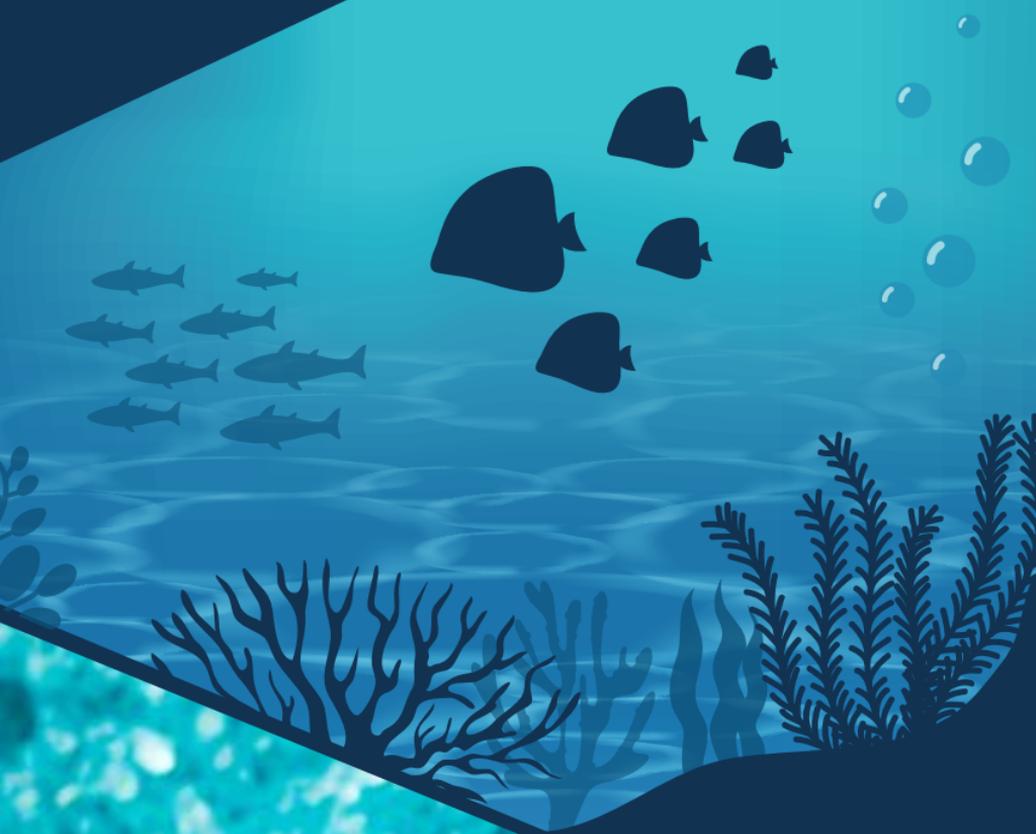


NUTEC Plastics

A nuclear solution to plastic pollution

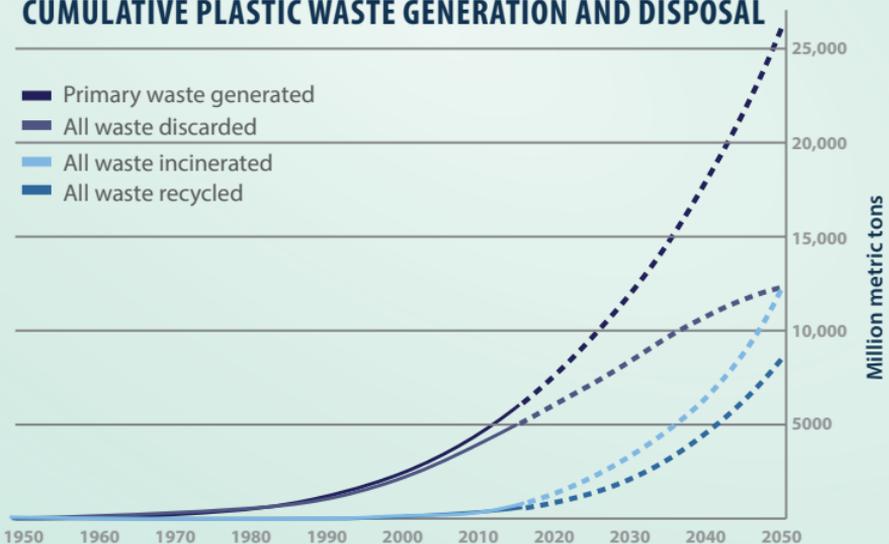


IAEA

Plastic pollution

is one of today's most pressing global environmental challenges and a direct threat to sustainable development. According to projections, by 2025 the ocean will contain one tonne of plastic for every three tonnes of fish, and by 2050, there may be more plastic in the ocean than fish. Landfills are often brimming with plastic waste and pose an environmental threat to downstream ecosystems such as rivers, groundwater, and the ocean. Furthermore, incineration of plastic refuse may also release toxic gases.

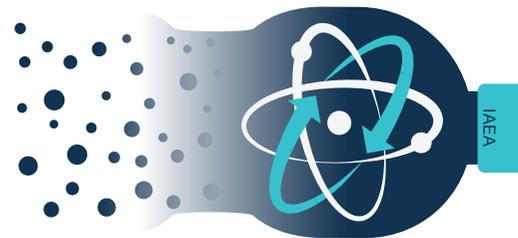
CUMULATIVE PLASTIC WASTE GENERATION AND DISPOSAL



Geyer, R., Jambeck, J. R., & Law, K. L. (2017). Production, use, and fate of all plastics ever made. *Science advances*, 3(7), e1700782.

