PLASTIC WASTE FREE ISLANDS

ANTIGUA AND BARBUDA

BUSINESS PLAN
BOTTLE-TO-BOTTLE RECYCLING

An initiative supported by Norad managed by IUCN
and co-implemented by Searious Business

ACKNOWLEDGMENTS

IUCN Plastic Waste Free Islands (PWFI) project wishes to thank the various partners from government, private sector and industry, academia and research, civil society and nongovernmental organisations that contributed to this work through their participation in workshops, meetings, field excursions, and related consultations within the country.

This work could not have been accomplished, first and foremost, without the partners and stakeholders who supported the data collection efforts within each country. Above all, the PWFI team acknowledges the generous support of the Norwegian Agency for Development Cooperation (NORAD), and the cooperation of Searious Business.

Thanks also goes to colleagues in the IUCN regional and country teams for their continuous and invaluable support throughout the implementation of the assessment.

AUTHORSHIP

To be cited as

Searious Business, (2021). Report to IUCN Plastic Waste Free Islands, Bottle-to-Bottle Recycling Business Pan, Antigua and Barbuda, Gland, Switzerland, IUCN

Support and Funding

Norad

Technical Lead Authors

Searious BUSINESS

Implementing Agency

IUCN

Design

Ludovic Di Donato

BOTTLE-TO-BOTTLE RECYCLING

BUSINESS PLAN

The **Plastic Waste Free Islands (PWFI) Project** is part of the *Close the Plastic Tap* Program of IUCN. PWFI is a three-year project working in six islands in the Caribbean and Pacific.

Implemented in Fiji, Vanuatu and Samoa in Oceania and Antigua and Barbuda, Saint Lucia and Grenada in the Caribbean, the project seeks to promote island circular economy and to demonstrate effective, quantifiable solutions to addressing plastic leakage from Small Island Developing States (SIDS).

This business plan focusses on the **“Bottle-to-Bottle-Recycling”** solution, in the geographic context of Antigua and Barbuda. It demonstrates how the solution can be realized, allowing for the creation of an alternative value chain.

MISSION

WHAT & WHY

What

- A successful deposit return scheme to enable Bottle-to-Bottle Recycling
  - A system that allows for effective collection, transport, processing and export of PET bottles for Bottle-to-Bottle Recycling
  - Strong legislative mechanisms which support an effective functioning of the scheme

Why

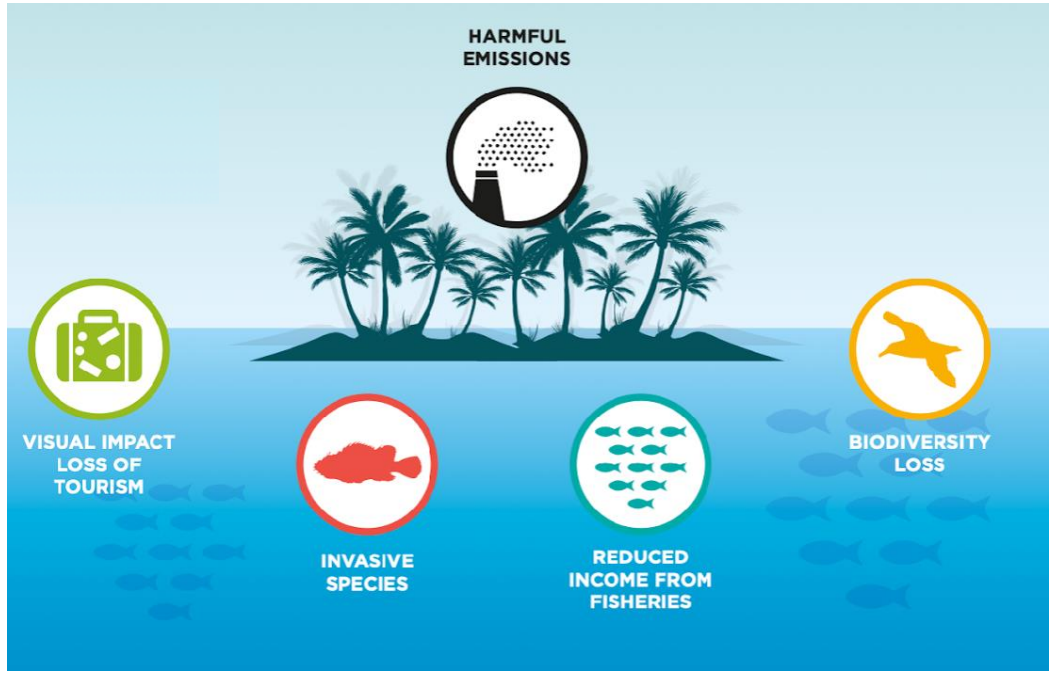
- Import-dependent economy, with limited end-of-life processing options on-island
- Scarce landfill space and high plastic leakage prevalence
- Local business opportunity for
  - Collectors
  - Transporters and PET processors
  - Economies of scale for exporters of plastic materials

PLASTIC WASTE GENERATION & LEAKAGE

ANTIGUA AND BARBUDA

Plastic Waste Generation: The total amount of plastic waste that is produced on an annual basis, per plastic material type

Plastic Waste Leakage: The amount of unaccounted waste that is calculated by the difference of plastic material imported and plastic waste disposed.



