

The Global Advanced Plastics Recycling Market 2025-2040

<https://marketpublishers.com/r/GAD7F08A6CA4EN.html>

Date: February 2025

Pages: 370

Price: US\$ 1,400.00 (Single User License)

ID: GAD7F08A6CA4EN

Abstracts

Current projections indicate that plastic production will double by 2050, accompanied by a corresponding doubling of plastic-related emissions by 2060, with a projected tripling of annual plastic waste volume by 2060. This presents a major challenge in sustainable waste management. Despite growing environmental awareness and improved waste management infrastructure, global plastic recycling rates have stagnated at approximately 8%. While certain nations have achieved notable success – South Korea, Germany, and several other European countries report recycling rates exceeding 50% – these regional achievements, though commendable, cannot offset the global challenge. Moreover, the limitations of traditional mechanical recycling technology further constrain global recycling capabilities.

Mechanical recycling, while energy-efficient and widely deployed, exhibits significant limitations in its application scope. The process demonstrates effectiveness primarily with PET and HDPE but struggles with other plastic types. PVC and PP undergo degradation during mechanical recycling, while LDPE frequently causes equipment damage. A critical drawback of mechanical recycling lies in its inability to remove contaminants such as inks, dyes, and additives, resulting in lower-quality recyclate with limited market applications and reduced commercial value.

The emergence of advanced recycling technologies – encompassing various physicochemical processes for monomer and polymer extraction – promised to address these fundamental limitations of mechanical recycling. The past five years have witnessed rapid market growth in this sector, with varying degrees of success in addressing mechanical recycling's technical constraints. Among the first commercialized advanced recycling technologies, pyrolysis and depolymerization have established distinct niches. Pyrolysis has demonstrated particular efficacy in converting

mixed plastic waste into fuels, while depolymerization has achieved market leadership in PET recycling. However, neither technology has fully delivered on the comprehensive solution initially envisioned. The latest innovation in advanced recycling, solvent dissolution, shows promise in exceeding both technologies in terms of scope (polymer compatibility) and efficiency (output quality).

The Global Advanced Plastics Recycling Market 2025-2040 examines the current state of advanced plastics recycling technologies, analyzing their relative strengths, limitations, and potential to address the escalating global plastics crisis. Through detailed market analysis and technical evaluation, we assess whether these technologies can fulfill their promise of revolutionizing plastic waste management and supporting the transition toward a more sustainable circular economy. The report provides comprehensive insights into the rapidly evolving advanced recycling industry. This detailed analysis covers market trends, technological innovations, competitive landscape, and growth opportunities across the entire advanced plastics recycling value chain.

Key Report Highlights:

In-depth analysis of market size and growth projections (2025-2040)

Detailed assessment of key technologies: pyrolysis, depolymerization, solvent-based purification, and emerging solutions

Regional market analysis covering North America, Europe, Asia-Pacific, Latin America, and Middle East & Africa

Comprehensive evaluation of recycling technologies for different plastic types (PET, PE, PP, PS, and others)

Analysis of end-user industries including packaging, automotive, electronics, textiles, and construction

Detailed competitive landscape and strategic positioning of major market players.

Companies profiled include Aduro Clean Technologies, Advanced Plastic Purification International (APPI), Aeternal Upcycling, Agilyx, Alpha Recyclage Composites, Alterra Energy, Ambercycle, Anellotech, Anhui Oursun Resource Technology, APChem, APK AG, Aquafil, ARCUS Greencycling, Arkema, Axens SA, BASF, Bcircular, BioBTX, Biofabrik Technologies, Blest (Microengineer), Blue Cycle, BlueAlp Technology, Borealis AG, Boston Materials, Braven Environmental, Breaking, Brightmark, Cadel Deinking, Carbios, Carboliq, Carbon Fiber Recycling, Cassandra Oil, Chevron Phillips Chemical, Chian Tianying, CIRC, Clariter, Clean Energy Enterprises, Clean Planet Energy, Corsair Group International, Covestro, CreaCycle, CuRe Technology, Cyclic Materials, Cyclize, DeepTech Recycling, DePoly SA, Dow Chemical Company,

