

1.3.3.402 – Cybersecurity Value-at-Risk Framework



Photo by Jim Miller, NREL

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Project Overview

Project Summary

- The Cybersecurity Value-at-Risk Framework (CVF) tool will guide users through an assessment and detailed analysis of a hydropower plant's operations. The tool will then provide results and data to inform effective cybersecurity investment decision-making and planning. The results will help managers understand the risk probability of cyberattacks on their facilities and how best to use resources to mitigate those risks.

Intended Outcomes

- The Cybersecurity Value-at-Risk Framework will be an industry-accessible, self-guided, automated tool that will allow hydropower plant managers to identify best practices and make sound cybersecurity investment decisions for their systems.

Project Information

Principal Investigator(s)

- Anuj Sanghvi

Project Partners/Subs

- Argonne National Laboratory
- Nate Evans, Amanda Joyce, Stephany Jenkins

Project Status

New

Project Duration

- October 2020 to December 2022

Total Costed (FY19–FY21)

\$172k

Project Objectives: Relevance and Approach

Relevance to Program Goals:

- CVF focuses on WPTO's mission to publish valuation assessment guidance to facilitate investments into hydropower digitalization, maintenance, and cybersecurity.

Approach:

- CVF uses risk-based analysis to develop metrics that enable cybersecurity valuation. The framework enables efficient allocation of funds and overall operational risk mitigation.

Project Objectives: Expected Outputs and Intended Outcomes

Outputs:

- An online valuation methodology via a web application with accompanying instructional guide.
- Final public report with details from a case study applying CVF to a partner hydropower plant, excluding any plant-specific information.

Outcomes:

- Streamlined process for managing hydropower plant-specific cybersecurity risks.
- Informed cybersecurity investment decisions are made.
- Cybersecurity is top-of-mind for hydropower operators and policymakers.

Project Budget

Total Project Budget – Award Information		
DOE	Cost-share	Total
\$395,000	\$0	\$395,000

FY19	FY20	FY21	Total Actual Costs FY19–FY21
Costed	Costed	Costed	Total Costed
\$0	\$0	\$172K	\$172k

- Project began in FY21 with a \$200k first year budget.
- We carried over \$28k worth of first-year funding to FY22. This aligns with the increased number of deliverables and milestones in FY22 compared to FY21.

End-User Engagement and Dissemination

- Project team, in coordination with DOE WPTO, will engage utilities and federal agencies for hydropower-specific assessments.
 - Primary users: hydropower plant owner/operators of private and public plants of varying sizes requiring guidance on making informed decisions from both an investment and operational security perspective.
 - Partners and advisors: Delta Montrose Electric Association, Berkshire Hathaway Energy, Bureau of Reclamation, and Army Corps of Engineers. One of the partner hydropower facilities will be used to conduct a validation assessment using CVF.
 - Two sets of partners, a) application validation entity and b) advisory role entity, were engaged to enable resolution for small, private plant owner/operator challenges and to advocate for risk management and other policy- and resource-oriented challenges.
 - At CVF's core are crucial mappings of critical hydropower plant operations and threats/impacts, which are vetted by plant operators. This improves the reliability and accuracy of CVF.
- CVF's public-facing application will leverage the existing DER-CF user base but will expand to private facilities. Under-resourced entities will benefit from a WPTO-funded tool to measure risks and quantify an investment score specific to their site.

Performance: Accomplishments and Progress

- Step 1: Classify Hydropower-Focused Operations and Assets
 - Identified mission-critical hydropower systems
 - Highlighted areas of cyber concern for hydropower plant operations
 - Scoped assets that may be vulnerable to cyberattacks.
- Step 2: Identify Impacts and Likelihood Categories
 - Established impact considerations as safety, environmental, economical, and operational consequences
 - Identified likelihood factors considering system location, operational modes, and personnel attendance.

Performance: Accomplishments and Progress (cont.)

- Step 3: Define, Assign, Validate Weighted Values
 - Established values and associated weights for control implementations
 - Leveraged MITRE's ATT&CK for Industrial Control Systems.
- Step 4: Develop Custom Security Controls
 - Structured hydropower operational and facility-focused control questions
 - Developed requirements for hydropower assessment type.

Future Work

- CVF application is underway and will be complete by CY 2022.
 - Industry engagement ongoing
 - Development staff shortage addressed
 - Novel Value-at-Risk methodology developed for cybersecurity risk-based investment assistance
 - Demonstration of CVF application at partner facility
 - Final project report.
- CVF FY23 Expansion
 - Consolidated risk posture at organization level to visualize assessment results for entire hydropower fleet
 - Comparative analysis for multiple facilities
 - Expansion for site-specific properties such as location, size, and configuration for tailored assessment and valuation of user experience.