



IEA - INTERNATIONAL ENERGY AGENCY

**IMPLEMENTING AGREEMENT FOR
HYDROPOWER TECHNOLOGIES AND PROGRAMMES**

End of Term Report

for the Second Phase (1999 - 2004)

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Objectives and Strategy

Phase 2 Strategy (1999-2004)

The Phase 2 strategy for the Hydropower Implementing Agreement was approved by the Executive Committee in November 1999 for the five year period 1999-2004. The vision statement was:

Facilitating worldwide recognition of hydropower as a well established, environmentally and socially acceptable renewable energy technology

The mission of the Implementing Agreement was:

To encourage the sound management and use of hydropower through awareness, knowledge, and support.

Five programme-based objectives were agreed on:

- 1. Encourage Public Acceptance of Hydropower as a feasible, socially desirable form of renewable energy.*
- 2. Increase the current wealth of knowledge on a wide array of issues currently associated with hydropower.*
- 3. Explore areas of common interest among international organizations interested in the continued use of hydropower as a socially desirable energy resource.*
- 4. Bring a balanced view of hydropower to the worldwide debate on its feasibility as an environmentally desirable energy technology.*
- 5. Encourage an interdisciplinary approach to the research needed to support the technology.*

To achieve these objectives, five strategic initiatives were defined, as follows:

- 1. An Assessment of the Role of Hydropower Facilities in Global Climate Change*
- 2. The Social Issues of Hydropower in the Global Community*
- 3. Cumulative Assessment of the beneficial and detrimental Impacts of Hydropower Facilities*
- 4. Developing Hydropower Proposals*
- 5. Partnerships in Hydropower*

The strategy recommended that two standing sub-committees of the Executive Committee be created for strategic planning and strategic outreach. The document also described on-going Annexes that would continue their work from phase 1, and new Annexes to be set up during phase 2.

Main technology areas

The phase 2 strategy did not specifically define the technological boundaries of the agreement. In practice, the work included conventional large and small scale hydropower and pumped storage, and did not address other potential uses of hydraulic turbines such as tidal power, wave power, or use of stream or tidal currents for electricity production.

The phase 1 work had clearly demonstrated that large or even small scale hydro projects are truly inter-disciplinary undertakings, with social, environmental, economic, and engineering dimensions. For this reason programme-based objective no. 5 emphasized an inter-disciplinary approach that goes well beyond engineering or specific technology issues. The professional background of participants in the work included biologists, environmentalists, officials of government regulatory agencies, members of electrical research institutes, as well as engineers and staff of electric utilities.

New Technology Areas

A new Implementing Agreement on Ocean Energy recently entered into operation and the Hydropower IA will avoid overlap with its work.

There is interest in the Small Scale Hydropower Annex to look into stream generation.

The unique ability of hydropower to store large amounts of water, and consequently electricity, makes it highly complementary to intermittent forms of renewable energy such as wind and solar energy. Although this technology is not new, there are certain economic, regulatory, and grid management issues, and it is the intention to actively pursue these in cooperation with the Wind Energy IA during phase 3.

Participation of Countries and Industry

List of Participants

The following table shows participation in the Agreement and its Annexes:

STATUS OF PARTICIPATION AS OF MAY 31, 2004

| | PARTICIPANT CATEGORY | IMPLEMENTING AGREEMENT (EXECUTIVE COMMITTEE) | ANNEX II SMALL SCALE HYDROPOWER | ANNEX VI PUBLIC AWARENESS | ANNEX VII HYDROPOWER COMPETENCE NETWORK | ANNEX VIII HYDROPOWER GOOD PRACTICES |
|--------------------------|-----------------------------|---|--|----------------------------------|--|---|
| CANADA: | | | | | | |
| CEA Technologies | Industry | X | | | | |
| Natural Resources Canada | Government | | X | | | |

