



IEA Implementing Agreement for Hydropower Technologies & Programmes

Hydropower Implementing Agreement

The Norwegian delegates to IEA
Norwegian Research Council 4th February
2016



Participating Countries & Members

- **Australia** – *Hydro Tasmania*
- **Brazil** – *Ministry of Mines and Energy, CEPEL*
- **China** – *China Yangtze Power Co/International Centre for Small Hydropower*
- **Finland** – *Finnish Funding Agency for Technology & Innovation (TEKES), Kemijoki Oy*
- **France** – *Électricité de France (EDF)*
- **Japan** – *New Energy Foundation (NEF), Agency for Natural Resources & Energy (MITI)*
- **Norway** – *Norwegian Water Resources & Energy Directorate (NVE)*
- **USA** – *US Department of Energy, Oak Ridge National Laboratory (ORNL)*



IEA Hydropower Vision & Mission

Vision

- Through the facilitation of worldwide recognition of hydropower as a well-established and socially desirable energy technology, advance the development of new hydropower and the modernisation of existing hydropower

Mission

- To encourage through awareness, knowledge, and support the sustainable use of water resources for the development and management of hydropower



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Hydropower Implementing Agreement

Annexes (Working groups)

Annex II
Small Scale
Hydropower

Annex IX
Valuing
Hydropower
Energy and
Water
Services

Annex XI
Renewal &
Upgrading
of
Hydropower
Plants

Annex XII
GHG
Emissions
from
Freshwater
Reservoirs

Annex XIII
Hydropower
and Fish

Annex XIV
Management
Models for
Hydropower
Cascade
Reservoirs



Annex II: Small-Scale Hydropower

The Annex II work program is based on policy, technology and dissemination. Policy issues include collating worldwide experience. Technology includes innovative methods, computerized tools and rehabilitation. Dissemination methods are through the dedicated web site and workshops at major hydropower conferences.

Annex II activities

A1 - World-wide Small Hydro Information and Technology Exchange

A3 - Government Policies and Experience – what works and what doesn't?

A5 - Sustainable Small-scale Hydropower in Local Community

B2 - Innovative Technologies and Applications for Small, Mini & Micro Hydro

Hydropower can be compared to this
nice Swiss army knife

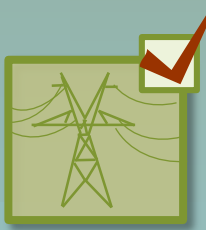


Introduction :

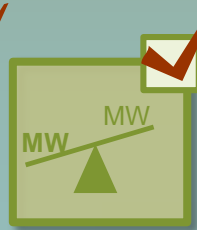
Non-energy benefits are seldom considered in a hydropower reservoir system analysis



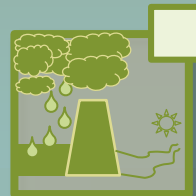
Generation



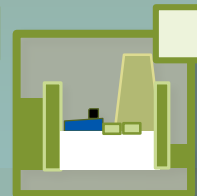
Grid
Stability



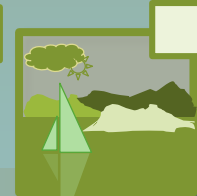
Load
Balancing



Flood Control



Navigation



Recreation



Water Supply



Others

Project Background

Project Purpose :

Recognize the value proposition of multipurpose reservoirs by identifying and quantifying both energy & non-energy benefits



Project Objectives :



