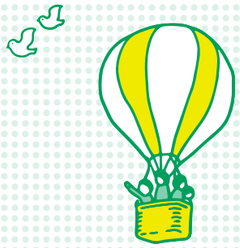
Material Cycles RESEARCH OFFICE

In April 2021, we launched two new offices to provide technical support in the fields of disaster waste management and international cooperation and to facilitate application of our research outcomes in society.



Environmental Emergency Management Office

We provide support for environmentally sound recovery from disasters.

Post-disaster clean-up and recovery generate a large amount of disaster waste. Delays in properly treating it may cause odors, vermin and damage to human health and the natural environment. We work together with relevant organizations to help local governments and communities tackle disaster waste for protecting the environment and accelerating recovery. We also collect and provide disaster waste data, establish institutional network, and organize training and workshops to enhance resilience of the society.

Field survey on the state of disaster waste

Disaster waste management training

International Waste Management Research Administration Office

We disseminate our research outputs and promote their utilization in the world.

We communicate the Material Cycles Division's various research outputs to international audience through international publications and events so that the research outcomes can solve social issues in waste management and promote recycling. We also help our researchers and research teams to provide their knowledge and expertise according to international and local needs through their participation in international events and collaborative research projects.

International workshop

Field trip with foreign interns

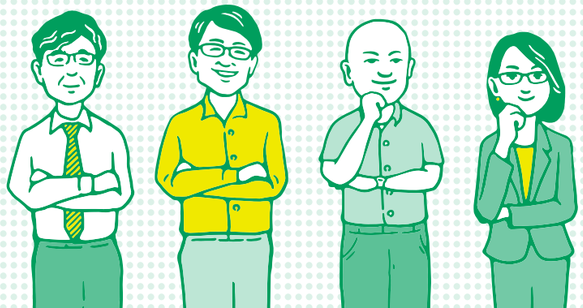
Promote sustainable use of resources and reduce environmental impacts of wastes

An affluent society we pursue is based on the use of various materials, or resources. However, resources are finite, and disposal of wastes after the use of products has a non-negligible negative effect on the environment.

Our research aims to propose paths that lead to a sustainable material-cycle society and less environmental burden. We promote resource conservation and recycling throughout a product's life cycle from resource extraction to waste disposal.

We will contribute to balancing sustainable use of resources with reduction of environmental impact. We will work together with other divisions and institutions to create a decarbonized society in future and to find the best way to solve various social issues in line with the Sustainable Development Goals (SDGs).

Masahiro OSAKO
Director, Material Cycles Division



Material Cycles Division

Material Cycles Domain

Our research provides foundation and intellectual infrastructure for material cycles research in Japan. Our five research sections and one research group jointly conduct foresight and advanced basic research pioneering for the future. We also conduct policy-oriented research to provide scientific basis for Japan's policy-making in this field.

System research
Examine material flows and propose appropriate systems for material cycles

Risk and technology research
Develop waste treatment technologies and analyze environmental risks

Sustainability assessment and future vision design on material use

Our daily lives are full of products that contain natural resources such as iron and wood. These products are recycled after being used over several years to several decades. The use of resources, whether it is extraction or recycling, consumes energy and has a negative impact on the global environment. We will conduct computer simulation for projecting future lifestyles, resource use, environmental impact, and sustainable utilization of resources and develop their visualization methods.

Keisuke NANSAI, Head

Advanced science and engineering for material cycles

We may think that our wastes are safely treated or recycled, but are we sure they are not related to the recent global environmental problems? In order to clarify this relationship, we will study micro-plastic emissions from recycling facilities to the environment and decarbonization of recycling technology systems using advanced science and engineering. Our research will offer solutions to overcome these new environmental problems and contribute to establishment of sustainable material cycles.

Hidetoshi KURAMOCHI, Head

Collaborative Research Group for Plastic Material Cycles

Plastic production and incineration emit carbon dioxide (CO_2) contributing to the climate change. If not collected properly, used plastics are discharged into the environment, becoming partially degraded into microplastics, and may affect marine ecosystems and fish species they host. We will find appropriate ways to monitor and evaluate environmental impact of plastics from a broad perspective and devise technological and social systems that can reduce the environmental impacts, in collaboration with researchers from a wide range of fields beyond the material cycles domain.

Jun NAKATANI, Group Leader

Research on social systems for material cycles and waste management

Major changes are needed in our social systems to ensure full use of every resource and reduction of waste. We investigate and evaluate the current social systems to design and propose more appropriate ones for the future. We also analyze how people can use resources in a sustainable way. Our research results are intended to contribute to stimulating policy discussion among relevant stakeholders and raising public awareness on this transition.

