



IEA :Implementing Agreement for Hydropower Technologies & Programs
Workshop; Optimizing Hydropower Value
L'Enfant Plaza Hotel, Washington, D.C., USA, May 30, 2012



IEA Hydropower Annex-XI
Renewal and Upgrading of Hydropower Plants

History and Value of Hydropower in Japan

May 30, 2012

Annex-XI Operating Agent
Takashi AKIYAMA

1912~2012
JAPAN-US
CHERRY
BLOSSOM
CENTENNIAL



DOGWOOD (Flower Language : Returning a favor)

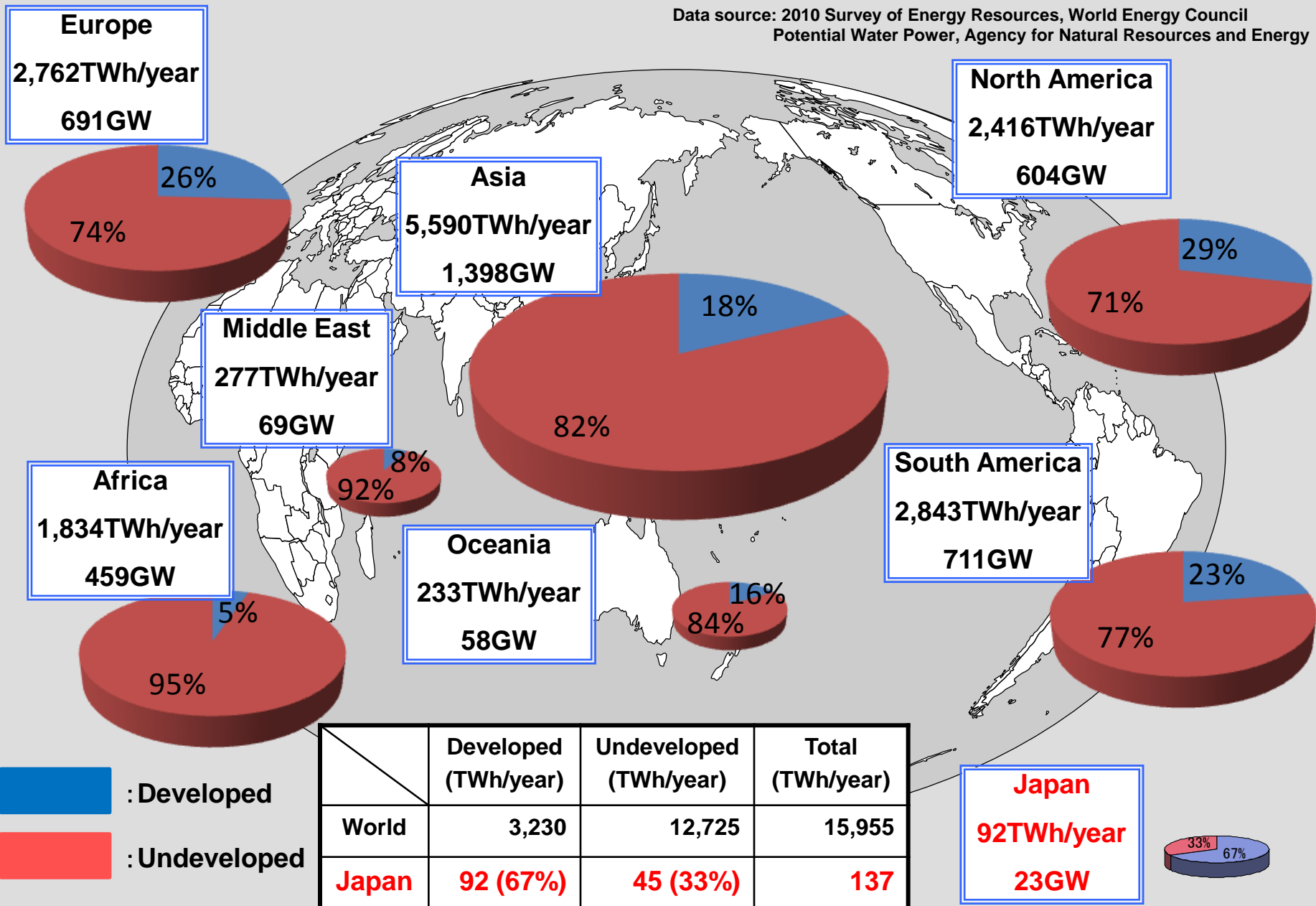


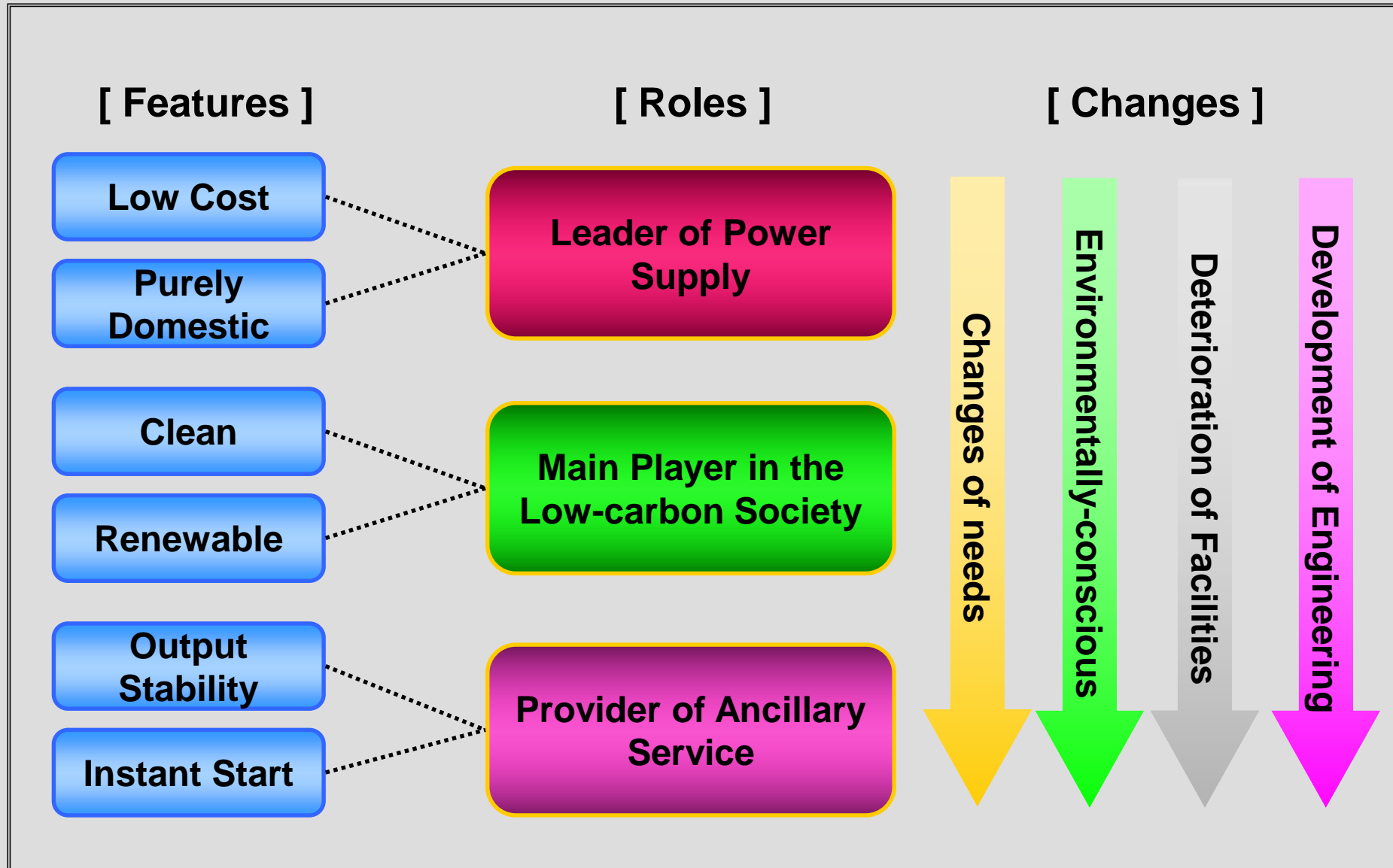
CENTENNIAL CELEBRATION
OF THE GIFT OF TREES

- ① **Contribution to national security as emergency power due to purely domestic energy**
- ② **Reduction of the dependence on oil**
- ③ **Contribution to global warming due to clean energy emitting no carbon dioxide**
- ④ **Low cost and stability in long term because of smaller effect from the inflation and the fluctuation of fuel cost than other power sources**
- ⑤ **Reliable local energy in grid operation due to low accident rates**
- ⑥ **Benefits of flood control, drinking water and irrigation**
- ⑦ **Extension of service life-time with appropriate maintenance**
- ⑧ **Contribution to the local economy and the infrastructure (road) development by local constructor**

