



**MOU Between DOE and TVA
on Hydropower Technology Development**

MEMORANDUM OF UNDERSTANDING

between

UNITED STATES DEPARTMENT OF ENERGY

and

TENNESSEE VALLEY AUTHORITY

regarding

HYDROPOWER TECHNOLOGY DEVELOPMENT

This memorandum of understanding (MOU) is between the United States Department of Energy (DOE), through its Water Power Technologies Office (WPTO), and the Tennessee Valley Authority (TVA), a corporate agency and instrumentality of the United States government, established by the Tennessee Valley Authority Act of 1933, 16 U.S.C. § 831 *et seq.*, hereinafter collectively referred to as the “Participants.” This MOU is made and entered into this 5th day of January , 2023.

WHEREAS, the goal of electricity decarbonization is a priority of the Participants; and

WHEREAS, hydropower has a key role in affordable decarbonization while maintaining electrical reliability; and

WHEREAS, WPTO enables research, testing, development, and commercialization of emerging technologies to advance the next generation hydropower and pumped storage systems for a flexible, reliable grid; and

WHEREAS, TVA maintains a fleet of hydropower generating assets across the Tennessee Valley; and

WHEREAS, TVA desires to adapt our existing and future hydropower assets in pursuit of an aspirational 2050 goal of carbon-free electricity generation;

THEREFORE, TVA and WPTO are executing this MOU to mutually promote, pursue, evaluate, and demonstrate the feasibility, operability, and affordability of emerging options for hydropower fleet adaptation.



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1. PURPOSE

The Participants intend to collaborate in an array of activities to promote, pursue, evaluate, and demonstrate the feasibility, operability, and affordability of emerging options for hydropower fleet adaptation. This adaptation centers around hydropower's operational flexibility necessary to meet the needs of a dynamic electric grid with respect to energy storage, capacity, and ancillary services. The Participants' activities under this MOU will leverage each Participant's relative areas of expertise, to pursue the objectives generally described above and detailed below.

2. ROLES AND ACTIVITIES

a. **ROLES OF THE PARTICIPANTS.** IN THE CONTEXT OF THIS MOU:

- **DOE**, through WPTO, will generally focus on improving the technical feasibility of new hydropower and pumped storage technologies, advancing promising technologies toward deployment in service of the Nation, as part of their core mission. DOE will also pursue research into the adaptation of existing hydropower assets to the changing energy needs of the Nation, which may include modeling, data collection and analysis, and technical assistance.
- **TVA** will generally focus on techniques and technologies that allow its hydropower system to adapt to the changing needs of the Tennessee Valley and the electricity industry more generally. TVA may host demonstrations of more mature technologies anticipated for near-term utility scale deployment, whose benefits outweigh the costs and risks to TVA's ratepayers.

b. **BI-ANNUAL MEETING.** The Participants intend to conduct meetings twice per year to prioritize and coordinate activities under this MOU.

c. **ACTION PLAN.** The Participants intend to create a yearly action plan, outlining the joint efforts over the coming year. The initial action plan will be developed within 180 days of the execution of this MOU.



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- d. **ADDITIONAL ACTIVITIES.** The Participants also may exchange available, public information to advance the purposes of this MOU. Information that either Participant deems business sensitive, confidential and/or proprietary may require a separate non-disclosure agreement between the Participants prior to exchange; the Participants will independently determine whether or not the information contemplated for exchange requires such agreement, and will inform the other Participant accordingly. The Participants may pursue joint publications, and co-host meetings and workshops to support national needs and the technical collaboration activities described herein.

