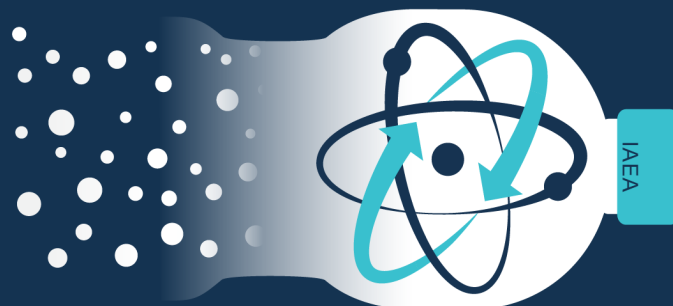


SUMMARY REPORT



NUTEC Plastics A nuclear solution to plastic pollution

ROUNDTABLE

FOR NORTH, CENTRAL, SOUTH AMERICA AND THE CARIBBEAN

26 August 2021, Vienna, Austria



IAEA

International Atomic Energy Agency



The sea as seen through a discarded plastic bottle by the beach. (Photo: Karu vadography/Pixabay)

NUTEC Plastics Roundtable

FOR NORTH, CENTRAL, SOUTH AMERICA
AND THE CARIBBEAN

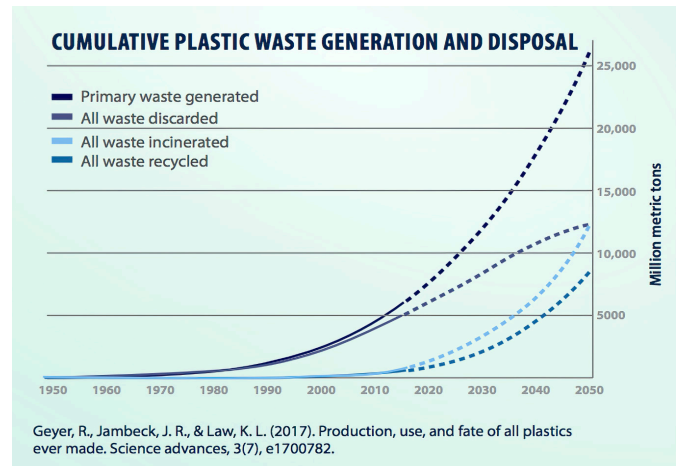
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Background on NUTEC Plastics

Following current trends, the ocean is expected to contain one tonne of plastic for every three tonnes of fish by 2025, and by 2050, there will be more plastic than fish.¹ Approximately 70% of all plastics produced to date is now waste and of this only 9% has been recycled. In many places, plastic waste is mismanaged and ends up in unregulated landfills or open dumps from where it enters the ocean.²

Plastic waste pollution not only has adverse effects on the ocean, but also on terrestrial environments such as soil and groundwater. Even as waste, plastic does not decompose due to its durability and longevity. When it reaches the ocean it can remain there for hundreds of years, and over time it fragments and turns into micro- and nano-plastic. The problem of plastic pollution is increasingly receiving global attention, but gaps in addressing the problem remain due to the lack of sufficient awareness, knowledge, technology, financing and effective policy.



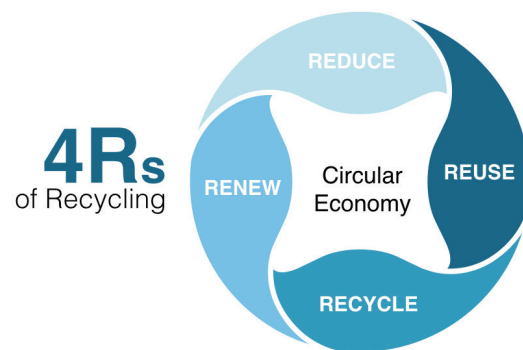
70% of all plastics produced to date is now waste.

Only 9% is being recycled globally

Towards a circular economy

The linear model of producing, using and disposing plastic is unsustainable. A global approach is needed that establishes a circular economy and focuses on the ‘4Rs’: reduce, reuse, recycle and renew. Analysis and evidence show that nuclear applications can complement existing technologies and thus accelerate the transition towards a circular economy for plastics.

However, the potential contribution of nuclear science and technology for addressing the plastic waste problem is not well known, and hence is rarely integrated into proposals for sustainable, scalable solutions. A change is needed to increase the knowledge and awareness of these techniques and technologies. More importantly, they need to be applied more broadly in practice in order



to use the full potential of nuclear techniques in reducing the global plastic waste burden. For this to happen, and based on its previous and existing work, the IAEA has developed NUTEC Plastics to assist IAEA Member States in integrating nuclear techniques in their efforts to address challenges of plastic pollution – making IAEA’s

1 World Economic Forum, ELLEN MacARTHUR Foundation, MCKINSEY Center for Business and Environment, The New Plastics Economy – Rethinking the Future of Plastics, WEF, Cologne (2016).
 2 GEYER, R., JAMBECK, J.R., LAW, K.L., Production, use, and fate of all plastics ever made, *Sci. Adv.*, (2017).

contribution to solving this global problem more apparent and perceptible. The IAEA supports research and uptake of nuclear techniques in two main areas: monitoring and assessment of marine plastics and plastic/polymer waste recycling and upcycling.

Radiation technology in plastic waste recycling

Radiation technology for industrial purposes, such as gamma and electron beams, offers unique advantages for reducing plastic and polymer waste and therefore fills existing technological gaps in dealing with such waste. Irradiation can address sorting challenges experienced by mainstream mechanical recycling methods by enabling effective sorting of plastic wastes to feed into recycling streams, thus improving the quality and value of the recycled plastics.

Radiation technologies can be used to transform or recycle plastic waste into other products, such as fillers and binders for construction materials. They can also be used to break down or convert waste plastic polymers into smaller components, fuel or monomers to generate chemical feedstocks to produce consumer products, with or without the addition of virgin polymers. Reduction of plastic waste is also possible by replacing petroleum-based plastics with biodegradable biopolymers obtained through radiation-driven processes.

Furthermore, radiation technology offers cleaner production and recycling processes, thus reducing the use of potentially harmful additives and solvents, as well as delivering energy savings.

NUTEC Plastics will integrate radiation technologies for plastic waste recycling into national, regional and global initiatives. Ongoing laboratory-scale activities



Radiation technology can help in the effective sorting of plastic wastes thus improving the value of the recycled plastics. (Photo: D. Jekic/123rf)

are paving the way for pilot plastic recycling plants to establish the volume, energy and financial balances associated with using radiation technologies to recycling various plastic wastes. Based on the proof of principle and experience gained from the pilot(s), the technology will be scaled-up to a large-scale plastic waste recycling demonstration plant(s).³

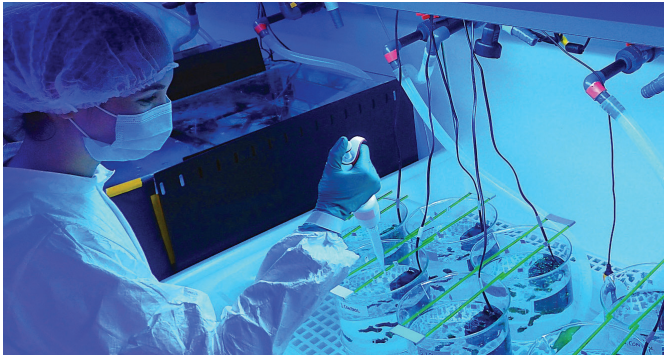
Protecting the ocean

The ocean is the final repository of mismanaged and unrecycled land-based plastics, and there is a lack of sufficient knowledge and understanding of the abundance and impact of microplastics in the ocean. More accurate data are needed to assess the effect that microplastics and associated contaminants have on marine organisms that are part of the global food chain, such as food for human consumption, and therefore on seafood exports, food safety and human health. Isotopic



Photo: R. Quevenco

³ IAEA Brochure: NUclear TEChnology for Controlling Plastic Pollution (2021).



