The First Global Stocktake

International Hydropower Association (IHA) Submission

May 2023

Executive Summary and Key messages

The International Hydropower Association (IHA) respectfully submits the following text to the First Global Stocktake process of the UNFCCC.

The Key Messages we bring to Parties' attention are as follows:

1. Hydropower needs to double by 2050 if we are to meet climate goals

To keep global warming to below 1.5°C, at least 2,500 GW of hydropower capacity is needed, according to modelling done by the International Energy Agency and the International Renewable Energy Agency. This is around twice today's installed capacity.

Today, hydropower is the largest source of low carbon electricity, and third largest overall, providing more than 15% of the world's electricity. Through the flexibility and storage services it provides, hydropower plays a key role integrating and accelerating growth in variable renewables such as solar and wind, as well as strengthening overall system resilience. Indeed, according to the IEA and IRENA models, by 2050 hydropower will be the single largest source of *flexible* electricity generation. Therefore, if we want the most from wind and solar, we need to also increase hydropower.

2. The world is not on track to meet this goal

Hydropower is not developing fast enough to meet these global targets. There needs to be a step change in the amount of global installed capacity of sustainable hydropower by 2050 in order to support the clean energy transition away from fossil fuels and to tackle climate change.

Hydropower should be growing at an average pace of around 46 GW per year, the equivalent of the combined capacity of Norway and Mexico. The current rate of development is well below these levels. Between 2016 and 2021, hydropower grew at an average rate of 22 GW/year, half the required rate and well below the record

47GW commission in 2012. In 2022, 30 GW were added to the mix which is a slight improvement over the previous five years, but still well below what is required.[1]

3. Going forward, the only acceptable hydropower is sustainable hydropower

There is no excuse for unsustainable hydropower projects to go ahead.

Hydropower developers and operators should demonstrate their commitment to sustainable hydropower in a way that is clear, transparent and verifiable. The preparation, implementation and operation of hydropower should be delivered in accordance with international good practice as defined by the Hydropower Sustainability Standard.

4. What needs to change for the world to be on track?

Policy recommendations from the IHA:

- **Plan for a low carbon future now**. Hydropower takes 10-15 years to develop. This includes assessing storage and flexibility needs for the future grid, identifying potential sites and undertaking feasibility studies. .
- Establish **financial mechanisms** that reward flexibility and stability and give investors predictability. Subsidies, grants and capacity markets are some of the mechanisms able to achieve this.
- **Streamline license and permitting processes**. Currently, too many projects are unable to progress due to extensive delays, which slows down the deployment of essential infrastructure that is vital for tackling climate change.
- Embed the **Hydropower Sustainability Standard** into processes and regulations.
- Incorporate **climate resilience** into the planning and operation of hydropower projects by using the IHA's Climate Resilience Guide.
- Make the most of **existing infrastructure**. Facilitate modernisation and retrofitting of ageing hydropower plants and incorporate increases in generation capacity through refurbishment projects. Fitting turbines to non-powered dams or adding floating solar to existing reservoirs are other methods of using existing infrastructure, offering low impact added capacity.

[1] IHA, World Hydropower Outlook, 2023

Introduction

International Hydropower Association (IHA) respectfully submits the following text to the First Global Stocktake process of the UNFCCC. We support and acknowledge the excellent submissions of our partner agencies, the International Energy Agency (IEA)[2] and the International Renewable Energy Agency (IRENA),[3] who provided thorough analyses and answers to the Technical Guiding Questions regarding progress towards emissions reductions in the energy sector.

The IHA therefore does not attempt to provide detailed answers to each question but rather, to complement the submissions of these two agencies by highlighting the specific role of hydropower in the energy transition.

Mitigation guiding questions[4]

1. What is the collective progress in terms of the current implementation of, and ambition in, mitigation actions towards achieving the goals defined in Articles 2.1(a)1 and 4.12 of the Paris Agreement?

The energy transition is not on track. There needs to be a step change in the amount **of global installed capacity of sustainable hydropower by 2050** to support the clean energy transition away from fossil fuels and to tackle climate change. This is based on an assessment of modelled pathways to Net Zero from IEA and IRENA, as well as looking at current and future planned hydropower capacity.

