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Workforce, Education and Training Needs Assessment for U.S. Hydropower

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Workforce Development for Hydropower

To assist the hydropower industry in better understanding future workforce and training and to help the U.S. Department of Energy (DOE) assess where to target future support efforts, the DOE retained Navigant Consulting, Inc. (Navigant) and the National Renewable Energy Laboratory (NREL) for a project with the following objectives:

- Estimate the size of the current hydropower workforce in the United States
- Catalog skills, training, and educational needs of the hydropower workforce and how those are met
- Project the potential size of the hydropower workforce under different growth scenarios and where skillset gaps exist relative to today's workforce
- Determine if additional training programs are needed to meet different potential hydropower workforce needs in 2020 and 2030, and develop recommendations to fill the gaps.

Workforce Development for Hydropower

Optimization

- Optimize technical, environmental, and water-use efficiency of existing fleet
- Collect and disseminate data on new and existing assets
- Facilitate interagency collaboration to increase regulatory process efficiency
- Identify revenue streams for ancillary services

Growth

- Lower costs of hydropower components and civil works
- Increase power train efficiency for low-head, variable flow applications
- Facilitate mechanisms for testing and advancing new hydropower systems and components
- Reduce costs and deployment timelines of new PSH plants
- **Prepare the incoming hydropower workforce**

Sustainability

- Design new hydropower systems that minimize or avoid environmental impacts
- Support development of new fish passage technologies and approaches
- Develop technologies, tools, and strategies to evaluate and address environmental impacts
- Increase resilience to climate change

Workforce Development for Hydropower

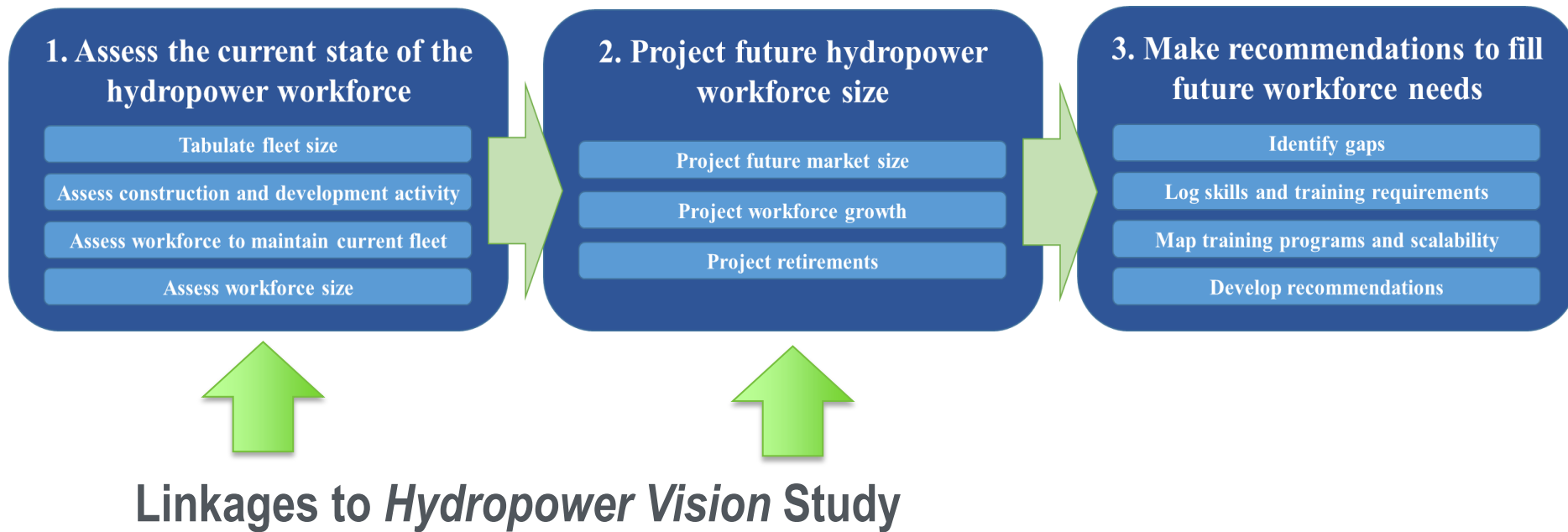
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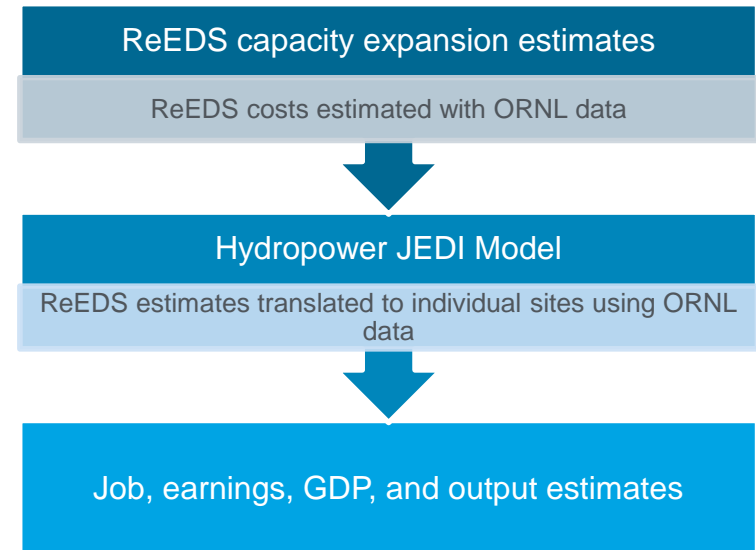
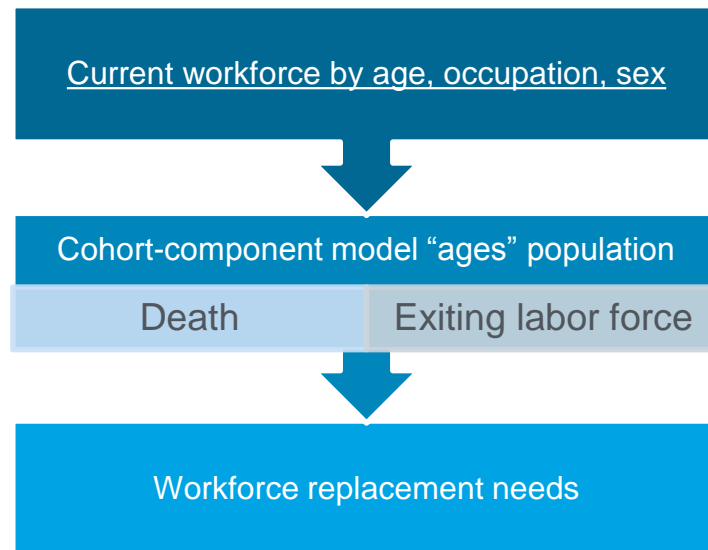
The Impact

