The process for collecting case histories of best practice

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New Energy Foundation

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Conceptual Life Cycle

- Start of operation
- Degradation with time
- Usual maintenance work

(A) Recurrence of malfunction
(F) Accidents/Disasters
(B) Environmental deterioration
(D) Safety improvement
(C) Higher performance
(E) Third-party relation

soundness

Usage limit line

Time
## Trigger Causes

<table>
<thead>
<tr>
<th>Trigger Causes</th>
<th>Expected Performance</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>(A) Ageing and recurrence of malfunction</strong></td>
<td>(a) Improvement of efficiency&lt;br&gt;(b) Improvement of durability and safety&lt;br&gt;(c) Cost reduction&lt;br&gt;(d) Easy maintenance with less labor</td>
</tr>
<tr>
<td><strong>(B) Environmental deterioration</strong></td>
<td>(a) Sedimentation reduction&lt;br&gt;(b) Improvement of river environment&lt;br&gt;(c) Others</td>
</tr>
<tr>
<td><strong>(C) Needs for higher performance</strong></td>
<td>(a) Improvement of efficiency. Addition of units, Expansion of power &amp; energy&lt;br&gt;(b) Role change of hydropower generation. Addition of new functions</td>
</tr>
<tr>
<td><strong>(D) Needs for safety improvement</strong></td>
<td>(a) Improvement of safety</td>
</tr>
<tr>
<td><strong>(E) Needs due to third party factors</strong></td>
<td>(a) Sustainable operation (sometimes accompanied by power reduction)</td>
</tr>
<tr>
<td><strong>(F) Accidents/Disasters</strong></td>
<td>(a) Recovery</td>
</tr>
</tbody>
</table>
Flow Chart of Case Collection

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

[STEP-2] Classification, Screening and Selection

[STEP-3] 2nd round Case Collection

[STEP-4] Analyzing and Reporting

1. Literature survey
2. Outline Questionnaire to enterprises
3. 10 electric cos
4. 26 public utilities
5. Data format (For collecting overview information)
6. With respect to each Category and Key point
7. 10 electric cos
8. 5 public utilities
9. Data format (For collecting detailed information)
### Status of Case History Collection: (Japan)
Classification of Collected Case Histories by Trigger Causes/Key Points

<table>
<thead>
<tr>
<th>Trigger Causes</th>
<th>Category-1</th>
<th>Category-2</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>(A) Ageing and recurrence of malfunction</td>
<td>(a) 1</td>
<td>(b) ---</td>
<td>(c) ---</td>
</tr>
<tr>
<td>(B) Environmental deterioration</td>
<td>(a) ---</td>
<td>(b) ---</td>
<td>(c) 4</td>
</tr>
<tr>
<td>(C) Needs for higher performance</td>
<td>(a) 1</td>
<td>(b) 3</td>
<td>(c) 1</td>
</tr>
<tr>
<td>(D) Needs for safety improvement</td>
<td>(a) ---</td>
<td>(b) 1</td>
<td>(c) ---</td>
</tr>
<tr>
<td>(E) Needs due to third party factors</td>
<td>(a) 1</td>
<td>---</td>
<td>---</td>
</tr>
<tr>
<td>(F) Accidents / Disasters</td>
<td>(a) ---</td>
<td>(b) 1</td>
<td>(c) ---</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>1 1 3 2 1 4</td>
<td>12 2 13 0</td>
<td>39</td>
</tr>
</tbody>
</table>
Category-1. Public Policies, Facilitation Measures, etc.

e) Projects justified by the Non-monetary valuation of stabilizing unstable power system in the up-coming low-carbon society
⇒ Cases of adjustment functions, the use of non-power dams and increased output will be collected to analyze new values of hydropower

Case-1

f) Environmental conservation and improvement
⇒ Cases of measures for sedimentation, protection of fish and birds, GHG emission and mitigation are collected. Safety improvement and aseismic reinforcement are also collected.
Case-1: Solution of Sand sedimentation and turbid water

Refurbishment of dams due to damages by Typhoon in September 2005
(Construction Period: November 2011 ~ December 2016)
Case-1 : Solution of Sand sedimentation and turbid water

**Flood control plan**

[ Existing ]

Sand sedimentation

a. Refurbishment of dams (Lowering reservoir water level)
b. Flushing sand (Effective flood control, Environmental Measures)

[ Planned ]

All gate open (Free flow)
Case-1: Solution of Sand sedimentation and turbid water

Yamasubaru dam
[ Existing ]

[ Planned ]

Saigou dam
[ Existing ]

[ Planned ]
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
Case-2 : Upgrading of Seismic Performance

Sasamagawa dam

(This dam has been used for over 50 years.)

Dam Body: Hight= 46.4 (m), Length=140.8 (m)

Centre pier: Hight=16.3 (m)
Width=2.0 (m)

Side Piers: Hight=3.7 (m)
Width=1.8 (m)

There is risk of damage in piers of the dam against Earthquakes.

