the NRC and the Nauru government to convert these sites into functional facilities for waste management or energy generation.

Strategic Considerations for Investors

Investment opportunities in Nauru's solid waste management sector focus on establishing the foundational infrastructure required for effective waste management, improving operational efficiencies through technology, and developing local capacity to manage waste sustainably. Given the existing gaps and the government's commitment to addressing these issues through its National Sustainable Development Strategy, there is significant potential for investors to contribute to the sector's transformation while achieving long-term economic and environmental returns.

NEW CALEDONIA

Current Context¹⁰⁰

New Caledonia, a French territory in the South Pacific, is comprised of the main island of Grande Terre and a number of smaller islands, including the Loyalty Islands, Île des Pins, and the Belep archipelago. Together,

these islands span a total area of 18,575 km². With a population of approximately 290,000 people distributed across these islands, New Caledonia faces a range of challenges related to waste management, driven by its geographic dispersion, diverse governance structure, and varying socio-cultural contexts.

The territory's waste management issues are compounded by rapid urbanization and population growth, particularly in the capital city, Noumea, where the majority of the population is concentrated. As urban areas expand, the volume of waste generated continues to increase, putting immense pressure on existing waste management infrastructure. The challenges are further exacerbated by the complexity of governance, with responsibilities shared between local municipalities and French authorities, often leading to fragmented waste management efforts.

Geographic isolation and dispersed settlements make it difficult to implement a centralized waste collection and disposal system across all islands. Some of the more remote areas struggle with limited access to waste collection services, leading to inconsistent practices and environmental degradation. Additionally, the territory faces challenges in integrating modern waste management solutions, including recycling and composting, due to the lack of necessary infrastructure and public awareness programs.

As the population grows and waste volumes rise, there is an urgent need for investment in upgraded waste management systems that can cater to New Caledonia's unique context. Enhancing waste collection, expanding recycling facilities, and developing sustainable waste treatment technologies are critical steps toward mitigating environmental risks and improving public health. The combination of local initiatives and international partnerships will be essential in addressing these complex waste management challenges.

Key Investment Areas

Development of Integrated Waste Management Facilities¹⁰¹

New Caledonia's existing waste management infrastructure is fragmented, with most

waste being disposed of in poorly managed landfills. There is an urgent need for modern, centralized waste treatment facilities that incorporate waste sorting, recycling, and advanced waste processing technologies. Investment in modern sanitary landfills and material recovery facilities (MRFs) could significantly enhance efficiency, reduce environmental impact, and open up new revenue streams through the sale of recovered materials and energy production from waste.

Recycling and Circular Economy Initiatives¹⁰²

Recycling activities in New Caledonia are currently limited to a few key waste streams, such as metals and plastics, with much of the waste being exported for processing. Establishing new recycling facilities and expanding existing ones can increase local capacity to handle a wider range of materials, such as glass and organic waste, while reducing dependency on exports. Investors can explore opportunities in developing local markets for recycled products, supporting circular economy initiatives that turn waste into valuable resources, and promoting sustainable consumption patterns across communities.

Waste-to-Energy Projects¹⁰³

With the high volume of waste generated and limited landfill space, small-scale WtE projects can provide dual benefits of waste management and renewable energy production. Potential projects include developing incineration plants or anaerobic digestion systems that convert organic waste into biogas or electricity, reducing reliance on imported energy sources. WtE projects are particularly suitable for urban centers such as Noumea, where waste volumes are concentrated, and there is a demand for alternative energy solutions.

Hazardous and E-Waste Management¹⁰⁴

New Caledonia currently lacks dedicated facilities for handling hazardous waste and e-waste, creating environmental and health risks. Establishing specialized hazardous waste treatment plants and e-waste processing facilities can address these gaps and enable the safe disposal and recycling of valuable materials from electronic waste. This also presents an opportunity

to recover rare and precious metals, which are otherwise lost in conventional disposal practices.

Strategic Considerations for Investors

New Caledonia's waste management sector presents multiple investment opportunities, particularly in urban waste systems, industrial waste treatment, and sustainable tourism waste solutions. The government is increasingly focused on environmental sustainability and improving infrastructure to balance economic growth with conservation efforts. Investors can leverage opportunities in public-private partnerships (PPPs), particularly in projects focused on modernizing waste infrastructure, recycling, and resource recovery. These investments will support New Caledonia's transition toward sustainable development and environmental protection, offering both economic and environmental returns.

NIUE

Current Context¹⁰⁵

Niue, one of the world's largest coral islands, offers distinct opportunities for investment in its solid waste management (SWM) sector. Although the country has a small population of around 1,719 people, it faces significant waste management challenges due to its isolated geography, limited infrastructure, and increasing waste volumes from both residents and the growing eco-tourism sector. Despite existing efforts and support through regional programs like PacWastePlus, there is a need for private sector participation and investment to enhance waste management practices, modernize infrastructure, and develop sustainable waste processing solutions.

Key Investment Areas

Development and Modernization of Waste Disposal Facilities¹⁰⁶

Niue currently relies on two main landfills at Vaiea and Makato, neither of which meets modern environmental standards. These landfills lack leachate management systems, proper waste compaction processes, and emissions control. Investments are needed to upgrade these facilities, install leachate

management and waste compaction systems, and establish daily cover routines to improve environmental performance and minimize pollution risks.

Recycling and Resource Recovery Programs¹⁰⁷

The current recycling initiatives in Niue are limited, with a focus on aluminum can collection through the Niue Catholic Church Mission (CCM) and small-scale e-waste collections. A planned recycling facility is under construction and presents a strong investment opportunity for expanding recycling activities. Investors can participate in the development and operation of this facility to process aluminum, plastics, and other recyclables, while also supporting the implementation of a container deposit scheme to increase recycling rates and resource recovery.

Waste-to-Energy and Organic Waste Treatment Solutions¹⁰⁸

Organic waste accounts for the largest proportion of Niue's municipal solid waste. There is potential for small-scale waste-to-energy or composting projects to address this issue. Investments in anaerobic digestion or composting facilities can convert organic waste into biogas or soil conditioners, reducing landfill volumes, and providing renewable energy or agricultural inputs to support local communities.

Public-Private Partnerships for Waste Collection and Management¹⁰⁹

Waste collection services are available to nearly 99% of households, but there is a need to improve the efficiency of these services and reduce illegal dumping. Investors can explore opportunities for PPPs in waste collection and management services, bringing in expertise, technology, and capital to optimize waste collection logistics and reduce operational costs. This could include expanding collection services to cover commercial waste or providing specialized collection for bulky items, hazardous waste, or electronic waste.

Development of a Centralized Hazardous Waste Management Facility¹¹⁰

Niue lacks adequate facilities for managing hazardous wastes such as asbestos, e-waste,

and medical waste. Establishing a centralized hazardous waste management facility with proper storage, treatment, and disposal systems can fill this critical gap and help protect the environment and public health. Potential investment opportunities include the construction of a dedicated incineration plant, specialized storage units, or modern processing facilities for hazardous and medical waste.

Innovation in Waste Minimization and Circular Economy Practices¹¹¹

With increasing dependence on imported goods, the development of innovative circular economy initiatives presents an attractive investment opportunity. Investors can support initiatives that minimize waste generation and promote reusability, such as the introduction of sustainable packaging solutions, product buy-back schemes, or community-based waste reduction campaigns. Establishing local markets for recovered materials can also reduce the reliance on imports and provide new economic opportunities.

Regulatory and Institutional Support

The Government of Niue, through the Department of Environment (DoE), has demonstrated a commitment to improving waste management through strategies such as the National Integrated Waste Management Strategy (2010-2015). The DoE is responsible for designing and implementing waste management programs, while additional regulations under the Environment Act 2015 cover landfill development, recycling stations, and other waste-related activities. Continued support from regional programs such as PacWastePlus ensures a conducive environment for private sector engagement.

Strategic Considerations for Investors

Investing in Niue's waste management sector offers a unique opportunity to support sustainable development while achieving favorable returns. As a small, ecologically sensitive island, Niue faces challenges with limited land space and remote waste disposal. Investors can explore solutions such as decentralized waste management, composting, and waste-to-energy systems to address these challenges and reduce reliance on imports. These innovations align

with Niue's sustainability goals and have the potential to generate both environmental benefits and long-term economic returns.

PALAU

Current Context

Palau is the most western island group of the Caroline Islands, located in the Micronesia region of the Western Pacific Ocean. The archipelago of over 500 islands covers an area of 488 km², with a combined coastline of 1,519 km. Palau consists of two main islands, Babeldaob and Koror. The former is the largest island of Palau, comprising 10 of the country's 16 states, and is connected to Koror by way of a bridge. The total population is estimated to be around 17,400.¹¹²

Palau relies heavily on its pristine natural environment as a primary driver of its economy, with tourism accounting for around 50% of the national GDP. Visitors are drawn to Palau's unique biodiversity, clear waters, and vibrant coral reefs, making sustainable waste management a critical factor in maintaining the country's economic and environmental health.¹¹³

Palau faces several challenges that threaten both its environmental integrity and its ability to continue attracting tourists. The country's waste management infrastructure is limited, with existing landfills rapidly nearing capacity. The absence of proper waste treatment facilities, especially for hazardous and medical waste, further complicates waste disposal efforts. Hazardous waste, including used batteries, electronic waste, and chemicals, often ends up mixed with general waste due to a lack of specialized disposal options, posing risks to both public health and the environment.¹¹⁴

The challenges are compounded by Palau's geographic isolation and small population, which limit economies of scale in waste management operations. Recycling and exporting waste materials, such as plastics and metals, are difficult and costly, further contributing to the accumulation of waste on the islands. In addition, while Palau has implemented some public awareness campaigns, there is still a need to improve

local waste sorting practices and reduce reliance on single-use plastics, which make up a significant portion of the waste stream.

As tourism continues to grow, so too does the volume of waste generated by visitors, straining Palau's already overburdened waste management systems. Addressing these issues requires investments in waste reduction technologies, better waste treatment infrastructure, and more efficient recycling systems. Palau's government, with support from international partners, is exploring innovative solutions to manage waste sustainably, protect its natural resources, and preserve its status as a leading ecotourism destination.¹¹⁵

Key Investment Areas

Development of New Sanitary Landfill

The current landfill at Babeldaob, only opened 3 years ago, is filling up at a faster rate than expected, endangering the original projections of a 25-year lifespan. This has stressed the need for a more comprehensive waste management strategy.¹¹⁶

Investors can explore opportunities to develop and operate the new landfill through a PPP model, ensuring that the facility adheres to modern sanitary and environmental standards. Waste diversion and recycling activities will have to be prioritized in the short term, bringing new opportunities.

Expansion of Recycling and Resource Recovery Facilities

Palau has made some progress in recycling, particularly with aluminum cans and composting organic waste. However, recycling activities need to be expanded to include a broader range of materials, such as plastics and glass.¹¹⁷

Establishment of a larger recycling and materials recovery facility in Koror, with advanced sorting and processing capabilities, would reduce pressure on the landfill and create new economic opportunities. Investors can also consider partnerships to support the Beverage Container Recycling Regulation program, which has shown success since its introduction in 2011.