DyeRecycle, Eastman Chemical Company, Eco Fuel Technology, Ecopek, Ecoplasteam, Eeden, Emery Oleochemicals, Encina Development Group, Enerkem, Enval, Environmental Solutions (Asia), Epoch Biodesign, Equipolymers, Evonik Industries, Evrnu, Extrachive, ExxonMobil, Fairmat, FRE Technologies, Freepoint Eco-Systems, Fulcrum BioEnergy, Futerro, Fych Technologies, Garbo, GreenMantra Technologies, Greyparrot, Gr3n SA, Handerek Technologies, Hanwha Solutions, Honeywell, Hyundai Chemical, InEnTec, INEOS Styrolution, Indaver, Infinited Fiber Company, Ioncell, Ioniqa Technologies, Itero Technologies, Jeplan, JFE Chemical Corporation, Kaneka Corporation, Khepra, Klean Industries, Lanzatech, Licella, Loop Industries, LOTTE Chemical, Lummus Technology, LyondellBasell Industries, MacroCycle, Metaspectral, Mint Innovation, Microwave Chemical, Mitsubishi Chemical, MolyWorks Materials, Mote, Mura Technology, Nanya Plastics Corporation, NatureWorks, Neste Oyj, New Hope Energy, Nexus Circular, Next Generation Group (NGR), Novoloop and many more.

Contents

1 CLASSIFICATION OF RECYCLING TECHNOLOGIES

2 RESEARCH METHODOLOGY

3 INTRODUCTION

- 3.1 Global production of plastics
- 3.2 The importance of plastic
- 3.3 Issues with plastics use
- 3.4 Bio-based or renewable plastics
 - 3.4.1 Drop-in bio-based plastics
 - 3.4.2 Novel bio-based plastics
- 3.5 Biodegradable and compostable plastics
 - 3.5.1 Biodegradability
 - 3.5.2 Compostability
- 3.6 Plastic pollution
- 3.7 Policy and regulations
- 3.8 The circular economy
- 3.9 Plastic recycling
 - 3.9.1 Mechanical recycling
 - 3.9.1.1 Closed-loop mechanical recycling
 - 3.9.1.2 Open-loop mechanical recycling
 - 3.9.1.3 Polymer types, use, and recovery
 - 3.9.2 Advanced recycling (molecular recycling, chemical recycling)
 - 3.9.2.1 Main streams of plastic waste
 - 3.9.2.2 Comparison of mechanical and advanced chemical recycling
- 3.10 Life cycle assessment

4 THE ADVANCED PLASTICS RECYCLING MARKET

- 4.1 Market drivers and trends
 - 4.1.1 Growing Environmental Concerns
 - 4.1.2 Stringent Regulatory Policies
 - 4.1.3 Corporate Sustainability Initiatives
 - 4.1.4 Technological Advancements
 - 4.1.5 Circular Economy Adoption
- 4.2 Market Challenges and Restraints

- 4.2.1 High Initial Investment Costs
- 4.2.2 Technical Challenges
- 4.2.3 Infrastructure Limitations
- 4.2.4 Technological Barriers
- 4.2.5 Supply Chain Complexities
- 4.2.6 Cost Competitiveness
- 4.3 Industry news, funding and developments 2020-2025
- 4.4 Capacities
- 4.5 Global polymer demand 2022-2040, segmented by recycling technology
 - 4.5.1 PE
 - 4.5.2 PP
 - 4.5.3 PET
 - 4.5.4 PS
 - 4.5.5 Nylon
 - 4.5.6 Others
- 4.6 Global polymer demand 2022-2040, segmented by recycling technology, by region
 - 4.6.1 Europe
 - 4.6.2 North America
 - 4.6.3 South America
 - 4.6.4 Asia
 - 4.6.5 Oceania
 - 4.6.6 Africa
- 4.7 Chemically recycled plastic products
- 4.8 Market map
- 4.9 Value chain
- 4.10 Life Cycle Assessments (LCA) of advanced plastics recycling processes
 - 4.10.1 PE
 - 4.10.2 PP
 - 4.10.3 PET
- 4.11 Recycled plastic yield and cost
 - 4.11.1 Plastic yield of each chemical recycling technologies
 - 4.11.2 Prices
- 4.12 Market challenges

