Asia-Pacific
Economic Cooperation

2011/SMEMM/006
Agenda Item: 2.3

Japan's Challenge Towards Recovery

Purpose: Information
Submitted by: Japan

APEC USA 2011

18th Small and Medium Enterprises Ministerial Meeting
Big Sky, United States
21 May 2011

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Great Support of the International Community

Japan deeply appreciates the assistance offered from people all over the world.

- 156 countries and regions
- 41 international organizations

- [Rescue teams]
  From 27 countries, regions and international organizations

(As of May 16th)

US Navy/US Pacific Command
(Operation Tomodachi)

Ministry of Defense

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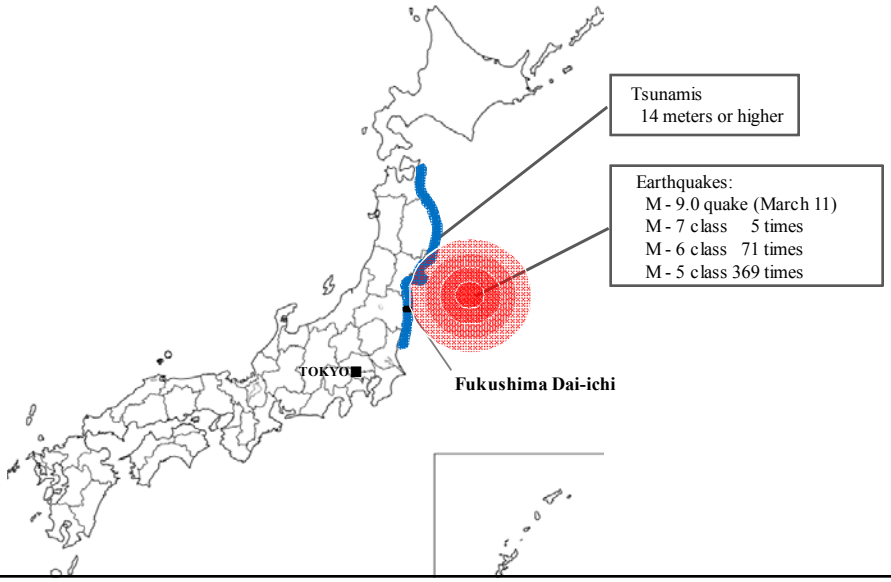
A. Japan Faces an Unprecedented Challenge
(Enormous Earthquake, Tsunamis and Nuclear Accident)



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1. Damage

KYODO NEWS

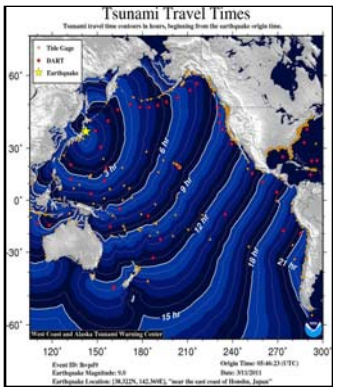
KYODO NEWS

Casualties : over 29,000

- Dead over 15,000
- Missing over 9,000
- Injured over 5,000

Evacuees : over 115,000

(As of May 17th)



NOAA/US Dept of Commerce, http://wcatwc.arh.noaa.gov/

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2. Rescue Efforts and Foreign Assistance

KYODO NEWS

Ministry of Defense

Ministry of Defense

Ministry of Defense

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3. Nuclear Power Stations
Nuclear Reactors near Epicenter of the Earthquake

4 Nuclear Power Stations with 14 Units

		automatic shut down	cold shut down
Onagawa			
Unit 1	524 MW, 1984-	✓	✓
Unit 2	825 MW, 1995-	✓	✓
Unit 3	825 MW, 2002-	✓	✓
Fukushima Dai-ichi			
Unit 1	460 MW, 1971-	✓	
Unit 2	784 MW, 1974-	✓	
Unit 3	784 MW, 1976-	✓	
Unit 4	784 MW, 1978-	Periodical inspection	
Unit 5	784 MW, 1978-		✓
Unit 6	1,100 MW, 1979-		✓
Fukushima Dai-ni			
Unit 1	1,100 MW, 1982-	✓	✓
Unit 2	1,100 MW, 1984-	✓	✓
Unit 3	1,100 MW, 1985-	✓	✓
Unit 4	1,100 MW, 1987-	✓	✓
Tokai Dai-ni			
Unit 1	1,100 MW, 1978-	✓	✓

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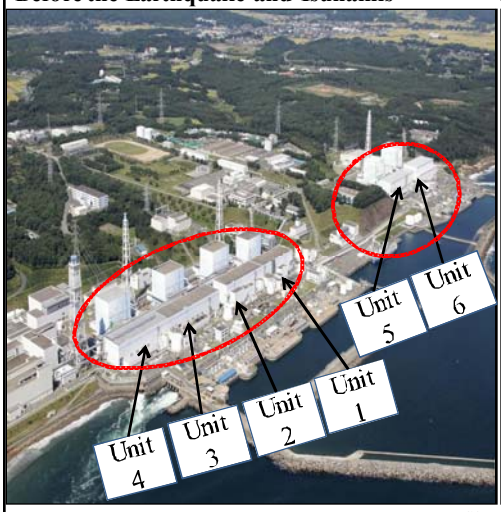
3. Nuclear Power Stations
Fukushima Dai-ichi Nuclear Power Station

Before the Earthquake and Tsunamis



TEPCO

After the Earthquake and Tsunamis

Air Photo Service Inc (Myoko, Niigata Japan)

