

Financing Dam Rehabilitation and/or Removal

Summary of Roundtable Discussion

Convened by Duke University

On April 6, 2023, Duke University's Nicholas Institute hosted an online roundtable to explore the potential opportunities in financing dam rehabilitation, repair, and removal. The roundtable brought together participants from across sectors related to dam management, construction, financing and investing, as well as government.

INTRODUCTION

Dams are critical elements of the nation's water resources infrastructure, providing flood reduction, hydropower, inland navigation, and water supply among other benefits. These benefits, however, come along with well-recognized costs, particularly environmental and public safety liabilities. Of the 91,000 dams in the US, 87,000 are nonfederal, 14,000 of which are considered high hazard. Indeed, over 50% were built before 1970, and fully 75% are senescent, i.e., no longer serve originally intended, functional purpose. Addressing the challenges associated with dams in the US will require innovations across topics and sectors, from engineering and ecology to governance and finance.

As in other areas of US infrastructure renewal, the aggregate cost of dam projects is very significant. Nearly \$160 billion is required for rehabilitating the nation's dams (defined as repairing, replacing, or removing a structure), with \$34 billion needed for high hazard dams alone.¹

While dam rehabilitation and removal are now increasingly common engineering practices, how to fund or finance these activities is far from clear. At one end of the spectrum are the numerous small dams, which may be removed for hundreds of thousands of dollars, or in some cases, just tens of thousands of dollars. Yet with 91,000 such structures, the total funding and financing challenge is substantial. A further challenge of these many small structures is that many of them do not produce a revenue stream. At the other end of the spectrum are larger dams, where rehabilitation can require years and cost in the millions to tens of millions of dollars. There is substantial experience in rehabilitating and repairing moderate to large dams, yet our collective experience with removing large dams is limited, creating substantial risks and

¹ Estimates of the costs for dam rehabilitation can vary tremendously; see generally [The Cost of Rehabilitating Dams in the United States](#) (The Association of State Dam Safety Officials, updated March 2023)

uncertainties. And while there is some funding available for rehabilitation, repair and removal of dams, the scale of funding available is not commensurate with the need.²

THE ROUNDTABLE

Given the scale and diversity of dam rehabilitation projects, a significant amount of discussion among a wide range of stakeholders will be necessary to identify effective funding and financing approaches, along with governmental policies, needed for dam related costs. This discussion is still at an early stage in the US. The primary objective of the roundtable was to initiate a focused discussion on dam financing, prompted in part by the imminent implementation of the Army Corps of Engineers' Corps Water Infrastructure Financing Program (CWIFP) and its specific funding for dam safety projects.

The roundtable was framed by five short presentations on the scale of the problem, experiences with financing larger dam projects, innovative funding sources that have been used for smaller dam projects, followed by current and potential aspects of the financing available from CWIFP. The remainder of the roundtable was an open discussion about these topics and a range of others. The discussion reflected the wide range of viewpoints and experience across the spectrum of dam rehabilitation projects. The group included twenty-two individuals with expertise in dam project management, funding and financing, and federal policy and programs (participants are listed at the end of the document).

TOPICS DISCUSSED

1. Scale and Nature of the Challenge

- The scale of the challenge related to dam management is a notable challenge, along with the wide diversity in the size, type, purpose, and ownership of dams. All of these factors contribute to the need for substantial amounts of funding.
- Due to the number of 'high-hazard dams' (HHDs), projects that improve safety should be prioritized.
- In addition to amount, funding and financing for dam projects will need to take many forms, reflecting the diversity and idiosyncratic nature of this infrastructure sector, including the wide range of owners of dams (e.g., private, municipal).
- There is an important distinction (noted frequently throughout the roundtable) between larger projects (approximately \$20 million and above) that have an ongoing economic

² For example, the Bipartisan Infrastructure Act provided over \$4 billion that can go toward dam rehabilitation. For review of other sources of funding for dam removal, see summary reports at [Resources for the Future](#).

purpose (e.g., hydro power, water management) and smaller dam projects, which frequently do not. The latter category is by far the larger proportion of the total challenge, representing tens of thousands of structures. This distinction has fundamental implications for the nature and availability of financing (vs. grant funding) for smaller projects.

