



Environmental Remediation in Affected Areas in Japan

January, 2019



Ministry of the Environment, Japan

Result and Effect of the Whole Area Decontamination

Interim Storage Facility

Disposal of the Specified Waste

Communication to the Public and
International Societies

Decontamination and Waste Treatment based on the “Act on Special Measures”

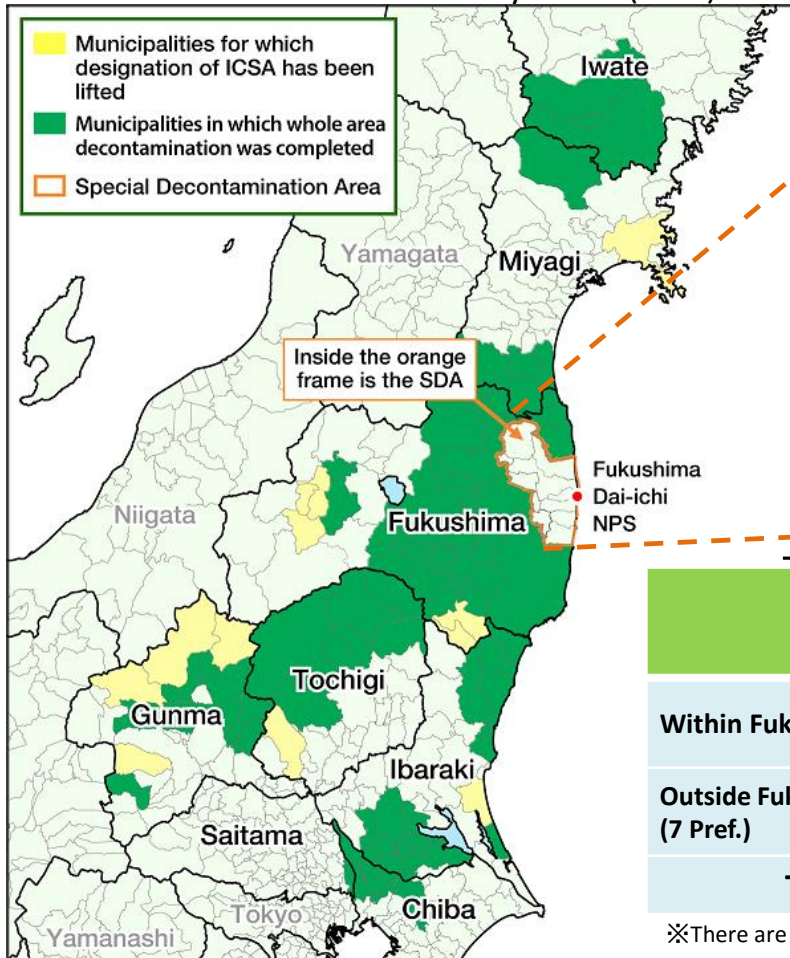
Measures on decontamination of soil contaminated by radioactive materials

Result of Whole Area Decontamination

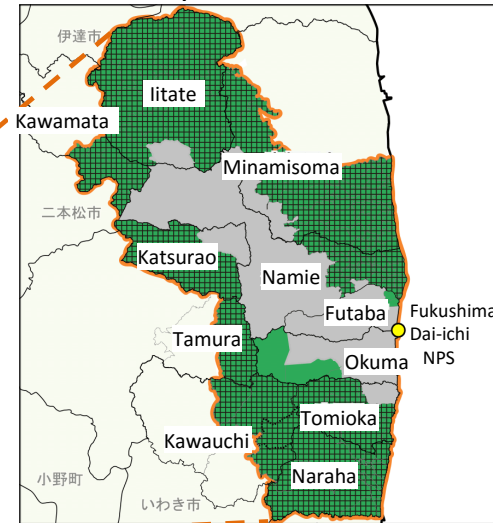
Whole area decontamination based on the Act on Special Measures was completed on March 19, 2018, excluding the Areas where Returning is Difficult (ARD)

* In ARD, “Specified Reconstruction and Revitalization Base (SRRB)” were set in 6 municipalities, where decontamination and infrastructure construction are being implemented in an integrated way.

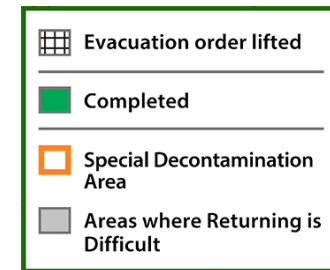
<Intensive Contamination Survey Areas (ICSA)>



<Special Decontamination Areas (SDA)>



→ **Whole area decontamination in the SDA was completed at the end of March 2017**



	Municipalities where whole area decontamination was completed		
		SDA (11)	ICSA (93)
Within Fukushima Pref.	43※	11	36
Outside Fukushima Pref. (7 Pref.)	57	—	57
Total	100	Completed in March 2017	Completed in March 2018

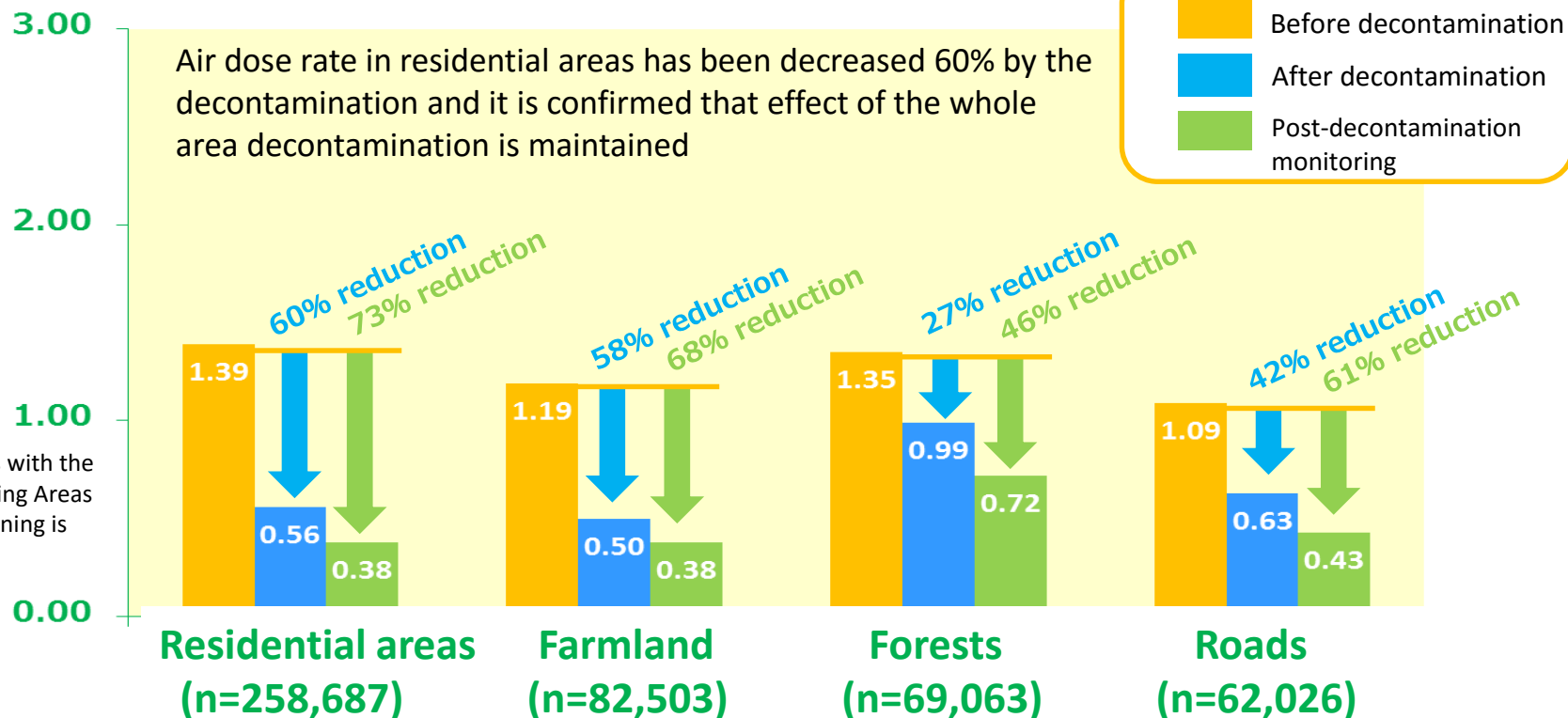
※There are both SDA and ICSA in Minamisoma, Tamura, Kawamata, and Kawauchi

Effects of Decontamination in SDA

【Air dose rate at the height of 1m from the ground / Transition according to land category】

(n=472,279)

[Air dose rate ($\mu\text{Sv/h}$)]



※Only in areas with the data, excluding Areas where Returning is Difficult

The chart shows the air dose rate average in each category (aggregated data of measuring points).

