NIES Letter FUKUSHIMA
No.6
2018

Environmental Renovation Research Communicating Our Research Findings

We ran a booth at the REVIVAL OF FUKUSHIMA Renewable Energy Industrial Fair 2018.

▲ Posters introducing our environmental renovation research, including community development support utilizing renewable energy, were exhibited. In addition, we showed the experience-based programs such as a 3D projection mapping and a life-support system.

We ran a NIES Fukushima Branch booth at the 7th REVIVAL OF FUKUSHIMA Renewable Energy Industrial Fair 2018 (REIF Fukushima 2018) held at the BIG PALETTE FUKUSHIMA, Koriyama City on November 7th and 8th. The REIF Fukushima is an event held by Fukushima Prefecture every year, with the aim of providing opportunities for information dissemination and exchanges to companies and organizations related to renewable energy businesses. This year, 160 booths were exhibited, and approximately 7,000 people visited in two days.

We enjoyed the opportunity of widely introducing our daily efforts to about 100 people that visited our NIES Fukushima Branch booth. We were also able to have exchanges of opinions with people who engage in renewable energy businesses on how industry, academia and government can work together to take concrete actions to build sustainable communities, etc.

REIF Fukushima 2018 Exhibition Programs

Some of the experience-based programs exhibited are introduced below.

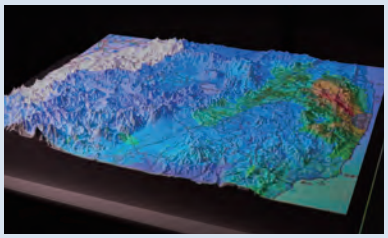
PICK UP

Sustainable Development Goals (SDGs)

The Sustainable Development Goals (SDGs) are international targets to be achieved by 2030, which were adopted at the UN Summit in September 2015. It consists of 17 goals with 169 targets. The SDGs are to be maximally reflected when developing and revising various plans, strategies and policies in Japanese local governments. We asked visitors to put a sticker on the listing of the SDGs which they think is important for the communities in Fukushima Prefecture. While many stickers were put on the listings related to energy and climate change, visitors also voted for a variety of listings, showing residents' diverse interests.

PICK UP

3D Projection Mapping



Various environmental, social, and geographic data are projected on the 3D blank map of Fukushima. Any data can be projected, including aerial photographs, land use, population distribution, energy consumption, potential sites for renewable energy generation, areas vulnerable to future global warming, radiation dose, etc.

PICK UP

Life-support System

The life-support system developed by the NIES supports community surveys and communication by interactively connecting regional actors including residents, local authorities, etc. Various data such as household electricity consumption and regional facilities/event information can be seen with a PC or a smartphone. Utilizing this system, we make suggestions regarding local energy conservation approaches and revitalization of communities.

ShibuShibu-kun's advice!

How Will the Removed Soil Stored in Interim Storage Facilities Be Treated and Disposed Of?

TOKOYODA Kazuhiko, Junior Research Associate, Radiological Contaminated off-site waste Management Section, NIES Fukushima Branch

Working toward Final Disposal Outside the Prefecture 30 Years Later

The accident at Fukushima Daiichi Nuclear Power Plant caused by the Great East Japan Earthquake in March 2011 led to the environment in areas around the plant being contaminated by radiocesium, among other substances. Accordingly, the government carried out various decontamination projects to reduce the exposure dose from radioactive material in the environment. This then generated large quantities of removed soil and decontamination waste that were temporarily stored at preliminary storage sites. The transfer of this soil and waste from those preliminary sites to interim storage facilities is now underway in earnest.

Interim storage facilities are facilities at which materials, such as soil removed in the course of decontamination activities in Fukushima Prefecture and incinerator ash generated when burning combustible materials, are to be stored until final disposal outside the prefecture is completed 30 years later (Figure 1 [(1)]). These facilities are currently being developed in the towns of Okuma and Futaba. However, the volume of removed soil, etc. due to be transported to these interim storage facilities is huge — 20 million m^3 (equivalent to about 16 times the size of Tokyo Dome) — so it will be necessary to secure adequate storage space and to reduce the volume of soil and waste with a view to final disposal outside the prefecture. What methods of reducing the volume are being considered?