Hazardous and Medical Waste Treatment Facilities

Palau's hazardous waste, including used oil, batteries, and asbestos, lacks proper treatment and storage facilities. The Belau National Hospital and other dispensaries also struggle with the safe disposal of medical waste. There is an opportunity for an investment in specialized treatment plants for hazardous and medical waste, such as autoclaves and modern incinerators. Partnerships with the health sector and local authorities would be beneficial in setting up these facilities.

Composting and Organic Waste Processing

With over 26% of the municipal waste stream consisting of organic kitchen waste, establishing large-scale composting facilities could reduce landfill usage and generate organic fertilizer for local agricultural use.¹¹⁸ Investors could develop centralized composting operations in Koror, utilizing organic waste to produce compost that supports local agriculture or landscaping, enhancing the circular economy.

Waste-to-Energy Solutions

Palau's heavy reliance on imported fossil fuels presents both an economic and environmental challenge. With rising fuel costs and a growing need for energy security, waste-to-energy solutions offer a promising opportunity to diversify the country's energy portfolio while addressing waste management issues. Converting waste into energy would not only reduce the volume of waste destined for landfills but also provide a renewable energy source that supports the country's sustainability goals.¹¹⁹ Feasibility studies and pilot projects for small-scale WtE plants could explore the viability of converting organic and non-recyclable waste into electricity or heat energy, reducing dependency on imported fuels.

Strategic Considerations for Investors

Palau's solid waste management operates under the Environmental Quality Protection Act (1981) and the Recycling Act (2006). The Ministry of Public Infrastructure, Industry, and Commerce manages infrastructure and landfills, while the Environmental Quality Protection Board (EQPB) regulates waste storage, collection, and disposal. Investors

must comply with EQPB licensing to meet national environmental standards.

Palau depends on government funding and U.S. assistance through the Compact of Free Association. To reduce reliance on subsidies, investors can explore cost recovery models, green bonds, and impact investing to finance waste management projects. These mechanisms offer sustainable financing options for developing infrastructure and improving services.

Investing in Palau's waste management sector presents opportunities to address environmental challenges and support sustainable development. Strategic investments in infrastructure and financing mechanisms can reduce reliance on external funding, benefiting both the environment and local communities.

PAPUA NEW GUINEA

Current Context¹²⁰

Papua New Guinea (PNG) and its 600 offshore islands have a land area of approximately 462,840 km² with a combined coastline of 5,152 km. Located in the Melanesian region of the Southwestern Pacific Ocean, the country's capital is Port Moresby. Its population is estimated to be 7,200,000. A large proportion, approximately 6,254,000, or 87%, live in rural areas.¹²¹

PNG faces significant challenges in managing municipal solid waste, especially in urban centers like Port Moresby. Rapid urbanization, population growth, and changing consumption patterns have led to increased waste generation, overwhelming the country's already limited waste management infrastructure. The system suffers from fragmented waste collection, insufficient regulatory oversight, and inadequate funding.

Port Moresby, as the country's largest city, struggles with waste accumulation, illegal dumping, and overloaded landfills. Rural areas face even greater challenges, often lacking formal waste management systems altogether. Environmental degradation, especially from plastics, is a growing concern as waste pollutes waterways and threatens ecosystems. Limited public awareness and

widespread practices like open burning exacerbate these issues.

Additionally, PNG's waste management sector is hampered by insufficient government funding, limiting investment in modern technologies and recycling initiatives. The informal sector contributes to waste collection and recycling but remains unregulated, posing health and safety risks.

Despite these challenges, there is increasing recognition of the need for improvement. Opportunities exist for public-private partnerships (PPPs), regulatory enhancements, and investment in sustainable waste management practices. With a focus on capacity building and public awareness, PNG can reduce the environmental and health risks associated with poor waste management.

Key Investment Areas

Development of Modern Waste Management Infrastructure¹²²

Investment Opportunity: There is an urgent need to replace unregulated dump sites like Baruni with modern, engineered sanitary landfills that include environmental safeguards, such as leachate and landfill gas management systems. Investors can focus on developing these landfill facilities and waste transfer stations to streamline waste collection, reduce transportation costs, and improve overall service efficiency.

Rehabilitation and Upgrade of Existing Dumpsites

Investment Opportunity: Short-term remediation of unregulated waste sites, such as the Baruni dumpsite, is critical. Investment in remediation and upgrading existing dumpsites to mitigate environmental risks can prevent further environmental degradation, protect water sources, and improve public health outcomes.

Expansion of Waste Collection and Transportation Systems¹²³

Investment Opportunity: Expanding waste collection services and improving the efficiency of existing operations through investments in new collection vehicles, technology, and monitoring systems can enhance service delivery. A more reliable

collection system would reduce illegal dumping and improve public sanitation.

Promotion of Recycling and Resource Recovery Initiatives¹²⁴

Investment Opportunity: PNG lacks formal recycling infrastructure, but informal scavenging for valuable materials like metals and batteries is common. Establishing formal recycling facilities, including materials recovery facilities (MRFs) for metals, plastics, and organic waste, can promote a circular economy, creating safer and more profitable opportunities for local communities and reducing environmental impacts.

Development of Waste-to-Energy Projects¹²⁵

Investment Opportunity: PNG generates large volumes of organic waste and non-recyclable materials, presenting an opportunity for small-scale WtE projects in urban areas like Port Moresby. WtE technologies, such as incineration, gasification, or anaerobic digestion, can convert waste into energy, contributing to energy security while reducing waste volumes.

Improvement of Medical Waste Management Systems¹²⁶

Investment Opportunity: Hospitals and healthcare facilities in PNG currently lack functional incinerators, leading to unsafe disposal practices for hazardous and infectious waste. Investing in incinerators and centralized medical waste treatment facilities can ensure the safe disposal of medical and hazardous waste, supporting compliance with environmental and health regulations.

Strategic Considerations for Investors

Investing in solid waste management in PNG offers opportunities to address critical environmental and public health challenges while contributing to sustainable development. Strategic investments in infrastructure, recycling, and community engagement can significantly improve waste management outcomes, benefiting both the environment and local populations. Partnerships with local governments, leveraging PPPs, and incorporating modern technologies will be key to building a more

resilient and sustainable waste management system in PNG.

SAMOA

Current Context

Samoa comprises an archipelago of islands covering an area of 3,000 km² with a combined coastline of 403 km. It is situated in the central South Pacific region, forming part of Polynesia. There are 10 islands, six of which are uninhabited. The majority of the population lives on Upolu Island, where the center of government and the country's capital of Apia are located. Samoa's total population was 192,196 in 2016. A rural population of approximately 80%, or 153,756, was predominantly living in villages on the coastal fringes of the islands.¹²⁷

Key Investment Areas

Recycling and Waste Segregation Facilities

Investment Opportunity: Establish recycling facilities to process plastics, metals, and e-waste, coupled with investments in sorting and segregation centers to optimize the flow of recyclable materials and reduce landfill use. This approach can reduce the environmental footprint of waste while creating local jobs and promoting sustainable development and circular economy practices.¹²⁸

Composting Facilities for Organic Waste

Investment Opportunity: Develop composting sites to manage the high volume of organic waste generated by households and agriculture. Compost produced from these facilities can be used to support local agriculture, improving soil health and productivity. Reducing organic waste in landfills will also lower methane emissions, contributing to both climate resilience and sustainable agricultural practices.¹²⁹

Waste-to-Energy Projects

Investment Opportunity: Establish small-scale WtE facilities to convert organic waste and non-recyclable plastics into energy. These projects reduce Samoa's dependence on imported fuels while providing a sustainable energy source, thus enhancing

energy security, reducing waste volumes, and providing alternative energy for the island's grid.¹³⁰

Integrated Waste Management

Investment Opportunity: Develop collaborations between the government and private entities to build and operate waste management infrastructure, including landfills, transfer stations, and recycling facilities. PPPs could bring in technical expertise and investment capital, leading to improved efficiency and effectiveness in waste management operations, reducing the burden on the government, and fostering innovation in waste processing.¹³¹

Strategic Considerations for Investors

Investing in Samoa's waste management sector offers significant environmental and socio-economic benefits. Enhanced waste management practices will reduce pollution, promote recycling, and contribute to a healthier ecosystem. Additionally, the sector offers potential for job creation, energy production, and improved public health outcomes. Strategic investments and effective partnerships will enable Samoa to achieve a more sustainable waste management system that supports its development goals while addressing the challenges posed by its geographical isolation and limited resources.

SOLOMON ISLANDS

Current Context

The Solomon Islands is a Pacific Island nation comprising nearly 1,000 islands, covering a total land area of approximately 28,400 km². The country is home to a diverse population of around 700,000 people, many of whom live in rural areas and rely on subsistence farming, fishing, and small-scale agriculture for their livelihoods. The Solomon Islands has a rich cultural heritage, with over 70 distinct languages spoken, and its natural environment is known for its abundant marine and forest resources.

However, the country faces significant developmental and environmental challenges. The Solomon Islands is one of the least developed countries in the Pacific, with

high levels of poverty, limited infrastructure, and a reliance on foreign aid. The economy is largely driven by logging, fisheries, and agriculture, but unsustainable practices in these sectors, particularly in logging, have led to environmental degradation, deforestation, and threats to biodiversity.

The Solomon Islands is also highly vulnerable to the impacts of climate change, including rising sea levels, more frequent and intense cyclones, and increased flooding, which pose serious risks to coastal communities, agriculture, and infrastructure. The geographic spread of the islands creates logistical challenges for service delivery, particularly in health, education, and waste management, further complicating the country's development trajectory.

Despite these challenges, the Solomon Islands is working to diversify its economy, focusing on sustainable tourism, fisheries, and renewable energy. International development assistance, climate finance, and regional cooperation play critical roles in supporting the country's efforts to improve infrastructure, build resilience, and promote sustainable development.

Key Investment Areas

Development of Integrated Waste Management Infrastructure

The Solomon Islands faces considerable challenges in managing its waste due to rapid urbanization, population growth, and the unique geographic distribution of its islands. Waste generation is projected to increase by 3% annually, with Honiara, the capital, generating an estimated 25,000 tons of municipal solid waste (MSW) each year. The current waste management system is fragmented, with many areas lacking collection and disposal services, resulting in unregulated dumping and environmental degradation. The country's solid waste management issues are compounded by inadequate infrastructure, minimal enforcement of regulations, and limited funding and technical expertise.

To establish a comprehensive waste management system, including collection, disposal, and recycling facilities, the Solomon Islands would need an estimated USD 25-35 million over the next five years. This would

cover development in Honiara and selected provincial centers.

Disposal Sites

The Solomon Islands primarily relies on open dumping and poorly managed landfills for waste disposal. The primary landfill serving Honiara, Ranadi dumpsite, lacks basic environmental controls, resulting in contamination of water sources and coastal areas. The estimated capacity of Ranadi is 300,000 cubic meters, and it is expected to reach full capacity by 2025. There is a significant need for modernized disposal sites with proper leachate management, recycling facilities, and waste treatment plants. Developing localized waste management centers in provincial areas could also improve waste collection and reduce illegal dumping. The Asian Development Bank is financing the construction of a new landfill in Honiara, and this new site will open the opportunity to rethink waste management and include sorting facilities, composting, or other alternative treatment systems.