Researchers at the IAEA Environment Laboratories model realistic scenarios to examine how and to what extent microplastics can transfer contaminants to marine organisms and eventually to humans. (Photo: F. Oberhaensli and H. Jacob/IAEA)

techniques offer unparalleled precision and complement conventional techniques in tracking the abundance and distribution of nano- and micro-plastics in the marine environment.

Isotopic tracers, imaging techniques and gamma and beta counters have unique abilities to assess the impacts of micro- and nano-plastics on marine biota. These techniques provide important markers for studying the toxicity of plastics on living organisms, to reveal in detail the impacted organs and systems, and allow to trace the actual toxicological stress and their possible propagation in food chains that can ultimately impact humans through consumption of seafood.

NUTEC Plastics will strengthen and scale up the development of reliable and cost-effective techniques to assess the spatial and temporal abundance and character of marine plastics to better understand their origin, transport mechanisms, as well as fate and impact. This includes the establishment of harmonized, standardized protocols to identify microplastics in environmental samples, analytical techniques that are in line with best practices and state-of-the-art science, and training for scientists and technicians in their use.

Global partnership needed

A holistic and sustainable solution to the global plastic burden requires an integrated and comprehensive

approach that can only be achieved in partnership with organizations that have complementary roles and expertise. Working within existing national, regional and international initiatives, including private-public partnerships is essential. This includes collaboration with United Nation entities, multilateral development banks, philanthropies, existing large scale initiatives and multi-stakeholder platforms, private sector, and scientific and research institutions. The private sector will be a critically important partner in making the transition to a circular plastic economy, underpinned by strong governmental action and ownership through enabling policies and supportive legal environment.

NUTEC Plastics' two main components – monitoring and assessment and plastic recycling – are logically intertwined as both represent a contribution to the solution of the global plastic pollution problem. However, implementation of the two components is not contingent on each other.

Taking this connected but not co-dependent relationship into account, NUTEC Plastics adopts a modular approach. This approach offers the advantage of facilitating the implementation of certain activities according to resource availability, while offering Member States and partners the opportunity to engage in activities linked to their profile, preferences and priorities.

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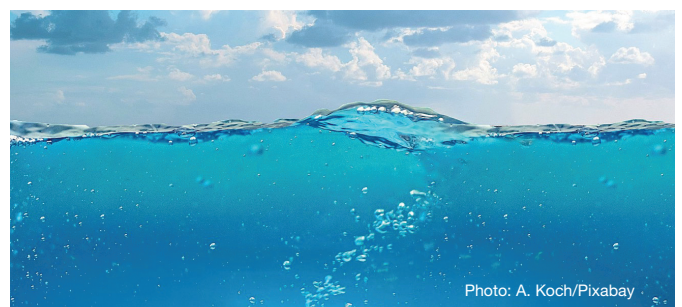


Photo: A. Koch/Pixabay

Summary of the NUTEC Plastics Roundtable for the North, Central, South America and the Caribbean



The NUTEC Plastics Roundtable for North, Central, South America and the Caribbean took place on 26 August 2021 with the participation of 401 national and regional stakeholders, including high level speakers, specialists, national liaison officers and representatives from Member State Permanent Missions.

The Roundtable was the second in a series of similar events providing a platform for presenting and discussing new solutions to address global plastic pollution, with a particular focus on the unique contributions of nuclear technologies and the promotion of partnerships for an integrated, coordinated and solution-oriented approach.

Session 1 '*Plastic Pollution: Challenges and the Need for Global Action*' of the Roundtable included presentations by distinguished panellists from Argentina, Brazil, Chile, Colombia, Costa Rica, Cuba, Mexico and the United States of America on key policy and socio-economic issues, regulatory frameworks, and initiatives for

strengthening partnerships and synergies to address plastic pollution from its source to the sea.

Session 2 '*Partnerships for Sustainable Solutions to Plastic Pollution*' showcased presentations on nuclear technologies for recycling and for marine microplastic monitoring, as well as a programmatic overview of NUTEC Plastics at the IAEA. Prominent researchers and scientists from Argentina, Brazil, Jamaica, the United States of America and the United Nations Environment Programme (UNEP) presented national, regional and research project results on monitoring marine microplastics and experiences on the use of radiation for transforming plastic waste materials into valuable goods. Experts shared their knowledge and expertise in monitoring marine plastic pollution and technologies for recycling plastic waste. Participants also exchanged information on existing networks, programmes and practices to explore new partnership opportunities.

Participants learned about various initiatives, programmes and projects launched at national levels, and by international and regional institutions in North, Central, South America and the Caribbean to apply sustainable solutions to plastic pollution. Speakers emphasized the critical role of science, technology, innovation and partnerships in addressing the growing issue of ocean plastic pollution. Instead of the linear ‘take-make-waste’ model used today, participants voiced their support for moving towards a sustainable circular economy for plastics built on the 4R principles: reduce, reuse, recycle and renew.

Roundtable Participants

-  **435** total attendees
58 IAEA + 353 external participants
-  **37** countries represented
-  **4** international/regional organizations
-  **16** panelists
internal and external senior level officials
-  **2** roundtable sessions

Attendance Per Affiliation	
Ministry/Governmental Institution	203
Industry/Private sector	8
International/Regional Organization	48
Permanent Mission	40
University/Research Institution	123
NGO	4
other	9
Grand Total	435

Attendance Per Country			
Antigua & Barbuda	1	Jamaica	18
Argentina	58	Mexico	24
Austria	37	Monaco	8
Belize	4	Netherlands	1
Bolivia	8	Nicaragua	18
Brasil	40	Panama	38
Canada	3	Paraguay	3
Chile	15	Peru	35
Colombia	11	Portugal	1
Costa Rica	9	Saint Lucia	2
Cuba	9	Saint Vincent and the Grenadines	2
Dominica	2	Switzerland	2
Dominican Republic	8	The Bahamas	1
Ecuador	2	Trinidad and Tobago	1
El Salvador	7	United Kingdom	1
Guatemala	4	United States	14
Guyana	1	Uruguay	12
Haiti	1	Venezuela	21
Honduras	13		
TOTAL			435

Introduction



Global plastic pollution has become one of the major environmental challenges of the 21st century. The North, Central, South America and the Caribbean region is a significant producer of plastic, and countries in the region are heavily affected by plastic waste pollution. The issue is, therefore, high on the political agenda both regionally and nationally.

Decision makers from all levels are involved in adopting measures to prevent and reduce plastic pollution in an integrated land-to-sea approach. Calls for action include scientific developments to provide effective and accurate methodologies to monitor plastic pollution and prevent it at its source on land, to reduce plastic waste amounts through broader and intensified recycling efforts and to scientifically support holistic decision making for healthy marine and terrestrial environments.

The role of the IAEA

The IAEA is the world's central intergovernmental forum for scientific and technical cooperation in the nuclear field. It works for the safe, secure and peaceful use of nuclear science and technology, contributing to international peace and security and the Sustainable Development Goals.

The technical cooperation (TC) programme is the IAEA's primary mechanism for building capacities in the peaceful application of nuclear technology in Member States, supporting their efforts to address key development priorities.

The IAEA technical departments provide the nuclear scientific and technological expertise for the TC programme in transferring proven nuclear techniques, as well as conducting research and development and providing training and analytical services to IAEA Member States.

The IAEA undertakes these research and development (R&D) activities in its own laboratories in Monaco, Seibersdorf and Vienna, as well as through its extended research networks composed of research institutions, academia and reference laboratories around the world, and its Coordinated Research Activities and Collaborating Centres schemes.

NUTEC Plastics...

... builds on a portfolio of IAEA research and technical cooperation projects in plastic recycling using radiation technology, and in marine monitoring of microplastics via isotopic tracing techniques. With NUTEC Plastics, the IAEA seeks to engage and expand dialogue with Member States, partners, industry and civil society. It provides a vision for the solutions that the IAEA offers to support better management of plastic waste. Implementation of activities will take place through established IAEA delivery modalities, such as technical cooperation and coordinated research projects and other programmatic activities.