| | PARTICIPANT CATEGORY | IMPLEMENT'G AGREEMENT (EXECUTIVE COMMITTEE) | ANNEX II SMALL SCALE HYDROPOWER | ANNEX VI PUBLIC AWARENESS | ANNEX VII HYDROPOWER COMPETENCE NETWORK | ANNEX VIII HYDROPOWER GOOD PRACTICES |
|--|-------------------------------------|---|---------------------------------|---------------------------|---|--------------------------------------|
| Hydro Québec | Industry | | | | | X |
| CHINA: International Network for Small Hydropower | Other (Int'l organization) | X | X | | | |
| FINLAND: Kemijoki Oy | Industry | X | | X | | |
| FRANCE: ADEME | Government | | X # | | | |
| JAPAN: New Energy Foundation | Other (Joint Gov't & Industry Org.) | X | | X | X | X # |
| NORWAY: E-Co Vannkraft | Industry | X | | | | |
| Vannkraft-Ost | Industry | | | X | | |
| Int'l Center for Hydropower | Research Institute | | | | X # | |
| SWEDEN: Elforsk | Research Institute | X | | | | |
| Vattenfall | Industry | | | X | | |
| USA: Bureau of Reclamation | Government | | | X # | | |
| Argonne Laboratory | Research Institute | Δ | | X # | | |
| TOTAL | 7/10 | | 3 | 5 | 2 | 2 |

X AGREEMENT SIGNED; ANNEX JOINED
Δ MoU signed, DoE now intends to become contracting party
OPERATING AGENT FOR ANNEX

Non-IEA Member Countries

China formally joined the Agreement and the small scale hydropower Annex as a non-IEA member contracting party in 1996. The participating organization (IN-SHP) has contributed in-kind to the work of Annex II (small scale hydropower) and Annex VIII (hydropower good practices). However, in general it has been found a challenge to find the resources to participate in most Executive Committee or Expert Meetings.

A special effort has been made during phase 2 to make contact with Brazil, and an Executive Committee meeting was organized in Parana State (Segredo) in 2001. However, the host organization, COPEL, the utility of Parana State, was just being privatized at that time. This had not been foreseen at the time when the meeting was agreed on. The hosts had other more pressing priorities and no lasting contacts resulted, although their hospitality was generous. Subsequently, contacts were made with the Brazilian small hydropower organization, and this may lead to more sustained cooperation.

In both cases of China and Brazil, travel and accommodation funds remain a significant barrier, and it may be better to make contacts and work a day before or after international hydropower conferences. Representatives from non-IEA countries sometimes have the resources to participate in one major international hydropower conference per year.

Industry Involvement

The term “industry” in the hydropower industry has a special meaning that has changed considerably during the past 10 years due to liberalization of the power sector. Most of the hydroelectric producers that participated in phases 1 and 2 are completely or partially government-owned. When the IA started in 1995, they considered their main mandate to be to deliver a reliable electricity supply to the customers in their service area, they usually owned generation, transmission and distribution assets, and they had built up spare capacity in order to ensure the reliability of supply. They also had budgets to participate in international collaborative activities such as Implementing Agreements. With the introduction of electricity markets, the responsibility for ensuring a reliable supply was transferred to Market Operator Organizations, and the spare capacity resulted in most cases in rapidly falling wholesale prices. Henceforth, the “industry” was only required to make a profit and operating costs were reduced drastically, mainly by personnel reductions but also through cuts in budgets for international activities. At present, the hydropower industry consists of a wide variety of business models, from the former completely government-owned electricity producers to completely private corporations. The industry participants in the Implementing Agreement were all government owned ten years ago, but today are in various stages of privatization.

Industry Participation in the Executive Committee and Annexes

Industry participates in the Executive Committee, in the work of the Annexes, and at technical meetings or seminars because they were designated by their Governments to represent their

countries in these capacities. They are full partners alongside representatives of Government Ministries and research organizations.

The producers of hydropower equipment have occasionally been invited to Experts' meetings, but generally have not participated in the work of the Implementing Agreement. There are few technology issues since the efficiencies of turbines and generators are well over 90% and very close to their theoretical maxima. There are other more established international conferences and fora for the hydropower equipment industry.

Potential for Increased Participation

Many IEA countries are significant producers of hydroelectricity and are not currently participating in the Agreement. (Australia, Austria, Italy, Germany, Greece, Mexico, New Zealand, Portugal, Spain, Switzerland, Turkey, United Kingdom). Of these, Italy, Spain, and the United Kingdom participated during phase 1 but withdrew during phase 2. The constraints to participation include:

- o The benefits of hydropower (zero or little greenhouse gas emissions, renewable energy, does not use fossil fuels, ability to store electricity, reliability of supply) are of importance to IEA Governments but are not rewarded or little rewarded in the market place. There are few incentives for privatized utilities to promote hydropower. At the same time, public acceptance of hydropower and the need to ensure environmental and social acceptability of new hydropower projects can be political constraints on IEA Governments.
- o The resources available for international collaboration within both privatized and non-privatized utilities have been significantly reduced.