Residential areas include schools, parks, cemeteries, and large-sized facilities, farmland includes orchard, and forests include slopes, grassland and lawn.

Post-decontamination monitoring was implemented after 6 months to a year after the decontamination work. The latest result of post decontamination monitoring in municipalities were summarized (the first or the second)

[Implementation period] • Monitoring before decontamination

Nov.2011 - Oct. 2016

• Monitoring after decontamination

Dec. 2011 - Dec. 2016

• Post decontamination monitoring

Oct. 2014 - Jun. 2017

Prospects on Export of Removed Soil and Restoration of Land in Temporary Storage Sites (TSS) <Estimation>

By early 2020, max. 60% of the removed soil from approx. 1,300 TSS*¹ will be transported to the ISF, and up to 40% of land restoration will be completed, according to estimation based on prospect*¹ of the transportation to the ISF and achievement in the land restoration*²

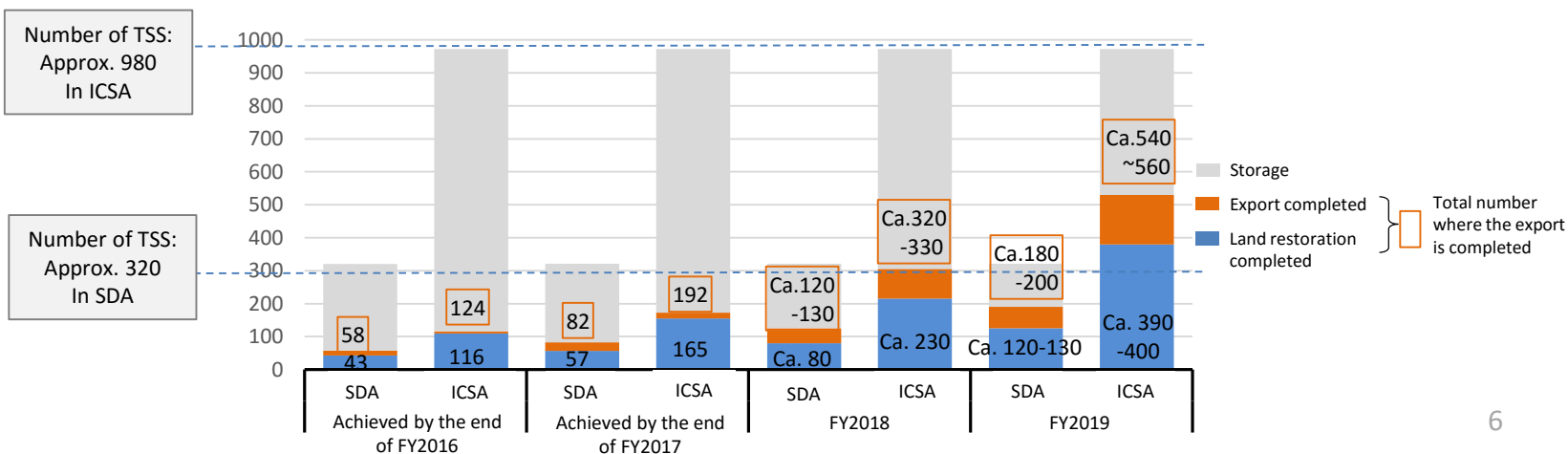
Image of export and land restoration



*1 The accumulative number of TSS as of the end of FY2016

*2 Aiming to transport 1.8 mil. m³ in FY2018, and 4mil. m³ in FY2019

Number of TSS where export and restoration will be completed (Estimation)



Scale of Whole Area Decontamination Project

- ◆ The MOE has budgeted approx. JPY 2.9 trillion (= USD 27 billion) for decontamination until FY2018.
- ◆ 17mil. m³ (among which approx. 16.5mil. m³ were from Fukushima Prefecture) of contaminated soil and wastes were removed until the end of FY2017.
- ◆ MOE published "Decontamination Project Report" to leave a record behind of the experiences, knowledge and lessons learned through decontamination works.

Decontamination in SDA

- Total number of labor:
approx. 13,700,000 workers
※as of the end of March 2018
- Budget: approx. JPY 1.5 trillion
※ MOE's budget until FY2018
- Volume of the generated soil:
approx. 9,100,000 m³
※Estimation as of the end of March 2018
- Transported volume of soil from TSS*:
approx. 1,900,000 m³
(ISF: approx. 280,000 m³, Volume Reduction Facility: approx. 1,620,000 m³) ※Estimation as of the end of 2018

※Considered 1US\$ =JPY107

Decontamination in ICSA

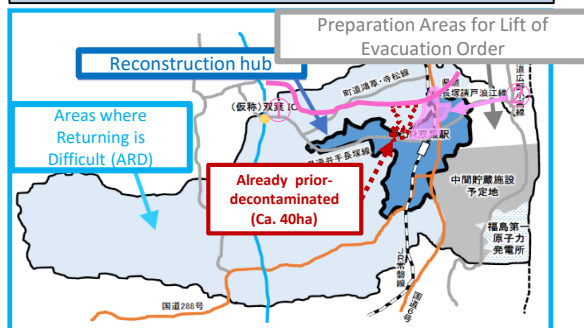
- Total number of labor:
approx. over 18,400,000 workers
※ estimated from interviews with relevant municipalities as of the end of March 2018
- Budget: approx. JPY 1.4 trillion
(within Fukushima Pref. : approx. JPY 1.4 trillion,
outside Fukushima Pref. : approx. JPY 40 billion
※MOE's budget until FY2018)
- Volume of the generated soil:
approx. 7,900,000 m³ (estimation)
(within Fukushima Pref.: approx. 7,400,000m³, outside Fukushima Pref.:
approx. 500,000m³, both are estimation as of March 2018)
- Transported volume of soil from TSS:
approx. 1,700,000 m³
(ISF: approx.500,000 m³, Volume Reduction Facility:
approx. 1,200,000 m³) ※Estimation as of the end of March 2018

Plans of Specified Reconstruction and Revitalization Base in ARD

(as of November 22, 2018)

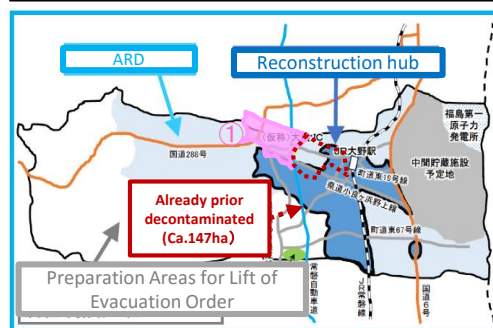
- ◆ By revision of the “Act on Special Measures for the Reconstruction and Revitalization of Fukushima” (May 2017), the municipalities can make plans to construct “Specified Reconstruction and Revitalization Base” (SRRB), aiming at lifting evacuation orders and allowing the residents to return
- ◆ The government approved the plans of 6 municipalities and decontamination and dismantlement started in all 6 municipalities

Futaba (approved on September 15, 2017)



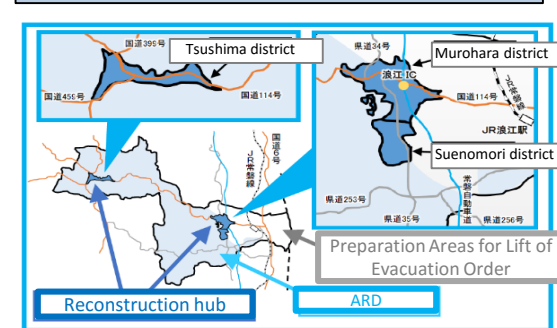
Decontamination work started

Okuma (approved on November 10, 2017)



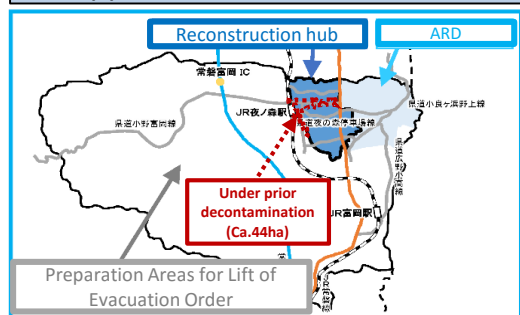
Decontamination work started

Namie (approved on December 22, 2017)



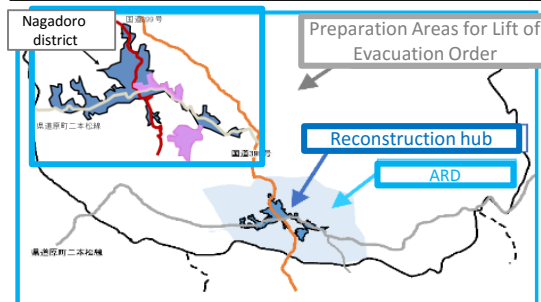
Decontamination work completed on a part of the road

Tomioka (approved on March 9, 2018)



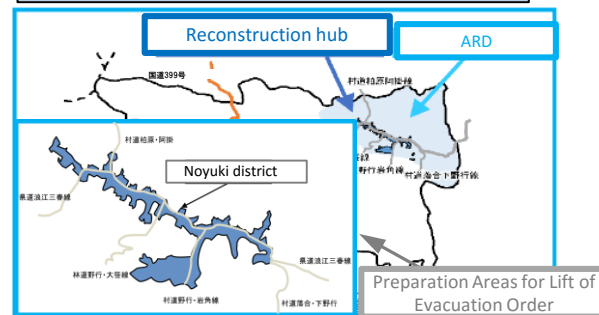
Decontamination work completed around JR station

Iitate (approved on April 20, 2018)



Decontamination work started.