Establishing a new sanitary landfill with a capacity of 500,000 cubic meters, equipped with leachate management systems, gas capture, and waste sorting facilities, is estimated to cost between USD 10-15 million. Rehabilitation of the current Ranadi landfill could cost around USD 2-3 million to upgrade environmental controls and improve operational efficiency.

Waste Collection and Transportation Systems

Waste collection in Honiara covers only about 60% of the population, and services are concentrated along main roads and commercial areas. In rural areas, formal collection is virtually non-existent, leaving 40% of the population without access to waste management services. This has led to widespread illegal dumping and burning of waste, creating health risks and environmental damage.

Extending collection services to cover 100% of Honiara's population, as well as other key provincial centers, would require an investment of approximately USD 5-7 million. This would include the acquisition of 10-15 new waste collection vehicles, development of transfer stations, and route optimization. Public-Private Partnerships (PPPs) can

further enhance service efficiency, with outsourcing contracts in Honiara potentially generating annual revenue of USD 1-2 million for private companies while reducing operational costs for local governments.

Material Recovery and Recycling Infrastructure

Recycling activities in the Solomon Islands are limited, with only aluminum cans consistently collected and exported. The introduction of the single-use plastic ban has shown promise in reducing plastic waste, but broader recovery systems are needed. Setting up material recovery facilities (MRFs) in Honiara and Gizo could cost between USD 3-5 million per facility. These MRFs would include sorting lines for plastics, metals, and glass, as well as baling equipment for export. Expanding the capacity of existing recyclers could require an investment of USD 1-2 million, allowing them to handle a broader range of materials and improve profitability through economies of scale.

Organic Waste Management and Composting

Organic waste accounts for approximately 50% of the total waste generated in the Solomon Islands, particularly in markets and agricultural areas. Currently, there are no large-scale composting facilities, and most organic waste is either burned or dumped in landfills, contributing to greenhouse gas emissions and environmental contamination.

Establishing a composting facility capable of processing 10,000 tons of organic waste annually could cost around USD 1-2 million. This facility would convert organic waste into high-quality compost, supporting local agriculture and reducing landfill waste. Smaller-scale composting initiatives at the community level could be developed for USD 50,000-100,000 per community, creating a decentralized network of organic waste processing facilities.

Waste-to-Energy Projects

The Solomon Islands relies almost exclusively on imported diesel for energy generation, making electricity costs among the highest in the world. Waste-to-Energy projects could help address waste management issues while reducing dependence on imported fuels. Developing small-scale WtE facilities, such as

gasification plants, could cost between USD 5-10 million per plant. These facilities could process up to 20,000 tons of waste annually, generating 2-3 MW of electricity. Potential locations include Honiara, Auki, and Gizo.

Plastic Waste Reduction and Recycling

Plastic pollution is a major concern, especially in coastal areas and the marine environment. The government has introduced a ban on single-use plastics, but additional measures are needed to manage existing plastic waste and develop sustainable alternatives. Establishing networks for plastic collection and export could require USD 500,000-1 million. Developing local recycling plants to convert waste plastics into building materials or reusable containers could cost between USD 3-5 million.

E-Waste Management

E-waste management is a growing issue in the Solomon Islands, with large quantities of end-of-life electronics and vehicles abandoned in urban areas. Establishing a dedicated e-waste processing facility, including dismantling and refurbishment lines, is estimated to cost USD 1-2 million. Such a facility would enable safe disposal and potential reuse of electronic components.

Education, Policy Development, and Capacity Building

The Solomon Islands faces challenges in enforcing waste management regulations due to limited institutional capacity and financial resources. An estimated USD 500,000-1 million could be directed toward developing new waste management policies, regulatory frameworks, and enforcement mechanisms. Capacity-building programs for local authorities, waste management workers, and community leaders could require USD 200,000-500,000 over three years.

Conclusion

Investing in the waste management sector in the Solomon Islands offers significant opportunities to address pressing environmental and public health challenges while achieving positive economic returns. The estimated investment needs range from USD 25-35 million to establish a comprehensive waste management system. Targeted investments in infrastructure,

recycling, and community-based initiatives can create a resilient and sustainable waste management framework for the country, benefiting both the environment and the population.

TONGA

Current Context

Tonga is in the Polynesia region of the Central Pacific Ocean, covering 749 km² and with a coastline of 419 km. It has more than 170 islands, of which 45 are inhabited. Nuku'alofa, the capital, is located on the main island of Tongatapu.¹³²

Tonga, with a population of approximately 103,300 people, faces significant challenges in solid waste management (SWM). The majority of the population resides on the main island of Tongatapu, where Nuku'alofa, the capital, is located. Rapid population growth, urbanization, and increasing consumption patterns have led to a rise in waste generation. Waste management services are currently managed by Waste Authority Limited (WAL), established under the Tonga Waste Management Act (2005) and the Tongan Solid Waste Management Project (TOSWMP). Despite progress in waste collection and disposal, key issues remain, including limited landfill capacity, lack of recycling facilities, and inadequate hazardous and medical waste management.

Key Investment Areas

Waste Collection and Transportation Systems

WAL currently collects approximately 65% of urban municipal solid waste (MSW) and 25% of rural MSW, leaving about 10 tons of waste uncollected daily. This uncollected waste is often burned or illegally dumped, leading to environmental contamination and public health risks.

Investment Opportunity: USD 5-8 million over five years to expand waste collection networks, acquire new collection vehicles, and develop transfer stations. Expanding collection services to underserved areas would reduce illegal dumping, improve collection efficiency, and could generate

additional revenue of USD 1-2 million annually through user fees and service contracts.¹³³

Recycling and Resource Recovery Infrastructure

Recycling activities in Tonga are limited and primarily focused on metal recovery. Establishing material recovery facilities (MRFs) for plastics, glass, paper, and organic waste would improve recycling rates, reduce landfill use, and generate economic value.

Investment Opportunity: USD 3-5 million for developing MRFs with sorting and baling equipment, with an additional USD 1-2 million for community-level recycling centers to increase local engagement. This investment could yield potential revenue from recovered materials ranging from USD 500,000 to 1 million annually, depending on the volume and quality of recyclables.

Development of Integrated Waste Management Systems

The Tapuhia landfill, the primary disposal site for Tongatapu, faces operational challenges due to limited equipment and funding. The landfill is expected to reach capacity within 10-15 years, requiring new solutions for waste management.

Investment Opportunity: USD 10-15 million for expanding landfill capacity, implementing leachate management systems, and installing landfill gas collection technologies. This investment would ensure sustainable waste disposal while enabling the development of waste-to-energy solutions and reducing greenhouse gas emissions by 10-15%.¹³⁴

Hazardous and Medical Waste Management¹³⁵

Tonga lacks adequate facilities for hazardous and medical waste treatment, resulting in improper disposal practices and environmental risks.

Investment Opportunity: USD 1-3 million for establishing a dedicated hazardous and medical waste treatment facility, including incineration and autoclave systems. The facility would require an annual operating budget of USD 200,000-300,000, which could be covered by service fees from hospitals and industries, helping to mitigate

environmental risks and improve public health.

Public-Private Partnership Models for Waste Management

With limited government resources, there is strong potential for public-private partnerships (PPPs) to expand and modernize SWM infrastructure.

Investment Opportunity: USD 15–20 million over ten years for comprehensive SWM development through PPPs, including waste collection, landfill management, and recycling operations. PPPs would leverage private sector expertise, improve operational efficiency, and provide sustainable financing for long-term waste management solutions.¹³⁶

Strategic Considerations for Investors

Tonga presents significant opportunities for waste management investment, with clear prospects for enhancing the current system, addressing gaps in service delivery, and promoting sustainable practices. Strategic investments, particularly through public-private partnerships, can position Tonga to tackle waste management in a sustainable manner while generating environmental, social, and financial returns. An estimated USD 25–35 million is needed for a comprehensive SWM system over the next five years.

TUVALU

Current Context¹³⁷

Tuvalu is a small, low-lying nation consisting of nine atolls, spread across the Pacific Ocean, with a total land area of just 26 km². The country is highly vulnerable to environmental changes, especially climate change, due to its extreme geographic isolation and environmental fragility. Approximately 57% of Tuvalu's population lives on the main island of Funafuti, which covers just 2.4 km², leading to a high population density and exacerbating land use challenges.

Due to its limited land availability, geographic remoteness, and lack of infrastructure, Tuvalu struggles to manage waste effectively. The nation relies on subsistence living,

supplemented by remittances and aid, but its small economy has limited means to invest in necessary waste management systems. The influx of imported goods, combined with minimal recycling and waste processing capabilities, has led to mounting environmental challenges, particularly around solid waste management.

Key Investment Areas

Development of Integrated Waste Management Infrastructure

Tuvalu currently relies on open dumpsites and unmanaged waste disposal, posing environmental and health risks. Upgrading the existing dumpsite or developing a new, centralized sanitary landfill with proper environmental safeguards could significantly improve waste management outcomes. Investment in modern facilities equipped with liners, leachate collection systems, and methane gas capture technology could reduce environmental impacts. The projected investment requirement for these developments' ranges from USD 5–7 million for a new landfill, while upgrading existing sites would require approximately USD 2–3 million.

Improving Waste Collection and Transportation Systems

The current waste collection services on Funafuti are limited, with around 80% of households receiving services. The collection is often interrupted due to mechanical issues with the trucks, leading to illegal dumping and open burning.

Upgrading Equipment and Vehicles: Investment of approximately USD 500,000–1 million is needed to procure reliable waste collection trucks and improve maintenance capabilities. This would enhance service coverage and reduce illegal dumping and burning.

Introducing Segregation at Source: Implementing a system for segregating waste at the household level, particularly for green waste, could cost USD 200,000–300,000. This initiative would enable more effective composting and recycling activities.

Recycling and Resource Recovery¹³⁸

Recycling activities in Tuvalu are minimal. Although a small private sector business is engaged in metal recycling, the country lacks formal recycling facilities for other materials like plastics, glass, and e-waste.

Establishment of Recycling Facilities: Developing recycling facilities in Funafuti, with an estimated investment of USD 500,000–1 million, could serve as hubs for processing various recyclable materials and support waste diversion from landfills.

Expansion of Metal Recycling: Partnering with existing metal recycling businesses to scale up operations and support the establishment of a formal recycling facility could generate economic value and reduce waste volumes. The investment required for expansion is projected to be around USD 200,000–400,000.

Organic Waste Management and Composting¹³⁹

Organic waste constitutes about 50% of the total solid waste generated on Funafuti. There is potential for large-scale composting initiatives that can convert organic waste into valuable compost for local use.

Large-Scale Composting Facilities: Establishing a centralized composting facility could require an investment of USD 1–2 million. Such a facility would enable the diversion of a significant portion of organic waste from landfills and contribute to soil enrichment and local agricultural productivity.

Strategic Considerations for Investors

Close collaboration with national and local governments, as well as development partners like the Asian Development Bank and Japan International Cooperation Agency (JICA), is crucial for navigating the regulatory environment and securing co-financing. Opportunities exist to leverage concessional loans, green bonds, and climate finance to reduce investment risks and improve returns. Investments in education and awareness campaigns to promote waste reduction and proper waste disposal can complement infrastructure investments and support sustainable waste management practices.