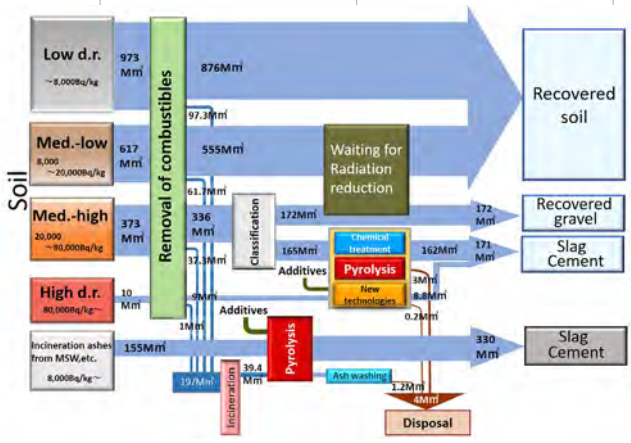


Figure 1 Procedure for processing removed soil and incinerator ash

Methods of Reducing the Volume of Soil and Waste

Various techniques can be used to reduce the volume of the soil, including 1) removing extraneous material; 2) grading of soil to sift out only small soil particles, as radiocesium is particularly prone to adhering to small soil particles; 3) chemical treatment in which chemicals and heat are used to make the radiocesium in the soil leach out and an adsorption material is used to recover it; and 4) heat treatment in which the soil is heated at high temperatures, discharging the radiocesium for collection in a filter. All these methods are either being carried out or under consideration. Heat treatment technologies, which offer the prospect of more efficient removal than the other techniques, are expected to be most effective for reducing the volume of soil and incinerator ash with particularly high concentrations of radiocesium.

Current and Future Studies

Accordingly, we are conducting research focused on heat treatment technologies. These technologies can be broadly divided into two approaches: baking and melting. Both approaches involve adding calcium chloride or a similar substance as a reaction accelerator; the removed soil is processed at a temperature at which it either does not melt (baking) or does melt (melting), causing the radiocesium to vaporize as cesium chloride, which is then recovered. Both approaches use existing heat treatment technology, but the reaction temperature differs according to the type of heat treatment and there are many things that are not yet clear, such as how the radiocesium vaporizes, so we are working on unraveling these mysteries. The products left after the removal of radiocesium by means of heat treatment can be recycled, so it will be possible to reduce the volume of material requiring long-term storage to about 1/20 of the current volume.

Once the technology for reducing the volume of soil and waste is established, it will be necessary to move forward with research focused on technology for turning the radiocesium into stable solid packages for final disposal, and research concerning the structure and durability of the final disposal facilities where the packages will be disposed of. We will also need to set out a number of conceivable scenarios through to final disposal that integrate numerous element technologies in this way and undertake a comprehensive evaluation that incorporates diverse perspectives, including the reliability and cost of the technologies and safety evaluation of the exposure dose throughout all treatment and disposal processes, as well as reflecting the views of local citizens and other stakeholders. We will work with numerous experts to move this research forward in a timely fashion.

Reference

(1) Investigative Commission on Technology Innovation Strategy for Volume Reduction Treatment and Recycling of Radioactively Contaminated Soil after Interim Storage (2nd Meeting), Document 3 "Development of Volume Reduction Treatment Technology: Challenges and Targets," 33, 2017, 12.21 (Ministry of the Environment:) http://josen.env.go.jp/chukanchozou/action/investigative_commission/pdf/volume_reduction_170424.pdf

Click here if you want more technical information

(1) NIES Letter Fukushima (August 2018)

Traveling Researchers: Going Wherever They Need to for Fieldwork

GOMI Kei, Senior Researcher, Regional Environmental Renovation Section, NIES Fukushima Branch

What springs to mind when you think of a researcher? Do you imagine someone in a white coat, observing a strange-colored liquid in a test tube while surrounded by complex machinery in a gloomy laboratory? Although this is routine for some researchers, the laboratory is not our only place of work. Many of us frequently get outside the laboratory and into the fresh air, traveling to various places. In this column, I would like to tell you a little about researchers' travels.

Fieldwork: Up Mountains, in Rivers, in Towns

This kind of research outside the laboratory is also called fieldwork. Many of us who work at the Fukushima Branch of the National Institute for Environmental Studies (NIES) get in the car and drive to forests and rivers in the Hamadori area to collect samples, which we bring back to the laboratory so that we can study organisms and water from the area. (But once we have brought them back to the institute, the reality of analyzing them is not so far removed from that "gloomy laboratory" image.) Another important part of our work is social research. When conducting research aimed at creating a better environment, it is vital to learn about the behavior and attitudes of the people who live in it, so we carry out surveys using questionnaires and other methods. Some things can be done online, but we also visit people in person at their homes or elsewhere if we want to ask about something in detail. We carried out one survey in the Fukushima Prefecture town of Shinchi (changing onto the Joban Line at Sendai Station), visiting each of the 70 households in turn to ask about energy conservation and reconstruction of the town in the wake of the disaster. My own specialism is simulation, so I do not need to go out into the field and can just do my calculations on a computer in the laboratory as long as I have data...or so you might think. In fact, this is far from being the case. If you have never actually seen the area, you will end up with a ridiculous simulation, because you do not know the reality of the situation, such as the topography in terms of mountains and rivers, the atmosphere downtown, the status of agriculture, and, in disaster-stricken areas, the extent to which reconstruction has progressed. The most unusual place I have been to is the Kingdom of Bhutan, but I felt a strange affinity to it, because it was like something out of a Japanese folk tale.