Investigate the socio-economic contributions of each reservoir use



Quantify a dollar value for each benefit using appropriate methodologies

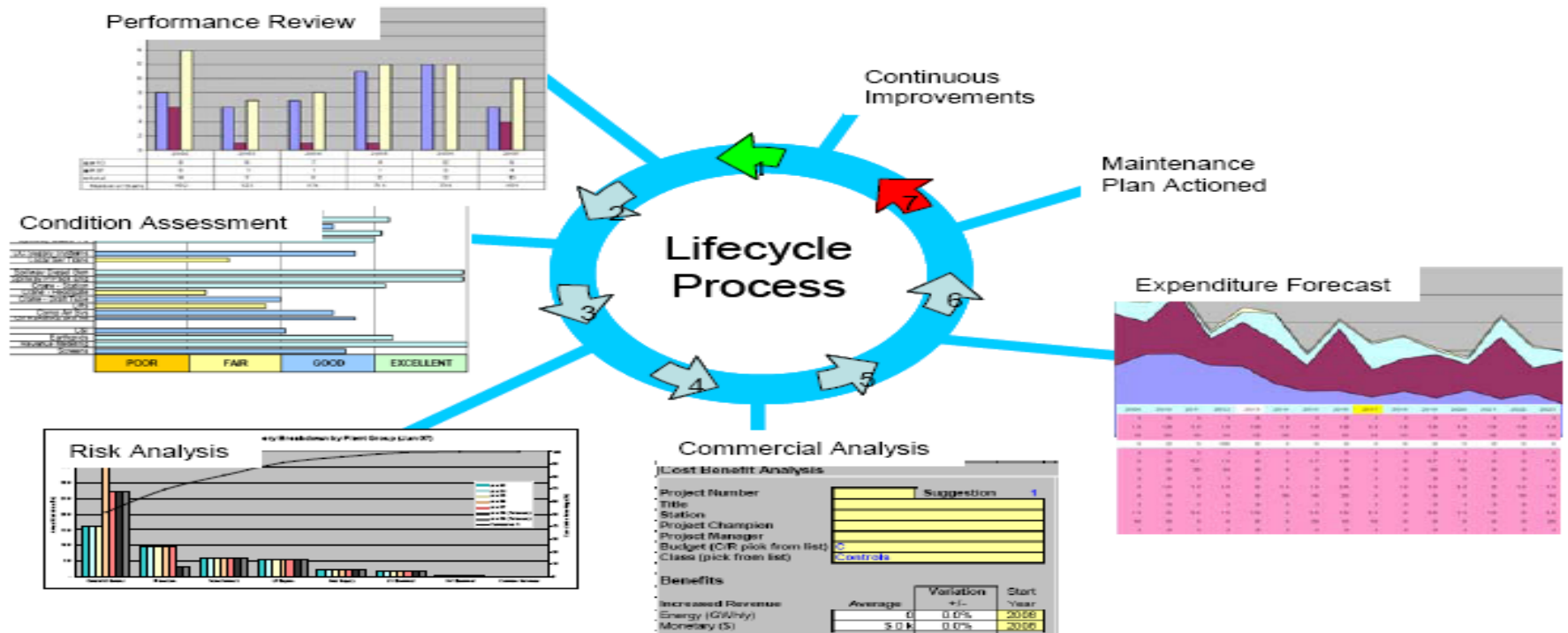


Present findings on an individual reservoir and river system basis



Annex XI: Renewal and Upgrading of Hydropower Plants

As powerplants age, many utilities implement a hydroplant modernization program with an attractive return on investment. With significant knowledge on technical aspects, best management practice is important to success



Conclusion

◆ There is much more potential for hydropower capacity increase in the United States

- ◆ TVA has preserved 3,258 MW and increased hydropower installed capacity of its existing fleet by about 10% through the 60 turbines (out of 113) upgrades since 1990's
- ◆ USCOE, Cumberland River System is upgrading all of its nine hydropower plants on the Cumberland River System (numbers will be published when available)
- ◆ Other Federal and non-federal hydropower agencies are in the process of upgrading their fleet (numbers will be published when available)

Measurement of GHG Emissions from Freshwater Reservoirs

Before reservoir construction

Divided into components

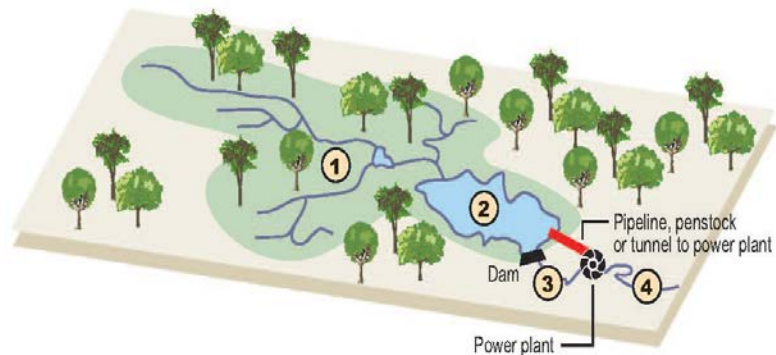
- 1 River basin
- 2 Downstream river reach



After reservoir construction

Divided into components

- 1 River basin with reservoir
- 2 Reservoir
- 3 River reach between dam and power plant outlet
- 4 River reach downstream power plant outlet





Annex XII: Hydropower and the Environment

- The Brazilian GHG field measurement campaign has been completed with measurements collected at eleven reservoirs.
- Collected data processed and available for modelling
- Guidelines issued on *“Quantitative Analysis of Net GHG Emissions from Reservoirs. Volume 1: Measurement Programs and Data Analysis”*
- Guidelines for *“Volume 2: Modelling”* to be launched at HYDRO 2015
- Scoping underway for best practices in management and mitigation