Although much of this new renewable deployment will be led by wind and solar photovoltaic (PV), their variable nature means that there will be a significant increase in demand for sources of flexible low carbon generation. Consequently, the IEA[5] and IRENA[6] both assess that in order to cost-effectively keep global warming to below 2°C **at least 850 GW of new hydropower capacity is needed**. For the more ambitious Net Zero target (limiting temperature rise to below 1.5°C) the numbers are even greater, with at **least 2,500 GW of capacity needed** (around twice today's installed capacity of approximately 1,360 GW). Hydropower therefore has a key role in future energy systems as an enabler of variable renewables, as well as a renewable energy source itself.

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[2] IEA, The First Global Stocktake, International Energy Agency (IEA) updated submission, March 2023
[3] IRENA, The First Global Stocktake, International Renewable Energy Agency (IRENA) Submission, March 2023
[4] Technical Assessment component of the first Global Stocktake, Revised questions, 18 February 2022
[5] IEA, Net Zero by 2050: A Roadmap for the Global Energy Sector. Paris: International Energy Agency, 2021, p.117
[6] IRENA (2021) World Energy Transitions Outlook: 1.5°C Pathway. Abu Dhabi: International Renewable Energy Agency, p.73

Substituting new build hydropower for other dispatchable energy sources would be a huge undertaking and most likely impractical in the limited time available. By 2050 hydropower will be the dominant source of system flexibility. No low carbon options are available today that can deploy at the scale needed. If it were replaced by carbon intensive gas, the extra emissions would be equivalent to what Japan (the world's third largest economy) emits in a year.

4. How adequate and effective are the current mitigation efforts and support provided for mitigation action towards achieving Articles 2.1(a) and 4.1 of the Paris Agreement?

Current mitigation efforts regarding the increase in hydropower capacity are not adequate. The IHA has undertaken an analysis of its global hydropower database[7], which shows that of at least 850 GW of new hydropower capacity that is needed, there are only 500 GW of projects in the pipeline i.e. future hydropower capacity.

However, only 156 GW of this is under construction. 165 GW has been regulator approved but awaiting construction, 138 GW is pending approval and 89 GW has been announced. **Moving these projects into construction is crucial if we are to cost-effectively tackle climate change**.

Hydropower should be growing at an average pace of around 46 GW per year, the equivalent of the combined capacity of Norway and Mexico. The current rate of development is well below these levels. Between 2016 and 2021, hydropower grew at an average rate of 22 GW/year, half the required rate.[8]

There are clear trends for future hydropower, such as the regional disparities in development and the growth of pumped storage. Breaking down the pipeline by regions demonstrates larger future growth in capacity in East Asia and Pacific, Africa, and South and Central Asia, with 240 GW, 118 GW and 91 GW in the pipeline respectively (see Figure 1). It highlights the great potential in regions where hydropower is less developed, as well as the centrality of hydropower for many countries' shifts towards renewable energy and extending electricity access to growing populations.

[7] IHA, Hydropower 2050: Identifying the next 850+ GW towards Net Zero, 2021
[8] IHA, World Hydropower Outlook, 2023