Potential Water Power in the world

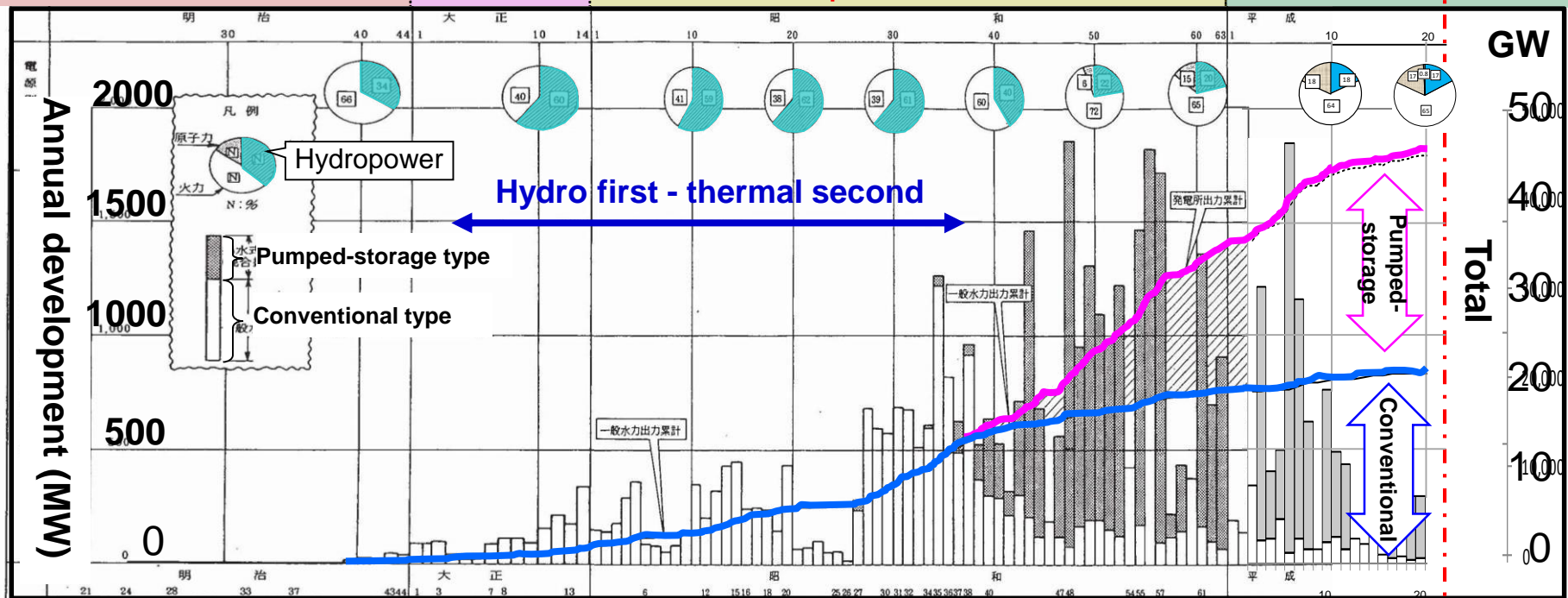
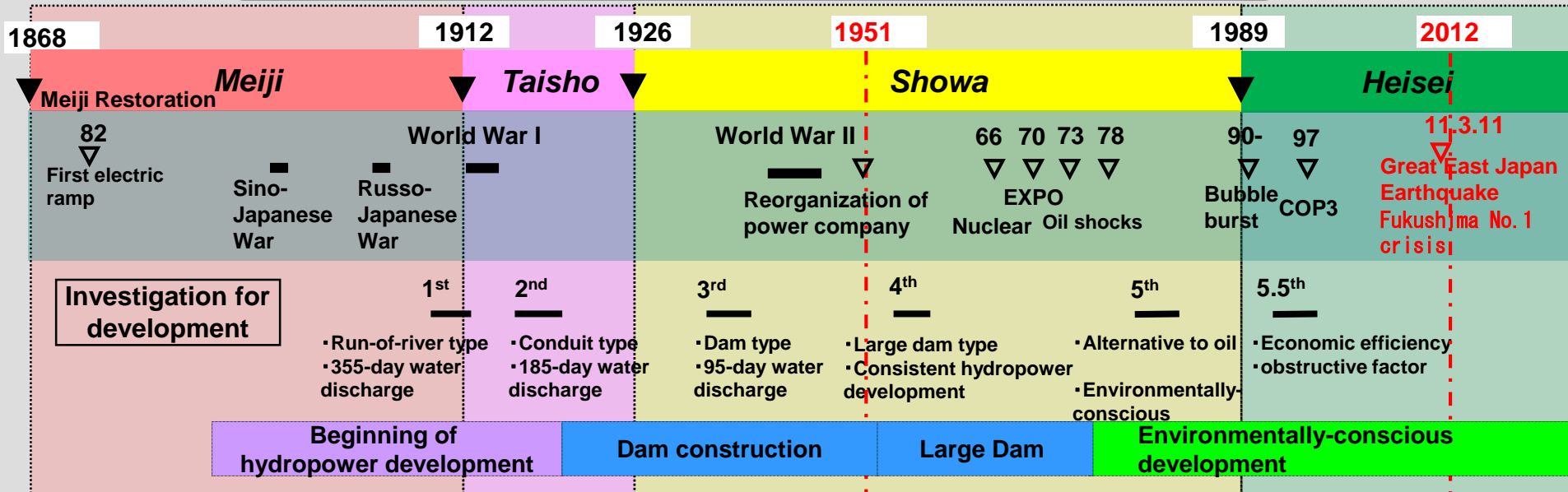
Data source: 2010 Survey of Energy Resources, World Energy Council