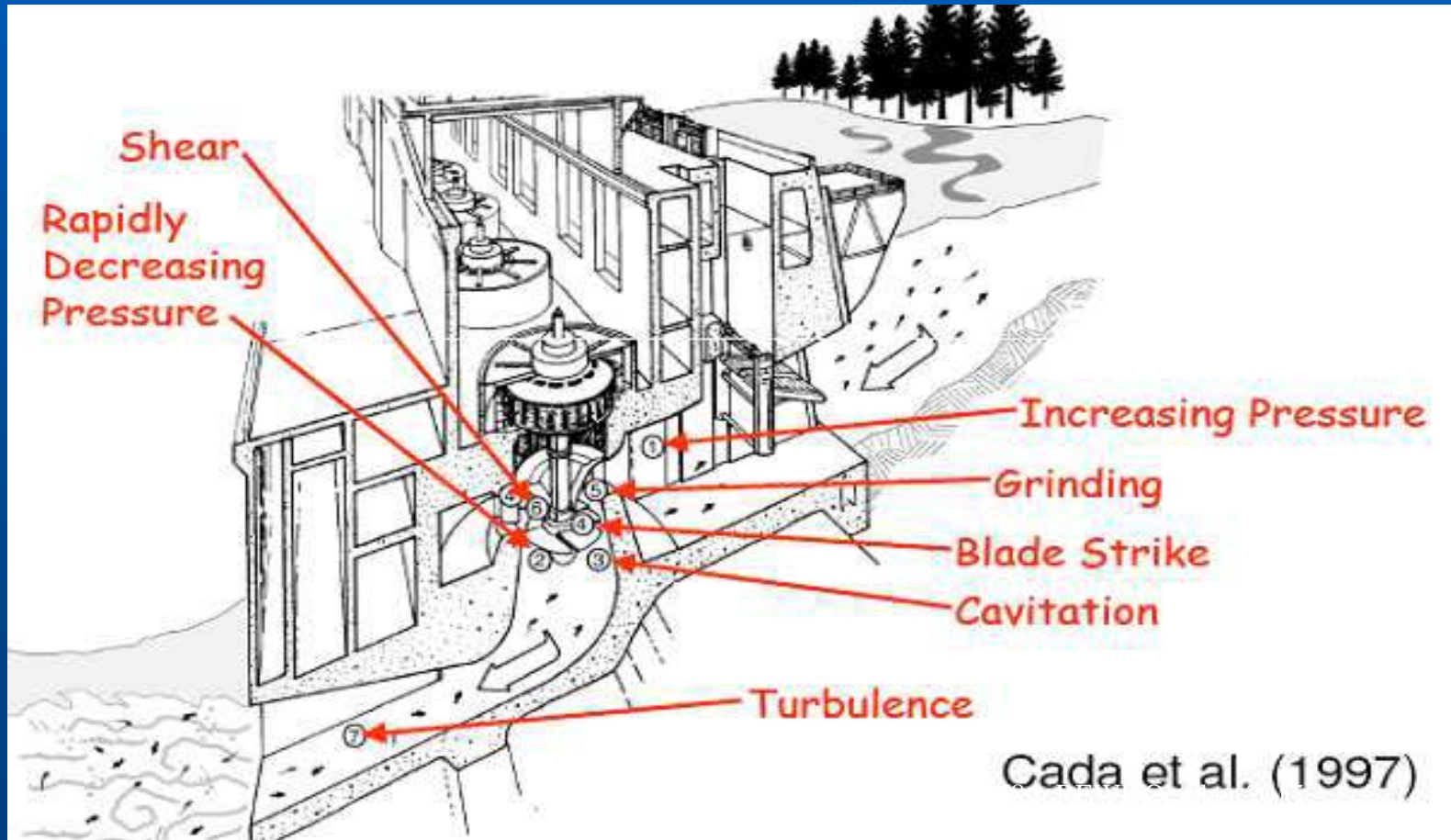
-
- **Tucuruí**
- **Balbina**
- **Serra da Mesa**
- **Xingó**
- **Três Marias**
- **Funil**
- **Segredo**
- **Itaipu**
-
- **Santo Antônio**
- **Belo Monte**
- **Batalha**





Annex XIII: Hydropower and Fish

Potential Damage Mechanisms for Fish Passing Through Hydro Turbines



Species of focus

- Eels
- lampreys
- Salmonids in general
- Catfish
- Whole-of-community and prioritizations for research and protection