Tomohiro TASAKI, Head

Impact assessment of hazardous substances in material cycles

End-of-life products and their wastes need to be safely recycled or disposed of in order not to harm human health and the environment. We will develop methods for determining concentrations of specific hazardous substances in such wastes, from plastics to demolition waste, and their emissions to the environment. Our analysis results will contribute to the creation of proper management systems of these substances.

Hirofumi SAKANAKURA, Head

Advancement and implementation of waste management technologies for society

Our research promotes advancement and application of safer and more eco-friendly waste management technologies in Asia in the following areas: reduction of waste and safe landfilling through segregated collection, transportation, sorting, microbial decomposition, and incineration; treatment of domestic wastewater; and adaptation of these new technologies in a sustainable manner through participation of residents.

Masato YAMADA, Head

Intellectual Research Infrastructure Development

Develop and update global databases on material cycles and waste management in collaboration with international organizations and overseas research institutions

Applications of research outcomes in society

- To support national and local governments in making plans and policies
- To advance engineering and support technological development in industries
- To raise public awareness through various events and publications
- To provide technical inputs for developing international rules

Material Flow Innovation Research Program

Research Director Keisuke NANSAI

《Innovative Transitions in Material Flows toward Planetary Health》

Objective

We will accumulate scientific knowledge to show transition pathways for material flows that form a foundation for planetary health. Our research outcomes are expected to encourage both producers and consumers to achieve sustainable utilization of resources.

PJ1

Leader
Kenichi NAKAJIMA

Material flows transition and social adaptation

Direction for transition, science-based target, adaptation measures

- Disciplines: Environmental systems
- Focused materials: Metals and biomass
- Viewpoint: Macroscopic view of natural resource flows
- Target region: Global and Japan

Time frame of analysis: 2050 〉 2100

PJ2

Leader
Masahiro OGUCHI

Chemical management for material flows transition

Measures for chemicals and pollutions impeding transition

- Disciplines: Environmental systems and risk
- Focused materials: Plastics, WEEE, By-products of soil and stone
- Viewpoint: Microscopic view of material product flows
- Target region: Japan

Time frame of analysis: 2030 〉 2050

PJ3

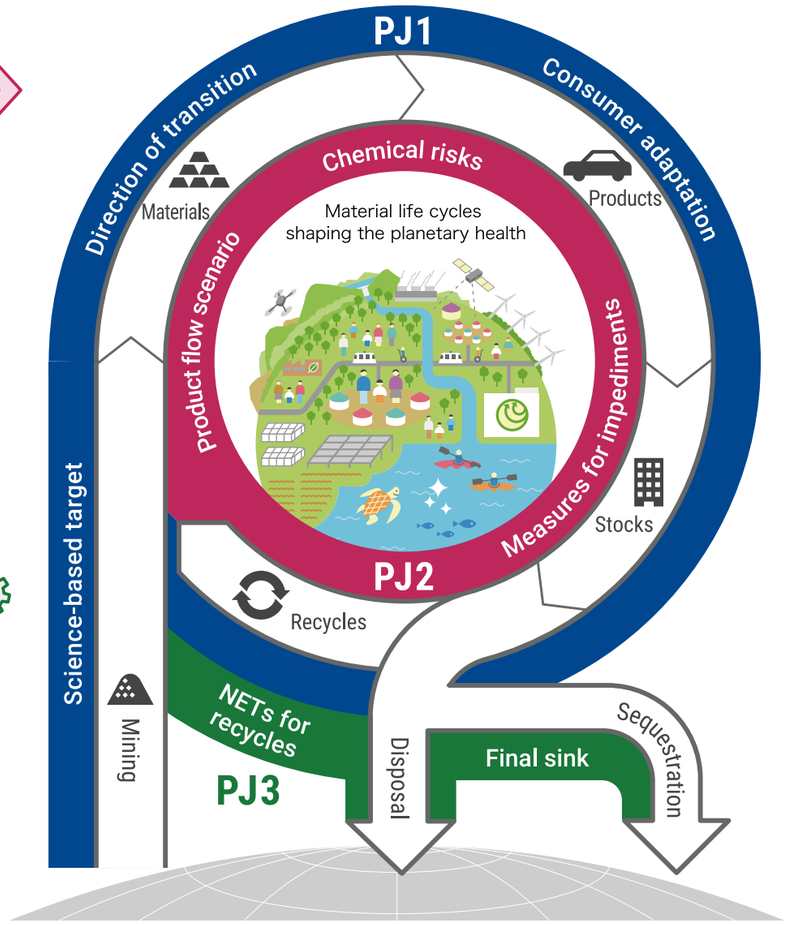
Leader
Takuro KOBAYASHI

Material circulation and sequestration technology

Development of material circulation and sequestration technologies and systems that are adaptable to transition