2. Financing and Funding for Larger Projects

Three presenters discussed various recently completed larger dam rehabilitation projects, especially aspects of their funding and financing. Most importantly, because these larger projects had a current economic purpose and a funding base, their private and public-sector owners were able to access a range of financing (most usually in the bond market) to cover construction costs. However, government funding and loan programs still had important roles to play.

- The US EPA's WIFIA loan program (of which the Corps' CWIFP program is a new section) has broad eligibility for dam projects and has provided an effective financing alternative to bonds and State Revolving Fund loans (the latter is often limited with respect to dam project purpose). Benefits include a Treasury-based interest rate, long loan term and debt service deferral options. CWIFP will provide these benefits with more focus and prioritization on dam projects.
- Larger dams with an economic purpose will usually have annually budgeted O&M repair programs. Only larger capital expenditures require specific financing. Such capex is becoming more frequent due to the aging of dams generally (often well past their originally intended service life), HHD reclassification, and compliance with current standards. Such projects often include an essential rebuilding of the dam, the significant cost of which leads to a careful examination of financing alternatives by the project sponsors.
- Larger dam projects highlight the multi-faceted complexity of funding and financing for this sector. Each project is essentially unique. State and federal funding for various purposes is available and can be added to the mix. FEMA grants for the identification of HHDs and a state program for dam safety are examples. CWIFP financing will likely be an important initiative in this context.
- A local entity may consider the acquisition of an existing Federal dam for economic or other non-federal purposes (typically referred to as divestiture or asset transfer). Such acquisitions would benefit from CWIFP and other government financing, but (as discussed later) there may be complicating factors for accessing such financing.

3. Large Dam Removal

Two presenters described a very large dam removal project for environmental restoration (not economic) objectives. The project is funded through a settlement with the dam's original utility

owner, which in turn was financed by a revenue bond that will be amortized through the utility's customer rates.

- This case highlighted an important theme that was further discussed in the open discussion: In some cases, a non-economic dam removal project can be funded from the dam owner's economic base when the cost of removal is less than projected cost of not removing it, even if the dam still has some remaining economic potential. Imposing a settlement to actualize this result might require stakeholder and governmental action. This approach should be explored because similar situations exist in the US, but limitations need to be recognized as well. State or federal direct funding may be required instead.

4. Innovative Funding for Smaller Dam Projects

In contrast to larger projects with access to an economic base, funding for small dam rehabilitation, and especially removal, is very challenging. A presenter outlined an innovative approach to access funding for small dam removal by selling environmental mitigation credits. In essence, when a small dam removal project results in environmental restoration, this may be utilized as an offset for specific environmental degradation caused by an unrelated economic project or activity.

- The process is intensive and time-consuming, but the application of the approach is increasingly accepted and is growing, albeit in specific geographic areas.
- Acquisition of the dam is the first step. Financing for that purpose may be important in terms of increasing the volume of potential projects.

5. CWIFP – Overview and Possible Improvements

The roundtable's final two presenters outlined the features of the new CWIFP loan program and possible improvements to it by amendment of the underlying WIFIA statute.

- CWIFP, which will be accepting applications soon, has \$7.5 billion in loan capacity for dam-specific projects. The program can offer all the proven loan features of the successful WIFIA program, including a Treasury interest rate, structural flexibility, ability to combine with other federal funding, etc.
- Because CWIFP's current funding is specifically dedicated to dam safety projects, these will be prioritized, and the program will actively work to develop new capabilities for this sector. For example, although the usual maximum loan amount is 49% in the WIFIA framework, CWIFP will raise this limit wherever possible to 80%.
- For larger dams, CWIFP can operate as WIFIA has in the past, as an attractive alternative to bonds. But for smaller projects, the program's minimum project size of \$20 million will be a serious limitation. To meet the threshold, a portfolio approach comprised of several small projects may qualify, but under current interpretation, this will require types

of cross-collateralizations that are usually unacceptable for most borrowers. A more flexible interpretation or statutory amendment could mitigate the limitation, though small projects will also face challenges associated with repayment and credit standards.

