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# Lessons from the Great East Japan Earthquake

The Necessity of a Resilient Society

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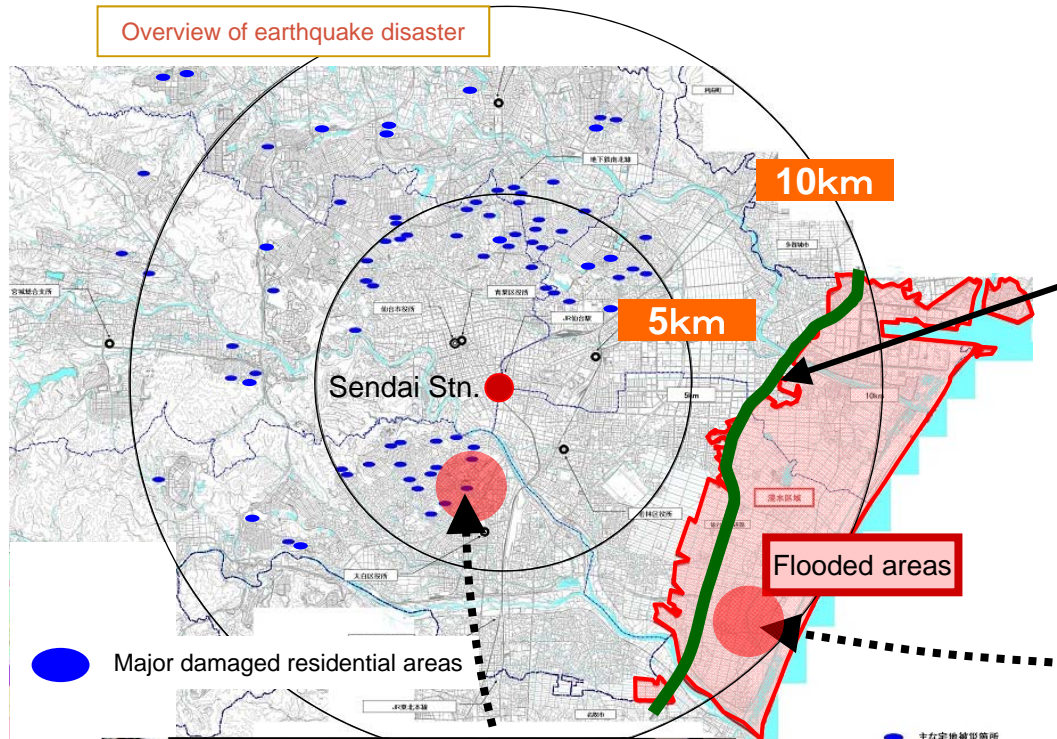
# Lessons from the Great East Japan Earthquake

(Late May, 2014)

	Damage to Sendai City	Countrywide damage
Magnitude of earthquake	M9.0	M9.0
Surface area flooded by tsunami	45 km <sup>2</sup>	561 km <sup>2</sup>
Casualties (deaths and missing persons)	975 persons	Appr. 19,000 persons
Evacuees (Max.)	105,947 persons <small>(All evacuation shelters were closed on July 31<sup>st</sup>)</small>	Appr. 480,000 persons <small>(Only in Iwate, Miyagi, and Fukushima Prefectures)</small>
Houses partially or completely destroyed	137,660 bldgs.	Appr. 393,000 bldgs.
Cost of damages	Appr. 1.3 trillion yen	Appr. 16.9 trillion yen

