Three Pillars of the IAEA Mandate

- Science & Technology
- Safety & Security
- Safeguards & Verification
IAEA mechanisms

NA Programme

R&D
- Laboratories
- CRPs
- CCs
- TMs
- CMs

TC Programme

Validation
- CRPs
- Pilot plants

Tech Transfer
TC Projects (WS, RTC, FE, SV, EM)

Education & Training
Health Applications

- **Sterilization of Healthcare Products**
  - Decontamination of raw materials
  - Medical Devices, Tissue allografts, Packaging Materials, Toys

- **Advanced biomaterials**
  - Biomaterials, functionalised polymers
  - Nanomaterials for medical and industry

**F22070**: Enhancing the Beneficial Effects of Radiation Processing in Nanotechnology (2019 -2023)

**F23035**: Radiation Effects on Polymer Materials Commonly Used in Medical Devices (2021~2025)

**F22079**: Biomaterials for sustainable health care (2024~2028)
Food applications

- Irradiation for Sanitary purposes
- Phytosanitary treatment
- Sterile Insect Technique (SIT)
- Surface disinfestation
- Mutation breeding

D24015 Radiation-induced Crop Diversity and Genetic Associations for Accelerating Variety Development

D44004 Mosquito Irradiation, Sterilization and Quality Control

D61026 Phytosanitary Treatment of Food Commodities and Promotion of Trade

D61025 Innovating Radiation Processing of Food with Low Energy Beams from Machine Sources
Industrial Application

- Cross-linking of Polymer
  - Improve mechanical and thermal property
  - Wire and cable production, Surface Curing
- Coating/curing on surface
- Grafted polymers
  - Provides new functional properties
  - Heavy Metal adsorbent
- Degradation of Polymers

F22072: Development of Grafted Membrane for Cleaner and Sustainable Energy (2019~2023)

F22081: Strengthening the Use of Biomass for Synthesis of Bioplastics and Other Compounds, Using Radiation Technology (2023-2027)
Preservation of Cultural Heritage

• Disinfection of Cultural Heritage
  - Microbial decontamination
  - Controlled biocidal effects

• Consolidation of Porous materials
  - Improve the mechanical properties of porous material

F22082: Development and Implementation of Cultural Heritage Preservation using Ionizing Radiation Technology (2023-2027)
Environmental Applications

- Flue Gas Treatment
- Industrial Wastewater Treatment
- Sludge Hygienisation
- Recycling of Wastes


F23036: Recycling of polymer waste for structural and non-structural materials (2021~2025)
Irradiation Facilities and Quality Management

• **Radiation Sources:**
  - Radioisotope sources (Gamma ray)
  - Radiation Generators (EB, X ray)

• **Quality Management:**
  - Inter-Comparison Dosimetry
  - IQ, OQ, PQ

• **Safety and Securities:**
  - Maintenance and Upgrade
  - Safety program implementation

• **Guidelines:**
  - Setting-up facilities
  - Feasibility studies
Three Flagship Initiatives

- Rays of Hope
- DIAC
- NUClear TEChnology for Controlling Plastic Pollution
NUTEC 
**UPSTREAM** 
ACTIVITIES 
Plastics Recycling & Biosources

NUTEC 
**DOWNSTREAM** 
ACTIVITIES 
Marine Plastic Monitoring
# NUTEC

## UPSTREAM ACTIVITIES

### Plastics Recycling & Biosources

<table>
<thead>
<tr>
<th>Stage</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>I</strong></td>
<td>Capacity Building, R&amp;D</td>
</tr>
<tr>
<td><strong>II</strong></td>
<td>Verification of proof of concept and economic feasibility</td>
</tr>
<tr>
<td><strong>III</strong></td>
<td>Pilot plant build and operation</td>
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<tr>
<td><strong>IV</strong></td>
<td>Ultimate upscaling to commercialisation</td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>TRL Level</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>TRL1</td>
<td>Basic principle postulated and observed</td>
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<tr>
<td>TRL2</td>
<td>Formulation of technology concept and application</td>
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<tr>
<td>TRL3</td>
<td>Proof of concept - validation of concept</td>
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<tr>
<td>TRL4</td>
<td>Small scale prototype/technology validated at lab-scale</td>
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<tr>
<td>TRL5</td>
<td>Technology validated in intended operational environment</td>
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<tr>
<td>TRL6</td>
<td>Industrial pilot/Technology validated in operational environment</td>
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<tr>
<td>TRL7</td>
<td>System prototype demonstration in operation environment</td>
</tr>
<tr>
<td>TRL8</td>
<td>Pre-production system/qualified in operation environment</td>
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<tr>
<td>TRL9</td>
<td>Full commercial application</td>
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</tbody>
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**Timeline:**
- 2023: TRL4, TRL5, TRL6, TRL7, TRL8
- 2026: TRL9

**National Commitment:**
- **a** MS interested in Nutec Plastic - Radiation Technology
- **b** National Focal Point officially nominated
- **c** Initial Capability Assessment / Presentation of the Basic conceptual idea
NUTEC Plastics Portal

A single Portal to facilitate consultation, improve coordination and access periodic progress reports

PLATfor m
FEATURES

- Nutec Events/News/Social Media
- Nutec Progress reports and Dashboards
- Partners activities
- Nutec Outreach Documents
- Nutec Scientific Papers
- Collaborative workspace with restrictive access

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ATOMS FOR PEACE AND DEVELOPMENT
How the IAEA supports the Sustainable Development Goals

13 CLIMATE ACTION
6 CLEAN WATER AND SANITATION
3 GOOD HEALTH AND WELL-BEING
2 ZERO HUNGER
15 LIFE ON LAND
7 AFFORDABLE AND CLEAN ENERGY
14 LIFE BELOW WATER
12 RESPONSIBLE CONSUMPTION AND PRODUCTION
17 PARTNERSHIPS FOR THE GOALS
4 QUALITY EDUCATION
8 DECENT WORK AND ECONOMIC GROWTH
5 GENDER EQUALITY
Next ICARST

- April 7-11, 2025
- IAEA Headquarters, Vienna

Next AccConf

- Spring 2026
- IAEA Headquarters, Vienna
THANK YOU FOR YOUR ATTENTION!