Katsurao (approved on May 11, 2018)



Decontamination work started.

*Note: SRRB in the pictures stands for “Specified Reconstruction and Revitalization Base”

Result and Effect of the Whole Area
Decontamination

Interim Storage Facility

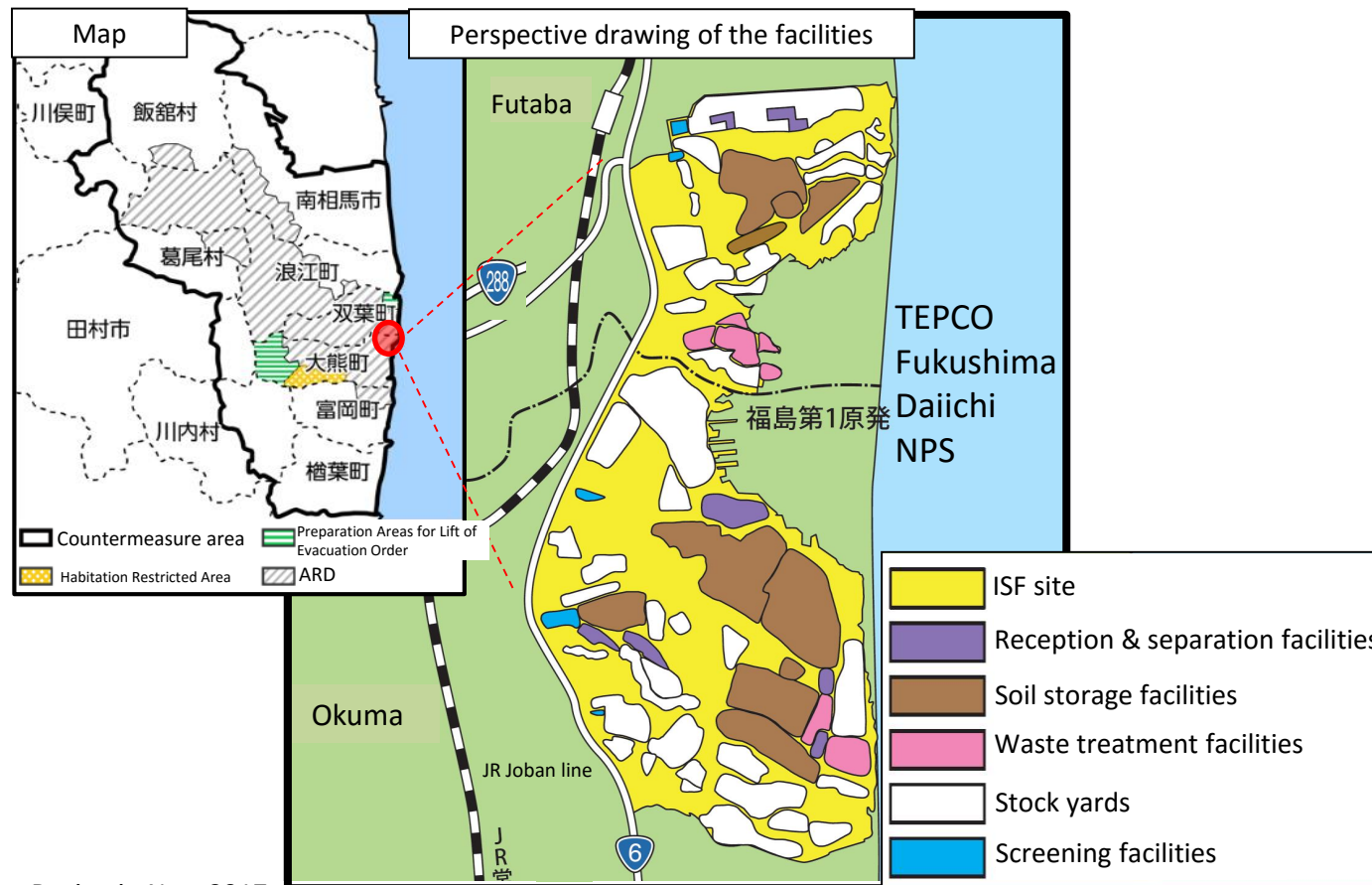
Disposal of the Specified Waste

Communication to the Public and
International Societies

Interim Storage Facility (ISF)

What is the Interim Storage Facility?

- In Fukushima Prefecture, large quantities of removed soil and waste have been generated from decontamination works. It is estimated that the volume will be approx. 16 ~22 mil. m³ after incineration of combustibles
- **The Interim Storage Facility is necessary to safely and intensively manage and store the soil and waste until final disposal.**
- Removed soil, waste, and incinerated ash (> 100,000 Bq/kg) are stored.



Process of the ISF Project

Land acquisition

Construction of facilities

Transportation of soil and waste

Processing and storage of soil and waste

Progress of Land Acquisition of the ISF

As of the end of
December 2018

<u>Whole Area</u> Ca. 1,600ha	Item	Ratio to the whole area	Ratio and the number of people registered to whole registration record (2,360 pers.※1)
	Landowners with contact information	Ca. 1,550ha ※1 96.9%	Ca. 1,940 pers. ※1 82.2%
<u>Private land</u> Ca.1,270ha (Ca.79%)	<div><div><u>Contracted</u></div><div><u>Private land out of contracted land</u> Ca. 1,037ha</div><div><u>Public land out of contracted land</u> Ca. 39ha</div></div>	<div><div><u>Ca. 1,076ha</u> (67.3%)</div><div><Reference> Ca. 1,367ha (85.4%)</div></div>	<div><div><u>1,652 pers. ※2</u> 70.0%</div><div>The ratio to 1,940 pers. landowners with contact information: 84.2%</div></div>
<u>National/ Municipality land</u> Ca.330ha (Ca. 21%)	Other public land	Ca. 291ha (18.2%)	

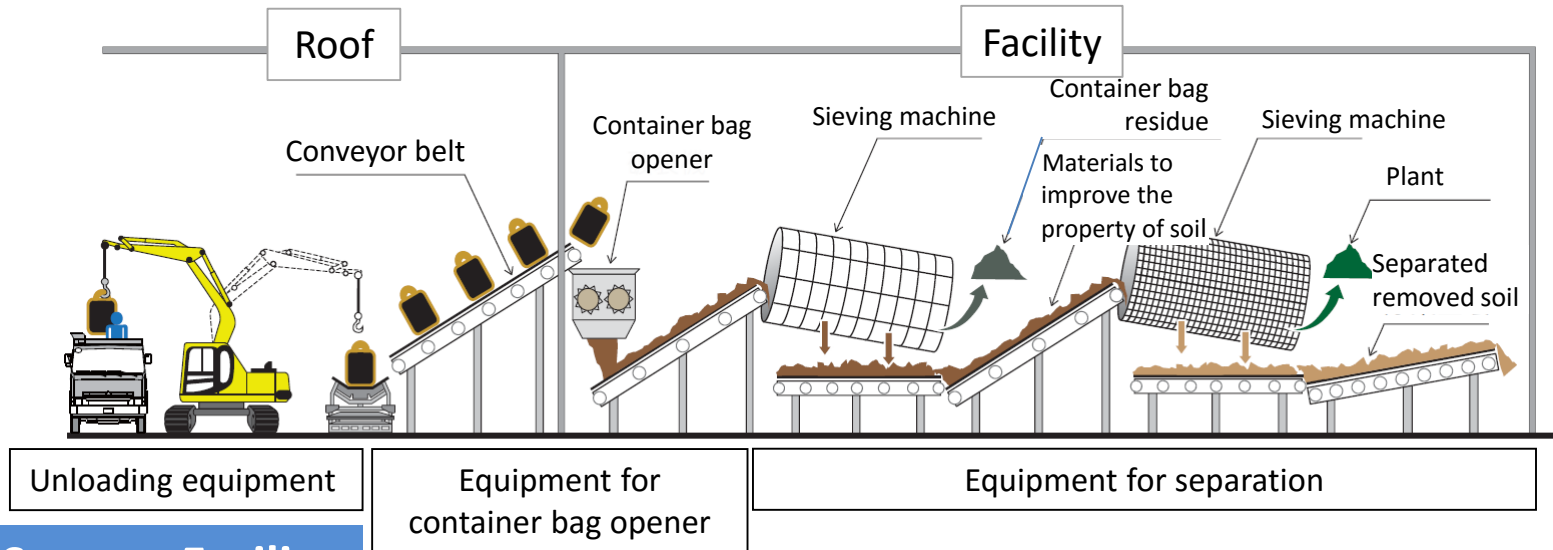
※1 Including National/Municipality institutions

※2 Private landowner: 1,650 pers.
Public land: 2pers.