The Implementing Agreement made a special effort to make itself known to hydropower authorities in Portugal and in Turkey, and to encourage their participation. Executive Committee meetings were organized in Porto and Antalya, respectively, and an extra day was added for a workshop with the host authorities, in Porto and in Ankara respectively. Half of the one-day workshops were a presentation by the host authorities of the hydropower situation in their country, and the other half was a presentation of the work and achievements of the Hydropower IA. The workshops were highly informative and good personal contacts were made, but to date neither country has decided to join as yet.

Withdrawals

Italy, Spain, and the United Kingdom withdrew from the IA after the completion of phase 1. (1999). In the case of Italy it was due to the privatization of ENEL. In the case of Spain one of the utilities (Iberdrola) wished to continue and did continue for a time, but the other large utilities did not wish to continue, and the umbrella organization for all utilities (UNESA) could not reach a consensus on this matter. In the case of the UK, the Government required that the small scale hydropower industry contribute half of the cost of participation in Annex II and in the Agreement. Industry was not willing to contribute.

The Work Programme and Nature of the Work

Executive Committee

In addition to directing the work of the Annexes, the Executive Committee itself was also active in dissemination activities and in establishing strategic contacts with other international hydropower organizations. As part of the phase 2 strategy, ExCo meetings were held in the countries of potential new participants (Portugal, Brazil, Turkey) with the aim of establishing closer contacts with interested organizations and encouraging their participation.

The main dissemination activities were the publication of a special issue of “Energy Policy” on Hydropower. (Volume 30 Number 14 November 2002 - SPECIAL ISSUE - Hydropower, society, and the environment in the 21st century), the publication of an article in “Revue de l’Energie”, the maintenance of a web-site, and the distribution of brochures at international hydropower conferences, and participation in an IEA conference on Life Cycle Analysis.

The IA initiated a meeting of international hydropower organizations at the Hydrovision 2000 conference, and this has now become an annual event. The IA also participated in the work of the World Commission on Dams, and its follow-up, the UN Environment Program (UNEP) “Dams and Development Forum”.

Annex 1 - Hydropower Upgrading

Annex 1 on Hydropower Upgrading published three technical reports on turbine, generator, and control systems upgrading during phase 1. These are sold by a technical publisher. For phase 2, it was the intention to do a study on ancillary services and management of hydropower plants in the new market environment. A well-attended workshop agreed on the work plan, but to date an Operating Agent has not been found.

Annex 2 - Small Scale Hydropower

Annex 2 on small scale hydropower continued to manage and improve its highly successful web-site (www.small-hydro.com) which recently has attained 100,000 “hits” per month. It also organized a series of well-attended workshops on small scale hydropower every year in conjunction with a major international conference. The Annex will continue in phase 3 under the new leadership of ADEME.

Annex 3 - Hydropower and the Environment

Annex 3 on hydropower and the environment completed almost all of its work during the year 2000 and introduced it to the media at a press conference chaired by the Executive Director of the IEA. Other presentations were organized at the World Bank and at international conferences. The reports were posted on the IA web-site, which reached about 3750 “hits” per month during 2001.

This Annex has completed its work, and is officially closed down.

Annex 4 - Systems approach to river basins

Annex 4 was planned at the start of phase 1 of the IA, but was never implemented due to lack of resources. There is wide agreement in the hydropower community that the development of watersheds should be done using a systems approach encompassing the entire basin. However, there was insufficient participation to start up the annex on this subject.

Annex 5 - Education and Training

Annex 5 on education and training conducted several surveys on the human resources needs of the hydropower industry in both developed and developing countries. It then formulated recommendations for meeting these needs. One sub-task investigated the use of the Internet to share hydropower teaching materials among Universities and technical institutes in industrialized and developing countries. The Annex was completed at the end of phase 1, and was succeeded by Annex 7 in phase 2.

Annex 6 - Public Awareness

Annex 6 on public awareness addresses one aspect of the issue of public acceptance of hydropower. It leaves aside advocacy or lobbying activities, and focuses instead on the provision of objective, balanced information about hydropower. Among the achievements is the production, jointly with other international hydropower organizations, of a white paper on hydropower, and of articles on the renewable and sustainable nature of hydropower. A very extensive information base on technical information has been assembled and is published on the Internet. A study on public decision making processes related to hydropower has also been done.

Annex 7 - Hydropower Competence Network

Annex 7 is the successor to Annex 5 on education and training. It has further developed the software for the sharing of teaching materials over the Internet, and will set up links between providers of learning materials and groups of students as test cases. Workshops have been held in developing countries to familiarize educators with the hydropower competence network.

