

FY14 Technology Innovation Portfolio Summary



Project Category	Sponsor	TIP No	FY14 BPA Budget	Project Name	Abstract	Lead Org	BPA Project Mgr	Project Start Date	Project End Date	Total Budget incl. Cost Share
Cyber Security										
\$139,163										
	Larry Buttress									
		0255	\$99,163	EPRI P183: Cyber Security	The landscape of activities in the cyber security and privacy for the electric sector involves numerous industry, government, and regulatory groups. This project set can provide members with an up-to-date view of these activities and support the technical contribution to these groups to increase the usability of their work products. This project set will address several security challenges facing transmission and distribution (T&D) systems, such as reducing the security risk of legacy systems, developing protective measures, and managing cyber incidents to increase the resiliency of the grid. Starting TRL 4 ; Ending TRL 5	EPRI	Andy McGuire	1/1/2014	12/31/2014	\$99,163
		0255a	\$40,000	EPRI P183: Project 073546 – Penetration Testing Tools	The project will identify existing penetration test tools and techniques applicable to electric sector distribution equipment. The techniques and tools identified will undergo gap analysis to determine high-priority protocols and technologies for which test coverage is inadequate. Results of the gap analysis will be used to identify techniques and tooling that can be applied to bridge, reduce, or eliminate gaps in testing. Lab testing and experimentation will be performed to develop, validate, and hone the effectiveness of the techniques and tools developed. Starting TRL ; Ending TRL	EPRI	Andy McGuire	9/23/2013	8/23/2014	\$40,000
Demand Response										
\$1,177,433										
	Lee Hall									
		0266	\$0	EWEB / Metropolitan Wastewater Management Commission (MWMC)	The goal of the DR Demonstration Project is to demonstrate that the Metro Wastewater facility can act as a dispatchable large utility-scale DR resource (>1MW) to both increase load (DECs) when there is extra capacity on the grid, and decrease load (INCs) during peak periods, capacity constraints, grid emergencies or during periods when renewable resources experience intermittency. M&V of DR events will provide a performance based approach in developing reliable resources that can be used year-round for ancillary services. Starting TRL 8 ; Ending TRL 9	EWEB	Thor Hinckley	10/1/2012	3/31/2014	\$953,024
		0270	\$415,223	Demand Response Demonstration Market	The City of Port Angeles will work with BPA to create and analyze an internal and external demonstration market for INCs and DECs at the commercial and industrial customer locations. The goal is to move the individual technical DR pilot projects further towards a realistic DR market by working out many of the practical issues. The City proposes to develop the demonstration market at two (2) customers' locations. Starting TRL 3 ; Ending TRL 7	City of Port Angeles	Tom Brim	10/1/2012	9/30/2014	\$941,120
		0301	\$0	Data Center Demand-Response (Project Canceled)	The project objectives are to 1) create and investigate capabilities to allow datacenters to participate in demand-response programs and, 2) determine the timescale on which it can operate and the ability for a data center to participate in ancillary services, including inertial and even governing services. Starting TRL 4 ; Ending TRL 6	Intel Federal	Thor Hinckley	10/1/2013	9/30/2014	\$743,224

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		0302	\$192,551	Demand Response Potential of Heat Pump Water Heaters	The project goal is to measure demand response energy use and storage, standby losses and impact on standard efficiency measurements. After lab tests, the unit will be moved to the PNNL Test Center in Richland, Washington for the controlled field tests. The split system will be used in both the lab and field tests and the unitary will be subjected to the field tests. NEEA will review protocols and reports, and be chief editor of a report comparing heat pump water heater demand response with that of electric resistance water heaters. Starting TRL 6 ; Ending TRL 8	Washington State University	Kacie Bedney	10/1/2013	9/30/2015	\$638,960
