PLASTIC WASTE FREE ISLANDS

GRENADA

BUSINESS PLAN

WASTE-TO-PRODUCT

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

AUTHORSHIP

To be cited as

Searious Business, (2021). Report to IUCN Plastic Waste Free Islands, Waste-to-Product Business Pan, Grenada, Gland, Switzerland, IUCN

Support and Funding

Technical Lead Authors

Implementing Agency

Design

Ludovic Di Donato

WASTE-TO-PRODUCT

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

MISSION

WHAT & WHY

What

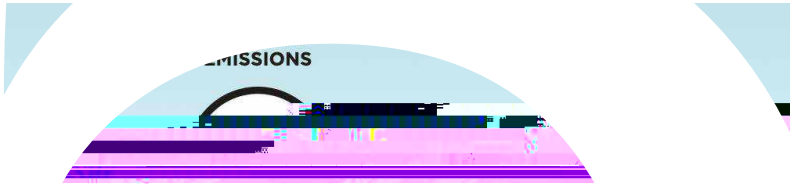
- A successful business in Furniture and semi-finished products
  - Made from recycled plastic
  - Locally sourced and locally produced

Why

- Local business opportunity
  - Reduce Import-dependency
  - Enhance resource recovery options on-island
  - Job creation
- Reduce overfull landfills and high plastic leakage prevalence
  - Improved waste management
  - Lower environmental impact

WH ART THIS BU ESS

PLAS E GENERATION & LEAKAGE



Polymer	Annual Imports 2018–2019 (T/y)	Total waste disposed 2019 2019 (T (T/y)	Total recycled 2019 (55)6CTd (49 55)6CTd65.984 Tf 44E 44-15(8>-314ti)6(m)1)	Leakage (T/y) – model-based estimate (95% credible

Financial and e s of plastic leakage

National plastic waste generation & leakage data Grenada, with polyolefins in blue.
Source: Final quantification report – Executive summary APWC July 2021

- No central collection at source or segregation at landfill, no local plastics recyclers → landfill, or leakage
  - Except for PET→ small scale collection for stockpiling and conversion into

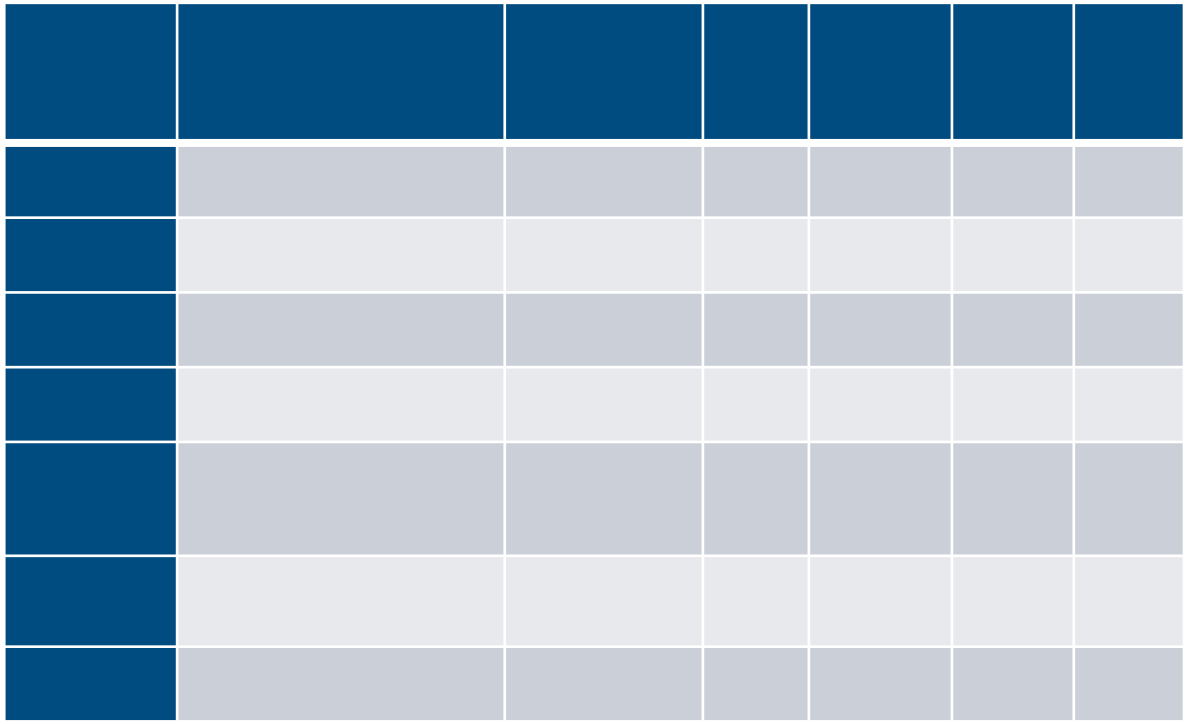
TARGETED MATERIAL(S)

PP – CURRENT VALUE CHAIN

Class	Item	Household (T/y)	Commercial (T/y)	Tourism (T/y)	Fisheries (T/y)	Total (T/y)
PP 5	straws single use	3.6	0.0		0.0	3.6
PP 5	food containers pp	15.0	2.5		0.2	17.7
PP 5	food semi rigid containers e g trays pp	7.3	13.4		0.0	20.7
PP 5	container lids pp					

TARGETED MATERIAL(S)

LDPE – CURRENT VALUE CHAIN



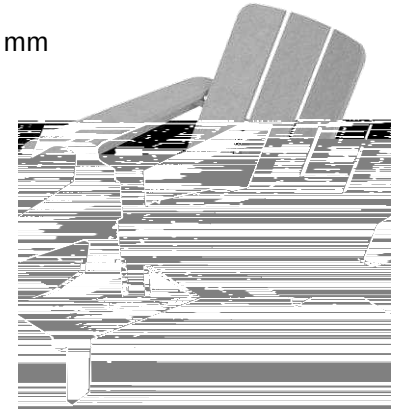
OUTLINE WASTE TO PRODUCT

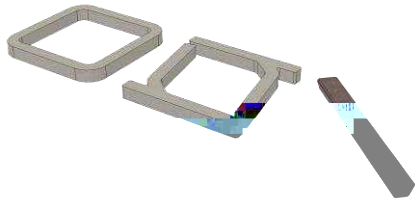
ALTERNATIVE VALUE CHAIN

PRODUCT CONCEPT

MIXED EXTRUSION PRODUCTS

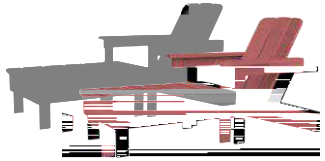
- Beams, planks, tiles and parts (semi-finished product)
- Outdoor public and private furniture (end product)
- Example Prototypes:
  - Park bench (mainly polyolefins)
    - Dimensions: L650 x W1520 x H825 mm
    - Weight: 75 kg
    - Intended use: Garden, park, wharf, public space (outdoor)
  - Trash tree / trash nest (mixed plastics)
    - Dimensions: L1280 x W1320 x H1545 mm
    - Weight: 43 kg
    - Intended use: public space (central collection points (outdoor)
  - Lounge chair (recycled HDPE)
    - Dimensions: L 805 x W 733 x H 729 mm
    - Weight: 14 kg
    - Intended use: garden, park, wharf, public space (outdoor)

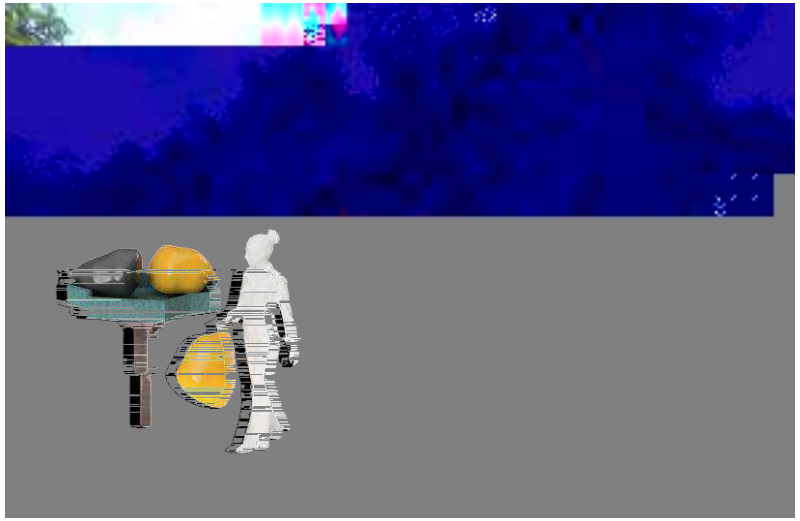




USER SCENARIOS

Furniture





- Modular, repairable
- Produced locally
- Weather & climate-proof
- Comfortable
- Durable

UNIQUE SELLING POINTS

SUSTAINABLE & DURABLE

Technology

- Producibility: can process flakes directly so no high machine investments needed
- Scalability: Semi-finished products can be stored, and once machines reach their maximum capacity, an extra machine can be added
- Risk & compliance: Quality performance, with health and safety compliant setup

Product performance

- Sustainability – longer life: material vs wood based sheet
  - Lifespan: 40+ years r-plastic lumber vs 20 years hardwood
- Sustainability: green image – local waste converted
- Sustainability: easily repaired / parts replaced / recyclable
  - Recyclable: r-plastic sheets 7x recyclable
- Superior performance: weather proof / termite proof / UV-resistant
- Convenience: easily cleaned
- Superior Design: high end product/ distinctive design / high quality surface finish

Market

- Marketability: Completely circular product
- Marketability: Different furniture for different markets; tourism (i.e. hotels, restaurants), public (schools), private
- Marketability: Locally made vs imported
- Flexibility: Semi-finished products which can be sold directly or made into different end products with existing wood working techniques

DIFFERENTIATION FROM COMPETITION

CHEAP funriture, timber,

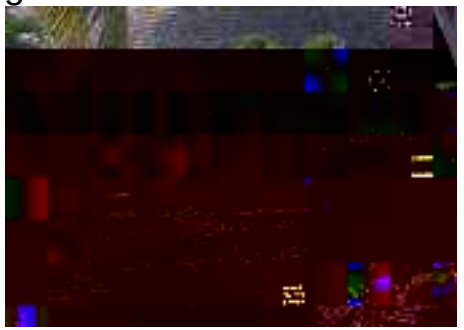
Cheap plastic furniture

Hardwood lumber / timber

Fencing

Lounge furniture

Street furniture



Park/picnic furniture

- More durable and longer lasting than cheap plastic import patio chairs
- High-end design
- Lasting look
- Easy repair with local service and parts from producer
- Added sustainable image value

CONCEPT DESCRIPTION

MIXED PLASTIC EXTRUSION BASED

Technique: Extrusion based (setup around extruder) + add-on moulding options

- Machines: shredder and/or agglomerator, extruder, press + molds, intrusion moulds, or continuous extrusion line
- Woodworking equipment: Saw table / crosscut saw, mill, hand tools.
- Types of plastic converted:
  - High-end product: HDPE sorted & washed
  - Lower-end product: Mixed unwashed plastics with >70% PE/PP
- Amount of plastics used: e.g. 8.53 kg per 40x80x2800 beam, or 4.59 kg per 18x130x2800mm HDPE plank, or 75 kg per Bench
- Source of input materials: Collection of HDPE, PP, LDPE or all mixed plastics
  - through (pre-paid) bag with all plastics collection and after sorting
  - Island wide stimulation through
    Advanced Recovery Fee scheme / Container deposit Legislation (CDL)
- Impact: up to 150t/y = 12% of total PE/PP stream, 6.33% of total plastic generated

COLLECTION AND SORTING

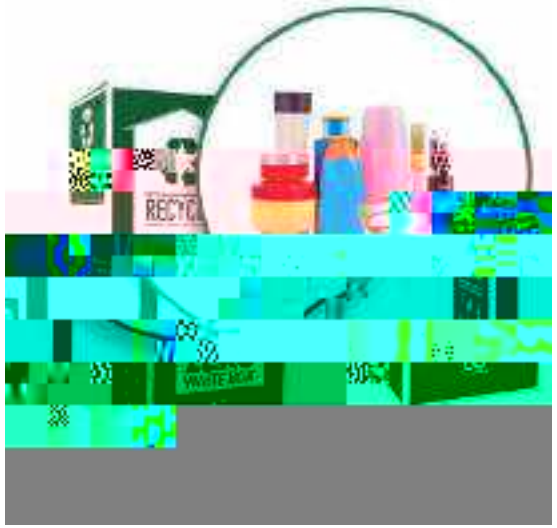
COLLECTION

Drop off points

- E.g. schools, supermarkets, public buildings, or resorts
- Incentives for consumers to sort and return plastic products
  - E.g. Discounts on end product
- Educational programmes and awareness campaign

Collaboration with existing waste management structures is crucial

- E.g. partnership with municipal solid waste management
- Collaboration with ministries and government



MACHINERY

Machines	USD 49.000	
Shredder, 5 kW	USD 5.000	

SELECTION FACTORS

TECHNIQUE AND PRODUCT

Impact

- (semi-) Industrial set-up and machinery to
  - Convert enough plastic to keep from landfill and (ocean) leakage
  - Get quality output that can compete with existing products
  - Create durable business
  - Create local employment

Flexibility

- Create different (mix of) semi-finished and end-products
- Create output material for different markets
- Enable sector-specific contribution to reduce waste
- Enable to convert different plastics

Viability

- Durable business plan / calculation
- Fitting the volumes on the island
- Ready for investors to step in
- Scalable: capacity aim is 150 tonnes / year

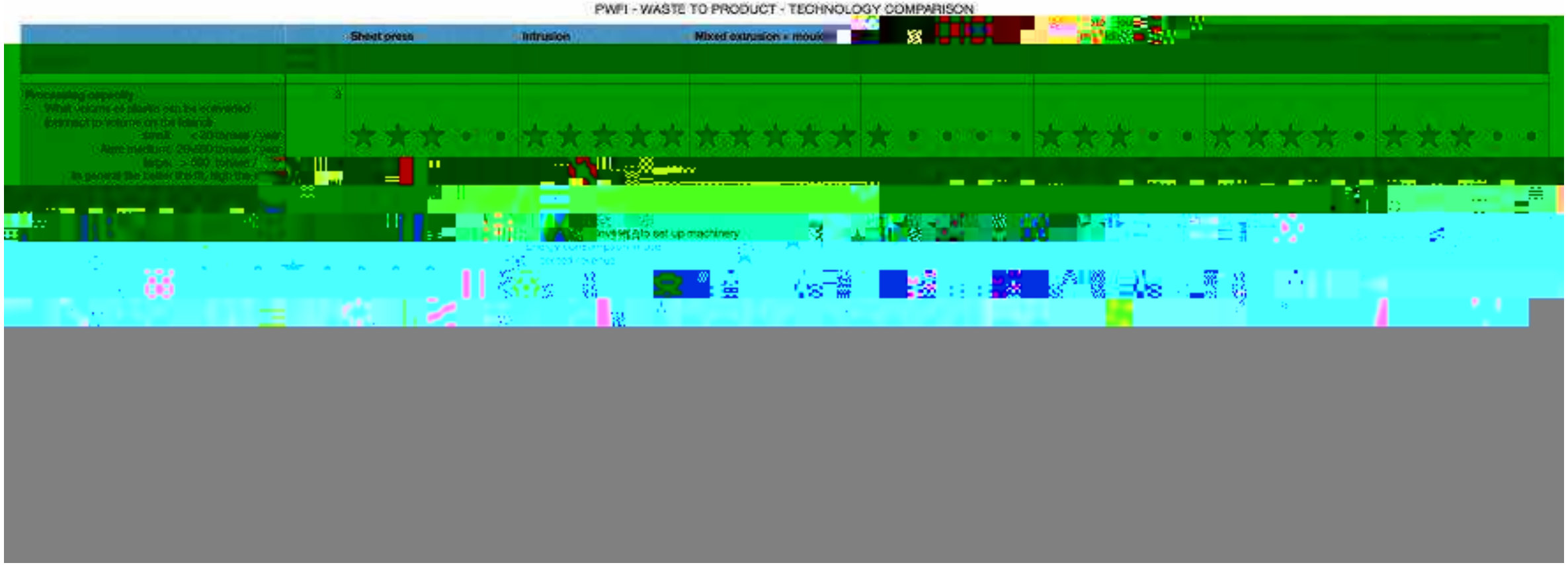
Complementarity to existing initiatives

- Utilizing local recycler's machinery, if compatible
- Tailor-made for local situation and market

TECHNOLOGY COMPARISON

MATRIX

This table provides a structured approach on how the recycling technology is selected. It is a general comparison example used for the technology selection, in which island specific factors have been considered.



MARKET ANALYSIS

Estimated annual expenditure on furniture

- USD 225,540 (3222 rooms and accommodations with a average spending of $70/year/room on outdoor furniture)

Global expected CAGR (Compound Annual Growth Rate) tourism after Covid-pandemic

- 3.1% (2021-2026)

Longer term market fundamentals

- Shorter supply chains decrease need for imports
- Less pressure on landfill

Demand-drivers

- Showing sustainable focus
- Longer lasting alternatives

•

MARKET ANALYSIS

HOSPITTALITY + B2B

Market segmentation
(sub target groups describing needs and wants)

- General needs
  - Durable furniture
  - Easy to maintain / keep looking new
  - Indoors and outdoors application
- Needs Hotels/resorts
  - Sustainable added marketing value
- Needs villas/apartments, consumers
  - High end design

Buying patterns

- Current yearly renew due to poor quality and extreme weather conditions (market research)

Locations of potential customers

- Mostly coastal area

Specify domestic vs export markets

- Domestic: Local network of sub sellers (stores, DIY markets, furniture makers)
- Export potential:
  - Caribbean region with the options of expending for processing waste

Launching customers:

- Accommodations who collect material themselves
- Governmental bodies

BUSINESS DRIVERS

INDUSTRY SUPPORT – INNOVATION AWARDS

rHDPE dining chair made from Caribbean plastic waste streams:

shortlisted for the prestigious **Plastics Recycling Awards Europe 2021**

- Household and Leisure products category

MARKET INTRODUCTION PLAN

FROM FUNCTIONAL PROTOTYPE TO MARKET INTRODUCTION

Timeline for key milestones of product development

PHASE 1- has been completed

- Extrusion testing
- Feedstock preparations
- Product interest inventory
- Design concept for products
- Engineering
- Prototyping
    - assembly testing
    - impression and use testing
- Improving based on feedback

PHASE 2

- Securing finances; procurement of machinery; staff recruitment

PHASE 3

- Production testing
- Production procedures development
- Packaging development
- Commercial production based on staged approach

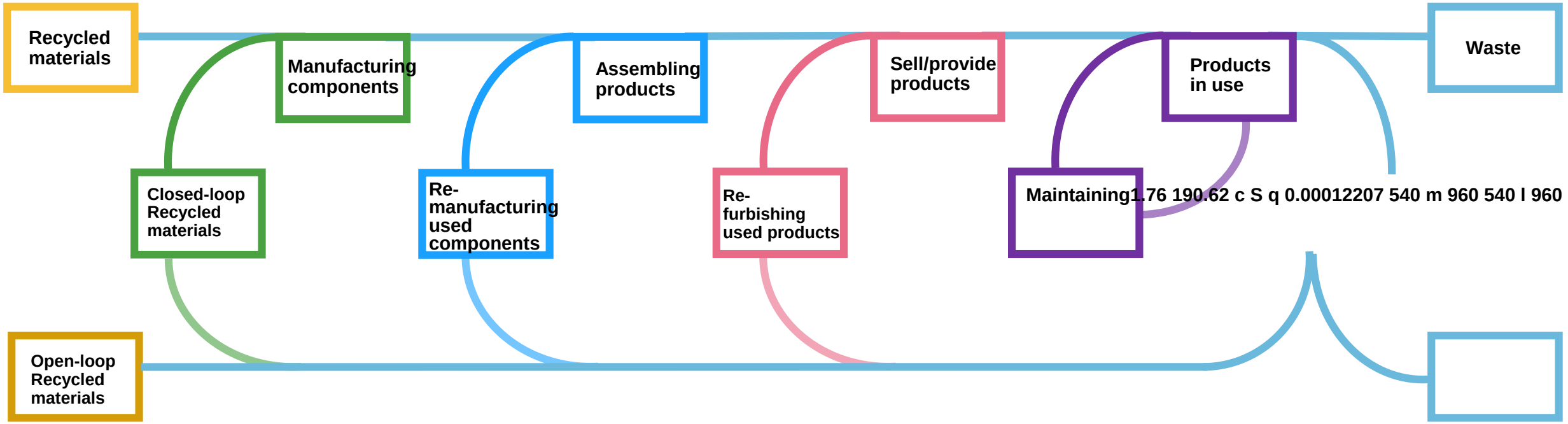
Engagement & Sales

- Sales approach
    - Personal sales contact
    - Online order and service website
- Sales channels
    - Sales person
    - Web shop
    - Furniture Stores
    - DIY stores
    - Workshop showroom/store
- Engagement (communication with target groups)
    - Sales person
    - Website
    - Showroom
    - Exhibition

POTENTIAL FOR CIRCULARITY

INCREASING CIRCULARITY

The below graph guides you on how to achieve maximum circularity for your product – on every step of the value chain!



OPERATIONS

Tools & Machines

- Shredder
- Optional agglomerator for flexibles processing
- Extruder
- Intrusion moulds
- Press + press moulds
- CNC mill
- Woodworking tools
- Pick up truck

Space & Permits

-

FINANCIALS

SUMMARY AND SALES OVERVIEW

Diversifying the product portfolio is necessary to build a sustainable business model. The sales overview example provides ideas for possible other products.

Summary	
Starting capital	181,320.17
Months to Pay Back Investment	34
Full Time Employees Needed	7.5
Revenue Earned Per Month	30,578.00
Fixed Costs Per Month	1,560.00
Material Costs Per Month	17,639.83
Total Wages Paid Per Month	5,783.34
Total Profit Earned Per Month	5,594.83

Sales Overview				
Products & Services	Selling Price Per Unit	Number of Expected Sales Per Month	Total Product Cost	Profit Margin
50 kgs of Medium Shredded Plastic	0.00	166.7	13.67	-100.00%
mixed Beam 2800 x 40 x 80 mm	16.00	300.0	14.58	9.72%
mixed Plank 2800 x 28 x 130 mm	17.90	180.0	16.25	10.19%
Pavement tile	10.70	460.0	9.65	10.87%
wide HDPE plank 2800 x 18 x 130 mm	14.80	180.0	13.51	9.55%
narrow HDPE plank 2800 x 18 x 65 mm	10.00	90.0	9.24	8.21%
Bench parts	0.00	12.0	34.60	-100.00%
Park bench	160.00	12.0	89.86	78.05%
Trash nest	230.00	30.0	129.09	78.17%
Lounge chair	49.00	30.0	27.57	77.71%
Side table / foot bench	32.00	15.0	17.77	80.09%
Dining chair	37.50	60.0	20.71	81.06%
Dining table	70.00	15.0	38.79	80.47%

FINANCIALS

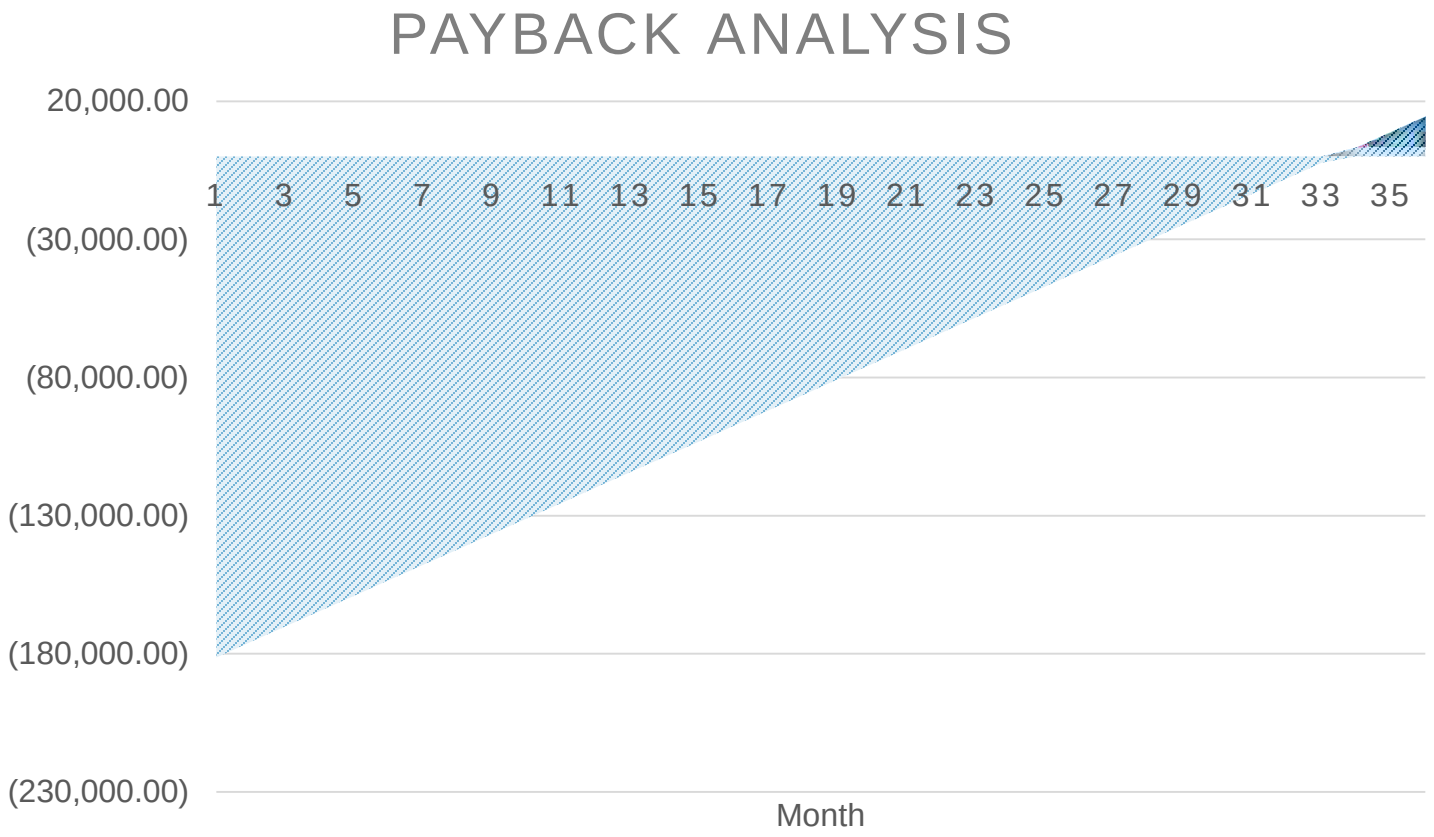
CASH FLOW

FINANCIALS

FUNDING & ROI

Starting capital: US $ 181,320
ROI 34 months

- Mostly machines and personnel



FINANCIALS

FUNDING PLAN

- Private money
- (Development) Bank loans: de-risking partner, e.g. offering loan guarantees) Incl. IADB, ADB, IFC, CEB
- Investors/business accelerators ((pre)-seed, angel investment, early stage)
  - Caribbean Export Development Agency
  - Caribbean Business Angels Network
  - Blue Bio Value
  - Blue Natural Capital Finance Facility
  - Ennovent
  - For Good Venture
  - LatitudR (the extension of the Inclusive Regional Recycling Initiative (IRR)
  - SAGANA
  - Sky ocean ventures
- (Governmental) grants
  - Development Cooperation partners, incl. UK, Norway, Italy, US, Germany, Swiss, France, China, Japan,
  - UNDP Innovation Fund
  - IUCN
  - World Bank - ProBlue. NGOs could become a third party within a governmental program
- Caribbean Biodiversity Fund (Endowment Fund)
- OECS
- WWF
- Alliance to End Plastic Waste
- The Nature Conservancy Caribbean
- Ocean Foundation
- Plastic Solutions Fund
- Bill & Melinda Gates Foundation
- Commonwealth Clean Ocean Alliance
- Dow Business Impact Fund
- Handelens Miljofond
- Plastics Solutions Fund
- Gallifrey foundation
- Oak Foundation
- PRIMAT (Didier and Martine Primat Foundation)
- The Fondation SUEZ
- Waitt Foundation
- For Good Foundation
- Onepercentfortheplanet