Participating countries

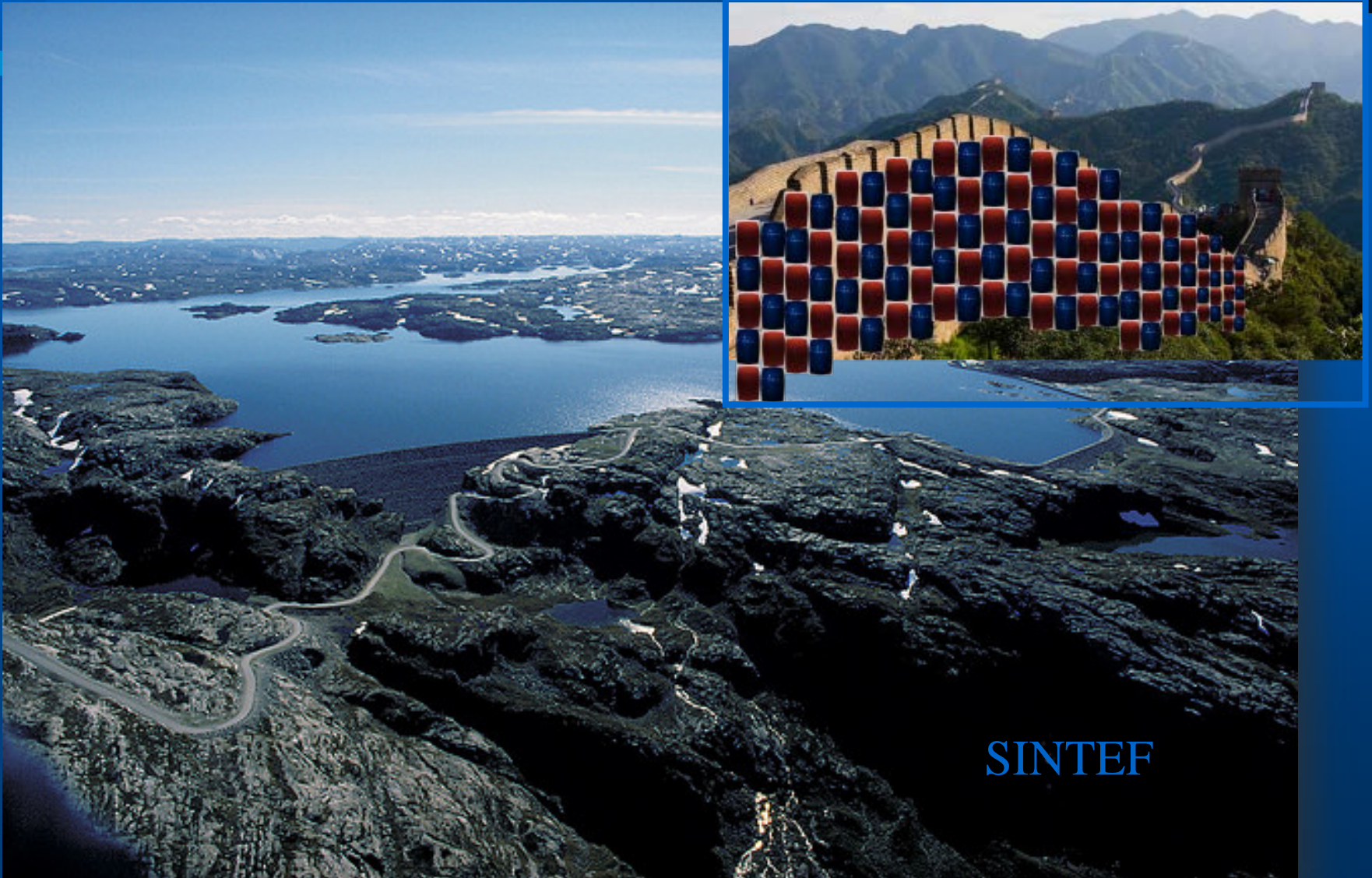
- **Norway** (lead): Hans-Petter Fjeldstad is the operating agent
- **Australia**
- **Brazil**
- **France**
- **Finland**
- **Germany**
- **Iceland**
- **Sweden**
- **Japan**
- **Laos**
- **United States**



Management Models for Hydropower Cascade Reservoirs

- The purpose of this Annex is to examine key issues that need to be addressed in the design of new hydropower cascade reservoir schemes and the operation and management of existing ones.
- Examples will be presented of both successful management models as well as lessons learned.
- The Annex will conclude with documentation and dissemination of the findings including case histories from the participating and other countries.

The value of hydro power reservoirs



SINTEF



Thankyou

www.ieahydro.org



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