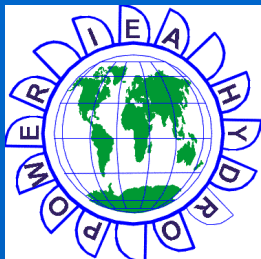


International Energy Agency
Implementing Agreement
For Hydropower Technologies & Programmes

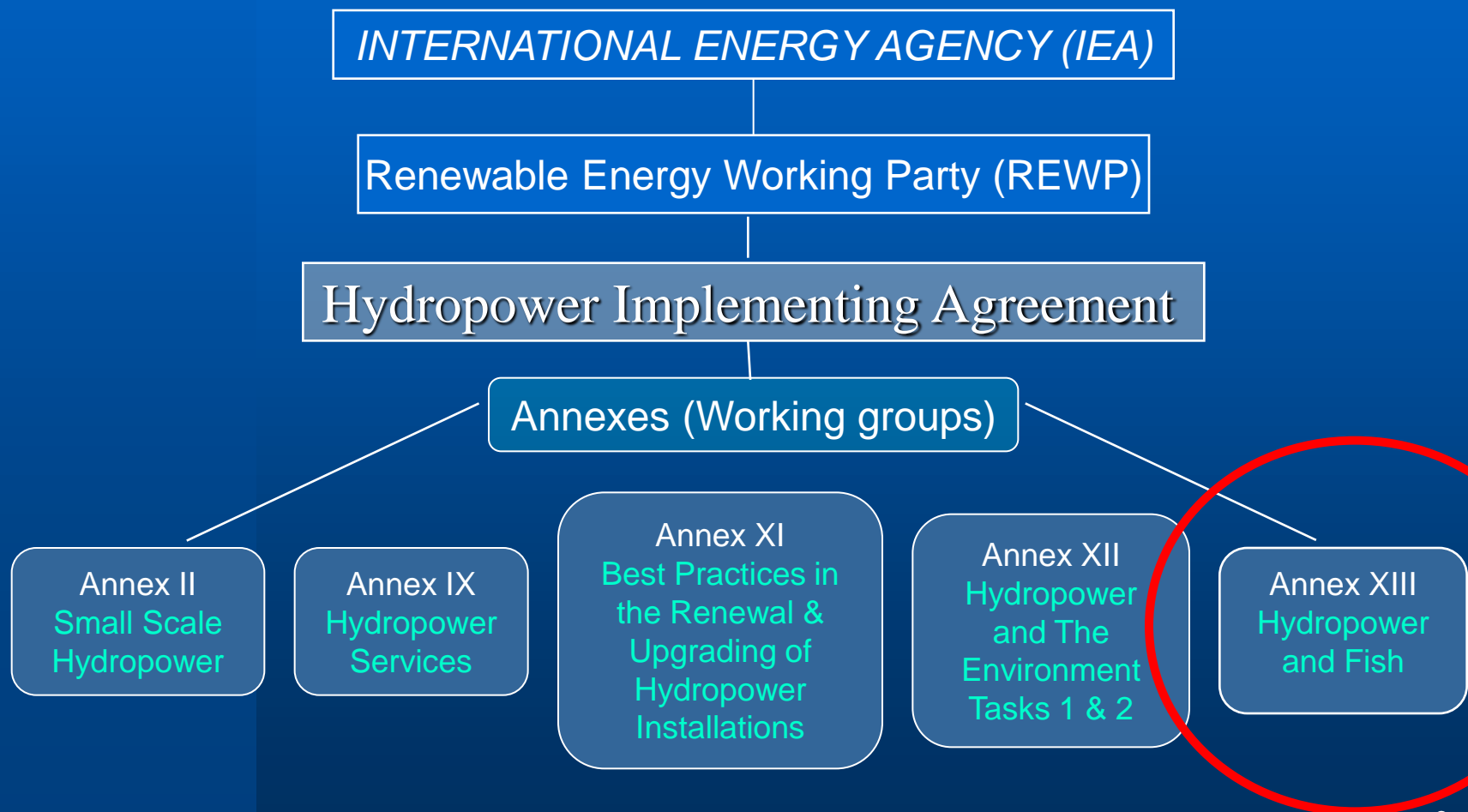
Annex XIII
Hydropower and fish

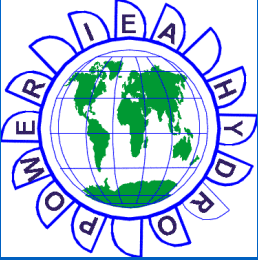
Open Seminar, Tuesday 10th June 2014, Rovaniemi, Arktikum

Marja Savolainen & Hans-Petter Fjeldstad



Organisational Structure





Workshops so far

Annex XIII on Hydropower and Fish, has commenced with an initial meeting in August (Laos PDR) and a second meeting:

- Trondheim, Norway Dec 2-4, 2013
- 15 participants from
 - Norway
 - Finland
 - France
 - Australia



Workshop in Trondheim

- Visit to the Hydraulic laboratory at the Norwegian University of Science and Technology
- Visit to the new Leirfossen hydropower plant
- Presentations from ongoing research in member countries
- Discussions and prioritizing coming annex activities