Roundtable for North, Central, South America and the Caribbean

NUTEC Plastics aims to assist IAEA Member States in integrating nuclear and nuclear-derived techniques in their efforts to address the challenges of plastic pollution. NUTEC Plastics builds on a portfolio of IAEA research and technical cooperation projects around plastic recycling using radiation technology, and marine monitoring of microplastics using isotopic tracing techniques.

To increase the visibility of NUTEC Plastics among Member States and partners, a three-hour virtual Roundtable for the North, Central, South America and the Caribbean was organized on 26 August 2021.

This roundtable aimed to:

- » Provide a platform for presentations and discussions on new solutions to plastic pollution, with a particular focus on the unique contributions of nuclear technology.
- » Promote collaborative partnerships for an integrated, coordinated and solution-oriented approach to the fight against plastic pollution.



Proceedings of the Roundtable

Session One

Plastic Pollution: Challenges and the Need for Global Action

Opening Remarks



Mr Luis Longoria, Director of the IAEA Technical Cooperation Division for Latin America and the Caribbean

Mr Luis Longoria, Director of the IAEA Technical Cooperation Division for Latin America and the Caribbean, welcomed participants to the Roundtable on NUTEC Plastics, organized by the IAEA. The Roundtable was focused specifically on North, Central, South America and the Caribbean region and its 31 Member States, in the second in a series of similar roundtables for NUTEC Plastics.

He acknowledged the participation of representatives from nuclear, environmental, and industrial sectors from IAEA Member States in the region, and participants from international and non-governmental organizations, as well as the private and academic sectors. He then introduced a video on NUTEC Plastics that was produced for the event.

Following the video presentation, Mr Longoria introduced the IAEA Director General, Mr Rafael Mariano Grossi; Deputy Director General and Head of the Department of Nuclear Sciences and Applications, Ms Najat Mokhtar, and Deputy Director General and Head of the Department of Technical Cooperation, Mr Hua Liu. He also welcomed the Ministers, Heads of organizations and the experts participating in the Roundtable.

“Through NUTEC Plastics, the IAEA seeks synergies and partnerships with other international efforts to address plastic pollution.”

*— Luis Longoria,
Director of the IAEA
Technical Cooperation Division
for Latin America and the Caribbean*

Opening Statement by Mr Rafael Mariano Grossi, Director General, IAEA



IAEA Director General Rafael Mariano Grossi addressing the Roundtable event. (Photo: D. Calma/IAEA)

Director General Rafael Mariano Grossi welcomed participants to the second Roundtable organized by the IAEA on the ways to address plastic pollution using nuclear technology. He stated that even though we are acutely aware of both the opportunities and benefits of plastic, we also know of the externalities and negative impacts, and noted the growing awareness of the problem.

Mr Grossi stressed that these challenges have transboundary effects and that global problems need global solutions. He emphasized the importance of international efforts for developing creative and scalable solutions to address plastic pollution in both plastic recycling and marine microplastic monitoring.

In that regard, he stated that nuclear techniques can help in assessing and understanding the dimension of the problem. In concluding his remarks, Mr Grossi emphasized the need to work together and form partnerships both globally and regionally, particularly in North, Central, South America and the Caribbean.

“Global problems need global solutions and we can only solve big issues when we come together.”

*—Rafael Mariano Grossi,
IAEA Director General*

Keynote Address by Mr Peter Thomson UN Secretary General’s Special Envoy for the Ocean



Participants at the Roundtable watching Mr Thomson’s keynote speech. (Photo: D. Calma/IAEA)

In his keynote speech, delivered via video message, Mr Peter Thomson shared five key points on the global challenge of marine plastic pollution:

1. There can be no healthy planet without a healthy ocean, and the ocean’s health is currently in decline.
2. Marine plastic pollution is a major cause of the decline of the ocean’s health with a staggering 11 million tonnes of plastic entering the ocean every year. Unless urgent global action is taken, plastic pollution is set to double by 2030.
3. Only a coordinated global response, which holds into account both businesses and government, can stop this plastic plague.
4. Plastic has entered the marine food chain from zooplankton up to the end-consumers of seafood, which is consumed as nano-plastics. The health effects are still unclear, but scientists are reporting nano-plastics crossing our blood, brain and placental barriers.

5. We have a clear path to a peace table in the form of an international treaty to stop plastic from entering the ocean.

In closing, Mr Thomson stated his gratitude and appreciation for IAEA’s efforts in the marine plastic pollution arena using nuclear technologies, which can help in assessing technological gaps and pushing us towards a circular economy for plastic.

“There can be no healthy planet without a healthy ocean.”

— Peter Thomson, UNSG’s Special Envoy for the Ocean

Roundtable Discussion

IAEA Director General Rafael Mariano Grossi chaired the Roundtable discussion of Session 1 on several pertinent topics including key policy and socio-economic issues; achievements and gaps in policy and regulatory frameworks; international, regional, and national instruments and initiatives; and opportunities for strengthening partnerships and synergy, including resource mobilization.



Session One Panelists



HE Mr Felipe Solá, Minister of Foreign Affairs, International Trade and Worship of Argentina



HE Mr Andrés Allamand Zavala, Minister of Foreign Affairs of Chile



HE Mr Marcelo Morales, Vice Minister for Research and Scientific Formation, Ministry of Science, Technology and Innovation of Brazil



HE Ms Haydée Rodríguez-Romero, former Vice Minister of Water and Ocean, Ministry of Environment and Energy of Costa Rica.



HE Mr José Fidel Santana Nuñez, First Vice Minister of Science, Technology and Environment of Cuba



HE Ms Martha Delgado Peralta, Undersecretary for Multilateral Affairs and Human Rights, Ministry of Foreign Affairs of Mexico



Mr Francisco Arias Isaza, Director General of the Institute for Marine and Coastal Research (INVEMAR) of Colombia



Mr Frank A. Rose, Principal Deputy Administrator of the National Nuclear Security Administration (NNSA), Department of Energy, United States of America

Mr Grossi opened the Session 1 discussion by welcoming the intervention of the first panelist, **HE Mr Felipe Solá, Minister of Foreign Affairs, International Trade and Worship of Argentina.**

Mr Solá highlighted that plastic pollution is one of the greatest environmental challenges that the world faces and that it represents a threat to the sustainable development of countries. Argentina highly values the NUTEC initiative as it aims to articulate public policies focussing on a circular economy, responsible consumption, and waste management, along with the implementation of technological innovation, and nuclear and isotopic techniques.

He emphasized the Argentinian national policy 'Pampa Azul' (2020-23), adopted to promote scientific research, technological development and innovation that enable the effective preservation and management of marine assets. Similarly, a National Programme for Research and Innovation in maritime space (PROMAR) has been established, with a permanent fund for scientific and technological research in the South Atlantic.

Mr Solá also informed that in the framework of Argentina's General Environmental Law, guidelines for the environmentally sound management of plastics in all life cycles were adopted towards mitigation of plastic pollution.

He added that the National Commission of Atomic Energy (CONEA) is conducting research on the use of radiation technology for the recycling of plastics, with support of the IAEA.

Lastly, Mr Solá emphasized that NUTEC Plastics is a very important tool and vector of cooperation to diversify and promote collaborations and research to address plastic pollution at national and regional levels.



Mr Grossi then invited participants to listen to the video message of **HE Mr Andrés Allamand Zavala, Minister of Foreign Affairs of Chile.**

Mr Allamand remarked that plastic pollution is of interest to the international community and in particular to Chile. He expressly thanked Director General Grossi for the IAEA NUTEC Plastics initiative. The continued growth of plastic waste and the slowness in which they degrade, creates an accelerated accumulation of plastic waste.

He noted that 75% of marine waste consists of plastic waste. In particular, micro and nano plastics represent a significant threat for the marine food safety chain, including the human food chain.

Chile is an oceanic country; the sea is vital for commerce, subsistence and economic development. 75% of Chile's external commerce is through maritime routes, and fishing and aquaculture are crucial economic activities.

Mr Allamand emphasized that Chile is a strong proponent for the establishment of a network of marine protected areas, which represent 43% of the country's economic exclusive zone. Chile also supports the 30x30 targets under the UN Convention on Biological Diversity (CBD).