Potential Water Power, Agency for Natural Resources and Energy





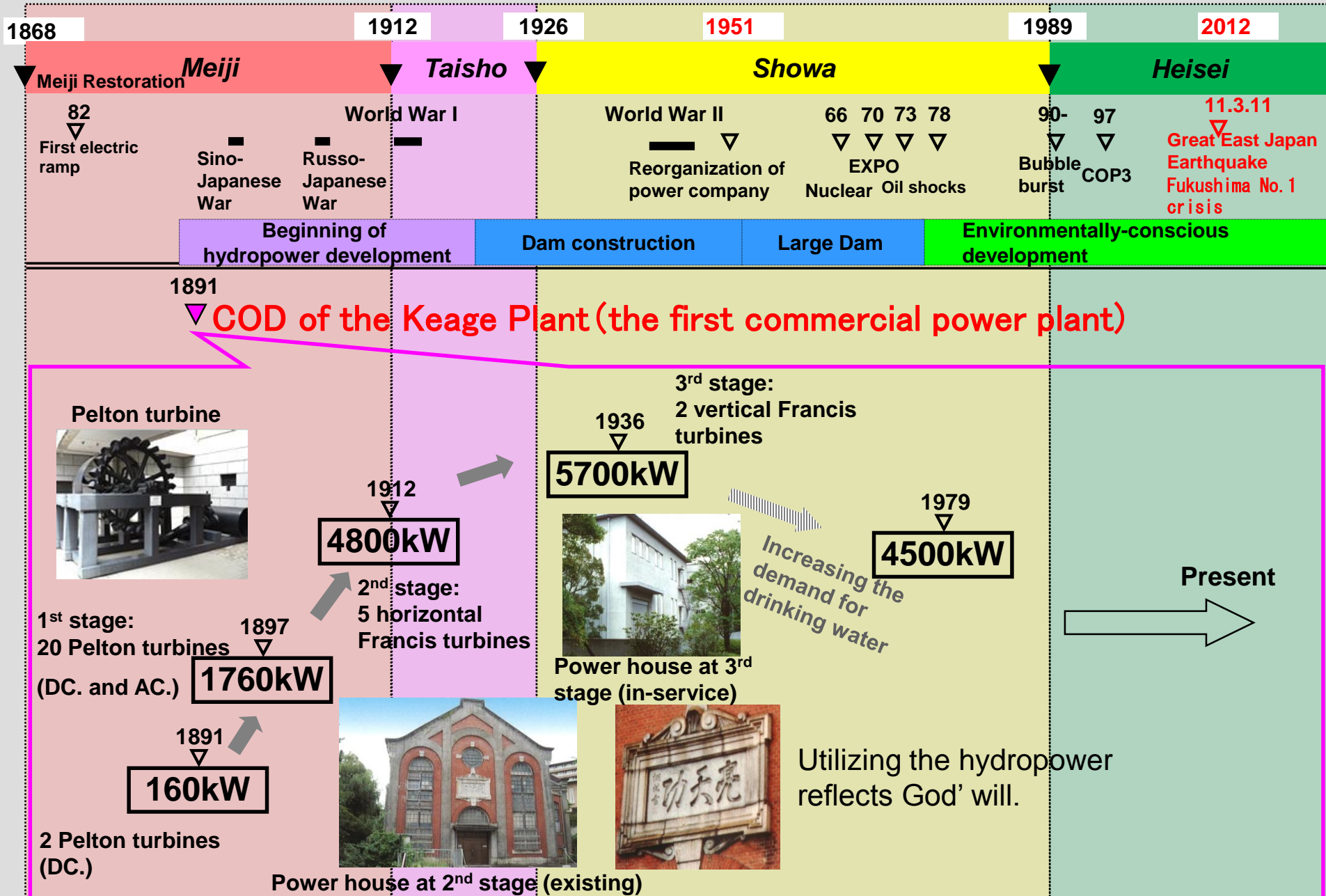
Progress of Hydropower Development in Japan