Financial and environmental impacts of plastic leakage

	Annual net Imports 2018-2019 (T/y)	Total disposed 2019 - landfill (T/y)	Total recycled 2019 (T/y)	Leakage (T/y) (95% credible interval)	Leakage Percent (95% credible interval)
PET (1)	892	796	156 (0.4-281)	16.4% (0.05%-33%)	892
HDPE (2)	629	535	109 (0-213)	16.9% (0%-39%)	629
LDPE (4)	449	401	69 (0.1-171)	14.6% (0.02%-41%)	449
PP (5)	181	148	41 (0-98)	21.6% (0.01%-63%)	181
PVC (3)	272	118	153 (0.3-116)	56.4% (0.3%-98%)	272
PS (6)	111	83	28 (0-58)	25.1% (0.01%-71%)	111
Other (7)	1.314	1.177	170 (0.2-362)	12.6% (0.02%-30%)	1.314
Overall	3.847	3.258	724 (302-952)	18.19% (7.6%-24%)	3.847

National plastic waste generation & leakage data Antigua and Barbuda with PET in blue.
Source: Final quantification report – Executive summary APWC July 2021

CONTEXTUAL ANALYSIS OF WASTE MANAGEMENT PRACTICES

ANTIGUA AND BARBUDA

The contextual analysis of waste management practices summarizes the current situation of waste management on Antigua and Barbuda. It evaluates actions like collection, sorting and recycling, as well as future ambitions.

- No central collection at source or segregation at landfill, no local plastics recyclers. So all plastics landfill, or leakage
  - Except for PET small-scale collection for stockpiling and export
- National ambitions / initiatives / pipeline:
  - Collection of PET bottles by Antigua and Barbuda Waste Recycling Corporation (ABWREC). Export to the USA without being economically viable
  - Incentivized PET bottle return program with one water brand (collaboration Oasis and ABWREC)
  - Advanced Recovery Fee system for recyclables, incl. PET and possibly HDPE is envisioned
  - PWFI PET bottles collection and export trial to ALPLA, Mexico
  - Green Corridor Sustainable Tourism Initiative (Green Tourism Initiative) expansion to more hotels / resorts

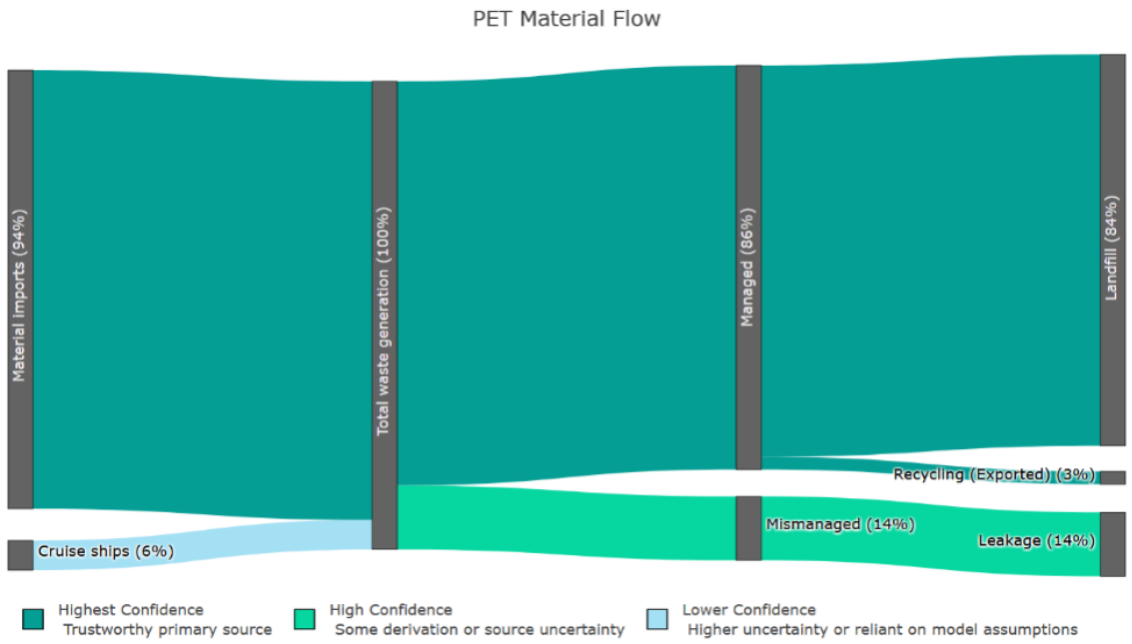
3253 tonnes plastic waste generated/year

