



**IEA :Implementing Agreement for Hydropower Technologies & Programs
Hydro 2013 International Conference and Exhibition
7 to 9 October 2013 Innsbruck, Austria**



**Session 20:Hydro Plant Rehabilitation and Refurbishment
Part A IEA Hydropower Annex-XI
Renewal and Upgrading of Hydropower Plants**

Introduction to the work of Annex-XI

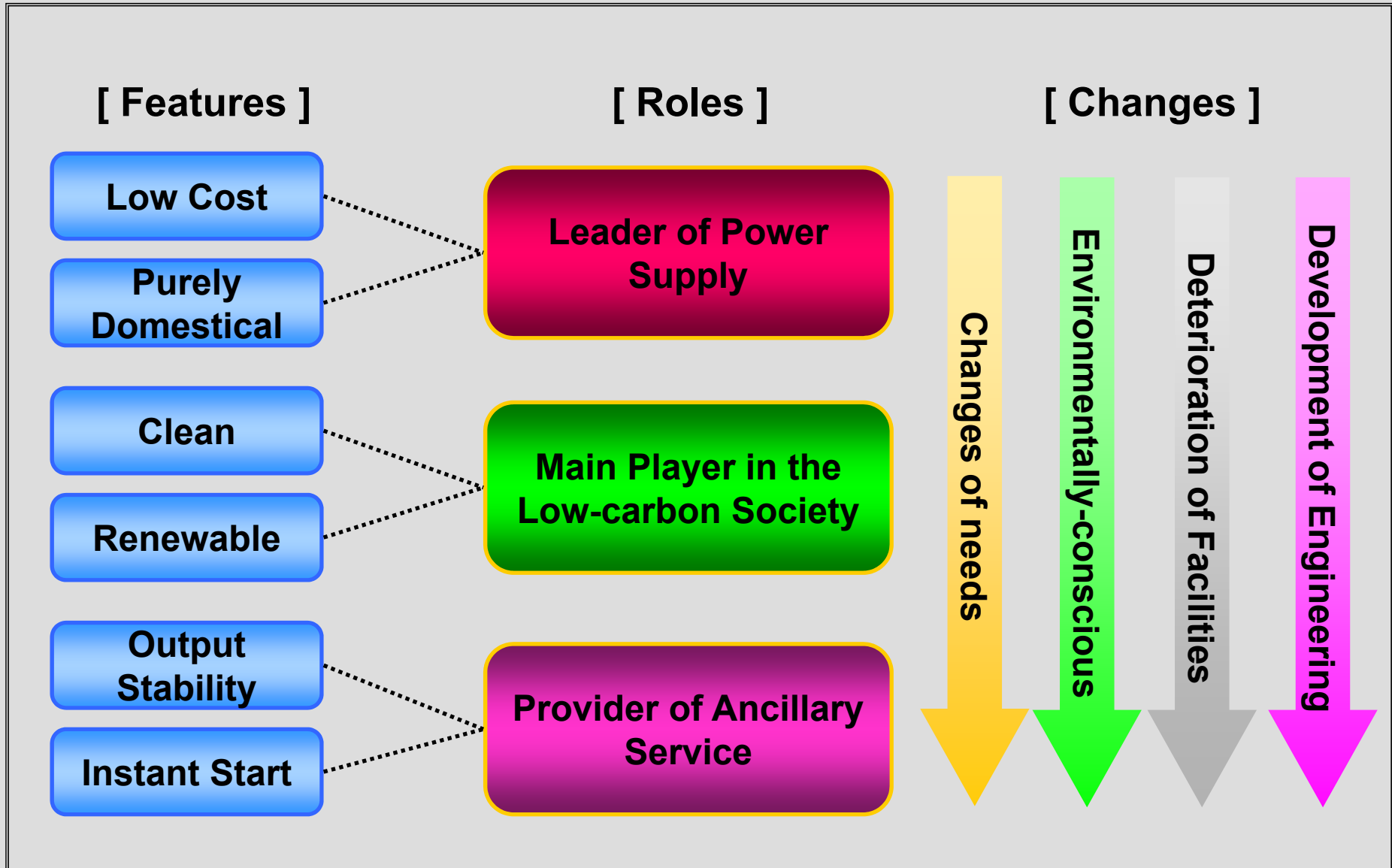
Wednesday 9 October , 2013

Annex-XI Operating Agent

Takashi AKIYAMA

Roles of Hydropower

1



(Background)

1. There are growing concerns not only in Japan but also in other industrialized nations about the **aging of hydropower facilities**.
2. 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.
3. 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.