Annex 8 - Hydropower Good Practices

Annex 8 on hydropower good practices is collecting about 70 case studies that illustrate good practices in a number of key issues related to hydropower. The report will be published at the end of phase 2, and various dissemination activities are planned for phase 3.

Co-ordination with Other Bodies

Co-ordination with other hydropower organizations takes place at the previously mentioned annual meeting of international hydropower organizations, as well as at international hydropower conferences and ad-hoc meetings. There are three categories of organizations:

- o Those that have a mandate to be neutral and objective about hydropower, such as the Implementing Agreement and the United Nations Environment Program (UNEP).

- o Those that have a mandate to advocate in favour of hydropower.
- o Those that have a mandate to advocate against hydropower.

The IA has contacts with all three categories, but co-ordination has to be managed within the constraints of these mandates. From the perspective of industry, they prefer to spend their limited budgets for international cooperation on organizations that will actively advocate in favour of hydropower.

Information Dissemination

The following is a list of major publications during the term under review:

1. Koch, F. (Guest Editor) Hydropower, society, and the environment in the 21st century, Energy Policy, Vol. 30, Number 14, November 2002. (The special issue contained 13 papers on hydropower, 10 of which were written by participants in the Implementing Agreement)
2. Klimpt, J-E., Koch, F., Seelos, K., Des projets hydroélectriques contribuant au développement durable, Revue de l'Énergie, no. 546 - mai 2003
3. Koch, F.H., Hydropower - Internalised Costs and Externalised Benefits, Externalities and Energy Policy : The Life Cycle Analysis Approach - Workshop Proceedings, Paris, France 15-16 November 2001, IEA, OECD, Nuclear Energy Agency.
4. Huseby, S., Recommendations, Guidelines, for Achieving Sustainable Hydro, Hydro Review Worldwide, Vol. 8, No. 6, December 2000, HCI Publications, Kansas City, MO. USA.
5. Implementing Agreement for Hydropower Technologies and Programmes, Annex I - Upgrading, Guidelines on Methodology for Hydroelectric Francis Turbine Upgrading by Runner Replacement, CD-ROM, March 2001, HCI Publications, Kansas City, MO. USA.
6. Implementing Agreement for Hydropower Technologies and Programmes, Annex I - Upgrading, Guidelines for Hydroelectric Generator Upgrading, CD-ROM, March 2001, HCI Publications, Kansas City, MO. USA.
7. Implementing Agreement for Hydropower Technologies and Programmes, Annex I - Upgrading, Guidelines on Methodology for Control Systems Rehabilitation, CD-ROM, March 2001, HCI Publications, Kansas City, MO. USA.
8. Natural Resources Canada, Small Hydro: Opportunities and Challenges, CD-ROM, August 2002, Ottawa.
9. Implementing Agreement for Hydropower Technologies and Programmes, Small Hydro Task Force (Annex II), Technical Reports, CD-ROM, October 2000, Ottawa.
10. Huseby, S. (Operating Agent) Annex III, Hydropower and the Environment, Technical Reports, CD-ROM, 2003, Oslo.
11. International Energy Agency Implementing Agreement for Hydropower Technologies and Programmes, Annex VIII, Hydropower Good Practices, CD-ROM distributed at the workshop in Dubrovnik, Croatia, November 2003. Available from New Energy Foundation, Tokyo, Japan.

Dissemination of the Agreement's Work

The main target groups are large utilities that own hydropower assets, government regulators and policy advisors, developers of small scale hydro plants, and persons interested in hydropower (from an environmental, social, technical, or educational perspective). The first two groups are reached through technical publications and at international conferences, the small hydro

community is reached at technical conferences, through international workshops, and through the Internet. Persons interested in hydropower are reached mainly through the Internet.

Number of “hits” on web-sites.

The site of Annex II (www.small-hydro.com) receives approximately 100,000 hits per month. The main site of the Implementing Agreement (www.ieahydro.org) receives approximately 3000 hits per month.

Search Engines and the web-sites.

If one types in “small hydro” to the Google search engine, the site of Annex II (www.small-hydro.com) comes at the top of the list.

If one types in “hydro power” to the Google search engine, the main site of the Implementing Agreement (www.ieahydro.org) comes up 22nd on the list.

If one types in “hydropower education and training” to the Google search engine, the site of Annexes V and VII comes up second on the list.

Brochures

Brochures about hydropower, about the Implementing Agreement, and about each of the Annexes are distributed mainly at international conferences.