Source: Quantification report, Executive summary, APWC July 2021

TARGETED MATERIAL

PET – CURRENT VALUE CHAIN

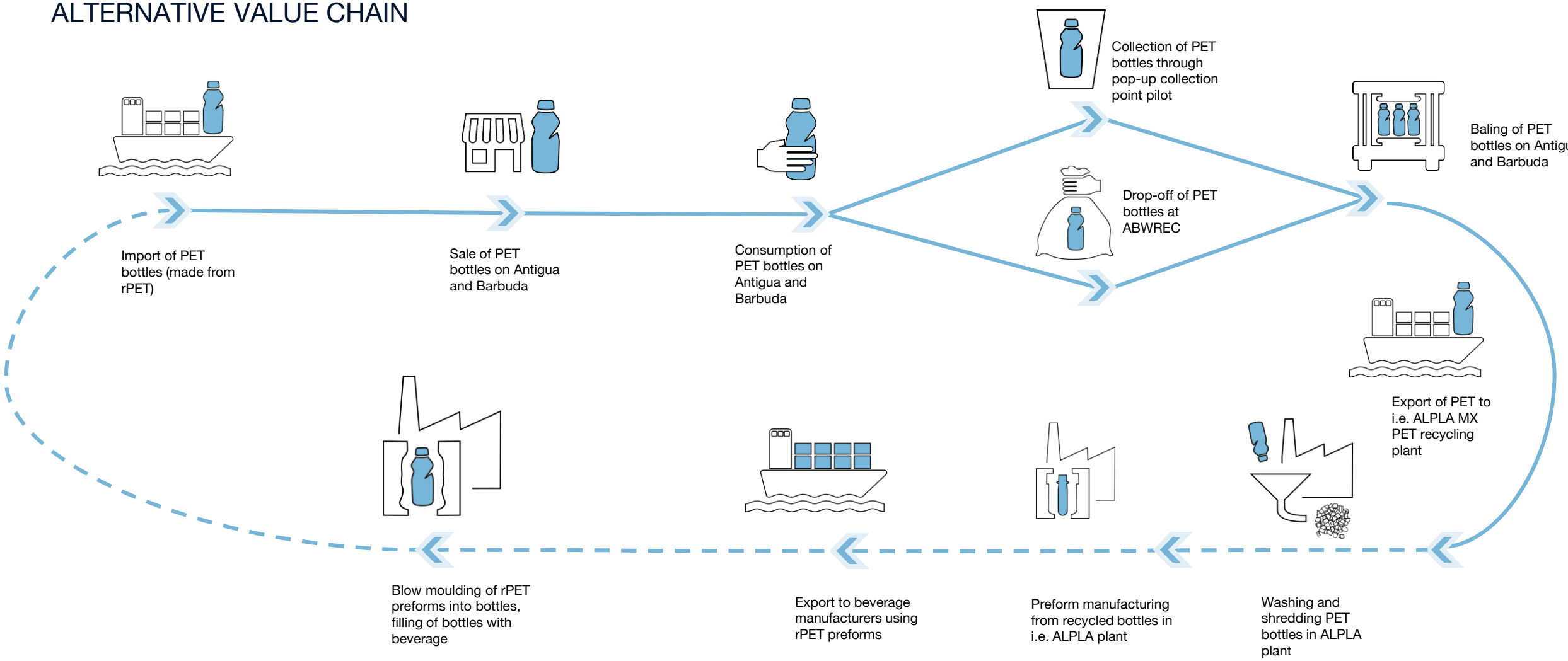
Polyethylene terephthalate (PET): A thermoplastic polymer of the polyester family, which is commonly used for beverage bottles and food packaging. PET is easily recyclable.