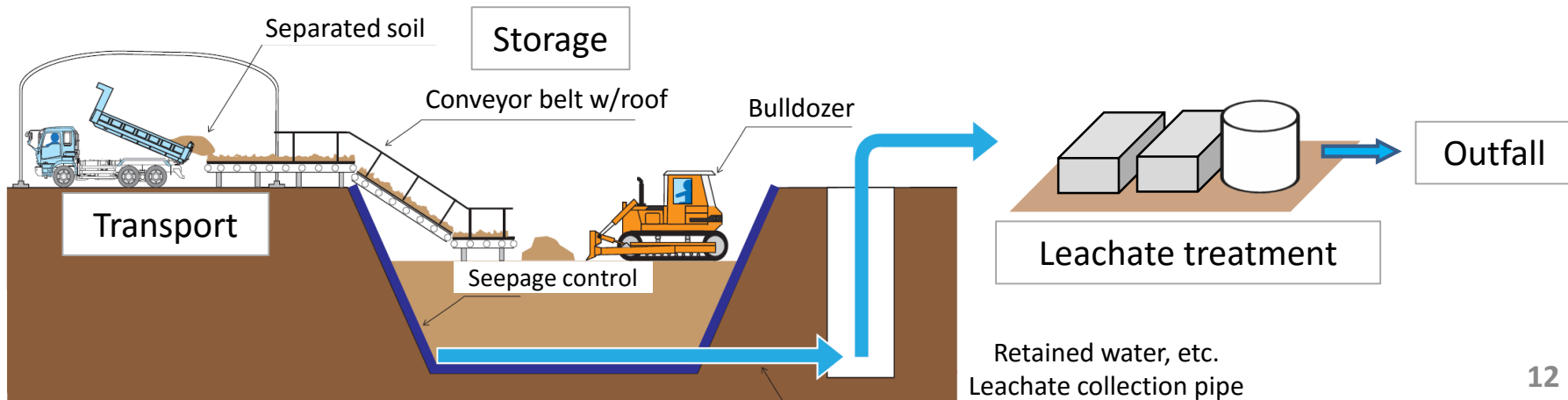
Reception / Separation / Soil Storage Facility

- ◆ Soil storage facility started the operation in October 2017 in Okuma and in December 2017 in Futaba

Reception / Separation Facility



Soil Storage Facility

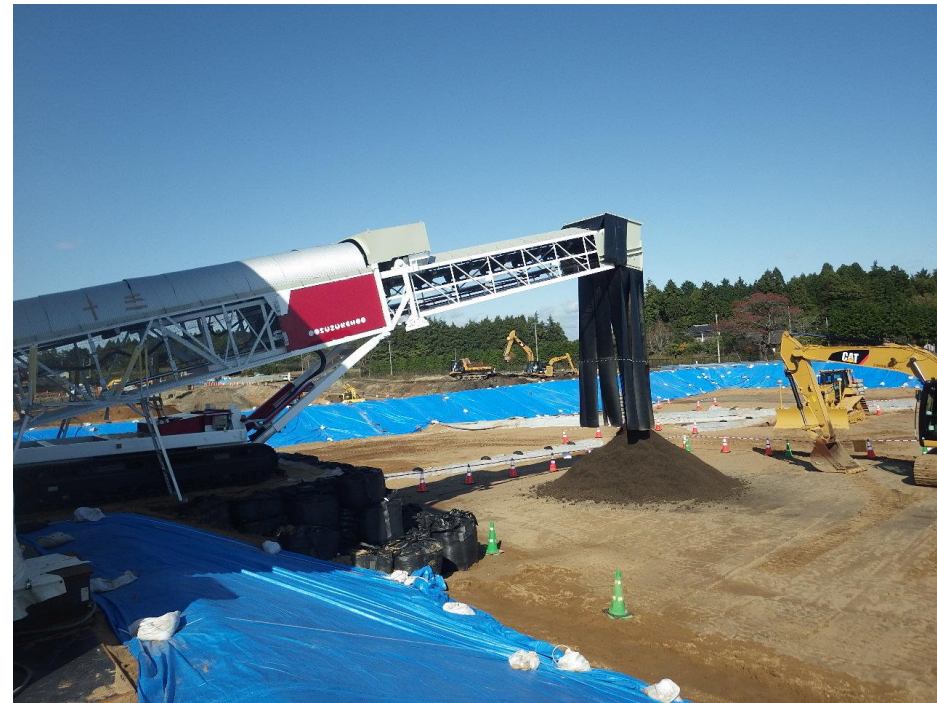


Operational Status of the ISF

- ◆ Construction of the facility started in November 2016
- ◆ The operation of Reception/Separation Facilities started in June 2017 in Futaba, and in August 2017 in Okuma
- ◆ The storage of the **removed soil started in October 2017 in Okuma and in December 2017 in Futaba** after the completion of the soil storage facilities



Reception/Separation Facility (in Futaba)



Soil Storage Facility (in Okuma)

Transportation to the ISF

- ◆ By July 4, 2018, accumulative total of 1,000,000m³ of removed soil was transported
- ◆ In FY2018, about 1,800,000m³ will be transported
- ◆ Safe and secure transportation will be sequentially conducted managing whole numbers of transport objects, managing traffic of trucks, and implementing environmental monitoring, and etc.

<Actual achievement>

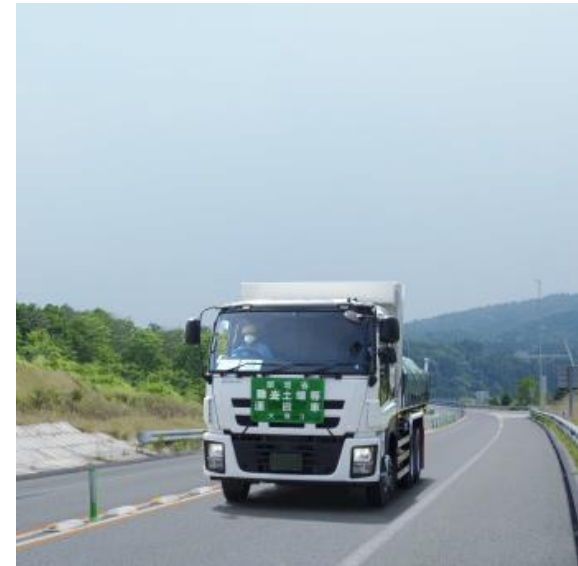
As of January 8, 2019

- ◆ Stored volume: 1,199,718 m³ in FY2018
(1,958,383 m³ in TTL)

* Calculated on the assumption that the volume of a large bag is 1 m³

- ◆ Total number of trucks used: 181,070 in FY2018
(306,746 in TTL)

