S&T Water Environment Roadmap 2022-2028

Updated as of 22 February 2024

Legend: New/ On-going | Completed | Target

Overall Strategies

Human Resource
- Capacity building /capabilities of institutions on water quality sensors and use of equipment on HM monitoring.

R&D Technologies
- **Development of Clean technologies for wastewater treatment, management, and reuse**. (*Microplastic capturing technology, Microbial Fuel Cells, Zero-Liquid Discharge, membrane fabrication, smart water management, rapid test kits for detection of toxins and pathogens in WW*)
- **Pilot Demonstration of treatment / rehabilitation / remediation technologies** (*IOT-based treatment, nanosilicate adsorbents,, resource recovery (nutrients, HM) using biocarriers or radiation-modified polymer, desalination, deionization*)

Facilities / Services
- Establishment of a Center for Lakes Sustainable Development
- Establishment of a Center for Environmental Technologies and Compliance
- Establishment of a Centralized Center for Wastewater Management and Treatment (Industry-Academe-Government linkage)

S&T Policies
- **Review and formulation of guidelines / policies / standards** *(water quality index for groundwater, Industry Specific Effluent Standards, EDCs, Microplastics, Diffuse Pollution, Water Reuse, Total Maximum Daily Load, Rain tax)*
- Adoption and implementation of approved policies

Possible Solutions

2022-2023

88M

- Constructed Wetland for Wastewater Treatment of Effluent from a Water Provider
- Envitecs Program
- NICER Lake Program
- RENEW Program
- DETOXs Program

- **Technologies:**
  - IOT-based treatment; Nanosilicate adsorbents; Biological wastewater treatment for EDCs; Constructed Wetland for wastewater treatment; Ships Ballast Water and Biofouling Treatment Systems for Marine Vessels; Moduar Eco-Friendy Doestic Wastewater (MEDoWW); Titanium Dioxide Films and its Derivatives for Semiconductor Mediated Photocatalytic Treatment of Water; Compact Wastewater Treatment System for Restaurants; Eco-System Modeling and Material Transport Analysis
- **Capacity Building:** IEC on Microplastics, Emerging Contaminants in Wastewater)
- **Facilities:**
  - Center for Environmental Technologies and Compliance; Center for Lakes Sustainable Development

2024

97M

Resource recovery of nutrients, HM, and Endocrine disruptors in wastewater (Biological, Capacitive deionization, radiation modified polymer, etc.)

Development of technology for smart wastewater management (PPCPs, nanotechnology purifiers, IOT, nanosensors)

Development of rapid test kits for detection of toxins and pathogens in water/wastewater.

45M

Development of technology for smart wastewater management (nanotechnology purifiers, IOT, nanosensors)

Desalination, Deionization Technology

Cost-effective and portable treatment for nitrate, phosphate, oil and grease and ammonia in accordance with DENR Administrative Order 2016-08 Water Quality Guidelines and General Effluent Standards

2025

- **Technologies:**
  - Detection, Treatment, and Detoxification System for Emerging Contaminants of Concerns in Wastewater; Biological wastewater treatment for EDCs; IOT-based treatment; Nanosilicate adsorbents; Capacitive deionization; Radiation-modified polymer; Smart Water Management; Desalination; Deionization; Rapid Test Kit for detection of pathogens and toxins in Wastewater; Additive Manufacturing; Biocarriers for removal of HM
- **Policy Review:**
  - Microbial-Source Tracking; Development of standards for EDCs, microplastics and water re-use; Resource Recovery of nutrients & HM in WW; Water Quality Index for groundwater; Technology Adoption; Promotion and Incentives for industries that adapts Zero Liquid Discharge Technology.
- **Facilities:**
  - Center for Environmental Technologies and Compliance; Center for Lakes Sustainable Development; Centralized Center for Wastewater Management and Treatment (Industry-Academe-Government linkage)

2026

150M

Development of Cost-effective Technologies on Water/Wastewater Reuse, Water recycling for industries and communities

Development/ Application of scalable treatment and/or removal of heavy metals (HM), micropollutants and other emerging pollutants in wastewater

Pilot scale/industry scale application for AI-based water treatment and/or resource recovery, desalination, deionization, etc.