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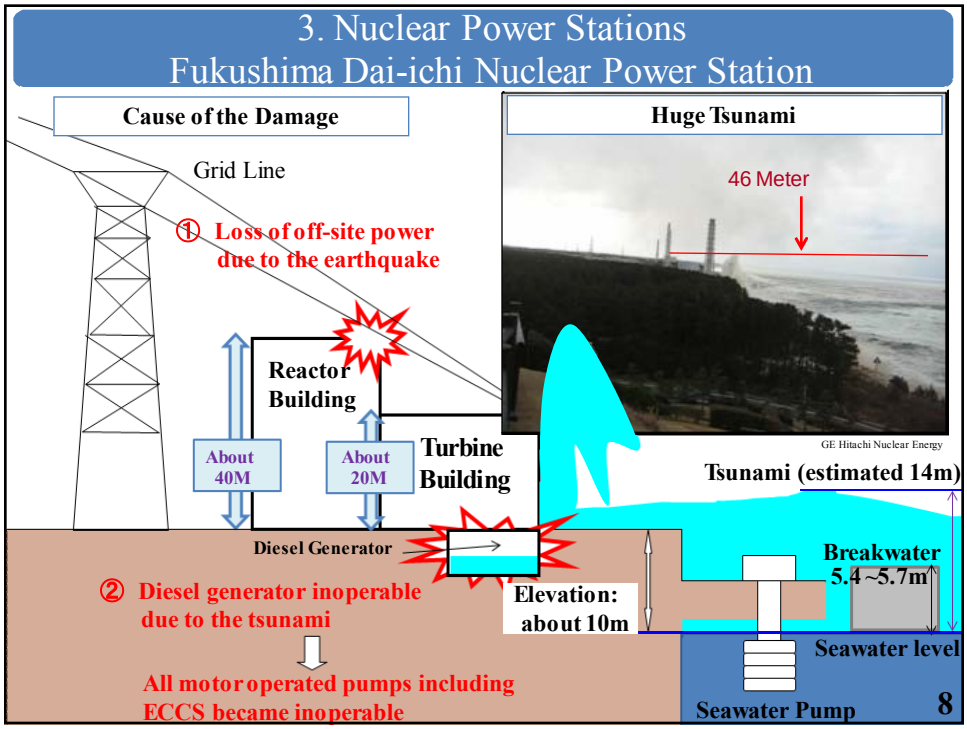
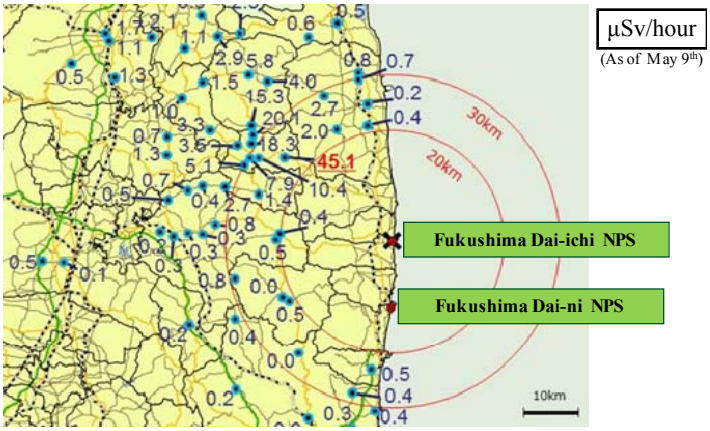
3. Nuclear Power Stations
Fukushima Dai-ichi Nuclear Power Station



3. Nuclear Power Stations
Fukushima Dai-ichi Nuclear Power Station



20 km radius of the plant and other designated areas
→ no-entry zone, planned evacuation zone

Other areas of the 30km radius of the plant (as a general rule)
→ emergency evacuation preparation area

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B. Key Challenges

1. Cool Down the Reactors
2. Contain the Spread of Radioactive Substances (sea, soil and atmosphere)
3. Rigorous and Intensive Monitoring
4. Ensure the Safety of Food, Products, and On-site Workers

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1. Cool Down the Reactors

		Unit 1 	Unit 2 	Unit 3 	Unit 4 
Type / MW / Commercial Operation		BWR / 460 / Mar 71-	BWR / 784 / Jul 74-	BWR / 784 / Mar 76-	BWR / 784 / Oct 78-
Status at time of Earthquake		In Operation	In Operation	In Operation	Periodical Inspection Outage
RPV	Automatic Shutdown	✓	✓	✓	—**
	Fresh Water Injection	✓	✓	✓	—**
	Water Level [mm] (distance from the top of fuel)	Off scale (A) -1,750 (B)	-1,500 (A) -2,100 (B)	-2,000(A) -2,300 (B)	—**
	Reactor Pressure [Mpa]	0.495 (A) 1.358 (B)***	-0.020 (A)*** -0.018 (D)***	-0.094 (A)*** -0.089 (C)***	—**
	Temperature －Feedwater Nozzle －Bottom Head of RPV	92.8℃*** 80.7℃	113.5℃ N/A *	137.5℃*** 129.5℃	—**
SFP	Fresh Water Injection	✓	✓	✓	✓
	Temperature	N/A *	47℃	N/A *	N/A *
Building		Damage	Slight Damage	Damage	Damage
AC Power (Lighting of Central Operation Room**)		✓	✓	✓	✓

*Measuring instrument malfunction
**Out of covering range for data collection
***Under monitoring of the change of the situation.

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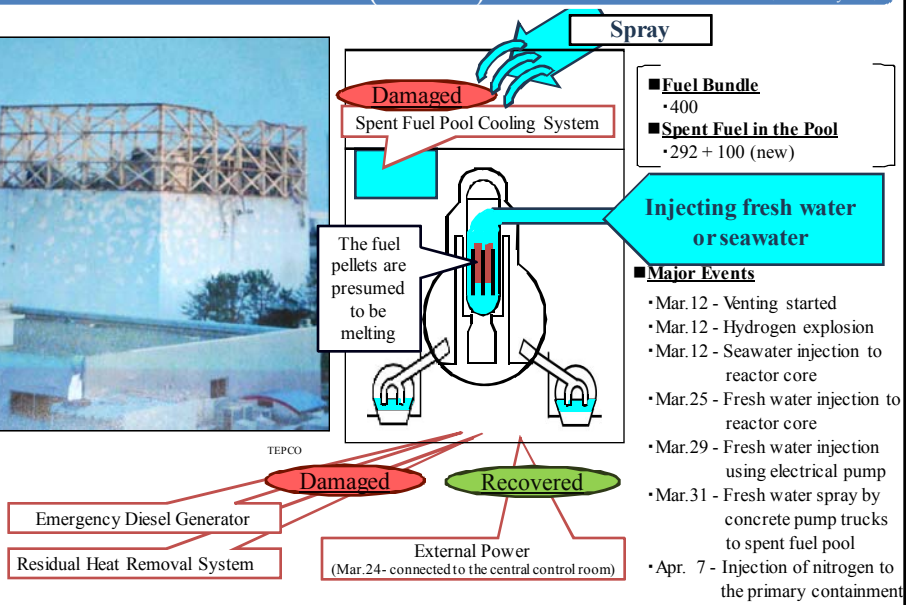
1. Cool Down the Reactors (Unit 1)

(As of May 16th)

TEPCO



■**Fuel Bundle**
・400
■**Spent Fuel in the Pool**
・292 + 100 (new)

■**Major Events**
・Mar.12 - Venting started
・Mar.12 - Hydrogen explosion
・Mar.12 - Seawater injection to reactor core
・Mar.25 - Fresh water injection to reactor core
・Mar.29 - Fresh water injection using electrical pump
・Mar.31 - Fresh water spray by concrete pump trucks to spent fuel pool
・Apr. 7 - Injection of nitrogen to the primary containment vessel