- CWIFP eligibility does include real estate acquisition (e.g., for small dam removal) but ancillary equipment unrelated to dam safety (e.g., new turbines) is excluded.
- There is proposed federal legislation to amend the WIFIA statute primarily to expand the effectiveness of CWIFP. Two amendments are currently included. The first addresses a loan program FCRA budgeting issue that seriously limits CWIFP lending to any project with federal involvement or history. The current interpretation of FCRA appears to be incorrect, and the amendment proposes a less restrictive (but more valid) approach. This issue is important for larger dams (especially when connected to other Corps activity) as well as possible acquisition scenarios.
- The second proposed amendment extends CWIFP's maximum loan term to 55 years from the current 35. This clearly applies to many long-lived dam projects and will significantly reduce loan debt service cash flow requirements. The extended term is likely to be useful to a wide range of dam projects.
- Two other possible amendments to WIFIA that will be useful for CWIFP were also discussed. The first is to add an interest rate management feature that is found in other federal infrastructure loan programs. This would primarily benefit larger projects that can access direct financing. The second is to enact a Congressional directive for a study of how CWIFP can be utilized or modified for small dam projects. Since the sector is complex and financing for it is challenging, the directive would be open-ended, but it would serve as a focal point and start-point for much-needed development.

6. Broader Discussion

In addition to further discussion of the topics noted above, several other points and questions arose in the open discussion segment of the roundtable.

- FCRA budgeting uncertainties also apply to non-dam infrastructure projects with federal involvement, including various cost-share arrangements. The proposed amendment will address the issue for these as well.
- For dam removal and environment restoration projects, the 'useful life' of the outcome is theoretically 'forever'. However, as a practical matter the time frame of credit-worthy repayment pledges is the limiting factor for these projects.
- Philanthropic funding and financing sourced from foundations should not be overlooked, especially for smaller projects. This type of capital has a unique risk tolerance and will mix well with other capital and debt sources.
- Small projects should be cautious with the engineering and other requirements of CWIFP financing. A state-sponsored project portfolio of many projects may have merit, both for the borrowers and for the CWIFP program itself.

- Federal infrastructure loan programs, although currently organized on a sectoral basis, have many common elements. A combined or unified policy approach may help accelerate and expand overall program development.

NEXT STEPS

Per the roundtable's objectives, there are two action items for stakeholders to potentially pursue:

- First, incorporate roundtable discussion topics and ideas in the development of a forthcoming summary of dam finance recommendations, both for US dam finance in general and CWIFP in particular. We anticipate this summary to be completed in the summer of 2023.
- Second, using the outcomes and participant base of this roundtable, begin planning for future dam finance roundtables with broader overall participation and specific segments. Given the scale and complexity of the challenge, this is expected to be a multi-year process.

PARTICIPANT LIST

Organizers

Martin Doyle (organizer), Professor, Duke University
John Ryan (co-organizer), Principal, InRecap, LLC

Participants

Joseph Abramson, VP Public Finance Investment Banking, Morgan Stanley
Bob Beduhn, Dams, Levees, and Civil Works Director, HDR
Margaret Bowman, Bowman Environmental Consulting
Derek Gardels, HDR
Brian Graber, Sr. Director, American Rivers
David Griffin, President, Association of State Dam Safety Officers
Laura Hazlett, COO & CFO, Klamath River Renewal Corporation
Tom Kiernan, President & CEO, American Rivers
Olivia Mahony, Manager, Klamath River Renewal Corporation
Tim Male, Executive Director, Environmental Policy Innovation Center
Tony Mardam, Sr Vice President, AECOM
Brittney May, Legislative Affairs Manager, National Hydropower Association
Tim Petty, Congressional Staff, House Transportation & Infrastructure Committee
Adam Riggsbee, President, RiverBank Conservation
Dan Rourke, Head of ESG Integration, JP Morgan Private Bank
Leonard Shabman, Senior Fellow, Resources for the Future
Aaron Snyder, Program Director, CWIFP, US Army Corps of Engineers
Julie Turrini, Director for Land, Rivers & Communities, Resources Legacy Fund

Background Resources

33CFR Part 386, Credit Assistance & Related Fees for Water Resources Infrastructure Projects 6/10/22.
CRS Report IN 12021, CWIFP, Corps Water Infrastructure Financing Program (CWIFP), 9/22/22.