- Catalog skills, training and educational needs
- Map current training programs
- Project potential future workforce needs
- Identify future skillset gaps
- Develop recommendations to fill gaps.

Overall Project Approach



- Two methods of estimating future workforce needs
 - Replacements use a cohort-component model parameterized with data from the Centers for Disease Control and Prevention, Bureau of Labor Statistics, and Census
 - Hydropower JEDI model set up with data from ORNL, IMPLAN
 - Inputs from ReEDS (JEDI) and Navigant (cohort-component)



Project completed in CY Q4 2016 and the final report is in review at DOE.

Key findings and results include:

Cumulative Total Workforce Gap Relative to Current Workforce

2020

Scenario	Low Domestic	High Domestic
Business-as-Usual	4,000	7,000
Advanced Technology, Low Cost Finance, Combined Environmental Considerations	2,000	3,000
Advanced Technology, Low Cost Finance, Critical Habitat	2,000	3,000
Advanced Technology, Low Cost Finance, High Fossil Fuel Cost	5,000	8,000

↑
This is up to 1/3 of the current workforce

2030

Scenario	Low Domestic	High Domestic
Business-as-Usual	5,000	5,000
Advanced Technology, Low Cost Finance, Combined Environmental Considerations	30,000	41,000
Advanced Technology, Low Cost Finance, Critical Habitat	36,000	51,000
Advanced Technology, Low Cost Finance, High Fossil Fuel Cost	67,000	93,000

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This could be a doubling or tripling of the workforce by 2030

Key labor categories: Craft-Skilled, Engineering, and Professional

- Initiation Date: March 1, 2014
- Original End Date: June 30, 2015
- Actual End Date: December 31, 2016
- During the course of the project, the team was directed by DOE to use industry forecasts from the *Hydropower Vision Study*.
- These forecasts were not finalized until CY Q2 2016, so we extended the project timeline.

Budget History

FY2014		FY2015		FY2016	
DOE	Cost-share	DOE	Cost-share	DOE	Cost-share
\$104k	\$0	\$79k	\$0	\$152k	\$0

- The project is complete and the remaining budget (\$14.85k) was spent in Q1 of FY2017.
- The FOA was opened in Q4 of FY 2013 and the project was awarded Q2 of FY 2014 with \$350k of DOE funds from FY 2013.

Communications and Technology Transfer:

- Interim results presented at 2015 HydroVision International Conference
- Interim results published in March 2016 Edition of Hydro Review Magazine
- Abstract for educational piece of study submitted to 2016 HydroVision International Conference.

Proposed future research:

Our study concluded with recommendations in the following areas:

1. Monitor and Project Workforce Needs
2. Industry Image and Awareness
3. Recruitment
4. Internships and Training Programs
5. Knowledge Transfer.