FACTSHEET

BENEFITS

FOR MORE INFORMATION

IUCN_Plastics

plastics@iucn.org

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

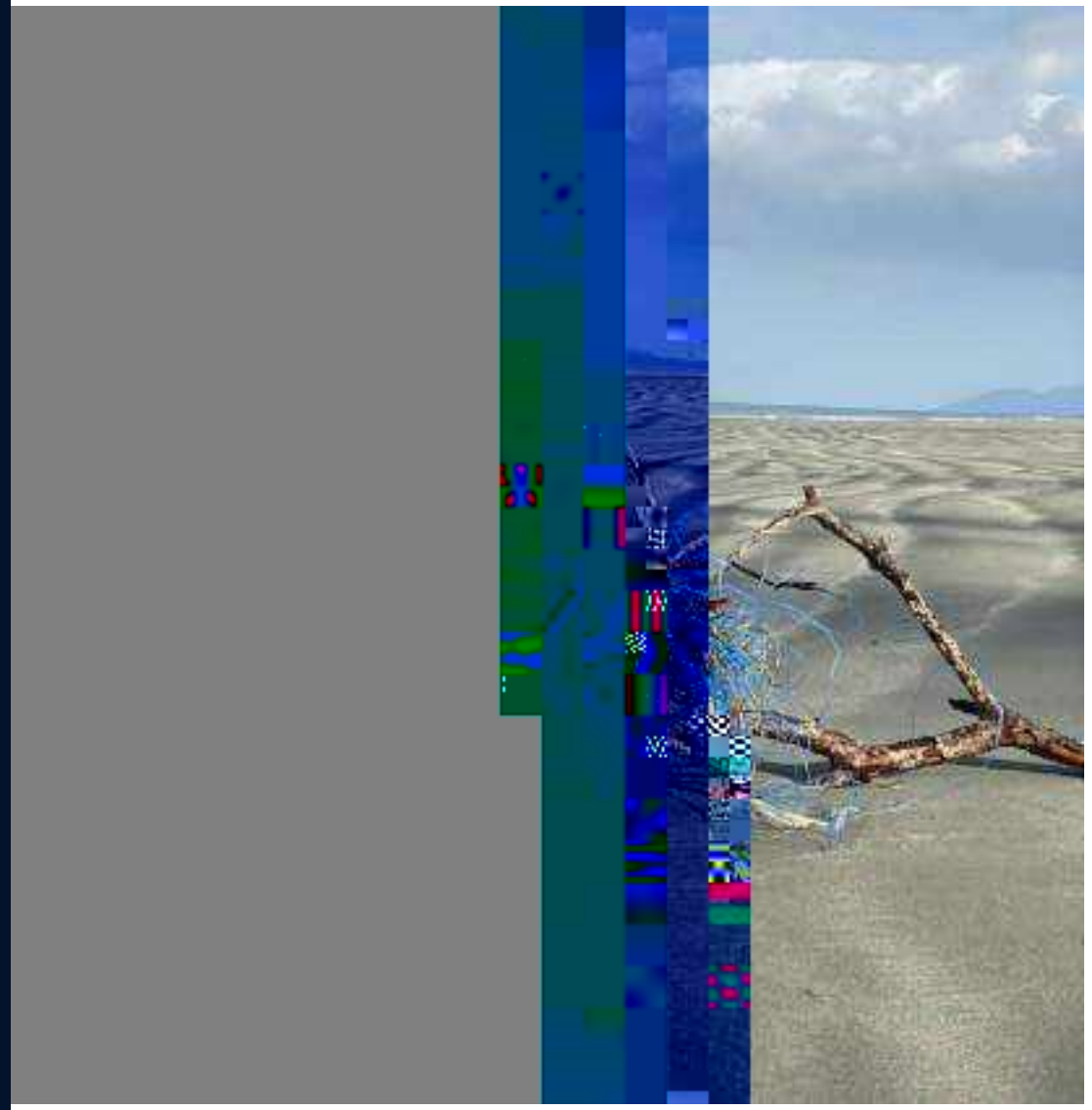
#ClosethePlasticTap

SeariousBusiness

connect@seariousbusiness.com

https://

#



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

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

Technical Lead Authors

Implementing Agency

Design

Ludovic Di Donato

BOTTLE-TO-

MISSION

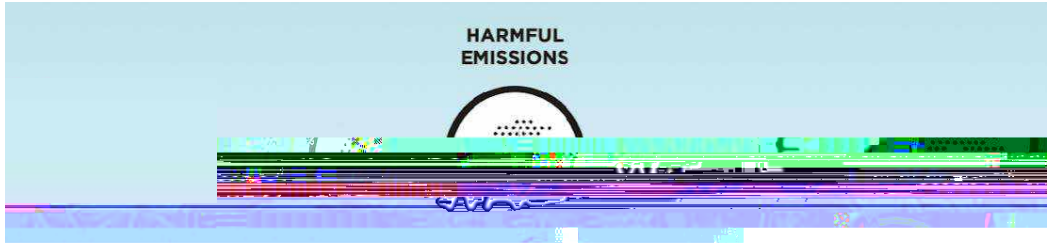
What

- 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
-

PLASTIC WASTE GENERATION & LEAKAGE



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

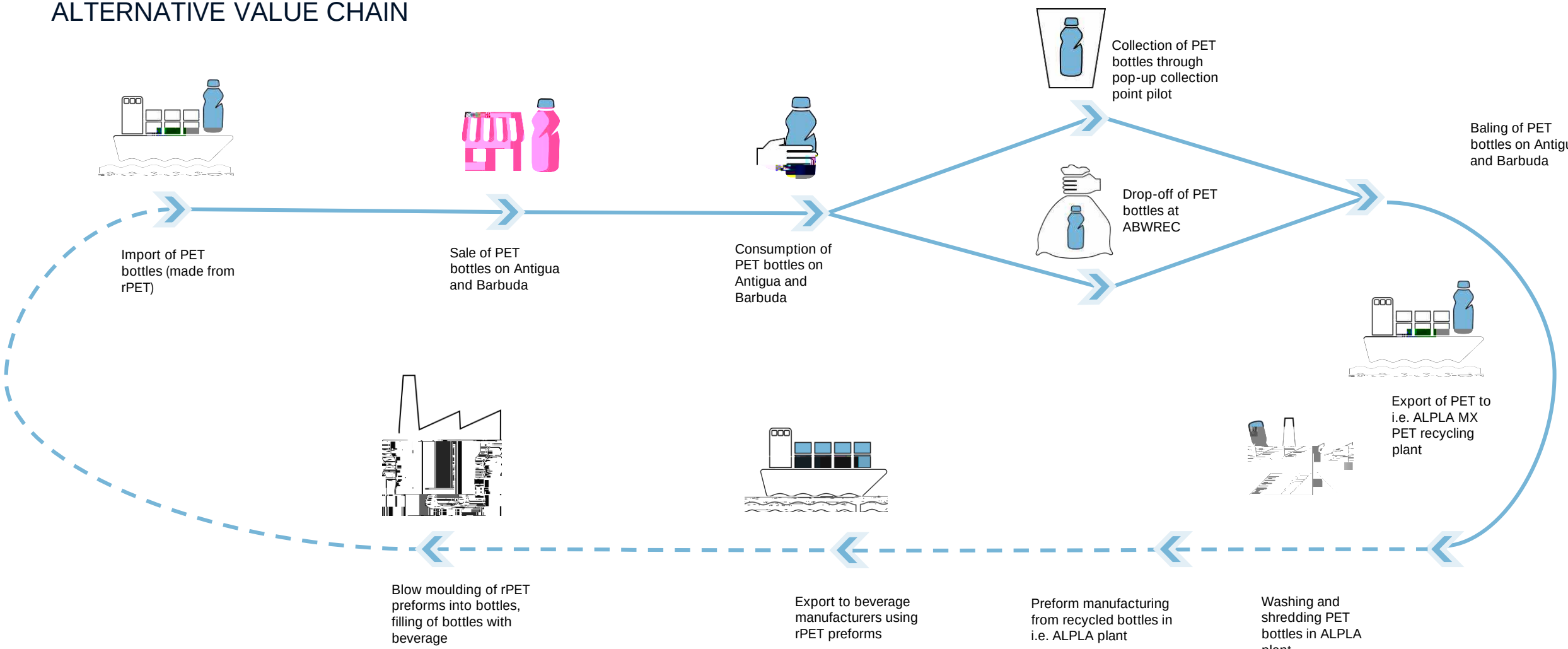
CONTEXTUAL ANALYSIS OF WASTE MANAGEMENT PRACTICES

ANTIGUA AND BARBUDA

- 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

OUTLINE BOTTLE TO BOTTLE RECYCLING

ALTERNATIVE VALUE CHAIN



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

OUTLINE OF CONTAINER DEPOSIT SYSTEM

DEPOSIT RETURN ENABLING BOTTLE TO BOTTLE RECYCLING

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 sL eTd[Idea)-3(ll)4(y,r87i2ve)-24r0.22960 54Flstewardship organizatstewardship organsdie1(0ade1(0a (ip)5(or)5(g)4(a)-2(n)-3(i

Design for Recycling

-

IMPORT/PRODUCTION

RECOMMENDATIONS - DESIGN FOR RECYCLING GUIDELINES

Labels, Sleeves and Wraps

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

Colours

- Transparent or light blue

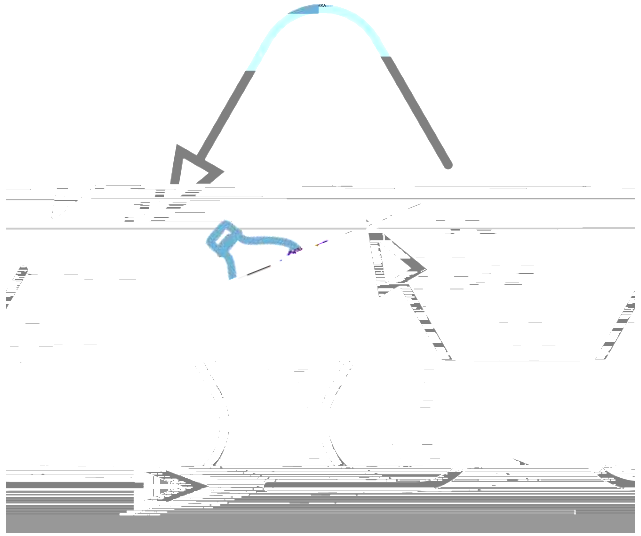
Closure system

- 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- in-store collection points
-

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

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.7( )) 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

HOW TO FINANCE THE CONTAINER DEPOSIT SCHEME

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

								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 /				

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

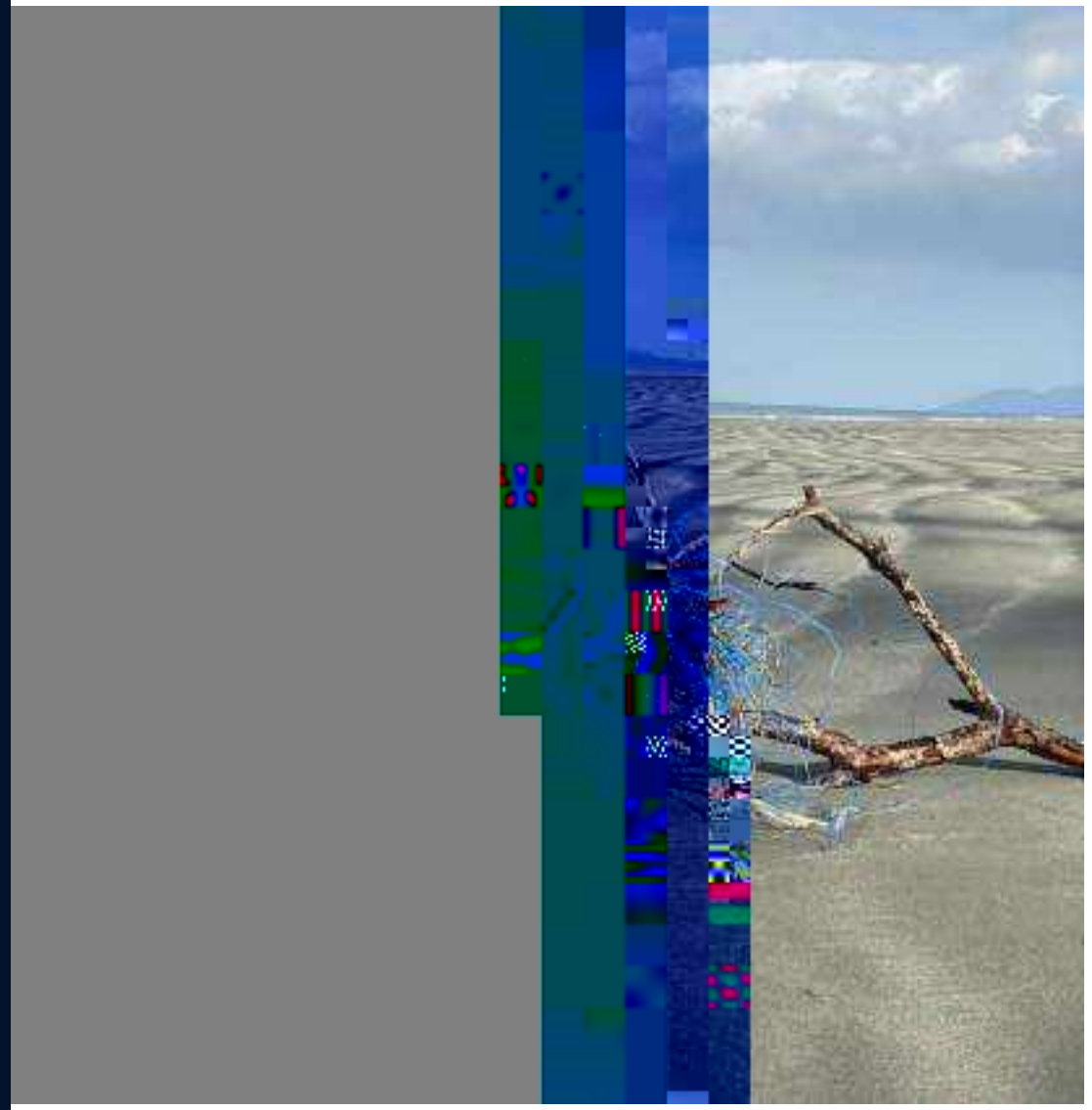
Searious Business

SeariousBusiness

connect@seariousbusiness.com

https://www.seariousbusiness.com/islands

#PlasticWasteFreeIslands #CloseThePlasticTap



PLASTIC WASTE FREE ISLANDS

ANTIGUA AND BARBUDA

BUSINESS PLAN

WASTE-TO-PRODUCT

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.

Support and Funding

Technical Lead Authors

WASTE-TO-PRODUCT

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 -to- 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.

WHY START THIS BUSINESS

PLASTIC WASTE GENERATION & LEAKAGE

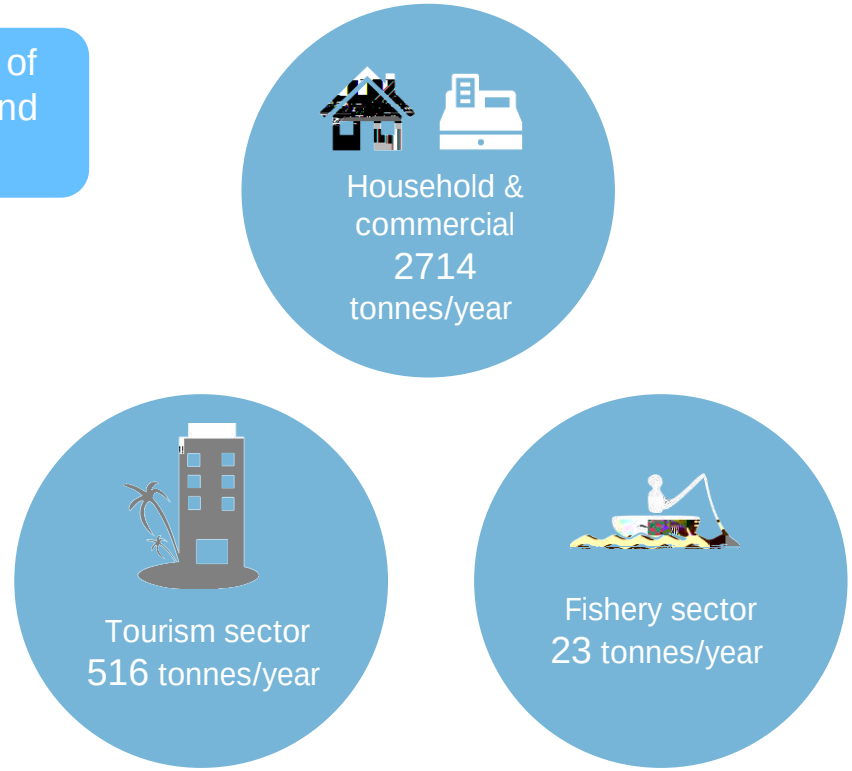
,

GENERAL STATUS OVERVIEW & SECTORAL DATA

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 landfill, or leakage
  - Except for PET small-scale collection for stockpiling and export
  - Large volumes of rigid HDPE and PP waste that could be diverted quite easily from landfill
- National ambitions/initiatives/pipeline:
  - Collection of PET bottles by Antigua and Barbuda Waste Recycling Corporation (ABWREC). Export to the USA without economic viability
  - Incentivised 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

HDPE

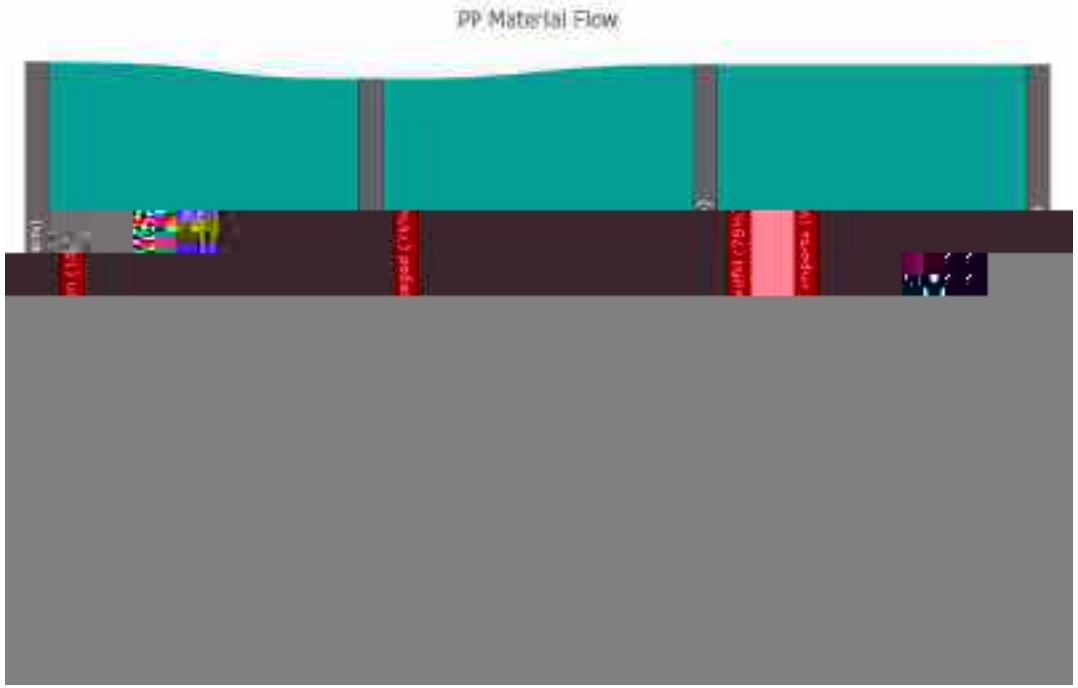
TARGETED MATERIAL(S)

PP – CURRENT VALUE CHAIN

Category	Material type	Household (T/y)	Commercial (T/y)	Tourism (T/y)	Fisheries (consumption based) (T/y)	Total (T/y)
PP 5	container lids pp	40,2	17,6	25	0,5	83,2
PP 5	bags resusable supermarket bags pp	17,8	0,0	0	0,0	17,8
PP 5	food containers pp	9,7	0,5	2,9	0,0	13,1
PP 5	food flexible packaging pp	4,0	3,9	1,7	0,0	9,6
PP 5	other pp	7,6	0,0	0	1,8	9,4
PP 5	food semi rigid containers e g trays pp	7,0	0,0	0	0,0	7,0
PP 5	straws single use	1,8	3,6	0,3	0,0	5,8
PP 5	glossy shopping bags single use plastics	3,5	0,0	0	0,0	3,5
PP 5	medicine bottles pp	0,2	0,0	0	0,0	0,2
PP 5	single use take away food containers pp single use	0,0	0,0	0	0,0	0,0
						149,6

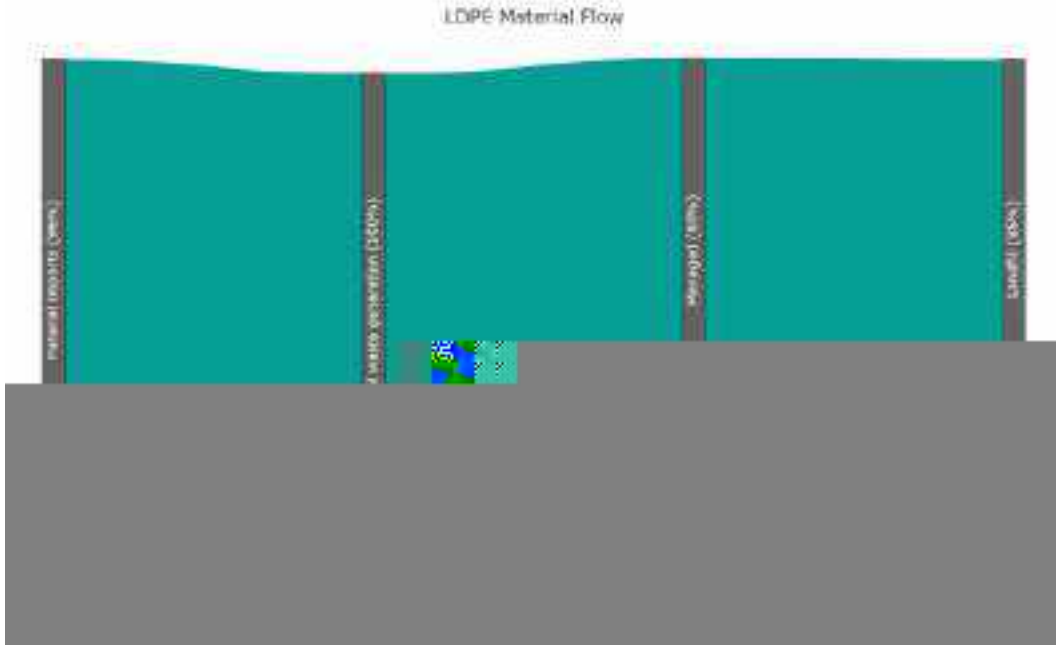
Source: Quantification report, Final data, All sectors plastics breakdown, APWC July 2021

Polypropylene (PP): A thermoplastic polymer used in a variety of applications. PP is sturdy can be used in a flexible or rigid form. PP can potentially be recycled.



TARGETED MATERIAL(S)

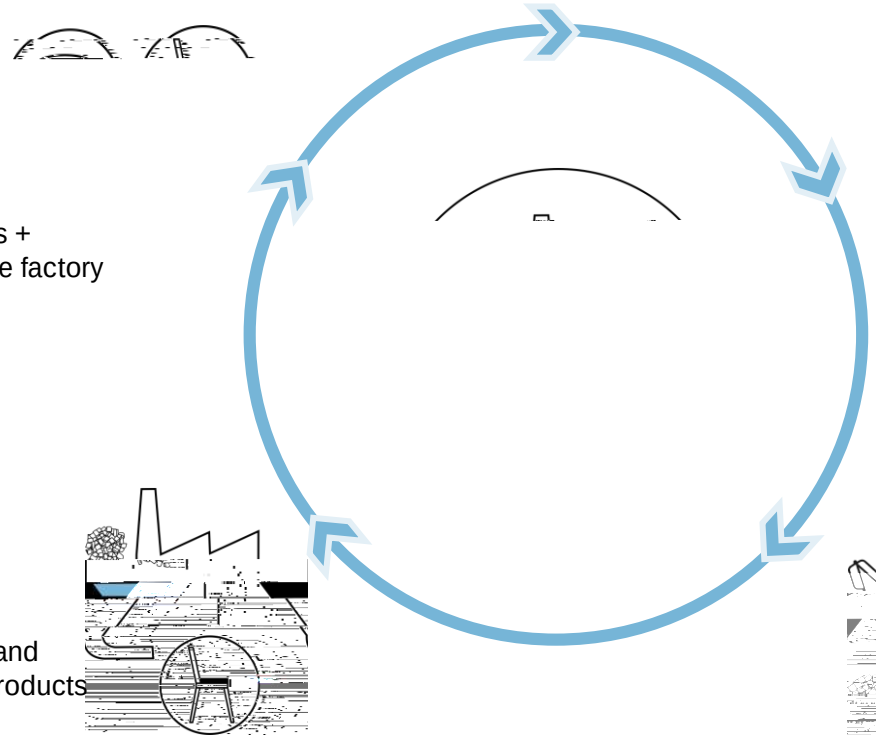
LDPE – CURRENT VALUE CHAIN



WASTE TO PRODUCT

ALTERNATIVE VALUE CHAIN

Source segregation of HDPE and PET bottle with PP caps not for toxic applications (only PET will be sorted out).
In resorts, hotels, schools: Bottle only collection, with after-sorting of PET



Sorting HDPE, PP at redemption centre

Products to be used for domestic and regional markets + recyclable at end of life in same factory or rental model

Small scale recycling to convert products into pellet/flakes

Manufacturers on island convert it into new products

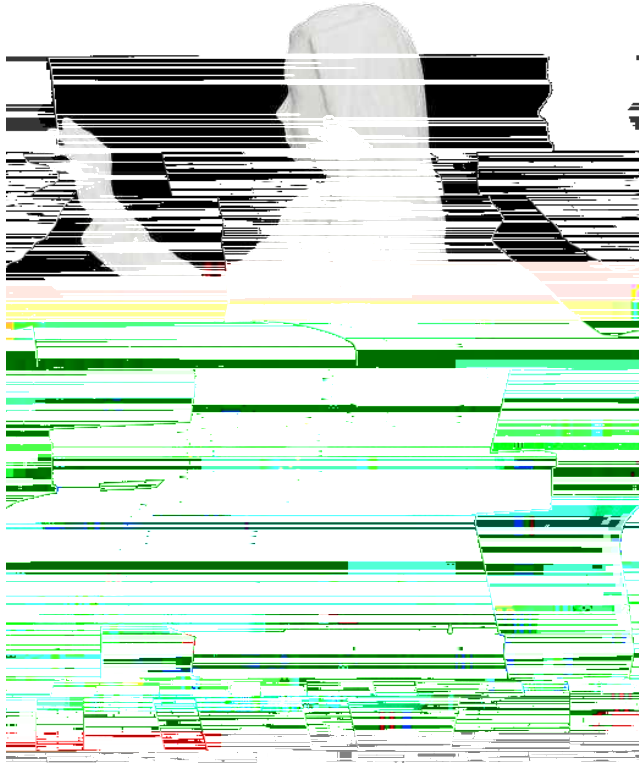
CONCEPT DESCRIPTION

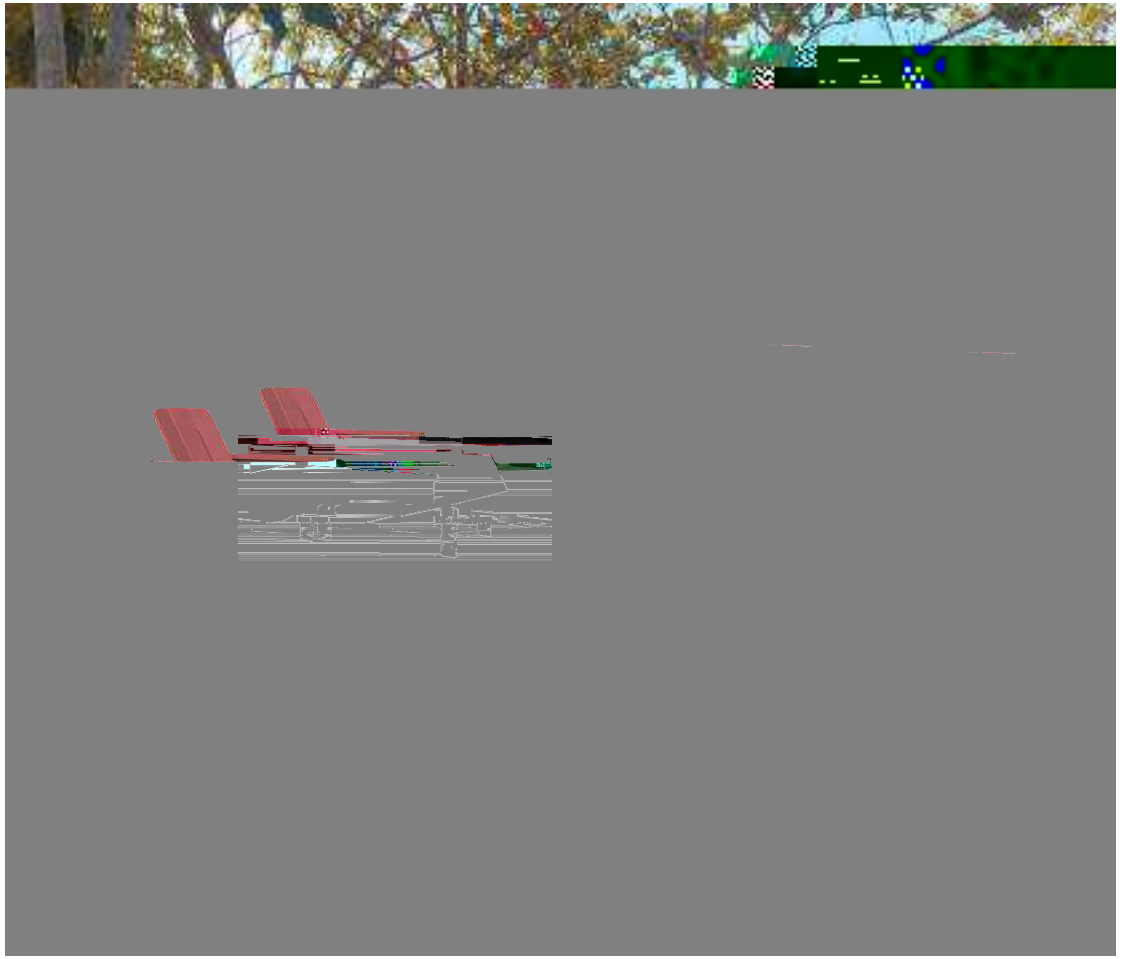
Plastic lumber, beams, planks, tiles and parts (semi-

USER SCENARIOS

Furniture

- Comfortable
- Durable
- Climate/weather-proof
- Modular, repairable
- Locally manufactured





UNIQUE SELLING POINTS

Technology

- Producibility: can process flakes directly so no high machine investments needed
- Scalability: Semi-finished products can be stored, and once machines reach their maximum capacity, an extra machine can be added
-