* 6 m³ (6 bags) of removed soil is loaded on each truck

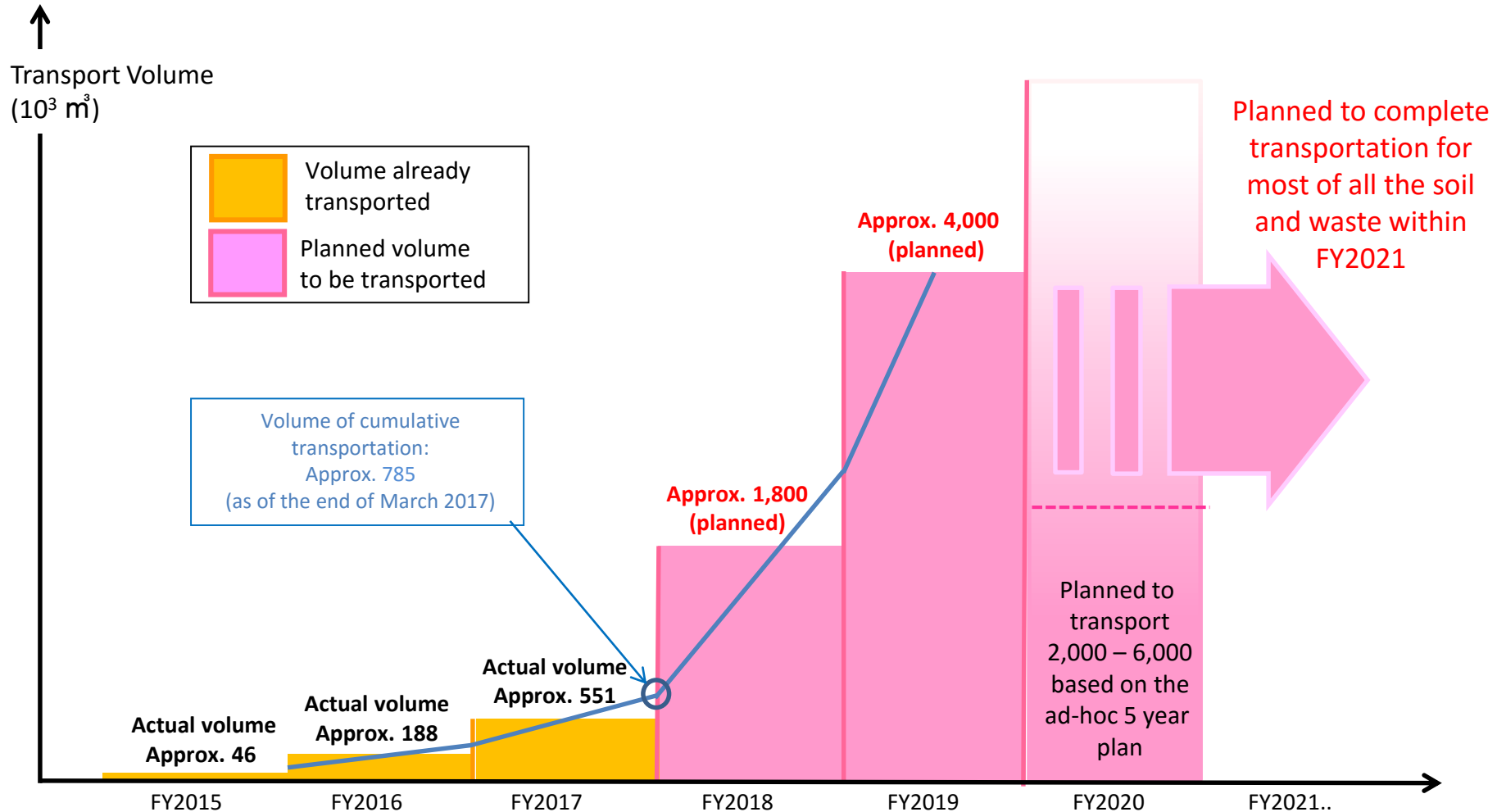


A truck transporting removed soil

Prospect for Ad-hoc Policy on Interim Storage Facility

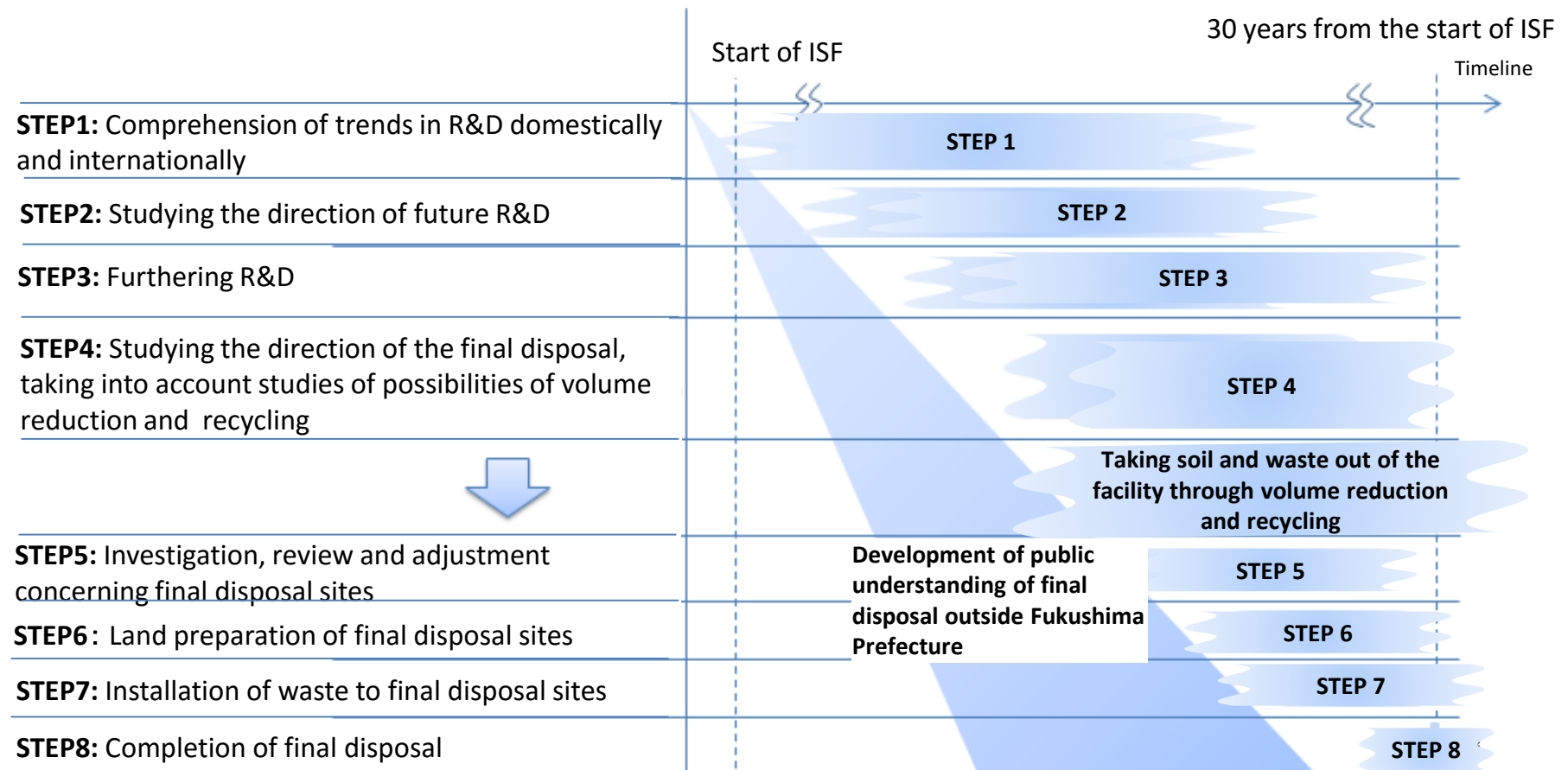
<Inc. achievement>

- ◆ Transport volume is expected to be largely increased in future and traffic measures are conducting accordingly
- ◆ Proceed the transportation of the removed soil from TSS and aim to reduce a number of TSS close to the residential areas by the year 2020



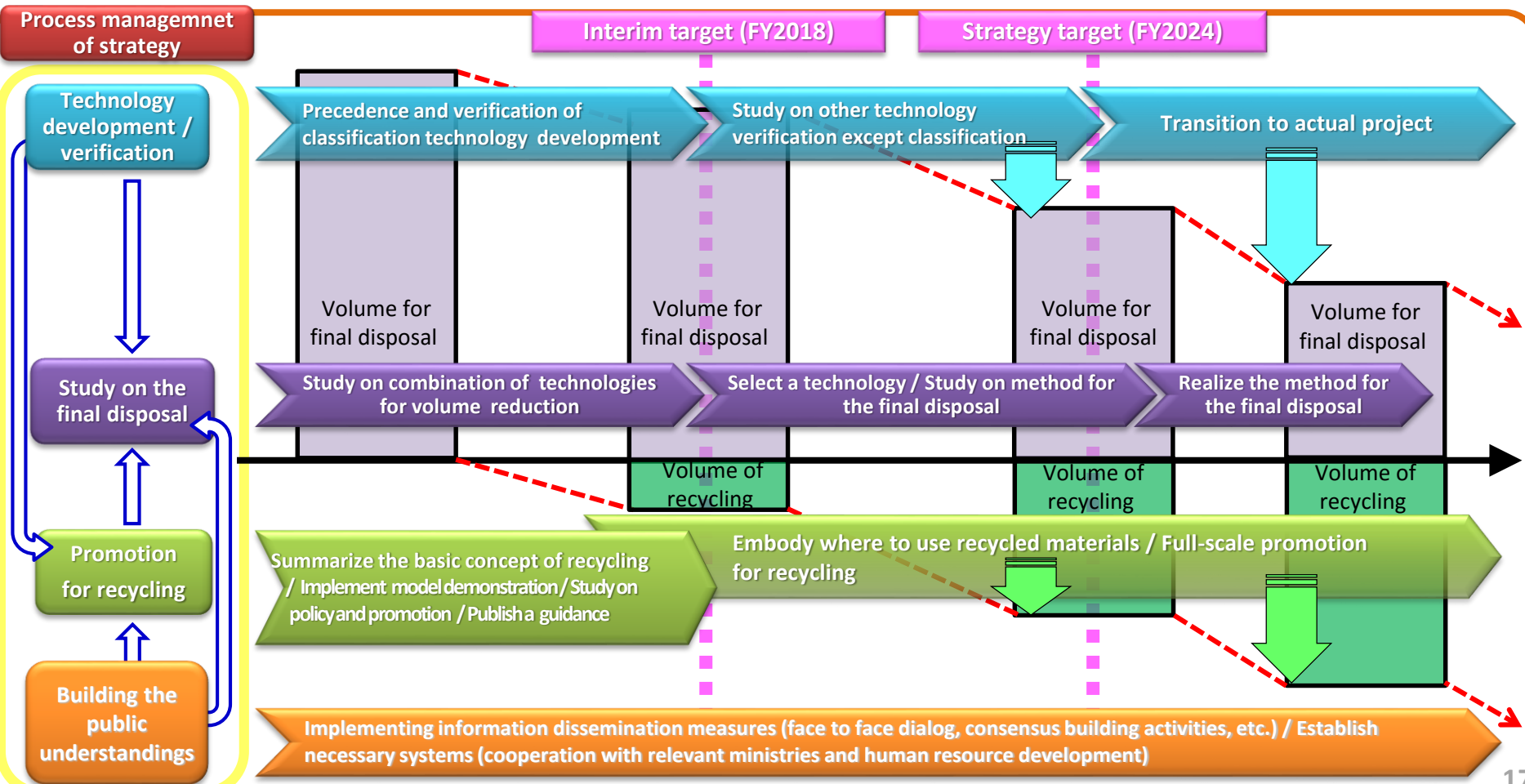
8 Steps towards the Final Disposal outside Fukushima Prefecture within 30 years from the Start of the ISF

