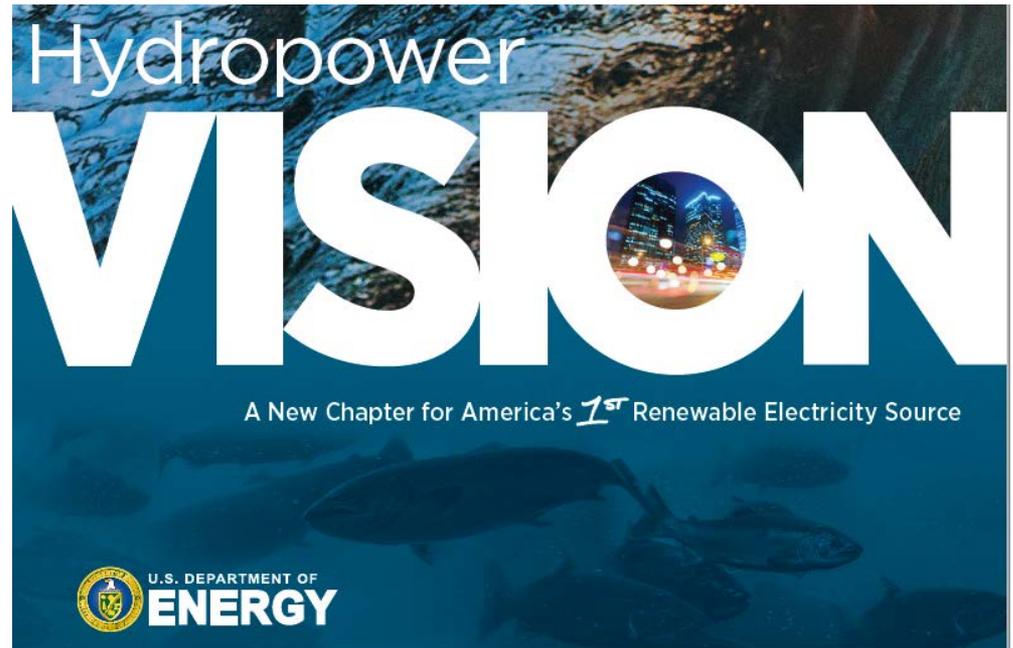


Hydropower Vision Roadmap Update

WBS: 1.2.1.602



Hydropower Program

October 8, 2019

TJ Heibel

Pacific Northwest National Laboratory

Project Summary

This project meets DOE's commitment to the hydropower community that the 2016 Hydropower Vision Report would be a living document. During the peer review period, the national labs surveyed the literature and experts on tangible progress against the action areas outlined in the original report. The Visionaries and Forum groups were formed as a part of this process and are composed of high-ranking hydropower community and technical decision makers, respectively. The results of these efforts were a Progress Report and associated database, which will serve as the basis of the updated Roadmap to be released in June 2021.

Project Objective & Impact

- **Objectives:**
 - Catalyze the hydropower community to action towards achieving Vision objectives
 - Assess progress through actions outlined in the original Roadmap
- **Final Product:** Update of the Hydropower Vision Roadmap outlining the pathway to achieving sustainable hydropower

Project Information

Project Principal Investigator(s)

TJ Heibel, PNNL

WPTO Lead

Tim Welch

Project Partners/Subs

ORNL
NREL
INL
ANL

Project Duration

- Project Start Date: 10/1/2017
- Project End Date: 9/30/2021

Hydropower Program Strategic Priorities

Environmental R&D and Hydrologic Systems Science

Big-Data Access and Analysis

Technology R&D for
Low-Impact
Hydropower Growth

R&D to Support
Modernization,
Upgrades and Security
for Existing Hydropower
Fleet

Understand, Enable,
and Improve
Hydropower's
Contributions to Grid
Reliability, Resilience,
and Integration

Environmental R&D and Hydrologic
Systems Science

Big-Data Access and Analysis

Technology R&D for Low-Impact
Hydropower Growth

R&D to Support Modernization,
Upgrades, and Security for Existing
Hydropower Fleet

Understand, Enable, and Improve
Hydropower's Contributions to Grid
Reliability, Resilience, and Integration

The Hydropower Vision Roadmap Update project fully supports all the Hydropower Program Approaches as its focus is identifying the ongoing and evolving actions needed to achieve sustainable hydropower in the United States. All the Approaches can be directly linked to one or more of the individual Actions included within the Action Areas targeted in the Roadmap.