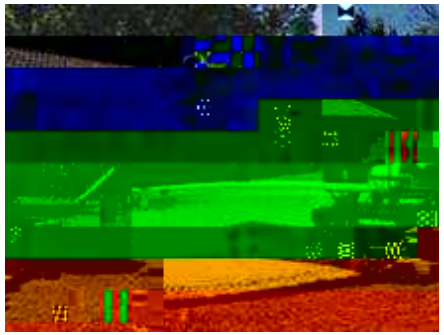
DIFFERENTIATION FROM COMPETITION

HOSPITALITY SECTOR

Cheap plastic furniture

Cheap metal

Wicker



Pool lounge furniture

Picknick furniture

Hardwood furniture

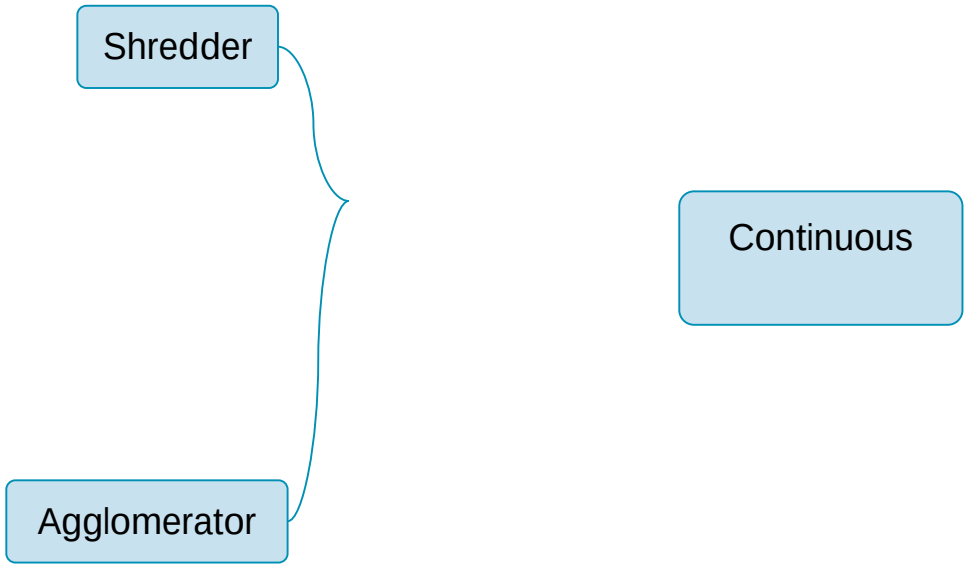
- More durable and longer lasting than cheap plastic import patio chairs
- High-end design
- Lasting look
- Easy repair with local service and parts from producer
- Added sustainable image value

Technique: Extrusion based (setup around extruder) + add-on moulding options

- Machines: shredder and/or agglomerator, extruder, press + moulds, intrusion moulds, or continuous extrusion line
- Woodworking equipment: Saw table / crosscut saw, mill, hand tools.
- Types of plastic converted:
  - High-end product: HDPE sorted & washed
  - Lower-end product: Mixed unwashed plastics with >70% PE/PP
- Amount of plastics used: e.g. 8.53 kg per 40x80x2800 beam, or 4.59 kg per 18x130x2800mm HDPE plank, or 75 kg per Bench
- Source of input materials: Collection of HDPE, PP, (LDPE) or all mixed plastics
  - Source segregation in resorts, hotels, schools:

OUTLINE WASTE TO PRODUCT

RECYCLING PROCESS



COLLECTION AND SORTING

IDENTIFYING

Plastics have different properties
The focus in this business plan lays on:

- HDPE, PP and LDPE for their melting properties & easiness to recycle
- Slide 6-8 give an overview of what kind of applications are typically made of the targeted materials in the local context

COLLECTION AND SORTING

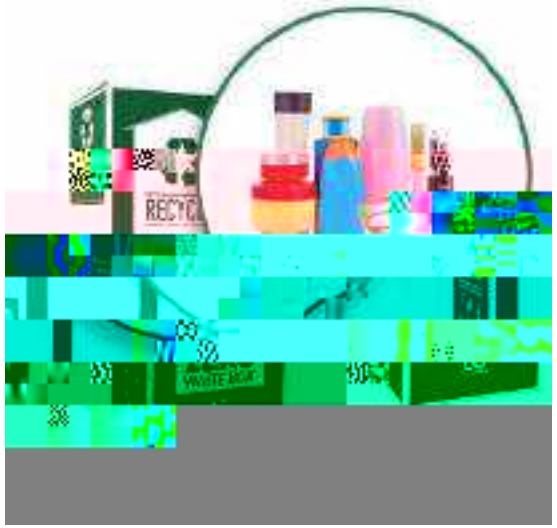
COLLECTION

Drop off points

- E.g. schools, supermarkets, public buildings, or resorts
- Incentives for consumers to sort and return plastic products
  - E.g. Discounts on end product
- Educational programmes and awareness campaign

Collaboration with existing waste management structures is crucial

- E.g. partnership with municipal solid waste management
- Collaboration with ministries and government



MACHINERY

Machines	USD 49.000	
Shredder, 5 kW	USD 5.000	
Optional: shredder with washer		At a capacity of 250 kg/h 80kW is needed and will cost around 30.000 USD
Agglomerator	USD 5.000	
Extruder, 35 kW	USD 15.000	Spare parts like heating element and screw removal tool included
Intrusion moulds, on cart system	USD 10.000	
Press, 3 kW	USD 7.000	
Two moulds	USD 7.500	Mould costs are estimated because they depend on product design, and related production method (mill/laser/waterjet)
Optional: For 220V3P or 440V3P there will be extra costs (estimate) USD 2.00		Standard voltage of the machines is 380V, 50 or 60Hz.
Shipping (CIF) estimate	USD 14.000	Shipping cost are hard to predict due to fluctuations from china. Shipping costs of moulds not included; depends on local or remote production
Support at distance by Technical partner (3 years)	USD 10.000	
Detailed machine specification		
Support RFQ process		
Verification Factory acceptance test (FAT)		
Mould drawings		
Remote support for setting up facilities incl. unpacking and installing equipment		
Remote training and support machines start up		
Provide manuals, maintenance and user instructions		
Support on input mix and additives		
Total	USD 73.500	

Modular production hall layout example

SELECTION FACTORS

TECHNIQUE AND PRODUCT

Impact

•

SELECTION APPROACH

Recycling technology

This table provides a structured approach on how the recycling technology is selected. It is a general comparison example used for the technology selection, in which island specific factors have been considered.

MARKET ANALYSIS

HOSPITTALITY + B2B

Primary market

- Tourism - Hospitality Outdoor furniture and Construction, i.e. dinner chairs, fencing, plastic lumber

Secondary markets

- B2C:hHigh-end consumer design furniture has similar product characteristics and demands (overlap villas and apartments)
- B2B: semi-finished products, i.e. timber, lumber, sheets for furniture makers. i.e. countertop
- Public: governmental, school furniture
- Public works, Infrastructure + construction: governmental, public furniture, e.g. park bench, picnic table, signage, fencing

Market size hospitality furniture

- 60+ hotels & resorts with over 3,000 rooms

Estimated total annual expenditure on furniture

- USD 210,000 (3000 rooms and accommodations with an average spending of $70/year/room on outdoor furniture)

Global expected CAGR (Compound Annual Growth Rate) tourism after Covid-pandemic

- 3.1% (2021-2026)

Longer term market fundamentals

- Shorter supply chains decrease need for imports
- Less pressure on landfill

Demand-drivers

- Showing sustainable focus
- Longer-lasting alternatives
- Locally produced

BUSINESS DRIVERS

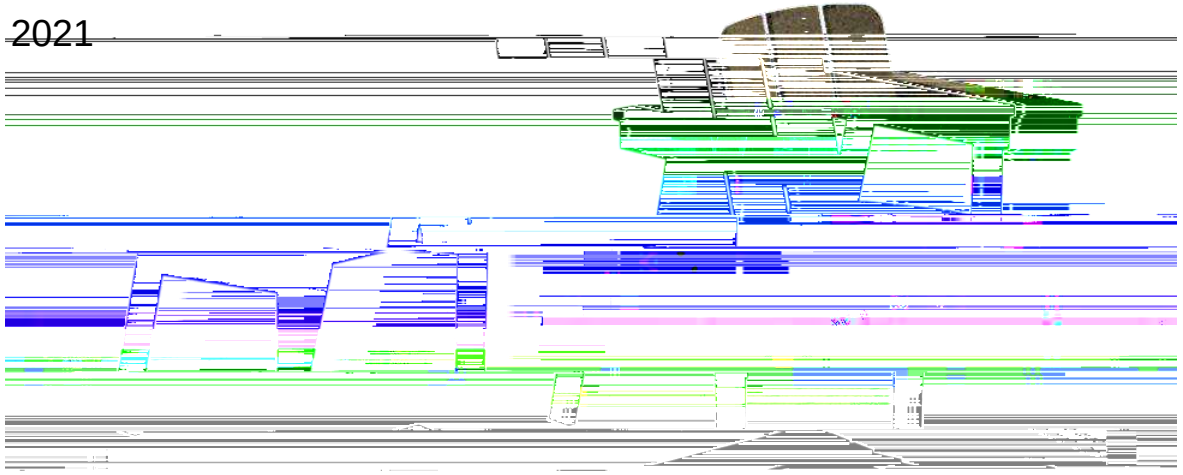
BUSINESS DRIVERS

INDUSTRY SUPPORT – INNOVATION AWARDS

Recycled HDPE dining chair made from Caribbean plastic waste streams is already recognized by industry experts as a promising and innovative business plan:

shortlisted for the prestigious Plastics Recycling Awards Europe 2021

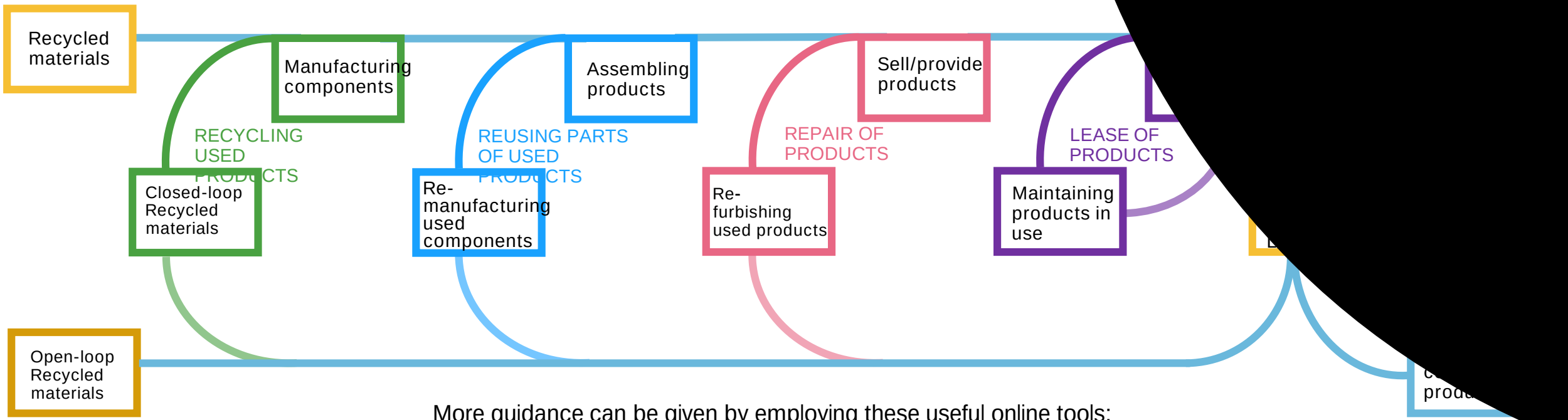
- Household and Leisure products category



POTENTIAL FOR CIRCULARITY

INCREASING CIRCULARITY

The below graph guides you on how to achieve maximum circularity for your product – on every



More guidance can be given by employing these useful online tools:

Circularity Calculator and

and

OPERATIONS

Tools & Machines

- Shredder
- Optional agglomerator if collection is expanded for flexibles processing
-

FINANCIALS

SUMMARY AND SALES OVERVIEW

Summary	
Starting capital	183,532.06
Months to Pay Back Investment	33
Full Time Employees Needed	7.5
Revenue Earned Per Month	32,931.0
Fixed Costs Per Month	1,560.00
Material Costs Per Month	17,639.83
Total Wages Paid Per Month	7,995.24
Total Profit Earned Per Month	5,735.94

7,995.24

Sales Overview				
Products & Services	Selling Price Per Unit	Number of Expected Sales Per Month	Total Product Cost	Profit Margin
50 kgs of Medium Shredded Plastic	0.00	166.7	17.73	-100.00%
mixed Beam 2800 x 40 x 80 mm	17.00	300.0	15.32	10.96%
mixed Plank 2800 x 28 x 130 mm	19.00	180.0	16.98	11.87%
Pavement tile	11.70	460.0	10.51	11.30%
wide HDPE plank 2800 x 18 x 130 mm	17.40	180.0	15.48	12.42%
narrow HDPE plank 2800 x 18 x 65 m80.0				

10(18)3(0.0)] TJ ET Q q 0.000014

FINANCIALS

CASH FLOW

Cash Flow

A cash flow analysis shows that you have enough money throughout your first year to buy materials, pay your employees, or make an investment into a new machine.

	Month 1	Month 2	Month 3	Month 4	Month 5	Month 6	Month 7	Month 8	Month 9	Month 10	Month 11	

FINANCIALS

PROFIT, LOSS

Profit and Loss

This table is to show how much money the company is projected to make each year. It assumes that you paid yourself for the hours you worked, so the "Net Income" at the bottom is the remaining profit made by your company. It is greatly influenced by the "Monthly Sales Improvement Rate" on the Dashboard page. This table is also useful to show your bank or include in grant applications.

	Year 1	Year 2	Year 3
Revenue	395.172.00	434,689.20	478,158.12
Cost of Sales	279,083.65	306,992.01	337,691.21
Net Revenue	116,088.35	127,697.19	140,466.91
Fixed Costs	18,720.00	18,720.00	18,720.00
Gross Income from Operations	97,368.35	108,977.19	121,746.91
Business Taxes	24,342.09	27,244.30	30,436.73
Net Income	73,026.27	81,732.89	91,310.18

Yearly Growth Rate
10%

(conservative scenario)

Business Tax Rate
25.00%

- Private money
- (Development) Bank loans: de-risking partner, e.g. offering loan guarantees)
  Incl. IADB, ADB, IFC, CEB
- Investors/business accelerators ((pre)-seed, angel investment, early stage)
  - Caribbean Export Development Agency
  - Caribbean Business Angels Network
  - Blue Bio Value
  - Blue Natural Capital Finance Facility
  - Ennovent
  - For Good Venture
  - LatitudR (the extension of the Inclusive Region reW*n8S2nBI(yclnBT0 0 0 rg0 0 0 RG/F2 12 Tf99.096 227.47 Td[F)-2(o)-3(r)-4( )8(Go)-2(ol(1lni-4(n)-2(gr)-4(3(en)-3(si)0 02

FACTSHEET

BENEFITS

Financial benefits 	Environmental benefits	Social benefits 
ROI – 33 months	Lower landfill pressure for government: up to150 tonnes / year or 14% HDPE/PP/LDPE waste diverted from landfill/dumpsites	Develop recycling market - Create more jobs in island in collection, sorting, cleaning, recycling – 7.5-11 FTE when converting 5% of total plastic waste generated
Better license to operate for construction and furniture market. And allows for green/circular public procurement	Approx. 164.7 tonnes of CO2 emissions saved by redirecting plastic waste into products	Contribution to cleaner island and attractiveness for local population and visitors
Customer loyalty for producers	Reduced amount of plastic waste that might leak into the environment. up to 150 tonnes / year diverted from potential leakage	
Lower waste disposal and clean-up costs for government: Approx. savings XCD 21,323 /year		

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

PLASTIC WASTE FREE ISLANDS

FIJI

BUSINESS PLAN

WASTE-TO-PRODUCT

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

ACKNOWLEDGMENTS

IUCN

WASTE-TO-PRODUCT

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 **“Waste-to-product”** solution, in the geographic context of Fiji. It demonstrates how the solution can be realized, allowing for the creation of an alternative value chain.

MISSION

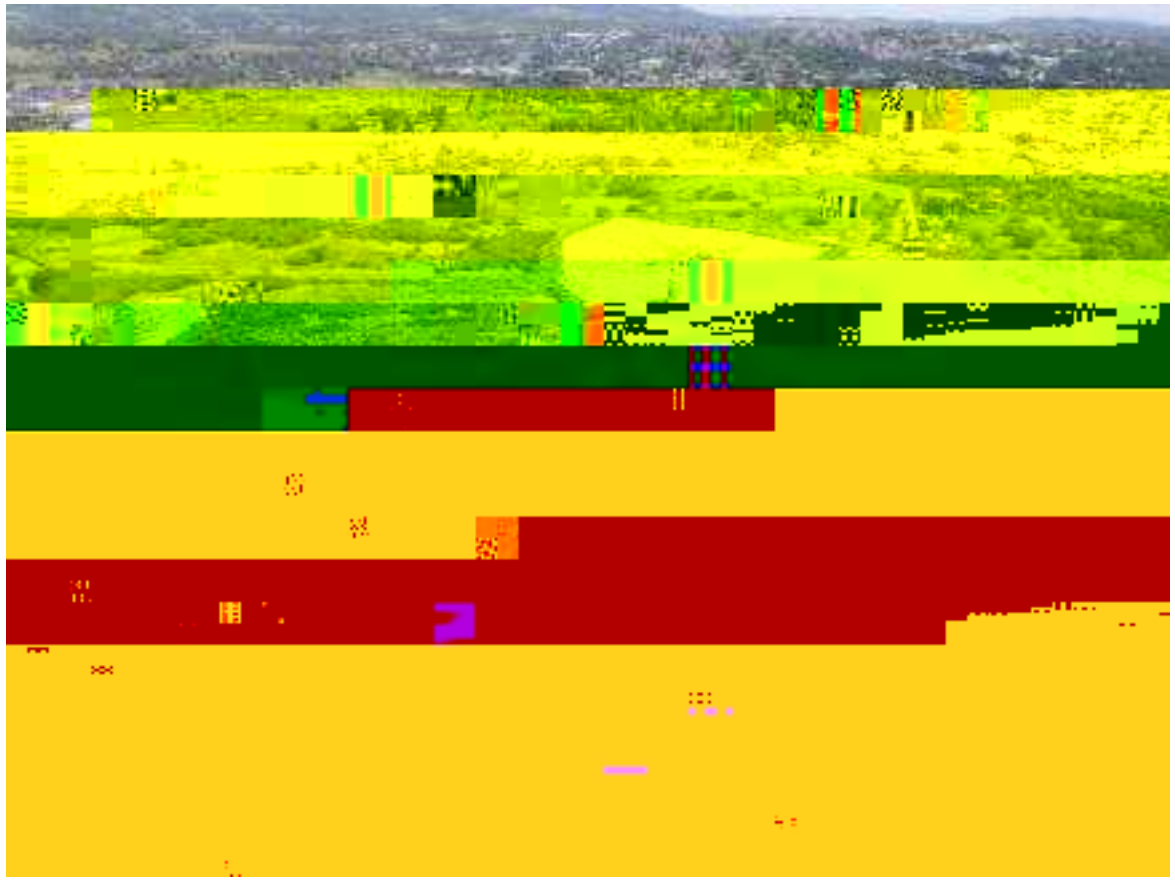
WHAT & WHY

What

- A successful business in Furniture and semi-finished products
  - Made from recycled plastic
  - Locally sourced and locally produced

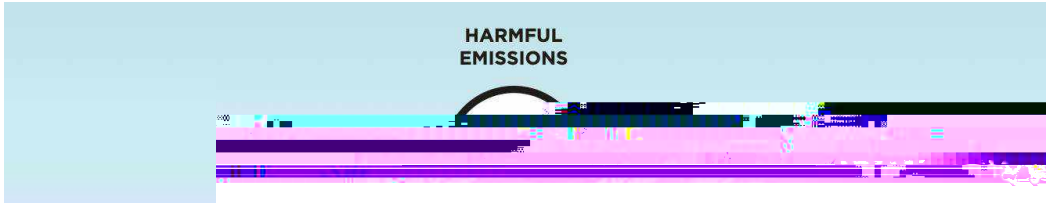
Why

- Local business opportunity
  - Reduce Import-dependency
  - Enhance resource recovery options on-island
  - Job creation
- Reduce overfull landfills and high plastic leakage prevalence
  - Improved waste management
  - Lower environmental impact



WHY START THIS BUSINESS

PLASTIC WASTE GENERATION & LEAKAGE



Financial and environmental impacts of plastic leakage

	Annual net Imports 2018-2019 (T/y)	Total disposed 2019 - landfill (T/y)	Total disposed 2019 – dumpsite (T/y)	Total recycled 2019 (T/y)	Leakage (T/y) (95% credible interval)
PET (1)	4540	2164	1459	10	951 (3-2091)
HDPE (2)	2246	974	706	6	567 (2-1402)
PVC (3)	160	853	53	0	52 (0.3-126)
LDPE (4)	1854	514	584	12	429 (1-1079)
PP (5)	1254	55	369	0	378 (2

National plastic waste generation & leakage data Fiji with polyolefins in blue.
Source: Final quantification report – Executive summary APWC July 2021

CONTEXTUAL ANALYSIS OF WASTE MANAGEMENT PRACTICES

- No wide scale source segregation, collection, or segregation at landfill, except for PET

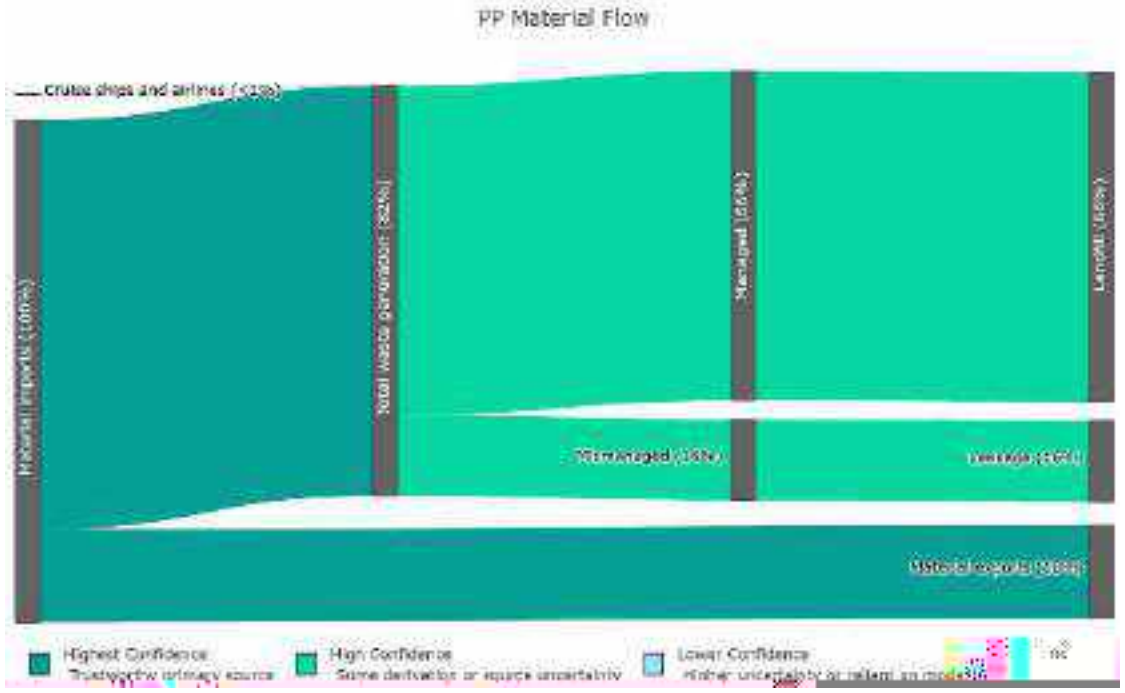
14,883.3 tonnes plastic waste generated/year

TARGETED MATERIAL(S)

HDPE – CURRENT VALUE CHAIN

TARGETED MATERIAL(S)

PP – CURRENT VALUE CHAIN



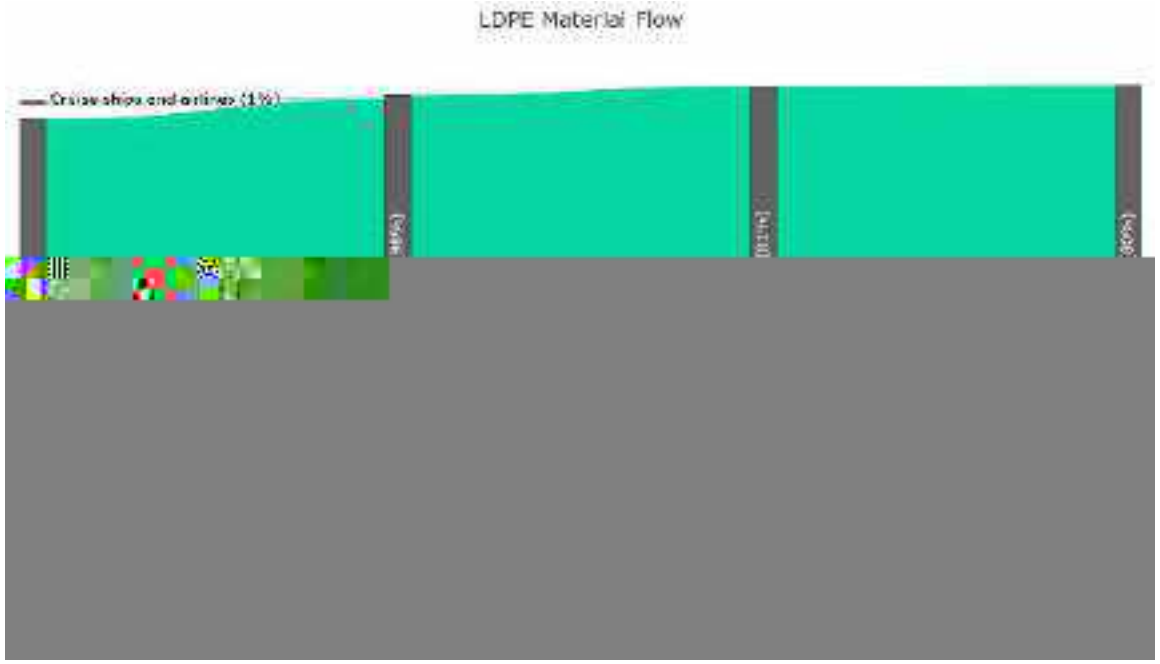
TARGETED MATERIAL(S)

LDPE – CURRENT VALUE CHAIN

Low-density Polyethylene (LDPE): A thermoplastic polymer, which is a soft, flexible, lightweight plastic material, oftentimes used for plastic bags. LDPE is recyclable.