5 ADVANCED PLASTICS RECYCLING TECHNOLOGIES

- 5.1 Applications
- 5.2 Pyrolysis
 - 5.2.1 Non-catalytic

- 5.2.2 Catalytic
 - 5.2.2.1 Polystyrene pyrolysis
 - 5.2.2.2 Pyrolysis for production of bio fuel
 - 5.2.2.3 Used tires pyrolysis
 - 5.2.2.3.1 Conversion to biofuel
 - 5.2.2.4 Co-pyrolysis of biomass and plastic wastes
- 5.2.3 SWOT analysis
- 5.2.4 Companies and capacities
- 5.3 Gasification
 - 5.3.1 Technology overview
 - 5.3.1.1 Syngas conversion to methanol
 - 5.3.1.2 Biomass gasification and syngas fermentation
 - 5.3.1.3 Biomass gasification and syngas thermochemical conversion
 - 5.3.2 SWOT analysis
 - 5.3.3 Companies and capacities (current and planned)
- 5.4 Dissolution
 - 5.4.1 Technology overview
 - 5.4.2 SWOT analysis
 - 5.4.3 Companies and capacities (current and planned)
- 5.5 Depolymerisation
 - 5.5.1 Hydrolysis
 - 5.5.1.1 Technology overview
 - 5.5.1.2 SWOT analysis
 - 5.5.2 Enzymolysis
 - 5.5.2.1 Technology overview
 - 5.5.2.2 SWOT analysis
 - 5.5.3 Methanolysis
 - 5.5.3.1 Technology overview
 - 5.5.3.2 SWOT analysis
 - 5.5.4 Glycolysis
 - 5.5.4.1 Technology overview
 - 5.5.4.2 SWOT analysis
 - 5.5.5 Aminolysis
 - 5.5.5.1 Technology overview
 - 5.5.5.2 SWOT analysis
 - 5.5.6 Companies and capacities (current and planned)
- 5.6 Other advanced chemical recycling technologies
 - 5.6.1 Hydrothermal cracking
 - 5.6.2 Pyrolysis with in-line reforming

- 5.6.3 Microwave-assisted pyrolysis
- 5.6.4 Plasma pyrolysis
- 5.6.5 Plasma gasification
- 5.6.6 Supercritical fluids
- 5.6.7 Carbon fiber recycling
 - 5.6.7.1 Processes
 - 5.6.7.2 Companies
- 5.7 Advanced recycling of thermoset materials
 - 5.7.1 Thermal recycling
 - 5.7.1.1 Energy Recovery Combustion
 - 5.7.1.2 Anaerobic Digestion
 - 5.7.1.3 Pyrolysis Processing
 - 5.7.1.4 Microwave Pyrolysis
 - 5.7.2 Solvolysis
 - 5.7.3 Catalyzed Glycolysis
 - 5.7.4 Alcoholysis and Hydrolysis
 - 5.7.5 Ionic liquids
 - 5.7.6 Supercritical fluids
 - 5.7.7 Plasma
 - 5.7.8 Companies
- 5.8 Comparison with Traditional Recycling Methods
 - 5.8.1 Mechanical Recycling Limitations
 - 5.8.2 Energy Efficiency Comparison
 - 5.8.3 Quality of Output Comparison
 - 5.8.4 Cost Analysis
- 5.9 Environmental Impact Assessment
 - 5.9.1 Carbon Footprint Analysis
 - 5.9.2 Energy Consumption Assessment
 - 5.9.3 Waste Reduction Potential
 - 5.9.4 Sustainability Metrics
- 5.10 5.5. Emerging Technologies
 - 5.10.1 AI and Machine Learning Applications
 - 5.10.1.1 Sorting Optimization
 - 5.10.1.2 Process Control
 - 5.10.1.3 Quality Prediction
 - 5.10.1.4 Maintenance Prediction
 - 5.10.2 Robotics in Sorting
 - 5.10.2.1 Vision Systems
 - 5.10.2.2 Picking Mechanisms

- 5.10.2.3 Control Systems
- 5.10.2.4 Integration Methods
- 5.10.3 Novel Catalyst Development
 - 5.10.3.1 Nano-catalysts
 - 5.10.3.2 Bio-catalysts
 - 5.10.3.3 Hybrid Catalysts