Development of microplastic capturing technology and treatment for industries and/or waterbodies

Input in the formulation of guidelines/ policies and standards on Water Environment sector

2027-2028

50M

Loading analysis, Pilot-scale Technologies for treatment of diffused pollution

Vision

Sustained ecological functions & services of water ecosystems

Enhanced industry compliance on wastewater quality policies/regulations

Upgraded the quality of water ecosystems in the country

Milestones

Overall Outcomes

Human Resource
- PhD, MS, BS students graduated
- Established pool of experts on water
- Trained personnel; stakeholders

R&D Technologies
- Clean Technologies for water /wastewater management
- Pilot-tested/deployed/ Commercialized technologies

Facilities / Services
- Established centers to address water pollution

S&T Policies
- Inputs to DAO 2016-08, and updating of the Philippine Clean Water Act (RA 9275)
- Drafted NRDP-PCWP to include a Central database on wastewater technologies

Sub-sector 1: S&T Water Environment Roadmap									
R&D Technologies	Project Title	Budget Allocation ('000)							Status
		2022	2023	2024	2025	2026	2027	2028	
2022-2023 (88M)									
Application of technologies for treatment of Industry Environmental Concerns (IOT-based treatment, application of nanosilicate adsorbents, etc.)	Synergistic Air and Water Quality Sensing System with Purification Devices Using Local Materials for Micro Small Medium Scale Industries (MSMEs)	3,099.429	-	-	-	-	-	-	Ongoing
	NanoSiliCage (NSC): Nanocaged silicate composite for treatment of wastewater from Valenzuela City plastic industries	10,639.78	4,946.03	-	-	-	-	-	Ongoing
	Design, Construction, and Process Optimization of a Combined Physico-Chemical Coagulation and Electrocoagulation System in Treating Complex Wastewater Contaminated with Heavy Metals (Ni, Cu, and Pb)	2,600.32	2,395.90	-	-	-	-	-	Ongoing
	Constructed Wetland for Wastewater Treatment of Effluent from a Water Provider	3,187.82	-	-	-	-	-	-	Completed
Establishment of a Center for Lakes Sustainable Development and Center for Environmental Technologies and Compliance	Project 1: Evaluating Dynamic Internal Loading of Nutrients in Sediment for Recovery of Lakes from Eutrophication (INLakes)	12,284.60	5,655.10	-	-	-	-	-	Ongoing
	Project 2: Predictive Estimation of Ecological Carrying Capacity: Tool For Sustainable Aquaculture and Eco-Tourism Development In Small Crater Lakes of Quezon Province	2,806.66	527.74	-	-	-	-	-	Ongoing
	Project 3: A Model Rehabilitation of a Laguna de Bay Tributary - Taytay River - Maningning Creek Sub-basin	3,366.24	5,257.79		-	-	-	-	Ongoing
	Project 4: Source Tracking of Microbial Contamination in Selected Lakes of Laguna, Philippines (STROLL)	5,310.76	4,504.96		-	-	-	-	Ongoing

Sub-sector 1: S&T Water Environment Roadmap

R&D Technologies	Project Title	Budget Allocation ('000)							Status
		2022	2023	2024	2025	2026	2027	2028	
2024-2025 (97M)									
Resource recovery of nutrients, HM, and Endocrine disruptors in wastewater (Biological, Capacitive deionization, radiation modified polymer, etc.)	RENEW P1: Point-of-source determination of Endocrine Disrupting Compounds in wastewaters for interventions (PoST-EDCs)	6,061.06	5,635.56	5,353.81	-	-	-	-	Ongoing
	RENEW P2: Microbial community composition and function for the removal of excess nitrogen and endocrine disruptors in wastewater treatment	6,984.32	4,809.82	4,157.07	-	-	-	-	Ongoing
	RENEW P3: Functional Microbial Community Contained as Granules and Biofilm in Aerobic-Anaerobic Bioprocess Systems for Removal of Nitrogen and Endocrine Disruptors in Wastewater	6,724.10	3,780.10	3,514.10	-	-	-	-	Ongoing
	Streamlined Treatment of Nutrient Pollutants (STEP Nutrient)	-	-	3,491.53	2,638.41				For implementation in 2024
	RApid Treatment of Dissolved Metals (RATED Metals)	-	-	3,745.19	2,610.19				For implementation in Q3 of 2024
Development of rapid test kits for detection of toxins and pathogens in water	Project 1: Evaluation of Wastewater Treatments for Emerging Contaminants of Concerns with Eco-Biological Parameters (ECoCs)	-	25,770.03	12,780.88	-	-	-	-	Ongoing
	Project 2: The Application of Nanomaterials on Electrochemical Sensor (NATROSENSOR) for Rapid and Multiplex Detection of Various Antibiotics for Monitoring of Hospital Wastewater Treatment	-	6,728.77	3,563.63	-	-	-	-	Ongoing
	Project 3: River Ecosystem Health Assessment using Biomonitoring Tools (REHAB)	10,730.08	5,650.58						Ongoing