Workshop presentations and talks in Trondheim

- **Elver migration in Tasmania** (Hydro Tasmania, by Caroline Whalley)
- **Eel migration in France** (EDF, by Emmanuel Branche, Katrin Linne and Camille Alava)
- **Fish Friendly turbines** (Voith Hydro, by Armin Schuh)
- **Atlantic salmon population dynamics** (NVE, Norway, by Jan Henning L'Abée-Lund)
- **The CEDREN research program** (SINTEF, Norway, by Atle Harby)
- **Hydropower and fish in Finland** (Fortum, by Marja Savolainen)
- **Hydropower and fish in Norway** (Statkraft, by Tormod Schei)

Decisions and further annex work

- Most of the participants suggested **fish migration in a wide sense as a main topic** for the further Annex XIII work
- It was decided that the final product of the Annex XIII work should be **special report on efficient two-way fish migration in regulated rivers.**
- This document (or handbook) will serve as **a toolbox and guideline** for the member institutions and decision makers in general.



Areas of common interest

- Eel and salmonids
- Migration especially downstream but also upstream
- Cost-efficiency of measures



Handbook elements

Technologies

- Monitoring techniques
- Fish passage devices
- Tracking of fish
- Turbines/structures

Fish passage protocol

- Legal matters: (re)licensing of HPP, obligations, legislations
- Relevance: Fish passage as a competitive measure for enhancing fish populations
- Verification of efficiency
- Cost benefit assessments

Case histories, Cost effective solutions, different needs

Advices and messages

Homework from Trondheim

- 2-page summaries from all the members:
 - Important topics/challenges of interest regarding hydropower and fish
 - Best practise knowledge
 - Relevant literature available
 - Knowledge needs and gaps
 - Ongoing research
 - Areas of common interest and collaboration

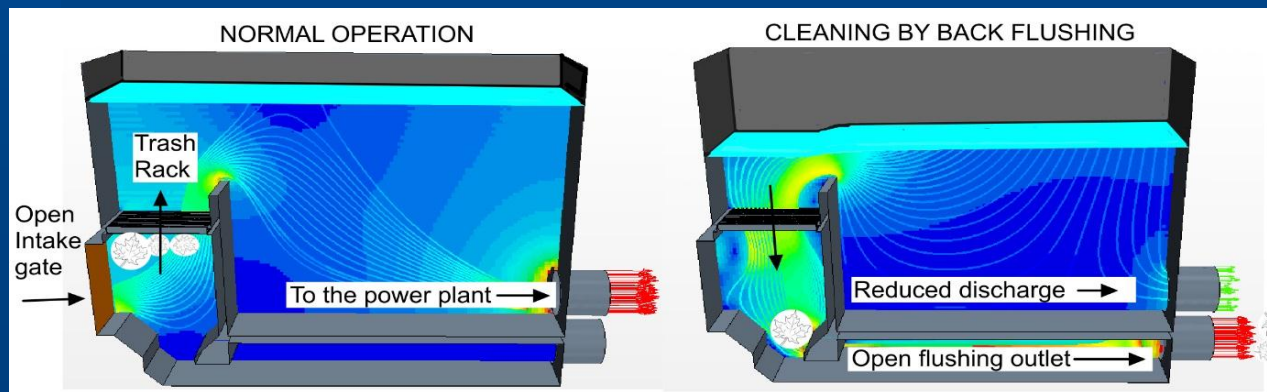
Example / Finland:

Areas of interest & collaboration

- Species: Baltic salmon(ids) and lamprey.
- Both upstream and downstream migration
- Applications for run-of-the-river -HPPs 10-200 MW, head 10-20 m
- Country-specific examples of population estimations
- Monitoring techniques and results
- Work on CFD studies, methodologies:
 - E.g. modeling appropriate environmental flows for salmon
 - Fortum's Swedish hydro & studies at river Klarälven about up- and downstream migration
 - Own examples of population estimation

Ongoing research

- Within all member countries, relevant research on fish migration is presently going on
- Results and publications will be used in the Annex work.
- The most important issue is to identify resources and institutions with the capacity to accomplish the Annex XIII tasks. The operating agent is working on this.



Laboratory testing of fish friendly intake (Norway)

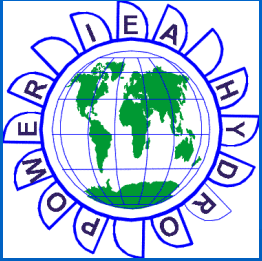
Next steps

- Based on the 2-page summaries, a roadmap for Annex XIII will be compiled by the operating agent (ongoing)
- A table of content for a final report will be outlined
- To be discussed at Rovaniemi
 - Later feedback from the US members suggests that the results from the Annex can also be published as a special issue in a relevant international journal
 - So far, the practical tasks for completing the final report have not been given to member institutions

Coming events

- **Annex XIII has been granted a 90 minutes session during the Hydro 2014 conference in Italy in October**
 - **Good opportunity to present our activities**
 - **A relevant arena for establishment of new contacts**
- **Titles and topics to be discussed in Rovaniemi**
- **Next Annex Meeting directly after the HYDRO 2014 Conference**





Thank you

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