		0307	\$265,930	Demand Response for Retail Supermarkets	The project goal is to demonstrate that substantial DR and energy savings are achievable in supermarket refrigeration systems and that the integrity and safety of refrigerated products will be maintained to minimize risks to supermarket owners and customers. The project plans to analyze supermarket refrigeration energy loads in the Pacific Northwest for both demand response and energy efficiency. The purpose is to identify the most promising control strategies and technologies that can yield energy savings and demand response as part of an integrated management approach. Starting TRL 5 ; Ending TRL 7	NREL	James Anthony	12/1/2013	9/30/2015	\$891,581
		0308	\$303,729	DEMONSTRATION OF A DEMAND RESPONSE SOLUTION FOR RTU & LIGHTING RETROFITS	The proposed project will demonstrate Transformative Wave Technology eIQ building management system year round capability for meeting BPA demand response criteria for roof top units, lighting, miscellaneous electric loads, and electric hot water heaters. The demand response criteria that will be met will be for day-ahead response, under 10 minute response and permanent load reduction. The goal is to evaluate the cost effectiveness, feasibility and scalability of the eIQ BMS for both energy efficiency and demand response. Starting TRL 7 ; Ending TRL 8	NREL	Janice Peterson	12/1/2013	11/30/2015	\$918,401
Energy Storage Technology										
\$795,786										
	Lee Hall	0260	\$120,000	A Modular and Dispatchable Battery Storage System	The proposed project is to deploy, test, and evaluate a scalable, modular, dispatchable battery storage system in real-world trials over a two-year period, first at the BPA testing facility in Vancouver, Washington, and then in BPA's service area of the Pacific Northwest at different utility customer locations. Energy Northwest already wants to host the storage system at its Nine Canyon Wind Project facility, and it has interest from some of its member utilities to host the system at their facilities, who want to get hands-on experience regarding the deployment, integration, operation, and maintenance of a battery storage system for demand response applications. Starting TRL 7 ; Ending TRL 9	Powin Energy	Thor Hinckley	10/1/2012	9/26/2014	\$769,190
		0285	\$675,786	Energy Storage Multifaceted Tool for Demand Management	The project objectives are to analyze value of distributed storage in Puget Sound Energy's (PSE) distribution system to PSE and BPA, Select a location for a pilot to capture as many different value streams as possible, Develop a control strategy that maximizes the total value of the storage both from a distribution system and transmission perspective, Demonstrate a 500kW, 1 MWh system, analyze the operation, test control algorithms and validate performance and effectiveness. Starting TRL 5 ; Ending TRL 7	Primus	Thor Hinckley	10/1/2012	9/18/2015	\$2,866,717
Energy Efficiency										
\$2,142,954										
	Ryan Fedie	0140	\$1,000,000	EE Emerging Tech Assessment	Multi-year program for the identification, assessment, development, and transfer of emerging energy efficiency technologies and solutions. This program consists of a portfolio of emerging technology assessment projects. The objectives are, 1. Identify and screen emerging energy efficiency innovations for assessment and development as EE measures, 2. Select and manage portfolio of emerging technology assessment projects that bridge targeted emerging technologies into BPA energy efficiency programs ("fill the pipeline"), 3. Increase the speed of development, the quality, and the impact of new energy efficiency measures, and 4. decrease the cost to identify, develop, and implement new measures. Starting TRL 7 ;	BPA	Jennifer Williamson	10/1/2007	9/30/2015	\$5,897,380

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		0257	\$79,528	Energy and Cost Optimized Technology Options to Meet Energy Needs of Northwest Food Processors	The Pacific Northwest National Laboratory (PNNL) and the Northwest Food Processors Association (NWFPA) propose to carefully evaluate opportunities for energy, emission, and cost savings and non-wires solutions including alleviation of transmission bottlenecks and fast-ramping supply capabilities with greater use and better design of combined heat and electric power (CHP) distributed generators (DGs); combined cooling, heating, and electric power (CCHP) DG; and energy storage installed on-site at energy-intensive food processing facilities. Starting TRL 3 ; Ending TRL 5	PNNL	Erin Hope	10/1/2012	6/30/2014	\$738,695