Sub-sector 1: S&T Water Environment Roadmap

R&D Technologies	Project Title	Budget Allocation ('000)							Status
		2022	2023	2024	2025	2026	2027	2028	
2025-2026 (45M)									
Development of technology for smart wastewater management (nanotechnology purifiers, IOT, nanosensors)	N/A	-	-	-	-	-	-	-	
Desalination, Deionization Technology (for TECHNICOM)	N/A	-	-	-	-	-	-	-	
Cost-effective and portable treatment for nitrate, phosphate, oil and grease and ammonia in accordance with DENR Administrative Order 2016-08 Water Quality Guidelines and General Effluent Standards	N/A	-	-	-	-	-	-	-	
2026-2027 (150M)									
Development of Cost-effective Technologies on Water/Wastewater Reuse, Water recycling for industries and communities	N/A	-	-	-	-	-	-	-	
Development/ Application of scalable treatment and/or removal of heavy metals (HM), micropollutants and other emerging pollutants in wastewater	N/A	-	-	-	-	-	-	-	
Pilot scale/industry scale application for AI-based water treatment and/or resource recovery, desalination, deionization, etc.	N/A								
Development of microplastic capturing technology and treatment for industries and/or waterbodies	N/A	-	-	-	-	-	-	-	
2028 (50M)									
Loading analysis, Pilot-Projects and Technologies for treatment of diffused pollution	N/A	-	-	-	-	-	-	-	

Sustainable S&T Clean Air Roadmap (2022-2028)

Legend: New/ On-going | Completed | Target

Updated as of 22 February 2024

Overall Strategies

Human Resource
- Capacity building of institutions/LGUs on air quality sensors/equipment on air quality monitoring;. use of satellite data for regional concentration of pollutants
- IEC/Info dissemination for collected data (I.e. for LGUs and industries; Fora/FGDs on air quality

R&D Technologies
- Use of satellite data for improvement of air quality
- Development of localized technology for Indoor air quality
- Real-time monitoring & sensor networks
- Containment technologies to prevent diffusion of pollutants/industrial gas leaks
- Calibration centre for aerosol devices
- portable analyzer, localized data loggers, pollution exposure monitors, and upgrading of equipment for real-time monitoring
- Use of predictive/smart technology for AQ monitoring

Facilities / Services
- Center for air quality monitoring
- Calibration center for sensors
- Industry monitoring of air quality
- Updated data base for air quality/ Online emission inventory system
- Real time reporting of air quality
- Installation of air pollution treatment facilities in key areas (terminals, port areas)

S&T Policies
- Policy review on amendment of air quality measurement on concentration and equivalent guidelines on emission flow rate
- Policy on preparedness of Industry to capture the leaks of air pollutants
- Incentives for industries that apply pollution prevention/containment technology (e.g. bio-filters/air scrubbers, etc.)
- Updating of emission standards (every 2 years)

Possible Solutions

2022-2023

80M
- Ambient Air Remote Sensing, Modeling & Visualization
- Aluminosilicate Technology for Compact Air Purification
- Comparative Study Between Standard Methods and Philippine Made PM and CO Measuring Devices
- Connected Embedded Systems for Indoor and Outdoor Air Quality Monitoring
- Indoor Air Quality Monitoring and Reporting System
- Development of Filter Media, eBC and VOC Sensors for Local Conditions
- Air Adsorption Silica-Alumina technology for Valenzuela Environmental Remediation

- Technologies:
  - Modelling techniques & approaches
  - Locally developed sensors
  - IOT-based sensor platform,
  - indoor air quality sensor
- Capacity Building
  - Capacity building of institutions/LGUs on air quality sensors/equipment on air quality monitoring

2024

100M
- Establishment of Calibration centre for aerosol devices
- Development of portable analyzer, test kits, localized data loggers, pollution exposure monitors for real-time monitoring
- Containment technologies to prevent diffusion of pollutants/industrial gas leaks