- MOE conducts R&D to examine how the final disposal to be implemented taking into account the effect of radioactive decay and the potential of volume reduction and recycling
- MOE shares the information with the public to build the consensus for recycling of lower contaminated soil and the final disposal outside Fukushima Prefecture



Technology Development Strategy for Volume Reduction & Recycling of the Removed Soil

- Towards the final disposal of the removed soil outside Fukushima Pref., MOE will promote recycling of the soil after volume reduction technology as much as possible, which consequently would lead to reduce the volume of soil for the final disposal
- After clarifying the objectives and priority of technology development and volume reduction & recycling, basic technology development is planned to be completed within 10 years, then move onto a phase of treatment
- On the premise of securing safety, MOE will try to realize the recycling in the possible field, building public understandings for the safety
- Based on technology development and prospect of recycling in the future, MOE would propose some options for structure and necessary dimension of the final disposal



Concepts on Safe Use of the Removed Soil after Recycling (June 2016)

【Basic Concept】

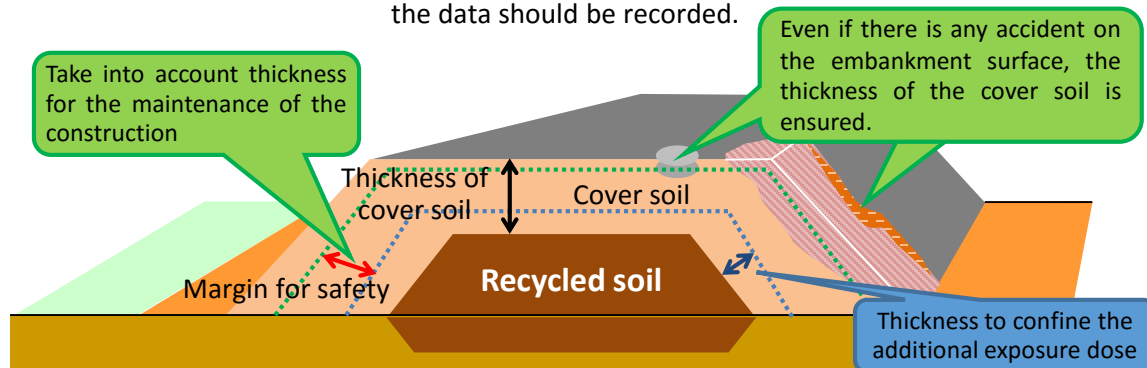
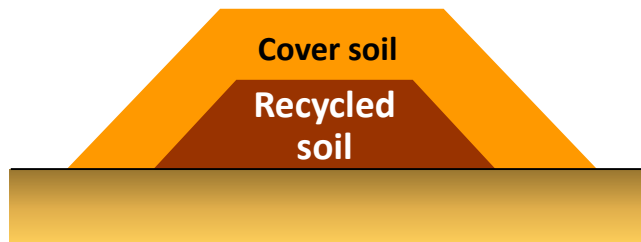
The removed soil should be used mainly for public projects with a responsible management system for the controlled materials (with a radioactivity level below 8,000Bq/kg in principle and set according to purpose) after necessary treatment, e.g. removal of debris, classification treatment. The use will be limited, such as the basic structure material of an embankment which is not assumed to change shape artificially, and be managed appropriately.

Limited use

- The use will be limited to the material which is not assumed to change shape artificially for a long time period, e.g. basic structure material of banking for coastal levees or seaside protection forests, embankment materials for roads, cover soil for waste disposal sites, landfill materials and basic structure for farms of flowers and energy crops.

Appropriate management

- The projects will be mainly public projects with a responsible management system.
- The radioactive cesium concentration in the removed soil should be limited in order to confine the additional exposure dose. The additional exposure dose should be below 1mSv/y during the construction and below 0.01mSv/y at the time of service.
- Covering soil should be installed, scatter and leakage should be prevented, ground form change should be observed, and the data should be recorded.



The thickness of cover soil should be designed to ensure the necessary thickness to confine the additional exposure dose, even when the general maintenance for the construction is conducted.

How to proceed recycling

As the environmental improvement towards the practical recycling of the removed soil, demonstration projects and model projects based on the above concepts should be implemented keeping the safety against radiation, studying specific verification of the management method and building stakeholders' and public understanding.

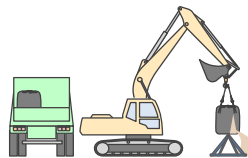
Demonstration Project for Recycling in Minamisoma City

Demonstration project is currently being implemented in Minamisoma City, studying specifically on handling radiation during the procedure of recycling and ensuring the quality of the recycled soil as construction material in order to promote safe recycling and reuse of the removed soil in a step by step manner.

1. Preliminary treatment / quality control process (April 2017-)

1. Open sandbags and remove large stones and debris

Open large sandbags and remove large foreign materials



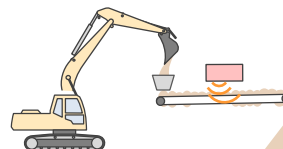
2. Further eliminate smaller debris

Eliminate small foreign materials through sieves



3. Classify soil by concentration

Measure radiation and classify soil



4. Control quality

Control quality of soil to be used for an embankment (such as water content and grain sizes)



vegetation



stones



pebbles

2. Test embankment process (May 2017-)

5. Construct test embankment / Monitoring

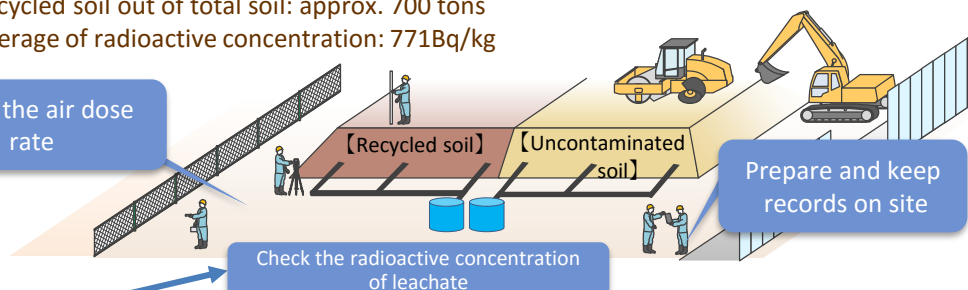
- Construct a test embankment (covered with uncontaminated soil by 50cm)
- Continue to measure the air dose rate and other indicators

Check the air dose rate

- Total amount of soil in embankment: approx. 4,000 tons
- Recycled soil out of total soil: approx. 700 tons
- Average of radioactive concentration: 771Bq/kg

Check the radioactive concentration of leachate

Prepare and keep records on site



Air dose rate was not much changed before and after opening of sandbags of the removed soil

Since the test embankment was constructed, **radioactive materials have not been detected in the leachate**



【Result of council of advisers】

- ◆ **Confirmed safety in this method** for recycling demonstration
- ◆ To accumulate data continuously conducting demonstration project