3. AREAS CONSIDERED

The Participants intend to collaborate in the following areas to pursue, promote, evaluate, and demonstrate the feasibility, operability, and affordability of various hydropower technologies and activities. Participants intend to collaborate with the shared goal of pursuing, promoting, and deploying these various technologies and activities at the utility scale:

- **Climate Change Adaptation.** The Participants intend to continue ongoing efforts to best forecast impacts of climate change on river operations so that river operating policies can adapt to provide for optimal operations. .
- **Hydropower Fleet Asset Management.** The Participants intend to pursue advances in hydropower fleet asset management, particularly around modelling reliability under new fleet missions and optimizing investment strategies.
- **Valuation of Hydropower.** The Participants intend to pursue improved quantification of the value of energy, capacity, and ancillary services provided to the electrical grid by hydropower generators, including pumped storage facilities.
- **Pumped Storage.** The Participants intend to continue ongoing efforts to explore the role, value, and technological options for deploying new pumped storage in service of the evolving grid and decarbonization.
- **New Turbine Demonstration.** The Participants intend to evaluate the potential of emerging turbine designs for use nationally, and in the TVA fleet.
- **Workforce Development.** The Participants intend to develop training opportunities to help fill the hydropower workforce pipeline. These



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opportunities are intended to prepare the national hydropower operations sector for upcoming retirements and industry changes.

- **Emerging Opportunities.** The participants intend to explore additional hydropower opportunities of joint interest that emerge over the period of this MOU.

4. GENERAL CONSIDERATIONS

- a) **NONBINDING AGREEMENT.** This MOU does not establish any legally binding agreements or commitments, or create or give rise to any financial, contractual, or other legal obligation among the Participants. This MOU shall not be construed to provide a private right or cause of action for or by any person or entity. Any such binding agreements or commitments would be memorialized in separate, written agreement(s) between the Participants, and would be subject to applicable DOE and TVA approvals. WPTO efforts under this MOU are subject to available funding. TVA's efforts pursuant to this MOU are subject to approval(s) of its executive management and Board of Directors.
- b) **POINTS OF CONTACT.** The designated points of contact for the implementation of this MOU are:

DOE

Name: Colin Sasthav

Title: General Engineer

Phone: (202)-731-2261

Email: colin.sasthav@ee.doe.gov

TVA

Name: Curt Jawdy

Title: Advisor to Vice President of Innovation and Research

Phone: 865-310-4727

Email: cmjawdy@tva.gov



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c) FUNDING, INTELLECTUAL PROPERTY RIGHTS, AND OTHER RESOURCES.

Participants will negotiate a separate written agreement if there is any commitment of funds and/or any commitment of other resources by either Participant. If the Participants determine that a particular activity may lead to the creation of intellectual property or the exchange of business-confidential information, they will consult with each other and make appropriate written arrangements for the protection and allocation of such intellectual property and the protection of such business-confidential information.

d) GOVERNING LAW.

As stated in Clause 4(a), this MOU creates no legal rights or obligations between the Parties. To the extent that any legal disagreement or dispute arises, this MOU will be governed by and construed in accordance with the federal laws of the United States of America.

- All agreements herein are subject to, and will be carried out in compliance with, all applicable laws, regulations, and other legal requirements.
- Any disputes relating to this MOU will, subject to applicable law, regulation, and other legal requirements, be resolved by consultation between the Participants.
- Nothing in this MOU is intended to create a committee subject to the requirements of the Federal Advisory Committee Act (Pub. L. 92-463), as amended.
- DOE enters into this MOU under the authority of Section 646 of the Department of Energy Organization Act (Pub. L. 95-91), as amended (42 U.S.C. §7256).

e) PERIOD OF AGREEMENT.

Cooperation under this MOU may commence on the Effective Date and will continue for a period of up to five (5) years, unless terminated in accordance with Section 3.g, below.

f) AMENDMENT/MODIFICATION.



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Participants may amend this MOU from time to time by written agreement or documentation between the Participants.

g) TERMINATION.

The Participants may terminate this MOU at any time by mutual written agreement. Alternatively, a Participant that wishes to discontinue its participation in and terminate this MOU may provide at least 60 days advance notice in writing to the other Participant's Point of Contact identified in Section 4(b).

h) EFFECTIVE DATE.

This MOU is effective on the date that it is fully executed by both Participants (the "Effective Date").

FOR DOE/WPTO

Jennifer L. Garson
Digitally signed by Jennifer L. Garson
Date: 2023.01.03 14:27:18 -05'00'

Name: Jennifer Garson

Title: Water Power Technology Director

Date:

Place:

FOR TVA

By: [Signature]

Name: Dr. Joseph Hoagland

Title: VP of Innovation and Research

Date: January 5, 2023

Place: