



Memorandum from the Office of the Inspector General

July 23, 2018

Laura J. Campbell, MR 3M-C

**REQUEST FOR FINAL ACTION – AUDIT 2018-15544 – CAPITAL PROJECTS –
POST-PROJECT ECONOMIC ASSESSMENT REVIEW**

Attached is the subject final report for your review and final action. Your written comments, which addressed your management decision and actions planned or taken, have been included in the report. Please notify us when final action is complete. In accordance with the Inspector General Act of 1978, as amended, the Office of the Inspector General is required to report to Congress semiannually regarding audits that remain unresolved after 6 months from the date of report issuance.

If you have any questions or wish to discuss our findings, please contact Rick L. Taylor, Audit Manager, at (865) 633-7370 or Rick C. Underwood, Director, Financial and Operational Audits, at (423) 785-4824. We appreciate the courtesy and cooperation received from your staff during the audit.

David P. Wheeler
Assistant Inspector General
(Audits and Evaluations)
WT 2C-K

RLT:KDS

Attachment

cc (Attachment):

TVA Board of Directors
J. Al Berrong, MR 3M-C
Janet J. Brewer, WT 7C-K
Robert M. Deacy, Sr., LP 5D-C
Robertson D. Dickens, WT 9C-K
William D. Johnson, WT 7B-K
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Jill M. Matthews, WT 2C-K
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OIG File No. 2018-15544



Office of the Inspector General

Audit Report

To the Vice President,
Enterprise Planning

CAPITAL PROJECTS – POST-PROJECT ECONOMIC ASSESSMENT REVIEW

Audit Team
Rick L. Taylor
Maria V. Edwards
Ala H. Young

Audit 2018-15544
July 23, 2018

SYNOPSIS

We included an audit of the Tennessee Valley Authority's (TVA) capital projects post-projects economic assessment process in our annual audit plan because of the capital-intensive nature of the electric utility industry. TVA spent \$2.076 billion on capital expenditures in fiscal year (FY) 2017 and anticipates capital expenditures of \$1.974, \$1.885, and \$1.706 billion, respectively, in FYs 2018, 2019, and 2020.

Our audit objective was to determine if TVA adequately monitors the actual return on investment of capital projects compared to those submitted during the budgeting and project review processes. The scope of the audit was TVA's capital projects post-project economic assessment process for FYs 2015 through 2017. We limited our review to projects that were greater than \$10 million. During our audit period, TVA completed or put in service 22 projects totaling \$597.9 million that were considered candidates for post-project benefits assessments.¹

We found TVA is not adequately monitoring actual return on investment of capital projects. Specifically, TVA Standard Programs and Processes (SPP) requiring the assessments do not provide adequate guidance. We also found the required post-project benefits assessments were generally not being performed as only 1 assessment was performed in FYs 2015 through 2017 out of 22 projects completed. In addition, we found the estimated benefits in the project justification for the 1 assessment performed were not valid. Accordingly, the post-project assessment's basis for comparison was not valid.

We made recommendations to management to (1) revise the SPPs to provide adequate guidance for post-project assessments, (2) perform post-project assessments, and (3) ensure estimated benefits are reasonable and alternatives are realistic. Our specific recommendations are included at the end of this report.

TVA management concurred with each of our recommendations and provided the actions they plan to take to address each of our recommendations. See Appendix B for TVA management's complete response.

BACKGROUND

The electric utility industry is a capital-intensive industry requiring significant capital investments in property, plant, and equipment. As evidence of significant capital expenditures, TVA spent \$2.076 billion on capital expenditures in FY2017 and anticipates capital expenditures of \$1.974, \$1.885, and \$1.706 billion, respectively, in FYs 2018, 2019, and 2020. Due to the significant amount of money spent, it is important to prioritize to ensure the selection of the correct projects.

¹ TVA completed or put in service 56 projects greater than \$10 million, which totaled \$1.53 billion during FYs 2015 through 2017. However, only 22 of the projects were considered candidates for post-project benefits assessments. The remaining 34 projects were completed for reasons other than economic benefits.

TVA developed SPPs to address the issue of prioritizing and selecting projects. In addition, several SPPs require post-project benefits assessments, including:

- TVA-SPP-34.017, *Project Closure*, required a post-project benefit analysis and defined what such an analysis would typically include. This SPP was in effect from October 1, 2011, through January 31, 2015.
- TVA-SPP-34.004, *Project Closure, Suspension, or Cancellation*, superseded TVA-SPP-34.017 effective February 1, 2015, and requires a post-project analysis with a section on project benefits that is to (1) describe the verified benefits obtained, (2) provide an explanation if projects do not realize benefits that were stated in the business case, and (3) if actual project benefits are not yet available (i.e., occur in the future), explain the plan for verifying and documenting actual benefits achieved.
- TVA-SPP-19.003, *Portfolio Management*, requires TVA's Enterprise Planning group to validate project benefits, which includes conducting post-project economic assessments for select projects. The SPP's purpose is to ensure TVA's investment portfolio of projects and programs align with TVA, strategic business unit, and business unit goals and strategic objectives to realize optimal returns to TVA.
- TVA-SPP-13.950, *Economic Analysis*, states Portfolio Analytics (which is part of Enterprise Planning) is responsible for validating project benefits including conducting post-project benefits assessments for select, significant projects.

The Project Management Institute, Inc.'s (PMI)² extensive research over the past several years has been on benefits realization management. A paper³ presented at the 2015 PMI Global Congress encouraged "moving beyond assessing project execution toward additionally examining whether or not a project has delivered its intended outcome." The author further noted:

Ideally, all project activities, project outputs, operational outputs, and project outcomes can be tied (or traced) back to project goals and objectives ... but it is the outcomes which are the primary evidence of the project's success.

In summary, the author noted a project's success is not determined wholly by whether the project was done on time or within budget. They noted:

In order to measure outcome, measureable evaluation criteria need to be established. This means that while outcome measurement often occurs at the end of a project or periodically long after the project has completed, thinking about and planning for outcome

² The PMI was founded in 1969 and is a not-for-profit professional membership association for the project management profession.

³ Burk, S. M. (2015). Beyond on-time and under-budget: outcome measurement for solution delivery. Paper presented at PMI® Global Congress 2015—EMEA, London, England. Newtown Square, Pennsylvania: PMI.

measurement has become a part of initial project planning, when candidate evaluation criteria may not be as well understood.

Post-project reviews that focus on execution of the project, actual cost compared to budget, meeting schedule, and lessons learned are valuable to a project execution program. However, none of these activities prove that the project delivered value and whether it was worth the effort to bring the project or program to completion. The key to a project being successful is to determine if the project benefits align with company objectives and if the projected benefits were realized. If the process for evaluating projects stops at project execution, TVA cannot determine if it is optimizing benefits/return.

We included an audit of TVA's post-projects economic assessment process in our annual audit plan because of the capital-intensive nature of the electric utility industry.

OBJECTIVE, SCOPE, AND METHODOLOGY

Our audit objective was to determine if TVA adequately monitors the actual return on investment of capital projects compared to those submitted during the budgeting and project review processes. The scope of the audit was TVA's capital projects post-project economic assessment process for FYs 2015 through 2017. We limited our review to projects that were greater than \$10 million. During our audit period, TVA completed or put in service 56 projects greater than \$10 million, which totaled \$1.53 billion. Of these, 22 projects totaling \$597 million were considered candidates for post-project benefits assessments. The remaining 34 projects were completed for reasons other than economic benefits (strategic, safety and regulatory projects). A complete discussion of our audit objective, scope, and methodology is included in Appendix A.

FINDINGS

We found TVA is not adequately monitoring actual return on investment of capital projects. Specifically, we found (1) TVA SPPs requiring the assessments do not provide adequate guidance, and (2) required post-project benefits assessments were generally not being performed.

TVA POLICIES AND PROCEDURES LACK GUIDANCE

As noted in the Background, we found TVA-SPP-34.004, TVA-SPP-19.003, and TVA-SPP-13.950 all require post-project assessments of benefits achieved compared to benefits noted in the project justification. However, the SPPs do not provide adequate guidance. We found TVA's SPPs requiring post-project economic assessments for selected, significant projects did not contain procedures defining (1) when to perform the post-project analysis, (2) how to perform the analysis, and (3) how to document the analysis. In addition, the SPPs did not define "select, significant projects."