Polymer type	Plastic Item	Household (T/y)	Commercial (T/y)	Tourism land (T/y)	Fisheries (T/y)	Total
LDPE 4	soft plastic packaging single use plastics	816.60	399.60	160.10	0.46	1376.76
LDPE 4	glossy shopping bags single use plastics	13.00	30.30	0.00	0.11	43.41
LDPE 4	food containers ldpe	1.70	0.00	0.00	0.00	1.70
						1,437.3

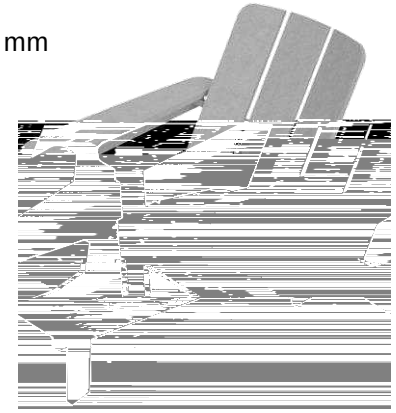
Source: Quantification report, Final data, All sectors plastics breakdown, APWC July 2021

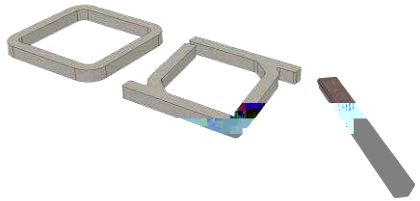


PRODUCT CONCEPT

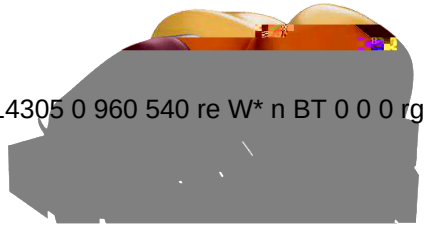
MIXED EXTRUSION PRODUCTS

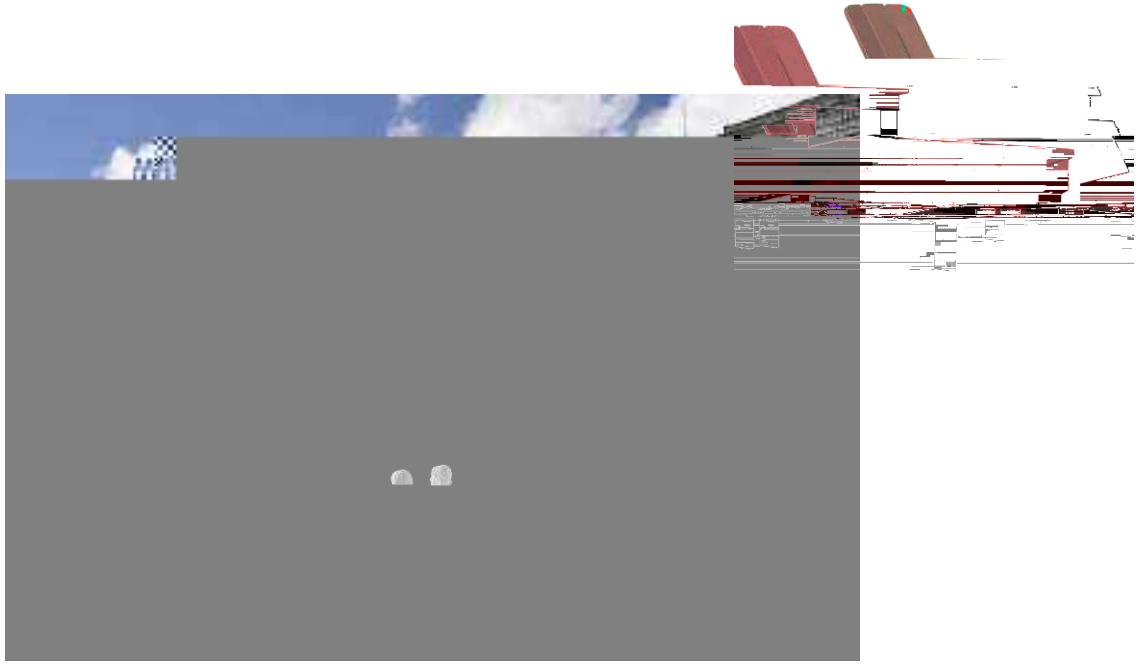
- Beams, planks, tiles and parts (semi-finished product)
- Outdoor public and private furniture (end product)
- Example Prototypes:
  - Park bench (mainly polyolefins)
    - Dimensions: L650 x W1520 x H825 mm
    - Weight: 75 kg
    - Intended use: Garden, park, wharf, public space (outdoor)
  - Trash tree / trash nest (mixed plastics)
    - Dimensions: L1280 x W1320 x H1545 mm
    - Weight: 43 kg
    - Intended use: public space (central collection points (outdoor)
  - Lounge chair (recycled HDPE)
    - Dimensions: L 805 x W 733 x H 729 mm
    - Weight: 14 kg
    - Intended use: garden, park, wharf, public space (outdoor)





- Other potential products
  - Lumber/timber, planktatODO 0 rg 0 .be3-3(,)38(pl)75 0s14305 0 960 540 re W* n BT 0 0 0 rg 0 0 0 RG





UNIQUE SELLING POINTS

Technology

- Producibility: can process flakes directly so no high machine investments needed
- Scalability: Semi-finished products can be stored, and once machines reach

DIFFERENTIATION FROM COMPETITION

FURNITURE, TIMBER, CONSTRUCTION

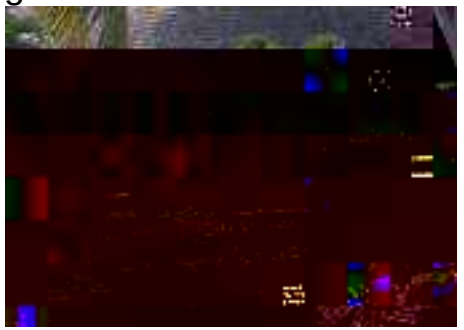
Cheap plastic furniture

Hardwood lumber / timber

Fencing

Lounge furniture

Street furniture



Park/picnic furniture

- More durable and longer lasting than cheap plastic import patio chairs
- High-end design
- Lasting look
- Easy repair with local service and parts from producer
- Added sustainable image value

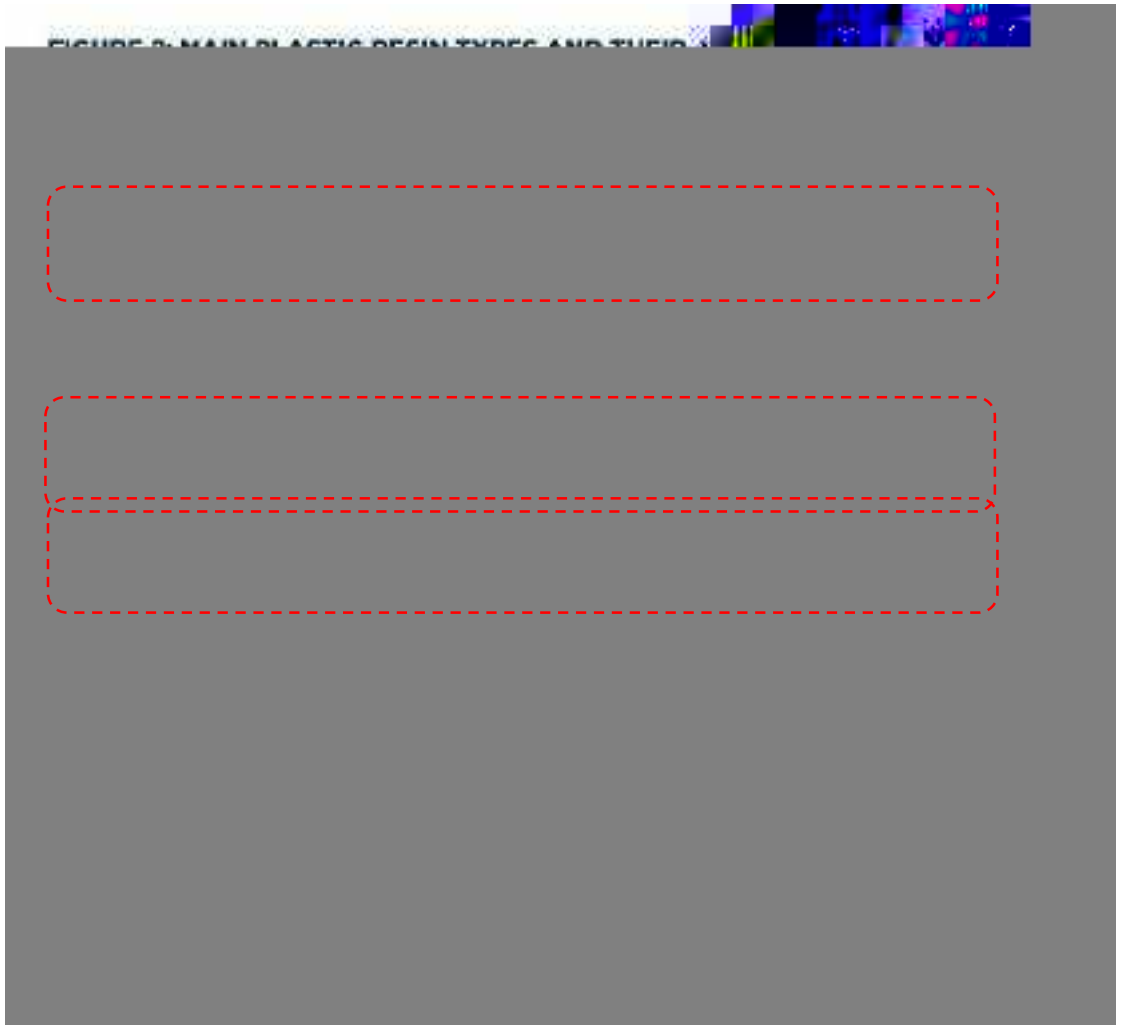
Technique: Extrusion based (setup around extruder) + add-on moulding options

.26 Td [<0087>] TJ ET Q q 0.000 0 1430 0 960 540 re W* n BT 0 0 0 rg 0 0 0 RG /F2 14.04 Tf 62.808 375.26 Td [(M)4(ac)-3(h35Q q 0.00(W)21(oodw)31(o

• Machines: shredder and/or agglomerator, moulds

COLLECTION AND SORTING

IDENTIFYING



Plastics have different properties
The focus in this business plan lays on:

- HDPE, PP and LDPE for their melting properties & easiness to recycle
- Slide 6-8 give an overview of what kind of applications are typically made of the targeted materials in the local context

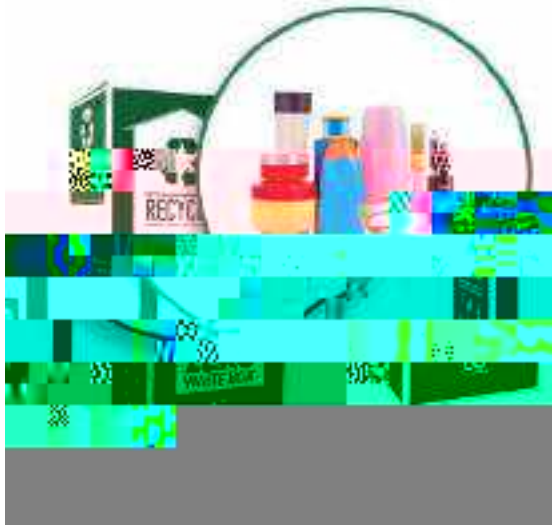
COLLECTION AND SORTING

COLLECTION

While working towards public collection schemes for source-segregated plastic, strengthening and building on existing collection initiatives is recommended, including:

Drop off points

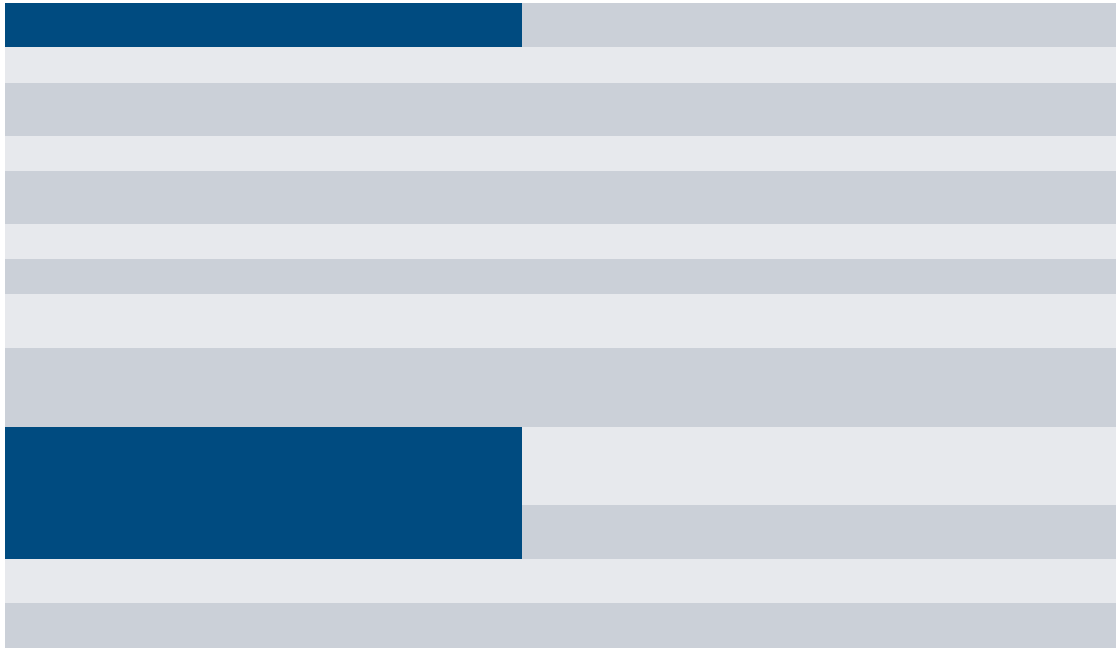
- E.g. schools, supermarkets, public buildings, redemption centers or resorts
- Incentives for consumers to sort and return plastic products
  - E.g. Discounts on end product
- Educational programmes and awareness campaign



Scale up collection of recyclables at commercial enterprises

Collaboration with existing waste 0 0 RG im 1m4l te cded,r 540 re W* n BT 0 0 0 rg 0 0 0 RG /F8 14.04 Tf 44.808 225.6 Td [<0087>] TJ ET Q q

MACHINERY



MARKET ANALYSIS

HOSPITALITY

Primary market

- Tourism - Hospitality Outdoor furniture and Construction, i.e. dinner chairs, fencing, plastic lumber

Secondary markets

- B2C: High-end consumer design furniture has similar product characteristics and demands (overlap villas and apartments)
- B2B: semi-finished products, i.e. Timber, lumber, Sheets for furniture makers. i.e. countertop
- Public: governmental, school furniture
- Public works, Infrastructure + construction: governmental, public furniture,
  e.g. park bench, picnic table, signage, fencing

Market size hospitality furniture

- ±300 hotels, resort, with over 7600 apartments and rooms

Estimated annual expenditure on furniture

- USD 532,000 (7600 rooms and accommodations with a average spending of $70/year/room on outdoor furniture)

Global expected CAGR (Compound Annual Growth Rate) tourism after Covid-pandemic

- 3.1% (2021-2026)

Longer term market fundamentals

- Shorter supply chains decrease need for imports
- Less pressure on landfill

Demand-drivers

- Showing green/sustainable focus
- Longer lasting alternatives
- Locally produced

MARKET ANALYSIS

HOSPITALITY

Market needs

- Durable furniture
- Easy to maintain / high quality
- Indoors and outdoors application
- Sustainable/green
- High end design

Buying patterns

- Current yearly renew due to poor quality and extreme weather conditions (market research)

Locations of potential customers

- Mostly coastal area

Specify domestic vs export markets

- Domestic: Local distribution network (stores, DIY markets, furniture makers)
- Export potential:
  - Pacific region: local furniture production for tourism based on recycled plastic lumber

Launching customers:

- Accommodations who collect material themselves
- Governmental bodies

BUSINESS DRIVERS

50% willingness to purchase recycled plastic furniture made from own waste
+ **50% considering** to procuradn,bbn(o)3(t)-h(ad1422(f)-3nit)5(u917( )] TJ ET Q q 0.000014

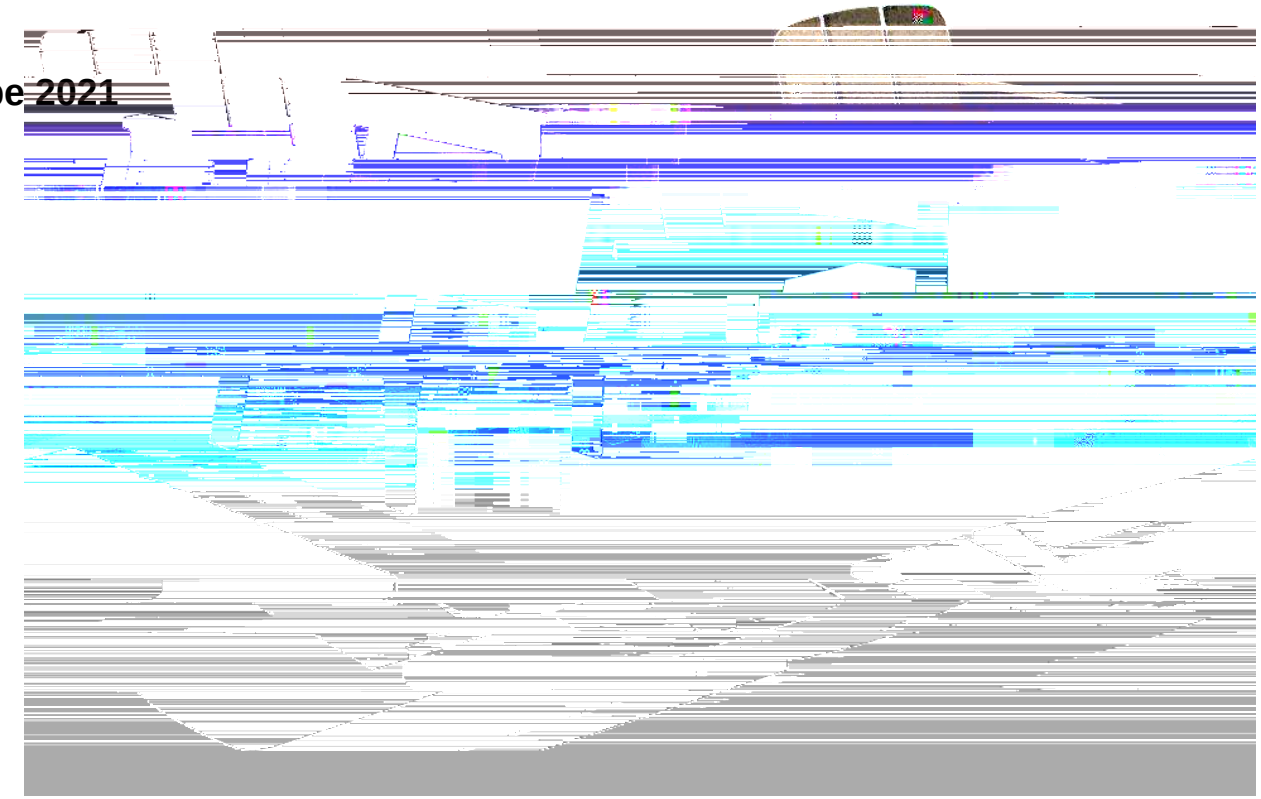
BUSINESS DRIVERS

INDUSTRY SUPPORT – INNOVATION AWARDS

rHDPE dining chair made from Caribbean plastic waste streams:

shortlisted for the prestigious **Plastics Recycling Awards Europe 2021**

- Household and Leisure products category

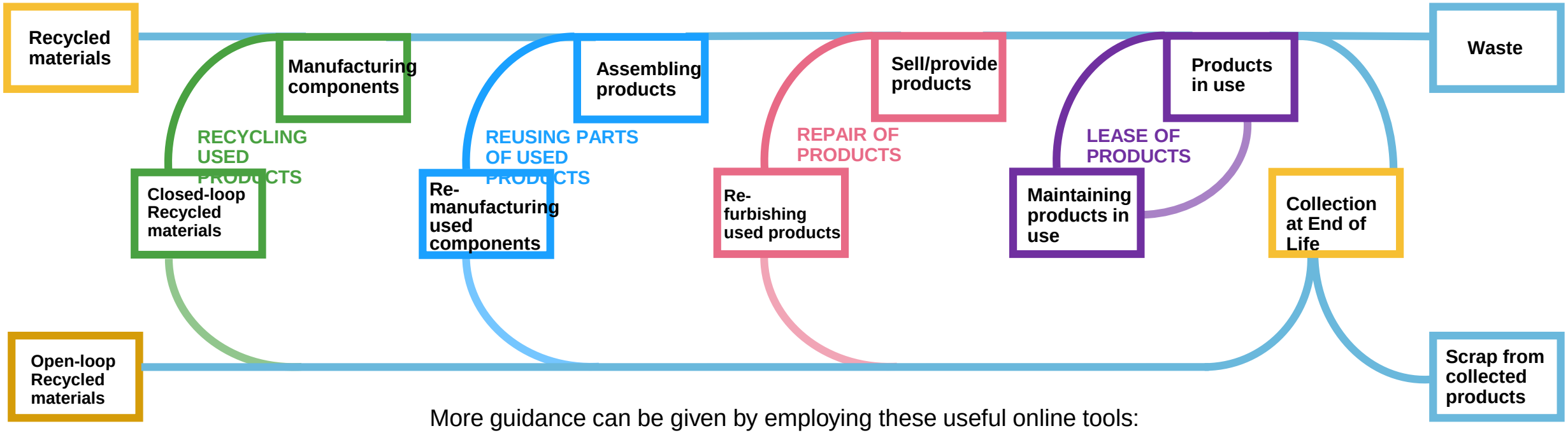


MARKET INTRODUCTION PLAN

POTENTIAL FOR CIRCULARITY

INCREASING CIRCULARITY

The below graph guides you on how to achieve maximum circularity for your product – on every step of the value chain!



More guidance can be given by employing these useful online tools:

Circularity Calculator and Circularity Pathfinder

OPERATIONS

Tools & Machines

- Shredder
- Optional agglomerator if collection is expanded for flexibles processing
- Extruder
- Intrusion moulds
- Press + press moulds
- CNC mill
- Woodworking tools
- Pick up truck

Space & Permits

- 20 sqm stock
- 50 sqm production
- 20 sqm wood workshop

Key Tasks /activities

- Feedstock preparation
  - Collection
  - Washing
  - Shredding / agglomeration
- Production
  - Extrusion + intrusion + press moulding
  - Machine maintenance
- End product making
  - Cuttingn

FINANCIALS

SUMMARY AND SALES OVERVIEW

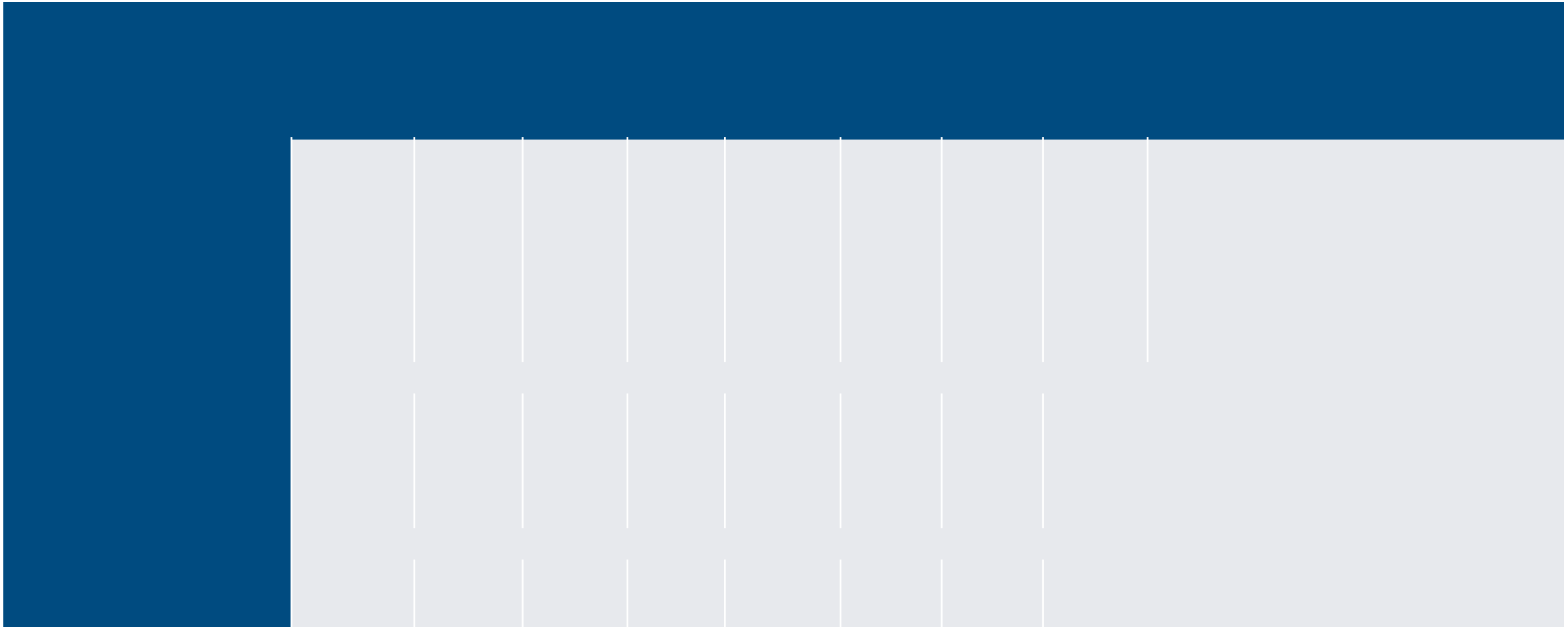
Diversifying the product portfolio is necessary to build a sustainable business model. The sales overview example provides ideas for possible other products.

Summary	
Starting capital	178,452.62
Months to Pay Back Investment	30
Full Time Employees Needed	7.5
Revenue Earned Per Month	28,399.00
Fixed Costs Per Month	1,560.00
Material Costs Per Month	17,639.83
Total Wages Paid Per Month	2,915.80
Total Profit Earned Per Month	6,283.38

Sales Overview				
Products & Services	Selling Price Per Unit	Number of Expected Sales Per Month	Total Product Cost	Profit Margin
50 kgs of Medium Shredded Plastic	0.00	166.7	8.41	-100.00%
mixed Beam 2800 x 40 x 80 mm	15.00	300.0	13.63	10.09%
mixed Plank 2800 x 28 x 130 mm	16.90	180.0	15.29	10.54%
Pavement tile	9.40	460.0	8.53	10.15%
wide HDPE plank 2800 x 18 x 130 mm	12.00	180.0	10.96	9.51%
narrow HDPE plank 2800 x 18 x 65 mm	7.70	90.0	7.01	9.88%
Bench parts	0.00	12.0	32.69	-100.00%
Park bench	160.00	12.0	87.63	82.59%
Trash nest	230.00	30.0	125.47	83.31%
Lounge chair	45.00	30.0	25.09	79.33%
Side table / foot bench	29.00	15.0	16.46	76.15%
Dining chair	35.00	60.0	18.97	84.51%
Dining table	65.00	15.0	36.61	77.54%

FINANCIALS

CASH FLOW



FINANCIALS

PROFIT, LOSS

Profit and Loss

This table is to show how much money the company is projected to make each year. It assumes that you paid yourself for the hours you worked, so the "Net Income" at the bottom is the remaining profit made by your company. It is greatly influenced by the "Monthly Sales Improvement Rate" on the Dashboard page. This table is also useful to show your bank or include in grant applications.

	Year 1	Year 2	Year 3
Revenue	340,788.00	374,866.80	412,353.48
Cost of Sales	236,260.23	259,886.25	285,874.88
Net Revenue	104,527.77	114,980.55	126,478.60
Fixed Costs	18,720.00	18,720.00	18,720.00
Gross Income from Operations	85,807.77	96,260.55	107,758.60
Business Taxes	17,161.55	19,252.11	21,551.72
Net Income	68,646.22	77,008.44	86,206.88

Yearly Growth Rate
10%

(conservative scenario)

Business Tax Rate
20.00%

- Private money
- (Development) Bank loans: de-risking partner, e.g. offering loan guarantees)
  Incl. ADB, IFC, CEB
- Investors/business accelerators ((pre)-seed, angel investment, early stage)
  - Blue Bio Value
  - Blue Natural Capital Finance Facility
  - Ennovent
  -

FACTSHEET

BENEFITS

Financial benefits	Environmental benefits	Social benefits
ROI – 33 months	Lower landfill pressure for government: up to150 tonnes / year or 4% of HDPE/PP/LDPE waste diverted from landfill/dumping sites	Develop recycling market - Create 5(s)

FOR MORE INFORMATION

IUCN

IUCN_Plastics

plastics@iucn.org

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

#ClosethePlasticTap

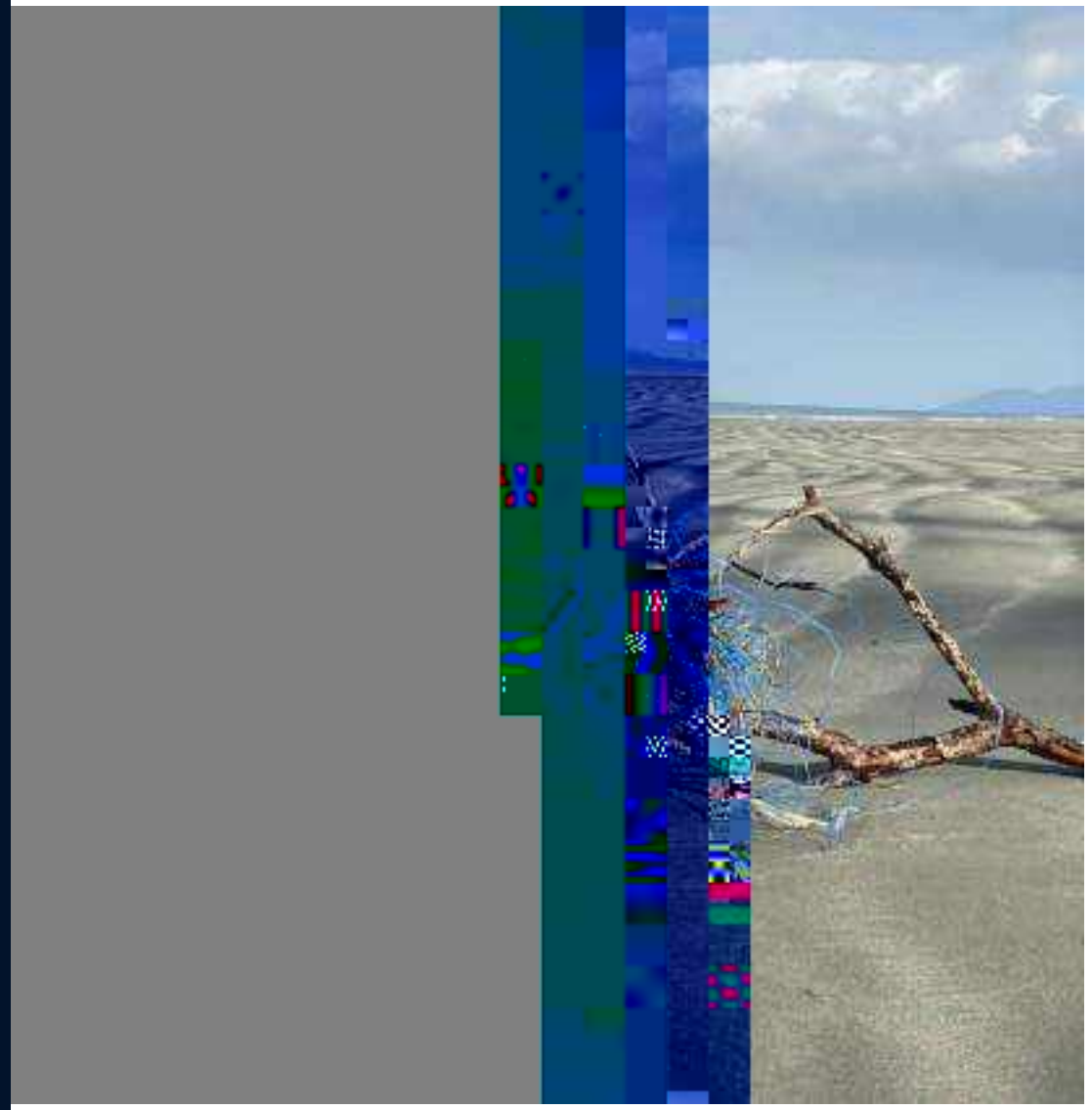
Searious Business

SeariousBusiness

connect@seariousbusiness.com

https://www.seariousbusiness.com/islands

#PlasticWasteFreeIslands #CloseThePlasticTap



PLASTIC WASTE FREE ISLANDS

BUSINESS PLAN

WASTE

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 stakeh(aw-(7tak5R Tda15 0.00001

Support and Funding

Technical Lead Authors

MISSION

WHAT & WHY

What

- A successful business in Furniture and semi-finished products
  - Made from recycled plastic
  - Locally sourced and locally produced

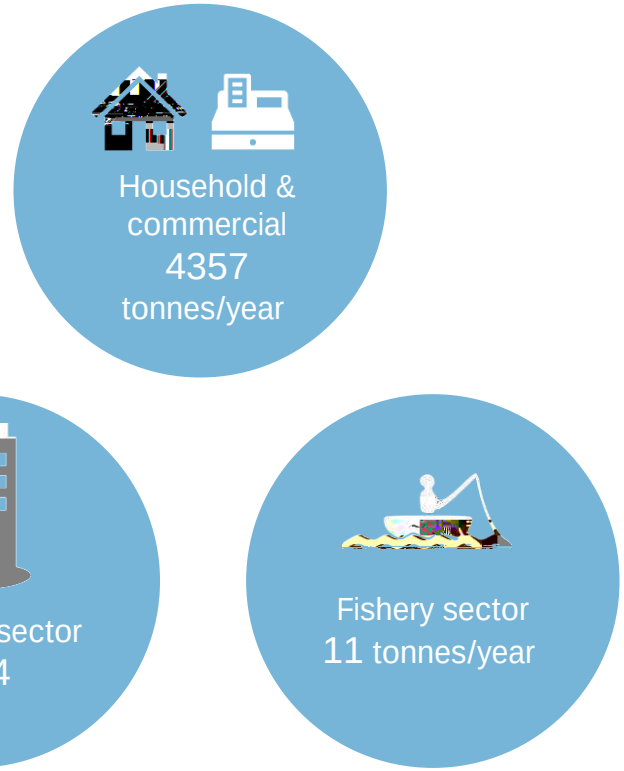
Why

- Local business opportunity
  - Reduce Import-dependency
  - Enhance resource recovery options on-island
  - Job creation
- Reduce overfull landfills and high plastic leakage prevalence
  - Improved waste management
  - Lower environmental impact
- Supporting this venture means supporting the green economy

WHY START THIS BUSINESS

CONTEXTUAL ANALYSIS OF WASTE MANAGEMENT PRACTICES

- No central collection at source or segregation at landfill, no local plastics recyclers landfill, or leakage
  - Except for PET Incentivised collection and export of PET beverage bottles through RePlast Project
  - Large volumes of rigid HDPE and PP waste that could be diverted quite easily from landfill
- National ambitions/initiatives/pipeline:
  - Incentivised PET bottle return program of PET beverage bottles through RePlast Project (OECS, Unite Caribbean)
  - The Department of Environment is considering introduction of CDL for PET beverage containers
  - SLSWMA purchased 20 pyrolysis machines in 2020 t.93 122.93 T673(be 5)-4(l)-2(0087-e 5)- reWnBT0 0 0 rg0 0 0 RG/F2 14.04 Tf96.432 144.