With an estimated total investment need of USD 20-40 million, Vanuatu's waste management sector offers diverse opportunities across waste collection, disposal, recycling, and community-based initiatives. Strategic investments can drive significant environmental and economic benefits, positioning the country for sustainable growth while addressing critical public health and environmental challenges.

VANUATU

Current Context¹⁴⁰

Vanuatu is a Y-shape string of islands that runs in a northwest-to-southeast direction in the Melanesia region of the Pacific Ocean. Over 80 islands total a land area of 12,2812 km², with a combined coastline of 2,530 km. The largest cities are the capital, Port Vila (Island of Efate), and Luganville (Espiritu Santo, the largest island). Vanuatu's population in 2015 was approximately 277,500, with approximately 205,350, or 74%, living in rural areas.¹⁴¹

Vanuatu faces significant challenges in managing waste, particularly in rapidly urbanizing centers like Port Vila and Luganville. Urbanization and population growth are putting immense pressure on existing waste management systems, which are inadequate to meet rising demands. Improper waste disposal is leading to environmental degradation, including waterway pollution, and posing public health risks.

With plans for new townships in Efate and Santo to support tourism and economic development, the need for a comprehensive waste management strategy is becoming critical. This strategy must address the entire waste cycle, from collection and sorting to recycling and disposal, with a focus on sustainability. An integrated approach will mitigate environmental and health risks while supporting Vanuatu's broader development objectives.

The estimated investment required for a national integrated waste management system is between USD 20-40 million. This would cover infrastructure upgrades, technological improvements, and capacity building to ensure long-term waste solutions

for Vanuatu's growing urban population and tourism-driven economy.

Key Investment Areas¹⁴²

Development of Integrated Waste Management Infrastructure

Vanuatu currently relies on open dumpsites, which are unsustainable and pose serious health risks. Modern sanitary landfills with environmental safeguards, such as liners, leachate collection systems, and methane gas capture, are urgently needed. While Port Vila's Bouffa landfill has some of these features, it requires upgrades to operate efficiently.

Development of New Sanitary Landfills: Investment of USD 5-10 million per landfill in locations like Luganville and Lakatoro, which are expected to see increased waste due to development projects.

Improvement and Expansion of Bouffa Landfill: An estimated USD 3-5 million is needed to upgrade Bouffa landfill and add recycling facilities, further enhancing its environmental and economic impact.

Waste Collection and Transportation Systems¹⁴³

Waste collection in Port Vila is funded by the sale of disposal bags, with services gradually outsourced to private companies. However, rural areas lack formal collection systems, leading to improper disposal.

Expansion of Collection Systems in Urban Centers: Investment of USD 2-5 million in new vehicles and maintenance facilities would expand coverage and improve service quality, particularly in Port Vila and Luganville.

Development of Waste Transfer Stations: Transfer stations, costing USD 500,000-1 million each, would streamline waste transport, reducing costs and improving efficiency in urban areas.

Material Recovery and Recycling Infrastructure¹⁴⁴

Recycling efforts in Vanuatu are minimal, with most recyclables ending up in landfills or burned. A few private companies handle aluminum, steel, and e-waste, but there is a need for broader recycling infrastructure.

Establishing Material Recovery Facilities (MRFs): Investments of USD 1-3 million per MRF in Port Vila and Luganville would support sorting and processing recyclables, creating economic opportunities and reducing landfill pressure.

Supporting Existing Recycling Enterprises: Expanding operations of established recycling companies could cost USD 500,000-1 million, enhancing capacity through new machinery like compactors and balers.

Organic Waste Management and Composting¹⁴⁵

A large portion of Vanuatu's waste stream is organic. While small initiatives like V-Organic and HomeBiogas systems exist, most organic waste is still burned or sent to landfills.

Large-Scale Composting Facilities: A centralized composting facility would cost USD 1.5-2.5 million and could process organic waste from households and agriculture, producing compost for local use.

Anaerobic Digestion Systems: These systems could cost USD 500,000-1 million per unit and would generate biogas for cooking and digestate for agriculture. They could be deployed in rural or small community settings.

Waste-to-Energy Projects

Vanuatu relies heavily on imported fossil fuels, making it vulnerable to price fluctuations. Waste-to-energy projects offer the dual benefit of addressing waste challenges while enhancing energy security.

Small-Scale WtE Plants: Developing modular WtE plants could cost USD 5-10 million each, converting 30-50% of the waste (excluding organics and hazardous materials) into electricity or heat energy.

Plastic Waste Reduction and Recycling

Plastic pollution is a growing problem, particularly in coastal areas. A Container Deposit Scheme (CDS) is being developed to incentivize plastic container return and recycling.

Plastic Collection and Export Systems: Investment of USD 500,000-1 million

could establish networks for collecting and exporting PET bottles and other plastics.

Plastic Recycling Facilities: A plant to recycle plastic into useful products like building materials would cost USD 3-5 million, supporting local industries and reducing environmental harm.

Strategic Considerations for Investors

Investing in Vanuatu's waste management sector presents opportunities to address critical environmental and public health challenges while contributing to the country's sustainable development goals. Strategic investments in modern infrastructure, waste-to-energy projects, and recycling

facilities can generate long-term returns while protecting Vanuatu's natural beauty and supporting its growing tourism industry. The estimated USD 20-40 million required over the next five years will enable the development of resilient waste systems that align with both economic growth and environmental sustainability.





12. Investment Risks and Barriers

Financial, Legal, and Logistical Challenges

Investors in Pacific Island Countries face significant financial and logistical hurdles due to geographic isolation, underdeveloped infrastructure, and regulatory inconsistencies. For example, Vanuatu and Solomon Islands both experience challenges in transporting waste, materials, and equipment between islands. In Vanuatu, the Bouffa landfill serving Port Vila incurs high operational costs due to infrequent shipping routes and underdeveloped port facilities. Additionally, achieving economies of scale is difficult because of the small market size on each island, which leads to higher transportation and logistics costs.

Regulatory challenges also create barriers for investors. In Papua New Guinea, waste management regulations differ significantly between provinces, complicating efforts to implement waste-to-energy or recycling projects. Investors often need to navigate complex bureaucratic processes, which can delay project timelines. The regulatory frameworks across PICs are not standardized, leading to confusion and difficulties in ensuring compliance with waste management policies. In contrast, Fiji's regulatory landscape is more advanced, with the government making strides to improve environmental standards. However, in smaller PICs, the processes remain slow and under-resourced.

Foreign Exchange, Corruption, and Money Laundering Risks

Foreign exchange (FX) volatility is a persistent issue in PICs. For instance, Solomon Islands and Kiribati have highly dependent, small-scale economies, and their currencies fluctuate in value due to reliance on foreign aid and remittances. In Samoa, FX risks are significant, with fluctuations in the Samoan Tala leading to increased costs for importing waste management technologies and exporting recyclables. Limited access to foreign exchange can also hinder the repatriation of profits, as seen in Tuvalu, where foreign currency reserves are often scarce, increasing investor risks.

Corruption and money laundering risks are also prevalent in some PICs. For example, Papua New Guinea has faced scrutiny for corruption in the awarding of contracts, particularly in infrastructure and environmental services. Similarly, Fiji has been flagged for money laundering risks, requiring investors to conduct thorough due diligence on financial institutions. The Financial Action Task Force (FATF) placed Vanuatu on its list of countries with strategic AML/CTF deficiencies, which adds another layer of compliance burden for investors.

In Solomon Islands, weak banking infrastructure limits access to financial services, complicating efforts for businesses to manage cash flows effectively. To mitigate these risks, companies must adhere to international standards like AML regulations and conduct enhanced due diligence before entering into partnerships with local entities.

Political and Economic Instability

Political instability is a critical concern for investors in many Pacific Island nations. Solomon Islands, for example, has experienced political unrest and changes in government, leading to disruptions in infrastructure projects, including waste management initiatives. In 2019, Vanuatu faced significant delays in the rollout of waste collection and recycling projects due to shifts in government priorities. Frequent changes in leadership can result in new administrations reversing or deprioritizing ongoing projects, impacting investor confidence.

Economic instability, such as currency fluctuations and inflation, is a common issue across the region. Papua New Guinea has seen rapid devaluation of its currency, the kina, making it difficult for investors to project long-term costs. Economic volatility, coupled with a reliance on imports, affects both the cost of equipment and the viability of waste-to-energy and recycling projects. In Kiribati, the small size of the economy and reliance on foreign aid make it particularly vulnerable to external shocks, creating uncertainty for investors seeking long-term returns.

To mitigate these risks, investors often look to engage in projects backed by multilateral development banks like the Asian Development Bank (ADB) or the World Bank, which can provide both financial support and political risk insurance. For instance, Tonga has seen greater investment in its waste management sector through ADB-backed projects, which help shield investors from political risks.

Corruption and Ethical Considerations

Corruption remains a barrier to sustainable investment in several PICs. In Papua New Guinea, high-profile cases of corruption have led to delays and disruptions in infrastructure projects, including waste management facilities. Investors must contend with demands for bribes and unethical practices, particularly in local contracting processes. Similar issues have been noted in Fiji and Solomon Islands, where business practices can be opaque, and government officials may lack transparency in awarding contracts.

Recent reforms in Fiji have been implemented to address these issues, with government efforts to improve transparency and reduce corruption in public-private partnerships (PPPs). However, in smaller PICs like Tuvalu and Kiribati, institutional capacity remains weak, and regulatory oversight is often minimal.

To mitigate corruption risks, investors should establish clear anti-corruption policies and ensure compliance with international frameworks like the U.S. Foreign Corrupt Practices Act (FCPA) and the UK Bribery Act. Investors should also implement regular audits and transparency measures in their operations. Samoa has made some progress in fostering more transparent business practices through its partnerships with international NGOs and development banks, which can serve as a model for other PICs.





13. How Improved Waste Management Systems Contribute to Achieving SDGs

SDG 1: No Poverty

Improved waste management systems can significantly contribute to poverty reduction in Pacific Island Countries by creating employment, empowering communities, and supporting the formalization of informal sectors.

Job Creation and Economic Empowerment: Establishing waste management infrastructure such as recycling plants, composting facilities, and waste-to-energy plants can generate employment opportunities, particularly in rural and outer island communities where job markets are limited. This can boost local economies and reduce poverty levels. Formalizing informal waste management activities through cooperatives or partnerships with local governments can also enhance income security for vulnerable groups, including women and youth.

Resource Recovery and Cost Savings: Encouraging local recycling and upcycling of waste materials like plastics, glass, and organic waste can reduce dependence on imported goods, stabilize prices for essential items, and create value chains that support low-income communities. By turning waste into valuable resources, communities can generate cost savings and new revenue streams.

Social Safety Nets and Financial Services: The formalization of

employment in the waste management sector can provide access to financial services such as microcredit and savings programs. This is particularly relevant for remote communities where access to banking and financial services is limited, helping lift families out of poverty.

SDG 3: Good Health and Well-being

Improved waste management directly influences public health outcomes by reducing pollution and preventing disease transmission.