Objective of Development

Upgrading of Seismic performance of Spillway piers in preparation for Earthquakes.
Case-2: Upgrading of Seismic Performance

[ Before ]

Spillway bridge

- Winch

Movable → Fixed

Fixed → Movable

Spillway gate

- Trouble in gate operation

- Damage

Earthquake motion

[ After ]

- Winch Bridge

- Fixed

Pin

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

Case-3

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
Case-3: Renovation of Power Plant

Toyomi PS
(Commissioning in 1929)

6 Units 56,400kw

Renovation of Generating Equipment and Concrete Structure due to Power Equipment Ageing
(Construction period: August 2008 ~ September 2013)

2 Units 61,800kw
Case-3: Renovation of Power Plant

[Existing]

6 Units

Legend
- Intake
- Channel, Head Tank
- Power House
- Tailrace

[Renovated]

2 Units
Case-3 : Renovation of Power Plant

[ Existing ]

Vertical shaft type Kaplan Turbine

[ Renovated ]

Vertical shaft type Bulb Turbine

Legend
- Orange: Intake
- Green: Channel, Head Tank
- Pink: Power House
- Orange: Tailrace
Main Contents of the 2nd Round Data Collection (1)

1. Outline of the Project Site (before Renewal/Upgrading)
   - General information of the Project Site
   - Specification of the Power Plant/Facilities/Equipment

2. Description of the Renewal & Upgrading Project
   2.1 Process to Identify and Define Renewal and Upgrade Work Measures
       To describe about the main process of the project in chronological order. (incl. year of operation started)
   2.2 Trigger Causes and Drivers for Renewal and Upgrading
       To describe about the drivers for the renewal and upgrading project (requirements to the project) based on “Identification of Trigger Causes of Renewal/Upgrading” of the 1st round data collection.
       - Condition, Performance and Risk Exposure
       - Opportunities to Increase Value
       - Market Requirements (if necessary)
   2.3 Description of Work Undertaken
       To describe the detailed specific information with a focus on the main key point of renewal and upgrading by texts, figures and tables, based on the information of “Category-1: Public Policies, Facilitation Measures, etc.” and /or “Category-2: Modern Technologies, Systems, Material, etc.”.
3. Feature of the Project

3.1 Best Practice Components
To describe the best practice components in connection with the written in “2.3 Description of Work Undertaken”.

3.2 Reasons for Success
Completed project: The reason why a promotional factor was able to be achieved for the renewal and upgrading project (requirements to the project). Ongoing project: The implementing work that will achieve the promotion for the renewal and upgrading project (requirements to the project).

4. Points of Application for Future Project

5. Others (monitoring, ex-post evaluation, etc.)

6. Further Information
   ➢ Reference etc.
### Status of Case History Collection: *(Other than Japan)*

Classification of Collected Case Histories by Trigger Causes/Key Points

(Tentative)

<table>
<thead>
<tr>
<th>Trigger Causes</th>
<th>Category-1</th>
<th>Category-2</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>(a) (b) (c) (d) (e) (f)</td>
<td>(a) (b) (c) (d)</td>
<td></td>
</tr>
<tr>
<td>(A) Ageing and recurrence of malfunction</td>
<td>--- ---</td>
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<td>11</td>
</tr>
<tr>
<td>(C) Needs for higher performance</td>
<td>2 1</td>
<td>4 1 1</td>
<td>10</td>
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<tr>
<td>(D) Needs for safety improvement</td>
<td>--- ---</td>
<td>---</td>
<td>1</td>
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<tr>
<td><strong>Total</strong></td>
<td>2 1 1 16 2</td>
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<td>22</td>
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</table>

Norway (12), USA (3), Finland (1), New Zealand (4), Australia (2)
## Activity Schedule of Annex-XI

<table>
<thead>
<tr>
<th>Work Item</th>
<th>2010</th>
<th>2011</th>
<th>2012</th>
<th>2013</th>
<th>2014</th>
<th>2015</th>
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</thead>
<tbody>
<tr>
<td>1. Agreeing on and starting the new ANNEX</td>
<td></td>
<td></td>
<td>24th</td>
<td></td>
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<tr>
<td>2. Formulating a detailed activity plan</td>
<td></td>
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<tr>
<td>3. Annex-11 expert meetings</td>
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<tr>
<td>4. Collecting cases</td>
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<tr>
<td>1st round Case Collection</td>
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<tr>
<td>Screening</td>
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<tr>
<td>2nd round Case Collection</td>
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<td></td>
<td></td>
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<tr>
<td>5. Analyzing and evaluating cases</td>
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<td>6. Creating and releasing reports</td>
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<tr>
<td>7. Workshops, etc.</td>
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<tr>
<td>8. ExCo meeting</td>
<td>24th</td>
<td>25th</td>
<td>26th</td>
<td>27th</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*-1: Sacramento, USA, July 19th.  
*-2: Tokyo, Japan, February 2012.  
*-3: Washington, D.C., USA, May 30th  
*-4 Bilbao, Spain, October 2012
### Selected Case Histories (Category-1)

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

<table>
<thead>
<tr>
<th>Key points</th>
<th>Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>(a) Energy policies of Countries &amp; States</td>
<td>1</td>
</tr>
<tr>
<td>(b) Investment incentives (Feed-in-Tariff (FIT), Renewable Portfolio Standard (RPS), subsidies, financial assistance, tax deductions, etc.)</td>
<td>1</td>
</tr>
<tr>
<td>(c) Integrated management of water resources and river systems</td>
<td>5</td>
</tr>
<tr>
<td>(d) Asset management, strategic asset management and life-cycle cost analysis</td>
<td>3</td>
</tr>
<tr>
<td>(e) Projects justified by the non-monetary valuation of stabilizing unstable power systems in the up-coming low-carbon society</td>
<td>1</td>
</tr>
<tr>
<td>(f) Environmental conservation and improvement</td>
<td>5</td>
</tr>
</tbody>
</table>

**Total** 16
## Selected Case Histories (Category-2)

**Category-2. Modern Technologies, Systems, Material, etc.**

<table>
<thead>
<tr>
<th>Key points</th>
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<tbody>
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<td>(a) Technological innovation &amp; deployment expansion of electro-mechanical (E/M) equipment</td>
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<tr>
<td>(d) Integration of other renewable energies into hydropower systems</td>
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</table>

**Total** 45
Thank you for your kind attention

New Energy Foundation

Email : hydropower@nef.or.jp