We also found the SPPs do not address how the results of the post-project assessments will be used. The SPPs do not require the results to be communicated with any TVA organization. The post-project assessment process would be enhanced if the SPPs included reporting requirements for assessment results, including (1) minimum standards for the information to be reported and (2) TVA management responsible for reviewing the assessment results.

POST-PROJECT BENEFITS ASSESSMENTS ARE GENERALLY NOT BEING PERFORMED

We identified 22 projects for which TVA spent about \$597.9 million during FYs 2015 through 2017 that were candidates for assessments. However, we found only 1 assessment was performed. According to TVA personnel, the only post-project benefits assessment performed during our audit period was on the Nextel Remediation (Nextel) project.⁴

TVA had a Nextel radio system through Sprint for communications at nuclear and fossil plants that, according to TVA documents, was critical for plant operations. Sprint informed TVA in 2011 that the current system was scheduled for termination in 2013, and TVA would need to migrate to the new Sprint system. The Nextel project considered three alternatives: (1) do nothing, (2) convert to the new Sprint system, or (3) install a TVA-owned and maintained trunked radio system.⁵ Doing nothing was not a viable option since Sprint was terminating the system. According to TVA documentation, switching to the new Sprint system did not meet TVA requirements; therefore, it was not an option. TVA selected the option of installing TVA-owned and maintained trunked radio systems.

We found the estimated benefits in the project justification were not valid because they were calculated using one of the options that was not viable—doing nothing. The project justification's estimated benefits were the costs TVA would avoid paying annually for the system being terminated. Accordingly, the post-project assessment's basis for comparison was not valid.

In addition, TVA did not retain sufficient documentation for the post-project benefits assessment. We were informed that the only information in the file for the Nextel post-project benefits assessment was the project justification form, which contained only estimated project costs and benefits. As a result, TVA cannot support how the project's benefits were verified. We also noted the post-project assessment did not include all benefits TVA received⁶ and excluded annual costs TVA would incur to maintain the trunked radio systems.

⁴ The Nextel project cost about \$25.2 million and is 1 of the 22 projects completed during our audit period.

⁵ In a trunked radio system, a computer controls the system in such a way that a large group of users can share a relatively few radio frequencies.

⁶ The post-project benefits assessment did not include a \$10.5 million settlement TVA received from Sprint as a result of Sprint terminating the contract.

RECOMMENDATIONS

We recommend the Vice President, Enterprise Planning, take the following actions:

1. Revise applicable TVA SPPs to include:

- a. A definition of significant projects in order to specify when to perform an assessment or develop a process for selecting projects to assess.

TVA Management's Comments – TVA management agreed that further refining “significant projects” within relevant SPPs will help provide guidance on when an assessment of economic benefits should be conducted. TVA management stated TVA-SPP-13.950 and TVA-SPP-19.003 will be revised to include a definition of significant projects by the end of May 2019. See Appendix B for TVA management's complete response.

- b. Procedures for performing the post-project benefits assessments. Specifically, (i) when to perform the assessment and (ii) how to adequately verify project benefits or an expectation of how benefits are to be verified/documented.

TVA Management's Comments – TVA management agreed SPPs for performing post-project economic benefit can be further refined and stated TVA-SPP-13.950 will be revised to include (1) defined expectations for what constitutes a verifiable and quantifiable benefit, (2) what group(s) are responsible for maintaining the data and evidence that confirm said benefits have been realized as a result of the applicable project, and (3) processes for assessing/verifying benefit obtainment by the end of May 2019. See Appendix B for TVA management's complete response.

- c. Assessment reporting requirements that include (i) minimum standards for the information to be reported and (ii) TVA management responsible for reviewing the assessment results.

TVA Management's Comments – TVA management agreed relevant SPPs can be further refined and stated TVA will (1) develop a template that includes recommended minimum standards for reporting post-project economic benefits, (2) present the template to the Project Review Board for approval, and (3) provide post-project benefit assessments to the Project Review Board for review. TVA management stated these actions will be completed by end of May 2019. See Appendix B for TVA management's complete response.