In addition, he informed that Chile adopted legislation to reduce the impact of plastic waste. In May 2021, a new legislation was approved to reduce single-use plastic products in commerce.

Chile is committed to Article III of the IAEA Statute on the safe and peaceful applications of nuclear technology. NUTEC Plastics aligns with Chile's actions at national, regional and international levels and the country will continue working together with the IAEA on this initiative.

Mr Allamand expressed appreciation for the support provided to Chile through the IAEA's TC programme, in particular on the application of nuclear and isotopic techniques to measure ocean acidification, and marine pollution by marine toxins and microplastics. This TC assistance focuses on building and strengthening national capacities to use nuclear and isotopic techniques to measure marine pollution.

At the regional level, Chile is part of REMARCO, a regional network for research and cooperation established by countries in the region to address common challenges related to the coastal and marine environment, including monitoring microplastics.

Mr Allamand concluded by reiterating Chile's engagement and proactivity to prevent and reduce the impact of plastic waste.



Next, Mr Grossi invited **HE Mr Marcelo Morales, Vice Minister for Research and Scientific Formation, Ministry of Science, Technology and Innovation of Brazil**, to take the floor.

Mr Morales began his intervention by noting that Brazil was the fourth largest producer of plastic waste in 2016 according to the World Wildlife Fund (WWF). Of the 11.3 million tons of plastic waste generated that year by Brazil, only 1.28% was sent for recycling, well below the global average of 9%.

To address this, Brazil continues to support actions such as the Blue Keepers Project, which has been integrated into the Brazil Network of the UN Global Compact and encourages the private sector to participate in seeking ecologically-minded solutions.

Mr Morales highlighted several national initiatives to help combat marine plastic pollution. This includes the Ministry of Science, Technology and Innovation establishing the Science at Sea Program in 2021, which aims to manage Brazilian science in oceanic, coastal and transitional waters, as well as facilitate the production and application of acquired scientific and technological knowledge with marine research. In addition to this effort, the Ocean Without Plastic Network is under development within the scope of the Ministry of Science, Technology and Innovation, which will aim to promote the integration of scientific research and technological development efforts on topics related to the prevention and mitigation of environmental pollution by plastic.

Mr Morales concluded his remarks by voicing Brazil's support for the Agency's commitment to pursuing nuclear solutions to plastic pollution through NUTEC Plastics.



Mr Grossi then introduced **HE Ms Haydée Rodríguez-Romero, former Vice Minister of Water and Ocean, Ministry of Environment and Energy of Costa Rica**.

Through a video message, Ms Rodríguez-Romero stated that we are currently facing various critical situations that are interconnected, mainly the loss of biodiversity, the climate crisis and the health crisis, which cannot be effectively addressed and solved by any country individually. In this regard, she welcomes the effort of creating spaces and opportunities to facilitate multilateral exchanges.

She noted that the limited management of plastic waste has seriously affected key ecosystems on earth, especially the ocean. She emphasized that Costa Rica equates investing in the proper management of natural resources and the conservation of biodiversity, with investing in the future. In line with this, the country has made commitments both nationally and internationally in order to achieve a green economy and true sustainable development. She highlighted several national instruments such as the National Decontamination Plan, the National Marine Waste Plan, and the Marine Litter Action Plan for the Northeast Pacific as actions to address the waste issue in an effective and sustainable manner. At the international level, Costa Rica is co-chair

of the High Ambition Coalition for Nature and People, which seeks to protect at least 30% of world's land and ocean by 2030, in order to halt the accelerating loss of species and protect vital ecosystems. She expressed appreciation for the support provided by the many partners of this initiative which were also present at the Roundtable, and highlighted the opportunity of creating an international instrument to guarantee the health and resiliency of the marine environment.

Ms Rodríguez-Romero also underscored that nuclear technology offers an innovative alternative, and she thanked the IAEA for its cooperation in this area, pointing to the role of the REMARCO network as an example. She also stressed the role of the international community in correcting past environmental mistakes, by promoting sustainable reconstruction based on clean energy and a circular economy accessible to all. Finally, she highlighted Costa Rica's support to a new international treaty that addresses the entire life cycle of plastic production, to articulate national and regional efforts.



Next, Mr Grossi invited **HE Mr José Fidel Santana Nuñez, First Vice Minister of Science, Technology and Environment of Cuba** to take the floor.

Mr Santana Nuñez stated that environmental issues are a strategic priority in Cuba and have been defined as one of the six strategic pillars of the Economic and Social Development Plan to 2030. A National Plan for Climate Change was approved in 2017. He noted that

there is a structured national legal basis that is updated and strengthened in accordance with international commitments related to environmental issues and political will. In Cuba, recycling is a priority for the government, which strives to promote its intensification, increase the added value of recovered products and prioritise the exploitation of the potential of waste, with a growing interest in plastic waste.

Mr Santana Nuñez underscored that, as a small island state in the Caribbean, Cuba is aware of the need to be responsible, vigilant, and proactive. He highlighted that more than 400 000 tonnes of plastic waste are generated every year in Cuba, a number that has been increasing during the pandemic. However, only 10% of this waste is recycled. In this regard, there are several recycling initiatives by the private sector with increasing citizen participation, and science and technology institutions ranging from monitoring to application of advanced nuclear technology.

There are also several state institutions that use science and technology to provide effective solutions, mainly the Technological Observatory for Recycling Industries in Cuba and the Center for Environmental Studies of Cuba (Cienfuegos). These two institutions are leaders in environmental monitoring of plastics and use nuclear technology for environmental studies. The Technological Observatory for Recycling Industries in Cuba is responsible for the technological management of waste, and the Centre for Environmental Studies is the leader in environmental monitoring of microplastics, and in charge of the Sustainable Development Goal 14 report. Mr Santana Nuñez stated that this centre is also part of the RLA7025 project 'Strengthened capacities in marine and coastal management by applying nuclear and isotopic techniques.' He highlighted that Cuba is able to produce plastic nanoparticles, which can be radiolabelled by IAEA laboratories to trace microplastic contamination processes.

Mr Santana Nuñez concluded that Cuba supports NUTEC Plastics for the opportunity it offers in bringing the region together for a shared objective of obtaining a circular economy for plastic and minimising its impact on biodiversity and the environment.



Afterwards, Mr Grossi invited **HE Ms Martha Delgado Peralta, Undersecretary for Multilateral Affairs and Human Rights, Ministry of Foreign Affairs of Mexico** to take the floor. Ms Delgado Peralta stated that this is an important event to facilitate dialogue and reflection to identify and promote global solutions to marine pollution by plastics. She stressed that the environmental impacts of this problem transcend the damage done to landscapes and marine ecosystems, as plastic pollution enters the human food chain through the trophic chains of seafood products. Therefore, plastic pollution makes this phenomenon a serious health and food safety issue. She also noted that the environment is the most severely affected, due to the damage to ecosystems and the services they provide us.

She noted that plastic pollution does not respect borders, and it is a global problem that requires multilateral solutions, which is why this event is so important. In this context, effective multilateralism is essential and global efforts to clean up the large waste banks in the ocean must be made to also solve the problem at its source. This requires a push for integrated waste management with innovative solutions to such a complex problem. As such, Ms Delgado Peralta took notice of the efforts of the IAEA and the NUTEC Plastics initiative in supporting

a circular economy that links to radiation, and that could potentially fill existing technological gaps in several areas involving the treatment of waste, its classification, the assessment of its impacts and toxicity on living organisms, and the substitution by other plastics that are biodegradable, among other solutions. She highlighted that in Mexico, waste and wastewater management is an activity that falls under the competence of municipal governments. However, these coastal municipalities usually do not have the technical and financial capacity to ensure comprehensive management, with a circular economy approach.