		0261	\$214,905	Determining and Improving the Energy Intensity of Microwave Sterilization & Pasteurization Technologies	An advanced thermal post-packaging food preservation technology for controlling pathogens called "Microwave Assisted Thermal Sterilization" (MATS™) has been developed by a team led by WSU . (http://www.microwaveheating.wsu.edu/). MATS™ technology has the potential for replacing conventional thermal retort ("canning") food preservation methodologies due to its greatly reduced processing time. Typical MATS™ processes cut conventional canning processing time by 80%, with increased energy efficiency and superior finished product characteristics like improved nutrient retention and substantially increased food quality. Starting TRL 6 ; Ending TRL 8	Washington State University	Erin Hope	10/1/2012	9/30/2015	\$1,261,094
		0262	\$17,856	Demonstration of 2nd Generation Prototype Ducted GE "Brillion" Hybrid Water Heater in the PNNL Lab Homes	The major objective of the project are: 1) demonstrate and quantify the energy performance of the prototype GE Brillion GeoSpring Hybrid Water Heater with and without exhaust air ducting over heating and cooling conditions in the lab homes; and 2) evaluate/quantify the potential for the GE smart grid-enabled HPWH to provide demand response (to both increase/absorb [INC] and decrease/shed/shift [DEC] load) under various price signals sent to the unit. In addition, the proposed project will provide GE information to determine and design the optimal ducting configurations for their unit should they decide to offer this feature as an option for this new-to-the-market unit. Starting TRL 5 ; Ending TRL 7	PNNL	Kacie Bedney	11/9/2012	2/28/2014	\$201,143
		0263	\$145,750	EPRI Development of Next-Generation Heat Pump Water Heater Technology	In recent years, heat pump water heaters have re-emerged as a potentially high-impact energy efficient technology. Hybrid heat pump water heaters have been shown by EPRI to provide high-efficiency electric water heating. EPRI's Energy Efficiency Demonstration has shown energy savings of 20-40% over conventional water heaters in preliminary analysis. The project will address the feasibility of variable speed compressors to eliminate electric resistance backup; alternative refrigerants and system configurations; demand response and ancillary service opportunities and strategies, and whole-building impacts of heat pump water heater systems. Starting TRL 2 ; Ending TRL 6	EPRI	Kacie Bedney	10/1/2012	9/30/2014	\$594,894
		0272	\$174,026	EPRI P170: End-Use Energy Efficiency & Demand Response	The electricity industry faces growing demand for power and the imperative to maintain reliable, affordable service while reducing carbon emissions. Utilities and policy makers in the United States and abroad are increasingly turning to energy efficiency as a resource to help address these challenges. Many U.S. states have enacted legislation that mandates specific energy-efficiency savings goals, and some explicitly require utilities to place energy efficiency atop their resource planning initiatives. Key to the realization of these goals is the development and adoption of emerging energy-efficient technologies and best practices. Starting TRL 2 ; Ending TRL 5	EPRI	Jennifer Williamson	1/1/2014	12/31/2014	\$174,026
		0272a	\$30,000	EPRI P170: CEA 2045 Standard Modular Communications Interface for DR	This supplemental project has been designed to provide utilities a means of working together in a coordinated fashion to test this concept in field environments. The goal of this supplemental project is 1) to prove the performance of universal CEA 2045 communications port ("comm port"), and 2) convince manufacturers that the installation of a simple comm port is very low cost, and makes their equipment easy to incorporate into any utility DR program nationwide so that it could eventually become standard practice on all water heaters. If that can be achieved, then the question of whether or not a customer participates in a utility DR program or not becomes a simpler customer choice. Starting TRL ; Ending TRL	EPRI	Tony Koch	9/9/2013	12/31/2015	\$60,000