Enhanced Communications

Within the hydropower community, the IA is reasonably well-known. Among the general public, considerable efforts to influence public opinion are made both by advocates and by opponents of hydropower. In general, the opponents allocate more resources to this effort than do the proponents. It is felt that the IA, which seeks to present objective, balanced information, has a role to play. However, the resources available to the IA for this purpose are very limited.

One way in which the web-pages could reach more people would be to translate them into other languages. The main web-site currently has a document that is translated into Japanese, Portuguese, and German. This could be expanded if additional volunteers were found to do the translation.

Technology Transfer to non-IEA member countries

There is ample further scope for technology transfer to non-IEA member countries. Two of the mechanisms used by the IA are the work of the Education and Training Annex and its “Hydropower Competence Network”, and the small scale hydropower Annex and its web-site. To date, the resources available to both these Annexes have been very modest, and significant increases in resources (probably from foreign aid organizations) would be required to expand the work and have a greater impact.

Scale of Activities

List of meetings

The Executive Committee meets approximately every nine months. Part of the phase 2 strategy was to have meetings in countries that are not currently participants in the IA. Due to increased security concerns and the extra cost and time required to travel longer distances, this has somewhat reduced the number of ExCo members present at meetings. On average there were from 10 to 15 persons at each meeting. In the concurrent workshops in Portugal and in Turkey, there were from 20 to 30 participants from the host country.

The small scale hydropower annex has organized one workshop every year at Hydrovision or Waterpower conferences. These have been successful and well-attended. (an average of 60 to 80 participants)

The public awareness annex has held meetings and workshops every six to nine months. (an average of 10 to 15 participants)

The hydropower competence network annex has held an average of two Expert meetings a year, and has organized a workshop in Bangkok, which had to be postponed for six month because of the SARS outbreak. (an average of 5 or 6 persons at Expert meetings, and about 20 persons from 6 South East Asian countries at the workshop).

The hydropower good practices annex has held an average of two Expert meetings a year (about 10 participants) and a workshop in Dubrovnik, Croatia, with about 25 participants.

Costs and budgets

The Annual budget of the Executive Committee for the last year was US \$ 48,000 and for the coming year will be US \$ 54,000.

Annex 1 on upgrading has completed its work. The sale of the CD-ROM's of its three technical studies result in annual revenues of approx. US \$ 5000. These funds are distributed back to the participants in the Annex.

Annex 2 on small scale hydropower had an annual budget of US \$ 30,000.

Annex 6 on public awareness does not have a common fund. Management and Administrative expenses were generously borne by the U.S. Bureau of Reclamation. It is estimated that 4 person-months of work were required per year for leading the annex, and a similar amount for producing the web-site of the Hydropower Information Network.

Annex 7 on the hydropower competence network had an annual budget of US \$ 56,000.

Annex 8 on hydropower good practices is generously financed by Japan. It is estimated that from 30 to 40 person-months of work per year are devoted to this annex.

Achievements, Benefits, and Issues

Technology Development and Deployment

The core hydropower technology of turbines and generators is more than 90 % efficient and near to the theoretical maximum, and there is only limited scope for further improvement. However, the associated technologies of control systems, electricity transformation, and transmission, and the associated disciplines of environmental science, market strategies, education and training, and working with communities affected by hydro projects have undergone major changes during the past decade and continue to evolve.

Some of the major recent technology developments have been:

- Advances in electronics and automatic control systems have made it possible to operate many large and small scale hydro plants automatically and/or by remote control. Many plants are un-manned, and visited only periodically by maintenance staff. This has greatly reduced operating costs.
- Advances in placing concrete (Roller Compacted Concrete) have reduced the costs and speeded up construction schedules of concrete dams.
- Advances in tunnelling machines have reduced the cost of constructing tunnels and underground power houses for hydro projects.
- Advances in computer technology and computational fluid dynamics have improved the designs of turbines.
- Advances in software have made it easier and cheaper to assess the hydropower potential of specific sites, and to design hydropower facilities.

Some of the “success” stories of the work of the Implementing Agreement are:

- Upgrading of existing hydropower facilities is by far the lowest cost means of producing renewable electricity. Annex I on upgrading of hydropower plants continued to sell its CD-ROMs of the three technical studies it had done during phase 1.
- The developers of small scale hydropower are often looking for preliminary advice on potential sites, assessing the suitability of potential projects, finding professional advisors, etc. and the web-site of the small scale hydro annex has been very helpful in these areas.
- The environmental studies done by Annex 3 and the life cycle analysis comparison with other generation technologies continue to attract attention and generate correspondence.