6 MATERIALS ANALYSIS

6.1 Plastics

- 6.1.1 Polyethylene (PE)
 - 6.1.1.1 HDPE Analysis
 - 6.1.1.2 LLDPE Analysis
 - 6.1.1.3 Recovery Methods
- 6.1.2 Polypropylene (PP)
 - 6.1.2.1 Homopolymer
 - 6.1.2.2 Copolymer
 - 6.1.2.3 Processing Methods
 - 6.1.2.4 Quality Grades
- 6.1.3 Polyethylene Terephthalate (PET)
 - 6.1.3.1 Bottle Grade
 - 6.1.3.2 Fiber Grade
 - 6.1.3.3 Film Grade
 - 6.1.3.4 Recovery Technologies
- 6.1.4 Polystyrene (PS)
 - 6.1.4.1 Expanded PS
 - 6.1.4.2 Processing Methods
- 6.1.5 Other Plastics
 - 6.1.5.1 PVC
 - 6.1.5.2 PC
 - 6.1.5.3 ABS
 - 6.1.5.4 Mixed Plastics

6.2 Metals

- 6.2.1 Precious Metals
 - 6.2.1.1 Gold
 - 6.2.1.2 Silver
 - 6.2.1.3 Platinum Group Metals
 - 6.2.1.4 Recovery Methods

6.3 Base Metals

- 6.3.1 Copper
- 6.3.2 Aluminum
- 6.3.3 Steel
- 6.3.4 Processing Technologies
- 6.4 Rare Earth Elements
 - 6.4.1 Light REEs
 - 6.4.2 Heavy REEs
 - 6.4.3 Extraction Methods
- 6.5 Electronic Waste
 - 6.5.1 Circuit Boards
 - 6.5.1.1 PCB Types
 - 6.5.1.2 Component Separation
 - 6.5.1.3 Metal Recovery
 - 6.5.1.4 Waste Management
 - 6.5.2 Batteries
 - 6.5.2.1 Lithium-ion
 - 6.5.2.2 Lead-acid
 - 6.5.2.3 Nickel-based
 - 6.5.2.4 Recovery Processes
 - 6.5.3 Displays
 - 6.5.3.1 LCD
 - 6.5.3.2 LED
 - 6.5.3.3 OLED
 - 6.5.3.4 Material Recovery
 - 6.5.4 Other Components
 - 6.5.4.1 Capacitors
 - 6.5.4.2 Resistors
 - 6.5.4.3 Semiconductors
 - 6.5.4.4 Connectors
- 6.6 Textiles
 - 6.6.1 Natural Fibers
 - 6.6.2 Cotton
 - 6.6.3 Wool
 - 6.6.4 Silk
 - 6.6.5 Processing Methods
 - 6.6.6 Synthetic Fibers
 - 6.6.1 Polyester
 - 6.6.2 Nylon
 - 6.6.3 Acrylic

6.6.4 Recovery Technologies

7 END PRODUCT ANALYSIS

7.1 Chemical Feedstocks

7.1.1 Monomers

7.1.2 Oligomers

7.1.3 Specialty Chemicals

7.2 Fuels

7.2.1 Diesel

7.2.2 Gasoline

7.2.3 Synthetic Gas

7.3 Raw Materials

7.3.1 Recycled Plastics

7.3.2 Recovered Metals

7.3.3 Other Materials

7.4 Energy Products

7.4.1 Electricity

7.4.2 Heat

7.4.3 Biofuels

8 COMPANY PROFILES 232 (188 COMPANY PROFILES)

9 GLOSSARY OF TERMS

10 REFERENCES

List Of Tables

LIST OF TABLES

Table 1. Types of recycling.

Table 2. Issues related to the use of plastics.

Table 3. Type of biodegradation.

Table 4. Overview of the recycling technologies.

Table 5. Polymer types, use, and recovery.

Table 6. Composition of plastic waste streams.

Table 7. Comparison of mechanical and advanced chemical recycling.

Table 8. Life cycle assessment of virgin plastic production, mechanical recycling and chemical recycling.

Table 9. Life cycle assessment of chemical recycling technologies (pyrolysis, gasification, depolymerization and dissolution).

Table 10. Market drivers and trends in the advanced plastics recycling market.

Table 11. Advanced plastics recycling industry news, funding and developments 2020-2024.

Table 12. Advanced plastics recycling capacities, by technology.

Table 13. Global polymer demand 2022-2040, segmented by recycling technology for PE (million tonnes).