She informed that Mexico is no stranger to the problem; due to the presence of extensive coastlines and a very large consumption of plastics. The challenge at the national level has been met through a series of measures and actions, such as i) an expression of interest in promoting an environmental policy on the sustainable management of plastics, which contributes to having better practices in the management of post-consumer waste; ii) a national policy on solid waste management, which is a model towards zero waste (this programme seeks to establish a sustainable regional model for the management of urban solid waste, including the remediation of the country's open dumps); iii) a robust regulatory framework for the regulation of solid urban and plastic waste both based on national and international law; and iv) a new agenda for ocean action derived from the participation of Mexico in the High-Level Panel for a Sustainable Ocean Economy, which is oriented towards having an integrated and sustainable management of marine waters under national jurisdiction by 2025. Ms Delgado Peralta noted that the challenge can only be resolved if these goals and actions are shared and agreed with civil society, the three levels of government, and the private sector and academia, with participation of society as a whole.

She reiterated the commitment of Mexico in promoting public policies that will result in a better managed, cleaner and more sustainable planet, including the ocean.



Mr Grossi invited **Mr Francisco Arias Isaza, Director General of the Institute for Marine and Coastal Research (INVEMAR) of Colombia** to take the floor. Mr Arias stated that plastic has been one of mankind's greatest inventions, as it is light, strong, waterproof and relatively cheap to produce, and useful in virtually all modern human activities. Around 78 million tonnes of plastic packaging are produced worldwide each year, of which 40% go directly to landfills, 32% go directly into the environment, about 14% are incinerated, and just 14% are recycled. He highlighted that a large proportion of this plastic ends up inexorably in the ocean, and if no action is taken, the amount of plastic entering them each year would grow from 11 million tonnes to 29 million tonnes over the next 20 years, equivalent to almost 50 kilograms of plastic on every metre of coastline worldwide. He remarked that in biological terms, by 2050 there could be more plastics than fish in the ocean, relating it to a plastic pandemic.

Mr Arias noted that Colombia's Ministry of Environment and Sustainable Development has made a commitment to ensure that by 2030, 100% of single-use plastics is reusable, recyclable or compostable (biodegradable by organisms), a goal that is divided into phases (2023, 2025 and 2030). However, while these interventions will reduce plastic pollution in the seas, they will not stop it: trying to achieve near zero plastic pollution requires technological breakthroughs, new business models,

significant investments and, most crucially, innovation, where nuclear techniques can play a key role in bringing about these transformations.

In this regard, he remarked that NUTEC Plastics is a coordinated response from IAEA Member States to address the challenge of plastic pollution in the ocean. He noted that the initiative is unique as it is based on addressing plastic pollution through recycling with radiation technologies and marine monitoring with isotopic tracking techniques.

Mr Arias informed that the Institute of Marine and Coastal Research has been a key player in the Colombia's commitment to respond to the NUTEC goals. The Institute's laboratories have led and developed activities that, in coordination with the IAEA and countries in the region, have contributed to the establishment of regional monitoring systems, the training of technical personnel and, most importantly, providing scientific messages to decision makers in an accessible and timely manner.

Mr Arias is a member of the Executive Planning Group of the UNESCO Intergovernmental Oceanographic Commission's Decade of Ocean Sciences for Sustainable Development 2021–2030, and recognizes the fundamental role that nuclear techniques must play in this unique opportunity for humanity to explore and understand ocean issues.



The final Session 1 intervention was made by **Mr Frank A. Rose, Principal Deputy Administrator of the National Nuclear Security Administration (NNSA), Department of Energy, United States of America** who voiced the full support of the United States for the IAEA's efforts in promoting nuclear solutions to plastic pollution through NUTEC Plastics. Mr Rose reiterated his country's commitment to engaging with the international community to combat climate change, underscoring the administration's decision to re-join the Paris Climate Accord in 2021.

In recognizing that environmental challenges must be solved through innovative technologies, Mr Rose announced that the NNSA would provide US \$1 million to NUTEC Plastics, which will support the establishment of pilot plants for plastic recycling in the North, Central, South America and the Caribbean region.

Through the Office of Radiological Security, NNSA encourages the use of radioisotopic alternative technologies to permanently reduce the security risk posed by high-activity radiological sources. With the \$1 million contribution, NNSA will support projects that focus on the use of electron-beam technology to advance plastic recycling in the region. Mr Rose remarked that in doing so, radiological security can be enhanced while reducing plastic pollution through innovative technological solutions.

Mr Rose ended his remarks by stating that NNSA looks forward to learning more about how e-beam technology can be used to compliment ongoing global efforts to combat plastic pollution, and by encouraging other countries to contribute to NUTEC Plastics.

“Joining forces with NUTEC Plastics can make a difference, improve knowledge, and develop solutions.”

— Najat Mokhtar, IAEA Deputy Director General and Head of the Department of Nuclear Sciences and Applications

Session One: Wrap-up and Observations

IAEA Director General Rafael Grossi wrapped up Session 1 and concluded with the following observations from the high level interventions:

- » There is a global awareness of the scale and impact of plastic pollution, and the need for urgent, concrete actions to find sustainable solutions was well emphasized. Actions are required.
- » Actions are enabled by having regional and national instruments in place to harmonize policy and programmes among countries in the region to address plastic pollution.
- » The collaborative programmes and projects to address plastic pollution led by international and regional organizations provide a platform for greater synergies.
- » Elements for a stronger drive forward to combat plastic pollution are in place, namely (i) robust policy instruments and programmes both at national and regional levels, and (ii) effective capacity in research, development, and innovation, and partnerships with industry.
- » Affirm the urgency to move away from the linear 'take-make-waste' model to a sustainable circular plastic economy built on the 4R principles: reduce, reuse, recycle, renew.
- » Identify opportunities to strengthen and expand the contribution of nuclear science and technology in this common global endeavour. NUTEC Plastics can provide a platform for cooperation for its effective and upscaled delivery.
- » Recognize that the discussion and exchange in this Roundtable represents a strong momentum for continued engagement and follow up actions.
- » Ensure that bridges are built between research and governmental institutions to enable coordinated actions at the national level for increased impact at the regional and global levels.
- » Emphasize the need for concerted efforts including synergy and partnerships among various initiatives, in mobilizing resources and ensuring effective interventions, to address both mitigation and monitoring aspects of plastic pollution.
- » The IAEA has defined concrete actions to improve analytical capacities in the region through the project 'Strengthening Capacities in Marine and Coastal Environments Using Nuclear and Isotopic Techniques' by providing specialized equipment and capacity building, including training and expert advice. The IAEA will build on existing capacities and consolidate the REMARCO network as well as share this experience as a good practice for NUTEC Plastics in other regions. Furthermore, the IAEA plans to support the demonstration of irradiation technologies for recycling in the Americas, including regional reference centres under the project 'Radiation Technology in Natural and Synthetic Polymers for the Development of New Products, with Emphasis on Waste Recovery'.
- » Affirm IAEA readiness to continue the journey in contributing to solutions.

Proceedings of the Roundtable

Session Two

Role of nuclear technologies to contribute to sustainable solutions on plastic pollution in partnership with the global community










Ms Najat Mokhtar, IAEA Deputy Director General and Head of the Department of Nuclear Sciences and Applications

Session 2 was chaired by Ms Najat Mokhtar, IAEA Deputy Director General and Head of the Department of Nuclear Sciences and Applications. This session aimed to:

- » Highlight available technologies for recycling plastic waste and monitoring plastic pollution in the ocean, for scientifically supported decision-making in the North, Central, South America and the Caribbean Region;
- » Exchange information on existing programmes and practices (e.g., R&D, industrial practices, regional initiatives and activities for capacity building and advocacy); and
- » Explore opportunities for cooperation and partnerships in the context of NUTEC Plastics, including resource sharing and mobilization.

Ms Mokhtar opened the discussion with an overview of NUTEC Plastics and then invited the presenters to share their presentations on technological advancements.