Networking

The IA tends to establish stronger working relations than for example, meetings at international technical conferences. The participants work together for 2 or 3 days at a time about twice a year and this tends to strengthen personal relations among them, to the point where they easily collaborate on IEA matters or on other matters. Most participants in the IA will easily telephone or e-mail other participants and find it useful to have several good contacts in the major hydropower organizations.

Policy Relevance

One example where the work of the IA has contributed to energy and environmental policy making was in the formulation of the World Bank's policy on large dams. The work of Annex 3 of the IA was used as one of the inputs for this process.

The International Hydropower Association is drafting environmental and social guidelines for the construction of large dams, and is using the work of Annex 3 of the IA as one of the inputs.

The IA has participated in the United Nations Environment Program (UNEP) Dams and Development Forum, which has encouraged a dialogue among the many stakeholders with an interest in large dams.

Efficient Use of R&D Resources

The three studies on upgrading done by Annex 1 are an example where funds were pooled to engage a consultant who did most of the technical work. The revenues from the publication of these studies represent about 20 % to date of their cost.

The studies done by Annex 3 on environmental and social impacts and mitigation measures relied both on cost sharing and task sharing. The Operating Agent and sub-task leaders were reimbursed for most of their management and administrative work, but most of the technical work was task shared.

Issues for the Renewable Energy Working Party and the CERT

Hydropower could make a larger contribution to energy security, reduced fossil fuel consumption and reduced greenhouse gas emissions in many IEA countries. This can be achieved through upgrading and re-licensing of existing plants and through construction of new ones. Many developing countries, including those with large populations and rapid economic growth (India, China, and Brazil), have large amounts of hydropower potential. In India and China, both coal and hydropower plants are used to meet increasing electricity demand, and the relative proportion of each will have a significant impact on global greenhouse gas emissions.

In discussions about renewable electricity and reduced greenhouse gases, the scale of hydropower is often overlooked or under-emphasized. One large hydro plant can often produce several hundred or several thousand times the amount of electricity of other technologies, and generally at lower cost.

The expansion of hydropower requires Governments to make decisions on proposed new hydro projects in order to ensure that they are environmentally and socially acceptable. It also requires Government policies that provide an appropriate incentive structure in terms of commercial revenues and in terms of rewards for positive externalities.

Hydropower decision making processes involve other users of the water resources, civil society organizations, governments, and proponents of hydro projects. By its nature, it is a competitive process in which stakeholders promote their own interests and disseminate information of an

advocacy nature intended to sway public opinion and affect the eventual public acceptance of a project.

The IEA Hydropower IA can play an important role in providing objective, balanced information about hydropower and its social and environmental impacts and mitigation measures to all stakeholders.

Within this framework, the following issues are drawn to the attention of the Renewable Energy Working Party and the CERT:

- o As other renewable energy technologies enter the market, they will face similar constraints in the regulatory environment that have been experienced by hydropower at local, state, and central government levels. Addressing these constraints will accelerate the deployment of renewable energies.
- o All energy technologies have greater or lesser environmental and social impacts. Balanced, objective information about such impacts and their mitigation measures is essential for sound decision making. Research and dissemination activities in this area should keep pace with research into the technology itself.
- o During phases 1 and 2, the Hydropower IA has enjoyed strong industry participation, but has suffered from a lower level of Government participation. Potentially, during phase 3 the IA could be a forum where Governments and industry jointly investigate ways and means of increasing the deployment of hydropower at home and abroad, but this would require more Governments to join and to take an active role.
- o Future IEA work on renewable energy could be strengthened by giving greater recognition to the amount of electricity produced by the various technologies, and by a more quantitative approach to future renewable energy deployment strategies.

Overall Significance of Agreement

During phase 2, the Hydropower IA has worked to increase worldwide recognition of hydropower as a well established, environmentally and socially acceptable renewable energy technology. It has also worked on subjects of interest to the hydropower industry itself, including technical studies on upgrading and meeting the human resources needs of the industry.

Both the public awareness annex and the hydropower good practices annex are based on the conviction that balanced, objective information about hydropower will be necessary to ensure that countries make sound decisions about existing and new hydro plants. During phase 2, both annexes have worked to produce such information, and they look forward to disseminating it to all interested stakeholders during phase 3.

The small scale hydropower annex has been particularly successful with its web-site, which now attracts 100,000 hits per month and is at the top of the list of the Google search engine. It looks forward to continuing to support the small hydro community during phase 3, both in IEA countries and in non-IEA member countries.