	Plastic Waste Generation	Household (t/y)	Commercial (t/y)	Tourism (t/y)	Fisheries (t/y)	Total (t/y)
PET 1	beverage containers water pet	213.51	106.33	115.30	1.71	436.84
PET 1	beverage containers not water pet	118.36	22.84	32.20	12.82	186.21
PET 1	food semi rigid containers e.g. trays pet	33.18	3.15	19.50	0.00	55.83
PET 1	single use take away food containers pet single use	0.01	0.00	0.00	0.00	0.01
PET 1	food flexible packaging pet	14.23	0.00	0.00	0.00	14.23
PET 1	Laundry detergent bottles	12.84	7.36	0.40	0.00	20.60
PET 1	shampoo body wash pet	8.29	0.00	0.00	0.00	8.29
PET 1	cooking oil pet	16.03	0.00	0.00	0.00	16.03
PET 1	cleaning agent products pet	4.76	2.36	0.00	0.00	7.12
PET 1	beauty and personal care pet	10.68	0.00	0.30	0.00	10.98
PET 1	textiles clothing pet	4.39	0.00	0.00	0.00	4.39
PET 1	toothpaste packaging pet	4.19	0.00	0.00	0.00	4.19
PET 1	other pet	27.84	10.60	2.60	0.00	41.04

OUTLINE BOTTLE TO BOTTLE RECYCLING

ALTERNATIVE VALUE CHAIN



OUTLINE BOTTLE TO BOTTLE RECYCLING

COLLECTION & RECYCLING STEPS

COLLECTION

- Manned collection points to ensure high level of efficiency and quality – combine with deposit return scheme including other materials used for beverage containers like HDPE, aluminum, liquid paper board etc.
- Separation of PET at source – distinction based on colors (transparent – light blue – other)
- Tracking of collected PET through log sheet, validation by weight and four-eye principle

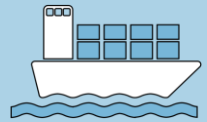
TRANSPORT

- Transportation by truck/van to processing facility
- Transportation is part of the value chain – therefore part of the tracking and validation
- If combined with deposit return scheme, high return rates can be expected – required transport on daily basis
- Could possibly be combined with NSWMA activities

PROCESSING

- PET gets baled (preferably with high-density baler), alternatively with metal compactor (optional: shredding of PET –possible when recycler has built trust in material)
- No liquids can stay in the bottles
- Caps and labels can stay on if they meet Design for Recycling Guidelines (no toxic adhesives in glues, no metal in labels/caps)
- Density goal of bales: 284 kg/m^2
- Costs of labor and material