Reduction in Pollution-Related Health Issues: Open burning of waste and uncontrolled dumping lead to air and water pollution, which causes respiratory issues and contaminates drinking water sources. Investments in modern disposal methods, such as sanitary landfills with emissions controls and community-based incinerators, can significantly reduce these health risks.

Safe Disposal of Hazardous and Medical Waste: Establishing dedicated facilities for hazardous and medical waste can reduce the risk of chemical exposure and the spread of infectious diseases. Investments in affordable technologies like autoclaves and solar-powered incinerators ensure that medical waste is treated safely.

Clean and Safe Living Environments: Public health campaigns that promote

proper waste disposal practices and community-level waste management initiatives can improve living environments, reduce disease vectors, and support overall community health.

SDG 6: Clean Water and Sanitation

Effective waste management is essential for protecting water resources and enhancing sanitation services in PICs.

Protection of Water Resources: Sanitary landfills with proper leachate management systems prevent groundwater contamination, ensuring access to clean water for communities. These facilities are particularly important in atoll nations with limited freshwater resources.

Reduction of Marine Pollution: By improving coastal waste management, PICs can significantly reduce the flow of plastics and other pollutants into the ocean, protecting coral reefs and marine biodiversity.

Enhanced Sanitation Services: Integrating waste management processes with decentralized wastewater treatment solutions, such as biogas digesters, can improve sanitation and reduce environmental pollution.



SDG 7: Affordable and Clean Energy

Waste-to-energy projects can provide an affordable and renewable energy source for PICs, reducing reliance on imported fossil fuels and enhancing energy security.

Waste-to-Energy Projects: Developing small-scale WtE plants can convert municipal solid waste, agricultural residues, and marine debris into electricity or heat, providing a sustainable energy source for islands with high energy costs.

Biogas Production from Organic Waste: PICs generate substantial organic waste, which can be processed into biogas through anaerobic digestion. This biogas can be used for cooking, heating, or electricity generation, offering a clean energy source, particularly for rural areas with limited access to traditional energy sources.

Reduction of Greenhouse Gas Emissions: Capturing methane gas from landfills and converting it into energy can significantly reduce greenhouse gas emissions, helping PICs meet global climate goals.

SDG 8: Decent Work and Economic Growth

Improved waste management systems can stimulate economic growth by creating new industries, promoting entrepreneurship, and supporting the transition to a circular economy.

Industrial Growth and Diversification: Establishing recycling industries can create new value chains and promote economic diversification in PICs. Recycled materials, such as plastics and metals, can be repurposed into consumer goods, stimulating economic growth while reducing environmental impact.

Support for Green SMEs: Enhanced waste management infrastructure can support the growth of green SMEs focused on waste reduction, recycling, and sustainable product design. These enterprises can drive innovation and introduce locally relevant solutions that create economic value.

SDG 14: Life Below Water

Improved waste management can significantly reduce marine pollution and protect coastal ecosystems.

Marine Pollution Reduction: Investments in waste management infrastructure, such as waste traps and coastal collection systems, can prevent plastics and other pollutants from entering the ocean, safeguarding marine biodiversity and supporting sustainable fisheries.

Protection of Coastal Ecosystems: Combining waste management strategies with coastal zone management can prevent harmful runoff and land-based pollution from degrading coral reefs and mangrove ecosystems, ensuring the long-term health and productivity of these vital resources.

Improved waste management practices are essential for advancing multiple SDGs in Pacific Island Countries. Strategic investments in waste management infrastructure, community engagement, and sustainable development can unlock environmental, social, and economic benefits, contributing to resilient and thriving communities across the region.



14. Investor Perspectives on the Solid Waste Sector in the Pacific Islands

A survey was conducted to gather insights into investor sentiments regarding the waste management sector in the Pacific Islands. Responses were collected from four investor groups actively engaged in this sector—these are based in the United States, the Netherlands, Switzerland and Fiji. The consolidated findings are summarized below:

Market Potential

How would you assess the market potential for solid waste management in Pacific Islands? What factors make this region attractive or challenging for investment?

“The market potential for solid waste management and recycling in Fiji and the broader Pacific Islands is influenced by a variety of factors, including environmental and health concerns, population size, economies of scale, waste generation trends, existing infrastructure, geographic considerations, land tenure complexities, regulatory challenges, and financing opportunities. The market requires local knowledge and experience to be assessed accurately. Creating an ecosystem of waste and recycling businesses is attractive as it addresses a major environmental and service issue but challenging due to stakeholder complexity and capability-building requirements.”

“Solid waste management is an untapped sector in the Pacific Islands with significant potential for growth. With increasing population and tourism, waste generation is rising, creating opportunities for new services and technologies. Recycling and waste-to-energy projects appear to be the most promising in the current landscape.”

“From a purely financial standpoint, the small population size and fragmented markets make it challenging to achieve the scale required for profitability. There’s little to no demand for high-value services, and the lack of a viable recycling market or waste valorization value chain means the revenue streams are not sufficiently diversified.”

“The market would primarily depend on valuable materials that are recoverable from wastes (either mixed or single stream), such as PET, PE, PVC plastics, metals and plastics from WEEE (waste from electrical and electronic equipment) and

disposed vehicles (here including waste tires). This is due to the lack of waste treatment fee to be paid by local governments and lack of market for materials such as compost. Biogas could be an option if the OPEX can be covered sufficiently by revenue streams.”

“The waste sector is complicated, with relatively low margins, even in developed economies. Logistics and lack of industrial processes make it challenging to invest in the sector”.

Regulatory Environment

How does the regulatory landscape in the Pacific affect investments in waste management? Are there any policies or incentives that particularly stand out, either positively or negatively?

“Ease of doing business is an issue in Fiji, with slow turnaround times for Environmental Impact Assessments (EIAs). While Fiji has recycling incentives and tax-free zones for recycling companies, few businesses have been able to access these benefits. Clearer guidelines and streamlined processes could significantly support investment.”

“The regulatory environment in the Pacific varies greatly between countries. Some, like Fiji and Samoa, have supportive policies, but enforcement remains inconsistent.

Bureaucratic red tape and a lack of coherent national waste strategies can hinder investment.”

“The absence of clear guidelines on waste management, combined with bureaucratic hurdles and lengthy approval processes, increases uncertainty and risk. The lack of robust incentives, such as tax breaks or subsidies, means there’s little financial justification to invest.”

“The lack of regulatory incentives and fee-collecting systems are the main hindrance for investing in waste management. Setting up the principle of “waste producers pay” could help local governments to collect waste treatment fees and enable payment for waste management services (from collection to treatment to final disposal) that would yield a return-generating business for investors.”

Operational Challenges

What operational challenges—such as logistics, infrastructure, or transportation—affect the viability of waste management projects in the Pacific?

“Capability and knowledge transfer represent the biggest operational challenges in the region. The high cost of overcoming these barriers erodes margins to the point where projects struggle to break even.”

“The islands’ geographical isolation leads to prohibitive transportation costs, and the underdeveloped infrastructure exacerbates these issues. Moving equipment and personnel across multiple islands is a logistical nightmare, and the limited availability of skilled local labor further complicates operations.”

“Building the necessary infrastructure or establishing regional processing hubs could help address these challenges, but these require significant upfront investment.”

“In general, there’s a lack of operational capacity/experience in waste management infrastructure. So, there is a need to build capacity of local government as well as businesses on how to operate a waste management infrastructure, how to deal with operational hiccups and minimize operational costs. Transportation can be hindered by lack of road infrastructure.”

Local Partnerships

How important are local partnerships to the success of waste management projects in the Pacific Islands? What qualities do you seek in a local partner?

“Local partnerships are incredibly important from a trust perspective, particularly relating to land tenure and usage. We are local and have spent many years building trust with stakeholders, especially landowners.”

“Local stakeholders, including municipalities and community groups, understand the unique social and cultural contexts of each island. Collaborating with local partners ensures that projects are tailored to local needs, enhancing their long-term sustainability.”

“Partnering with local entities can lead to misalignment of objectives, especially when the focus is on financial returns. Additionally, local partners may lack the necessary experience in complex waste management projects, which can lead to delays and suboptimal project outcomes.”

“Not-in-my-backyard mentality requires good planning in selecting sites and engaging local communities. Thorough engagement, consultation, and in some cases compensation systems are needed to avoid deadlocks. Partnerships with local government, waste feedstock providers, and off takers of recovered and recycled materials and energy are essential to ensure business robustness.”

“As an international financier, it is essential to work with local partners that have extensive experience in the country and/or region. They can help overcome many challenges and suggest models that wouldn’t necessarily work in other places”.

Technology and Innovation

Are there any waste management technologies or innovations that have been particularly effective in the Pacific context?

“We have focused on affordable solutions, with technologies that are resilient in tropical contexts. Our concept is a capped landfill as a backbone with basic separation services, which are then on-sold to an ecosystem of largely existing small and medium-sized enterprises (SMEs). These SMEs’ growth into upcycling needs to be supported.”

“Innovations like small-scale waste-to-energy systems and mobile waste processing units have shown promise. Given the limited land availability and high transportation costs, decentralized solutions are often more effective.”

“Maintenance and repair of advanced waste management technologies are difficult given the limited availability of parts and expertise. Many technologies that work in larger, more developed

markets don't scale down well, making it hard to justify the capital expenditure required."

"Collection to prevent dissipation into the environment and the sea is the first step. Then, sorting technologies that are affordable and effective to sort our recyclable materials are the second step. Typically then, one needs to look at which material or energy would make business sense and choose a technology to produce those accordingly."

Financing and Returns

What financing models or structures have worked best in the region? How do you balance financial returns with social and environmental impact? What do investors expect in terms of financial returns (IRR)?

"We intend to be an equity investor, alongside other equity and debt investors. As a local organization, we address the barrier of the government not wanting foreign ownership of public services and infrastructure. Our long-term exit strategy is ownership by the people (i.e., the users of the service). The IRR is not high (mid-high single digits), in line with what the users can afford."

"Financing models that blend public and private capital, such as public-private partnerships (PPPs), have been effective. Returns in the region are generally lower compared to larger markets, with expected IRRs typically ranging from 8-12% for commercial projects."

"The financing environment is problematic. There's a heavy reliance on concessional funding, which skews the financial landscape and makes it difficult for private investors to find their footing."

Expected financial returns are relatively low, typically below 10% IRR, making it hard to justify the investment given the risk levels."

"For municipal waste, PPP is a good model. For private waste, private contracts with companies are usually in place."

"Microfinance has been effective in other sectors, although the need of strong local partners is essential."

Risk Mitigation

What are the primary risks associated with investing in waste management in the Pacific, and how can they be mitigated?

"The primary risks associated with investing in waste management in the Pacific include country operational and political risks. Partnering with experienced local entities is a key risk mitigation strategy."

"Currency risks are significant, and hedging can be prohibitively expensive. Political risks are also high, with frequent policy shifts and lack of government stability. There's also the risk of local community opposition, which can arise unpredictably and derail projects."

"Investing in local capacity-building and workforce development programs is crucial to overcoming the skills gap and ensuring project continuity."

"The primary risk is the lack of revenue and the lack of certainty of revenue. Often the payment contracts are not long-term enough (often less than 5 years, while a plant runs for 15-20 years). Securing long-term contracts with fixed prices

can be a good strategy, but they are often hard to come by."

