

U.S. DEPARTMENT OF ENERGY WATER POWER TECHNOLOGIES OFFICE

### **1.3.3.402 – Cybersecurity Value-at-Risk Framework**



Photo by Jim Miller, NREL

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# **Project Overview**

Project Summary	Project Information
• The Cybersecurity Value-at-Risk Framework (CVF) tool will guide users through	Principal Investigator(s)
an assessment and detailed analysis of a hydropower plant's operations. The tool will then provide results and data to inform effective cybersecurity	Anuj Sanghvi
investment decision-making and planning. The results will help managers	Project Partners/Subs
understand the risk probability of cyberattacks on their facilities and how best to use resources to mitigate those risks.	<ul> <li>Argonne National Laboratory</li> <li>Nate Evans, Amanda Joyce, Stephany Jenkins</li> </ul>
Intended Outcomes	Project Status
<ul> <li>The Cybersecurity Value-at-Risk Framework will be an industry-accessible, self-guided, automated tool that will allow hydropower plant managers to</li> </ul>	New
identify best practices and make sound cybersecurity investment decisions	Project Duration
for their systems.	October 2020 to December 2022
	Total Costed (FY19-FY21)
	\$172k

#### **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 Timeline**

Кеу Т	asks/Deliverables - Description	1	2	3	4	Mont 5	hs (FY· 6	-1) 7	8	9	10	11	12	13	14	15	16	Мс 17	onths 18	(FY-2) 19	) 20	) 21	22	23	24	E 25	xtensio 26	n 2
Focus	Area 1: Background and Research Context																											
1.1	Literature Review																											
1.2	Hydropower plan operation and asset identification																											
1.3	Development of Dependency Mapping						٥																					
1.4	Cybersecurity Impact Analysis - Research Report						•																					
1.5	NERC Applicability																											
1.6	DERCF Expansion - Planning and Research																											
Focus	Area 2: Development of Valuation Method and Pro	motin	g Industry	Enga	gem	ent/Upta	ke																					
2.1	DERCF Expansion - Development																											
2.2	Development of Cyber Asset Registry																											
2.3	Development of Cyber-Resilience Scoring Method												•															
	Go/No Go Decision												٥															
2.4	Develop Value-at-Risk (VaR) Method																											
2.5	Demonstration with Industry partner																				•							
2.6	Draft Final Report																											
2.7	CVF Tool - Live																										٠	٠
2.8	CVF Guide and Report																										٥	•
Proje	ct Management and Communications																											
4.1	Kickoff Meeting	•																										
4.2	Monthly Team Meetings	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•			
4.3	Quarterly Progress Reports			•			•			•			•			•			•			•			•			
4.4	Dissemination of Key Findings and Final Report																											
		•	Meeting	•	Deli	verable	0	DOE I	Review	W																		

## **Project Budget**

		Total	Project Budge	t – Award Informa	ation	
	C	DOE	Cost	t-share	Тс	otal
		\$395,000	;	\$0		\$395,000
FY1	9	FY2	0	FY2	21	Total Act FY19
Cost	ed	Coste	ed	Cost	ed	Total
\$C	)	\$0		\$17:	2K	\$1

- 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.