EXPORT

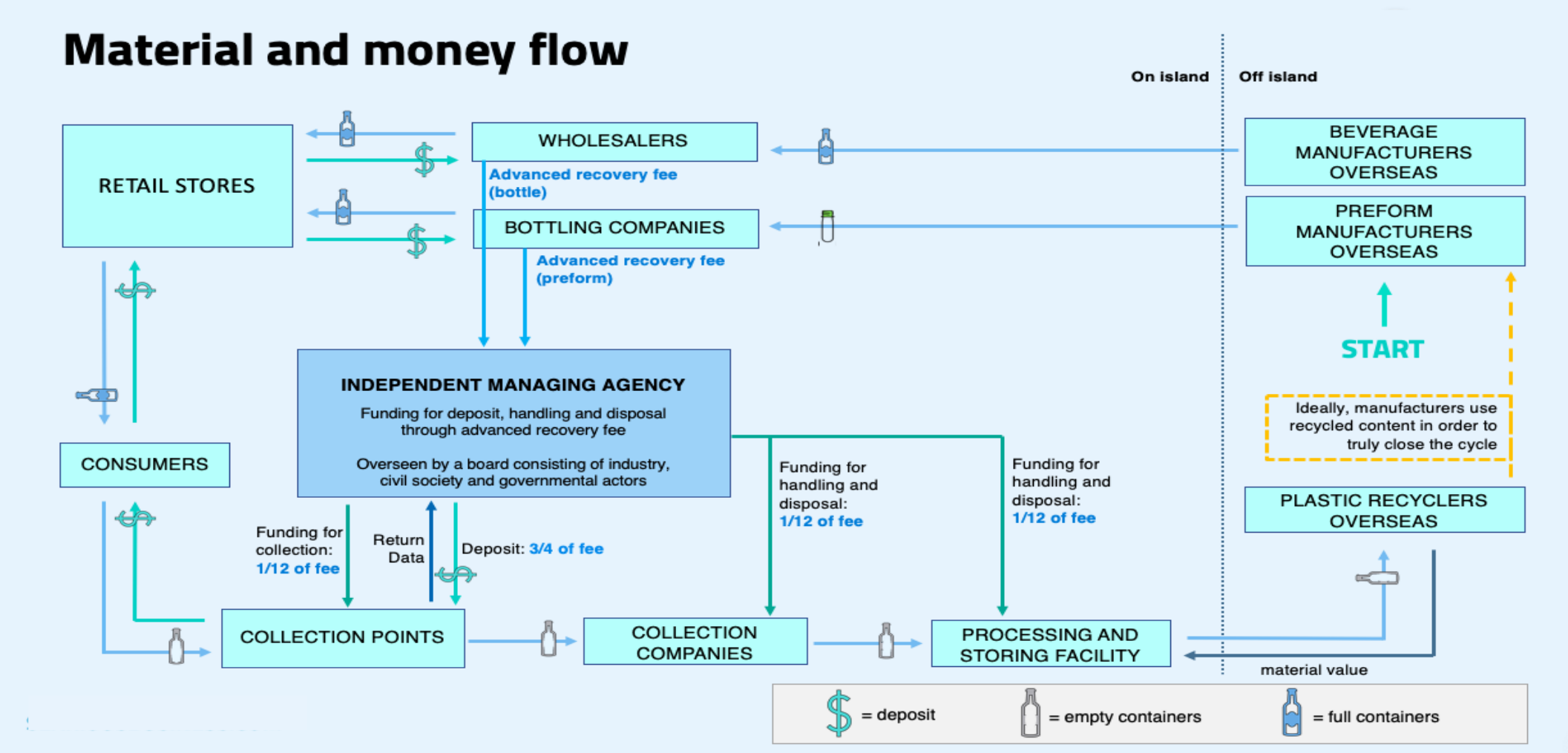


- Export to food grade recycling plant, e.g. ALPLA in Mexico
- Ensure stable, high quality to avoid negative business case because of high export costs
- Export to Mexico: In order to keep export costs low, negotiate for Deliver Duty Paid to Harbor, not end location
- Import of preforms made from recycled content to close the loop (incentivize incorporation of recycled %)

→ KEY ENABLING FACTORS: Container deposit scheme, high-quality material, food-grade recycling plant

OUTLINE OF CONTAINER DEPOSIT SYSTEM

DEPOSIT RETURN ENABLING BOTTLE TO BOTTLE RECYCLING



BENEFITS OF DEPOSIT SYSTEMS

OVERVIEW OF SUCCESS FACTORS AND BEST PRACTICES

Incentivized collection

- Prevents littering and landfilling of PET bottles
- Low barriers for participation
- Creates understanding for value of plastics and the circular economy in society

Enhanced material quality

- Increased purity through separate collection of PET
- Higher material value through enhanced purity and quality
- Saves resources and plastic clean-up costs, as system allows for closed-loop recycling

Best Practices from other island states

- Barbados: Deposit fee of US$ 0.05 for PET bottles. Has been in practice since 30 years
- Republic of Palau: Deposit fee of $0.10, of which $0.05 can be redeemed by consumer
- Kiribati: Deposit fee of AUD$0.05, of which AUD$0.04 can be redeemed by consumer

MANAGEMENT

RECOMMENDATIONS

Establishment of Independent Managing Agency

- Should be not-for-profit & independent
- Agency should fulfill the following tasks:
  - Collect funds from packaging producers
  - Contract partners in collection, transporting, processing and pay funds to them
  - Monitor and evaluate performance of scheme
  - Conduct audits
  - Overseeing and actively managing the scheme
- Should be governed by a Board of Directors
  - Board should represent actors from the beverage, retail grocery and recycling industries, government, actors with no vested financial interest
  - The legal entity should be not-for-profit in the form of an industry product stewardship organization
  - Ideally, board members should hold skills in Finance/Law/Environment/Resource Recovery

Best practice examples

- Canada: Not-for-profit Encorp Pacific, managing the return-it scheme

- Lithuania: Not-for-profit Užstato Sistemos Administratorius (USAD), managing the Grąžinti verta scheme

IMPORT/PRODUCTION

RECOMMENDATIONS

Design for Recycling

- For best uptake of Deposit Return Scheme, including effective Bottle-to-Bottle Recycling export routes, Design for Recycling (D4R) needs to be considered
- Recommendations include:
  - Always source PET made from recycled content (at least 50%)
  - If virgin material is sourced, only import transparent and light-blue PET bottles and/or preforms
  - Standardize as much as possible in collaboration with competitors

Recommended legislative change

- Include Design for Recycling (D4R) Guidelines and Measures into national EPR legislation
- Financially incentivize recyclable bottles / mandatory % of recycled content – i.e. D4R based eco-modulation and ring-fence income
- Ban specific unrecyclable PET products (strongly coloured bottles & preforms)

Best practice examples

- 'Recyclass' Design for Recycling Guidelines

RecyClass

- Design for Recycling Guidelines Oceania – ANZPAC Australia New Zealand Plastic Pact

ANZPAC PLASTICS PACT

IMPORT/PRODUCTION

RECOMMENDATIONS - DESIGN FOR RECYCLING GUIDELINES

Design for Recycling Guidelines: The following are guidelines for producers of PET beverage bottles. PET beverage bottles are commonly produced in the form of a *preform*, which is a miniature bottle which still needs to be blown into a full-size bottle by the beverage manufacturer. Already at the production process, the right design of a PET bottle and its additional components can enhance recycling at its end of life. These guidelines sum up the most important aspects this.