5



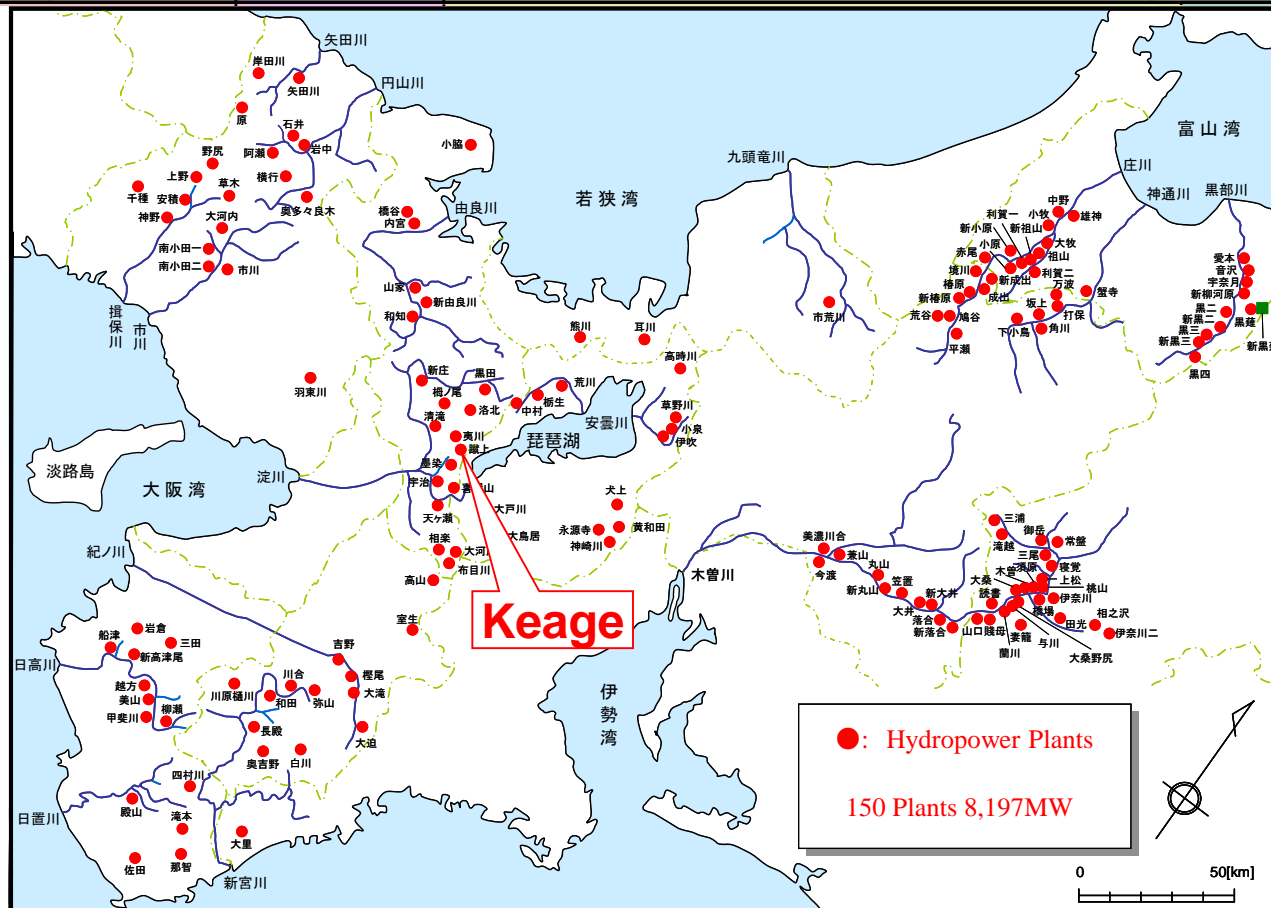
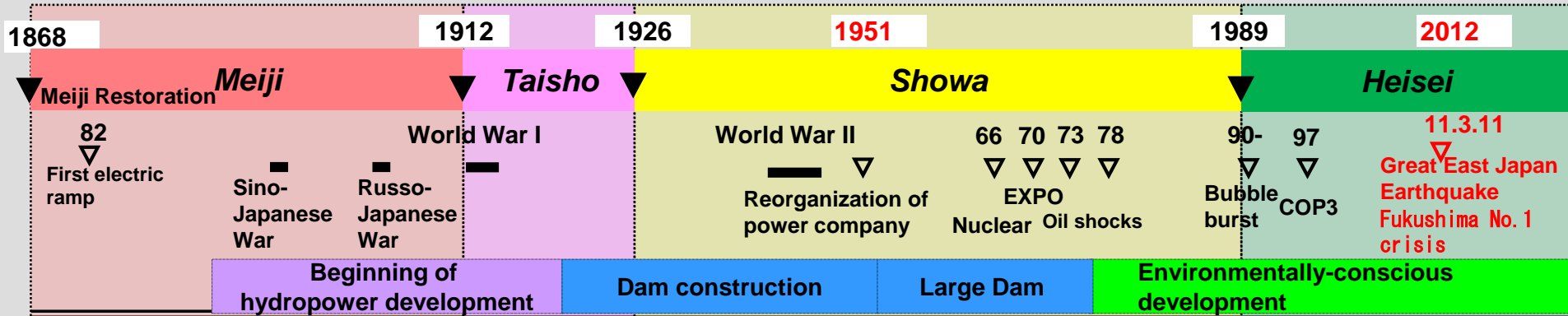
Progress of the Keage Hydropower Plant

6



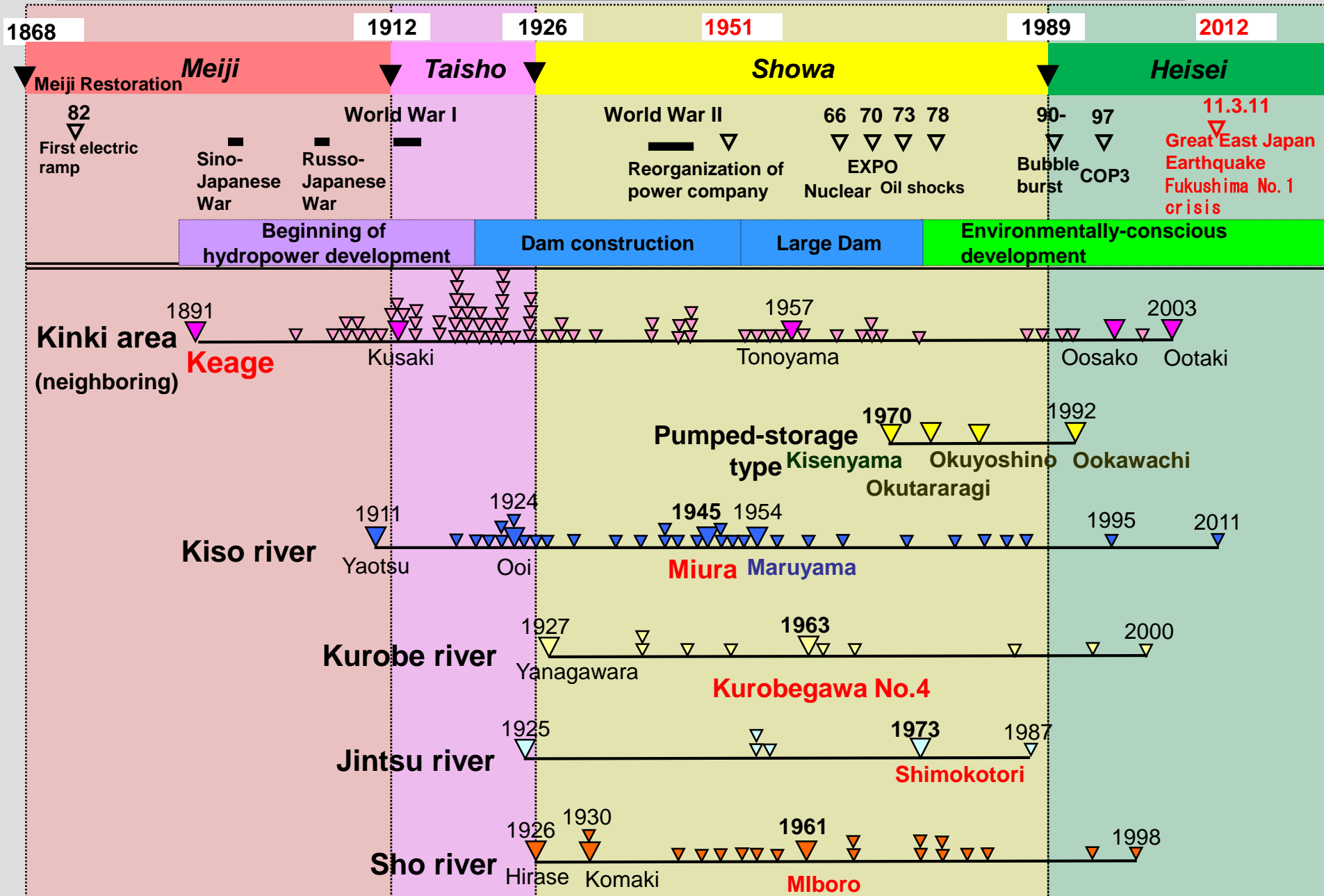
Progress of Hydropower Plants in KANSAI

7

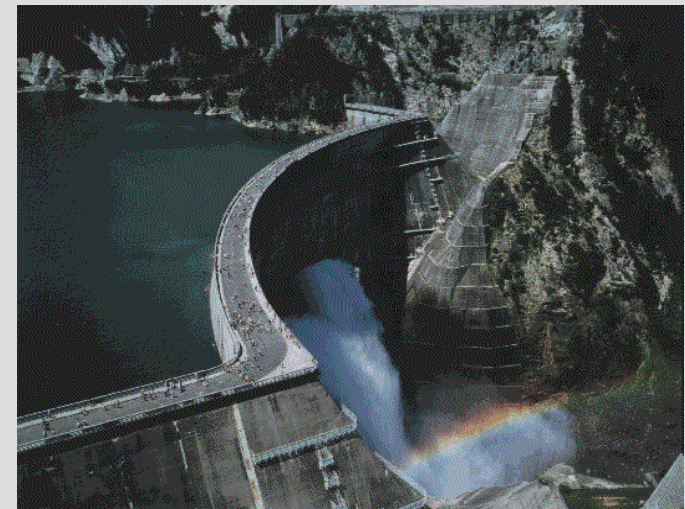
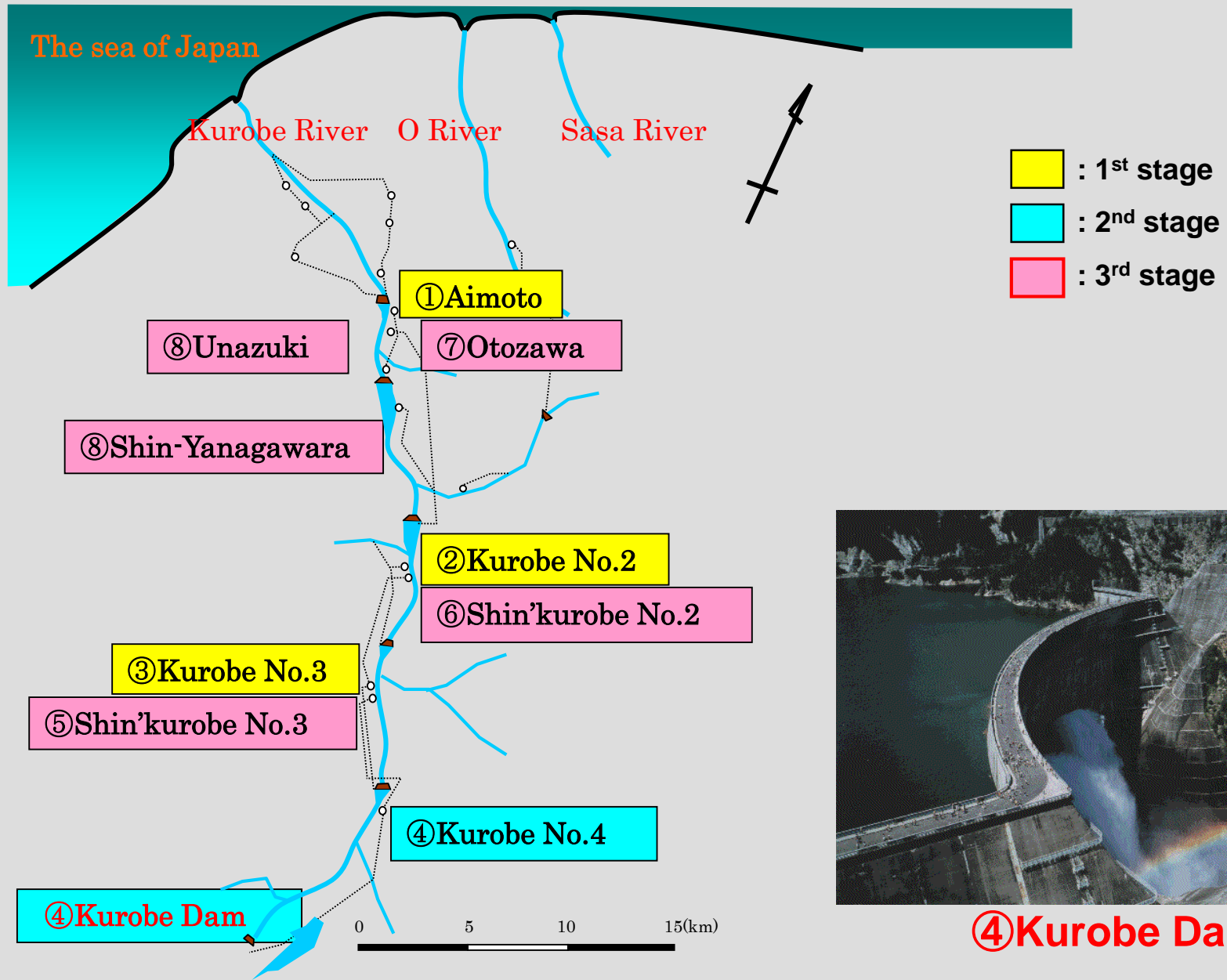