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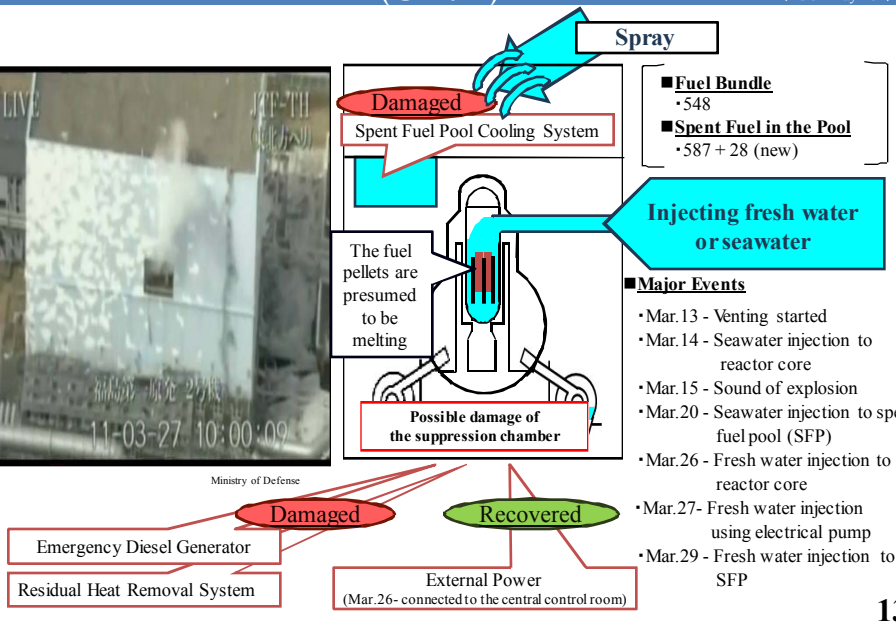
1. Cool Down the Reactors (Unit 2)

(As of May 16th)

Ministry of Defense



■**Fuel Bundle**
・548
■**Spent Fuel in the Pool**
・587 + 28 (new)

■**Major Events**
・Mar.13 - Venting started
・Mar.14 - Seawater injection to reactor core
・Mar.15 - Sound of explosion
・Mar.20 - Seawater injection to spent fuel pool (SFP)
・Mar.26 - Fresh water injection to reactor core
・Mar.27- Fresh water injection using electrical pump
・Mar.29 - Fresh water injection to SFP

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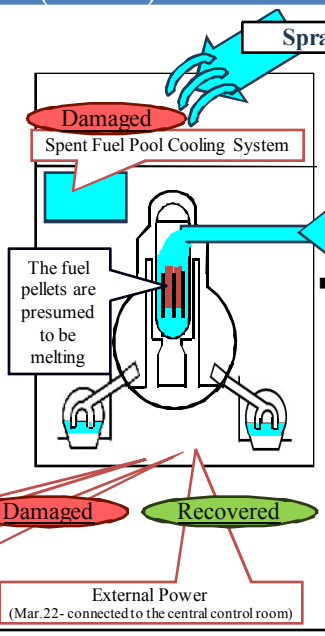
1. Cool Down the Reactors (Unit 3)

(As of May 16th)

Air Photo Service Inc (Myoko, Niigata Japan)



■**Fuel Bundle**
・548
■**Spent Fuel in the Pool**
・514 + 52 (new)

Injecting fresh water or seawater

■**Major Events**
・Mar.13 - Venting started
・Mar.13 - Seawater injection to reactor core
・Mar.14 - Hydrogen explosion
・Mar.20 - Sprayed to spent fuel pool(SFP) by Tokyo Fire Department
・Mar.25 - Fresh water injection to reactor core
・Mar. 28- Fresh water injection using electrical pump
・Mar.29~ Fresh water spray by concrete pump trucks to SFP

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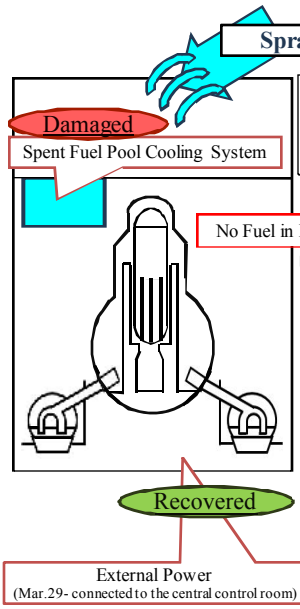
1. Cool Down the Reactors (Unit 4)

(As of May 16th)

Air Photo Service Inc (Myoko, Niigata Japan)



■**Fuel Bundle**
・0
■**Spent Fuel in the Pool**
・1331 + 204 (new)

No Fuel in Reactor Pressure Vessel

■**Major Events**
・Mar.15 - Fire occurred
・Mar.16 - Fire occurred
・Mar.20 - Seawater spray by Self- Defense Forces to spent fuel pool (SFP)
・Mar.25 - Seawater injection to SFP
・Mar.30 - Fresh water spray by concrete pump trucks to SFP

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1. Cool Down the Reactors (Unit 5&6)

(As of May 16th)

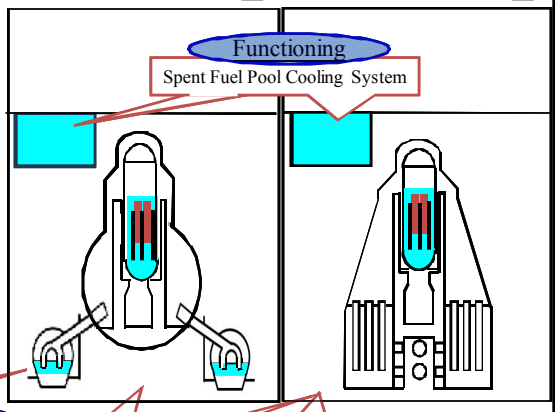
KYODO NEWS

■**Fuel Bundle**
・Unit5 : 548

■**Spent Fuel in the Pool**
・Unit 5 : 946 + 48 (new)

■**Fuel Bundle**
・Unit6 : 764

■**Spent Fuel in the Pool**
・Unit 6: 876 + 64 (new)



Functioning
- External Power [Unit 5]
- Emergency Diesel Generator
- Residual Heat Removal System

Recovered
- External Power [Unit 6] (Mar.22- connected to the central control room)

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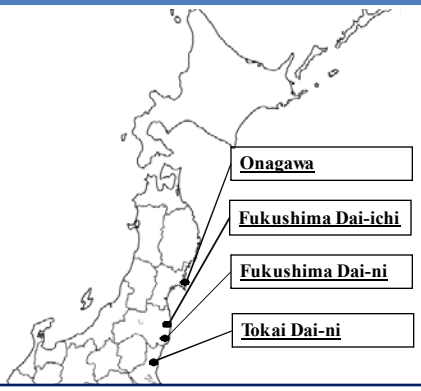
Other Nuclear Power Stations in the Tohoku Area

Onagawa (3 Units)

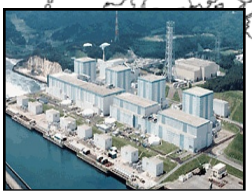
Tohoku Electric Power Co., Inc

All units (Units 1-3) were immediately shut down automatically, then safely went into cold shutdown.