5072 tonnes plastic waste generated/year

TARGETED MATERIAL(S)

HDPE –CURRENT VALUE CHAIN

Class	Item	Household (T/y)	Commercial (T/y)	Tourism (T/y)	Fisheries (T/y)	Total (T/y)
HDPE 2	garbage bags single use	132.0	76.0	ND	0.8	208.8
HDPE 2	light shopping plastic bags single use	115.1	51.5	ND	0.4	167.0
HDPE 2	beauty and personal care hdpe	20.5	0.3	ND	0.0	20.8
HDPE 2	other hdpe	19.0	0.0	ND	0.0	19.0
HDPE 2	cleaning agent products hdpe	18.8	1.4	ND	0.0	20.2
HDPE 2	food containers hdpe	14.4	9.8	ND	0.1	24.3
HDPE 2	home care hdpe	13.7	0.0	ND	0.0	13.7
HDPE 2	laundry detergents bottles hdpe	4.2	0.0	ND	0.1	4.3
HDPE 2						

TARGETED MATERIAL(S)

PP – CURRENT VALUE CHAIN

Class	Item	Household (T/y)	Commercial (T/y)	Tourism (T/y)	Fisheries (T/y)	Total (T/y)
PP 5						

WASTE TO PRODUCT

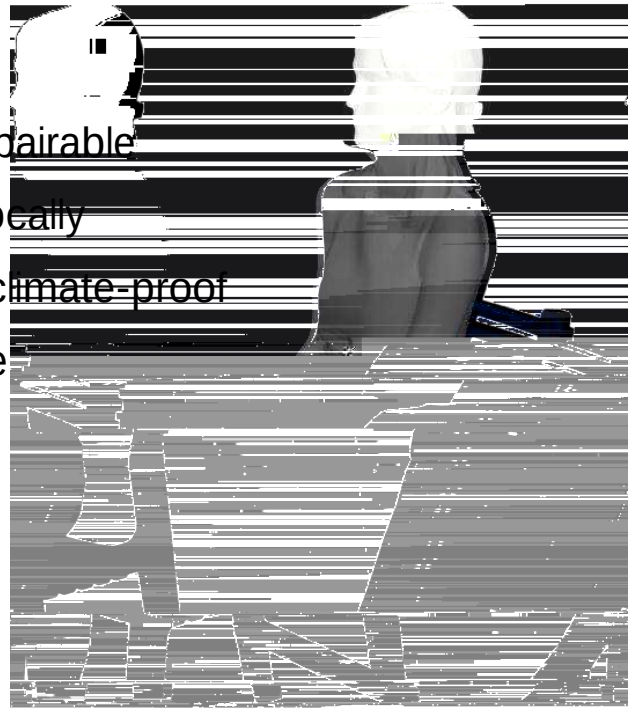
ALTERNATIVE VALUE CHAIN

Sorting HDPE, PP at redemption centre

USER SCENARIOS

FURNITURE

- Modular, repairable
- Produced locally
- Weather & climate-proof
- Comfortable
- Durable



UNIQUE SELLING POINTS

SUSTAINABLE & DURABLE

Technology

- Producibility: can process flakes directly so no high machine investments needed
- Scalability: Semi-finished products can be stored, and once machines reach their maximum capacity, an extra machine can be added
- Risk & compliance: Quality performance, with health and safety compliant setup

Product performance

- Sustainability – longer life: material vs wood based sheet
  - Lifespan: 40+ years r-plastic lumber vs 20 years hardwood
- Sustainability: green image – local waste converted
- Sustainability: easily repaired / parts replaced / recyclable
  - Recyclable: r-plastic sheets 7x recyclable
- Superior performance: weather proof / termite proof / UV-resistant
- Convenience: easily cleaned
- Superior Design: high end product/ distinctive design / high quality surface finish

Market

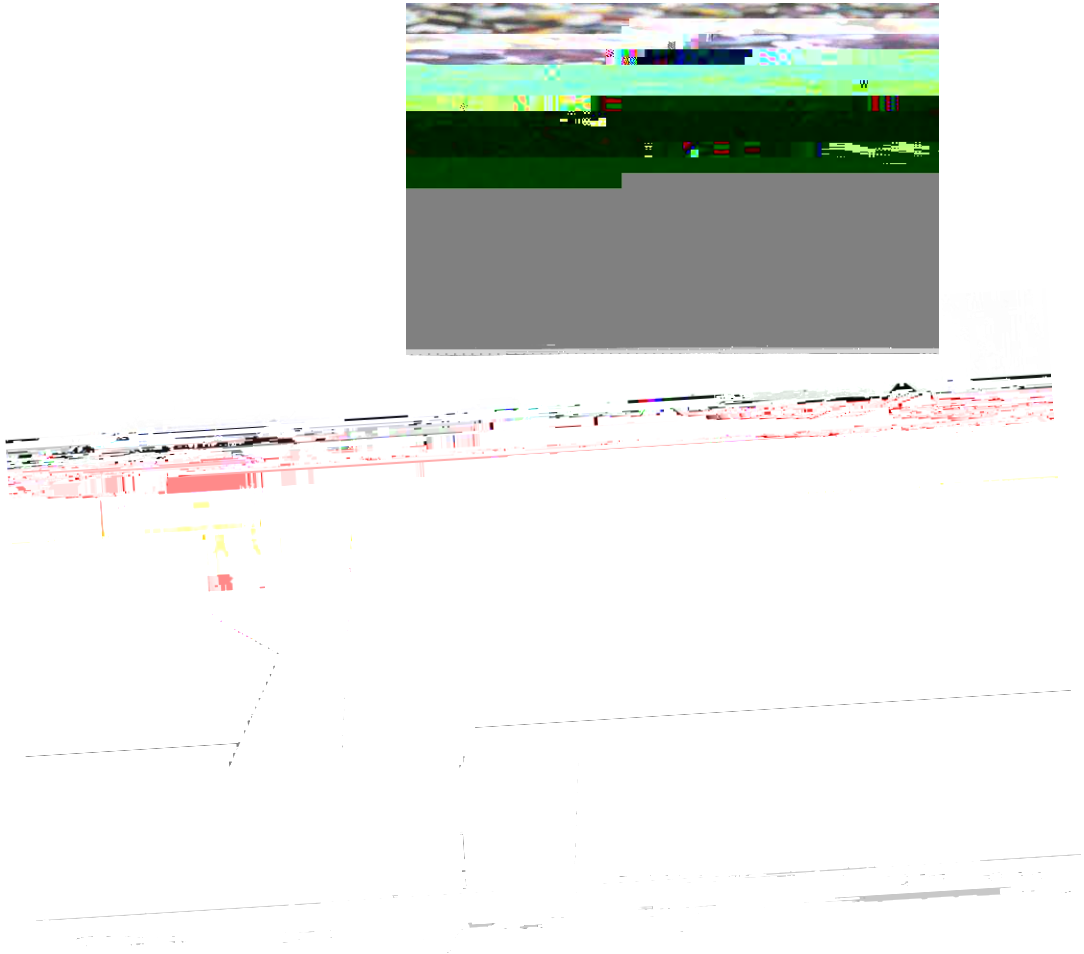
- Marketability: Completely circular product
- Marketability: Different furniture for different markets; tourism (i.e. hotels, restaurants), public (schools), private
- Marketability: Locally made vs imported
- Flexibility: Semi-finished products which can be sold directly or made into different end products with existing wood working techniques

RECYCLING TECHNOLOGY SPECS

SHEET PRESS BASED

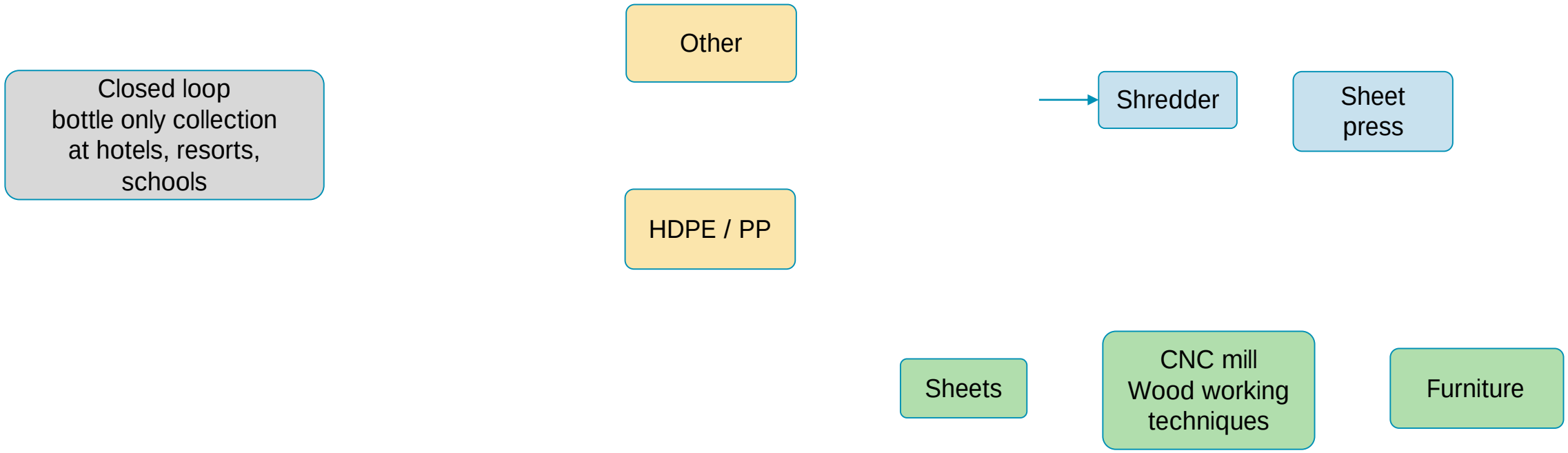
Technique: Sheet press

- Machines: Shredder, Sheet press + molds,
- Woodworking equipment: Saw table / crosscut saw, CNC-mill, hand tools.
- Types of plastic converted:
  - High end product: HDPE or PP sorted & washed (PS is very suitable to convert with this technique but is not suitable for collection in just hotels and resorts, because of lower volumes.
- Amount of plastics used: e.g. 19 kg per 1000x1000x20 mm sheet, 10 kg per Dining chair
- Source of input materials: Collection of HDPE, PP (later all plastics)
  - first through collection points at hotels, resorts, schools
  - Expanding option: (pre-paid) bag, or through Advanced Recovery Fee scheme (CDL)
- Impact: up to 80t/y = 8% of total HDPE + PP stream



SHEET PRESS

RECYCLING PROCESS



COLLECTION AND SORTING

IDENTIFYING

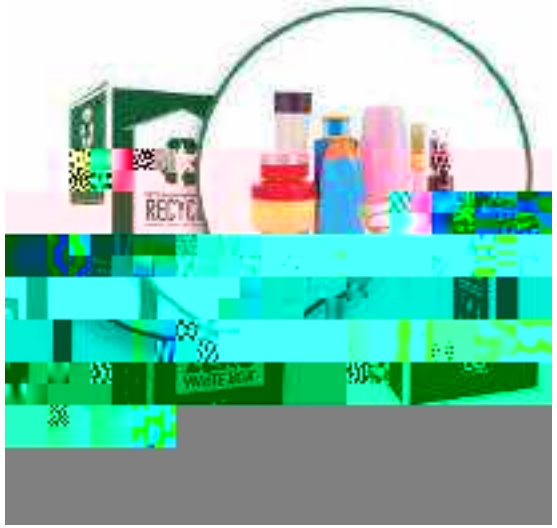
Plastics have different properties
The focus in this business plan lays on:

- HDPE and PP for their melting properties & easiness to recycle
- Slide 6-8 give an overview of what kind of applications are typically made of the targeted materials in the local context

COLLECTION AND SORTING

COLLECTION

While working towards public collection schemes for source



COLLECTION AND SORTING

Drop off points

- E.g. schools, supermarkets, public buildings, or resorts
- Incentives for consumers to sort and return plastic products
  - E.g. Discounts on end product
- Educational programmes and awareness campaign

Collaboration with existing waste management structures is crucial

-

SELECTION FACTORS

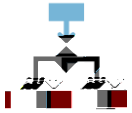
TECHNIQUE AND PRODUCT

Impact

- (semi-) Industrial setup and machinery
  - Converting plastic to keep from landfill and ocean leakage
  - Offering quality output that can compete with existing products
  - Creating durable business
  - Creating local employment

Viability

- Durable business plan / calculation
- Fitting the volumes on the island
- Ready for investors to step in
- Scalable: capacity aim 80 tonnes / year



Flexibility

- Creating different (mix of) semi-finished and end-products
- Producing output material for different markets
- Enabling sector-specific contribution to reduce waste
- Being able to convert different plastic

Complementarity to existing initiatives

- Utilizing local recycler’s machinery, if compatible
- Tailor made for local situation and market

TECHNOLOGY COMPARISON

MATRIX

This table provides a structured approach on how the recycling technology is selected. It is a general comparison example used for the technology selection, in which island specific factors have been considered.

MARKET ANALYSIS

HOSPITALITY

Market needs

- Durable furniture
- Easy to maintain / high quality
- Indoors and outdoors application
- Sustainable/green
- High end design

Buying patterns

- current yearly renew due to poor quality and extreme weather conditions (market research)

Locations of potential customers

- Mostly coastal area

Specify domestic vs export markets

- Domestic: Local distribution network (stores, DIY markets, furniture makers)
- Export potential:
  - Caribbean region with the option of expending for processing waste locally

Launching customers:

- Accommodations who collect material themselves
- Governmental bodies

BUSINESS DRIVERS

75% willingness to purchase recycled plastic furniture made from own waste

100% willingness to source-segregate recyclable plastics - place a

rHDPE dining chagawi1ade from Carabbeg0(c)- plgsti(a)-3-2(2(wa)-3g)-2(ste)-6( )13(str)-2(ea)-3gms:

MARKET INTRODUCTION PLAN

Timeline for key milestones of product development

PHASE 1- has been completed

- Sheet press testing
- Feedstock preparations
- Product interest inventory
- Design concept for products
- Engineering
- Prototyping
    - assembly testing
    - impression and use testing
- Improving based on feedback

PHASE 2

- Securing finances; procurement of machinery; staff recruitment

PHASE 3

- Production testing
- Production procedures development
- Packaging development
- Commercial production based on staged approach

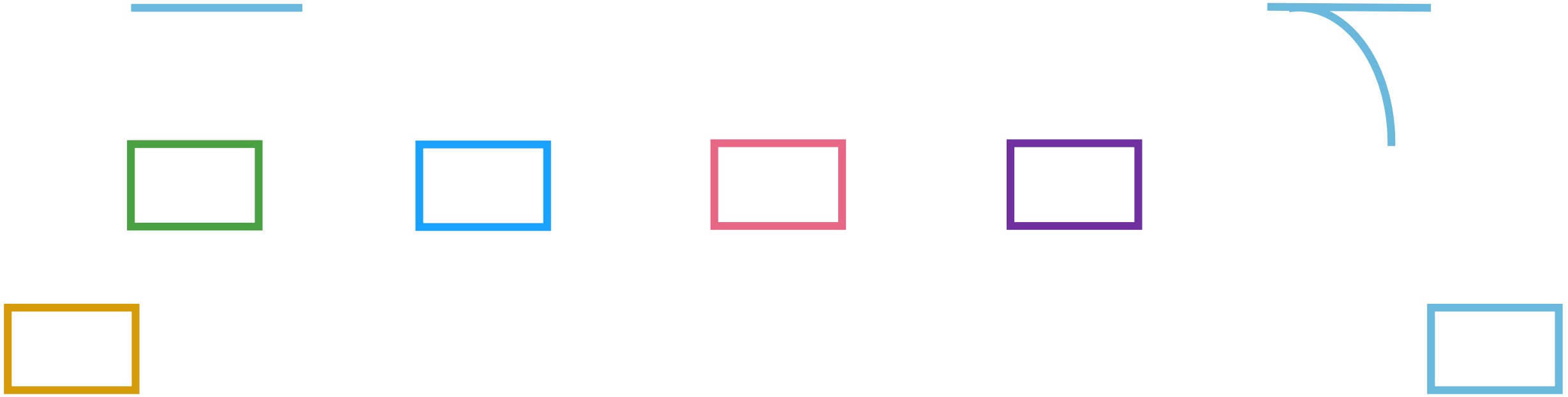
Sales & Communication

- Sales approach
    - Personal sales contact
    - Online order and service website
- Sales channels
    -

POTENTIAL FOR CIRCULARITY

INCREASING CIRCULARITY

The below graph guides you on how to achieve maximum circularity for your product – on every step of the value chain!



OPERATIONS

KEY RESOURCES, ACTIVITIES, PEOPLE

Tools & Machines

- Shredder
- Sheet press
- CNC mill
- Woodworking tools
- Pick up truck (waste collection & product distribution)

Space

- 20 sqm stock
- 20 sqm production
- 20 sqm wood workshop

Key Tasks /activities

- Feedstock preparation
  - Collection
  - Washing
  - Shredding
- Production
  - Sheet pressing
  - Machine maintenance
- End product making
  - CNC milling
  - Finishing
  - Packing
  - Servicing and repairs
- Sales and Distribution
  - Sales contact
  - Transportation: pick up and delivery

People

- Personnel: 4 up to 5 FTE
  - Sales person
  - Technician
  - Admin + online
  - Collection & Distribution - Transport
- Collaborators
  - Retailers, stores
  - Tourism sector
  - Government
  - IUCN/Searious Business

Running costs

- Space rent
- Electricity, water
- Staff costs
- Transport

FINANCIALS

SUMMARY AND SALES OVERVIEW

Diversifying the product portfolio is necessary to build a sustainable business model. The sales overview example provides ideas for possible other products.

Summary	
Starting capital	45,803.00
Months to Pay Back Investment	26
Full Time Employees Needed	4.4
Revenue Earned Per Month	20,540.00
Fixed Costs Per Month	1,850.00
Material Costs Per Month	12,222.00
Total Wages Paid Per Month	4,603.00
Total Profit Earned Per Month	1,865.00

Sales Overview				
Products & Services	Selling Price Per Unit	Number of Expected Sales Per Month	Total Product Cost	Profit Margin
50 kgs of Medium Shredded Plastic	0.00	133.3	30.75	-100.00%
20 mm Sheet (1m x 1m)	41.00	190.0	37.09	10.54%
8mm sheet (1mx1 m)	20.00	70.0	18.16	10.14%
Dining chair	74.00	40.0	40.82	81.29%
Table	114.00	10.0	62.87	81.33%
Lounge chair	119.00	10.0	66.02	80.25%
Side table	62.00	10.0	34.00	82.33%
stool	59.00	20.0	32.65	80.68%
chest	213.00	20.0	117.10	81.89%

FINANCIALS

CASH FLOW

Cash Flow

A cash flow analysis shows that you have enough money throughout your first year to buy materials, pay your employees, or make an investment into a new machine.

	Month 1	Month 2	Month 3	Month 4	Month 5	Month 6	Month 7	Month 8	Month 9	Month 10	Month 11	Month 12
Money In Bank (Beginning of Month)	45,803.00	22,918.48	27,161.96	31,405.43	35,648.91	39,892.39	44,135.86	48,379.34	52,622.82	56,866.29	61,109.77	65,353.25
Initial Investment	45,803.00											
Revenue	20,540.00	20,540.00	20,540.00	20,540.00	20,540.00	20,540.00	20,540.00	20,540.00	20,540.00	20,540.00	20,540.00	20,540.00
Total Cash In	66,343.00	20,540.00	20,540.00	20,540.00	20,540.00	20,540.00	20,540.00	20,540.00	20,540.00	20,540.00	20,540.00	20,540.00
Investment Costs	(27,128.00)											
Variable Costs	(14,446.52)	(14,446.52)	(14,446.52)	(14,446.52)	(14,446.52)							

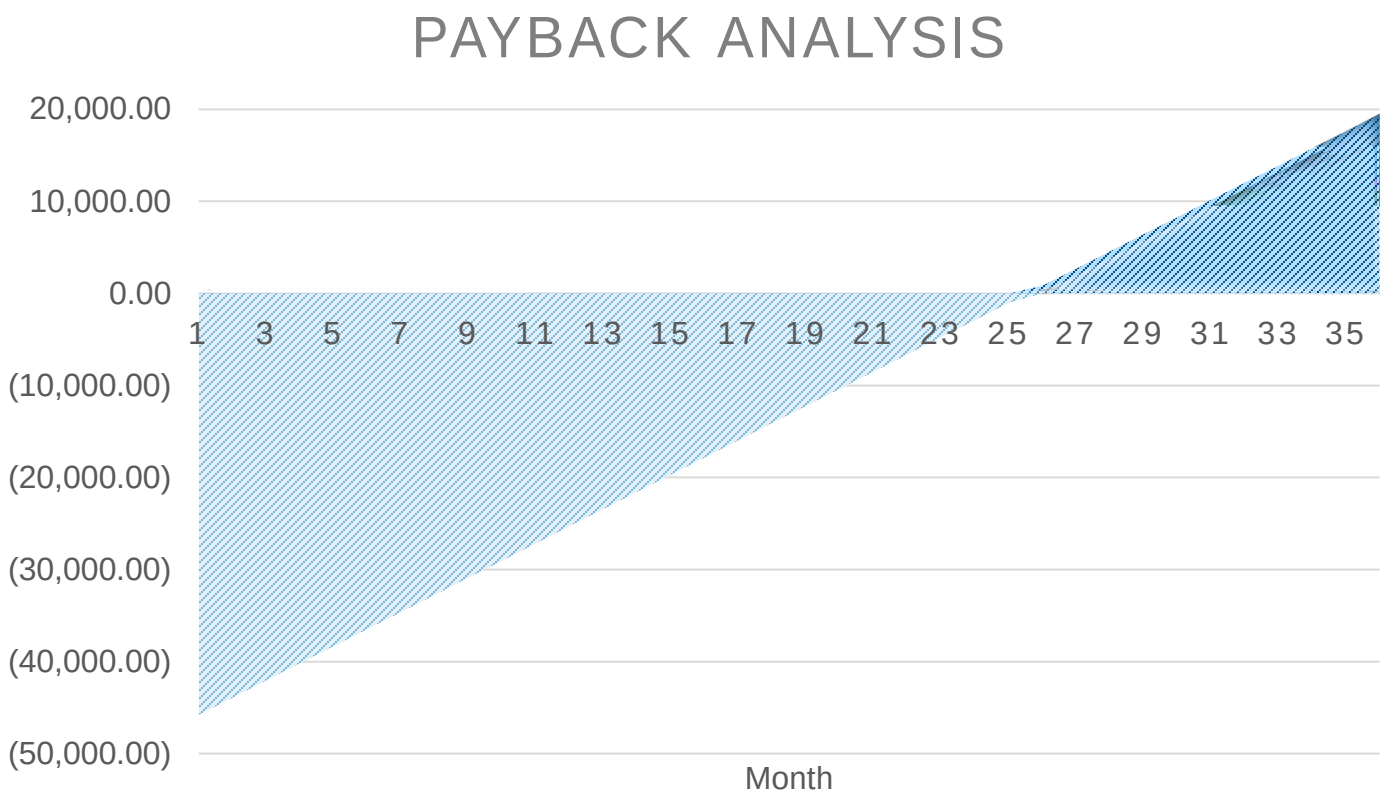
PROFIT, LOSS

FINANCIALS

ROI

Starting capital:
US $ 46.000, ROI 26 months

- Mostly machines and personnel



FINANCIALS

FUNDING PLAN

- Private money
- (Development) Bank loans: de-risking partner, e.g. offering loan guarantees)
  Incl. IADB, ADB, IFC, CEB
- Investors/business accelerators ((pre)-seed, angel investment, early stage)
  - Caribbean Export Development Agency
  - Caribbean Business Angels Network
  - Blue Bio Value
  - Blue Natural Capital Finance Facility
  - Ennovent
  - For Good Venture
  - LatitudR (the extension of the Inclusive Regional Recycling Initiative (IRR)
  - SAGANA
  - Sky ocean ventures
- (Governmental) grants
  - Development Cooperation partners, incl. UK, Norway, Italy, US, Germany, Swiss, France, China, Japan,
  - UNDP Innovation Fund
  - IUCN
  - World Bank - ProBlue. NGOs could become a third party within a governmental program

FACTSHEET

OVERALL BENEFITS

Financial benefits	Environmental benefits	Social benefits
ROI – 26 months	Lower landfill pressure for government:	

FOR MORE INFORMATION

IUCN_Plastics

plastics@iucn.org

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

#ClosethePlasticTap

SeariousBusiness

connect@seariousbusiness.com

#

PLASTIC WASTE FREE ISLANDS

SAMOA

BUSINESS PLAN

WASTE-TO-PRODUCT

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

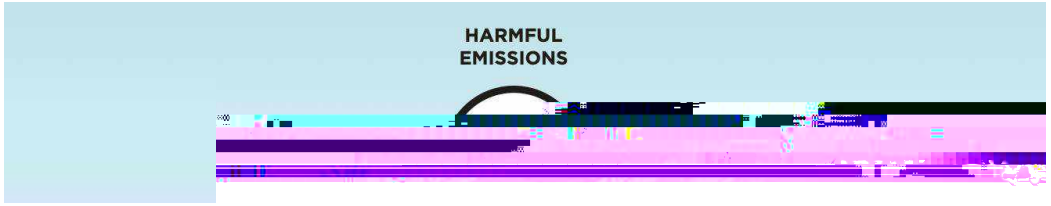
ACKNOWLEDGMENTS

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

WHY START THIS BUSINESS

PLASTIC WASTE GENERATION & LEAKAGE



National plastic waste generation & leakage data Samoa with polyolefins in blue.
Source: Final quantification report – ExecuT Q q 0.00001rvlEwGWC] TJ 39(Juue.)]al5-6(nci( )17(qu29(an

CONTEXTUAL ANALYSIS OF WASTE MANAGEMENT PRACTICES

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

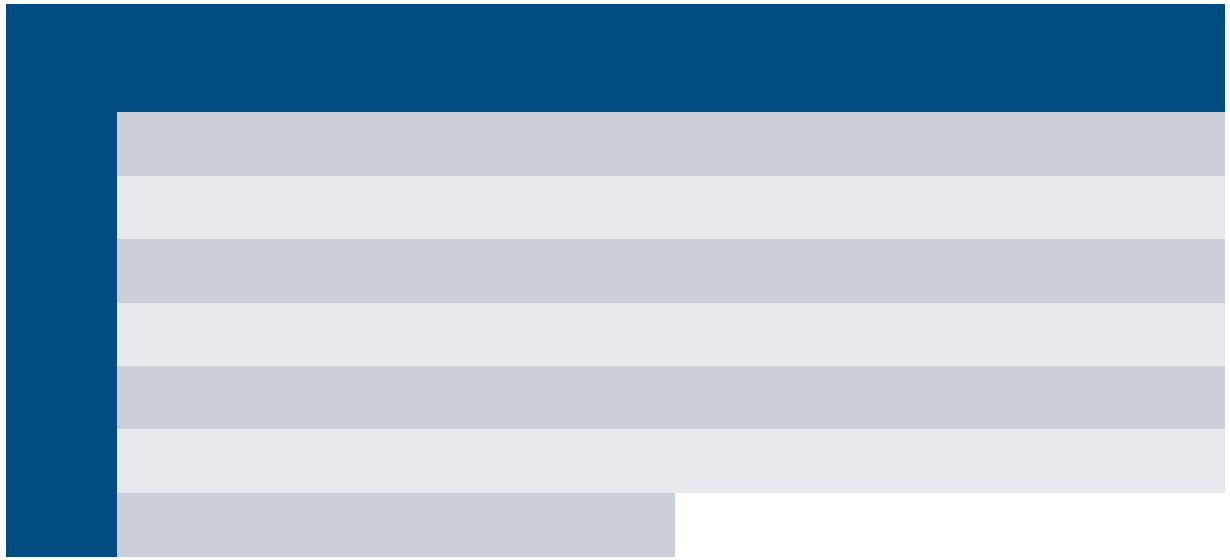
- No central collection at source or segregation at landfill, no local plastics recyclers → landfill, or leakage
  - Except for PET→ small scale collection for stockpiling
  - Large volumes of rigid HDPE, PP and flexible LDPE waste that could be diverted quite easily from landfill
- Recyclers & businesses united in Samoa Waste Recyclers Management Association (SWMRA)
- National ambitions/initiatives/pipeline:
  - Collection of PET bottles by Manino Water/Samoa Pure Water, Waste Management Co. Ltd, and SWMRA
  - Advanced Recovery Fee system for recyclables, incl. PET and possibly HDPE
  - SWMRA and PWFI PET export trial to Visy, Australia
  - Prepaid bag system for source separation plastics and general waste, MNRE
  - Recycling of mixed plastics into concrete aggregate (UNDP, CDRC/Resin8)
  - PRESS-Recycling of plastics into products – educational (Precious Plastics)
  - Recycling of plastics into bricks and beams – SWMRA, regional support from JPRISMII, JICA within the 3R-programme