Table 14. Global polymer demand 2022-2040, segmented by recycling technology for PP (million tonnes).

Table 15. Global polymer demand 2022-2040, segmented by recycling technology for PET (million tonnes).

Table 16. Global polymer demand 2022-2040, segmented by recycling technology for PS (million tonnes).

Table 17. Global polymer demand 2022-2040, segmented by recycling technology for Nylon (million tonnes).

Table 18. Global polymer demand 2022-2040, segmented by recycling technology for Other types (million tonnes).*

Table 19. Global polymer demand in Europe, by recycling technology 2022-2040 (million tonnes).

Table 20. Global polymer demand in North America, by recycling technology 2022-2040 (million tonnes).

Table 21. Global polymer demand in South America, by recycling technology 2022-2040 (million tonnes).

Table 22. Global polymer demand in Asia, by recycling technology 2022-2040 (million tonnes).

Table 23. Global polymer demand in Oceania, by recycling technology 2022-2040 (million tonnes).

Table 24. Global polymer demand in Africa, by recycling technology 2022-2040 (million tonnes).

Table 25. Example chemically recycled plastic products.

Table 26. Life Cycle Assessments (LCA) of Advanced Chemical Recycling Processes.

Table 27. Life cycle assessment of mechanically versus chemically recycling polyethylene (PE).

Table 28. Life cycle assessment of mechanically versus chemically recycling polypropylene (PP).

Table 29. Life cycle assessment of mechanically versus chemically recycling polyethylene terephthalate (PET).

Table 30. Plastic yield of each chemical recycling technologies.

Table 31. Chemically recycled plastics prices in USD.

Table 32. Challenges in the advanced chemical recycling market.

Table 33. Applications of chemically recycled materials.

Table 34. Summary of non-catalytic pyrolysis technologies.

Table 35. Summary of catalytic pyrolysis technologies.

Table 36. Summary of pyrolysis technique under different operating conditions.

Table 37. Biomass materials and their bio-oil yield.

Table 38. Biofuel production cost from the biomass pyrolysis process.

Table 39. Pyrolysis companies and plant capacities, current and planned.

Table 40. Summary of gasification technologies.

Table 41. Advanced recycling (Gasification) companies.

Table 42. Summary of dissolution technologies.

Table 43. Advanced recycling (Dissolution) companies

Table 44. Depolymerisation processes for PET, PU, PC and PA, products and yields.

Table 45. Summary of hydrolysis technologies-feedstocks, process, outputs, commercial maturity and technology developers.

Table 46. Summary of Enzymolysis technologies-feedstocks, process, outputs, commercial maturity and technology developers.

Table 47. Summary of methanolysis technologies-feedstocks, process, outputs, commercial maturity and technology developers.

Table 48. Summary of glycolysis technologies-feedstocks, process, outputs, commercial maturity and technology developers.

Table 49. Summary of aminolysis technologies.

Table 50. Advanced recycling (Depolymerisation) companies and capacities (current and planned).

Table 51. Overview of hydrothermal cracking for advanced chemical recycling.

Table 52. Overview of Pyrolysis with in-line reforming for advanced chemical recycling.

Table 53. Overview of microwave-assisted pyrolysis for advanced chemical recycling.

Table 54. Overview of plasma pyrolysis for advanced chemical recycling.

Table 55. Overview of plasma gasification for advanced chemical recycling.

Table 56. Summary of carbon fiber (CF) recycling technologies. Advantages and disadvantages.

Table 57. Retention rate of tensile properties of recovered carbon fibres by different recycling processes.

Table 58. Recycled carbon fiber producers, technology and capacity.

Table 59. Current thermoset recycling routes.

Table 60. Companies developing advanced thermoset recycling routes.

Table 61. Energy Efficiency Comparison.

Table 62. Quality of Output Comparison.

Table 63. Cost Analysis of advanced plastic recycling versus traditional recycling methods.

Table 64. Carbon Footprint Analysis.

Table 65. Energy Consumption Assessment.

List Of Figures

LIST OF FIGURES

Figure 1. Global plastics production 1950-2021, millions of tonnes.

Figure 2. Coca-Cola PlantBottle®.

Figure 3. Interrelationship between conventional, bio-based and biodegradable plastics.