Fukushima Dai-ni (4 Units)

All units (Units 1-4) were immediately shut down automatically, then safely went to cold shut down.



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Tokai Dai-ni (1 Unit)

The unit was immediately shut down automatically, then safely went to cold shut down.

The Japan Atomic Power Company

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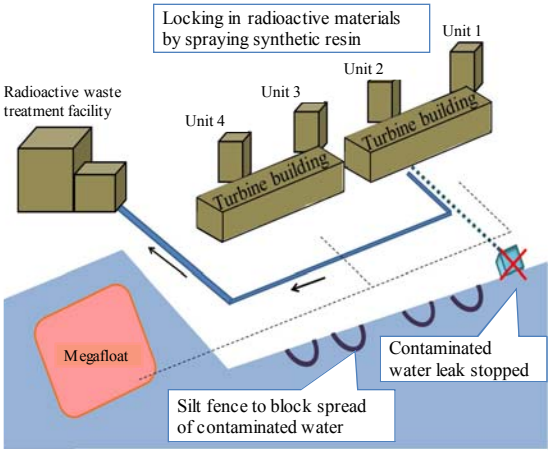
Contain the Spread of Radioactive Substances
(sea, soil and atmosphere)

The Japanese Government and TEPCO are making the utmost efforts to prevent the dispersion of flow-out radioactive contaminated water.



■Major Events

- Apr. 2
  Highly contaminated water discovered leaking into the sea.
- Apr. 6
  Leak of contaminated water into the sea was stopped.
- Apr. 12
  Transfer of stagnant water in the trench of Unit2 to the condenser started.
- Apr. 14
  Silt fence was installed to block the spread of contaminated water.
- Apr. 19
  Transfer of stagnant water in the trench of Unit 2 to the radioactive waste treatment facilities started.

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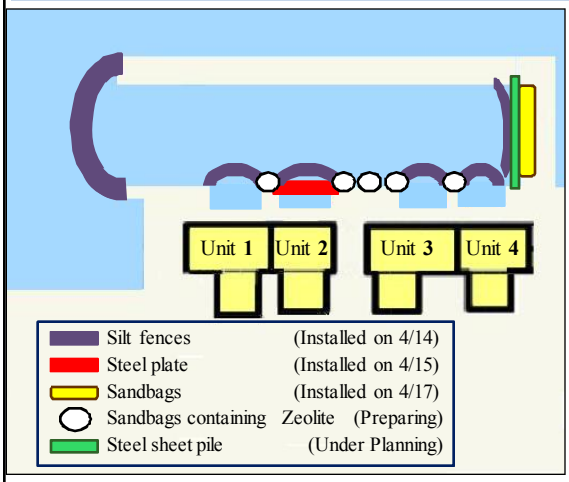
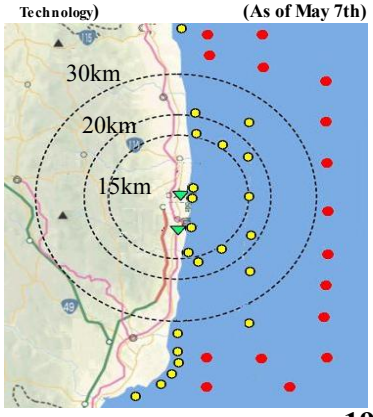
2. Contain the Spread of Radioactive Substances
(Preventing the Spread of Water) (As of May 16th)

Silt fences, steel plates, and sandbags with radioactive-substance absorption material have been installed to contain the spread of radioactive water. The Japanese Government and TEPCO carefully monitor seawater.



: Monitoring Locations by TEPCO
: Monitoring Locations by MEXT
(Ministry of Education, Culture, Sports, Science and Technology) (As of May 7th)



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2. Contain the Spread of Radioactive Substances
(sea, soil and atmosphere)

Experts are making the utmost efforts to prevent dispersing radioactive substances contained in dust, debris and vapor.

Spraying synthetic materials on the surface of the ground and debris to prevent radioactive substances dispersion

TEPCO

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Roadmap towards Restoration from the Accident

(announced by TEPCO on Apr.17)

Mar.11 | Apr.17 | Around 3 months | Around 6~9 months

Step 1 | Step 2

Target	Radiation dose in steady decline	Controlling release of radioactive materials (significant reduction of dose level)
[Reactors]	Stable cooling - Resume heat exchange function - [Unit 1,3] flood up to top of active fuel - [Unit 2] Seal the damaged location	Achieve cold shutdown
[Spent Fuel Pools]	Stable cooling - Enhance reliability of water injection - Restore coolant circulation system - [Unit 4] Install supporting structure	More stable cooling - Keep sufficient level of water by remote-control - Resume heat exchange function
[Contaminated Water]	Secure storage place - Prevention of outflow to the outside of the site	Decrease contaminated water (decontamination and desalt)
[Contaminated Atmosphere/Soil]	Prevention of spread	Install reactor building cover

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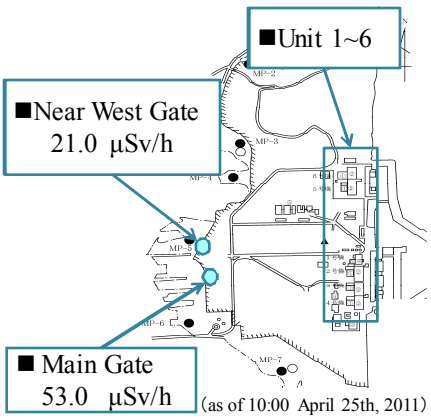
3. Rigorous and Intensive Monitoring

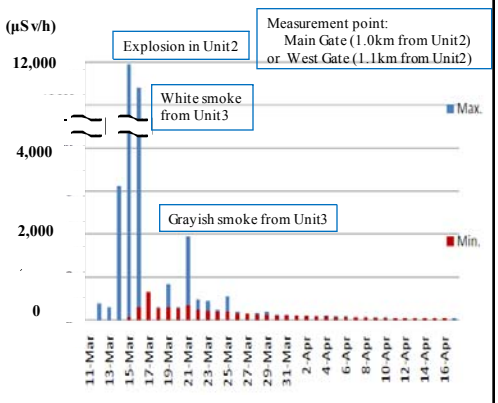
TEPCO monitors radioactivity levels every 10 minutes and releases the results immediately. Radioactivity levels rose on March 15th, but have since fallen and remain low.