Session Two Presentations

-  **Innovation to Mitigate Plastic Waste**, Ms Melissa Denecke, Director, Division of Physical and Chemical Sciences, Department of Nuclear Sciences and Applications, IAEA.
-  **Nuclear Techniques for Tackling Marine Plastics**, Ms Florence Descroix-Comanducci, Director, Marine Environment Laboratories, Monaco, IAEA.
-  **Microplastics in Small Island Developing States: Case Study of Jamaica**, Ms Mona Webber, Director, Centre for Marine Sciences, University of the West Indies, Jamaica.
-  **Regional Network for Monitoring Microplastics in Marine Ecosystems of Latin America and the Caribbean (REMARCO)**, Ms Betina J. Lomovasky, National University of Mar Del Plata (UNMDP), Argentina.
-  **Role of Partnerships for Improving Plastics Management in the Wider Caribbean Region**, Mr Christopher Corbin, Programme Manager, United Nations Environment Programme (UNEP), Cartagena Convention Secretariat.
-  **Use of Irradiated Recycled Plastic on Concrete**, Mr Oral Buyukozturk, Professor of Civil and Environmental Engineering, Massachusetts Institute of Technology (MIT), USA.
-  **Recycling of Teflon Using Irradiation Technology**, Mr Leonardo Gondim de Andrade E Silva, Professor of Nuclear Technology, University of São Paulo, Brazil.



Ms Melissa A. Denecke, Director of the Division of Physical and Chemical Sciences, Department of Nuclear Sciences and Applications, IAEA, presented the nuclear technologies available for the upstream recycling of polymer waste. She emphasized that only 9% of plastic waste generated is being recycled globally. Everyone can take part in reducing the amount of plastic waste, for example by reducing personal use of single-use plastic. Ms Denecke explained how radiation technologies can help replace petroleum-based plastics with bio-based ones, improve recycling, and be used to renew end-of-life plastics.

Radiation can support and complement conventional recycling strategies by enabling better sorting of recycled plastic pellets according to the polymer type, and by breaking down polymers for generating new secondary products. Other innovative forms of recycling include converting plastic into fuel and feedstocks through irradiation-assisted and chemical recycling. Treating plastic to make composite materials with tailored properties is yet another innovative recycling strategy.

Ms Denecke explained that ionizing radiation can be used to make and modify polymers in a green chemistry process at moderate conditions that save energy. She also explained how the IAEA is assisting its Members States with these techniques.

Through technical meetings, publications, coordinated research projects (CRPs) and the TC programme, the IAEA enhances Member States' capabilities in the application of innovative radiation techniques for reducing plastic waste volumes. The IAEA also plans to support Member States to strengthen their capabilities to develop, construct, and operate pilot recycling plants, focusing on the conversion of plastic waste into novel/functional materials. Ms Denecke expressed the need to form partnerships and expand activities to tackle the global plastic pollution problem.

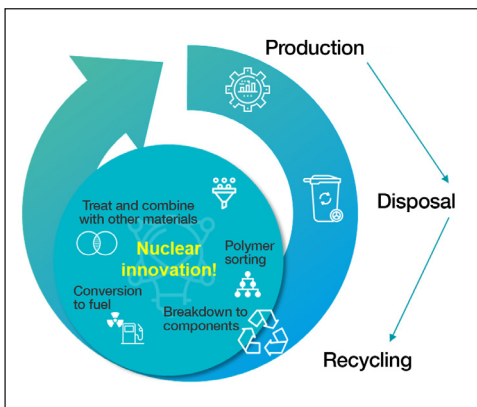


Figure 1. Nuclear innovation in the plastic value chain

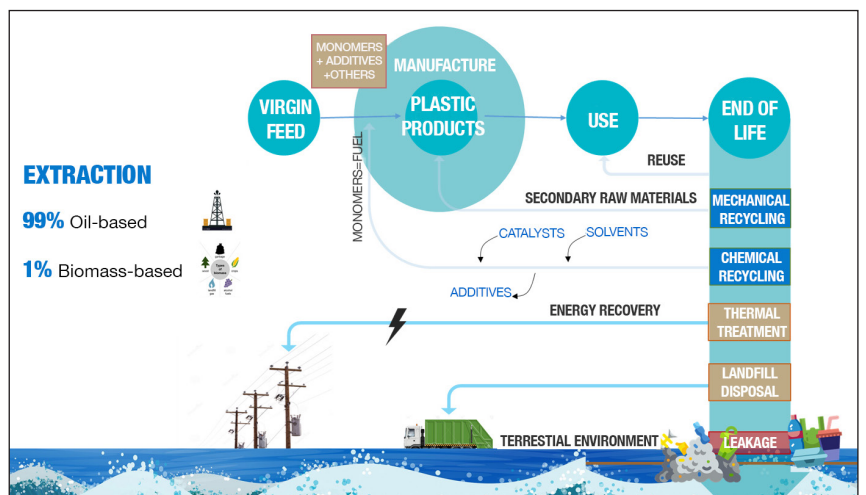


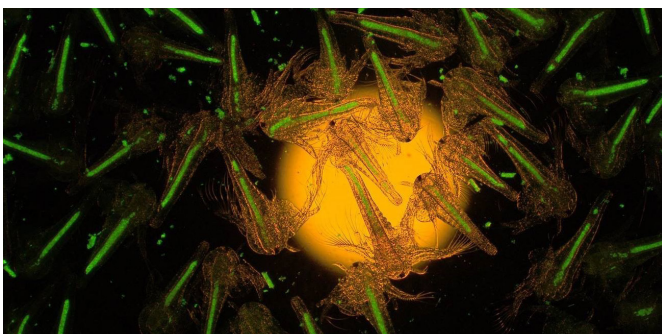
Figure 2. Ionizing radiation can modify or breakdown polymer materials and thus contribute to mechanical or chemical recycling methods.



Ms Florence Descroix-Comanducci, Director of IAEA Marine Environment Laboratories spoke about NUTEC Plastics and nuclear technologies for marine microplastic monitoring. She stated that microplastics are everywhere – air, water, dust and food are all important exposure routes. The smallest particles are the most dangerous.

Ms Descroix-Comanducci stressed the need to assess the sources, transport and sinks of marine microplastics in the ocean; gain information on the fate of microplastics following ingestion by marine animals and humans; and understand how microplastics interact with marine life. Nuclear science and technology can contribute to closing these knowledge gaps.

Ms Descroix-Comanducci explained how to identify marine plastics hotspots. She noted that nuclear and isotopic techniques can characterize and monitor marine microplastics.



Nauplii of brine shrimp *Artemia salina* after 3 hours of feeding with fluorescent nanoplastic. (Photo: F. Oberhaensli/IAEA)

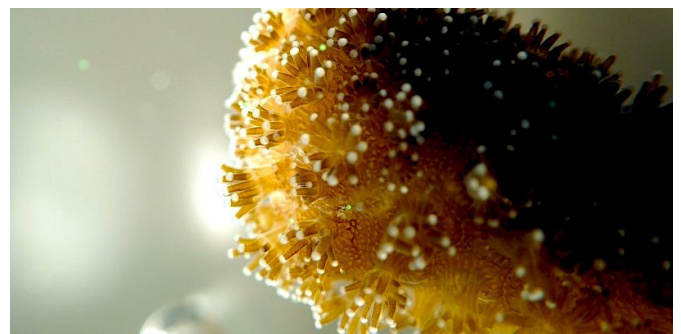
Microplastics are found in the water column and also in sediments. These are known as legacy plastic pollution. Nuclear and isotopic techniques can be used to characterize and monitor plastics, which can help to identify marine microplastics hotspots by, for example, evaluating the transfer from microplastic sources and how microplastics are carried by currents.

Ms Descroix-Comanducci explained how stable isotopic and radiotracer techniques complement conventional methods to:

- » Quantify atmospheric and riverine inputs to the ocean;
- » Test and validate microplastics transport and transfer models;
- » Characterize processes in sediment and establish chronologies of environmental decay and impact; and
- » Test the effectiveness of measures to improve the management of plastic waste.

She warned that chemicals leaching from plastics can affect coral reefs. Radiolabelled chemicals can help in evaluating sorption and leaching from microplastics, and stable isotope labelling can improve data accuracy.

