ieahydropower

the international energy agency implementing agreement for hydropower technologies and programmes

Update of Recommendations for Hydropower and the Environment

BRIEFING DOCUMENT

October 2010

The IEA Hydropower Implementing Agreement (IEA Hydro) is a group of IEA and non-IEA member countries working together to facilitate worldwide recognition of hydropower as a well-established and socially desirable energy technology.

A work program of Annexes advances the development of new hydropower, and the modernisation of existing hydropower, through research on issues such as small hydro, wind-hydro integration, hydropower good practices, reservoir impacts on climate change, and web-based knowledge exchange

Annex III (1995-2000), on Hydropower and the Environment, identified the most significant challenges to the hydropower sector and recommendations were made covering five areas:

Energy Policy Framework
Decision-making Process
Comparison of Hydropower Project Alternatives
Improving Environmental Management of Hydropower Plants
Sharing Benefits with Local Communities

THESE ORIGINAL FIVE RECOMMENDATIONS HAVE BEEN UPDATED BASED ON BEST PRACTICE COVERING IMPORTANT NEW DEVELOPMENTS AND CURRENT PRACTICES IN THE HYDROPOWER INDUSTRY

Background

Annex III (1995-2000), on Hydropower and the Environment, identified the most significant challenges to the hydropower sector and recommendations were made covering five areas. These recommendations, as well as their associated criteria and guidelines, apply to a very broad range of projects, and were prepared for hydropower planners and operators. Not all project-related impacts cannot be avoided or mitigated and environmental impact assessments, as well as corresponding mitigation, compensation, monitoring and follow-up programs, remain essential project planning tools.

Annex III laid the foundation for subsequent work, which is contributing to the global effort of making hydropower development more sustainable. IEA Hydropower's Annex VIII Hydropower Good Practices: Environmental Mitigation and Benefits (IEA, 2006), is the first study of its kind to document so extensively more than 60 international Good Practices case studies, using criteria identified in Hydropower and the Environment. The report was also used in the development of the International Hydropower Association (IHA)'s Sustainability Guidelines (IHA, 2004), written primarily for hydropower developers and owners.

The original five Annex III Recommendations covered:

- *Energy Policy Framework:* Governments setting national policy and guidelines for all generation options
- *Decision-making Process:* Agencies establishing equitable, credible and effective guidelines for environmental assessment rules and process
- *Comparison of Hydropower Project Alternatives:* Developers applying guidelines for project selection, design and operation
- *Improving Environmental Management of Hydropower Plants:* Operators ensuring proper social and environmental management practice
- *Sharing Benefits with Local Communities:* Owners providing equitable transfers across project life cycle

These original five Recommendations have been updated based on best practice covering important new developments and current practices in the hydropower industry, including:

- Hydropower as a renewable and sustainable resource
- Hydropower as a system integrator
- The multi-purpose nature of water resources, including hydropower
- Hydropower as an integrator of non-firm renewables

Best practice, as it relates to environmental and social management, is defined as:

- *Providing the desired outcome for each specific activity, in the most expedient manner, taking into account available resources*
- *Meeting corporate drivers for regulatory compliance, safety and risk exposure, technical quality and financial expenditure*
- *Being best for business in contributing to corporate business goals and expressing company values*

The updated Recommendations are set out in the following pages. The Briefing Document can also be downloaded from the IEA Hydropower Implementing Agreement 's website http://www.ieahydro.org

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Cover photo: Minamiaiki Dam, Kannagawa Pumped Storage Power Plant, Gunma & Nagano Prefectures, Japan. Operated by Tokyo Electric Power Company (TEPCO).

1. ENERGY POLICY FRAMEWORK

Energy is a fundamental sector of a country's economy, and a coherent energy policy is fundamental to a country's economic strength. Such an energy policy may be market-based and competitive – allowing market forces to freely allocate resources – or it may be centralized and restrictive, leaving governments to decide which investments should be made in terms of energy development. However, regardless of the relative merit of any type of policy, each country's energy context is unique and requires specific approaches for effective economic development.