1. Member Countries :

Japan (OA), Norway, Australia and USA

2. ExCo Member Countries

Finland, France, Brazil, Canada

3. Other Countries

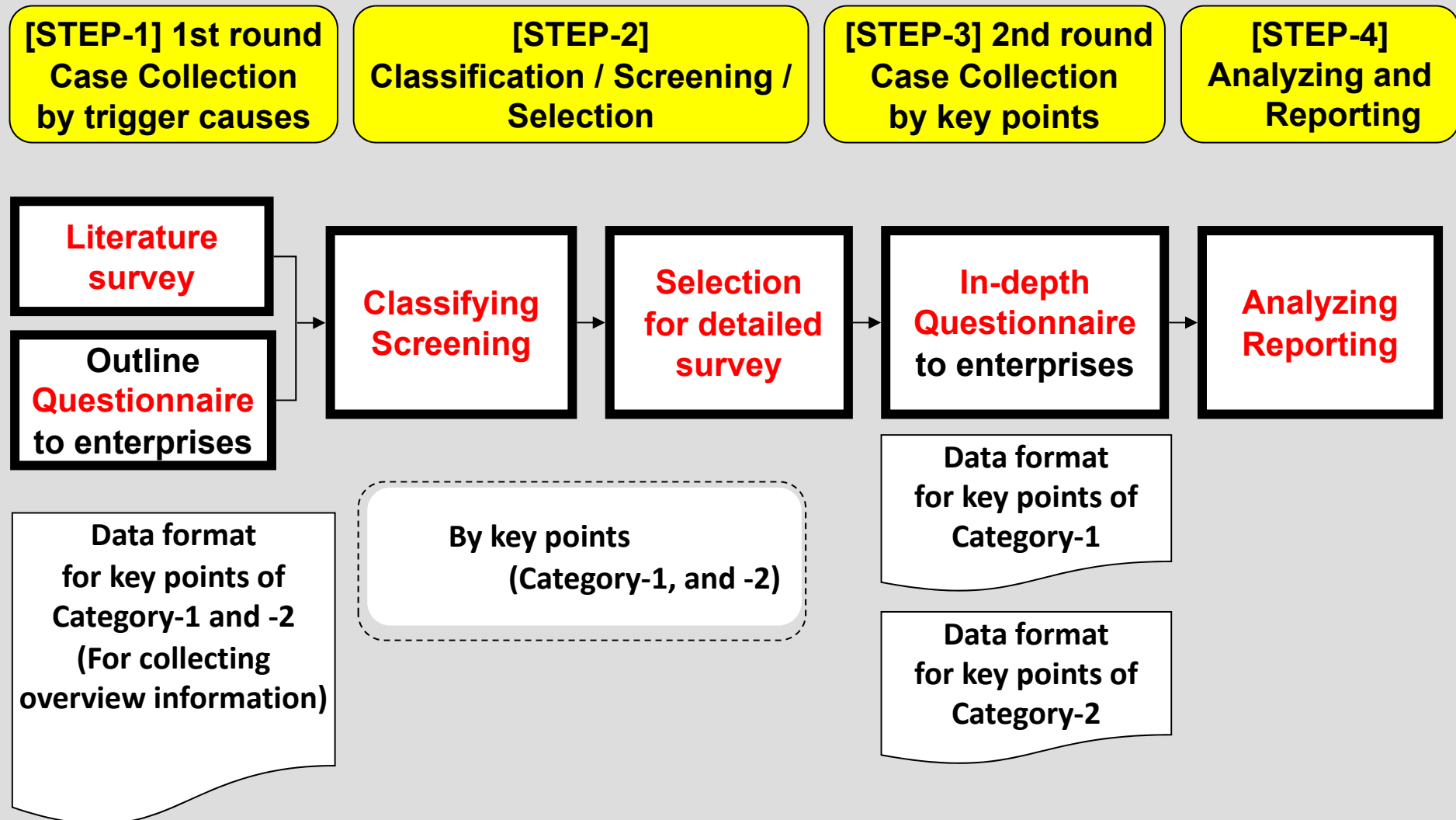
New Zealand (Meridian Energy, Genesis Energy, Mighty River Power)