Ms Descroix-Comanducci further explained that radiotracing and radio-imaging microscopy can track the fate and transfer of microplastics in the food chain, and also assess the stress that microplastics can present for marine biology.



Coral exposed to microplastics: Tropical coral *Stylophora pistillata* in the presence of fluorescent microplastic. (Photo: F. Oberhaensli/IAEA)



Ms Mona Webber, Director of the Centre for Marine Sciences at the University of the West Indies, Jamaica

spoke about microplastics research in the Caribbean. According to Forbes in 2019, Caribbean islands are the biggest plastic polluters per capita in the world. Of the top 30 global polluters per capita, 10 are from the Caribbean region. Within the Caribbean, 1.5 kilograms of plastics are generated per person per day with between 80% and 92% ending up in the ocean. In 2019, Jamaica collected nearly 800,000 items of litter during an annual coastal clean-up day. This was the highest on record for the region and over 90% of this material was plastic.

Ms Webber explained that when plastics remain in our environment, they become eroded and fragmented over time. When fragments are smaller than five millimeters, this material is classified as microplastic. Microplastics contamination of the environment increases every year. In 2015, approximately 3% of ocean plastics were determined to be microplastics. By 2018, this number grew to above 50%.

Research is accelerating on the topic, however regional distribution of this research is significantly weighed towards North America, Europe and Asia. As of 2020, only 82 papers have been published on microplastics from institutions in Latin America and the Caribbean, representing 4% of global research on the topic. This is a serious concern considering the Caribbean region's contribution to global plastic pollution. Existing research conducted in the Caribbean includes an analysis of the

water column in Kingston Harbour – the most plastic-polluted harbour in Jamaica. Research results indicated that plastic fragments constituted 87% of the plastic pollutants identified in the water column, followed by fibres (12%), foam (0.88%), and beads (0.12%). Research also confirmed expectations that the dominant pollutants were polyethylene (93%) and polypropylene (7%). According to Ms Webber, current research illustrates that the Caribbean has limited capacity to conduct detailed analysis of microplastics.

Ms Webber concluded her presentation by highlighting the importance of promoting quality research on the issue of microplastics in the Caribbean in order to inform policy makers, educate populations and combat the issue of marine microplastic pollution. This requires more training in relevant techniques, greater reliance on trans-boundary approaches, and multidisciplinary teams to address all dimensions of the issue.



Ms Betina J. Lomovasky, Regional Network for Monitoring Microplastics in Marine Ecosystems of Latin America and the Caribbean (REMARCO), National University of Mar Del Plata (UNMDP), Argentina

stated that REMARCO connects 18 countries in the region to facilitate decision-making on common problems present in marine and coastal environments through the generation of scientific knowledge. Ms Lomovasky explained how, through the safe and peaceful use of nuclear isotopic techniques, the network analyses marine chemical pollution, the significance of harmful

and other algal blooms, and especially the presence of micro plastics. The transfer of the scientific knowledge to key decision makers through technical meetings and workshops contributes to the definition of public policies for an integrated and sustainable management of the coastal marine environment. This action contributes to Sustainable Development Goal 14.

Ms Lomovasky informed that REMARCO also provides a unique south-south collaboration framework among Member States in the region in the use of nuclear and isotopic techniques, which can complement other existing monitoring programmes. She highlighted some of REMARCO's results to date, which include: the implementation of sampling protocols, the implementation of joint databases, the submission of joint projects, and the presentation and publication of articles in relevant scientific journals. A platform has also been established to consolidate the monitoring of stressors such as micro plastics in coastal marine systems and the possibility of studying their impact on ecosystems (and includes consideration for safety and health aspects).

She reiterated that we are facing a global problem, which has no borders due to the level of connectivity of our seas and ocean. Therefore, it is important to have a regional vision of the problem and establish a regional observatory for monitoring and research on microplastics, tailored to the needs and particularities of the countries. She highlighted some of the main activities that have taken place including the establishment of monitoring programmes for plastic waste in 18 Member States, the acquisition of different types of equipment for the study of microplastics, the design of a guide, and applications for monitoring programmes for microplastics in different systems, such as water, sediments, sands and organisms. Data is compiled in a regional data repository available to all participating countries, and a solid communication strategy is implemented to present results to decision-makers. Ms Lomovasky noted that REMARCO has also been able to identify regional gaps to

be addressed, such as the need for capacity building and the transfer of advanced technology to all countries.

She concluded that REMARCO can contribute to NUTEC Plastics and to the global microplastics monitoring network and become a regional partner for the implementation of solutions related to marine pollution.



Mr Christopher Corbin, Programme Manager for the United Nations Environment Programme (UNEP) Cartagena Convention Secretariat, delivered

a presentation on the role of Partnerships for Improving Plastics Management in the Wider Caribbean Region. Mr Corbin began his presentation by summarizing the sources of ocean plastics in the Caribbean region. Coastal tourism and commercial fishing accounts for 20% of plastics in the Caribbean Sea, while 40% comes from single-use consumer packaging. Approximately 87 000 pieces of macro and microplastics per square kilometre are currently floating in the Caribbean Sea, making it among the highest plastic concentrations in the world.

The first critical partnership Mr Corbin introduced was the Caribbean Node for Global Partnership on Marine Litter (GPML-Caribe), which brings together national and regional organizations, governments, and research and technical agencies to focus on reducing the quantity and impact of marine litter in the Caribbean region. The partnership is co-chaired with the Gulf and Caribbean Fisheries Institute (GCFI) and the Cartagena Convention Secretariat, working directly with governments in meeting regional, national and global agendas.

Mr Corbin explained that partnerships for education, awareness and advocacy are among the most important for generating positive change in the region towards the reduction of ocean plastic waste. Twenty countries in North, Central, South America and the Caribbean have signed on to the Clean Seas Campaign, which brings focus to this issue.

There is inadequate data on marine plastic pollution in the region. To address this gap, partnerships in research and monitoring must be established. The Cartagena Convention Secretariat partnered with the OSPAR Commission’s Regional Seas Programme for the North-East Atlantic to develop a harmonized marine litter monitoring manual. In addition, the Cartagena Convention Secretariat partnered with Saint George’s University in Grenada to conduct research on the presence of microplastics in fish.

Mr Corbin highlighted developments and opportunities related to partnerships with the private sector, and the promotion of integrated solutions to ocean plastic pollution. For example, the Cartagena Convention Secretariat has been collaborating with the Caribbean Tourism Organization and the Sandals Organization to combat plastic pollution as a transboundary issue.



Mr Oral Buyukozturk, Professor of Civil and Environmental Engineering at the Massachusetts Institute of Technology in the United States of America delivered a presentation on the use of irradiated recycled plastic in concrete. He presented the negative impact that global cement and concrete production has

on the environment, explaining that the production of cement is responsible for approximately 9% of global CO₂ generation. By extension, the replacement of cement with recycled or naturally available material could drastically reduce global CO₂ emissions.

Mr Buyukozturk explained that current research supports the claim that certain plastic additives can improve the structural integrity of concrete when treated with gamma irradiation. Repurposing post-consumer plastic into a concrete additive would address plastic waste and carbon footprint issues at scale while enhancing construction materials.

Mr Buyukozturk concluded his presentation by highlighting the use of irradiated recycled plastic in concrete as an example of how nuclear technology can address the issue of ocean plastic pollution through innovation and technical collaboration.



Mr Leonardo Gondim de Andrade E Silva, Professor of Nuclear Technology at the University of São Paulo, Brazil delivered a presentation on the Recycling of Teflon Using Irradiation Technology. He stated that production and consumption systems have changed significantly with the advance of industrial automation, and that this has had an important impact on the relationship of humans with nature. As consumption has increased, discussions and concerns for the future of the environment have been initiated. He noted that the pollution of ocean, soil and rivers has a great impact on the environment, and plastics are among the main

polluting materials. Almost all plastic waste produced ends up as waste that pollutes the environment and plastics remain in the environment for several years causing damage to it and to biodiversity. Plastic waste is a global environmental problem as only 9% of plastics are recycled, 12% are incinerated, and 79% are discarded into the environment. One of the lowest recycling rates in the world is found in Latin America, which only recycles 4% of waste in general. There are several types of plastics from industrial waste, including teflon. Teflon can be recycled by irradiation, using gamma irradiation and a cobalt-60 source in order to obtain products with other properties that can be reused for other applications.