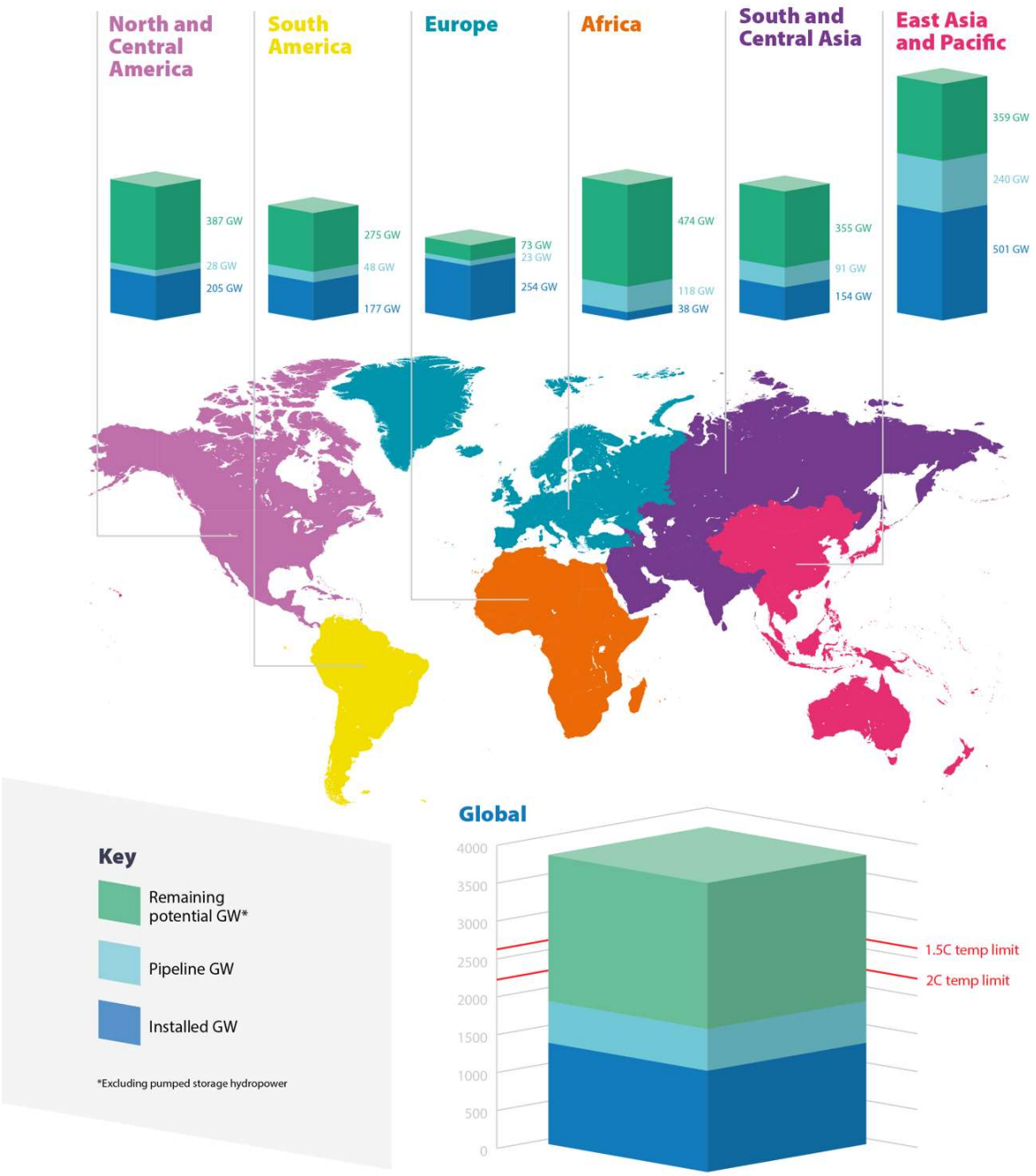

Figure 1: World map showing regional breakdown of current installed hydropower capacity, projects in the pipeline and remaining potential capacity, using 2020 data. Source: IHA, Hydropower 2050: Identifying the next 850+ GW towards Net Zero, 2021

IHA analysis also confirms the growing importance of pumped storage hydropower, currently the world's most widespread source of energy storage capacity. Data shows that, if all projects in the pipeline were completed, pumped storage capacity would almost double in the future. This will be especially important for future energy systems with a high proportion of variable renewables such as wind and solar PV.

5. In order achieve the goals defined in Articles 2.1(a) and 4.1 of the Paris Agreement:

a) What further action is required?

IHA analysis of academic research suggests that, even allowing for tight environmental and social restrictions as required of sustainable hydropower, the potential for an additional 1200 GW of installed capacity is well within our reach by 2050 as required in the IEA and IRENA Net Zero pathways.

Hydropower, like all sources of electricity, has physical restrictions. In the case of conventional (run-of-river and reservoirs) hydropower this means at the very least access to flowing water. As a well-established technology many sites, particularly in Europe and North America, have already been used. Furthermore, many theoretically feasible sites are situated in areas that for a range of practical, economic, social and environmental considerations mean they would not be suitable for hydropower.