Austria, Rumania, Nepal, South Africa, Sweden, Switzerland, etc. (Tentative)

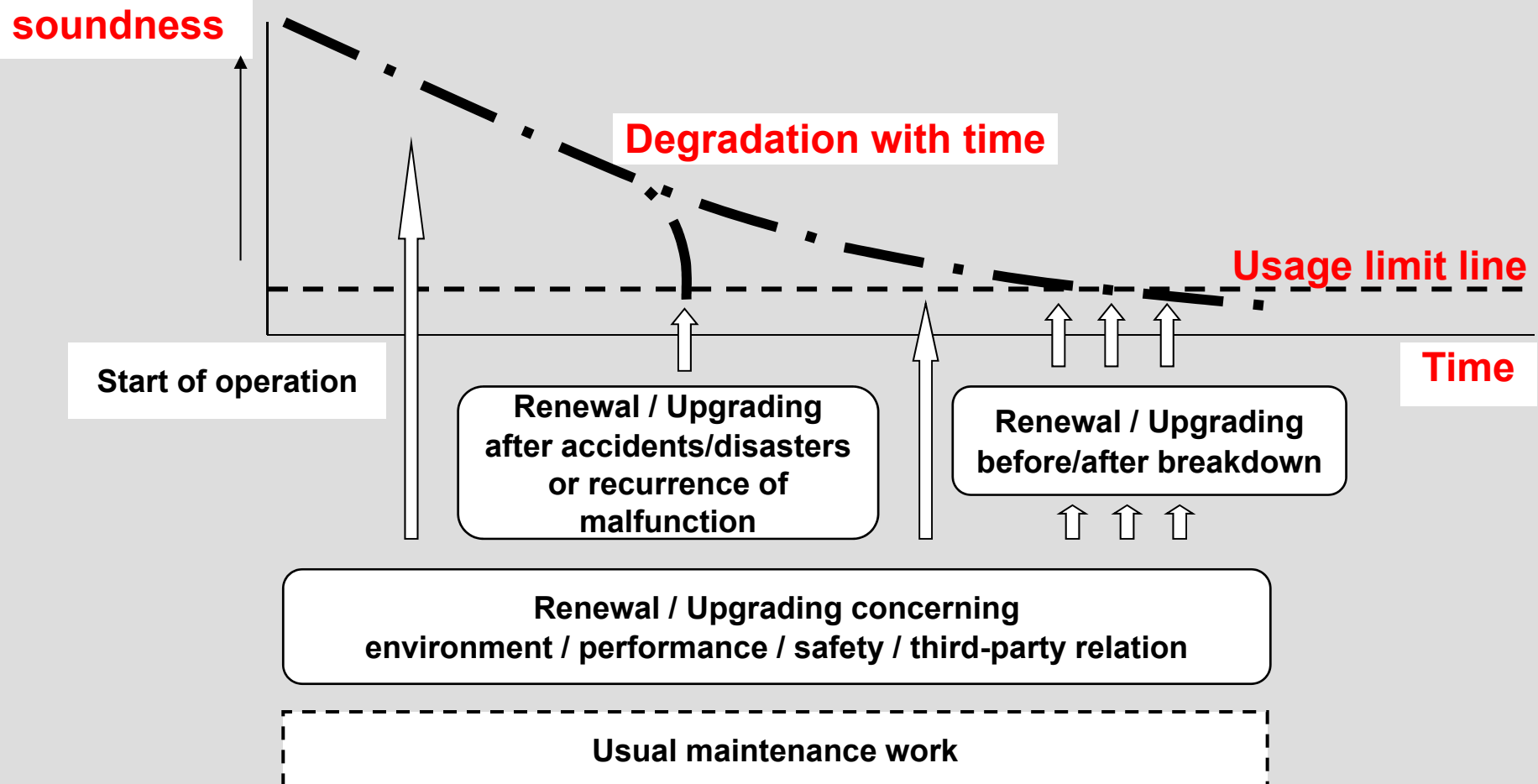
4. Other Organizations

IHA (Tentative)

Flow Chart of Case Collection



Conceptual Life Cycle



Trigger Causes of Renewal and Upgrading

Trigger Causes	Expected Performance
(A) Ageing and recurrence of malfunction	(a) Improvement of efficiency
	(b) Improvement of durability and safety
	(c) Cost reduction
	(d) Easy maintenance with less labor
(B) Environmental deterioration	(a) Sedimentation reduction
	(b) Improvement of river environment
(C) Needs for higher performance	(a) Addition of units, Expansion of power & energy
	(b) Role change of hydropower generation Addition of new functions
(D) Needs for safety improvement	(a) Improvement of safety
(E) Needs due to third party factors	(a) Sustainable operation (sometimes accompanied by power reduction)
(F) Accidents / Disasters	(a) Recovery

Coverage of Collected Cases in Japan

 Sufficient

 Starving

**Upgrading
(Adding New Value)**

Higher-Specification **1** (D) Safety improvement Countermeasures for earthquake **4**

(C) Higher performance
Expansion of unit no. **4** Maintenance-free Ancillary Services **1**
Consistent development of river systems **3** Multi-purpose Cost reduction **2** Asset Management **1**

(B) Environmental deterioration
Resettlement Fishes **1** Animals and plants Landscape Sedimentation and Turbid Water **4**

(A) Degradation due to ageing Life extension/Demolition/Renovation **16**

**Renewal
(Maintaining Existing Value)**

Influence by adjacent development **1** (E) Third party factors Conversion to other purpose **2**