		0272b	\$17,500	EPRI P170: Evaluationg Smart Thermostats' Impacts on EE and DR	This project is intended to inform both utilities and the public of the potential energy saving benefits of smart thermostats. For utilities, it may provide a measure of how these thermostats fit into their programs, and how customers use them to enable energy or demand savings. Utilities will get an opportunity to gauge cost effectiveness of EE programs for smart thermostats. Demand response from residential air conditioners has been a target of many utility programs, but the cost of installation of load control devices and the resulting perceived compromise in customer comfort have been large barriers. Starting TRL ; Ending TRL	EPRI	Tyler Dillavou	9/1/2013	8/31/2015	\$17,500
		0272c	\$0	EPRI P170: Support for ASHRAE Research Project #1608-TRP (Project Canceled)	This EPRI Supplemental Project supports energy efficiency emerging technologies by creating protocols and resources for load based testing of unitary HVAC equipment, which can be used to develop performance maps reflecting actual, field operation. Current equipment rating tests do not include advanced controls of variable part-load performance, and only one US test lab is capable of load based testing. The load based performance maps will facilitate cheaper and faster field tests by requiring only test-point verification, rather than long-term, highly instrumented field tests. Starting TRL ; Ending TRL	EPRI	Mira Vowles	7/23/2013	12/31/2014	\$0

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		0272d	\$62,500	EPRI P170: Coordinated Early Deployment	This project will apply the framework created in the prior research to develop early deployment plans for three additional technologies and to guide early deployments with multiple utilities for five technologies, two of which were planned in prior research. Starting TRL 4 ; Ending TRL 8	EPRI	Jennifer Williamson	7/1/2013	12/31/2014	\$262,850
		0272e	\$160,000	EPRI P170: EE Demo II	This projec builds on the success of the first demonstration project and provides an opportunity to demonstrate the next round of hyper-efficient end-use technologies. As such, consideration will be given to technologies that have been developed on a worldwide basis. The project could lay the groundwork for understanding the technical and other obstacles for adopting many of the new hyper-efficient technologies, which could lead to a substantial reduction in electricity consumption for several major end uses of electricity. Technologies demonstrated under this program have the potential for early deployment in the next stage of the pipeline, EPRI's Coordinated Early Deployments of Efficient End-Use Technologies	EPRI	Jennifer Williamson	7/1/2013	12/31/2016	\$560,000
		0287	\$100,889	Reducing Technology Evaluation Costs Through a Technology Performance Exchange	This proposal addresses Faster and Lower Cost End-Use Field Studies to Support Verification of New Energy Efficiency Measures, including the direct support of BPA's stated goal to "target an order of magnitude reduction in both cost and time for complete field studies, including research design, contracting, metering, data acquisition, analysis, and decision making." The DEFs will also be designed to aid in the evaluation and accelerate the adoption of a broad range of technologies including those that are included in the BPA Food Processing Technology Roadmap, such as absorption chillers and alternative refrigerants, sterilization, and pasteurization technologies. Starting TRL 6 ; Ending TRL 7	NREL	Tyler Dillavou	2/14/2013	1/31/2014	\$521,042
		0292	\$140,000	Advanced Heat Pump Water Heater Research	Washington State University Energy Program (WSUEP), in partnership with Avista, the Energy Trust of Oregon, the Northwest Energy Efficiency Alliance (NEEA), Puget Sound Energy, Ravalli Electric Co-op and Tacoma Public Utilities will research and demonstrate the performance of high performance, next generation heat pump water heaters in the laboratory and the three main heating climate zones of the Pacific Northwest. The technology WSUEP and its partners propose to introduce is split system heat pump water heaters with variable speed compressors. Starting TRL 1 ; Ending TRL 4	Washington State University	Kacie Bedney	12/7/2012	9/30/2015	\$720,001
Geomagnetic Disturbance \$40,000	Richard Becker	0025c	\$0	EPRI Supplemental: Geomagnetic Disturbance PID# 071802FY13 Project Complete	EPRI Supplemental: Geomagnetic Disturbance PID# 071802 FY13 Project Complete Starting TRL ; Ending TRL	EPRI	Richard Becker	1/1/2012	12/31/2013	\$0