Labels, Sleeves and Wraps

- PE/PP/OPP/EPS (density < 1g/cm3)

Colours

- Transparent or light blue

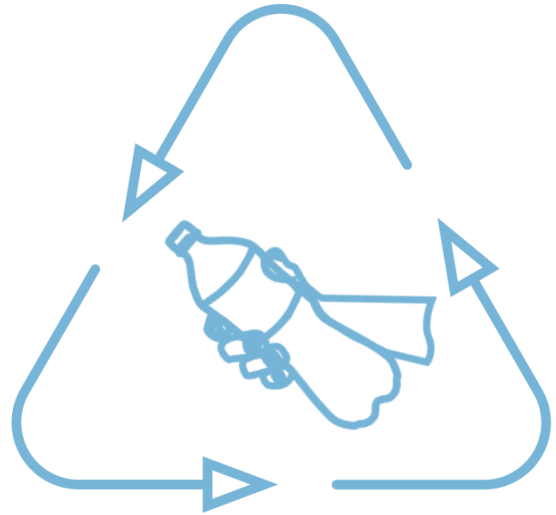
Closure system

- PE or PP with density < 1g/cm3

Adhesives for labels

- alkali/water soluble or alkali/water releasable at 60-80 Celsius

No additives



COLLECTION AND TRANSPORT

RECOMMENDATIONS

Collection

- Entities can apply to become officially contracted collection agency
- Collection Agencies are entitled to funds from the managing agency fund
- Tasks of collection agencies:
  - Collect used beverage containers at collection points
  - Make collection points accessible and easy to use for consumers
  - Pre-sort containers in different materials/colors
  - Ensure complete and comprehensive documentation of collection data

Transport

- Collection Agencies should be responsible for the transport from collection points to recycling facility
- Transport needs to be ensured between collection points, storage places and processing facilities on a regular basis

Best practice examples

- Low-tech solution: Hol' ab Germany – in-store collection points

- RePlast Saint Lucia Outdoor collection points

RePLAST OECS
Pilot Plastic Recycling Project

PROCESSING AND EXPORT

RECOMMENDATIONS

Processing

- Entities can apply to become an official processing agency
- Processing agencies are entitled to funds from the managing agency
- Tasks of the processing agencies include:
  - Receiving beverage containers
  - Do additional sorting if necessary to uphold high quality
  - Process (bale/shred/crush) beverage containers for export for recycling or domestic recycling
  - Ensure complete and comprehensive processing data
- Must comply with environmental standards

Export

- Export should be established between islands and recyclers overseas in long-term partnerships
- If possible, food-grade recycling should always be favored (closed-loop recycling), and most often offers the highest financial return

Best practice examples

- Antigua and Barbuda Waste Recycling Corporation (ABWREC) processing standards

- Food grade plant in Toluca, Mexico, for food-grade PET recycling

ALPLA

PROCESSING

RECOMMENDATIONS AND RECYCLING QUALITY REQUIREMENTS

- Bale density of 284 kg/cubic meter – good baling is essential to keep the export costs as low as possible!
- Meeting biosecurity standards is key! No organic matter (no animals, plants, soil, etc.) is allowed!
- It is important that the baling machines do not perforate the bottles
- Caps and labels can stay on the bottle if they meet design for recycling guidelines
- Highest price can be achieved if it is clear PET (and light-blue) only, pre-sorted in respective colors

FINANCIALS

MARKET ANALYSIS, COST OVERVIEW, USP

Major applications and markets for collected PET bottles under CDL

- Major market: Preforms made from 50% to 100% recycled PET - Food-grade PET bottle have highest revenues
- Alternative markets: non-food PET bottles, strapping, sheets
- Markets for used PET bottles: Mexico (through ALPLA), from 2023 on NUVI plant on the Dominican Republic
- Markets for rPET preforms: rising global demand through changing legislation in multiple countries

Volumes of PET bottles to be exported

- 40ft container
- e.g. ALPLA requires at minimum one full 40ft container (16 tons) of baled PET bottles

Source

- Used transparent and light blue (up to 3%) PET beverage bottle, blow-molded. Manned sorting and cleaning for stable and consistent flow of PET bottles

Costs and capacities

- Revenue: 487 - 658 USD / MT of PET, 75 tonnes/year. See costs & revenues per stakeholder on next slide
- Collection: 34 h / month
- Transport: 7 h / month
- Processing: (washing, sorting, shredding: 40 h / month
- Export: once per month

