

Request for Information: Data and Research Needs for Climate Change-Informed Hydropower Operation and Resource Planning

DATE: April 4, 2022
SUBJECT: Request for Information (RFI): DE-FOA-0002713

Description

The U.S. Department of Energy (DOE), Office of Energy Efficiency and Renewable Energy (EERE), Water Power Technologies Office (WPTO) is requesting information and feedback on the data and research needs that may support the broader hydropower community (i.e., system operators, technology developers, facility owners, regulators, researchers, and other stakeholders) in developing and implementing climate change-informed practices for sustainable long-term hydropower operation and resource planning. The requested information will help WPTO design future research and development (R&D) initiatives, tools, and datasets that support the community in addressing the risk of long-term climatic change on hydropower generation.

Background

The potential impacts of climate change are widespread and complex. Therefore, the focus of this RFI is to explore how the hydropower community may leverage state-of-the-art climate change science to inform hydropower operation and resource planning. Most of the existing infrastructure and water management practices were designed decades ago, at a time when the community had limited historic observations and assumed climate to be stationary. Recent observations have revealed the changing nature of climate, hydrology, and water availability. These studies show that the frequency and severity of hydrologic extreme events such as droughts and floods are intensifying, severely impacting critical water and energy infrastructure systems. However, there remain opportunities to leverage these new findings in long-term operation and resource planning for sustainable future hydropower generation.

To understand how climate change may affect federal hydropower generation, as directed by Section 9505 of the SECURE Water Act (SWA) of 2009, WPTO previously engaged national laboratories to conduct three rounds of assessments^{1,2} between 2009 and 2014 to evaluate the effects of climate change on hydroelectric energy generated from 132 U.S. federal hydropower plants marketed by four Power Marketing Administrations (PMAs). Leveraging the latest global

¹ <https://www.energy.gov/eere/water/water-power-reports-congress#climate>

² <https://www.ornl.gov/project/effects-climate-change-hydropower>

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climate projections from international research efforts,³ an assessment framework was established to develop future water availability projections to support the evaluation of long-term impacts. While this WPTO-led effort provided preliminary insights to help understand the broad impacts of climate change on federal hydropower, the assessment did not cover non-federal hydropower assets due to the legislative limitation of SWA. ***It is recognized that the broader community of non-federal hydropower stakeholders may require similar assistance to further evaluate climate change-induced long-term risks to their assets.*** For example, if hydroclimate modeling is not within a utility's original mission scope, the utility may not have sufficient resources or dedicated in-house expertise to evaluate the risks due to long-term climate change. To reduce a utility's burden in conducting a full-scale hydroclimate study (i.e., from global climate model selection, downscaling, all the way to river management simulation), it may be beneficial for DOE to create actionable, climate-informed data and research that supports energy and water communities.

Given the diverse nature of the hydropower community (i.e., across different geographical regions, system features, water management objectives, and localities), it is also recognized that climate research and data needs are unique for each community member. Through this RFI, WPTO would like to understand the specific areas of concern, objectives, priorities, focused issues, regulatory constraints, and resource limitations across a wide variety of relevant stakeholders. While a one-size-fits-all solution to address all concerns is unlikely and impractical, WPTO will use the collected information to identify common challenges and prioritize future R&D directions to provide tools, data, and resources that produce the greatest benefit to the majority of hydropower stakeholders. The requested information will also be used to inform workshops and other activities that will be announced later this year.

Purpose

The purpose of this RFI is to request feedback from industry, academia, research laboratories, government agencies, and other stakeholders on the data and research needs for climate-informed long-term hydropower operation and resource planning. Specifically, WPTO will identify potential tools, data, and resources that may be developed to reduce the burden a utility would incur by conducting their own full-scale hydroclimate assessments, and to help it establish climate-informed future plans. The requested information will help WPTO design future R&D initiatives, tools, and datasets to support the broad hydropower community in addressing the risk of long-term climatic change.

³ <https://www.wcrp-climate.org/wgcm-cmip/wgcm-cmip6>

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Disclaimer and Important Notes

This RFI is not a Funding Opportunity Announcement (FOA); therefore, EERE is not accepting applications at this time. EERE may issue a FOA in the future based on or related to the content and responses to this RFI; however, EERE may also elect not to issue a FOA. There is no guarantee that a FOA will be issued as a result of this RFI. Responding to this RFI does not provide any advantage or disadvantage to potential applicants if EERE chooses to issue a FOA regarding the subject matter. Final details, including the anticipated award size, quantity, and timing of EERE funded awards, will be subject to Congressional appropriations and direction.

Any information obtained as a result of this RFI is intended to be used by the Government on a non-attribution basis for planning and strategy development; this RFI does not constitute a formal solicitation for proposals or abstracts. Your response to this notice will be treated as information only. EERE will review and consider all responses in its formulation of program strategies for the identified materials of interest that are the subject of this request. EERE will not provide reimbursement for costs incurred in responding to this RFI. Respondents are advised that EERE is under no obligation to acknowledge receipt of the information received or provide feedback to respondents with respect to any information submitted under this RFI. Responses to this RFI do not bind EERE to any further actions related to this topic.

Confidential Business Information

Pursuant to 10 CFR 1004.11, any person submitting information that he or she believes to be confidential and exempt by law from public disclosure should submit via two well-marked copies: one copy of the document marked “confidential” including all the information believed to be confidential, and one copy of the document marked “non-confidential” with the information believed to be confidential deleted. Submit these documents via email. DOE will make its own determination about the confidential status of the information and treat it according to its determination.