2371.1 tonnes plastic waste generated/year

Source: Quantification report, Executive summary, APWC July 2021

TARGETED MATERIAL(S)

HDPE – CURRENT VALUE CHAIN



TARGETED MATERIAL(S)

PP – CURRENT VALUE CHAIN

Class	Item	Household (T/y)	Commercial (T/y)	Tourism (T/y)	Fisheries (T/y)	Total
PP 5	food containers pp	1.60	0.00	3.36	0.00	4.96
PP 5	other pp	2.62	143.07	0.00		

TARGETED MATERIAL(S)

LDPE – CURRENT VALUE CHAIN

Class	Item	Household (T/y)	Commercial (T/y)	Tourism (T/y)	Fisheries (T/y)	Total
LDPE 4	container lids ldpe	2.83	0.00	0.00	0.02	2.84
LDPE 4	wrap foils cling films					

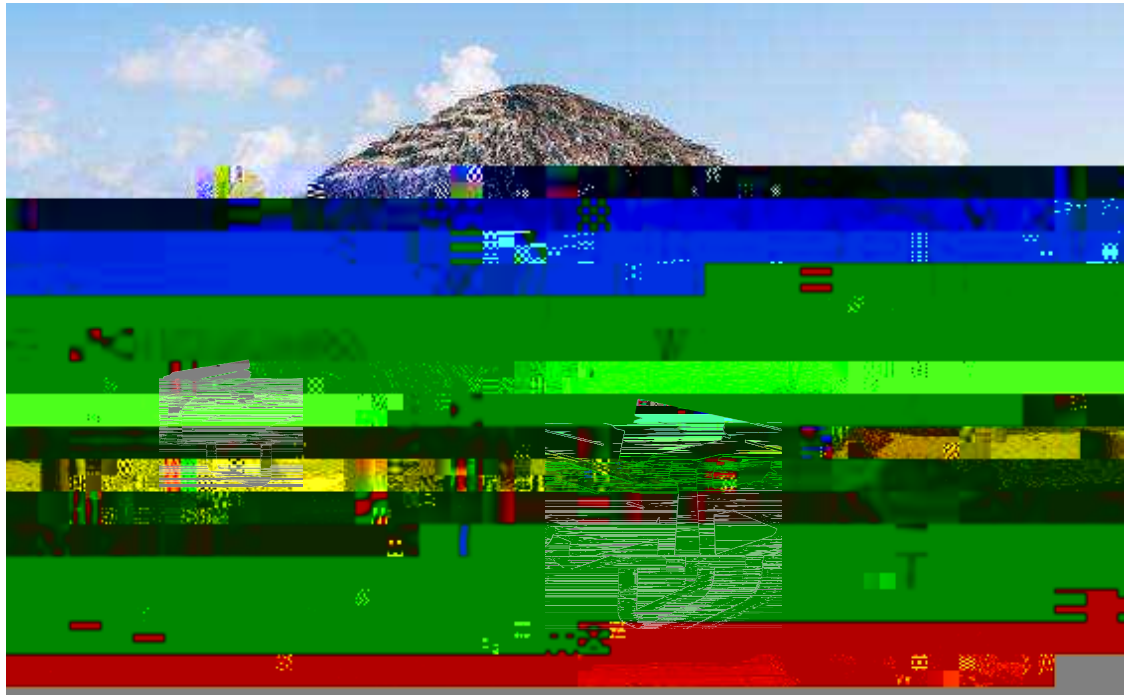
- Beams, planks, tiles and parts (semi-finished product)
- Outdoor furniture (end product)
- Example Prototype: Park bench (mainly polyolefins)
  - Dimensions: L650 x W1520 x H825 mm
  - Weight: 75 kg
  - Intended use: Garden, park, wharf, public space (outdoor)
- Other potential products
  - Lumber/timber, planks, posts
  - Purlin, rubbing styles
  - Street furniture, benches, picnic tables
  - Decking, cladding, siding
  - Fencing, bollards, palisade, edging
  - Shed foundation blocks, water side sheeting
  - Bridges, wharfs
  - Signage, litter bins, planters, raised waste platforms
  - Pergola, dog house
  - Garden, patio, terrace furniture
  - Exercise equipment
  -

USER SCENARIOS

EXAMPLES

Park bench

- Modular, repairable
- Produced locally
- Durable: Weather & climate-proof
- Comfortable



Wharf bench

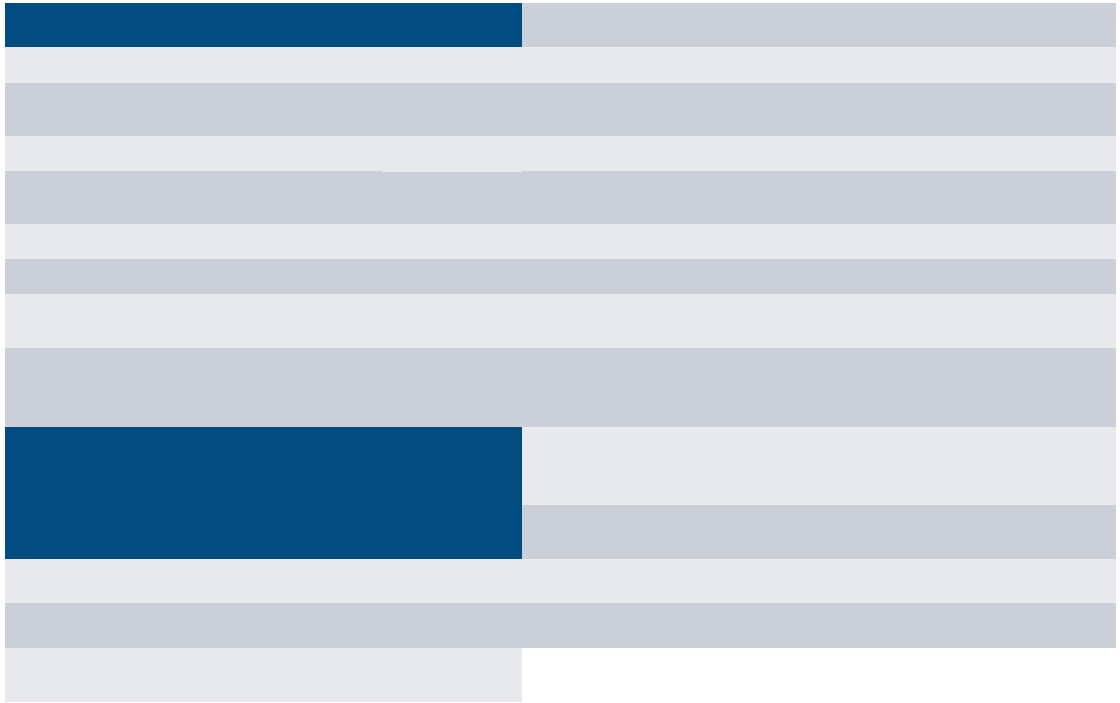
UNIQUE SELLING POINTS

COLLECTION AND SORTING

Plastics have different properties
The focus in this business plan lays on:

- HDPE, PP and LDPE for their melting properties & easiness to recycle
- Slide 6-8 give an overview of what kind of applications are typically made of the targeted materials in the local context

MACHINERY



SELECTION FACTORS

TECHNIQUE AND PRODUCT

Impact

- (semi-) Industrial set-up and machinery to
  - Convert enough plastic to keep from landfill and (ocean) leakage
  - Get quality output that can compete with existing products
  - Create durable business
  - Create local employment

Flexibility

- Create different (mix of) semi-finished and end-products
- Create output material for different markets
- Enable sector-specific contribution to reduce waste
- Enable to convert different plastics

Viability

- Durable business plan / calculation
- Fitting the volumes on the island
- Ready for investors to step in
- Scalable: capacity aim is 150 tonnes / year

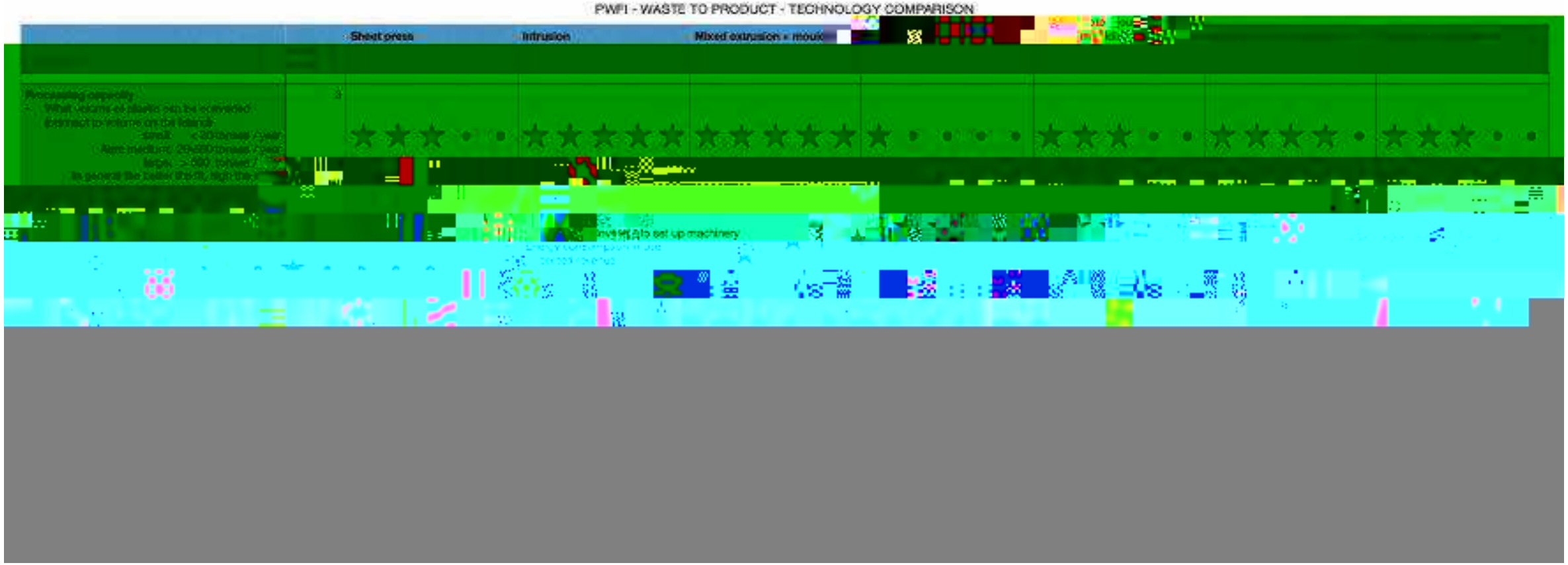
Complementarity to existing initiatives

- Utilizing local recycler’s machinery, if compatible
- Tailor-made for local situation and market

TECHNOLOGY COMPARISON

MATRIX

This table provides a structured approach on how the recycling technology is selected. It is a general comparison example used for the technology selection, in which island specific factors have been considered.



MARKET ANALYSIS

Primary market

- Tourism - Hospitality Outdoor furniture and Construction, i.e. dinner chairs, fencing, plastic lumber

Secondary markets

- B2C: High-end consumer design furniture has similar product characteristics and demands (overlap villas and apartments)
- B2B: semi-finished products, i.e. Timber, lumber, Sheets for furniture makers. i.e. countertop
- Public: governmental, school furniture
- Public works, Infrastructure + construction: governmental, public furniture,
  e.g. park bench, picnic table, signage, fencing

Market size hospitality furniture

- ±130 hotels, resort, with over 3000 apartments and rooms

Estimated annual expenditure on furniture

- USD 210,000 (3,000 rooms and accommodations with a average spending of $70/year/room on outdoor furniture)

Global expected CAGR (Compound Annual Growth Rate) tourism after Covid-pandemic

- 3.1% (2021-2026)

Longer term market fundamentals

- Shorter supply beîí£ $¾3NN C `T ° •@OR’r2•' ‡

ƒ#"-Ù2-žCå ü C `T ° Y„ô‟'0 „--Öà 0P– @ë ñ˜ÖhEVÑ„® C `T ° Y„ô‰V 1„- Öà 0P– @ë ø õ)'#!e p

MARKET ANALYSIS

Market needs

- Durable furniture
- Easy to maintain / high quality
- Indoors and outdoors application
- Sustainable/green
- High end design

Buying patterns

- current yearly renew due to poor quality and extreme weather conditions (market research)

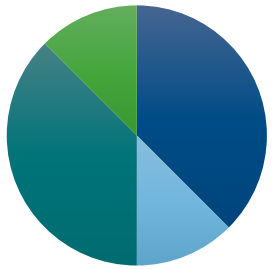
Locations of potential customers

- Mostly coastal area

BUSINESS DRIVERS

50% willingness to purchase
recycled plastic furniture made from own waste

86% willingness to source-segregate recyclables
place a separate bin for collecting HDPE/PP shampoo, body wash and detergent bottles at hotel/resort



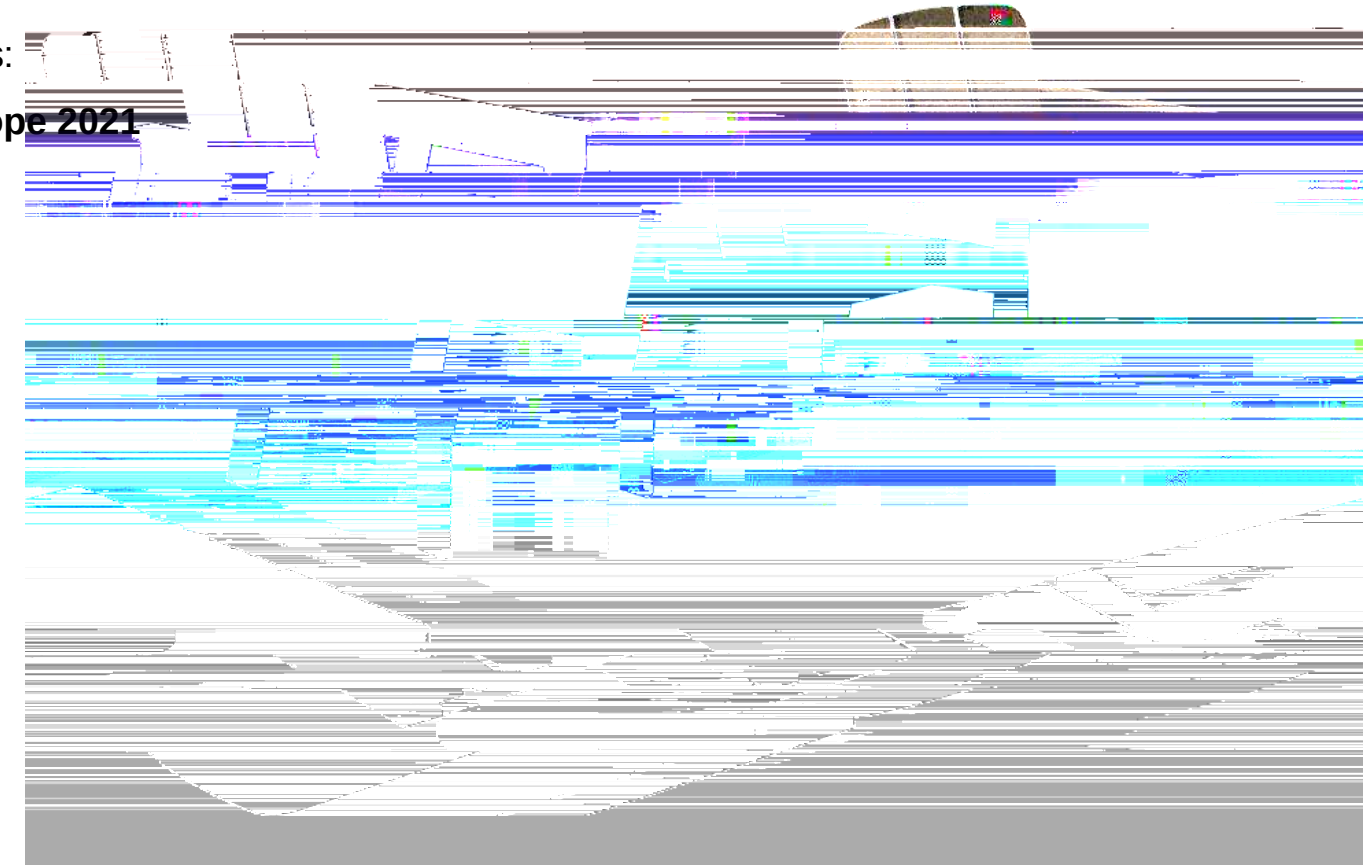
Current budget for outdoor furniture (e.g x1 plastic chair)?*
Saint Lucia survey results: **75% willingness to spend ±10% > average price**
*This question was not part of the Samoa survey

BUSINESS DRIVERS

INDUSTRY SUPPORT – INNOVATION AWARDS

rHDPE dining chair made from Caribbean plastic waste streams: shortlisted for the prestigious **Plastics Recycling Awards Europe 2021**

- Household and Leisure products category



MARKET INTRODUCTION PLAN

Timeline for key milestones of product development

PHASE 1- has been completed

- Extrusion testing
- Feedstock preparations
- Product interest inventory
- Design concept for products
- Engineering
- Prototyping
    - assembly testing
    - impression and use testing
- Improving based on feedback

PHASE 2

- Securing finances; procurement of machinery; staff recruitment

PHASE 3

- Production testing
- Production procedures development
-

OPERATIONS

Tools & Machines

- Shredder
-

FINANCIALS

SUMMARY AND SALES OVERVIEW

Summary	
Strating capital	179,649.43
Months to Pay Back Investment	30
Full Time Employees Needed	7.5
Revenue Earned Per Month	29,545.00
Fixed Costs Per Month	1,560.00
Material Costs Per Month	17,639.83
Total Wages Paid Per Month	4,112.60
Total Profit Earned Per Month	

FINANCIALS

PROFIT, LOSS

Profit and Loss

This table is to show how much money the company is projected to make each year. It assumes that you paid yourself for the hours you worked. so the "Net Income" at the bottom is the remaining profit made by your company. It is greatly influenced by the "Monthly Sales Improvement Rate" on the Dashboard page. This table is also useful to show your bank or include in grant applications.

	Year 1	Year 2	Year 3
Revenue	354,540.00	389,994.00	428,993.40
Cost of Sales	246,350.15	270,985.17	298,083.68
Net Revenue	108,189.85	119,008.83	130,909.72
Fixed Costs	18,720.00	18,720.00	18,720.00
Gross Income from Operations	89,469.85	100,288.83	112,189.72
Business Taxes	24,156.86	27,077.99	30,291.22
Net Income	65,312.99	73,210.85	81,898.49

Yearly Growth Rate
10%

(conservative scenario)

Business Tax Rate
27.00%

Starting capital: US $ 179,000
ROI 30 months

- Mostly machines and personnel

FACTSHEET

BENEFITS

Financial benefits	Environmental benefits	Social benefits
ROI – 30 months	Lower landfill pressure for government: 150 tonnes / year or 12% of HDPE/PP/LDPE waste diverted from landfill/dumping sites	Develop recycling market - Create more jobs in island in collection, sorting, cleaning, recycling

FOR MORE INFORMATION

IUCN

IUCN_Plastics

plastics@iucn.org

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

#ClosethePlasticTap

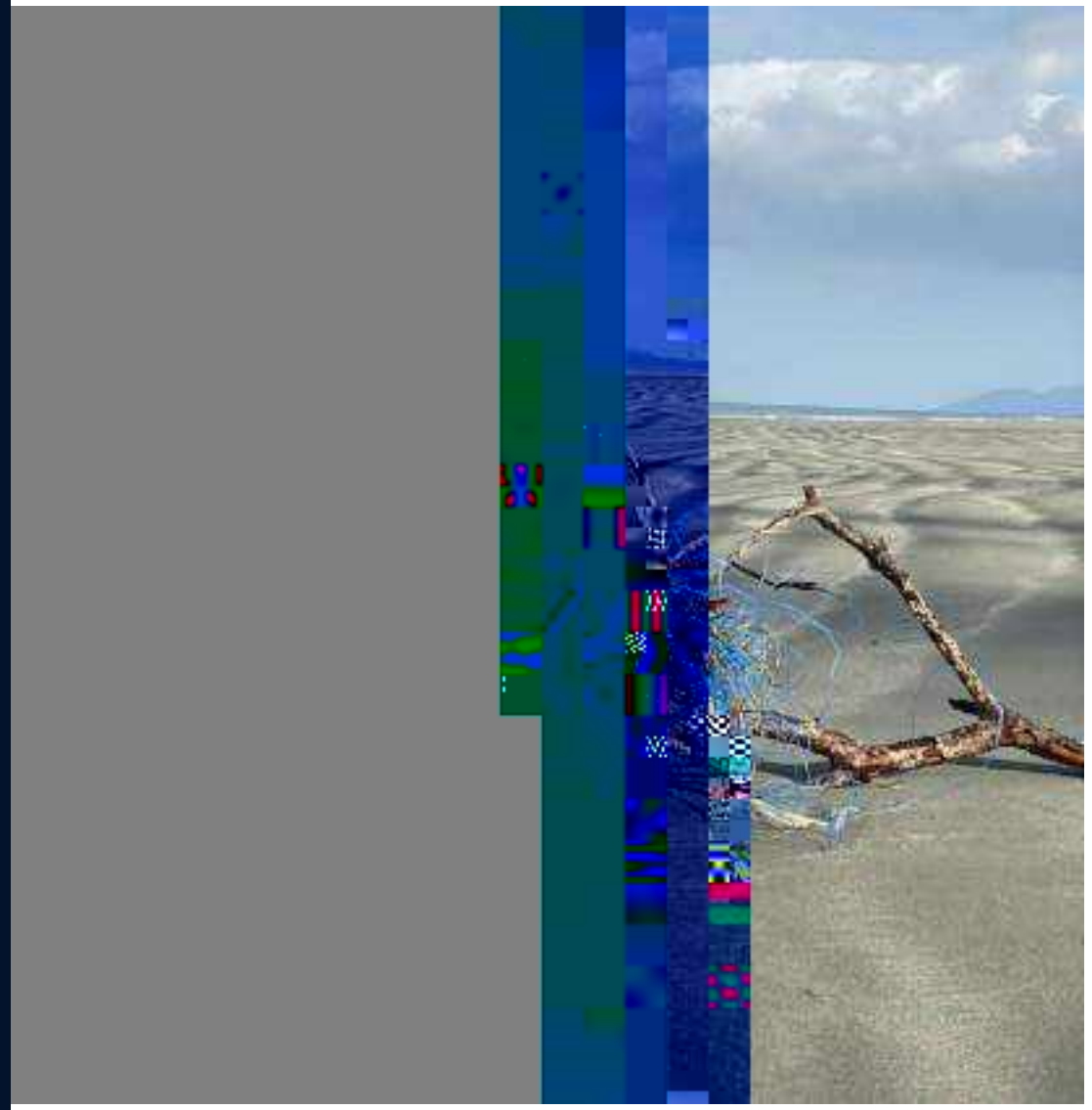
Searious Business

SeariousBusiness

connect@seariousbusiness.com

https://www.seariousbusiness.com/islands

#PlasticWasteFreeIslands #CloseThePlasticTap



PLASTIC WASTE FREE ISLANDS

BUSINESS PLAN

WASTE-TO-PRODUCT

An initiative supported by Norad managed by IUCN
and co-implemented bAn initiative supported by

Support and Funding

WASTE-TO-PRODUCT

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 **-to-** solution, in the geographic context of Vanuatu. It demonstrates how the solution can be realized, allowing for the creation of an alternative value chain.

MISSION

WHAT & WHY

What

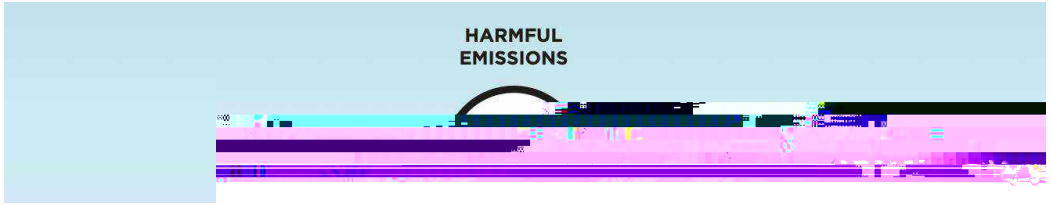
- A successful business in Furniture and semi-finished products
  - Made from recycled plastic
  - Locally sourced and locally produced

Why

- Local business opportunity
  - Reduce Import-dependency
  - Enhance resource recovery options on-island
  - Job creation
- Reduce overfull landfills and high plastic leakage prevalence
  - Improved waste management
  - Lower environmental impact

WHY START THIS BUSINESS

PLASTIC WASTE GENERATION & LEAKAGE



Financial and environmental impacts of plastic leakage

	Annual Imports 2018-2019 (T/y)	Total disposed 2019 - landfill (T/y)	Total disposed 2019 dumpsite (T/y)	Total recycled 2019 (T/y)	Leakage (T/y) (95% credible interval)
PET (1)	868	347	113	0	454 (86-656)
HDPE (2)	686	173	49	0	468 (192-633)
PVC (3)	123	36	18	0	69 (16-107)
LDPE (4)	1106	494	154	0	463 (29-741)
PP (5)	438	129			

National plastic waste generation & leakage data Vanuatu with polyolefins in blue.
Source: Final quantification report Executive summary APWC July 2021

- Prepaid bag collection at source, no segregation at landfill, no local plastics recyclers → landfill, or leakage
  - Large volumes of rigid HDPE, PP and flexible LDPE waste that could be diverted quite easily from landfill
- Recyclers and relevant bu 960A0ness partners united in the Vanuatu Recyclers Waste Management Association (VRWMA)
- Key developments:
  - Wan

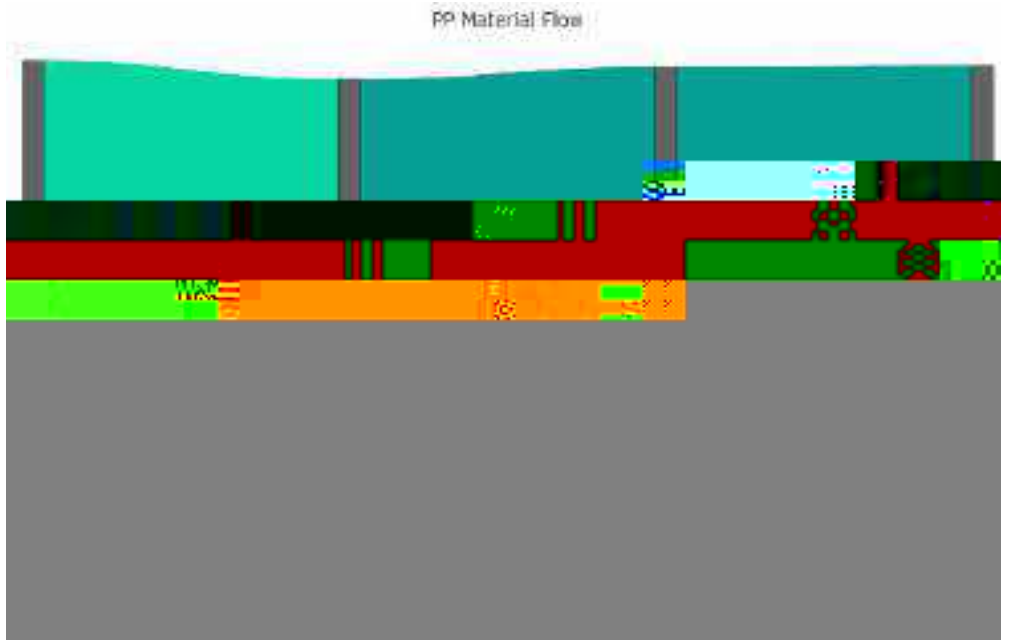
TARGETED MATERIAL(S)

PP CURRENT VALUE CHAIN

Class	Item	House T/y	Commercial T/y	Tourism	Fishing T/y	TOTAL
PP 5	food semi rigid containers e.g. trays PP	5.7	15.50		0.00	21.2
PP 5	glossy shopping bags single use plastics	0.0	8.92		3.88	12.8
PP 5	single use take away food containers PP single use	19.6	7.04		0.46	27.1
PP 5	straws single use	0.6	5.48		0.00	6.1
PP 5	container lids pp	1.0	5.38		0.00	6.4
PP 5	other pp	9.6	2.77		5.22	17.6
PP 5	furniture houseware pp	0.0	0.00		1.87	1.9
PP 5	rope pp	6.2	0.00		1.63	7.8
PP 5	food containers pp	0.0	0.00		0.00	0.0
PP 5	medicine bottles pp	0.0	0.00		0.00	0.0
PP 5	automobile parts pp	30.9	0.00		0.00	30.9
						131.8

Source: Quantification report, Final data, All sectors plastics breakdown, APWC July 2021

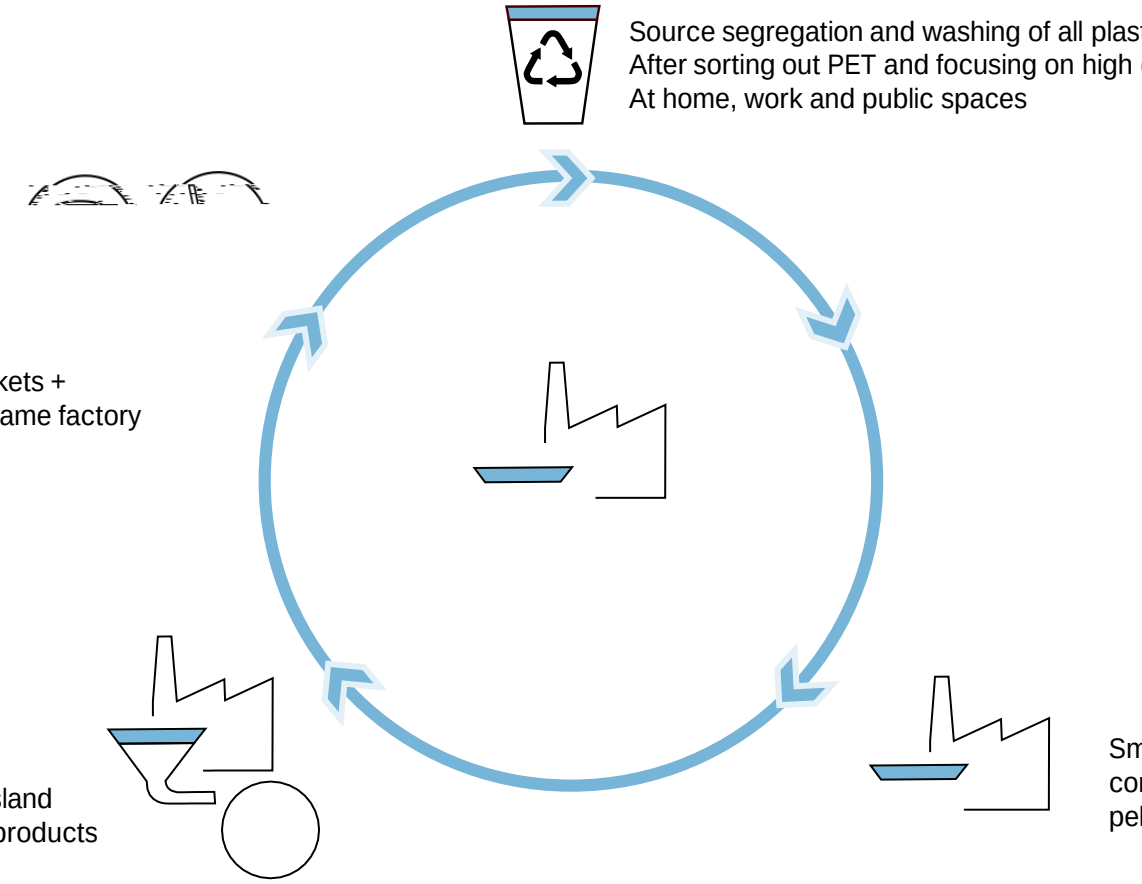
Polypropylene (PP): A thermoplastic polymer used in a variety of applications. PP is sturdy can be used in a flexible or rigid form. PP can potentially be recycled.