Monitoring posts and the readings at the Fukushima Dai-ichi NPS



(as of 10:00 April 25th, 2011)

Environmental Radioactivity Level at the Fukushima Dai-ichi NPS



TEPCO

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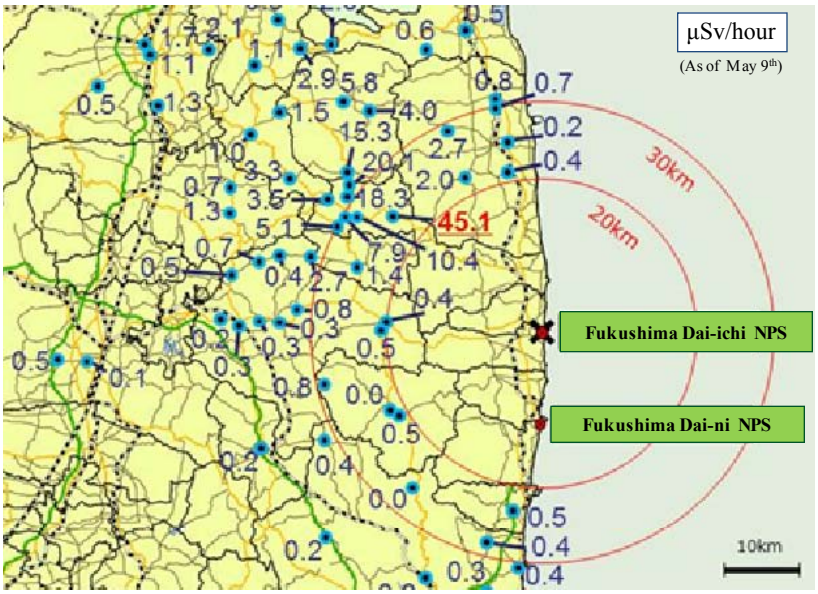
Readings at Monitoring Posts out of Fukushima Dai-ichi NPS



Ministry of Education, Culture, Sports, Science and Technology (MEXT)

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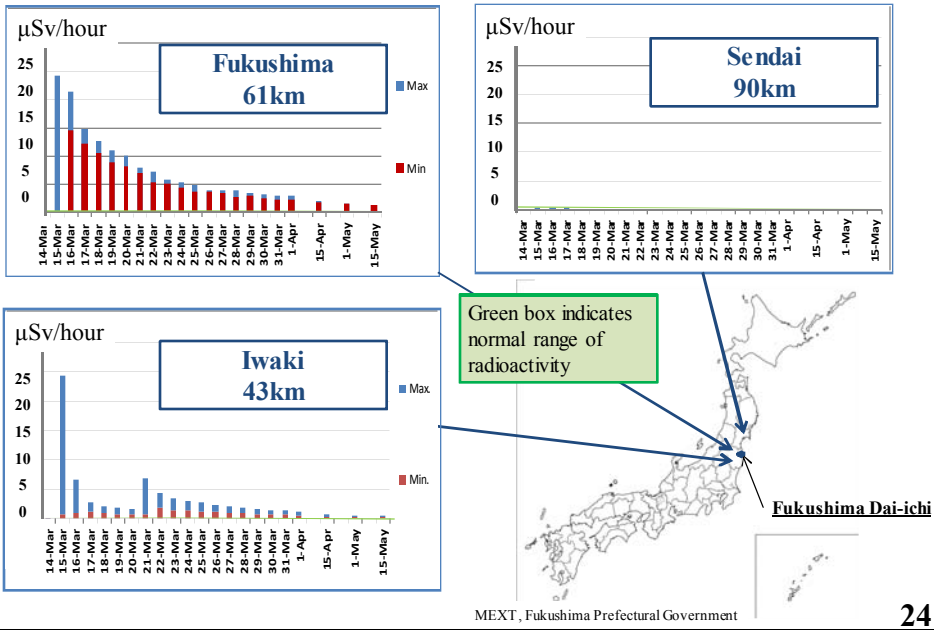
Atmospheric Readings within 100km



MEXT, Fukushima Prefectural Government

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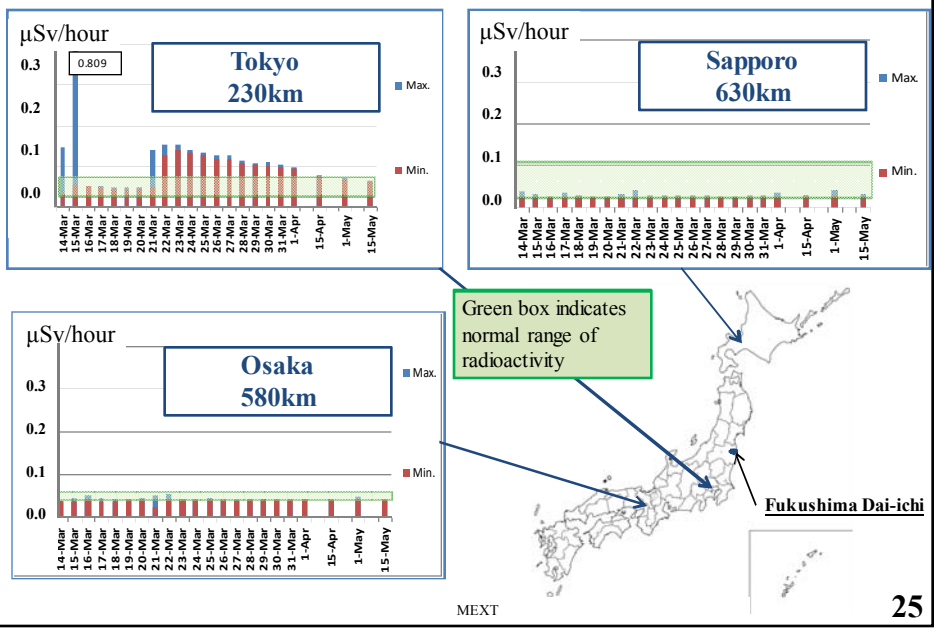
Atmospheric Readings in Tokyo, Osaka and Sapporo



MEXT

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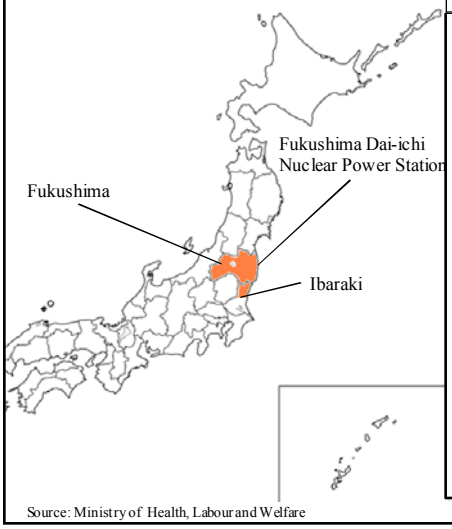
4. Ensure the Safety ~Food and Products~

Japan inspects radioactivity in food every day, and restricts distribution of food that fails to meet provisional regulation values taking into consideration the spread of contamination.