Progress of Consistent Hydropower Development in KANSAI

8



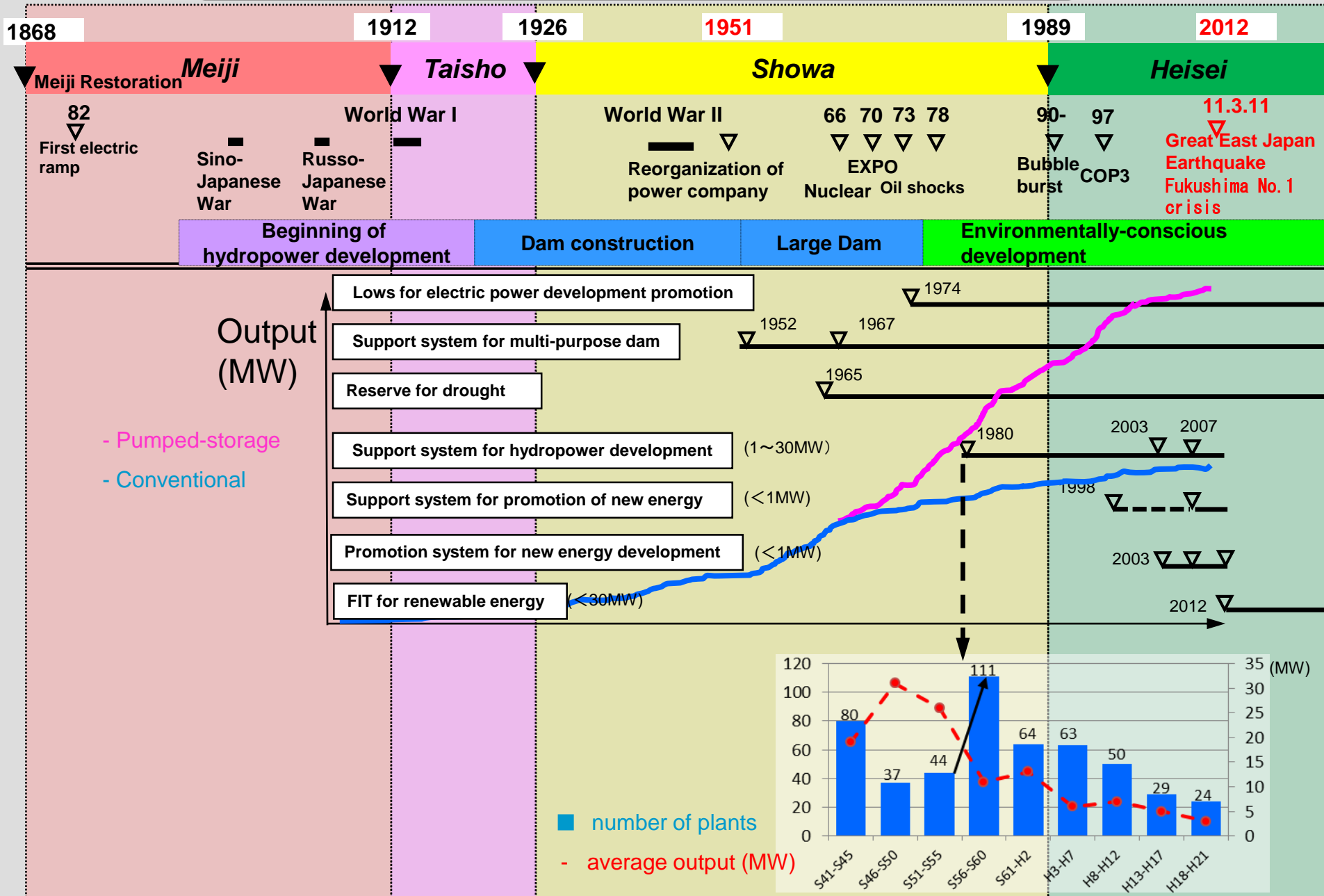
Hydropower development in the Kurobe River System



④ Kurobe Dam

Progress of Support System (Relevant Lows)

10



Theme: Renewal and Upgrading of Hydropower Plants

(Background)

- **The average age of Japan's hydropower stations is 65. There are growing concerns not only in Japan but also in other industrialized nations about the aging of hydropower facilities, sand sedimentation and turbid water.**
- **There is a growing expectation for hydropower as a future key player in low-carbon society, as it represents a domestic, affordable and CO2-free source of energy.**
- **In the western world, small- or medium-sized pumped-storage hydropower is gaining renewed recognition as a load-balancing system to complement the intermittent wind and solar power.**

(Purpose)

- **The taskforce is trying to gather as many good practice examples as possible from around the world on the renewal and upgrading of existing hydropower plants.**
- **The information will be used to identify and convey effective policies, assistance measures and innovative technologies to the rest of the world.**

Member Countries of Annex-XI

- 1. Member Countries:**
Japan (OA), Norway and USA
- 2. ExCo Member Countries**
Brazil, Finland, Canada
- 3. Other Countries**
New Zealand (Meridian Energy, Genesis Energy, Mighty River Power)
Australia (Hydro Tasmania)
Austria, Nepal, South Africa, Sweden, Switzerland, etc.
- 4. Other Organizations**
IHA