LDPE

OUTLINE WASTE TO PRODUCT

ALTERNATIVE VALUE CHAIN



T

UNIQUE SELLING POINTS

Technology

-

DIFFERENTIATION FROM COMPETITION

CHEAP AND HARDWOOD CONSTRUCTION SECTOR

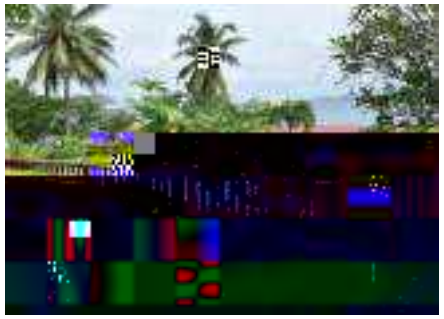
Hardwood lumber / timber

Stilt builds

Public raised waste platform

- More durable and longer lasting than wooden alternatives
- Easy repair with local service and parts from producer
- Added sustainable image value

Street furniture



Fencing

Private raised waste platform

CONCEPT DESCRIPTION

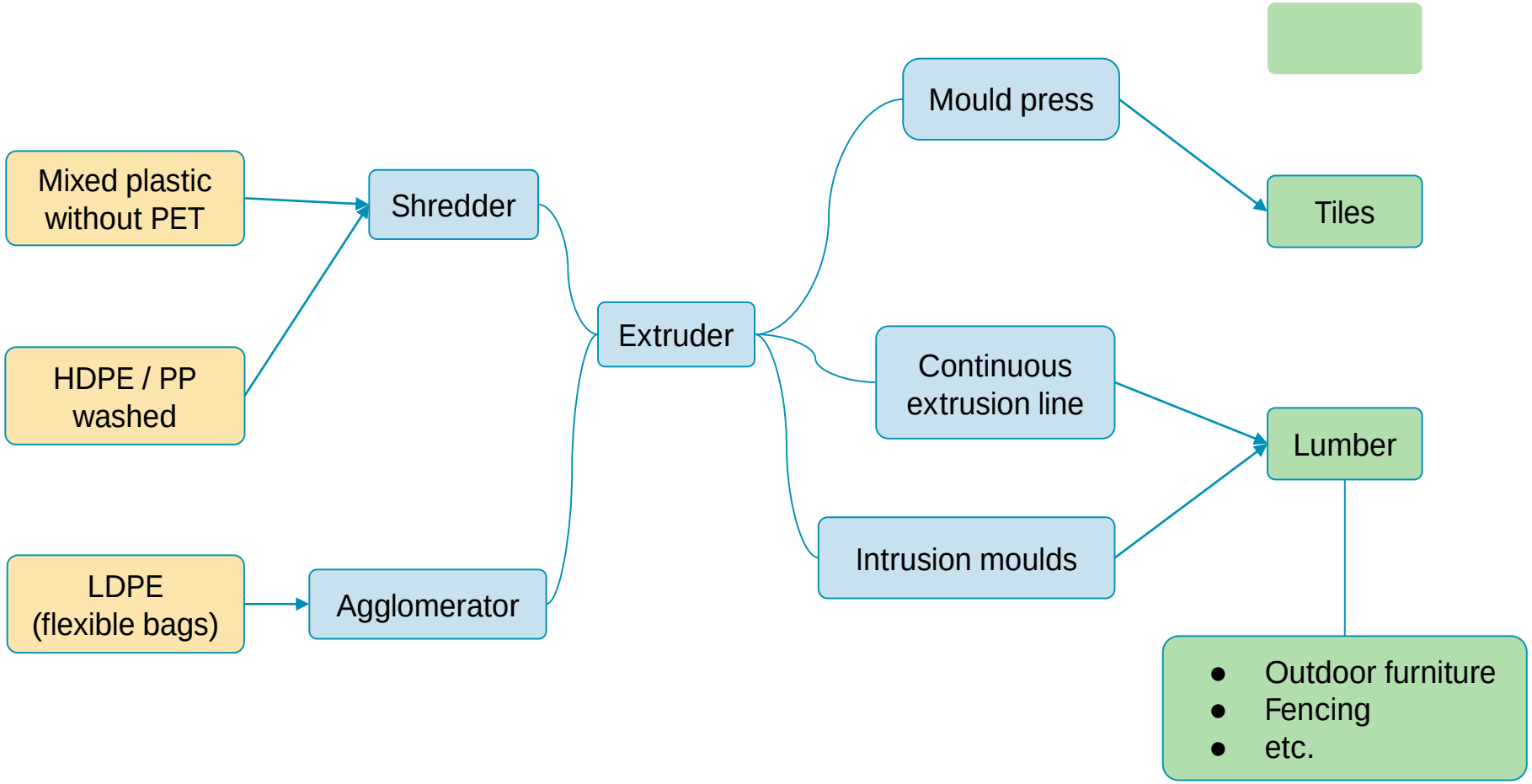
MIXED PLASTIC EXTRUSION BASED

Technique: Extrusion based (setup around extruder) + add-on moulding options

- Machines: shredder and/or agglomerator, extruder, press + molds, intrusion moulds
- Woodworking equipment: Saw table / crosscut saw, mill, hand tools.
- Types of plastic converted:
  - High end product: HDPE sorted & washed
  - Lower end product: Mixed unwashed plastics with >70% PE/PP
- Amount of plastics used: e.g. 8.53 kg per 40x80x2800 beam, or 4.59 kg per 18x130x2800mm HDPE plank, or 65 kg per Trash Nest
- Source of input materials: Collection of HDPE, PP, LDPE or all mixed plastics
  - through (pre-paid) bag with all plastics collection and after sorting
  - Island wide stimulation through Advanced Recovery Fee scheme / Container deposit Legislation (CDL)
- Impact: up to 150t/y = 18% of total PE, PP stream, 7.32% of total plastic generated

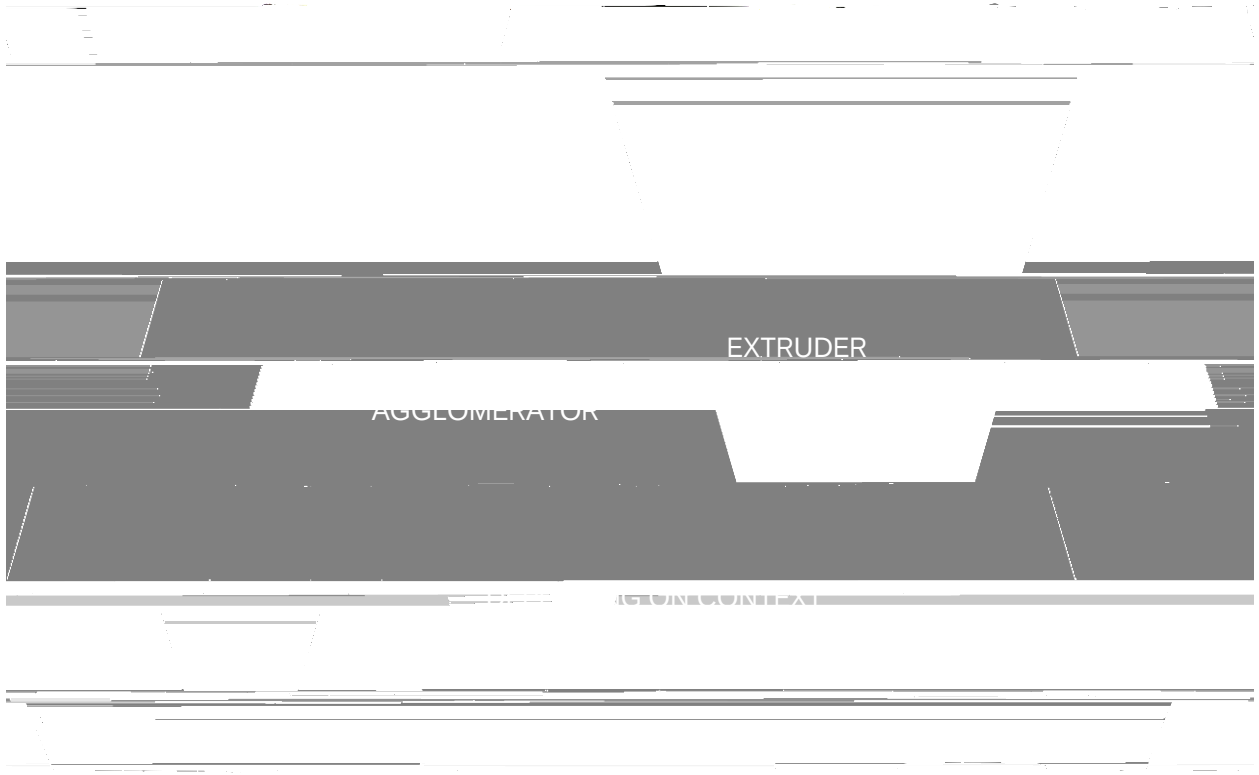
EXTRUSION BASED

RECYCLING PROCESS



MACHINERY

Machines	USD 49.000	
Shredder, 5 kW	USD 5.000	
Optional: shredder with washer		At a capacity of 250 kg/h 80kW is needed and will cost around 30.000 USD
Agglomerator	USD 5.000	
Extruder, 35 kW	USD 15.000	Spare parts like heating element and screw removal tool included
Intrusion moulds, on cart system	USD 10.000	
Press, 3 kW	USD 7.000	
Two moulds	USD 7.500	Mould costs are estimated because they depend on product design, and related production method (mill/laser/waterjet)
Optional: For 220V3P or 440V3P there will be extra costs (estimate) USD 2.00		Standard voltage of the machines is 380V, 50 or 60Hz.
Shipping (CIF) estimate	**USD 14.000**	Shipping cost are hard to predict due to fluctuations from china. Shipping costs of moulds not included; depends on local or remote production
Support at distance by Technical partner (3 years)	**USD 10.000**	
Detailed machine specification		
Support RFQ process		
Verification Factory acceptance test (FAT)		
Mould drawings		
Remote support for setting up facilities incl. unpacking and installing equipment		
Remote training and support machines start up		
Provide manuals, maintenance and user instructions		
Support on input mix and additives		
Total	**USD 73.500**	



Modular production hall layout example

SELECTION FACTORS

TECHNIQUE AND PRODUCT

Impact

- (semi-) Industrial set-up and machinery to
  - Convert enough plastic to keep from landfill and (ocean) leakage
  - Get quality output that can compete with existing products
  - Create durable business
  - Create local employment

Flexibility

- Create different (mix of) semi-finished and end-products
- Create output material for different markets
- Enable sector-specific contribution to reduce waste
- Enable to convert different plastics

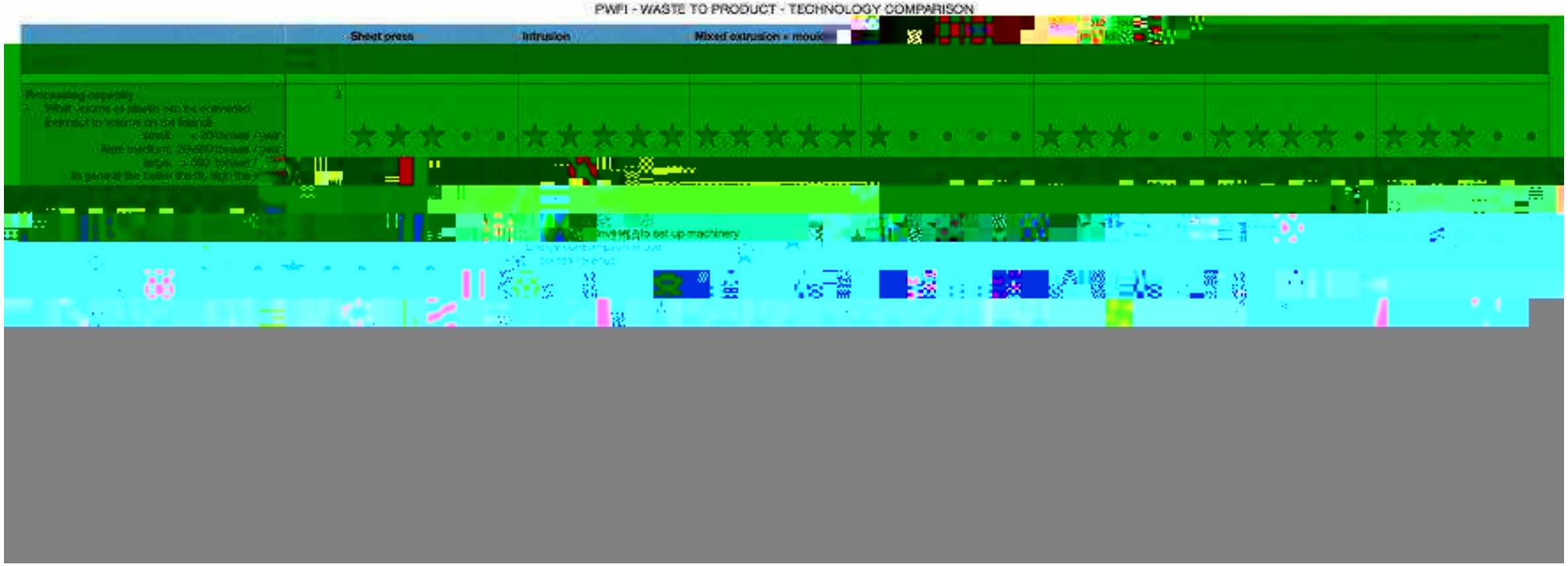
Viability

- Durable business plan / calculation
- Fitting the volumes on the island
- Ready for investors to step in
- Scalable: cas4 Tf5

TECHNOLOGY COMPARISON

MATRIX

This table provides a structured approach on how the recycling technnax y is selected. It is a general comparison example used for the

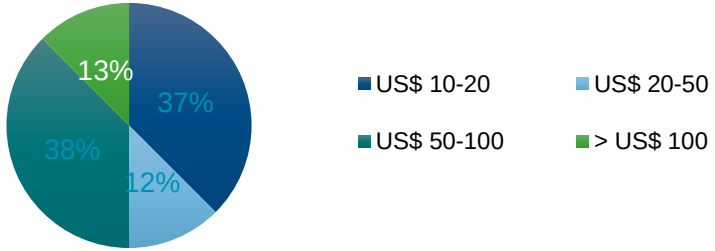


BUSINESS DRIVERS

COMMERCIAL MARKET ANALYSIS HOSPITALITY

40% willingness to purchase recycled plastic furniture made from own waste _
10% considering to purchase in the future

50% willingness to source-segregate recyclable plastics - place a separate bin for collecting HDPE/PP shampoo, body wash and detergent bottles at hotel/resort



Current budget for outdoor furniture (e.g x1 plastic chair)?*
Saint Lucia survey results: 75% willingness to spend ±10% > average price
*This question was not part of the Vanuatu survey

rHDPE dining chair made from Caribbean plastic waste streams:

shortlisted for the prestigious

MARKET INTRODUCTION PLAN

Timeline for key milestones of product development

PHASE 1- has been completed

- Extrusion testing
- Feedstock preparations
- Product interest inventory
- Design concept for products
- Engineering
- Prototyping
    - assembly testing
    - impression and use testing
- Improving based on feedback

PHASE 2

- Securing finances; procurement of machinery; staff recruitment

PHASE 3

- Production testing
- Production procedures development
- Packaging development
- Commercial production based on staged approach

Engagement & Sales

- Sales approach
    - Personal sales contact
    - Online order and service website
- Sales channels
    - Sales person
    - Web shop
    - Furniture stores
    - Do-It-Yourself stores
    - Workshop showroom/store
- Engagement (communication with target groups)
    - Sales person
    - Website

POTENTIAL FOR CIRCULARITY

INCREASING CIRCULARITY

FINANCIALS

SUMMARY AND SALES OVERVIEW

Summary	
Starting capital	180,898.91
Months to Pay Back Investment	31
Full Time Employees Needed	7.5
Revenue Earned Per Month	30,655.00
Fixed Costs Per Month	1,560.00
Material Costs Per Month	17,639.83
Total Wages Paid Per Month	5,362.08
Total Profit Earned Per Month	6,093.09

Sales Overview				
Products & Services	Selling Price Per Unit	Number of Expected Sales Per Month	Total Product Cost	Profit Margin
50 kgs of Medium Shredded Plastic	0.00	166.7	12.90	-100.00%
mixed Beam 2800 x 40 x 80 mm	16.00	300.0	14.44	10.79%
mixed Plank 2800 x 28 x 130 mm	17.90	180.0	16.10	11.15%
Pavement tile	10.60	460.0	9.49	11.74%
wide HDPE plank 2800 x 18 x 130 mm	14.80	180.0	13.13	12.68%
narrow HDPE plank 2800 x 18 x 65 mm	10.10	90.0	8.91	13.32%
Bench parts	0.00	12.0	34.32	-100.00%
Park bench	162.00	12.0	89.53	80.94%
Trash ne.76 129 184.92 reW*nBT0 0 0 rg0 0 0 RG/F2 11.04 Tf625.2 379.75 Td(Num)0 rg00 0 0201.ql162				

FINANCIALS

CASH FLOW

Cash Flow

A cash flow analysis shows that you have enough money throughout your first year to buy materials, pay your employees, or make an investment into a new machine.

	Month 1	Month 2	Month 3	Month 4	Month 5	Month 6	Month 7	Month 8	Month 9	Month 10	Month 11	Month 12
Money In Bank (Beginning of Month)	180,898.91	32,249.89	39,937.87	47,625.85	55,313.84	63,001.82	70,689.80	78,377.78	86,065.76	93,753.74	101,441.73	109,129.71
Initial Investment	180,898.91											
Revenue	30,655.00	30,655.00	30,655.00	30,655.00	30,655.00	30,655.00	30,655.00	30,655.00	30,655.00	30,655.00	30,655.00	30,655.00
Total Cash In	211,553.91	30,655.00	30,655.00	30,655.00	30,655.00	30,655.00	30,655.00	30,655.00	30,655.00	30,655.00	30,655.00	30,655.00
Investment Costs	(156,337.00)											
Variable Costs	(21,407.02)	(21,407.02)	(21,407.02)	(21,407.02)	(21,407.02)	(21,407.02)	(21,407.02)	(21,407.02)	(21,407.02)	(21,407.02)	(21,407.02)	(21,407.02)
Fixed Costs	(1,560.00)	(1,560.00)	(1,560.00)	(1,560.00)	(1,560.00)	(1,560.00)	(1,560.00)	(1,560.00)	(1,560.00)	(1,560.00)	(1,560.00)	(1,560.00)
Total Cash Out	(179,304.02)	(22,967.02)	(22,967.02)	(22,967.02)	(22,967.02)	(22,967.02)	(22,967.02)	(22,967.02)	(22,967.02)	(22,967.02)	(22,967.02)	(22,967.02)
Net Cashflow	32,249.89	7,687.98	7,687.98	7,687.98	7,687.98	7,687.98	7,687.98	7,687.98	7,687.98	7,687.98	7,687.98	7,687.98
Money In Bank (End of Month)	32,249.89	39,937.87	47,625.85	55,313.84	63.001.82	70,689.80	78,377.78	86.065.76	93,753.74	101,441.73	109,129.71	116,817.69

FINANCIALS

PROFIT, LOSS

Profit and Loss

This table is to show how much money the company is projected to make each year. It assumes that you paid yourself for the hours you worked, so the "Net Income" at the bottom is the remaining profit made by your company. It is greatly influenced by the "Monthly Sales Improvement Rate" on the Dashboard page. This table is also useful to show your bank or include in grant applications.

	Year 1	Year 2	Year 3
Revenue	367,860.00	404,646.00	445,110.60
Cost of Sales	256,884.22	282,572.64	310,829.91
Net Revenue	110,975.78	122,073.36	134,280.69
Fixed Costs	18,720.00	18,720.00	18,720.00
Gross Income from Operations	92,255.78	103,353.36	115,560.69
Business Taxes	0.00	0.00	0.00
Net Income	92,255.78	103,353.36	115,560.69

Yearly Growth Rate
10%

(conservative scenario)

Business Tax Rate
0%

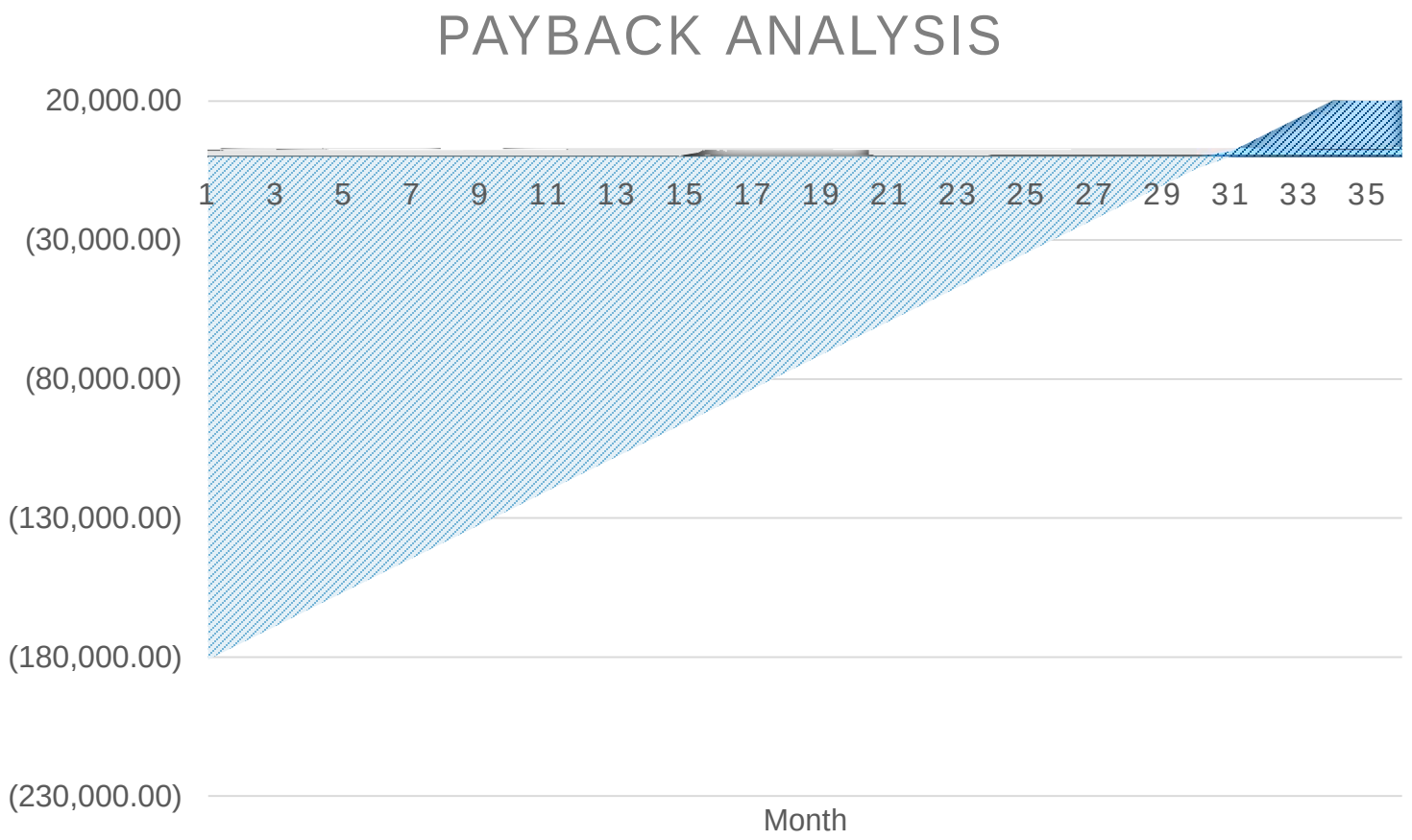
FINANCIALS

FUNDING & ROI

Starting capital: US $ 180,899

ROI 31 months

- Mostly machines and personnel



- Private money
- (Development) Bank loans: de-

FACTSHEET

BENEFITS

Financial benefits	Environmental benefits	Social benefits
ROI 31 months	Lower landfill pressure for government: 150 tonnes / year or 18% of PE/PPwaste diverted from landfill/dumping sites	Develop recycling market - Create more jobs in island in collection, sorting, cleaning, recycling up to 11 FTE when converting 8% of all plastic waste generated
Better license to operate for construction and furniture market. And allows for green/circular public procurement	Approx. 164.7 tonnes of CO2 emissions saved by redirecting plastic waste into products	Contribution to cleaner island and attractiveness for local population and visitors
Customer loyalty for producers	Reduced amount of plastic waste that might leak into the environment. 150 tonnes / year diverted from potential leakage	

FOR MORE INFORMATION

IUCN

IUCN_Plastics

plastics@iucn.org

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

#ClosethePlasticTap

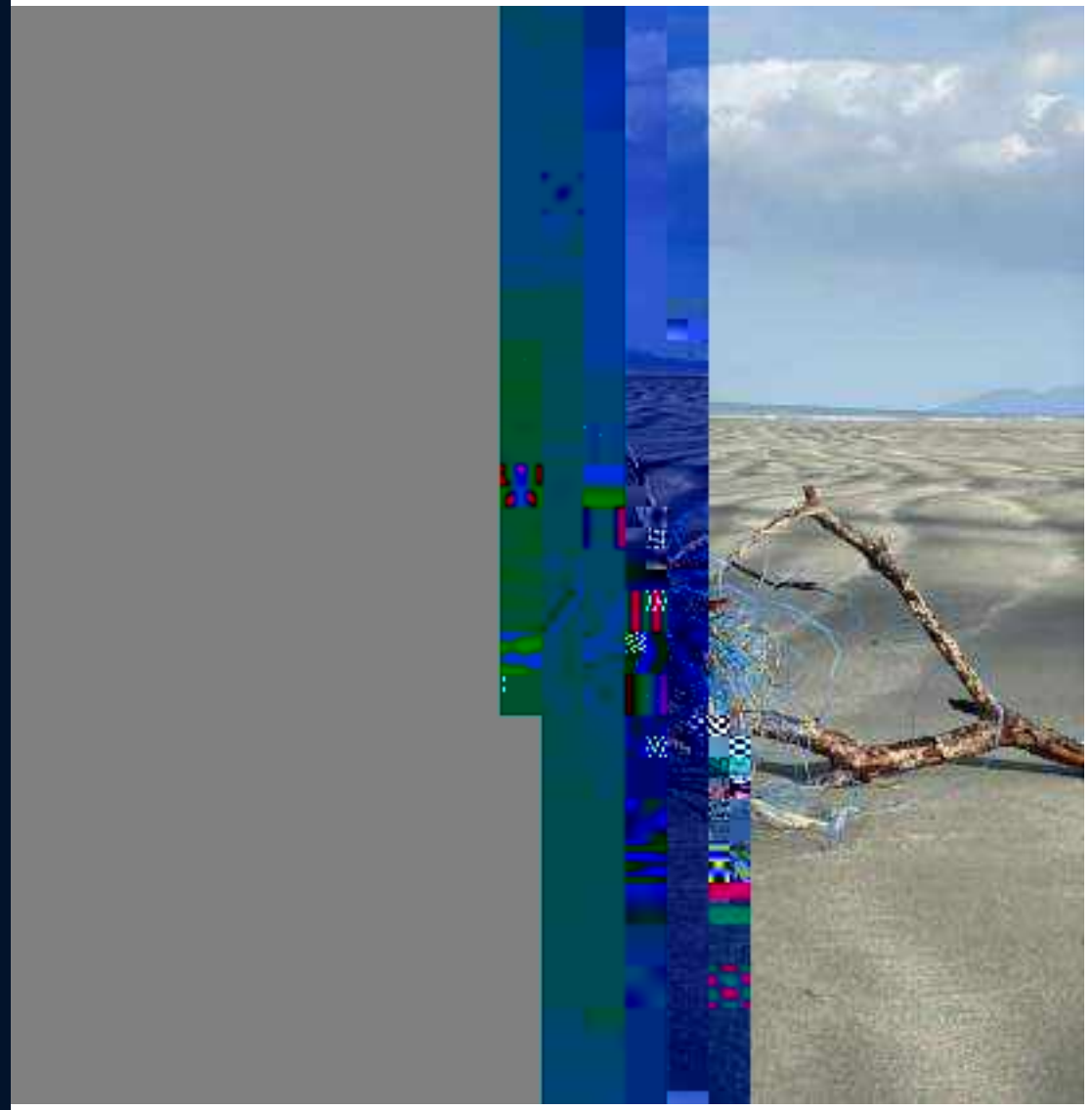
Searious Business

SeariousBusiness

connect@seariousbusiness.com

https://www.seariousbusiness.com/islands

#PlasticWasteFreeIslands #CloseThePlasticTap



PLASTIC WASTE FREE ISLANDS

BUSINESS PLAN

REUSABLE FOOD CONTAINERS

ACKNOWLEDGMENTS

IUCN Plastic Waste Free Islands (PWFI) project wishes to thank the various partners fromTf2Tr88Td[p)7a)1t)9e)1s)]TE

Searious Business, (2021). Report to IUCN Plastic Waste Free Islands, Reusable Food Containers Business Pan,

Support and Funding

Technical Lead Authors

REUSABLE FOOD CONTAINERS

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 solution, in the geographic context of Saint Lucia. It demonstrates how the solution can be realized, allowing for the creation of an alternative value chain.