Source: Ministry of Health, Labour and Welfare

Instructions (as of May 9th)

… Not to Distribute

* **Fukushima Prefecture**
  - Raw milk
  - Non-head type leafy vegetables (e.g. spinach)
  - Head type leafy vegetables (e.g. cabbage)
  - Flowerhead brassicas (e.g. broccoli, cauliflower)
  - Turnip
  - Log grown shiitake (grown outdoor)
  - Bamboo shoot
  - Ostrich fern
  - Juvenile (baby) fish of Japanese sand lance
* **Ibaraki Prefecture**
  - Spinach

… Not to Consume

* **Fukushima Prefecture**

  Non-head type leafy vegetables and head type leafy vegetables / Flowerhead brassicas

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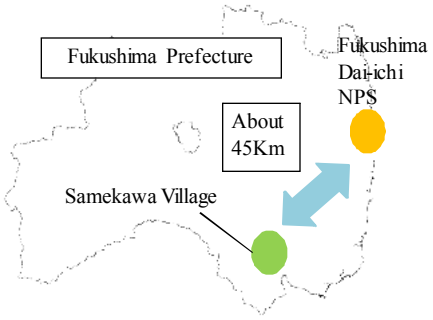
4. Ensure the Safety ~Farm Produce~



Radioactive Contamination in Leafy Vegetables in Samekawa-village (Fukushima Prefecture)

(bq/kg)	Samekawa-village		
	21-Mar		24-Mar
radioactive iodine	5,900	→	1,200
radioactive cesium (Cs134)	1,700	→	68

Guidance Levels for Radionuclides in Vegetables

Japan	EU	IAEA *
2,000	2,000	3,000
500	1,250	1,000

Ministry of Health, Labour and Welfare, EURATOM, IAEA
*OIL(Operational Intervention Levels) 6 : Locally produced food, milk and water have been screened, and all members of the public, including infants, children and pregnant women can safely drink the milk and water and eat the food during the emergency phase.

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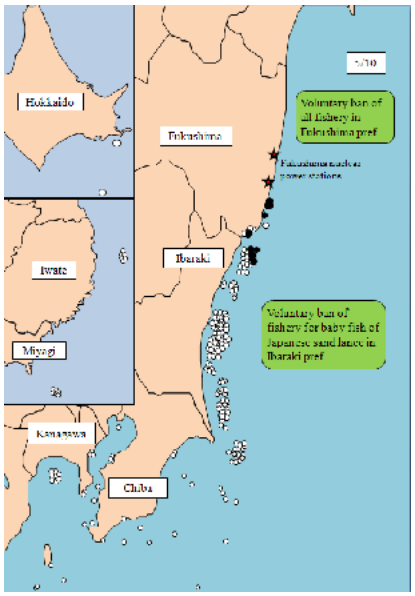
4. Ensure the Safety ~Marine Food~ (As of May 10th)



● Over provisional regulation limits : 12 samples
○ Below provisional regulation limits : 227 samples

All 12 samples over provisional regulation values :
Juvenile (baby) fish of "Japanese sand lance", which inhabits in very surface water influenced by radionuclides

Fisheries of this fish species :
not conducted in Fukushima prefecture and Ibaraki prefecture

No fisheries :
conducted in Fukushima prefecture

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Safety of Industrial Products

Japanese manufacturing industries spare no effort to ensure the safety of their products. Inspection institutions and industry associations provide testing service of the radiation levels of export products.

Example of Inspection Institutions
- NKKK (Nippon Kaiji Kentei Kyokai)
  (International Inspectation & Surveying Organization)
- SK (Shin Nihon Kentei Kyokai)
- ANCC (All Nippon Checkers Corporation)

etc.

Reference : JETRO Homepage
http://www.jetro.go.jp/world/shinsai/20110318_11.html

JAMA (Japan Automobile Manufacturers Association)
Comments on Radiation Testing Related to the Fukushima Nuclear Power Plant Situation
(April 18, 2011)

<extracts>
The tests implemented by JAMA －which are conducted directly on various designated areas of the surface of vehicles－ are showing results that fall within the range designated by the Nuclear Safety Commission of Japan as being unthreatening to human health, based on the daily readings performed by the Ministry of Education, Culture, Sports, Science and Technology in every prefecture since March25.

Reference : JAMA Homepage:
http://www.jama-english.jp/release/comment/2011/110418.html

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4. Ensure the Safety ~Drinking Water~

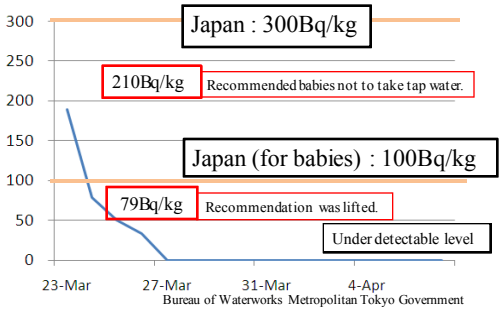
The Japanese Government has been implementing necessary measures based on its stringent criteria for radionuclides in drinking water, and monitoring radionuclide levels every day.

Guidance Levels for Radionuclides in Drinking Water

(Bq/kg)	Japan	EU
radioactive iodine(I131)	300 (for babies) 100	500
radioactive cesium	200	1,000

Ministry of Health, Labour and Welfare, EURATOM

Radioactive Iodine(I131) in Drinking-Water in Tokyo
(Kanamachi filter plant)



Bureau of Waterworks Metropolitan Tokyo Government

*On March 23, the Japanese Government recommended that the residents in Tokyo area refrain from having their babies take tap water, but it lifted the recommendation in two days.

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4. Ensure the Safety ~On-site Workers~

The Japanese Government closely supervises on-site workers' health conditions, limiting the level of their maximum exposure to radiation to 250mSv.
No workers in Fukushima NPS have been exposed to 250mSv or more.