- d. Requirements for document retention of support of the assessments.

TVA Management's Comments – TVA management agreed that relevant SPPs can be refined to include document retention requirements for assessments of the economic benefits of certain significant projects. TVA management stated these improvements are currently being implemented and will begin use in November 2018 for the FY2020 business planning cycle. See Appendix B for TVA management's complete response.

2. Perform post-project assessments to determine actual project benefits achieved compared to estimated benefits.

TVA Management's Comments – TVA management agreed some significant projects should have a post-project assessment of economic benefits and stated post-project assessments will be performed in accordance with processes detailed in TVA-SPP-13.950 and TVA-SPP-19.003. See Appendix B for TVA management's complete response.

3. Develop procedures that require evaluating estimated project benefits and alternatives early in the project proposal phase to ensure estimated benefits are reasonable and alternatives are realistic.

TVA Management's Comments – TVA management agreed it is beneficial to evaluate project benefits and alternatives early in the investment planning process and stated TVA is currently implementing improved methods and processes that will support meeting Recommendation No. 3. TVA management stated these improvements are currently being implemented and will be in use in November 2018 for the FY2020 business planning cycle. See Appendix B for TVA management's complete response.

OBJECTIVE, SCOPE, AND METHODOLOGY

Our audit objective was to determine if the Tennessee Valley Authority (TVA) adequately monitors the actual return on investment of capital projects compared to those submitted during the budgeting and project review processes. The scope of the audit was TVA's capital projects post-project benefits assessment process for fiscal years (FY) 2015 through 2017. We limited our review to projects that were greater than \$10 million. During our audit period, TVA completed or put in service 56 projects greater than \$10 million, which totaled \$1.53 billion. Of these, 22 projects totaling \$597 million were considered candidates for post-project benefits assessments. The remaining 34 projects were completed for reasons other than economic benefits (e.g., strategic, safety and regulatory projects).

To achieve our audit objective, we:

- Obtained and reviewed TVA Standard Programs and Processes relevant to the post-project benefits assessment process.
- Interviewed TVA personnel responsible for performing the post-project benefits assessments to obtain information about the assessment process.
- Obtained and reviewed documentation supporting the only post-project benefits assessment (Nextel Remediation project) performed during our audit period.
- Recalculated the post-project benefits assessment performance metrics, net present value, profitability index, internal rate of return, and payback period for the Nextel Remediation project.
- Obtained a list of completed/in-service projects from TVA personnel for FYs 2015 through 2017 in order to determine the number of projects that were potential candidates for a post-project benefits assessment.
- Obtained a list of completed/in-service projects from TVA's Power Plan system for FYs 2015 through 2017 and compared it to the list of completed/in-service projects TVA provided to ensure the data provided by TVA was reliable.
- Interviewed TVA personnel and reviewed TVA's guidance, *TVA Portfolio Management Guide*, to determine which completed/in-service projects were candidates for the post-project benefits assessment.

We did not identify internal controls significant to our audit objectives; therefore, internal controls were not tested as part of this audit. We conducted this performance audit in accordance with generally accepted government auditing standards. Those standards require we plan and perform the audit to obtain sufficient, appropriate evidence to provide a reasonable basis for our findings and conclusions based on our audit objective. We believe the evidence obtained provides a reasonable basis for our findings and conclusions based on our audit objective.



Tennessee Valley Authority, 1101 Market Street, Chattanooga, Tennessee 37402

July 13, 2018

David P. Wheeler

TVA Comments on OIG Draft Audit 2018-15544 Capital Projects – Post Project Economic Assessment Review

We have reviewed the OIG draft audit report on Capital Projects – Post-Project Economic Assessments and provide the following comments on the proposed recommendations:

1. Revise applicable TVA SPPs to include:

- a. A definition of significant projects in order to specify when to perform an assessment or develop a process for selecting projects to assess.

TVA Response: TVA agrees that further refining “significant projects” within relevant SPPs will help provide guidance on when an assessment of economic benefits should be conducted. TVA SPPs 13.950 and 19.003 will be revised to include a definition of significant projects. We will complete this action by end of May 2019.