Proceedings of the Roundtable

Wrap Up and Way Forward



Mr Hua Liu, IAEA Deputy Director General and Head of the Department of Technical Cooperation (Photo: D. Calma/IAEA)

Mr Hua Liu, IAEA Deputy Director General and Head of the Department of Technical Cooperation

led the wrap up session with closing remarks and a call to concretize follow-up actions through collaborative programmes and a continuum of activities.

Mr Hua Liu said that the Roundtable event clearly demonstrated how plastic pollution hinders the achievement of the Sustainable Development Goals, and negatively impacts our ocean, the food chain and human health. He said that the discussions highlighted the urgent need to move away from the way we use plastic today. We are creating mountains of plastic waste in our lands, rivers and our ocean. We need to produce and use plastic materials in a far more sustainable way, stepping away from the linear 'take-make-waste' model towards a sustainable circular economy for plastics built on the 4R principles: reduce, reuse, recycle and renew.

He pointed out that various initiatives, programmes and projects launched by international and regional institutions, as well as by countries in the region, are

converging towards this approach, and gearing up to find and apply sustainable solutions to plastic pollution. During the Roundtable, distinguished speakers emphasized that science, technology, innovation and partnership are key to finding these sustainable solutions, he added.

Through NUTEC Plastics, the IAEA will contribute to the global response for a sustainable solution to plastic pollution. NUTEC Plastics builds on the IAEA's efforts to deal with plastic pollution through recycling using radiation technology, and marine monitoring using isotopic tracing techniques. The IAEA's portfolio of existing and planned research and technical cooperation projects will also be an important part of NUTEC Plastics. The initiative builds on the comparative advantages and added value that the IAEA can offer in using nuclear techniques. Radiation technology can improve plastic recycling, and isotopic tracing techniques are key to monitoring the behaviour and fate of microplastics in the seas and ocean.

Through NUTEC Plastics, the IAEA seeks synergies and partnerships with other international efforts to address plastic pollution, Mr Liu said. It aims to assist Member States to integrate nuclear techniques into their efforts to address plastic pollution in a comprehensive way. The IAEA's contribution will strengthen the research capacity and the application of scientific knowledge to combat marine debris, supporting science-based policy and decision making.

Mr Liu said that this Roundtable marks the start of activities under NUTEC Plastics that will support the continuing development of new solutions to address plastic pollution, with a particular focus on the unique contributions of nuclear technology. It aims to strengthen

partnerships for a coordinated and solution-oriented approach to global efforts. He reminded participants that the IAEA already has in place various modalities that can support these activities, ranging from coordinated research projects to field applications of research results through the technical cooperation programme. Mr Liu reiterated what IAEA Director General Grossi said: “This roundtable is part of a series of similar events for other regions to discuss solutions to plastic waste pollution and to further explore opportunities for synergies, partnerships and actions.” The IAEA foresees several follow-up actions from the Roundtable discussions (see box below).

In conclusion, Mr Liu acknowledged the cooperation of IAEA Member States and partners – such as UNEP – in making the NUTEC Plastics Roundtable for North, Central, South America and the Caribbean region become a reality. He also acknowledged the coordinated efforts of various IAEA Departments and Divisions and reiterated his appreciation for the support of the participants and their important contributions.

Follow-Up Actions from the Roundtable discussions

- » Develop an action plan for NUTEC Plastics implementation in North, Central, South America and the Caribbean.
- » Strengthen the implementation of the microplastics component of the ongoing regional technical cooperation project on marine environment.
- » Support research and development through IAEA laboratories and IAEA Collaborating Centres, to fine tune the technology and methodologies and adapt them to the needs of Member States in a cost-effective manner.
- » Use different fora to enhance awareness and address plastic pollution; engage with other partners, including the private sector, at the national and regional level; and promote greater collaboration for upscaled, impactful projects in the region, ensuring synergies with ongoing initiatives to converge efforts towards a common goal: a healthy planet for today and for future generations.
- » Consolidate the existing REMARCO network in the region and initiate measures to establish a NUTEC Plastics Monitoring Network for the sustainable management of marine plastic pollution; put in place immediate measures to procure basic equipment for marine monitoring laboratories; and provide the necessary support to ensure that existing laboratories have adequate equipment and trained human resources.
- » Continue engagement with institutions and stakeholders of the many important national, regional and global initiatives and projects mentioned during the Roundtable. The IAEA’s goal is to explore and forge formal cooperation, as well as to add value, providing the scientific and technological dimension to these initiatives.

Agenda of the Roundtable for North, Central, South America and the Caribbean

16:00 – 17:30 Session 1: Plastic Pollution: Challenges and the Need for Global Action

- Opening remarks by Mr Rafael Mariano Grossi, IAEA Director General
- Keynote speech by Mr Peter Thomson, UN Secretary-General's Special Envoy for the Ocean
- Roundtable discussion with distinguished panellists, chaired by IAEA Director General

Panellists

- HE Mr Felipe Solá, Minister of Foreign Affairs, International Trade and Worship, Argentina
- HE Mr Andrés Allamand Zavala, Minister of Foreign Affairs, Chile
- HE Mr Marcelo Morales, Vice Minister for Research and Scientific Formation, Ministry of Science, Technology and Innovation, Brazil
- HE Ms Haydee Rodriguez-Romero, Vice Minister of Water and Ocean, Ministry of Environment and Energy, Costa Rica
- HE Mr José Fidel Santana Nuñez, First Vice Minister of Science, Technology and Environment, Cuba
- HE Ms Martha Delgado Peralta, Undersecretary of for Multilateral Affairs and Human Rights, Ministry of Foreign Affairs, Mexico
- Mr Frank A. Rose, Principal Deputy Administrator of the National Nuclear Security Administration, Department of Energy, United States of America
- Mr Francisco Arias Isaza, Director General of the Institute for Marine and Coastal Research (INVEMAR), Colombia

Conclusion: Mr Rafael Mariano Grossi, IAEA Director General

17:30 – 19:00 Session 2: Role of Nuclear Technologies to Contribute to Sustainable Solutions on Plastic Pollution in Partnership with the Global Community

Presentations and discussions chaired by Ms Najat Mokhtar, Deputy Director General and Head of the Department of Nuclear Sciences and Applications, IAEA

- Opening remarks by Ms Najat Mokhtar, DDG-NA IAEA
- Innovation to Mitigate Plastic Waste by Ms Melissa Denecke, Director, Division of Physical and Chemical Sciences, Department of Nuclear Sciences and Applications, IAEA
- Nuclear Techniques for Tackling Marine Plastics by Ms Florence Descroix-Comanducci, Director, IAEA Marine Environment Laboratories, Monaco, IAEA
- Microplastics in Small Island Developing States: Case Study of Jamaica by Ms Mona Webber, Director, Centre for Marine Sciences, University of the West Indies, Jamaica
- Regional Network for Monitoring Microplastics in Marine Ecosystems of Latin America and the Caribbean (REMARCO) by Ms Betina J. Lomovasky, National University of Mar Del Plata (UNMDP), Argentina
- Role of Partnerships for Improving Plastics Management in the Wider Caribbean Region by Mr Christopher Corbin, Programme Manager, United Nations Environment Programme (UNEP), Cartagena Convention Secretariat
- Use of Irradiated Recycled Plastic on Concrete by Mr Oral Buyukozturk, Professor of Civil and Environmental Engineering, Massachusetts Institute of Technology (MIT), USA
- Recycling of Teflon Using Irradiation Technology by Mr Leonardo Gondim de Andrade E Silva, Professor of Nuclear Technology, University of São Paulo, Brazil
- Questions and Answers

19:00 –19:10 Wrap Up and the Way Forward by Mr Hua Liu, Deputy Director General and Head of the Department of Technical Cooperation, IAEA

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