Emergency Dose Limit

mSv	JAPAN
emergency dose limit	100 ↓ 250 (limit raised for Fukushima emergency workers)

Ministry of Health, Labour and Welfare, Nuclear and Industrial Safety Agency

ICRP's limit : 500mSv

*ICRP = International Commission on Radiological Protection

Workers Exposed to Radiation in Fukushima Dai-ichi NPS, as of April 24

level of exposure	number of workers
more than 100mSv	30
more than 250mSv	0

Nuclear and Industrial Safety Agency

*On March 24, three workers exposed to more than 100mSv were hospitalized, but were released three days later after no health problems were found.

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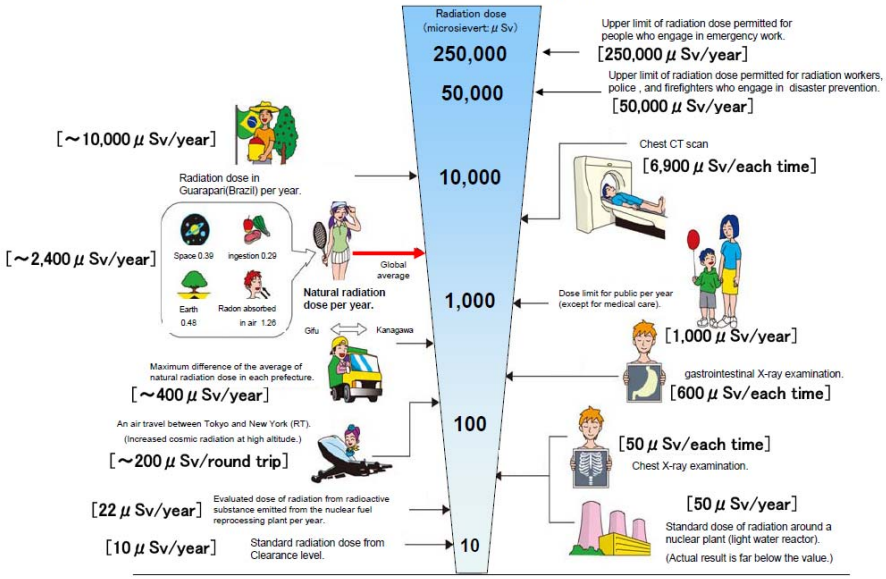
Radiation Daily Life



Ministry of Education, Culture, Sports, Science and Technology (MEXT)

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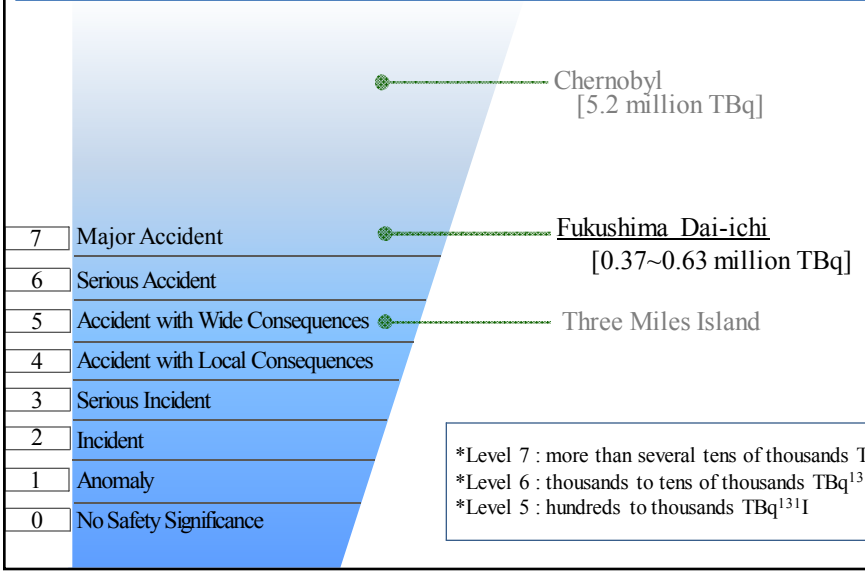
INES Rating on the Events in Fukushima Dai-ichi NPS

The Rating of the International Nuclear and Radiological Event Scale (INES) on Fukushima Dai-ichi Nuclear Power Station (NPS), in temporary assessed as Level 7.



*Level 7 : more than several tens of thousands TBq^{131}I
*Level 6 : thousands to tens of thousands TBq^{131}I
*Level 5 : hundreds to thousands TBq^{131}I

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C. Impact on Japanese Economy

1. Estimated Economic Damage and Plan for Reconstruction
2. Impact on Energy Supply/Demand in Japan
3. Reconstruction and Recovery
   (infrastructure and industrial activeties)

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1. Estimated Economic Damage and Plan for Reconstruction

Damaged Stocks in Disaster Areas

*estimated by the Cabinet Office of Japan

16～25 trillion Yen
(US$195～305 billion)

(Reference) Japan's GDP : 500 trillion Yen (US$5.9 trillion)

Plan for Recovery and Reconstruction

*from the speech of Prime Minister Kan on Apr. 1 and Apr. 12

Short-term: clearing debris, erecting temporary housing, rehabilitating industrial facilities

Mid and long-term: creating disaster-resilient local community, eco-friendly social system, and welfare-oriented society

"Reconstruction Planning Council" established
Compiling supplementary budgets and enacting/amending relevant laws

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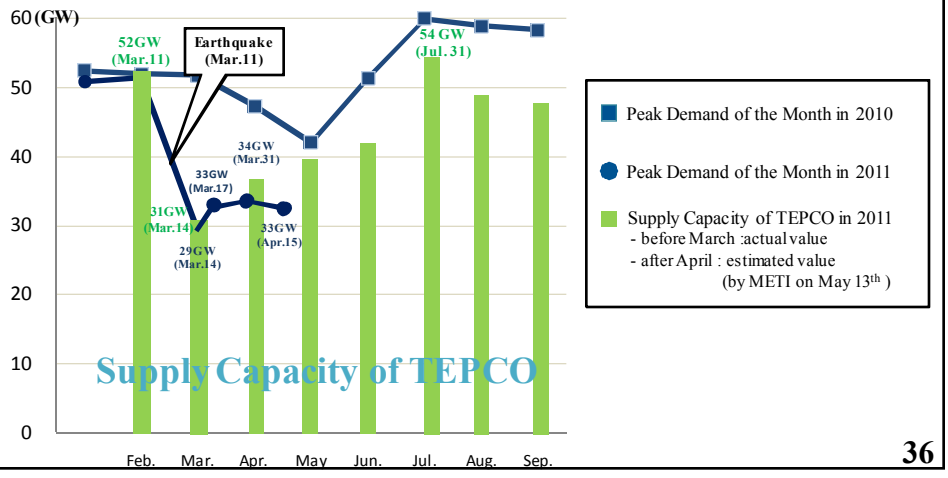
2. Impact on Energy Supply/Demand in Japan

Tokyo Electric Power Company supplies electricity to an area with 42 million people and 40% of Japan's GDP, but lost 40% of its generation capacity after the earthquake and tsunami.

We are making the utmost efforts to match supply and demand during the peak-load summer on both the demand and supply side.



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3. Reconstruction and Recovery
(infrastructure)

Infrastructure such as roads, railroads, seaports, airports and utilities such as electric power, gas and water have been rapidly and steadily recovering their function.

[Immediately after the earthquake]

Sendai airport (as of March.13th)

KYODO NEWS

(as of April.13th)

KYODO NEWS

- Roads : No traffic restriction is imposed due to the disaster, except part of Joban Expressway.
- Railroads : All Shinkansen lines are in operation.
- Seaports : All major ports are open and in operation.
- Airport : All airports are open and in operation.

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3. Reconstruction and Recovery
(infrastructure)

[Immediately after the earthquake]

Railroad

Port

Road

[Restored]

Sendai Station

Sendai-shiogama port

Miyagi prefectural road, Route 240

East Japan Railway, Miyagi prefectural government

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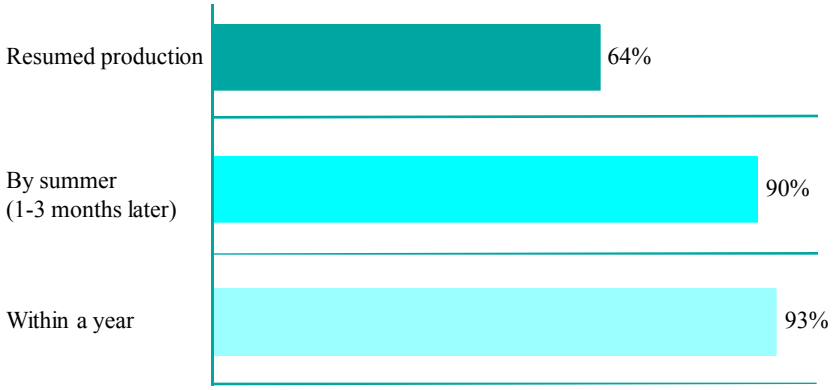
3. Reconstruction and Recovery
(industry)

More than 60% of manufactures have finished restoration, and less than 30% are expected to be restored by summer. (METI survey)

Present status and prospects of production bases in the affected areas

(survey period : April 8-15th)



*Affected areas : Aomori, Iwate, Miyagi, Fukushima, Ibaraki, Tochigi and Chiba
* 7 % answered 'Not Knowing'

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D. Responsiveness to the World

1. Cooperation with International Organizations
2. Speedy Dissemination of Accurate Information

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1. Cooperation with International Organizations

- International Atomic Energy Agency (IAEA)
- International Civil Aviation Organization (ICAO)
- International Maritime Organization (IMO)
- World Meteorological Organization (WMO)
- World Health Organization (WHO)

The March 19 Joint Statement Confirmed
- No Restrictions on Travel to Japan -

- International flight and maritime operations can continue normally into and out of Japan's major airports and sea ports, excluding those damaged by the tsunami.
- Screening for radiation of international passengers from Japan is not considered necessary at this time.
- Currently available information indicates that increased levels have been detected at some airports, but these do not represent any health risk.

Joint Statement from above Five Organizations
http://www2.icao.int/en/NewsRoom/Lists/News/Attachments/37/PIO.05.11.EN.pdf

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Cooperation with the IAEA

1. **Information Sharing**
   (1) Japan has been providing facility-related and other relevant information to the IAEA.
   (2) Nuclear Industry Safety Agency (NISA) provided updates on situations of the Fukushima Dai-ichi Nuclear Power Station at the IAEA Technical Briefing (21st March) and at the side event of the Fifth Review Meeting of the Contract Parties to the Convention on Nuclear Safety (4th April).

2. **IAEA Expert Missions**
   (1) The IAEA has extended to Japan upon the request of the Government of Japan, in connection with the incidents involving the nuclear power plants in Japan by dispatching a series of the IAEA experts to Japan mainly in the field of radiation monitoring. Such dispatch of experts includes :
   (a) Radiation Monitoring Teams, totaling up to 16 members who have been taking measurements mainly in Fukushima since 19 March;
   (b) one marine expert from the IAEA's laboratory in Monaco, who boarded Research Vessel "MIRAI" during 2 -4 April to observe and provide advice for Japanese experts on their method of collection and analysis of seawater samples; and
   (c) A Joint FAO/IAEA Food Safety Assessment Team, who met with local government officials, farmers etc. in Fukushima, Ibaraki, Tochigi and Gunma prefecture.
   (2) In addition, IAEA experts in BWR technology met with Japanese officials and operators including NISA and the Tokyo Electric Power Company (TEPCO) and visited the Fukushima Dai-ichi Nuclear Power Plant on 6 April.

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2. Speedy Dissemination of Accurate Information

- Japan is committed to the speedy dissemination of accurate information.
- All necessary information can be found at the following websites.

Japan's Countermeasures

- 1. http://www.kantei.go.jp/foreign/incident/index.html
- 2. http://www.meti.go.jp/english/index.html
- 3. http://www.nisa.meti.go.jp/english/

Measurement of Radioactivity Level

- 1. http://www.mext.go.jp/english/radioactivity_level/detail/1303962.htm
- 2. http://www.nisa.meti.go.jp/english/
- 3. http://www.worldvillage.org/fia/kinkyu_english.php
- 4. http://www.tepco.co.jp/en/press/corp-com/release/index-e.html
- 5. http://www.nsc.go.jp/NSCenglish/geje/index.htm

Drinking Water Safety

- 1. http://www.mhlw.go.jp/english/topics/2011eq/index.html
- 2. http://www.waterworks.metro.tokyo.jp/press/shinsai22/press110324-02-1e.pdf

Food Safety

- 1. http://www.maff.go.jp/e/index.html
- 2. http://www.mhlw.go.jp/english/topics/2011eq/index.html

Ports and Airports Safety

- 1. http://www.mlit.go.jp/page/kanbo01_hy_001428.html
- 2. http://www.mlit.go.jp/koku/flyjapan_en/index.html
- 3. http://www.mlit.go.jp/page/kanbo01_hy_001411.html

Tourism

- 1. http://www.mlit.go.jp/kankocho/en/index.html

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