# Lessons from the Great East Japan Earthquake

Overview of earthquake disaster



Sendai Tobu Expressway served as a levee



Surface area of flooding: 4,523 ha



Damage to residential lots:  
5,728 residential lots

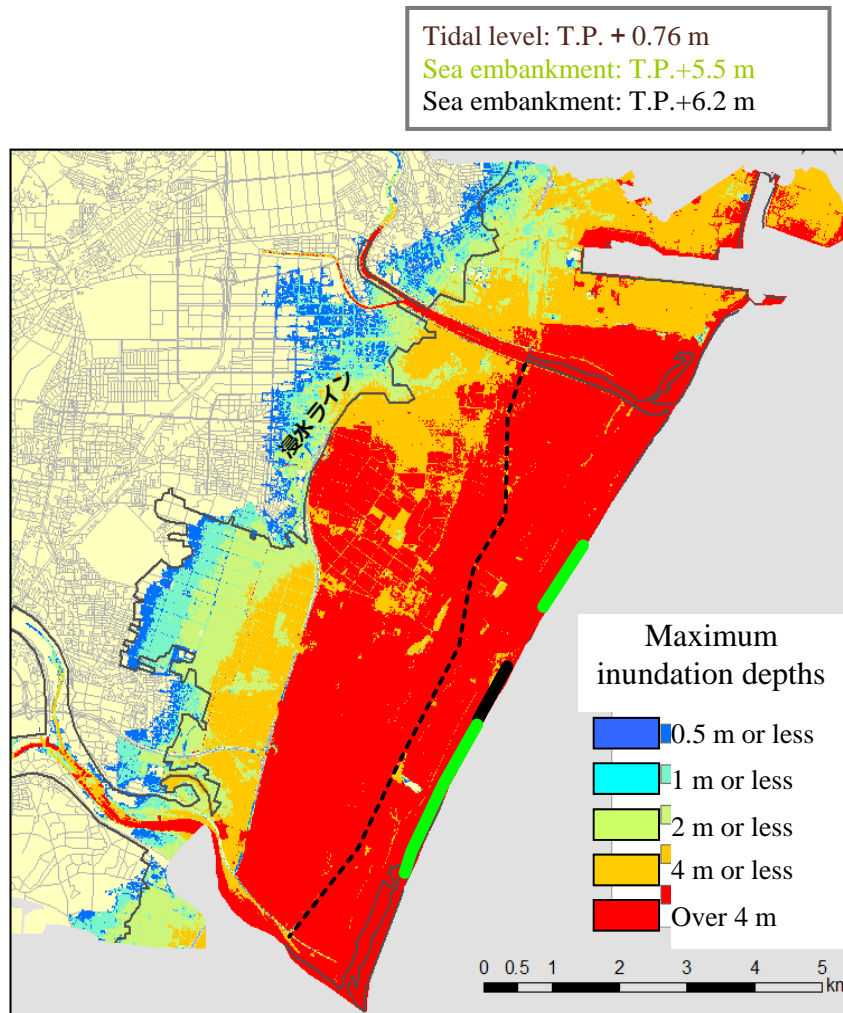




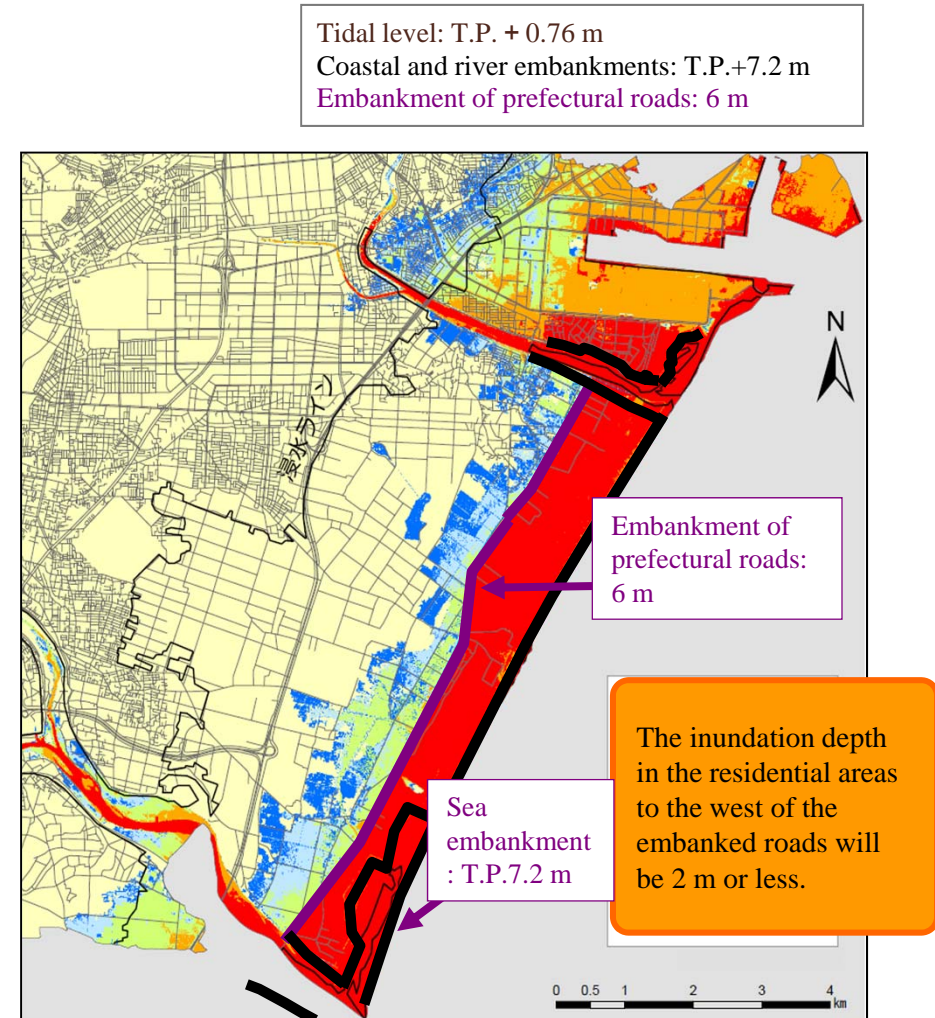
# Lessons from the Great East Japan Earthquake

## Simulation of a Tsunami

(1) Recreation of tsunami in the form of a spring tide



(2) Presumptions made in the recovery plans



From Sendai Recovery Report

# Lessons from the Great East Japan Earthquake

Basic approach to tsunami disaster prevention measures