To ensure this resource is developed, the IHA recommends the policies detailed in section 5b) below.

b) What are the barriers and challenges, and how can they be addressed at national, regional and international levels?

The IHA recommends a range of policy measures to facilitate at least 850+ GW by 2050.

- **Plan for a low carbon future now** – hydropower takes 10-15 years to develop. This includes assessing storage and flexibility needs for the future grid, identifying potential sites, and undertaking feasibility studies.
- Establish **financial mechanisms** that reward flexibility and stability and give investors predictability. Subsidies, grants and capacity markets are some of the mechanisms able to achieve this.
- **Streamline license and permitting processes**. Currently, too many projects are unable to progress, due to extensive delays, which slows down the deployment of essential infrastructure that is vital for tackling climate change.
- Embed the **Hydropower Sustainability Standard** into processes and regulations.

- Incorporate **climate resilience** into the planning and operation of hydropower by using the IHA's Climate Resilience Guide (2019).
- Make the most of **existing infrastructure**. Facilitate modernisation and retrofitting of ageing hydropower plants and incorporate increases in generation capacity through refurbishment projects. Fitting turbines to non-powered dams is another method to utilise existing infrastructure, offering low impact added capacity. Provide direct integration with other renewables, such as floating solar.

c) What are the opportunities, good practices, lessons learned and success stories?

Going forward, there is no excuse for new build hydropower to not be developed sustainably[9] – the IHA is leading the way in promoting the Hydropower Sustainability Standard, governed by the multi-stakeholder Hydropower Sustainability Governance Council.

Hydropower developers should take advantage of the Hydropower Sustainability Tools and Hydropower Sustainability Standard to ensure that projects are fit for purpose. This means that new projects will be built in a way that minimises impacts on the local environment and communities.

16. What is the collective progress in terms of the current implementation of, and ambition in, efforts made that address the social and economic consequences and impacts of response measures while implementing mitigation policies and actions towards the achievement of the Paris Agreement goals?

The hydropower sector has made substantial progress in improving the social impacts of hydropower projects.

Hydropower has benefited from advances in science, technology and, most of all, multi-stakeholder understanding of good sustainability practice, to enhance its efficiency, effectiveness, complementarity with other energy sources and benefits, while reducing its negative impacts. The Hydropower Sustainability Standard is the result, effectively a culmination of decades of work on establishing best practices in the sector, with the participation of environmental and social non-governmental organisations (NGOs). It should continue to strive for further improvements.

In addition, sustainably developed and responsibly operated hydropower projects can make a significant contribution to national and international efforts to achieve the Sustainable Development Goals (SDG), in particular:

[9] San José Declaration on Sustainable Hydropower

- SDG 6: sustainable water management
- SDG 7: affordable, reliable, sustainable and modern energy for all
- SDG 8: sustainable economic growth and jobs
- SDG 9: resilient infrastructure
- SDG 13: urgent action to address climate change

22. In order to achieve the purpose and long-term goals of the Paris Agreement:

c. How can international cooperation for climate action be enhanced?

International cooperation can be enhanced by the creation of alliances among similar stakeholders to speak with a stronger voice to policymakers.

We highlight two such alliances that were launched at COP27:

- **Global Renewables Alliance:** This unprecedented alliance brings together all the technologies required for the energy transition, namely the international associations representing the major sources of renewable energy, green hydrogen and long duration storage. Its goal is to ensure an accelerated energy transition, that climate targets are met, and that vital coordination and planning take place. The alliance also aims to position renewable energy as a pillar of sustainable development and economic growth, particularly in the global south.

- **Planning for Climate Commission:** This Commission was established to raise awareness for the need for improved planning and approval processes for renewable energy projects and the green hydrogen economy. Expeditious planning processes and procedures can and must be married with assured sustainability. The Commission will produce recommendations to strengthen the planning and approval processes for renewable energy projects. It will consider mechanisms, incentives, and awareness-raising to contribute to a high degree of acceptance for renewable energy and green hydrogen infrastructure by engaging local communities.

Members of both groups include the international associations representing hydropower, wind, solar and geothermal energy as well as long-duration energy storage and green hydrogen.