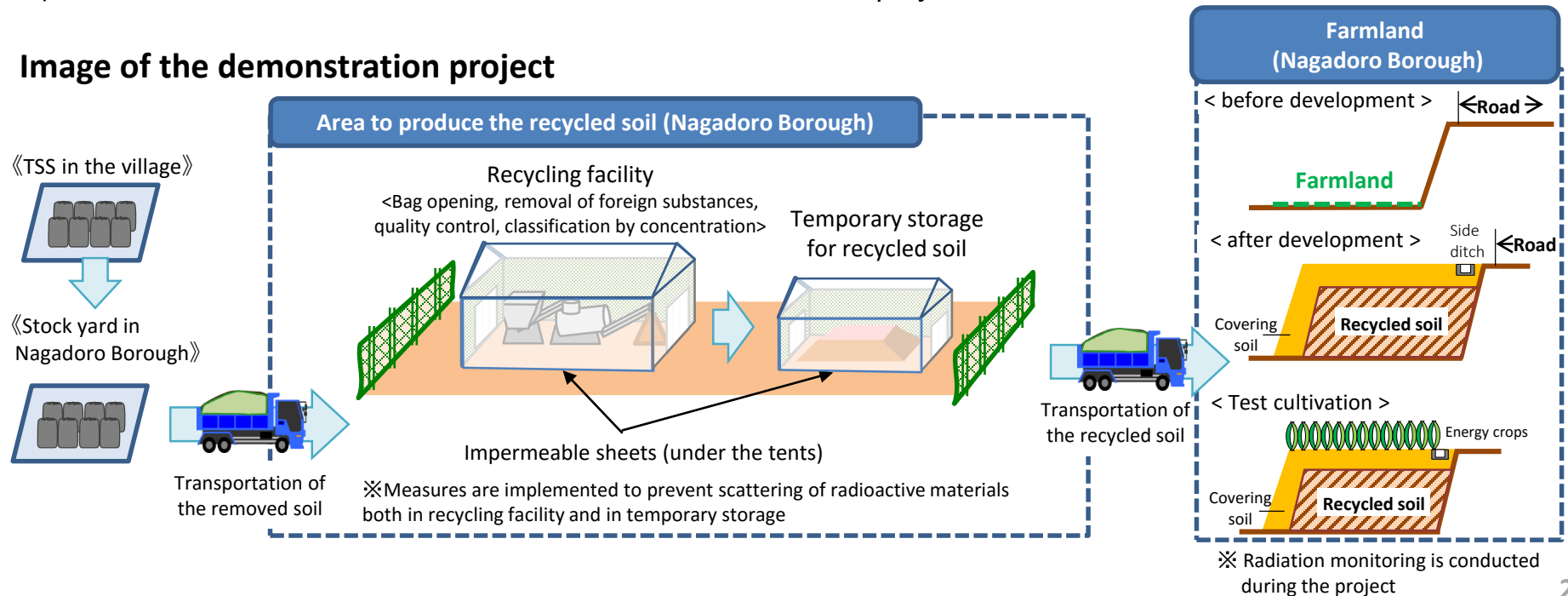
Demonstration Project for Recycling in Iitate Village

Another demonstration project is planned in Iitate Village. In response to the request from Iitate Village, the removed soil stored at TSS in Iitate Village will be recycled, and experimented in cultivation of flowers and energy crops in Nagadoro Borough of the village.

Contents of the demonstration project

- 1) Transport the removed soil from TSS in Iitate Village to the stock yard in Nagadoro Borough
- 2) Produce the recycled soil by separating foreign materials from the removed soil, classifying upon the radioactive concentration, and controlling the quality after construction of the recycling facility
- 3) At the demonstration project site, develop the basement of the farmland with the recycled soil covering the surface with uncontaminated soil
- 4) Conduct test cultivation at the farmland in the demonstration project site

Image of the demonstration project



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Communication to the Public and
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Progress on Disposal of waste in the Countermeasure Areas (Fukushima Prefecture)

As of January 7, 2019

- ◆ Transportation of disaster waste to the TSS has completed 2.1mil. tons as of the end of November 2018 (of which 380,000 tons were incinerated, 1,330,000 tons were recycled and 17,900 tons were reclaimed.)
- ◆ Transported disaster waste has been recycling as large as possible

< Status of disaster waste by category >

(1) Disaster waste disposal generated by Tsunami

- ◆ All the debris excluding that from Areas where Returning is Difficult (ARD) has been removed and transported to the TSS as of March 2016

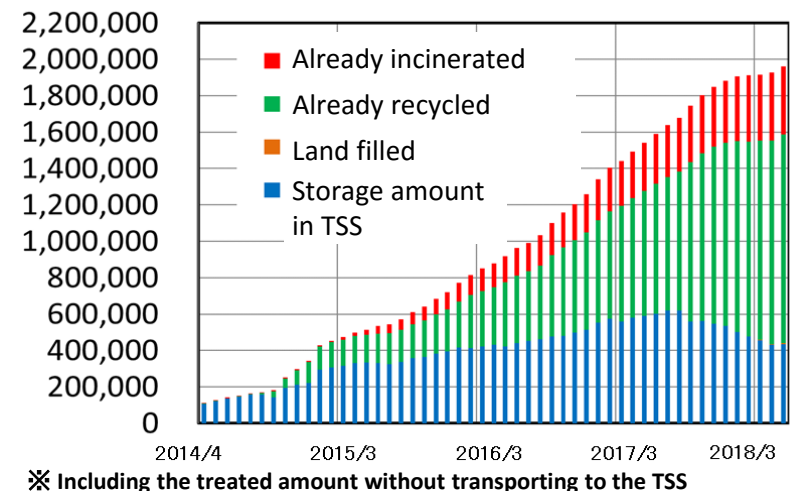
(2) Dismantling and removal of collapsed houses

- ◆ It is under operation to take application for dismantling and investigation, then conduct dismantling and removal
- ◆ Application for dismantling and removal of which 15,000 cases were registered, already announced dismantling work, 14,300cases, among which 11,400cases were removed

(3) Treatment of household waste

- ◆ Pick-up service at garbage stations or door-to-door visit
- ◆ Door-to-door retrieval is conducted after adjusting the schedule of the owner

Transported amount of disaster waste already transported to the TSS
in the countermeasure area <ton>



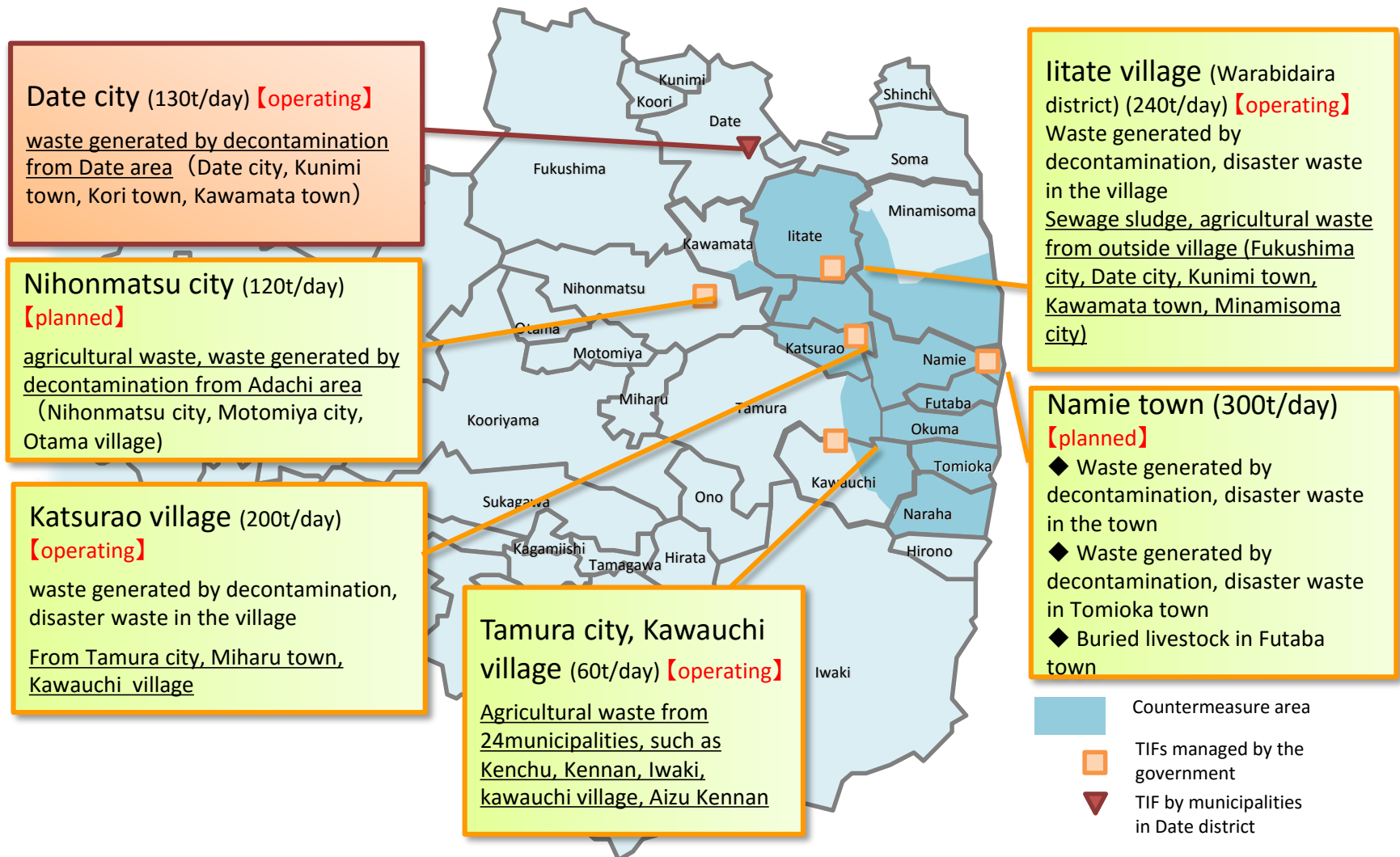
Dismantling of a collapsed house



TIF in Okuma

Implementation Situation of Waste Disposal across Municipalities

- ◆ To promote 'Waste disposal across municipalities': city/town/village hosting TIFs accept waste from other cities.
- ◆ Katsurao village and Nihonmatsu city will start 'Waste disposal across municipalities' at the TIFs in FY2018.