Recommendations

(i) **Countries and responsible jurisdictions should write and promote sustainable energy policies that set out clear objectives and provide a transparent framework for the development of all power generation options, including hydropower.**

- Energy policy should be based on clear sustainability objectives for all power generation options.
- Sustainability objectives should cover the full accounting of all environmental and social costs to enable the fair comparison of alternate electric power generation options.
- Sustainability policy objectives should cover the assessment of the carbon balance of all power generation options and the development of appropriate carbon assessment and pricing mechanisms.

(ii) **Existing or planned hydropower projects that meet acceptable environmental and social criteria should be classified as a renewable and sustainable resource.**

- Guidelines should be established that define acceptable environmental and social criteria for a fair, credible and effective classification of hydropower as a renewable and sustainable resource.
- Classifying hydropower as a renewable and sustainable resource should be based on meeting acceptable criteria and not on capacity, reservoir size or other physical characteristics.
- Discussions on the classification of hydropower should include participatory consultation with interested parties over the full range of issues.

(iii) **Hydropower should be acknowledged for its fundamental and important contribution to the electrical system and its ability to integrate other energy sources.**

- As electricity markets evolve, the full environmental and social advantages of using hydropower as the predominant system regulator should be studied and evaluated.
- Hydropower should be recognized as a having the inherent capability to integrate wind energy and other non-firm renewables into the electrical system.
- Hydropower should be recognized as a having the ability to provide fast, efficient, cost effective system regulation with minimum energy losses and equipment wear.
- Hydropower should be recognized for its provision of ancillary services for system regulation, including storage, peak power generation, load following and other forms of system support.
  - Provision of ancillary services can be very valuable to hydropower owners. The regulating function that hydropower (including pumped-storage) can provide will be important for dealing with the increased output fluctuation risk caused by the future growth of non-firm renewable energy sources.

(iv) **Each country's regulations and policy should be clearly set out, so that the rules are known and the process can be effective.**

- Hydropower developers need to know at an early stage if their projects will be encouraged, and under what conditions, particularly as long lead-times and expensive engineering and environmental studies are required.

- Hydropower development, whether publically or privately funded, must meet strict financial criteria.

(v) Hydropower should be promoted in developing countries through technical cooperation to investigate hydropower potential, and through financial cooperation to develop integrated water systems and efficient utilization of water resources

- There is a huge undeveloped hydropower potential, mainly in developing countries in Asia, Africa and Latin America. The importance of this potential should be recognized and technical and financial cooperation for the development of renewable and sustainable hydropower should be promoted.

2. DECISION-MAKING PROCESS

Environmental decision-making covers the Environmental and Social Impact Assessment (ESIA) process and the regulatory and legal framework that applies to hydropower development. Agencies should establish equitable, credible and effective guidelines for environmental and social assessment rules and processes and a framework on how to use the guidelines. The decision-making process must be efficient and effective for both the project proponent and society.

Recommendations

(i) A fair, credible and effective decision-making process should be established that integrates the interests of people and the environment.

- The decision-making process for hydropower assessment and licensing should effectively protect the environment and local communities without unfairly burdening project proponents with procedural uncertainties and unreasonable delays.
- Environmental and social decision-making should include the ESIA process and the applicable regulatory and legal frameworks.
- The environmental decision making process should have established rules, clear responsibilities, and a fixed and reasonable coverage of issues.

(ii) The decision making process should have a clearly defined and reasonable timeframe.

- Unreasonably long environmental assessment and licensing processes for hydropower projects translate into a competitive disadvantage for hydropower producers compared to other forms of power generation, including, for example, coal-fired power plants. Time delays generate significant costs for all participants in a hydropower project and they can lead to significant social and economic costs for concerned communities.

(iii) All hydroplant developments should include multi-purpose options, where feasible.

- The design, implementation and operation of a hydroplant should include all feasible multi-purpose options that meet acceptable environmental, social and economic criteria.
- Multi-purpose developments should include: hydropower, flood control, irrigation, potable water supply, navigation, reservoir recreation and fishing, and other tangible benefits
- Cost allocation among beneficiary sectors should be clearly defined.