Unique selling points

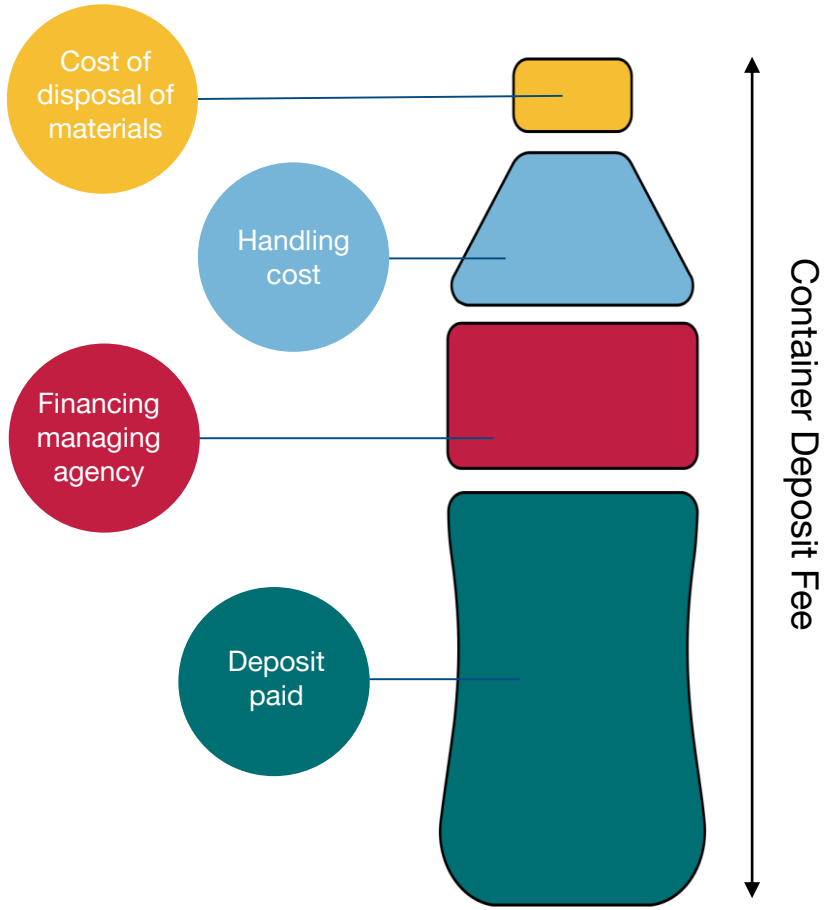
- Meeting recycling targets of beverage manufacturers
- Concept allows for high-standard export of valuable materials
- Meeting circularity/sustainability targets of governments
- Scalability: ALPLA processes all domestic (Mexican) Coca Cola bottles – Antigua and Barbuda could scale up.
- Marketability: Completely circular product, based on high readiness level from key stakeholders
- Risk & compliance: heath and safety compliant local setup of processing

FINANCIALS

HOW TO FINANCE THE CONTAINER DEPOSIT SCHEME

- For the implementation and viability of the system on Antigua & Barbuda, we suggest to introduce a container deposit fee to be paid by producers and importers of beverage containers
- It needs to cover all the costs of activities necessary to uphold the system, while not putting too much pressure on local manufacturers and importers of items falling under the fee

Usually, about 15 – 20% of bottles are not getting returned. These unclaimed deposits can **additionally** finance the managing agency



FINANCIALS – 1/2

FULLY ESTABLISHED PERIOD

Calculations based on 24,920,000 PET bottles being released into the local market per year. Envisioned recovery rate: 75% (18,690,000 PET bottles)

							paid/received by				
	Step	Description	Costs / annual PET bottle release (in XCD)	Costs / annual PET bottle release (in USD)	Costs per bottle (in USD)	Comments	bottlers / importers	collection point operators	transport companies	processing companies	managing agency
Container Deposit Fee imposed on responsible producers			7763977	2872697.4	0.128	this translates to an advanced recovery fee of 0.35 XCD per PET bottle	-2872697.4				2872697.4
Costs covered by Container Deposit Fee	Deposit	Deposit on each bottle of 0.2 XCD	4984000	1844080	0.074			1844080			-1844080
	Collection	operating collection points (labour)	1451520	537062.4	0.029	In order to achieve the envisioned collection rate, 51.205 PET bottles must be collected per day. If 50 collection points are being established, each has to collect 1024 PET bottles per day (128 PET bottles per hour per collection point). 120960 hours of work are needed for collection (based on 2 persons per collection point, 8 hour shift every day). 120960 hours * 12 XCD (above minimum wage)			537062.4		-537062.4
	Transport	Pick-up from collection points	45657	16910	0.0009	One 40ft truck fits 42000 PET bottles. In order to achieve the envisioned collection rate, 445 truck trips are needed annually. Assumption: 30 km one-way between collection point and recycling facility: costs for gasoline: USD 18; costs for labour: USD 20 (2 hours). This totals up to 38 USD for one truck trip from collection point to recycling company				16910	-16910