MISSION

WHAT & WHY

What

- Innovating your take away operations through
  - The introduction of reusable food containers
  - Saving resources, money and preventing waste

Why

- Import-dependent economy, with limited resource recovery options on-island
- Enhanced customer loyalty
- Business innovation opportunity for
  - Restaurants/cafes/resorts owners and logistics partners owners
  - Income streams: Less import and dependency, more effective use of packaging
  - Job creation: Reuse services create infrastructure and jobs in the community that cannot be outsourced

TARGETED MATERIALS

PET, PS, PP AND MATERIAL MIXES CURRENT VALUE CHAIN

z	Plastic Waste Generation					

REUSABLE FOOD CONTAINERS

ALTERNATIVE VALUE CHAIN

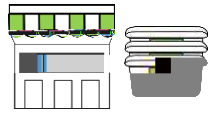
Concept

Customers avoid single-use plastic by using reusable containers for ready-meals, take-aways and any food in bulk. An incentive such as deposit or voucher encourages the return.
The containers are then professionally cleaned and can be reused up to 500 times.

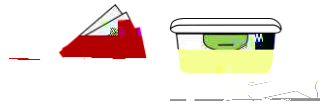
Target group:
- Hotels & restaurant guests
- Day-trippers
- Yacht owners

Stakeholders:

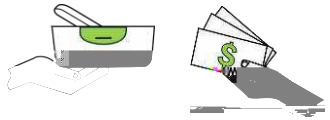
Supermarket / restaurant stocks containers



Containers transported back

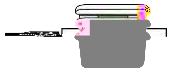


Food is bought with container and deposit is paid



Empty container is returned to supermarket and deposit back

Containers are cleaned



Containers are transported to washing facility

Containers made from PolyPropylene (PP)

- Can be recycled
- Lightweight
- Nestable
- Not energy intensive production
- Leakage-proof
- Heatable in microwave
- Dishwasher-safe
- BPA/B-free
- Rectangular shape recommended for more effective storage space usability

Why PP?

Compared to reusable alternatives made from stainless steel, glass, and

FACTSHEET

BENEFITS

Financial benefits	Environmental benefits	Social benefits

FACTSHEET

MARKET ANALYSIS, COST OVERVIEW, USP

Major applications and markets

- Primary market: restaurants, take-away places, pool areas of resorts and hotels
- Secondary markets: deli counters of supermarkets
- Major applications: For warm and cold meals, salads, soups and stews, sandwiches and desserts

Volumes to be procured

- Per restaurant, 25 reusable food containers as a starting point (relative to 200 meals/day of an average sized food outlet)
- If more restaurants join, purchase and import can be combined with other entities

Source

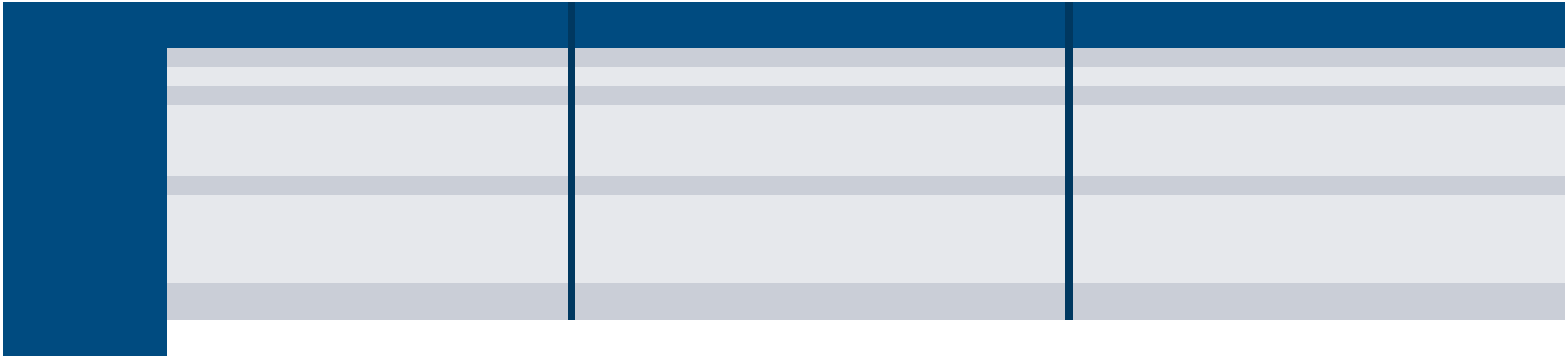
- Can be sourced from local or overseas suppliers, e.g. EMSA container from Groupe SEB. The quality needs to be high, for cost-effectiveness and multiple reuses

Costs and capacities

- Revenue: USD 126 per month.
-

FACTSHEET

COST BENEFITS ANALYSIS



FINANCIALS

FUNDING & ROI

Summary	
Money Needed to Start	USD 150
Months to Pay Back Investment	2
Full Time Employees Needed	No difference
Revenue Earned Per Month	USD 126.00
Fixed Costs Per Month	USD 68.92

- Reusable food container scheme ideally backed up by a national **campaign on reusing packaging material**
  - Communicates clearly about environmental benefits and cost-savings
  - Could be implemented by the Department for Sustainable Development
  - Important building block for public education for positive attitudes and behaviors
  -

KEY RESOURCES

GET INSPIRED

- About Standardisation in Reusable Packaging: https://www.resolve.ngo/site-pr3standards.htm
- Reuse Business directory: https://upstreamsolutions.org/reuse-businesses-directory
- KIDV What requirements must reusable food packaging meet? https://kidv.nl/what-requirements-must-reusable-food-packaging-meet
- Be part of a reuse and refill movement across the island: https://www.citytosea.org.uk/campaign/refill and: https://plasticsmartcities.org/
- Ellen MacArthur Foundation estimates that Reusable packaging offers a USD 10+ billion innovation opportunity that can deliver significant user and business benefits: https://ellenmacarthurfoundation.org/reuse-rethinking-packaging
- Searious Business introduced a similar reuse project in Morocco in collaboration with local supermarkets, which received the Sustainability Award 2021 in the Best Practice category, from Packaging Europe: https://packagingeurope.com/sustainability-awards-2021-winners-revealed/
- implementing or upscaling your reusable systems: connect@seariousbusiness.com

Refill app can be used to connect users across the island to places to eat, drink and shop with less waste

FOR MORE INFORMATION

IUCN

IUCN_Plastics

plastics@iucn.org

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

#ClosethePlasticTap

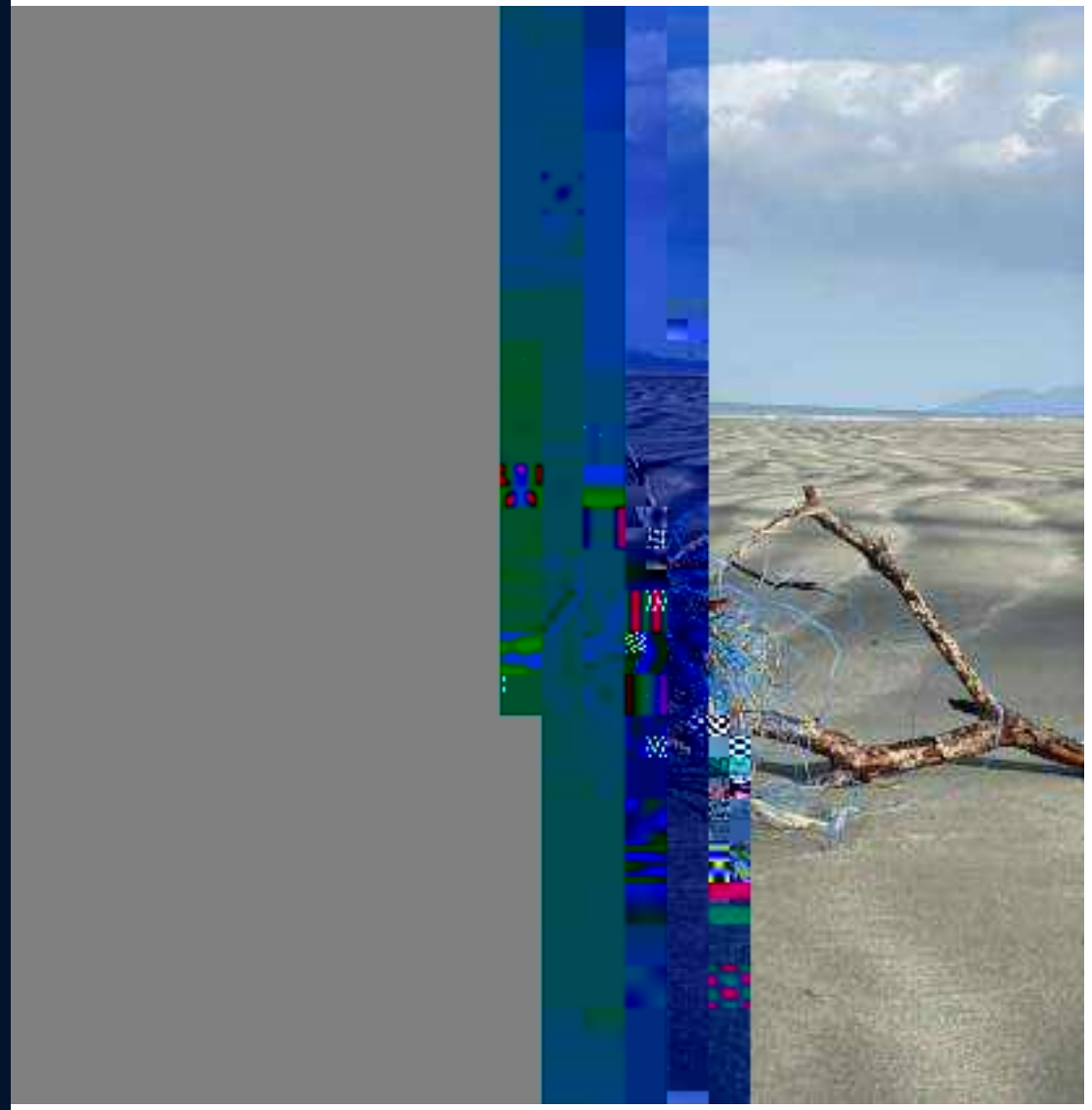
Searious Business

SeariousBusiness

connect@seariousbusiness.com

https://www.seariousbusiness.com/islands

#PlasticWasteFreeIslands #CloseThePlasticTap



WASTE SEGREGATION

INSPIRATIONAL GUIDE FOR SOURCE SEGREGATED WASTE STREAMS

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

Support and Funding

Technical Lead Authors

Searious Business, 87261.q53e f01410CB-22(G)4Seg 19,4,76 Sw re Wsupport and 519.46g

(2026). Report on Waste Segregation, Support and

Purpose of this inspiration guide

-

SUCCESS FACTORS & CONSIDERATIONS

FOR PROCESSING WASTE STREAMS ON SIDS

Circular solution

Turns trash into cash: creates a product with an existing local market

Enables island self reliance/autonomy

Creates island employment opportunity

Scalable/replicable

Behavioural changes

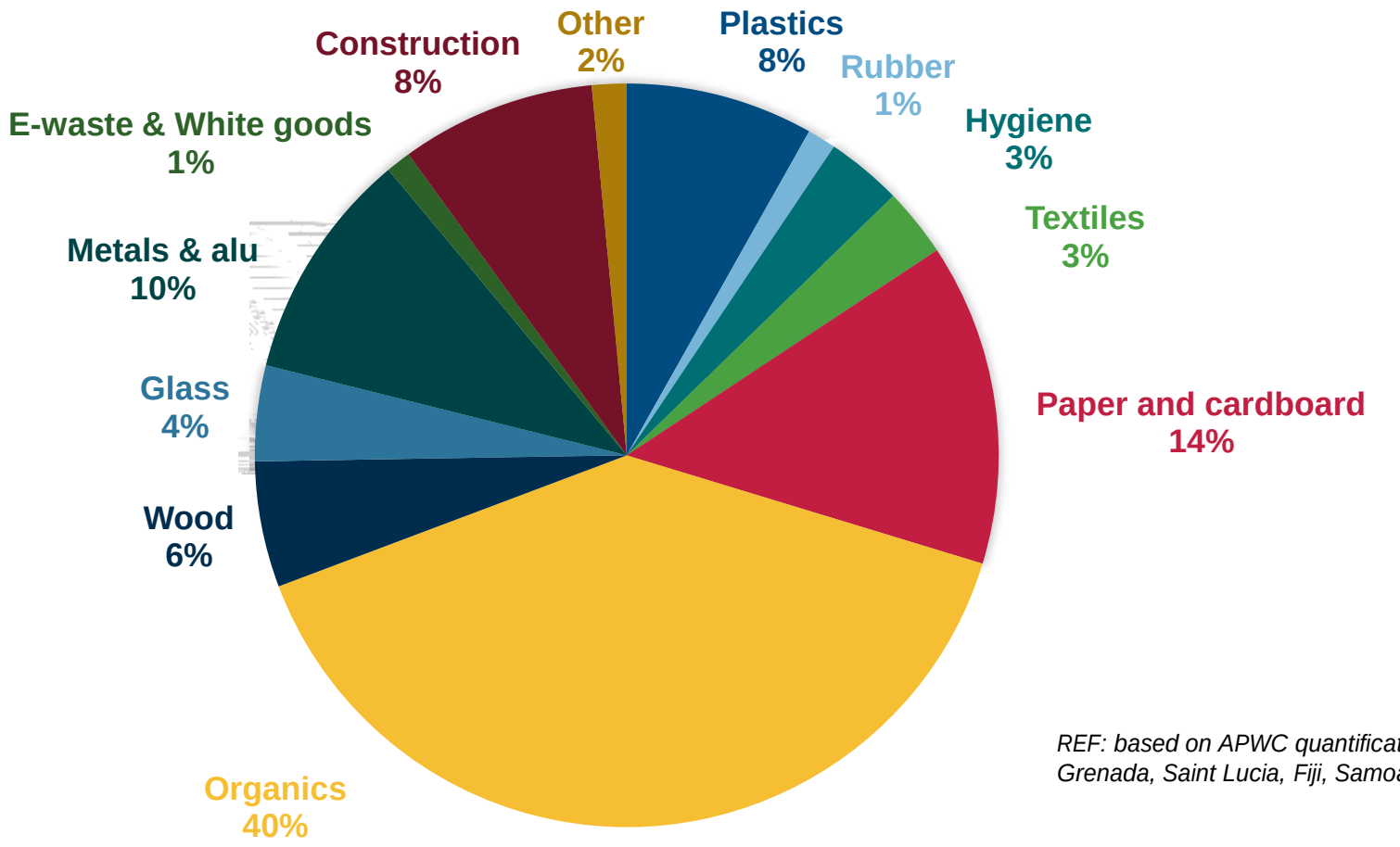
Speed of processing waste

Space needed

Costs and Return on investment

PRIORITY WASTE STREAMS

AVERAGE WASTE COMPOSITION IN % ACROSS PLASTIC WASTE



REF: based on APWC quantification data Antigua & Barbuda, Grenada, Saint Lucia, Fiji, Samoa, Vanuatu, 2021

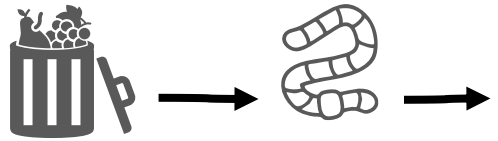
7

ORGANIC WASTE (1)

BEST PRACTICES

Compost heap

Kitchen and garden waste biodegrades naturally in a compost



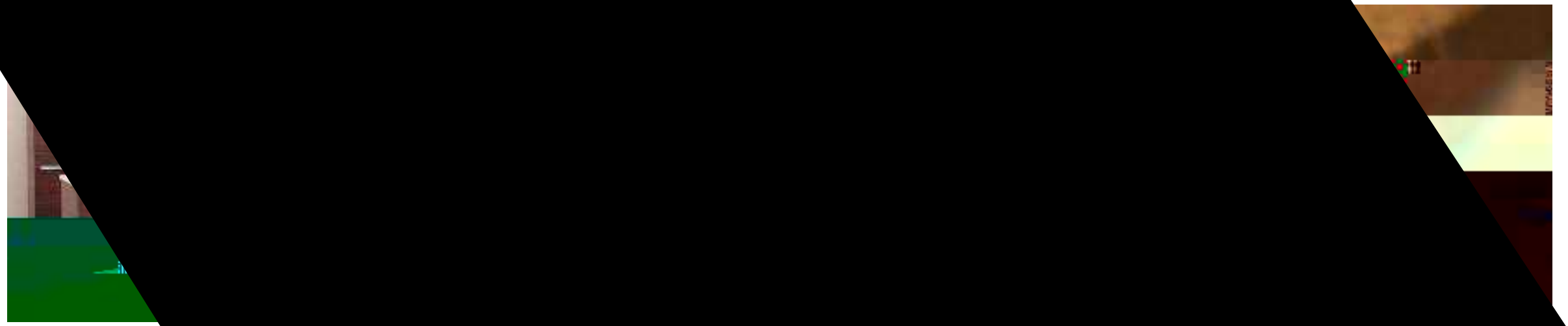
VERMICULTURE

WHAT DO YOU NEED FOR A WORM FARM?

1. **Bedding**- various materials can be used including straw, newspaper, leaves, corn cobs and stalks
2. **Food source**: organic material
3. **Moisture (50% by weight)** Worms need moisture to breathe so bedding must be able to hold sufficient moisture
4. **Aeration** choose bedding correctly so that it does not pack too densely. No need to turn the bedding.
5. **Protection** from extr2.

BLACK SOLDIER FLY LARVAE FARM

S (1)



Waste Banana
beautiful veneer

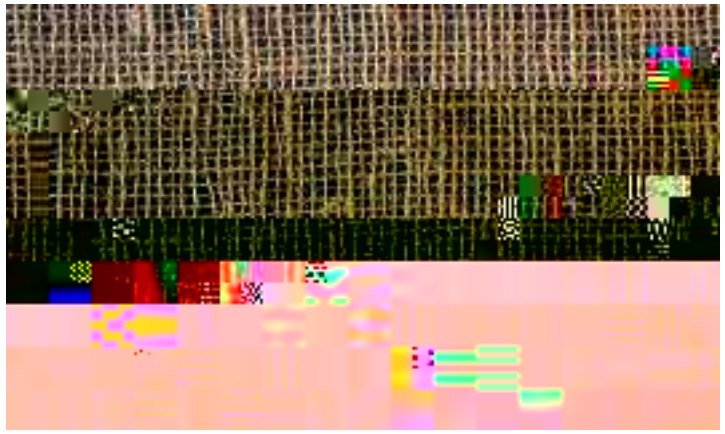
t3(o)st

SPECIFIC ORGANIC WASTE TYPE SOLUTIONS (2)

ALTERNATIVES TO PLASTIC

Waste Palm leaves for weaved reusable bags (e.g. 300 coconut bag, Vanuatu) and Harakeke (Flax) woven casket

Fish waste for producing compostable packaging, i.e. MarinaTex. Related innovations include packaging made from seaweed, algae, agar-agar



JACKS fibres, any natural fibres and value-added plastic replacing products like bags, particularly jute, abaca, coir, kenaf and sisal (JACKS fibres) are produced and exported by several developing countries thereby benefiting smallholder farmers and reducing plastic waste

TYRE WASTE

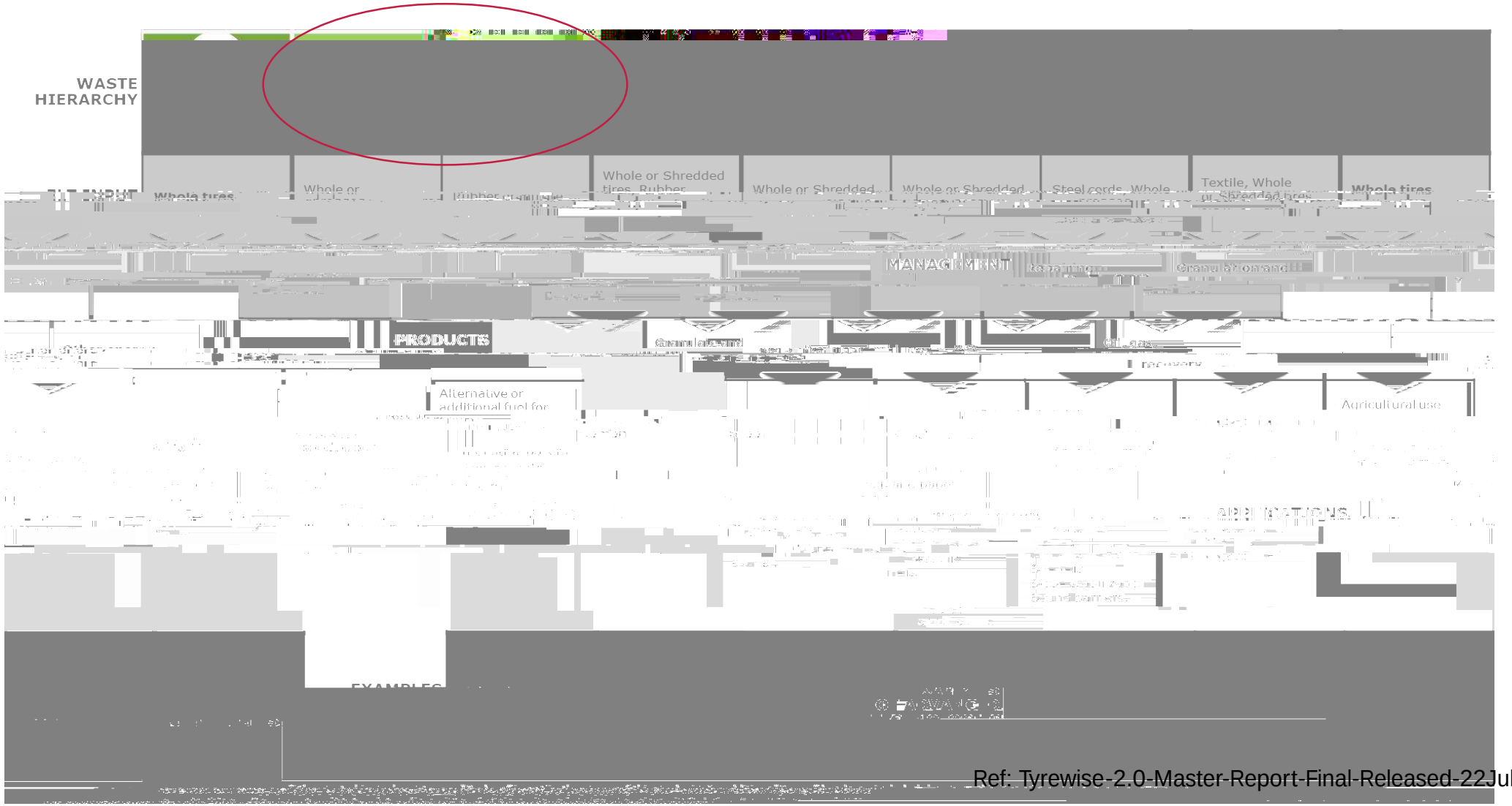
CHALLENGES AND OPPORTUNITIES

- Tyres cause 28% of primary microplastics in the ocean
- On average a tyre loses 10% of its weight in 4 years in the form of microplastics
- Solutions include i.e. circular design & business models, reuse and recycling

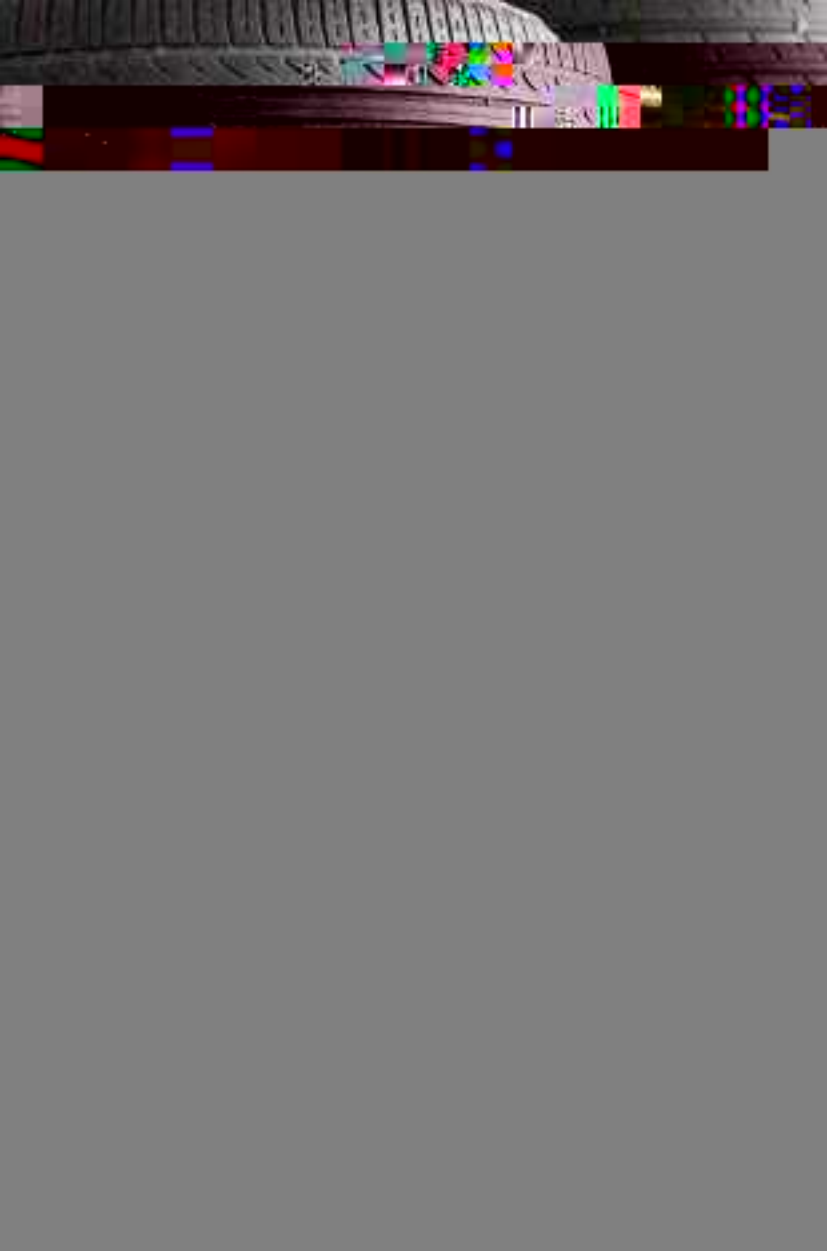
For SIDS, tyre recycling could contribute significantly to reduce plastic leakage and landfill pressures

NB: !!! Prioritise applications where there is limited wear & tear, and water/food contact, to prevent negative impacts from micro-plastics during the use phase

TYRE WASTE MANAGEMENT HIERARCHY



Ref: Tyrewise-2.0-Master-Report-Final-Released-22July2020-with-disclaimer.pdf



TYRE RECYCLING (2)

BEST PRACTICES

For example: Xtyre recycling

- Using low-tech recycling technology
- Low start-up costs
- Manufacturing recycled rubber products from waste tyres such as: reusable pallets, matting, sports materials, architecture materials, and safety & construction materials
- The steel tyre wiring can also be retrieved for recycling
- Scalable business model via a licensed manufacturing agreement with technology transfers
- Principle: Same products, same moulds and same formulations in all manufacturing entities and markets
- The recycling line/machinery can be dual purposed to recycling/granulating both used tyre and plastic waste
- Government could support business development in the form of regulation/mechanisms to obtain waste recycling licenses, and taxing for example the tyre suppliers per kg of tyres sold into this market. Then using this tax to pay/substitute the cost for the collection, storage and recycling of these waste tyres

Want to learn more about the benefits of source segregation and integrated waste management systems:

- Community level waste management, see: Waste Aid - Making Waste Work toolkit: https://wasteaid.org/toolkit/

- General Solid Waste Management suggestions for SIDS:
  - UNEP - SIDS Waste Management Outlook: https://www.unep.org/ietc/node/44
  - Plastic Waste Free Islands

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