3. COMPARISON AND SELECTION OF PROJECT ALTERNATIVES

As part of the planning process for a hydroplant, various alternative project arrangements are considered. The project developer should use the guidelines for decisions on project selection, design criteria and modes of operation. An important component of the planning process is to incorporate any studies necessary to improve knowledge of uncertainties

Recommendations

(i) **Project designers should apply environmental and social criteria to various project alternatives early in the planning process, to ensure selection of the most appropriate alternative for development.**

- For designers and project developers to effectively and consistently compare alternative hydropower projects and project arrangements, appropriate environmental and social decision-making criteria must be used. These criteria will be set by government agencies or regulators responsible for approving and licensing hydropower development.
- Environmental and social criteria should be consistent across all countries and jurisdictions, subject to specific regional issues. The use of international guidelines, such as the IHA *Sustainability Guidelines*, is strongly encouraged.
- The evaluation of net GHG emissions from reservoirs should be based on established methods of measurement and an evaluation protocol based on scientific evidence.

(ii) **The selection of projects and project arrangements should be made on best practice considerations.**

- Best practice considerations should include the following issues: using already developed river basins; balancing energy production with environmental and social impact; threats to vulnerable social groups and population displacement; public health risks; designated natural and human heritage sites and development in high quality habitats; incorporation of lessons-learned from previous projects; disappearance of known rare, threatened or vulnerable species; high risk of sediment accumulation.

(iii) **Project designers should clearly identify any specific environmental and social criteria that apply to hydro projects of different sizes and types.**

- Project designers should develop and apply tools to assess the merits of project alternatives from an environmental and social perspective, and consider both negative and positive impacts in the prioritization of such alternatives.
- The design of the hydroplant should incorporate best practice management of environment and social issues over the full project life-cycle.

(iv) **Renewal and upgrading of existing power plants, and adding hydropower facilities to existing dams should be promoted.**

- Existing hydroelectric facilities that are ageing, have poor reliability and have the potential to provide more power or system flexibility in an economic manner, should be considered for upgrading.
- In many countries, significant numbers of existing dams provide flood control, irrigation and water supply, without the provision of hydropower. The possibility of adding hydropower facilities to these existing dams should be considered.

4. IMPROVING ENVIRONMENTAL MANAGEMENT OF HYDROPOWER PLANTS

During construction, operation and decommissioning of a hydroplant (project life cycle), the construction manager and plant operator should ensure that appropriate social and environmental management practices are carried out. The hydroplant should utilise the water resource appropriately throughout the project life cycle.

Recommendation

(i) **A hydroplant should be built and operated based on best practice environmental and social management throughout its life-cycle.**

- The construction of the hydroplant should incorporate best practice management of environment and social issues.
- Environmental and social management should include interaction with interested parties over the full range of issues.
- Throughout the project life cycle, and including decommissioning, hydropower projects must be harmoniously integrated into their surroundings and communities. Responsibilities must be clearly identified to ensure that commitments are fulfilled.
- Best practice in environmental and social management cover the following important considerations, as applicable:
  - Human health and safety issues, including water quality impacts
  - Flow regimes and flow operating rules that acknowledge other water users
  - Fish passage for migratory species
  - Promoting conservation and protection of biodiversity
  - Reservoir sedimentation and reservoir debris
  - Monitoring and environmental follow-up programs and effectiveness of existing mitigation measures

5. BENEFITING LOCAL COMMUNITIES

An important issue associated with hydropower development is to ensure that social justice is provided through the fair distribution of project costs and benefits among local communities, society at large, project proponents and governments.

Recommendations

(i) **Hydropower projects should benefit local communities throughout the project life cycle.**

- Local communities should benefit from projects based on a fair assessment of net impacts to that community.
- Non-monetary benefits should be considered through community and infrastructure improvements, business and employment opportunities during construction and operation, improved electricity supply and multi-purpose uses of the water resource, where possible.

(ii) **Local communities are key players in hydropower development projects, as they are most directly affected by a project, and their involvement should be continuous from the early stages of the project.**

- Project proponents should maximize the benefits to the local community by:
  - Informing and consulting with local communities at all stages of the project
  - Acknowledging gender equity in participation, as well as outcomes
  - Liaising and cooperating with social and economic development agencies.
  - Designing and implementing monetary transfer mechanisms to local and regional institutions.
  - Optimizing local and regional economic spin-offs.

(iii) **Information associated with hydropower should be actively disseminated to society.**

- The importance of providing information related to hydropower to society should be recognized, and information associated with hydropower's value, environmental suitability and contribution to the economy should be actively disseminated to the public and the press.