## Multiple defenses

■ Mitigate tsunami damage by elevating prefectural highways, etc.

Mitigate disaster damage with multiple defenses such as rebuilding seawalls and levees, replanting disaster-prevention forests, elevating prefectural highways, etc.

## Evacuate

◆ Ensure there are facilities for evacuation

Emphasis “escape,” and maintain hills for evacuation, evacuation shelters, evacuation paths, etc.

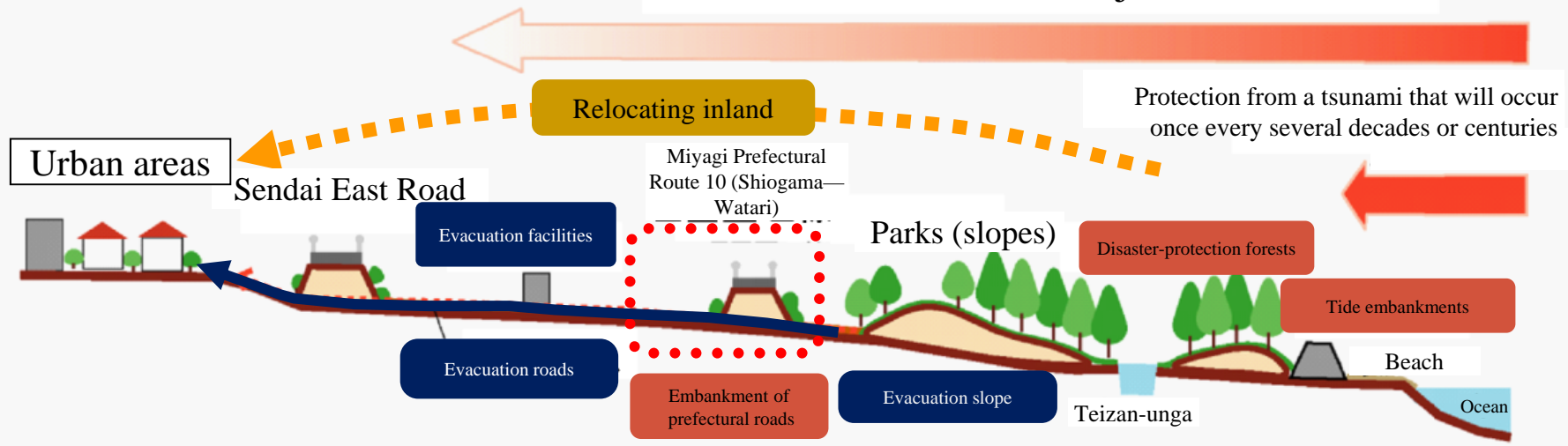
## Move

■ Move to safe area inland

“Comprehensive disaster prevention measures” using group move to safe area inland.

(Sectional diagram)

### Protection from a major tsunami

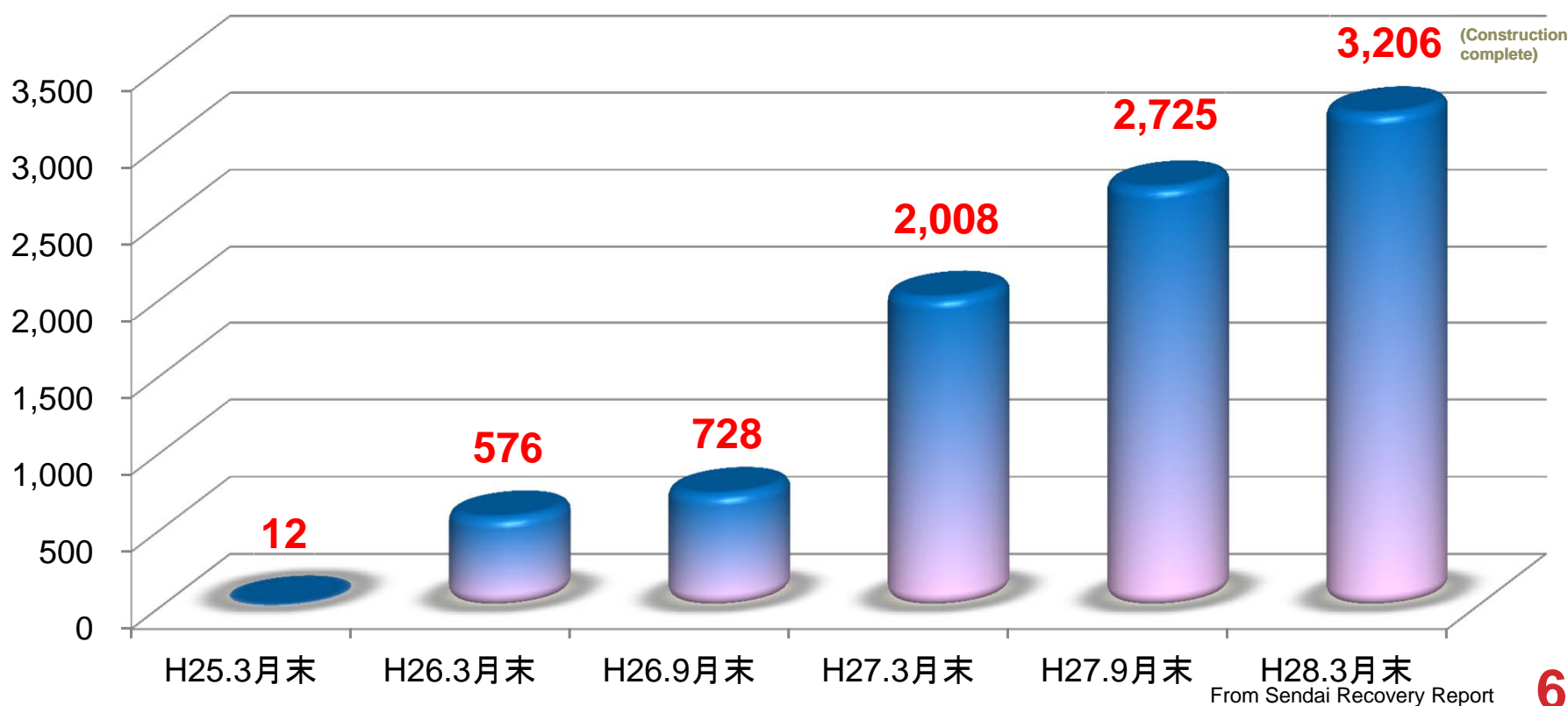


From Sendai Recovery Report

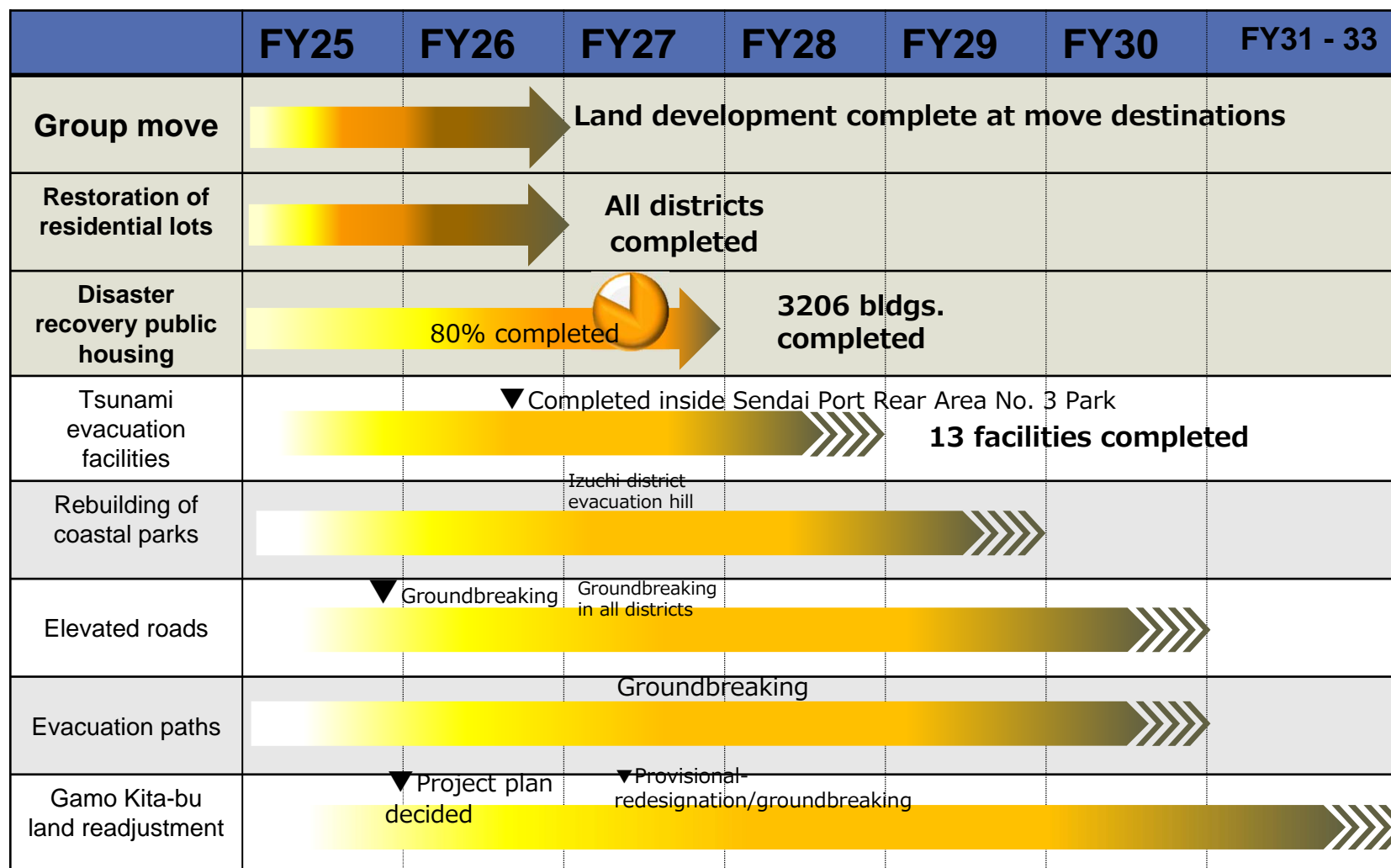
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## State of recovery public housing

Direct construction by Sendai City and public solicitation of proposals of where to purchase land and build housing. Goal is completion by March 2016.