Lessons Learned

What key lessons have you learned from your experience in waste management investments in the Pacific Islands?

"Being local is the key to delivering a successful proposition. Developing trust and understanding the cultural nuances are crucial for the long-term success of projects."

"One of the key lessons learned is the need for thorough due diligence and an understanding of local contexts. Overlooking cultural nuances or local market dynamics has led to failed projects in the past. Being flexible and adaptive in project design and implementation is crucial."

"The Pacific Islands are not an ideal region for commercially driven investments in waste management. Projects often get bogged down by regulatory issues, and the expected returns rarely justify the time, effort, and capital investment required."

Advice to Investors

What advice would you offer to others considering investing in waste management projects in the Pacific?

"Work with a local investment manager and developer, and ensure the operators and contractors have deep experience in the country/region."

"New investors should spend time understanding the regulatory environment and forming strong local partnerships. The Pacific market is different from other

regions, and a one-size-fits-all approach will not work.”

“Unless you have a compelling non-financial reason to invest, consider redirecting your capital to regions with a more favorable risk-return profile.”

“Have security in the waste feedstock and sales of outputs with long-term contracts and predictable prices (15 to 20 years). Easier to deal with wastes from private companies and industries because you don’t have to go through government processes. Work in places where there is an existing PPP framework. Don’t aim for high-tech expensive solutions, be focused on one well-existed technology. Try to include value-add steps in the process, example would be to produce plastic flakes after recovering waste plastics.”

Future Outlook

What trends or shifts do you foresee shaping the future of solid waste management investments in the Pacific Islands? Which waste management sub-sectors have the highest potential for investment growth?

“A hub-and-spoke model, starting with solutions in the larger economies, is the most viable. Waste-to-energy is too expensive, and we do not have the volumes or calorific value in the waste stream to make WtE viable. Recycling is needed to make waste solutions financially viable in the Pacific Island Countries (PICs).”

“I see growing interest in sub-sectors like recycling and waste-to-energy, particularly in the context of the circular economy. Waste-to-energy projects could address both waste disposal issues and energy shortages.”

“The recycling and waste-to-energy sectors are constrained by logistical and economic factors, and without significant external support or subsidies, the growth potential is negligible. Hazardous waste management could become more prominent as industrial and healthcare sectors grow, but it’s a high-risk niche with limited returns.”

“Recycling of plastics, especially those that are not yet recycled”.

Open Reflections

Is there anything else you’d like to share on investing in the Pacific’s waste management sector?

“The Pacific Islands have unique challenges but also offer unique opportunities. The key is to approach investments with a mindset of contributing to sustainable development and recognizing the socio-economic and environmental benefits.”

“Seek concessional capital and grant funding to de-risk projects at an early stage and reduce investment costs.”

15. Strategic Financial Approaches, Risk Mitigation, and Policy Recommendations for Investing in the Waste Sector

Best Practices for Designing Financial Structures

Blended Finance Approaches:

Leverage a combination of concessional finance (e.g., grants, low-interest loans from development banks) and private capital to reduce investment risks and attract diverse funding sources. Concessional finance lowers the overall cost of capital and serves as a risk-mitigation tool, making the project more appealing to private investors. It can also support the social and environmental goals of a project, ensuring a balanced approach that aligns with sustainable development objectives.

Equity Investments:

Encourage private investors to participate as equity holders to align their interests with the long-term success of the project. Equity investments allow investors to share in the rewards while also distributing risks more equitably. Structuring projects to include equity investment can help achieve a balanced risk-return profile and foster a sense of ownership and commitment to project outcomes.

Blended Finance Approaches

Concessional Finance:

Concessional finance, such as grants, low-interest loans, or guarantees from development banks, is instrumental in de-risking waste management investments in the Pacific. These funds reduce the financial burden on private investors and encourage commercial capital participation, especially in projects with high environmental or social impact but low short-term returns. Development banks like the Asian Development Bank (ADB) and the World Bank play a crucial role in bridging funding gaps, making otherwise unfeasible projects more attractive to private investors.

Equity Investments:

Equity participation helps distribute ownership among various investors, aligning their interests with the project's long-term success. In waste management, equity investments encourage collaboration between public and private stakeholders, attracting investors interested in steady growth and stability rather than quick profits. This form of financing provides long-term investors with ownership, creating alignment between financial returns and the sustainability of the project.

Public-Private Partnerships (PPPs):

PPPs are well-suited for the Pacific Islands, where governments may lack the capital or technical expertise for large-scale waste management infrastructure. By combining public oversight and private sector efficiency, PPPs enable effective resource sharing, risk management, and innovation. Reviewing and improving existing PPP frameworks can make these collaborations more effective in tackling the unique waste management challenges in the region.

Build-Operate-Transfer (BOT) Model:

The BOT model can be an effective solution for infrastructure development in the waste management sector in the Pacific. Under this model, government grants a concession to private companies to finance, build, and operate a project. The company operates the project for a period of time (typically 20 or 30 years) with the goal of recouping its investment, then transfers control of the project back to the public entity. BOT structures provide governments with access to private capital and expertise, while also allowing for long-term public control over critical infrastructure once the project is financially stable. In regions with limited public funding, BOTs can

accelerate the development of modern waste management solutions.

Risk Sharing and Mitigation

Guarantees and Insurance Products:

Leverage financial instruments like partial risk guarantees or insurance to mitigate risks associated with construction delays, operational challenges, or revenue shortfalls. These tools help protect investors by reducing financial exposure to unforeseen events, ensuring that projects remain viable even under challenging conditions. They also increase investor confidence, making the project more attractive to potential backers.

Performance-Based Incentives:

Incorporate performance-based clauses in contracts that align payments with specific operational outcomes such as service quality, efficiency, and sustainability. This ensures that operators and stakeholders remain accountable, driving continuous improvement in operations and aligning their goals with the success of the project. These incentives can enhance efficiency and boost long-term project viability by directly linking financial rewards to desired outcomes.

Sustainable Financial Models

Revenue Diversification:

Develop multiple revenue streams, such as through energy sales (in the case of waste-to-energy projects), sales of recyclable materials, or service fees. Diversifying income sources reduces reliance on a single revenue stream, improving the financial resilience of waste management projects. This approach ensures that projects remain financially sustainable even if one stream underperforms, balancing risk across multiple income channels.

Life Cycle Cost Analysis:

Perform a comprehensive life cycle cost analysis that accounts for capital expenditures, maintenance, operational costs, and eventual decommissioning of waste management facilities. This provides a more accurate financial picture over the long term, helping identify cost-saving opportunities and areas for operational improvement. Life cycle analysis allows investors to better plan for the total financial commitment, optimizing returns while ensuring operational efficiency.

Policy and Regulatory Support

Stable Policy Environment:

Governments must ensure a consistent and supportive policy framework that encourages long-term investment in waste management. Reducing policy uncertainty increases investor confidence, fostering greater private sector participation in the sector.

Transparency:

Transparent regulatory processes build trust with investors, making project approvals smoother and reducing the likelihood of delays. A clear regulatory environment helps avoid hidden costs and surprises during project execution.

Incentive Structures:

Implement incentives such as feed-in tariffs for energy generated by waste-to-energy plants, providing a guaranteed price for energy sold to the grid. This encourages investment by improving financial returns. Additional subsidies for recycling or waste collection services can reduce operational costs and make projects more commercially viable.

Regulatory Reforms:

Streamline and simplify regulatory processes to lower entry barriers for investors. Fast-track permitting, clearer guidelines, and standardized environmental regulations can

significantly reduce delays and facilitate more efficient project implementation.

Recommendations for Structuring Investment Interventions

Best Practices for Financial Structures:

When structuring waste management investments, it's essential to design models that effectively balance risk and reward across various stakeholders. Multi-tiered investment structures can allocate risk among governments, development banks, and private investors, ensuring that each party's exposure matches their capacity and expertise. This structure should also incorporate environmental, social, and governance (ESG) metrics to meet sustainability objectives.

Blended Finance Approaches:

Blended finance combines concessional capital (grants, low-interest loans) with private investments to reduce risks and attract commercial financing. By using concessional finance to absorb the higher risk or low-return portions of a project, private investors can focus on areas with a higher probability of returns. This approach is particularly useful in waste management, where environmental benefits might outweigh financial returns in the short term. For instance, waste-to-energy projects that involve complex technology could leverage concessional capital to finance initial infrastructure while private equity is allocated for operational stages, where returns are more predictable.

Risk Sharing and Mitigation:

Mitigating financial and operational risks is crucial for ensuring the long-term sustainability of waste management projects. This can be achieved through mechanisms like partial risk guarantees, performance-based incentives, and insurance products that cover specific risks such as delays, cost overruns, or operational shortfalls. Governments and development banks can backstop these risks, making the projects more attractive to private investors.

Structuring contracts with clear performance-based milestones linked to disbursements and rewards ensures accountability and maintains alignment between all stakeholders.

Local Capacity Building:

Building local capacity is essential for the success and sustainability of waste management projects. This includes providing training programs for local personnel to operate and manage waste facilities effectively, reducing reliance on external expertise. Capacity building should also extend to governance, with training for local authorities in regulatory oversight, enforcement, and project management. Investments in technology transfer, where advanced technologies are brought in by international partners, should include knowledge-sharing initiatives to ensure local teams can maintain and innovate

on these solutions post-handover. Collaborative partnerships between foreign investors and local entities are key to establishing long-term operational resilience.

Technology Transfer and Best Practices:

Facilitate the transfer of advanced waste management technologies, particularly in waste-to-energy, recycling, and hazardous waste treatment. Establish programs that encourage partnerships between foreign investors with technical expertise and local operators to ensure the seamless introduction and operation of modern solutions. Sharing best practices from regions with similar challenges, such as small island developing states (SIDS), can further enhance project design and execution, improving overall project outcomes and sustainability.



16. Conclusion

Final Thoughts

Investing in waste management in PICs is not just an economic opportunity but a critical intervention to safeguard the health and well-being of island communities and protect fragile ecosystems. By embracing innovative financial models, strengthening regulatory support, and fostering collaboration among stakeholders, it is possible to transform the waste management sector into a driver of sustainable development and resilience. The time to act is now, and with strategic investments and strong partnerships, the Pacific Island Countries can set a global example in addressing waste management challenges while advancing their sustainability goals.

The waste management sector in the Pacific Island Countries has the potential to offer a unique convergence of impact, financial returns, and transformative development. While the region faces challenges such as geographic isolation, limited resources, and complex cultural contexts, it also presents substantial investment opportunities for a diverse range of investors, including impact investors, the Pacific diaspora, and traditional capital sources seeking compelling returns.

Current waste management practices in many PICs are inadequate, leading to severe environmental degradation and public health risks. However, with targeted investments, this sector can be transformed into an engine for sustainable growth, environmental resilience, and improved quality of life for local communities.

The sector benefits from strong government support and a robust network of funding sources, including international donors, philanthropic foundations, and concessional finance providers. By translating this government support into strong policies and incentives, these sources of blended finance can be strategically leveraged to de-risk private investments, making the sector attractive not only to those with an impact focus but also to commercial investors seeking new market opportunities.