NUclear TEChnology for Controlling 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. It provides science-based evidence to characterize and assess marine microplastic pollution, while also demonstrating the use of ionizing radiation in plastic recycling, transforming plastic waste into reusable resources.



Marine monitoring

Using nuclear and derived methods, the IAEA will support marine laboratories to generate scientific knowledge on the impacts of plastic pollution in coastal and marine ecosystems. Specialized methods are used to precisely track and quantify the movement and impacts of microplastic particles and associated co-contaminants. This will allow to:

Determine

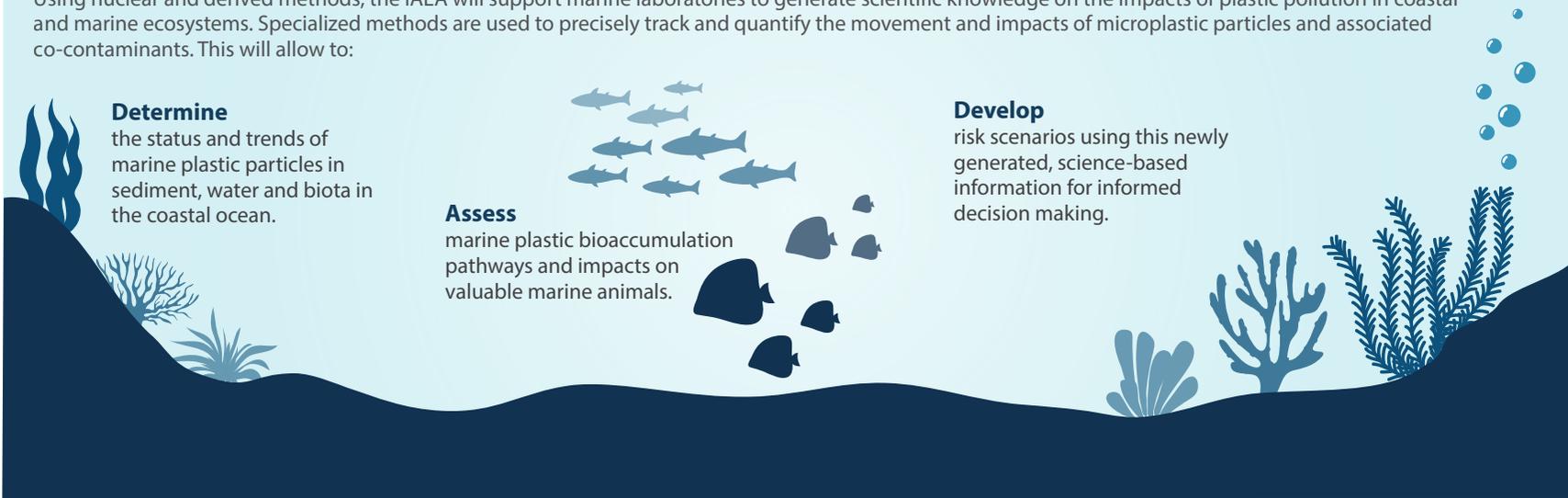
the status and trends of marine plastic particles in sediment, water and biota in the coastal ocean.

Assess

marine plastic bioaccumulation pathways and impacts on valuable marine animals.

Develop

risk scenarios using this newly generated, science-based information for informed decision making.



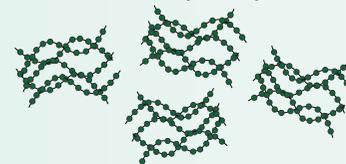
Recycling with irradiation

Using gamma and electron beam radiation technologies as a complement to traditional mechanical and chemical recycling methods, certain types of plastic waste can be modified and therefore reused or recycled. These technologies can complement existing recycling efforts to:

Sort mechanically treated plastic waste according to polymer type.



Breakdown plastic polymers into smaller components to be used as raw materials for new plastic products.



Treat plastic so that it can be amalgamated with other material to make more durable products.



Convert plastic into fuel and feedstocks through radiolysis (irradiation + chemical recycling).



Benefits to IAEA Member States

① **Precise scientific data to inform plastic pollution policies**

NUTEC Plastics will enhance the capability of participating laboratories to quantify and characterize marine plastic pollution. IAEA specialists will support scientists and experts from Member States in producing data on the abundance, distribution and impacts of plastic pollution. Such information can then be used to develop plastic mitigation and upstream disposal measures and policies.



② **Strengthened methodology to track plastics**

The IAEA will scale-up the development of reliable and cost-effective techniques to assess the spatial and temporal abundance and character of marine plastics, in order to better understand their origin, transport mechanisms and impacts. The techniques, which will be made available to Member States, include protocols to identify microplastics in environmental samples and the training of scientists and technicians.



③ **Effective and efficient technologies**

Irradiation, which is effective and environmentally friendly, makes plastic recycling and reuse become within reach for many countries. NUTEC Plastics offers a viable option to complement existing recycling and reuse capacities and help inform plastic policy development.



④ **Scalable technology**

NUTEC Plastics will demonstrate the utility of radiation technology in plastic recycling and reuse, and its potential economic benefits. It will work with Member States, particularly where recycling plants are operational, to supply suitable plastic feedstocks for this technique. These pilots could be followed by large-scale demonstrator plastic waste recycling plants. Following such demonstration of scalability, the IAEA will transfer the knowledge, expertise and technology to partners.



For more information, see
iaea.org/NutecPlastics

or contact

NutecPlastics@iaea.org



**A nuclear solution
to plastic pollution**