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## State of occupancy (number of households) of emergency housing

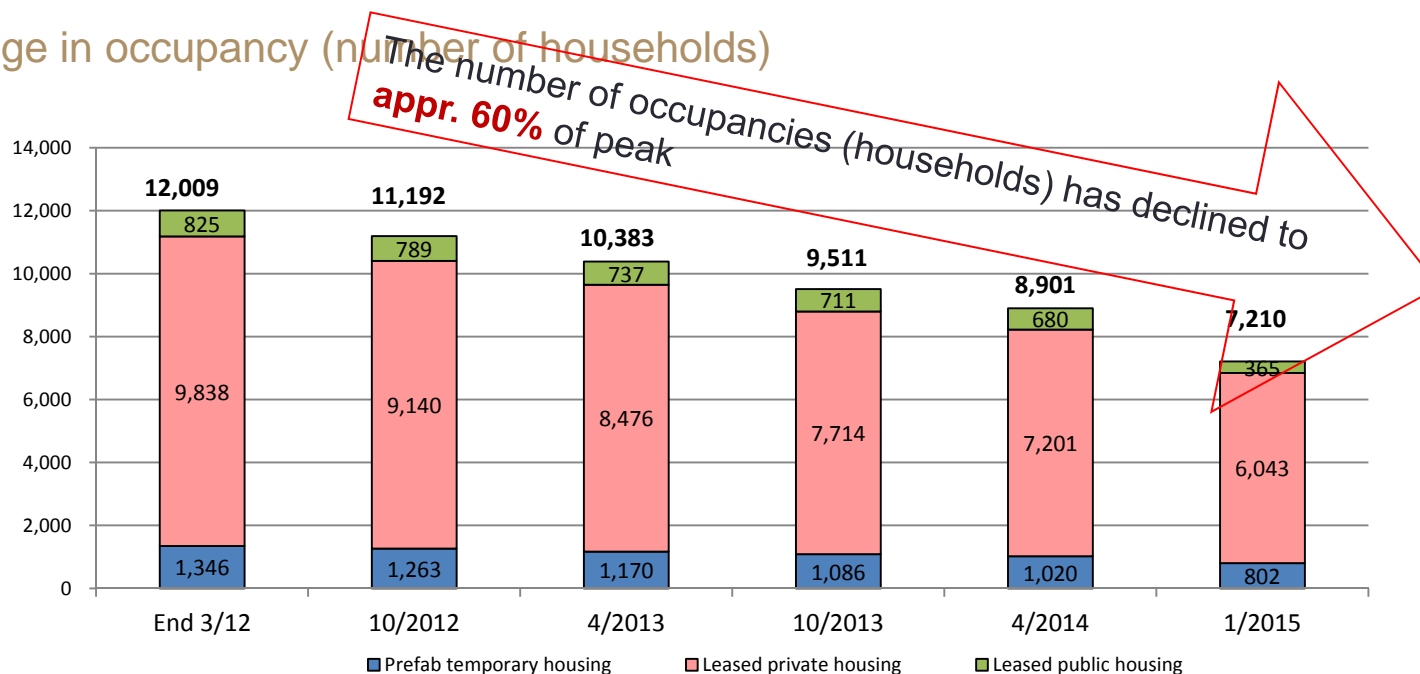
### Occupancy (number of households) (overall)

	Jan. 1, 2015	Percentage
Prefab temporary housing	802 households	11.1%
Leased private housing	6,043 households	83.8%
Leased public housing	365 households	5.1%
Total	7,210 households	

Approximate 80% of temporary housing is leased private housing.

\* First example of mass use of existing housing stock.

### Change in occupancy (number of households)





# Lessons from the Great East Japan Earthquake

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Disaster brings major damages in an instant



A great amount of time and labor is needed for restoration/recovery



Build resilient society