Design defect (F) Accidents/Disasters Earthquake **2** Flood **2**

Developing

Developed

Total : **44** 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)**
- c) Integrated management of water resources and river systems**
- d) Asset management, strategic asset management and Life cycle cost analysis**
- e) Projects justified by the Non-monetary valuation of stabilizing unstable power system in the up-coming low-carbon society**
- f) Environmental conservation and improvement**

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

- a) Technological innovation & deployment expansion of electro-mechanical (E/M) equipment**
- b) System and Reliability Improvement in Protection & Control (P&C)**
- c) Technological innovation, deployment expansion and new materials used for civil and building works**
- d) Integration of other renewable energies into hydropower systems**

Overall Schedule

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 XI expert meetings	★ Sep ★ Oct	★ July ★ Oct	★ May	★ Feb ★ June	★ Oct ★ March ★ June ★ Oct	★ March
4. Collecting cases						Completion
1st Round Data Collection		■	■	■		
Screening			■	■		Dissemination HYDRO2014
2nd round Data Collection			■	■		
5. Analyzing and evaluating cases				■	■	
6. Creating and Releasing reports					■	■
7. Workshops etc.			★ *-1	★ *-2 ★ *-3	★ *-4 ★ *-5	★
8. ExCo meeting	★ 24th	★ 25th ★ 26th	★ 27th	★ 28th	★ 29th ★ 30th	★ 31th

*-1 : Sacramento, USA, July 2011

*-2 : Washington, D.C., USA, May 2012

*-3 : Bilbao, Spain, October 2012

*-4 : Oslo, Norway, June 2013

*-5 : Innsbruck, Austria, October 2013

The End