Related to economic project selection for benefit assessment, TVA will implement an iterative process for selecting projects for post-project benefits assessments. The need to post-op additional projects will be based on the desired level of certainty in the overall economic benefit of the portfolio of projects, and the results of previous post-op analyses. Given the definition of achieved benefits, TVA will utilize a model that randomly selects a sample from the population to test. From the results, we would build a confidence around the true ratio of the successful projects. We would be able to identify a minimum number of samples to test to achieve a margin of error within an acceptable risk tolerance.

- b. Procedures for performing the post-project benefits assessments. Specifically, (i) when to perform the assessment and (ii) how to adequately verify project benefits or an expectation of how benefits are to be verified/documented.

TVA Response: TVA agrees that we can further refine SPPs for performing post project economic benefits. TVA already has very robust and complex models and processes for evaluating the economic benefits of pursuing work to ensure we have adequate and reliable generation capacity at the lowest possible cost to meet customer demand. TVA also has centralized analytical capabilities with expertise in evaluating economic value of certain projects. TVA SPP-13.950 will be revised to include (1) defined expectations for what

constitutes a verifiable and quantifiable benefit, (2) what group(s) are responsible for maintaining the data and evidence that confirm said benefits have been realized as a result of the applicable project, and (3) processes for assessing/verifying benefit attainment.

We will complete this action by end of May 2019.

- c. Assessment reporting requirements that include (i) minimum standards for the information to be reported and (ii) TVA management responsible for reviewing the assessment results.
TVA Response: TVA agrees the relevant SPPs can be further refined to include minimum standards of information to be reported and identify executives that will review the post project economic benefits of certain project results. TVA will develop a template that includes the recommended minimum standards for reporting post-project economic benefits. This template will be presented to the PRB for approval. Post-project benefit assessments will be provided to the Project Review Board (PRB) for review. We will complete this action by end of May 2019.

- d. Requirements for document retention of support of the assessments
TVA Response: TVA agrees that relevant SPPs can be refined to include document retention requirements for assessments of the economic benefits of certain significant projects. TVA is currently implementing improved processes and software that will support meeting this recommendation. The improvements include better evaluation, explanation, and documentation of project benefits and alternatives. This information will be stored and accessible after the project has closed. These improvements are currently being implemented and will begin use in November 2018 for the FY20 business planning cycle.

- 2. Perform post-project assessments to determine actual project benefits achieved compared to estimated benefits.

TVA Response: TVA agrees that some significant projects should have a post project assessment of economic benefits. TVA utilizes robust and complex models and processes for evaluating the economic benefits of pursuing work to ensure we have adequate and reliable generation capacity at the lowest possible cost to meet customer demand. TVA establishes and monitors performance criteria and cost of the entire system to assess economic impact to rate payers for the significant generating projects that make up a large portion of the capital project spend. Post project assessments will be performed in accordance with processes detailed in TVA SPPs 13.950 and 19.003.

- 3. Develop procedures that require evaluating estimated project benefits and alternatives early in the project proposal phase to ensure estimated benefits are reasonable and alternatives are realistic.

TVA Response: TVA agrees it is beneficial to evaluate project benefits and alternatives early in the investment planning process. Currently, TVA utilizes robust and complex models and processes for evaluating the economic benefits of pursuing work to ensure we have adequate

and reliable generation capacity at the lowest possible cost to meet customer demand. TVA establishes and monitors performance criteria and cost of the entire system to assess economic impact to rate payers for the significant generating projects that make up a large portion of the capital project spend. In addition, TVA is currently implementing improved methods and processes that will support meeting Recommendation 3. The improvements include the fleet wide implementation of leading software to support better evaluation of project benefits and alternatives along with revised processes and methods. There will also be new business procedures that govern the processes and methods to help ensure benefits are reasonable and realistic. These improvements are currently being implemented and will be in use in November 2018 for the FY2020 business planning cycle.

Thank you for the opportunity to review and comment on this draft audit report.

A handwritten signature in cursive script that reads "Laura H. Campbell".

Laura Campbell
Vice President, Enterprise Planning