TECHNOLOGY
ADVANCEMENT



ENHANCED
REVENUE & MARKET
STRUCTURES



SUSTAINABLE
DEVELOPMENT
& OPERATION



REGULATORY
PROCESS
OPTIMIZATION



ENHANCED
COLLABORATION,
EDUCATION, & OUTREACH

Project Budget

Lab	FY17	FY18	FY19 (Q1 & Q2 Only)	Total Project Budget FY17-FY19 Q1 & Q2 (October 2016 – March 2019)	
	Costed	Costed	Costed	Total Costed	Total Authorized
PNNL	\$0K	\$99K	\$94K	\$193K	\$459k
NREL	\$48K	\$57K	\$7K	\$112K	\$158K
ORNL	\$17K	\$251K	\$59K	\$327K	\$454K
ANL	\$0K	\$75K	\$5K	\$80K	\$123K
INL	\$0K	\$39K	\$25K	\$64K	\$132K
TOTAL	[\$65K]	[\$521K]	[\$190K]	[\$776K]	[\$1,326K]

Management and Technical Approach



Relational Database

- Community progress against the Roadmap



Progress Report

- Assess progress in action areas



Steward Visionaries & Forums

- Solicit input and feedback on project



Dissemination of Project Results

- Workshops, Presentations & Publications



Updated Roadmap

- Planned released in June 2021



- **Visionaries and Forums**
 - Decision-makers and technical experts from hydropower community
 - Provide feedback
 - Update their respective groups on project progress and findings
- **Conference participation**
 - HydroVision 2018
 - Waterpower Week 2018 & 2019
 - Various NHA regional meetings in 2018
- **Workshops**
 - Progress Report Workshop (April 2019)
 - Industry R&D Workshop (April 2019)
 - Environmental R&D Workshop (September 2019)

FY18 Technical Accomplishments

Report ID	Report Title	Abstract	Lab Responsible	VSM Code Level	VSM Code Level	VSM Code Level	VSM Code Category (Yes/No)	VSM Code Category (Yes/No)	Publication Site	Status	Methods	Report Website	Date Released	Report Number	Citation
OR18001	OR 2018 Estimating Hydroelectric Potential through the use of...	Hydroelectric generation has the potential to provide clean, renewable energy. However, the limited number of sites and the high cost of development have restricted its growth. This report provides a methodology for estimating the potential of hydroelectric power in the United States. The methodology is based on a combination of geographic information system (GIS) data and field data. The results show that there is a significant potential for hydroelectric power in the United States, particularly in the western and mountain regions. The report provides a methodology for estimating the potential of hydroelectric power in the United States. The methodology is based on a combination of geographic information system (GIS) data and field data. The results show that there is a significant potential for hydroelectric power in the United States, particularly in the western and mountain regions.		1	1.0	1.0	1.0	1.0				https://www.osti.gov/servlet/handle/11355/118444	21 May 2018	ORNL/TM-2018/044	
OR18002	OR 2018 Estimating Hydroelectric Potential through the use of...	Hydroelectric generation has the potential to provide clean, renewable energy. However, the limited number of sites and the high cost of development have restricted its growth. This report provides a methodology for estimating the potential of hydroelectric power in the United States. The methodology is based on a combination of geographic information system (GIS) data and field data. The results show that there is a significant potential for hydroelectric power in the United States, particularly in the western and mountain regions. The report provides a methodology for estimating the potential of hydroelectric power in the United States. The methodology is based on a combination of geographic information system (GIS) data and field data. The results show that there is a significant potential for hydroelectric power in the United States, particularly in the western and mountain regions.		1	1.0	1.0	1.0	1.0				https://www.osti.gov/servlet/handle/11355/118444	21 May 2018	ORNL/TM-2018/044	
OR18003	OR 2018 Estimating Hydroelectric Potential through the use of...	Hydroelectric generation has the potential to provide clean, renewable energy. However, the limited number of sites and the high cost of development have restricted its growth. This report provides a methodology for estimating the potential of hydroelectric power in the United States. The methodology is based on a combination of geographic information system (GIS) data and field data. The results show that there is a significant potential for hydroelectric power in the United States, particularly in the western and mountain regions. The report provides a methodology for estimating the potential of hydroelectric power in the United States. The methodology is based on a combination of geographic information system (GIS) data and field data. The results show that there is a significant potential for hydroelectric power in the United States, particularly in the western and mountain regions.		1	1.0	1.0	1.0	1.0				https://www.osti.gov/servlet/handle/11355/118444	21 May 2018	ORNL/TM-2018/044	

NOTICE: This document contains information of a preliminary nature and is not intended for release. It is subject to revision or cancellation and feedback does not constitute a final report.