- Disciplines: Environmental systems and engineering
- Viewpoint: Microscopic view of materials to be recycled and sequestrated
- Focused materials: Wastes
- Target region: Japan

Time frame of analysis: 2030 〉 2050



https://mfi.nies.go.jp/index.html

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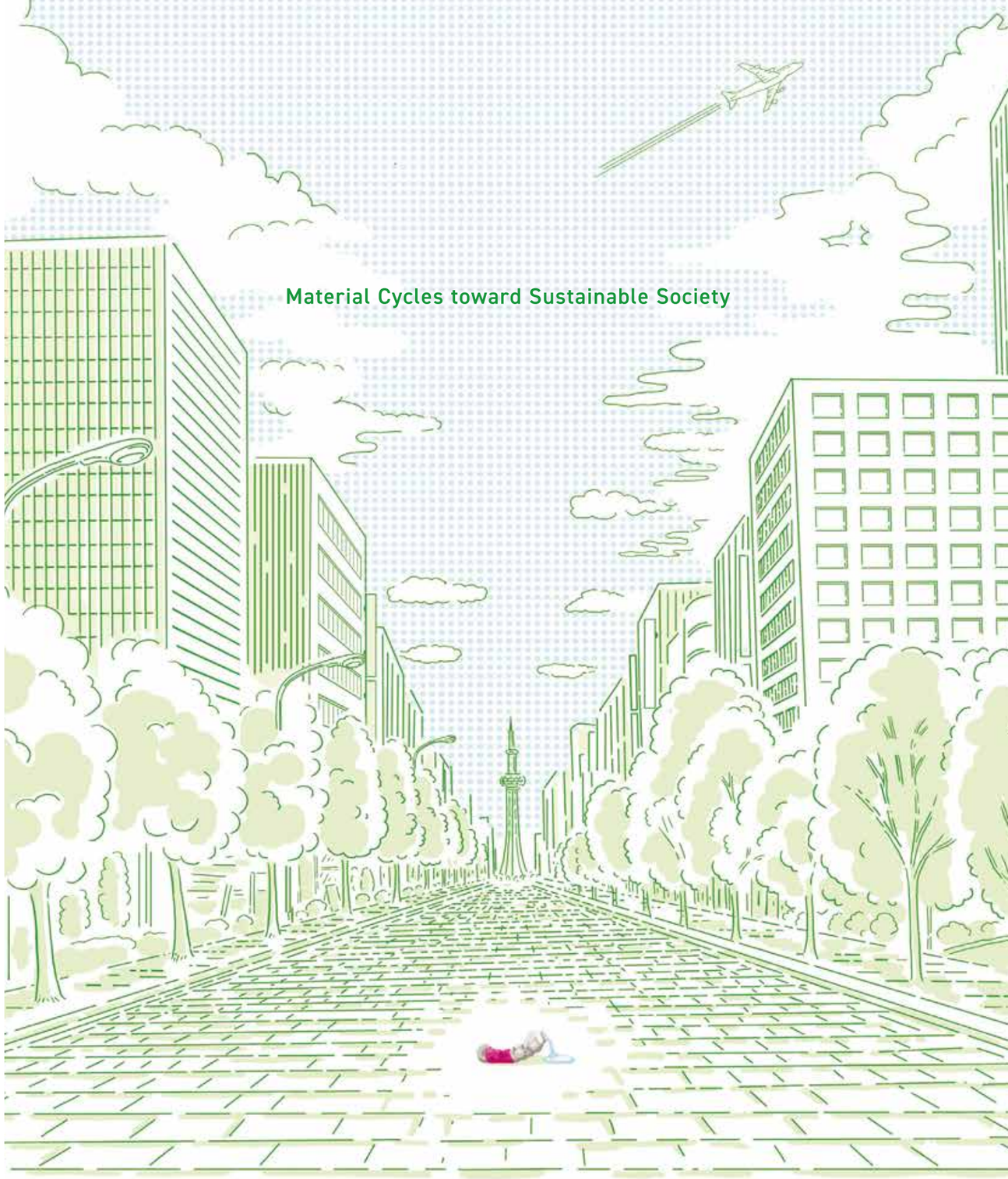

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