Meetings: Important Things Often Happen in the Conference Room, Too

I probably spend the biggest proportion of my time in meetings. Not all research can be carried out by the institute singlehandedly, so we get together to consult others, including local citizens and business operators, relevant staff from municipal offices, contractors assisting with our research, and academics from universities and other research institutes with whom we are conducting joint research. Contributing to the realization of better environmental policies is important work, but unless we know about those who develop and implement policies, people would say things like, "They just talk about complicated things and don't do anything useful." There is a famous line in a Japanese detective movie: "Crime happens out on the streets, not in the conference room!" But in our society, we have to discuss various things before we can make decisions, such as what kind of problems there are and what kind of research will help to solve them. Consequently, we often have to take our data into the conference room, which, in policymaking, is the streets.

Lectures: We Aim to Find Ways to Make Things Easy to Understand

Informing a large number of people about research findings is another important job for researchers. We find various ways to explain technical content in a way that people will understand and practice our presentations many times before we go and talk to audiences, wherever there are people who want to hear about our environmental research. From time to time, I have the chance to address gatherings here in Miharu or in other towns in Fukushima Prefecture, which sometimes means getting on a train to a town to which I have never been before.

Public lecture in Koriyama City in 2018

Academic Society Meetings: Informing the World, Learning from the World

There are also meetings of academic societies, which bring together researchers from various countries or organizations. Senior Researcher Kazuo Yamada wrote about international academic conferences in the April 2018 edition of NIES Letter FUKUSHIMA. At these meetings, everyone is an expert, so there is no need to use simple terminology and we engage in complicated discussions peppered with technical language. We mostly publish our research findings in written form, but academic society meetings are ideal for getting up-to-the-minute information about cutting-edge research, because some researchers use these gatherings to report on ideas that have not yet been developed into articles or are in the process of being written up. In addition, they give us the chance to talk directly to other researchers. We often discover new ideas when discussing things with researchers from across the globe.

Every day, there are researchers heading off somewhere or other on a train or a plane, with a change of clothes and their research documents in their suitcase. For us, our daily life consists of meeting and talking with various people, thinking about how to solve local and global problems while we are sitting on trains or planes or boats, bringing our samples back to the laboratory to carry out research, and then going back out with our findings.

NIES Fukushima Branch

Recent events

October

Oct. 10 The 2nd Sustainable Development Goals (SDGs) Workshop was held in Koriyama City, hosted by the NIES, the Utsukushima NPO Network, and Koriyama City.

▲ The SDGs Workshop (Oct. 19)

Oct. 31 The workshop on the theme of "Study on estimation and monitoring of effects of environmental stresses on plants" was held with municipal environmental research institutions, etc.

▲ The workshop with municipal environmental research institutions, etc. The facility tour was also conducted that day. (Oct. 31)

November

Nov. 10 We participated in the Tsukuba Science Collaboration 2018 Science and Environment Festival held in Tsukuba City, Ibaraki Prefecture.

Nov. 18 We held the 2018 NIES public lecture for Koriyama City "Aiming to Create a Sustainable Community" in Koriyama City. About 50 participants in their 20s to 70s learned about the environmental emergency research being carried out at the NIES, and deepened their interest in the SDGs.

▲ The NIES public lecture for Koriyama City (Nov. 18)

Nov. 20 We held the NIES visiting lecture in Koriyama City's Koriyama Dairoku Junior High School, and explained our research content to the students in the third-grade of junior high-school.

Nov. 26 A seminar on adaptation to climate change hosted by Koriyama City and sponsored by the NIES was held. It provided a good opportunity to think about the impacts of climate change, including global warming, and the adaptation to it.

▲ The NIES visiting lecture in Koriyama City's Koriyama Dairoku Junior High School (Nov. 20)

Nov. 27 The 3rd Sustainable Development Goals (SDGs) Workshop was held in Koriyama City, hosted by the NIES, the Utsukushima NPO Network, and Koriyama City.

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