Key investment areas include:

1. Recycling and Waste Valorization:

Establish decentralized recycling hubs and advanced waste processing technologies to reduce landfill dependency and create value-added products. This sub-sector is

supported by multiple donor and philanthropic programs focused on building a circular economy, enhancing local entrepreneurship, and fostering sustainable business growth. These efforts create a strong foundation for impactful and profitable ventures that can attract support from both impact investors and the Pacific diaspora interested in contributing to their communities.

2. Waste-to-Energy Projects:

High energy costs and waste management deficits present a lucrative opportunity for waste-to-energy solutions, such as biogas plants and resource recovery facilities. The combination of government incentives and support from donors and concessional finance providers makes this sector particularly attractive for investors. Projects in Fiji, Samoa, and Papua New Guinea can capitalize

on both public and private funding streams, making waste-to-energy initiatives viable and profitable while contributing to energy security and environmental sustainability.

3. Organic Waste Management:

Organic waste accounts for a significant portion of the waste stream in PICs, creating opportunities for investments in composting facilities and biogas production. Donor-backed programs focused on agriculture and food security offer additional financial support, reducing the upfront risk for private investors. Overseas Pacific Islanders can also engage in these projects, contributing to climate

resilience and sustainable agricultural practices that benefit their home countries.

The Pacific's waste management sector is bolstered by numerous supportive initiatives from governments, multilateral organizations, and blended finance mechanisms. This comprehensive support landscape significantly de-risks investments, making it a compelling proposition for both traditional and impact-focused investors.

Government policies and incentives—including tax breaks, subsidies for recycling programs, and fast-track permitting for strategic projects—can potentially enhance the sector's

attractiveness. Combined with concessional finance, these measures can bridge financing gaps and enable the execution of high-impact projects that generate stable returns.

Investing in the Pacific Islands' waste management sector is not only about addressing an urgent need; it's about seizing a compelling financial opportunity supported by an ecosystem of partnerships and resources. Strategic investments can generate sufficient financial returns, while at the same time fostering environmental and social benefits that contribute to a sustainable and prosperous future for the region.



Annex I: Analysis of Public-Private Partnership Frameworks

Public-Private Partnerships (PPPs) have emerged as a viable model for addressing the waste management challenges in PICs, where resources are often limited, and infrastructure needs are substantial. In some countries, well-structured PPP agreements have led to the development of modern waste management facilities and services, with clear roles and responsibilities defined for both public and private entities. However, challenges such as lengthy contract negotiations, inadequate risk-sharing mechanisms, and a lack of capacity within local governments to manage complex PPP projects often hinder the effectiveness of these partnerships. The analysis will also provide recommendations for enhancing PPP frameworks, such as improving the legal and regulatory environment, offering financial guarantees, and building government capacity to oversee and manage PPP projects.

Several countries around the world have developed well-structured Public-Private Partnership (PPP) agreements that have successfully led to the development of modern waste management facilities and services. Here are a few examples:

Singapore:

Tuas Nexus Integrated Waste Management Facility: Singapore has implemented several successful PPPs in waste management, with the Tuas Nexus being one of the most notable. This facility is the world's first integrated waste and water treatment plant, combining a waste-to-energy plant and a water reclamation plant. The project involves significant private sector participation in both the design, construction, and operation of the facility.

South Korea:

Sudokwon Landfill Site Management Corporation: In South Korea, the Sudokwon Landfill, one of the world's largest landfill sites, has been developed and managed under a PPP framework. The site not only manages waste disposal but also generates energy from waste, contributing to both waste management and energy needs.

United Arab Emirates:

Dubai Municipality's Waste-to-Energy Plant: Dubai has successfully employed PPPs to develop large-scale waste-to-energy plants. The facility in Dubai is one of the largest of its kind in the Middle East, and it was developed through a PPP arrangement involving private contractors for construction, operation, and maintenance, contributing to Dubai's goals of sustainable waste management.

Brazil:

Belo Horizonte's Waste Management Program: In Brazil, the city of Belo Horizonte has implemented successful PPPs for its waste management programs. The city partnered with private companies to develop and manage sanitary landfills and recycling facilities, significantly improving its waste management infrastructure.

Turkey:

Istanbul Waste Incineration Plant: Turkey's largest city, Istanbul, has developed a major waste-to-energy facility under a PPP agreement. The plant is designed to handle a significant portion of the city's municipal solid waste, converting it into energy, and is a key part of the city's strategy to reduce landfill use.

Annex II: International Organizations, Consultancies, and Consultants Operating in the Pacific Waste Sector

1. GHD Group

Headquarters: Australia

Overview: GHD is a global professional services firm offering engineering, architecture, environmental, and construction services. In the Pacific, GHD has delivered numerous waste management projects, focusing on infrastructure design, environmental impact assessments, and the development of sustainable waste management strategies.

Key Projects: GHD has led solid waste management master planning, landfill design and management, and environmental assessments across several PICs, including Fiji, Papua New Guinea, and Samoa.

Website: www.ghd.com

2. Tonkin + Taylor (T+T)

Headquarters: New Zealand

Overview: Tonkin + Taylor is an environmental and engineering consultancy with extensive experience in waste management across the Pacific. T+T offers specialized services in waste strategy development, landfill engineering, environmental monitoring, and climate change adaptation.

Key Projects: T+T has been involved in critical waste management initiatives, such as landfill design in Samoa, waste audits and strategy development in Vanuatu, and disaster waste management planning in Solomon Islands.

Website: www.tonkintaylor.com

3. Jacobs Engineering Group

Headquarters: United States

Overview: Jacobs Engineering is a global provider of professional and technical services, including waste management consulting. In the Pacific, Jacobs offers expertise in solid waste management planning, hazardous waste management, and designing waste treatment facilities.

Key Projects:

Jacobs has been engaged in a range of projects across PICs, including infrastructure development, environmental impact assessments, and capacity-building initiatives tailored to local needs.

Website: www.jacobs.com

4. Mott MacDonald

Headquarters: United Kingdom

Overview: Mott MacDonald is a global engineering, management, and development consultancy. Their expertise in the Pacific includes waste treatment technology, resource recovery, and integrated urban development solutions.

Key Projects: Mott MacDonald has been involved in designing integrated waste management systems, conducting environmental assessments, and implementing waste minimization programs across various PICs.

Website: www.mottmac.com

5. AECOM

Headquarters: United States

Overview: AECOM is a multinational engineering firm that offers design, consulting, construction, and management services. In the Pacific, AECOM provides consultancy for waste management solutions, such as landfill design, waste-to-energy feasibility studies, and environmental compliance.

Key Projects: AECOM has developed solid waste management strategies, conducted feasibility assessments for waste-to-energy initiatives, and created environmental management plans for landfill sites in multiple PICs.

Website: www.aecom.com

6. UNDP and UNEP Regional Advisors

Overview: The United Nations Development Programme (UNDP) and the United Nations Environment Programme (UNEP) play an important advisory role in the Pacific, focusing on sustainable waste management, climate resilience, and environmental governance. These agencies work closely with local governments, providing technical assistance, policy guidance, and funding support.

Key Initiatives: Programs such as PacWastePlus, spearheaded by UNDP and UNEP, aim to improve the management of hazardous waste, plastics, and e-waste across the region.

Websites: www.undp.org
www.unep.org

7. EnviroPacific Services

Headquarters: Australia

Overview: EnviroPacific specializes in environmental remediation, hazardous waste management, and environmental consulting. In the Pacific, they focus on managing contaminated sites, waste treatment, and promoting sustainable waste management practices.

Key Projects: EnviroPacific has led hazardous waste management projects involving the safe containment and disposal of asbestos, chemicals, and other dangerous materials across several PICs.

Website: www.enviropacific.com.au

8. SMEC (Snowy Mountains Engineering Corporation)

Headquarters: Australia

Overview: A multidisciplinary consultancy focused on infrastructure development and environmental management. In the Pacific, SMEC's expertise includes landfill design, waste minimization strategies, and sustainability assessments.

Key Projects: SMEC has been engaged in the design of waste treatment facilities, conducting environmental impact assessments, and implementing community-based waste management solutions in various Pacific Island nations.

Website: www.smec.com

9. COWI

Headquarters: Denmark

Overview: COWI is a leading international consulting firm offering services in engineering, environmental science, and economics. Their Pacific portfolio includes waste strategy development, recycling and resource recovery programs, and capacity building.

Key Projects: COWI has contributed to waste management initiatives across the Pacific, focusing on the implementation of sustainable practices, environmental monitoring, and strengthening local waste management authorities.

Website: www.cowi.com

10. Pacific Environment Consultants

Headquarters: New Zealand

Overview: Pacific Environment Consultants is a specialized firm offering environmental and waste management services tailored specifically to the Pacific region. Their expertise spans waste management planning, environmental impact assessments, and the development of sustainable practices.

Key Projects: The firm has been involved in diverse projects, including community-based waste management programs, environmental monitoring, and the formulation of waste management policies aligned with local needs and priorities.

Website: www.pacificenvironmentalconsultants.com

Annex III: Multinational Corporations with investment footprint in the waste sector

1. Veolia Environnement

Headquarters: France

Overview: Veolia is a global leader in environmental services, providing solutions for water, waste, and energy management. Veolia operates numerous waste management facilities in the Asia-Pacific region, including landfills, recycling plants, and waste-to-energy plants.

Website: www.veolia.com

2. Waste Management, Inc.

Headquarters: United States

Overview: Waste Management, Inc. is one of the largest waste management companies globally, with operations in the Asia-Pacific region through subsidiaries and joint ventures.

Website: www.wm.com

3. Covanta Holding Corporation

Headquarters: United States

Overview: Covanta is a global leader in waste-to-energy solutions, with a growing presence in the Asia-Pacific region, focusing on converting waste into renewable energy.

Website: www.covanta.com

4. Babcock & Wilcox (B&W)

Headquarters: United States

Overview: Babcock & Wilcox specializes in energy and environmental technologies, including waste-to-energy solutions. B&W has been involved in various waste management projects across the Asia-Pacific region.

Website: www.babcock.com

5. REMONDIS

Headquarters: Germany

Overview: REMONDIS is one of the world's largest private service providers in recycling, service, and water sectors, with expanding operations in the Asia-Pacific region.

Website: www.remondis.com

6. Cleanaway Waste Management Limited

Headquarters: Australia

Overview: Cleanaway is Australia's largest waste management company, offering comprehensive waste management services and expanding its presence in the Asia-Pacific region.

Website: www.cleanaway.com.au

7. ALBA Group

Headquarters: Germany

Overview: ALBA Group is a global recycling and environmental services provider, with a growing footprint in the Asia-Pacific region, focusing on waste collection, recycling, and resource recovery.

Website: www.alba.info

8. Hitachi Zosen Corporation

Headquarters: Japan

Overview: Hitachi Zosen is an engineering and construction company known for its expertise in waste-to-energy and environmental solutions, with a strong presence in the Asia-Pacific region.

Website: www.hitachizosen.co.jp

9. Sembcorp Industries

Headquarters: Singapore

Overview: Sembcorp Industries is a leading energy, water, and marine group with a strong focus on sustainable solutions, including waste management, in the Asia-Pacific region.