ORNL/TM-2018/044

Oak Ridge National Laboratory Hydropower Vision Roadmap Reference Database Methods and Results

S. Curo
R. Brink
K. Stewart
B. Smith
March 2018

OAK RIDGE NATIONAL LABORATORY
MEMBER OF THE UT-BATTELLE CORP. THE U.S. GOVERNMENT HAS CERTAIN RIGHTS

Relational Database & Draft Progress Report



Visionaries & Forum Groups Established



Presented Project Progress at Waterpower Week

FY19 Technical Accomplishments

Report ID	Report Title	Abstract	Lab Responsible	VSM Code Level	VSM Def Level	VSM Fine Level	VSM Fine Category	VSM Priority Category (Y/N/?)	Publication Size	Status	Methods	Report Website	Date Archived	Report Number	Citation
040001	IP 2018: Enhancing Substation Reliability through the use of...	Historically, substations have been...		1	1.1	1.1.1	Substation Reliability					https://www.osti.gov/servlet/handle/11365/55111	21 May 2018		
040002	IP 2018: Enhancing Substation Reliability through the use of...	Historically, substations have been...		1	1.1	1.1.1	Substation Reliability					https://www.osti.gov/servlet/handle/11365/55111	21 May 2018		
040003	IP 2018: Enhancing Substation Reliability through the use of...	Historically, substations have been...		1	1.1	1.1.1	Substation Reliability					https://www.osti.gov/servlet/handle/11365/55111	21 May 2018		
040004	IP 2018: Enhancing Substation Reliability through the use of...	Historically, substations have been...		1	1.1	1.1.1	Substation Reliability					https://www.osti.gov/servlet/handle/11365/55111	21 May 2018		
040005	IP 2018: Enhancing Substation Reliability through the use of...	Historically, substations have been...		1	1.1	1.1.1	Substation Reliability					https://www.osti.gov/servlet/handle/11365/55111	21 May 2018		
040006	IP 2018: Enhancing Substation Reliability through the use of...	Historically, substations have been...		1	1.1	1.1.1	Substation Reliability					https://www.osti.gov/servlet/handle/11365/55111	21 May 2018		
040007	IP 2018: Enhancing Substation Reliability through the use of...	Historically, substations have been...		1	1.1	1.1.1	Substation Reliability					https://www.osti.gov/servlet/handle/11365/55111	21 May 2018		
040008	IP 2018: Enhancing Substation Reliability through the use of...	Historically, substations have been...		1	1.1	1.1.1	Substation Reliability					https://www.osti.gov/servlet/handle/11365/55111	21 May 2018		
040009	IP 2018: Enhancing Substation Reliability through the use of...	Historically, substations have been...		1	1.1	1.1.1	Substation Reliability					https://www.osti.gov/servlet/handle/11365/55111	21 May 2018		
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040011	IP 2018: Enhancing Substation Reliability through the use of...	Historically, substations have been...		1	1.1	1.1.1	Substation Reliability					https://www.osti.gov/servlet/handle/11365/55111	21 May 2018		
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040014	IP 2018: Enhancing Substation Reliability through the use of...	Historically, substations have been...		1	1.1	1.1.1	Substation Reliability					https://www.osti.gov/servlet/handle/11365/55111	21 May 2018		
040015	IP 2018: Enhancing Substation Reliability through the use of...	Historically, substations have been...		1	1.1	1.1.1	Substation Reliability					https://www.osti.gov/servlet/handle/11365/55111	21 May 2018		
040016	IP 2018: Enhancing Substation Reliability through the use of...	Historically, substations have been...		1	1.1	1.1.1	Substation Reliability					https://www.osti.gov/servlet/handle/11365/55111	21 May 2018		
040017	IP 2018: Enhancing Substation Reliability through the use of...	Historically, substations have been...		1	1.1	1.1.1	Substation Reliability					https://www.osti.gov/servlet/handle/11365/55111	21 May 2018		
040018	IP 2018: Enhancing Substation Reliability through the use of...	Historically, substations have been...		1	1.1	1.1.1	Substation Reliability					https://www.osti.gov/servlet/handle/11365/55111	21 May 2018		
040019	IP 2018: Enhancing Substation Reliability through the use of...	Historically, substations have been...		1	1.1	1.1.1	Substation Reliability					https://www.osti.gov/servlet/handle/11365/55111	21 May 2018		
040020	IP 2018: Enhancing Substation Reliability through the use of...	Historically, substations have been...		1	1.1	1.1.1	Substation Reliability					https://www.osti.gov/servlet/handle/11365/55111	21 May 2018		