Figure 4. Global production, use, and fate of polymer resins, synthetic fibers, and additives.

Figure 5. The circular plastic economy.

Figure 6. Current management systems for waste plastics.

Figure 7. Overview of the different circular pathways for plastics.

Figure 8. Global polymer demand 2022-2040, segmented by recycling technology for PE (million tonnes).

Figure 9. Global polymer demand 2022-2040, segmented by recycling technology for PP (million tonnes).

Figure 10. Global polymer demand 2022-2040, segmented by recycling technology for PET (million tonnes).

Figure 11. Global polymer demand 2022-2040, segmented by recycling technology for PS (million tonnes).

Figure 12. Global polymer demand 2022-2040, segmented by recycling technology for Nylon (million tonnes).

Figure 13. Global polymer demand 2022-2040, segmented by recycling technology for Other types (million tonnes).

Figure 14. Global polymer demand in Europe, by recycling technology 2022-2040 (million tonnes).

Figure 15. Global polymer demand in North America, by recycling technology 2022-2040 (million tonnes).

Figure 16. Global polymer demand in South America, by recycling technology 2022-2040 (million tonnes).

Figure 17. Global polymer demand in Asia, by recycling technology 2022-2040 (million tonnes).

Figure 18. Global polymer demand in Oceania, by recycling technology 2022-2040 (million tonnes).

Figure 19. Global polymer demand in Africa, by recycling technology 2022-2040 (million tonnes).

Figure 20. Market map for advanced plastics recycling.

Figure 21. Value chain for advanced plastics recycling market.

Figure 22. Schematic layout of a pyrolysis plant.

- Figure 23. Waste plastic production pathways to (A) diesel and (B) gasoline
- Figure 24. Schematic for Pyrolysis of Scrap Tires.
- Figure 25. Used tires conversion process.
- Figure 26. SWOT analysis-pyrolysis for advanced recycling.
- Figure 27. Total syngas market by product in MM Nm³/h of Syngas, 2021.
- Figure 28. Overview of biogas utilization.
- Figure 29. Biogas and biomethane pathways.
- Figure 30. SWOT analysis-gasification for advanced recycling.
- Figure 31. SWOT analysis-dissoluton for advanced recycling.
- Figure 32. Products obtained through the different solvolysis pathways of PET, PU, and PA.
- Figure 33. SWOT analysis-Hydrolysis for advanced chemical recycling.
- Figure 34. SWOT analysis-Enzymolysis for advanced chemical recycling.
- Figure 35. SWOT analysis-Methanolysis for advanced chemical recycling.
- Figure 36. SWOT analysis-Glycolysis for advanced chemical recycling.
- Figure 37. SWOT analysis-Aminolysis for advanced chemical recycling.
- Figure 38. NewCycling process.
- Figure 39. ChemCyclingTM prototypes.
- Figure 40. ChemCycling circle by BASF.
- Figure 41. Recycled carbon fibers obtained through the R3FIBER process.
- Figure 42. Cassandra Oil process.
- Figure 43. CuRe Technology process.
- Figure 44. MoReTec.
- Figure 45. Chemical decomposition process of polyurethane foam.
- Figure 46. OMV ReOil process.
- Figure 47. Schematic Process of Plastic Energy's TAC Chemical Recycling.
- Figure 48. Easy-tear film material from recycled material.
- Figure 49. Polyester fabric made from recycled monomers.
- Figure 50. A sheet of acrylic resin made from conventional, fossil resource-derived MMA monomer (left) and a sheet of acrylic resin made from chemically recycled MMA monomer (right).
- Figure 51. Teijin Frontier Co., Ltd. Depolymerisation process.
- Figure 52. The Velocys process.
- Figure 53. The Proesa[®] Process.
- Figure 54. Worn Again products.

I would like to order

Product name: The Global Advanced Plastics Recycling Market 2025-2040

Product link: <https://marketpublishers.com/r/GAD7F08A6CA4EN.html>

Price: US\$ 1,400.00 (Single User License / Electronic Delivery)

If you want to order Corporate License or Hard Copy, please, contact our Customer Service:

info@marketpublishers.com

Payment

To pay by Credit Card (Visa, MasterCard, American Express, PayPal), please, click button on product page <https://marketpublishers.com/r/GAD7F08A6CA4EN.html>