FINANCIALS – 2/2

FULLY ESTABLISHED PERIOD

Calculations based on 24,920,000 PET bottles being released into the local market per year. Envisioned recovery rate: 75% (18,690,000 PET bottles)

								paid/received by				
	Step	Description	Costs / annual PET bottle release (in XCD)	Costs / annual PET bottle release (in USD)	Costs per bottle (in USD)	Comments		bottlers / importers	collection point operators	transport companies	processing companies	managing agency
Costs covered by Container Deposit Fee												
	Processing	Handling costs - unloading vehicle	27000	9990	0.0005						9990	-9990
		Sorting & Baling - labour	630000	233100	0.012	Based on input from PWFI pilot on Antigua and B and multiplied by 40 (as 30 times as much bottles would be collected in actual scheme) Bale size is 1 m3 and the density requirement is 284 kg/per m3					233100	-233100
		Sorting & baling - supplies	144000	53280	0.003						53280	-53280
		stockpiling costs	112500	41625	0.002						41625	-41625
		export costs	345000	127650	0.007	based on 11500 XCD per 40ft container (fits 16 tonnes of baled PET bottles) 40 containers per year are required for 75% recovery rate						
	Management	Personnel costs for managing agency	16200	6000	0.00032	2 people in charge, full time						6000
		Promotion (material costs)	8100	3000	1.6E-04	for radio/TV ads, information material						
Total costs			7763977	2872697	0.128			-2872697	1844080	537062	354905	142650

FINANCIALS

SCHEME UPTAKE PERIOD

Setting goals and ambitions

- The managing agency should set careful collection targets, to allow an ideal scale-up in the first years after establishment of scheme
- Recovery rate goals could roughly follow the below recommendation, based on an updated baseline on current collection

Year after establishment of scheme	Recovery rate goal
Year 1	Determine baseline recovery rate
Year 2	Monitor baseline recovery rate
Year 3	5% increase from baseline
Year 4	5% increase from Year 3
Year 5	5% increase from Year 4

Increasing recovery rates

- Advertisement activities
- Contracting more collection agency locations

Enabling factors

- Action plan should be put in place to ensure the supporting waste management infrastructure is in place
- A detailed (reversed) material flow analysis will inform the design of the waste management infrastructure

CONTAINER DEPOSIT LEGISLATION (CDL)

STEP-BY-STEP IMPLEMENTATION PLAN

STEP 1:	Introduction of Legislation
STEP 2:	Creation of Managing Agency
STEP 3:	Starting date for mandatory payment from producers/importers
STEP 4:	Starting date for refund payments to consumers
STEP 5:	Submission of product stewardship plan from producers/importers
STEP 6:	Issuing of permits for producers/importers
STEP 7:	Contracting partners for collection, transporting and processing
STEP 8:	Activate full scheme

See *Container Deposit Fee policy paper Fiji* (Sept 2021) for details on all steps, including key definitions, role division for all stakeholders, financing the system, and the composition of the board

BENEFITS BOTTLE2BOTTLE RECYCLING

UNDER A WORKING CONTAINER DEPOSIT LEGISLATION

Financial benefits	Environmental benefits	Social benefits
Revenues of PET bottles: 487 - 658 USD / tonnes	Lower landfill pressure for government. Amount of plastic waste diverted based on 75% collection rate with container deposit scheme: 476.2 tonnes/year = 59% of all PET waste generated on Antigua and Barbuda	Develop domestic recycling market - Create more jobs in island in collection, sorting, cleaning, recycling – 100 FTE when converting 59% of all PET waste
Attracting sustainable investments	Around 30% reduction of global warming, fossil resource scarcity and terrestrial acidification compared to landfilling PET bottles	Contribution to cleaner island and attractiveness for local population and visitors
Lower waste disposal and clean-up costs for government	Marine ecotoxicity reduced by > 50% compared to landfilling PET bottles	Human toxicity reduced > 50% compared to landfilling plastics
	Reduced amount of plastic waste that might leak into the environment. 476.2 tonnes/year = 59% of all PET waste generated	

FOR MORE INFORMATION

IUCN

IUCN_Plastics

plastics@iucn.org

https://www.iucn.org/theme/marine-and-polar/our-work/close-plastic-tap-programme

#ClosethePlasticTap

Searious Business

SeariousBusiness

connect@seariousbusiness.com

https://www.seariousbusiness.com/islands

#PlasticWasteFreeIslands #CloseThePlasticTap