Presented Progress Report draft findings at NHA California Regional Meeting

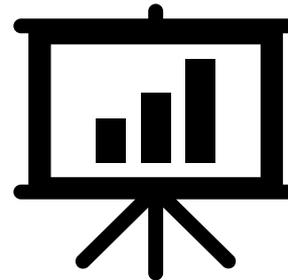


Relational Database Finalized



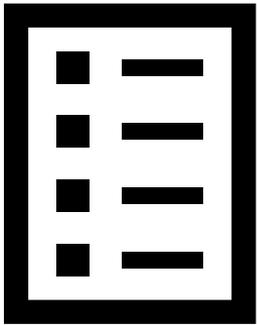
Created by priyanka from Noun Project

Initial Results Presented to Visionaries



Progress Report Results Released and Industry R&D Workshop Held at Waterpower Week

FY19 Technical Accomplishments (continued)



**Multi-Year
Project Plan
Finalized**



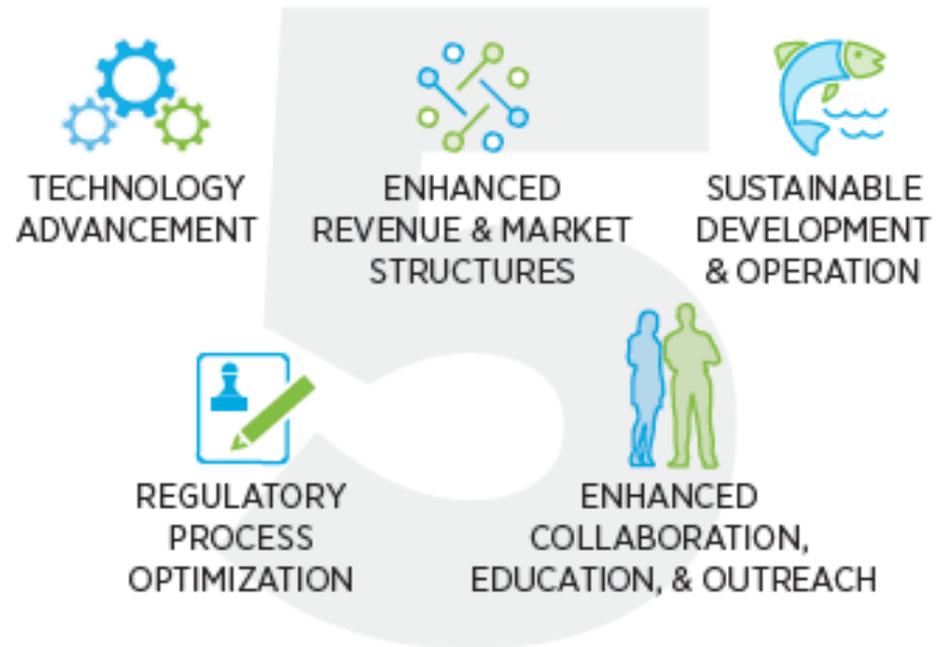
**Progress
Report
Finalized**



**Environmental R&D
Workshop Held**

Progress Since Project Summary Submittal

- ✓ Determined the organization and format of the updated Roadmap
- ✓ Confirmed Forum leaders
- ✓ Revisited Forum members and Visionaries
 - ✓ Added new members where gaps were identified



- Publish the Progress Report in FY20
- Review action areas
- Solicit and incorporate feedback and stakeholders via:
 - Visionaries
 - Forums
 - Workshops
 - Interviews
- Update the Roadmap and plan to release at HydroVision 2021

