VALUING HYDROPOWER FLEXIBILITY IN EVOLVING ELECTRICITY MARKETS

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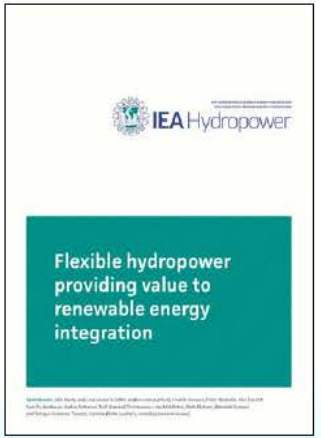
IEA Hydropower

THE INTERNATIONAL ENERGY AGENCY TECHNOLOGY COLLABORATION PROGRAMME ON HYDROPOWER

Presentation of White Paper no 1

Flexible hydropower providing value to renewable energy integration



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White Paper no 1 - October 2019

ANNEX IX WHITE PAPER 2 - OUTLINE

Title: Valuing Hydropower Flexibility in Evolving Electricity Markets

- Brief description of system flexibility needs (ref. white paper 1)
  - Definition of flexibility services to focus on in white paper
    - How are these services impacted by more VRE
    - To what extent can hydropower provide the selected services
- Mechanisms to provide system flexibility services
  - Market-based or other (e.g. contracts, interconnection requirements)
  - Flexibility service product definitions
- International case studies of flexibility services
  - Flexibility services, procurement, prices, hydropower role, important trends
- Perspectives on future electricity markets
- Conclusion
  - Current status, evolving trends, best practices, hydro implications
- Appendix: Brief list of most important terminology

TIMESCALES OF POWER SYSTEM FLEXIBILITY

Flexibility type	Short-term			Medium term	Long-term	
Time scale	**Sub-seconds to seconds**	**Seconds to minutes**	**Minutes to hours**	**Hours to days**	**Days to months**	**Months to years**
Issue	Ensure system stability	Short term frequency control	More fluctuations in the supply / demand balance	Determining operation schedule in hour- and day-ahead	Longer periods of VRE surplus or deficit	Seasonal and inter-annual availability of VRE
Relevance for system operation and planning	Dynamic stability: inertia response, voltage and frequency	Primary and secondary frequency response	Balancing real time market (power)	Day ahead and intraday balancing of supply and demand (energy)	Scheduling adequacy (energy over longer durations)	Hydro-thermal coordination, adequacy, power system planning (energy over very long durations)

SOURCE: IEA HYDROPOWER ANNEX IX // WHITE PAPER NO 1 - OCTOBER 2019

FLEXIBILITY QUESTIONNAIRE

- Questions across timescales
  - Please provide a brief overview of relevant grid flexibility services and products
  - How are these flexibility services currently procured?
  - Are these services compensated?
  - Does hydropower currently provide these services to the power grid?
  - How much is normally procured of this service? Use the last year(s) average or similar
  - List important current and future developments related to these flexibility services
- Responses from 12 countries received so far
  - A wide variety of flexibility mechanisms
  - Hydro provides flexibility services across the timescales

NEXT STEPS

- Confirm contributors to write the white paper
  - Volunteers welcome!
- Select case studies
  - Covering different flexibility topics (timescales and mechanisms)
  - Geographical diversity
- Extract relevant findings from survey
- Finalize outline and assign writing responsibilities
- Timeline
  - June-July: Prepare sections
  - Aug: Integrate material
  - Sep: Finalize
  - Oct: Announce white paper at Hydro 2020 (Strasbourg, France, Oct 26-28)

THANK YOU