Evaluation and Administration by Federal and Non-Federal Personnel

Federal employees are subject to the non-disclosure requirements of a criminal statute, the Trade Secrets Act, 18 USC 1905. The Government may seek the advice of qualified non-Federal personnel. The Government may also use non-Federal personnel to conduct routine, nondiscretionary administrative activities. The respondents, by submitting their response, consent to EERE providing their response to non-Federal parties. Non-Federal parties given access to responses must be subject to an appropriate obligation of confidentiality prior to being given the access. Submissions may be reviewed by support contractors and private consultants.

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Request for Information Questions

Note: It is not necessary to answer all questions, but **please attempt to answer Questions 9–13**. Also, please identify the questions to which a response applies.

Facilities and assets of concern

Question 1: Could you provide a high-level description about the objective, type, size, and service area of your organization? Please also provide a brief description about the facilities and assets of concern regarding the potential impacts due to climate change (e.g., reservoirs, power plants, transmission lines, conveyance structures, and other energy-water infrastructures)?

Question 2: Could you please describe the customer body, composition, and energy demand that these facilities are supporting?

Risks of concern

Question 3: Considering your facilities and assets, what are the potential risks due to climate change? Examples may include but are not limited to floods, droughts, heat waves, wildfires, etc.

Question 4: For these risks of concern, what worrisome trends in recent decades, if any, have you observed and how have they influenced your facilities and operations?

Question 5: What are other non-climatic risks of concerns and/or trends that you have observed that may affect your long-term operations? Examples may include but are not limited to changing population, energy demand, or urbanization.

Variables of interest

Question 6: What meteorologic and hydrologic variables are you using, if any, to support your operations, decision-making, or long-term planning? Examples may include but are not limited to rainfall, temperature, streamflow, snow water equivalent, reservoir storage, groundwater heights, etc.

Question 7: For these variables, what temporal (e.g., sub-daily, daily, weekly, monthly, seasonal, annual, decadal) and spatial (e.g., point measurement, or regional aggregation by watershed, county, state, or other geographical units) scales are you using to support your operations, decision-making, or long-term planning?

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Question 8: For these variables, what metrics (e.g., average, median, 95 percentile, 100-year return level extremes) are you using to support your operations, decision-making, or long-term planning? Also, how are you characterizing uncertainty in these metrics?

Data and research needs

Question 9: Have you ever used climate data to inform your operation and to evaluate potential future risks? Climate data is broadly defined in this RFI as any relevant historic or future hydro-meteorologic information based on observations, model simulations, or paleo-hydrologic information. Examples may include but are not limited to long-term observation of rainfall, snowpack, and streamflow, climate model projections (raw or downscaled), reconstructed historic paleo streamflow information, etc.

Question 10: If your organization has invested or plans to invest in developing climate change-informed data and decision-making capabilities, what is the preferred method of investment? Examples may include but are not limited to developing direct research contracts with a consultant or research institute, hiring in-house expertise, utilizing government supported technical assistance, joining a community-based consortium, etc.

Question 11: If WPTO provided baseline climate data across a set of potential future scenarios, would that be helpful for supporting your long-term planning and risk assessment? Examples of data that WPTO could provide include but are not limited to ensemble downscaled future temperature, rainfall, streamflow, and snowpack projections, estimated future water and energy demands, projected future land use and land cover change, etc.

Question 12: If WPTO provided baseline climate data across a set of potential future scenarios, what are time horizons of greatest concern (e.g., seasonal-to-subseasonal, annual, decadal, multi-decadal, and/or till the end of 21st century)? In considering the severity of climate projections, which emissions scenarios are of greatest interest – high, medium, or low?

Question 13: If WPTO expanded climate change research with respect to hydropower operation and resource planning, what research areas would you like to see explored? Examples may include but are not limited to climate change impacts on water management, drought and water availability assessment, environmental impact analysis, infrastructure safety evaluation, energy deployment model projection, adaption / mitigation studies, etc.

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Other general comments

Question 14: What additional approaches may help your organization better prepare and address the potential impacts of climate change in your long-term planning?

Question 15: What additional challenges (e.g., communications, stakeholder perception) have you encountered when addressing the issues of climate change-induced risks?

Request for Information WRITTEN Response Guidelines

Responses to this RFI must be submitted electronically to WPTORFI@ee.doe.gov no later than 5:00pm (ET) on June 6, 2022. Responses must be provided as attachments to an email. It is recommended that attachments with file sizes exceeding 25MB be compressed (i.e., zipped) to ensure message delivery. Responses must be provided as a Microsoft Word (.docx) attachment to the email, in 12-point font, and 1-inch margins. Only electronic responses will be accepted.

Please identify your answers by responding to a specific question or topic if applicable. Respondents may answer as many or as few questions as they wish.

EERE will not respond to individual submissions or publish publicly a compendium of responses. A response to this RFI will not be viewed as a binding commitment to develop or pursue the project or ideas discussed.

Respondents are requested to provide the following information at the start of their written response to this RFI:

- Company / institution name;
- Company / institution contact;
- Contact's address, phone number, and e-mail address.

Request for Information VERBAL Response Guidelines

In lieu of or in addition to providing written responses to this RFI, respondents may request a 30-minute individual discussion with a WPTO staff member regarding the content of their written responses to the RFI questions. Similarly, if a respondent is unable to submit written responses, or would otherwise prefer to do so, he/she may request a 30-minute individual discussion with a WPTO staff member to verbally provide responses to the RFI questions. If a respondent wishes to participate in an individual discussion for either of these reasons, please submit your request to WPTORFI@ee.doe.gov and you will be contacted by a WPTO staff

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member to schedule a time for the discussion. Requests for an individual discussion must be requested no later than 5:00pm (ET) on June 6, 2022.

Respondents will be asked to provide the following information at the start of the verbal response to this RFI:

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