- Technologies:
  - Real time portable analyzer /Test kits for air quality status
  - AI based air quality scenario generator
  - Pollution exposure monitors
  - GIS and AI for image analysis and information extraction (AirMoVE)
  - Real time reporting of air quality
- Facilities:
  - Center for Air Research in Urban Environments (CARE Program)
  - Updated data base for air quality/ Online emission inventory system
- Policy Review:
  - Updating of Joint Administrative Order for ETV of locally-developed / available sensors

2025

110M
- Modelling techniques and approaches, big data, datamining, etc
- Containment technologies to prevent diffusion of pollutants/industrial gas leaks
- Development of technologies for air pollution abatement and control
- Enhancement of Calibration centre/validation facility for aerosol devices

2026

180M
- Development of GHG emission monitoring & assessment tools and protocols
- Development of GHG capture & mitigation technologies
- Establishment of locally developed emission factors and standards
- Cost-effective air pollution control and abatement from anthropogenic sources
- Real-time spatio-temporal ambient air quality forecasting

- Technologies:
  - Enhanced methodology for Source apportionment
  - Inclusion of other air quality indicators
- Policy Review:
  - Local Guidelines /policies and standards on air quality

2027-2028

200M
- Use of GIS and AI for image analysis and information extraction
- Use of predictive/smart technology for AQ monitoring
- Development of GHG emission monitoring & assessment tools and protocols
- Development of GHG capture & mitigation technologies
- Development of locally developed emission factors and standards
- Localized system for source apportionment

Milestones

Vision

Malinis na Hangin Dahil sa Akin

Improved & Sustained quality of air ecosystems in the country

Overall Outcomes

Human Resource
- PhD, MS, BS students graduated
- Established pool of experts
- Trained personnel; stakeholders

R&D Technologies
- Clean Technologies for the prevention and control of air pollution
- Commercialized technologies

Facilities / Services
- Established centers to address air pollution

S&T Policies
- Inputs to policies and updating of the Philippine Clean Air Act (RA 8749)
- Incentives for industries that apply pollution prevention/ containment technology

Sub-sector 2: Sustainable S&T Clean Air Roadmap									
R&D Technologies	**Project Title**	**Budget Allocation ('000)**							**Status**
		2022	**2023**	**2024**	**2025**	**2026**	**2027**	**2028**	
2022-2023 (80M)									
Use of satellite data for improvement of air quality	Ambient Air Remote Sensing, Modeling & Visualization Environment (AirMOVE)	4,735,272	3,920.772						completed
Development of localized technology for Indoor air quality	Drive Air ni Juan-Aluminosilicate Technology for Compact Air Purification	4,999.926							completed
	Indoor Air Quality Monitoring and Reporting System	9,159.874	7,523.127	6,716.877					on-going
Real-time monitoring & sensor networks	Towards Green Smart Cities: Connected Embedded Systems for Indoor and Outdoor Air Quality Monitoring	25,373.273	15,277.374	14,793.624					on-going
	Development of Filter Media, eBC and VOC Sensors for Local Conditions	21,233.401	9,908.401	9,326.401					on-going
Containment technologies to prevent diffusion of pollutants/industrial gas leaks	Air SAVER: Air Adsorption Silica-Alumina technology for Valenzuela Environmental Remediation	12,563.613	4,417.657						on-going
Establishment of Calibration centre for aerosol devices	Comparative Study Between Standard Methods and Philippine Made PM and CO Measuring Devices (CSV)	4,397.800	7,093.800						on-going

Sub-sector 2: Sustainable S&T Clean Air Roadmap

R&D Technologies	Project Title	Budget Allocation ('000)							Status
		2022	2023	2024	2025	2026	2027	2028	
2024 (100M)									
Establishment of Calibration centre for aerosol devices	N/A								
Development of portable analyzer, test kits, localized data loggers, pollution exposure monitors for real-time monitoring	N/A								
Containment technologies to prevent diffusion of pollutants/industrial gas leaks	N/A								
2025 (110M)									
Enhancement of Calibration center/validation facility for aerosol devices	N/A								
Modelling techniques and approaches, big data, datamining, etc	N/A								
Containment technologies to prevent diffusion of pollutants/industrial gas leaks	N/A								
Development of technologies for air pollution abatement and control	N/A								

Sub-sector 2: Sustainable S&T Clean Air Roadmap										
R&D Technologies	Project Title	Budget Allocation ('000)							Status
		2022	2023	2024	2025	2026	2027	2028	
2026 (180M)									
Development of GHG emission monitoring & assessment tools and protocols	N/A								
Development of GHG capture & mitigation technologies	N/A								
Development of locally developed emission factors and standards	N/A								
Cost-effective air pollution control and abatement from anthropogenic sources	N/A								
Real-time spatio-temporal ambient air quality forecasting	N/A								

Sub-sector 2: Sustainable S&T Clean Air Roadmap										
R&D Technologies	Project Title	Budget Allocation ('000)							Status
		2022	2023	2024	2025	2026	2027	2028	
2027-2028 (200M)									
Use of GIS and AI for image analysis and information extraction	N/A	-	-	-	-	-	-	-	
Use of predictive/smart technology for AQ monitoring	N/A	-	-	-	-	-	-	-	
Development of GHG emission monitoring & assessment tools and protocols	N/A	-	-	-	-	-	-	-	
Development of GHG capture & mitigation technologies	N/A	-	-	-	-	-	-	-	
Development of locally developed emission factors and standards	N/A	-	-	-	-	-	-	-	
Development of localized system for source apportionment	N/A	-	-	-	-	-	-	-	

Sustainable S&T Solid Waste Management Roadmap

Updated as of 22 February 2024

Legend: New/ On-going | Completed | Target

Overall Strategies:

Human Resource:
- Upgrading of capacities/ capabilities of institutions for sustainable solid waste management

R&D Technologies:
- Development of alternative materials to plastic-based packaging and products under Non-Environmentally Accepted Products (NEAP) & Packaging (e.g., plastic stirrers/coffee cups)
- Development of Technologies for Upcycling/ Recycling of plastics/Co-processing
- Development of appropriate technologies for the detection, measurement and treatment of microplastics and other marine litter
- Conduct of Life Cycle Analysis (LCA) of single-use plastics with technological interventions

Facilities/Services:
- Establishment of a facility for biodegradability and recyclability testing of plastics

S&T Policies:
- Establishment of comprehensive resource recovery plan for plastic wastes & guidelines on final disposal
- Enhancement of industry compliance on solid waste management

Possible Solutions

2022-2023

17M
- Assessment and Profiling of COVID-19 Pandemic-Induced Wastes in General Santos City: Basis for the Development of Appropriate Solid Waste Management Technologies for the City
- Integrated Waste Analysis, Survey and Technological Option (IWASTO)
- Preliminary Characterization of Taal Volcanic Ash as Potential Raw Material for the Construction Industry and Safety Evaluation of its Leachates
- ELCA
- Plasticount
- Production of Polymeric Carbon Nanodots from Waste Plastic for Gas and Microplastic Identification and Detection
- 'Conversion of Quarry Wastes (Silt) Into High Temperature Refractory Bricks
- Post-radiation Reactive Extrusion of Plastic Waste (PREx Plastic)
- Establishment of Biodegradability Testing Facility

Technologies:
- Economic and LCA (SUPs)
- Polymeric carbon nanodots for sensing devices
- Solid waste analysis system
- Irradiation technology for plastic waste
- Technology for value-adding of quarry wastes
- Automated detection of macro & microplastics
- Database of microplastics levels in the Philippines

2024

55M
- Development of Technologies for Upcycling/ Recycling of plastics/Co-processing
- Development of tech for Microplastic capturing & treatment
- Development of scalable solid waste sorting system

Technologies
- Technologies for Upcycling/ Recycling of plastics/Co-processing
- Technologies for the detection, measurement and treatment of microplastics and other marine litter

2025

60M
- Development of Clean Technologies for solid waste prevention and control for ship recycling
- Product EOL Plan/System
- Establishment of LCA Certification Protocol/Standards
- Development of green alternatives to NEAP

Technologies
- Value-adding technology /recovery of high value materials from plastic wastes

Capacity Building
- Upgraded capacities of institutions for BEC-Lab

Facilities
- Establishment of a facility for biodegradability testing of plastics

2026

240M
- Development of technologies/strategies for marine litter prevention and reduction from point & non-point sources
- Value-adding of Solid Wastes/By-products from ship recycling, plastic materials and other conventional sources
- Integrated solutions following BCG model
- Establishment of Recyclability Testing Facility
- Establishment of Demo/Model Facility for Waste Infrastructure

Technologies:
- Treatment tech for solid wastes with POPs, Mercury, Arsenic and other Heavy Metals and hazardous chemicals
- Value-adding tech for solid wastes
- Integrated solutions with BCG strategies
- Enhanced waste infrastructure

Facilities
- Establishment of a facility for recyclability testing of plastics

2027-2028

200M
- Development of circular solutions for solid waste management
- Development of local standards for micro/ nanoplastics levels
- Development of green alternatives to SUPs
- Development of tech, for the recovery of high-value materials from wastes
- Enhancement of technologies for control of microplastics pollution

Milestones

Vision

A circular economy with solid waste pollution-free environment

Overall Outcomes

Human Resource
- PhD, MS and BS students graduated
- Established pool of experts
- Trained personnel/stakeholders

R&D Technologies
- Innovative and circular solutions to solid waste management
- Value-adding of solid wastes
- LCA certification standards

Facilities / Services
- Established centers for recycling
- Bbiodegradability testing facility
- Recyclability testing facility

S&T Policies
- Inputs to policies and updating of the Ecological Solid Waste Management Act (RA 9003) and EPR Law
- Input in the formulation of guidelines/ policies and standards on the prevention and control of solid waste
- Inclusion of circular solutions to solid waste management

Republic of the Philippines
DEPARTMENT OF SCIENCE AND TECHNOLOGY
PHILIPPINE COUNCIL FOR INDUSTRY, ENERGY AND EMERGING TECHNOLOGY RESEARCH AND DEVELOPMENT
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Sub-sector 3: Sustainable S&T Solid Waste Management Roadmap

R&D Technologies	Project Title	Budget Allocation ('000)							Status
		2022	2023	2024	2025	2026	2027	2028	
2022-2023 (100M)									
Waste recovery and management plan for the plastic generated (municipal wastes, infectious wastes/healthcare materials)	Assessment and Profiling of COVID-19 Pandemic-Induced Wastes in General Santos City: Basis for the Development of Appropriate Solid Waste Management Technologies for the City	2,000							completed
	Integrated Waste Analysis, Survey and Technological Option (IWASTO)	10, 297.174							completed
Development of Technologies for Upcycling/ Recycling of plastics/Co-processing	Production of Polymeric Carbon Nanodots from Waste Plastic for Gas and Microplastic Identification and Detection	4,971.2785	1,379.9715						on-going
	Post-radiation Reactive Extrusion of Plastic Waste (PREx Plastic)		14,758.669	2,704.909					on-going
	Conversion of Quarry Wastes (Silt) Into High Temperature Refractory Bricks		5,188.6	1,318.48					on-going
Technology/Facility for biodegradability testing	Establishment of Biodegradability, Eco-toxicity, and Compostability Testing Facility in the Philippines (BEC-lab)		68,543.86	66,057.75	8,512.728				on-going
High throughput monitoring technologies for both micro and macroplastics	PlastiCount Pilipinas: counting and visualizing marine plastics pollution in the Philippines	4,994.505							completed

Sub-sector 3: Sustainable S&T Solid Waste Management Roadmap

R&D Technologies	Project Title	Budget Allocation ('000)							Status
		2022	2023	2024	2025	2026	2027	2028	
2024 (200M)									
Development of Technologies for Upcycling/ Recycling of plastics/Co-processing	N/A								
Development of tech for Microplastic capturing & treatment	N/A								
Development of scalable solid waste sorting system	N/A								
2025 (60M)									
Development of Clean Technologies for solid waste prevention and control for ship recycling	N/A								
Product EOL Plan/System	N/A								
Establishment of LCA Certification Protocol/Standards	N/A								
Development of green alternatives to NEAP									

Sub-sector 3: Sustainable S&T Solid Waste Management Roadmap

R&D Technologies	Project Title	Budget Allocation ('000)							Status
		2022	2023	2024	2025	2026	2027	2028	
2026 (100M)									
Development of technologies/strategies for marine litter prevention and reduction from point & non-point sources	N/A								
Value-adding of Solid Wastes/By-products from ship recycling, plastic materials and other conventional sources	N/A								
Integrated solutions following BCG model	N/A								
Establishment of Recyclability Testing Facility	N/A								
Establishment of Demo/Model Facility for Waste Infrastructure	N/A								
Development of circular solutions for solid waste management	N/A								
Development of local standards for micro/ nanoplastics levels	N/A								
Development of green alternatives to SUPs	N/A								
Development of technology for the recovery of high-value materials from wastes	N/A								
Enhancement of technologies for control of microplastics pollution	N/A								