Flow Chart of Case Collection

**[STEP-1] 1st round
Case Collection
by trigger causes**

**[STEP-2]
Classification / Screening /
Selection**

**[STEP-3] 2nd round
Case Collection
by key points**

**[STEP-4]
Analyzing and
Reporting**

Literature
survey

Outline
Questionnaire
to enterprises

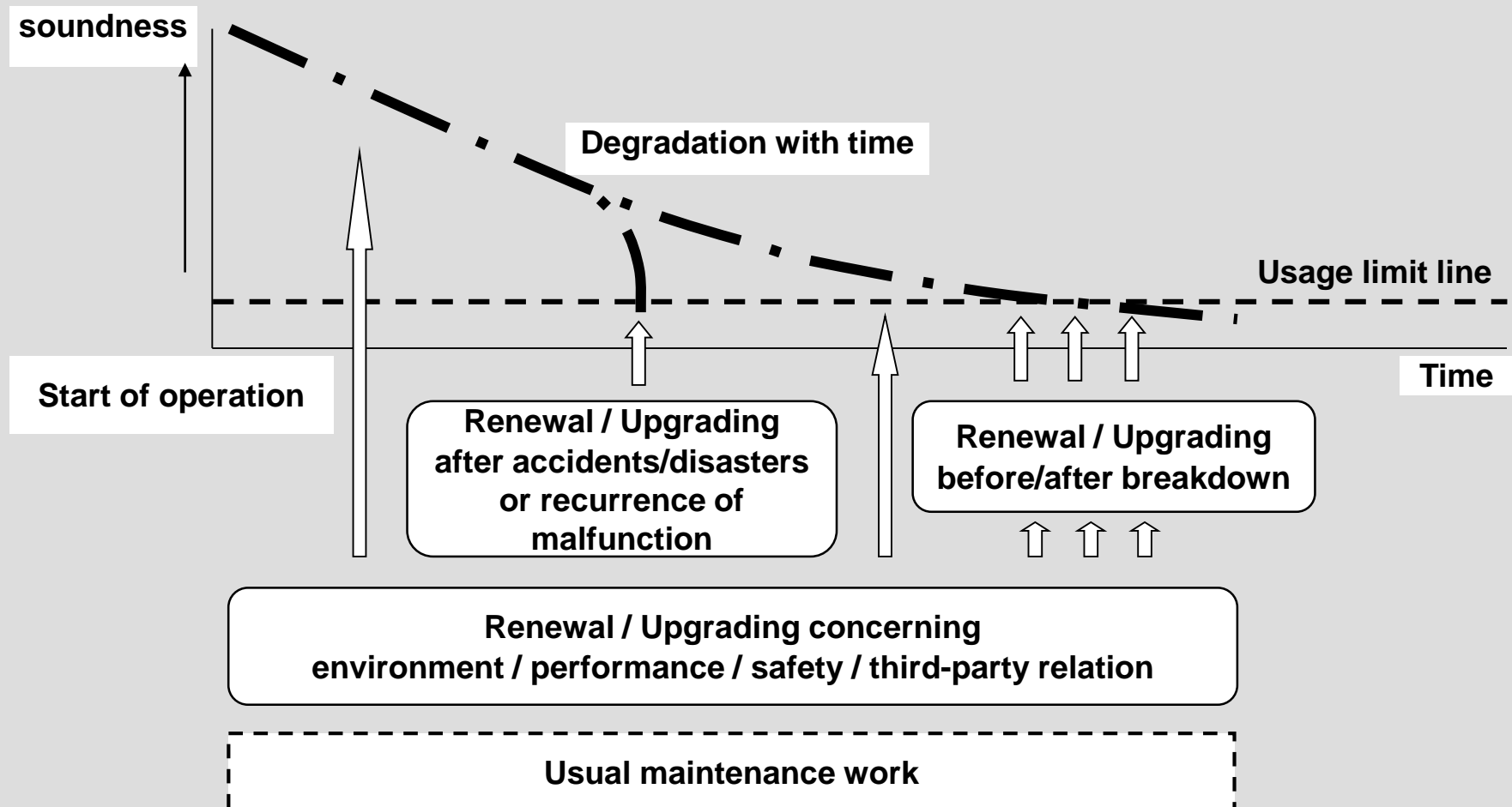
Classifying
Screening

Selection
for detailed
survey

Detailed
Questionnaire
to enterprises

Analyzing
Reporting

Conceptual Life Cycle

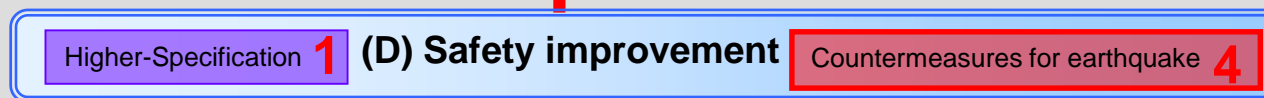


Coverage of Collected Cases in Japan

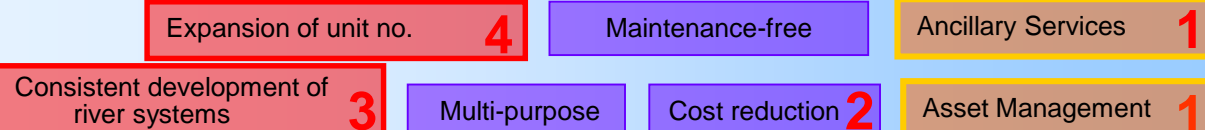
Sufficient

Starving

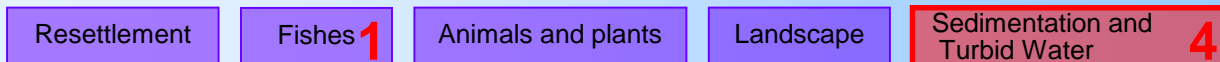
Upgrading (Adding New Value)



(C) Higher performance



(B) Environmental deterioration



(A) Degradation due to ageing

Life extension/Demolition/Renovation **15**

Renewal (Maintaining Existing Value)



Developing

Developed

Total :
39 cases

Key Points to be focused and analyzed

Category-1. Public Policies, Facilitation Measures, etc.

- a) Energy policies of Countries & States
- b) Investment incentives; Feed-in-Tariff (FIT), Renewable Portfolio Standard (RPS), Subsidies, Financial assistance, Tax deductions, etc.
- c) Integrated management of water resources and river systems
- d) Asset management, Life cycle cost analysis
- e) Non-monetary value of stabilization of unstable power system in the up-coming low-carbon society
- f) Environmental conservation and improvement







Key Points to be focused and analyzed

Category-2. Modern Technologies, Systems, material, etc.

- a) E/M equipment in technology innovation & deployment expansion
- b) System Improvement for Protection & Control
- c) Civil and Building Works in technology innovation & deployment expansion, along with new material
- d) Integration with other renewable energies

Activity Schedule of Annex-XI

18

Work Item	2010	2011	2012	2013	2014	2015
1. Agreeing on and starting the new ANNEX	✦ 24th					
2. Formulating a detailed activity plan						
3. Annex-11 expert meetings	✧ ✧	✧ ✧	✧ ✧	✧	✧	
	July Sep	July Oct	Jun Oct			
4. Collecting cases						
1st round Case Collection						
Screening						
2nd round Case Collection						
5. Analyzing and evaluating cases						
6. Creating and releasing reports						
7. Workshops, etc.		*-1 ★	*-2 *-3 *-4 ★ ★ ★	★	★	
8. ExCo meeting	✦ 24th ✦ 25th	✦ 26th	27th ✦	✦	✦	✦

*-1: Sacramento, USA, July 19th. *-2: Tokyo, Japan, February 2012. *-3: Washington, D.C., USA, May 30th

*-4 Bilbao, Spain, October 2012 (with Annex-9)

The End