Website: www.sembcorp.com

10. FCC Environment

Headquarters: Spain

Overview: FCC Environment is a global environmental services company that operates in waste management, water treatment, and other environmental services. The company has a presence in the Asia-Pacific region, focusing on integrated waste management solutions.

Website: www.fcc.es

11. Biffa

Headquarters: United Kingdom

Overview: Biffa is a leading UK-based integrated waste management company that provides collection, recycling, and energy recovery services. Biffa has been expanding its operations and partnerships in the Asia-Pacific region.

Website: www.biffa.co.uk

12. DOWA Eco-System Co., Ltd.

Headquarters: Japan

Overview: DOWA Eco-System is part of the DOWA Holdings group and specializes in waste management, recycling, and environmental remediation. The company has a strong focus on hazardous waste management and resource recovery in Asia.

Website: www.dowa-eco.co.jp

13. Stericycle, Inc.

Headquarters: United States

Overview: Stericycle is a global leader in the collection, disposal, and recycling of medical waste, hazardous materials, and other specialized waste streams. The company has operations in the Asia-Pacific region, focusing on compliance and safety.

Website: www.stericycle.com

14. Sims Metal Management

Headquarters: United States / Australia

Overview: Sims Metal Management is one of the world's largest metal and electronics recyclers, with operations across the Asia-Pacific region. The company focuses on sustainable materials recovery, particularly in metal and e-waste recycling.

Website: www.simsmm.com

15. SUEZ Recycling & Recovery Australia

Headquarters: Australia (Part of SUEZ Group)

Overview: Formerly known as SITA Australia, this subsidiary of SUEZ provides a full range of waste management and recycling services across Australia and has expanded into other parts of the Asia-Pacific region.

Website: www.suez.com.au

16. Covestro AG

Headquarters: Germany

Overview: Covestro is a leading supplier of high-tech polymer materials and is increasingly focused on recycling and sustainability. In the Asia-Pacific region, Covestro is involved in developing technologies for plastic recycling and circular economy initiatives.

Website: www.covestro.com

17. Envirosuite Limited

Headquarters: Australia

Overview: Envirosuite is a global provider of environmental management software and services, focusing on air, water, and noise management. The company offers solutions for optimizing waste management processes, particularly in industrial settings.

Website: www.envirosuite.com

18. Golder Associates

Headquarters: Canada (Now part of WSP Global)

Overview: Golder Associates is a global engineering and environmental services firm, providing consulting in waste management, including landfill design, waste auditing, and environmental impact assessments. The company has significant operations in the Asia-Pacific region.

Website: www.golder.com

19. TES (Total Environmental Solutions)

Headquarters: Singapore

Overview: TES is a leading provider of IT lifecycle services, focusing on the safe and sustainable disposal of electronic waste. TES operates globally, including significant activities in the Asia-Pacific region, where they manage e-waste recycling and recovery.

Website: www.tes-amm.com

Annex IV: Private capital companies investing in the waste sector in Asia-Pacific

1. KKR

Headquarters: United States

Overview: KKR is one of the world's leading private equity firms with a strong presence in the Asia-Pacific region. KKR has invested in various environmental services companies, including those involved in waste management, recycling, and renewable energy.

Key Investments: KKR has invested in companies like Ramky Enviro Engineers, one of India's largest environmental services firms, which operates in the waste management sector, including hazardous waste, municipal solid waste, and recycling.

Website: www.kkr.com

2. EQT Partners

Headquarters: Sweden

Overview: EQT Partners is a global private equity firm with a focus on sustainable investments. EQT has a dedicated infrastructure fund that invests in environmental services, including waste management and recycling companies.

Key Investments: EQT has invested in companies involved in waste management and environmental services across Asia, with a focus on sustainability and infrastructure.

Website: www.eqtgroup.com

3. Actis

Headquarters: United Kingdom

Overview: Actis is a leading private equity firm that focuses on emerging markets, including Asia-Pacific. Actis has invested in infrastructure and environmental services, with a growing interest in sustainable waste management and renewable energy projects.

Key Investments: Actis has invested in renewable energy projects across Asia and has shown interest in waste-to-energy and other waste management infrastructure projects.

Website: www.act.is

4. Macquarie Infrastructure and Real Assets (MIRA)

Headquarters: Australia

Overview: MIRA, a division of Macquarie Group, is one of the world's largest infrastructure investors, with significant investments in the waste management sector. MIRA focuses on assets that provide essential services, including waste management and recycling.

Key Investments: MIRA has invested in waste management companies and infrastructure projects across Asia-Pacific, particularly in waste-to-energy and recycling facilities.

Website: www.macquarie.com

5. Asia Environmental Partners (AEP)

Headquarters: Hong Kong

Overview: AEP is a private equity firm focused on environmental services and clean technology investments across Asia. AEP invests in companies that provide sustainable solutions, including waste management and resource recovery.

Key Investments: AEP has invested in waste management firms that focus on recycling, hazardous waste management, and waste-to-energy projects in Asia.

Website: www.asiainvestmentpartners.com

6. CLSA Capital Partners (CLSA CP)

Headquarters: Hong Kong

Overview: CLSA CP is the alternative asset management arm of CLSA, Asia's leading capital markets and investment group. CLSA CP has funds focused on sustainable investments, including waste management and environmental services.

Key Investments: CLSA CP has invested in companies in the environmental sector, including those in waste management, recycling, and energy recovery.

Website: www.clsacapital.com

7. Olympus Capital Asia

Headquarters: Hong Kong

Overview: Olympus Capital Asia is a private equity firm that invests in the environmental services sector, including waste management, water treatment, and renewable energy across Asia.

Key Investments: Olympus Capital Asia has invested in environmental services companies that focus on sustainable waste management, including hazardous waste treatment and recycling services in the Asia-Pacific region.

Website: www.olympuscap.com

8. TPG Capital

Headquarters: United States

Overview: TPG Capital is a global private equity firm with investments across various sectors, including environmental services. TPG has shown interest in the waste management sector, particularly in Asia, through its impact investment arm, TPG Rise Fund.

Key Investments: TPG has invested in waste management and recycling companies that align with its impact investment strategy, focusing on sustainability and social responsibility.

Website: www.tpg.com

9. Temasek Holdings

Headquarters: Singapore

Overview: Temasek is a global investment company headquartered in Singapore, with a strong focus on sustainable development. Temasek invests in various sectors, including environmental services and waste management, particularly in the Asia-Pacific region.

Key Investments: Temasek has invested in companies involved in recycling, waste-to-energy, and sustainable resource management across Asia.

Website: www.temasek.com.sg

10. China Everbright International

Headquarters: Hong Kong

Overview: China Everbright International is a leading investor in environmental protection industries, including waste management, waste-to-energy, and water treatment. The firm focuses on the Asia-Pacific region, particularly China and Southeast Asia.

Key Investments: China Everbright International has invested heavily in waste-to-energy plants and integrated waste management systems across China and Southeast Asia.

Website: www.ebchinaintl.com

11. InfraCo Asia

Headquarters: Singapore

Overview: InfraCo Asia is a development and investment company focused on infrastructure projects in South and Southeast Asia. They invest in early-stage infrastructure projects, including those in the waste management sector, with a focus on sustainable development.

Key Investments: InfraCo Asia has supported waste-to-energy and recycling projects across the region, particularly in emerging markets where infrastructure needs are growing.

Website: www.infracoasia.com

12. Ambianta SGR

Headquarters: Italy

Overview: Ambianta is a leading European private equity firm focused on sustainability-driven investments, including waste management. Although headquartered in Europe, Ambianta has shown interest in expanding its investments to the Asia-Pacific region, particularly in areas aligned with their sustainability focus.

Key Investments: Ambianta invests in companies that are active in recycling, waste management, and environmental technologies, with a view to entering the Asia-Pacific market.

Website: www.ambiantasgr.com

13. ADM Capital

Headquarters: Hong Kong

Overview: ADM Capital is an investment management firm focused on sustainable finance and private equity investments in Asia. They have a particular interest in sectors that address environmental challenges, including waste management.

Key Investments: ADM Capital has invested in companies and projects focused on sustainable waste management, recycling, and renewable energy within the Asia-Pacific region.

Website: www.admcapital.com

14. Warburg Pincus

Headquarters: United States

Overview: Warburg Pincus is a leading global private equity firm with a strong presence in Asia. The firm invests across various sectors, including environmental services and waste management, particularly in growth markets.

Key Investments: Warburg Pincus has invested in waste management companies in China and Southeast Asia, focusing on scaling up operations in recycling, waste treatment, and resource recovery.

Website: www.warburgpincus.com

15. LGT Lightstone

Headquarters: Switzerland

Overview: LGT Lightstone is the impact investment arm of LGT, one of the world's largest family-owned private banking and asset management groups. They focus on investments that generate measurable social and environmental impact, including in waste management.

Key Investments: LGT Lightstone invests in sustainable waste management solutions, such as recycling and waste-to-energy projects, across emerging markets in the Asia-Pacific region.

Website: www.lgtcp.com

16. Morgan Stanley Infrastructure Partners

Headquarters: United States

Overview: Morgan Stanley Infrastructure Partners is a global infrastructure investment platform that focuses on assets providing essential services, including waste management. The firm has a significant presence in the Asia-Pacific region.

Key Investments: The firm has invested in infrastructure projects, including waste management and recycling facilities, across Asia, targeting opportunities in urbanizing areas.

Website: www.morganstanley.com/im

17. Sitra (Finnish Innovation Fund)

Headquarters: Finland

Overview: Sitra is an independent public foundation that operates under the supervision of the Finnish Parliament. While primarily focused on Finland, Sitra also engages in international initiatives related to the circular economy, which includes waste management. They have been active in promoting circular economy practices globally, including in Asia.

Key Investments: Sitra has supported projects that aim to develop circular economy models, including waste recycling and resource recovery in Asia-Pacific countries.

Website: www.sitra.fi

18. Baring Private Equity Asia (BPEA)

Headquarters: Hong Kong

Overview: Baring Private Equity Asia is one of the largest and most established independent PE firms in Asia, with investments in various sectors, including environmental services and waste management.

Key Investments: BPEA has invested in waste management and recycling companies in Asia, focusing on expanding their operations and improving efficiency in waste processing and disposal.

Website: www.bpeasia.com

19. Equis Funds Group

Headquarters: Singapore

Overview: Equis is an independent infrastructure fund manager with a focus on renewable energy, waste

management, and environmental infrastructure in Asia-Pacific. They have a significant focus on sustainable development projects.

Key Investments: Equis has invested in waste-to-energy plants, biomass facilities, and other waste management infrastructure projects across the Asia-Pacific region.

Website: www.equisfg.com

20. Sumitomo Mitsui Banking Corporation (SMBC) / SMBC Venture Capital

Headquarters: Japan

Overview: SMBC is a leading financial group in Japan with a venture capital arm that invests in various industries, including environmental and waste management sectors. They have a strong presence in the Asia-Pacific region.

Key Investments: SMBC has provided funding for projects related to waste management and environmental services, supporting innovations in recycling and waste-to-energy technologies across Asia.

Website: www.smbcgroup.com

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