Disposal Project utilizing Existing Controlled Landfill Site

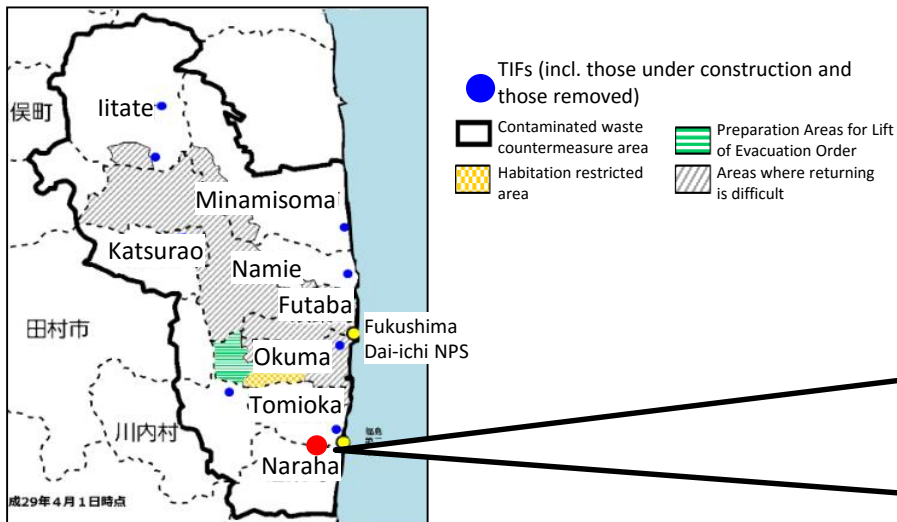
- ◆ As for Landfill disposal project for specified waste, the transportation to the site started on Nov. 17, 2017
- ◆ 53,212 container bags of waste mostly from Tomioka and Naraha Towns were transported (as of the end of Dec. 2018)
- ◆ Monitoring survey result before and after transportation shows no significant increase of air dose rate

Outline of the facility

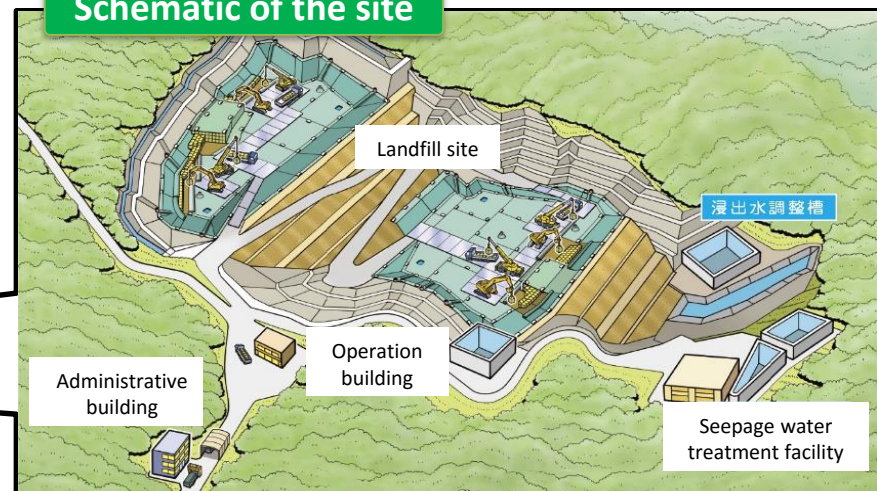
- ◆ To use **existing controlled landfill site** (formerly Fukushima Eco Tech Clean Center)
- ◆ To locate it in **Tomioka** (access from **Naraha**)
- ◆ The facility has been **nationalized** after local coordination
- ◆ Positioning as **the final disposal site**

Target object for landfill / Transport period

- ◆ **Waste within the countermeasure areas** (less than 100,000Bq/kg of radioactive concentration) [about 440,000m³] – about 6 years
- ◆ **Designated waste** (less than 100,000Bq/kg of radioactive concentration) [about 180,000m³] – about 6 years
- ◆ **General waste from houses** – about 10 years in 8 municipalities in Futaba
- ◆ Waste with more than 100,000Bq/kg of radioactive concentration will be delivered to the ISF



Schematic of the site



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**Communication to the Public and
International Societies**

Information Exchange with Local Communities

<Fukushima Regeneration Plaza>

- ◆ Established as “Decontamination Information Plaza” in January 2012 (Changed the name in July 2017)
- ◆ MOE and Fukushima Prefecture cooperate to operate as a station to convey information concerning environmental recovery such as reconstruction of Fukushima, radiation, and ISF

<Main activities>

- The facility is located close to JR Fukushima station, where exhibitions and seminars are held, and advice or answers are provided for any questions
- The explanation with panels and videos in events (“Moving Exhibitions”) are held
- Experts are dispatched to municipalities, town meetings and schools



Exhibition space

Number of visitors: 25,633
(February 2012-January 2018)



Moving exhibitions / Experts dispatch

Moving exhibitions: 555halls, Number of
attendants 59,627 (July 2012-January 2018)
Experts' dispatch: 1.340cases, Number of
attendants 70,594 (January 2012-January 2018)



Event (Kurumaza Café)

Attendants share information and
experiences at the event: Number of
attendants 738 (June 2013-January
2018)

Current PR Activities by MOEJ

Ministry of the Environment, Japan (MOEJ) released an English booklet in August 2017. English web-site, “Environmental Remediation” was also renewed and two TV shows are now available on MOE’s web site.

English booklet



A comic style booklet, “Nasubi no Gimon” was released in August 2017, explaining radiation measures for food, etc.

Renewal of the MOE web-site



MOE renewed the web-site, adding more updated information
<http://josen.env.go.jp/en/>

TV programs

“Fukushima Diaries” by Discovery Channel: In this 30-minitues show, three famous bloggers from overseas visited different destinations in Fukushima Pref. with their own interests. They showed the viewers what is really going on in Fukushima
http://josen.env.go.jp/en/movie_publication/cooperation_index.html



Channel Japan/CNBC ASIA: CNBC broadcasted 15-minitues program 4times in a row. Each program showed you the key persons in Fukushima how hard they work to fight against misconceptions and to revitalize Fukushima. Each content is as follows;



#1 The story of Mr. McMichael, who tries to help widely communicate correct information on Fukushima to international communities



#2 The story of two young people who are eager to revitalize their hometown, Fukushima



#3 The story of small factories that tackle on the development of robots for decommission.

#4 The story of Dr. Hayano, who teaches what is radiation from academic point of views.

Cooperation with International Societies

Dec. 5, 2016

The 4th Meeting of Japan-Ukraine Joint Committee for the cooperation to advance aftermath response to accidents at nuclear power stations (@Tokyo)

Apr. 17-21, 2017

The 3rd IAEA-MOE Experts Meeting on Environment Remediation of Off-Site areas after the Fukushima Dai-ichi Nuclear Power Station Accident (@Tokyo)

Oct. 26-27, 2017

The 6th Annual Japan-UK Nuclear Dialogue (@London)

Nov. 6-10, 2017

The 4th IAEA-MOE Experts Meeting on Environment Remediation of Off-Site areas after the Fukushima Dai-ichi Nuclear Power Station Accident (@Tokyo)

Nov. 21, 2017

The 7th Meeting of the Japan-France Nuclear Cooperation Committee (@Tokyo)

Nov. 27, 2017

The 5th Meeting of Japan-Ukraine Joint Committee for the cooperation to advance aftermath response to accidents at nuclear power stations (@Kiev)

Aug. 8, 2018

The 5th Meeting of US-Japan Bilateral Commission on Civil Nuclear Cooperation (@Tokyo)

Oct. 25, 2018

The 7th Annual Japan-UK Nuclear Dialogue (@Tokyo)

Nov. 21, 2018

The 8th meeting of the Japan-France Nuclear Cooperation Committee (@Paris)