		0290	\$40,000	Modeling high impact low frequency geomagnetic disturbances: Prediction of the magnitude of solar flare / coronal mass ejections and of local effects on geomagnetically induced currents.	Although various government agencies (e.g. NOAA) provide short-term (hours to days) forecasts of space weather that can be used for more immediate management of power transmission, there is a need for longer-term space climate forecasts that can inform management and planning processes over an extended time horizon. The aim of this project is to develop a method to forecast and predict extreme solar events at long time horizons. This in turn will allow for the prediction of potentially harmful geomagnetic disturbances. Starting TRL 2 ; Ending TRL 6	Queens Univ at Kingston	Scott Lissit	10/1/2012	9/30/2014	\$199,036
Hydro \$1,650,045	Erik Pytlak									

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		0304	\$335,632	Predicting the hydrologic response of the Columbia River system to climate change	The proposed project will update and enhance the existing climate change streamflow data set that was developed for use by the Columbia River Basin Management Joint Operating committee (RMJOC) in 2009-2010 to incorporate IPCC AR5 (CMIP5) model output and to incorporate certain enhancements such as inclusion of multiple hydrologic models, explicit representation of glaciers, and use of advanced methods of parameter estimation to resolve "cliffs" in certain fluxes and state variables at the boundaries of sub-basins. Starting TRL 5 ; Ending TRL 7	Washington State University	Erik Pytlak	10/1/2013	9/30/2016	\$1,432,356
		0309	\$316,769	Comprehensive Assessment of Climate Change Impact on the Hydrology of the Columbia River Basin: Characterizing and Reducing the Uncertainties from Various Sources on Streamflow Projection	In light of recent advances made in the field of hydroclimate modeling, statistical methods, multimodeling and uncertainty analysis, this project will preform a comprehensive assessment of climate change impact over the Columbia River Basin. The project will use the latest climate scenarios available by Couple Model Intercomparison Project Phase 5 and new methods in more accurately characterizing the uncertainties in streamflow modeling. Starting TRL 1 ; Ending TRL 2	PSU	Erik Pytlak	10/1/2013	9/30/2015	\$1,111,668
	Mark Jones	0233	\$117,000	Field Evaluation of the Service Life of Foul-Release Coatings in Columbia River	This project is a continuation of a panel experiment initiated in Fiscal Year 2011 to assess the effective service life of foul-release coatings to mitigate the impacts of invasive zebra/quagga mussels to the FCRPS and other entities in the Columbia River Basin. Panels with foul-release coatings were deployed in the spring of 2012 and will be removed at periodic intervals to assess durability and ability to resist fouling by quagga mussels. This information is necessary to determine the cost-effectiveness of coatings for maintaining the functionality of multiple structures at hydropower facilities, including fish screens and fish ladders. Starting TRL 3 ; Ending TRL 4	BPA	Hannah Dondy-Kaplan	10/1/2012	9/30/2015	\$517,006
		0276	\$180,054	Enhanced monitoring and investigation of the spread and potential impact of aquatic invasive mussels in the Columbia River Basin, with special reference to mitigation and placement of boat cleaning	This project proposed to expand existing efforts by Washington State University and the United States Geological Survey to 1) Enhance an integrated AIS monitoring and information system; 2) Enhance and further coordinate existing early detection efforts; 3) Provide a Geographic Information System layer describing all of the river access points on the mainstem Columbia and Snake Rivers; 4) Conduct research that will help to assess the cause and effects of biological invasions in the CRB; and 5) Provide opportunities to train young professionals in assessing the effects of AIS on food webs. Starting TRL 2 ; Ending TRL 3	Washington State University	Hannah Dondy-Kaplan	10/4/2012	9/30/2014	\$1,195,727
	Steve Kerns	0258	\$137,583	Development of a state-of-the-art computational framework and platform for the optimal control of multi-reservoir systems under uncertainty	BPA is looking for an innovative framework that can produce fast, stable and high-resolution results and that fully utilizes the advanced capabilities of modern computer processors such as high performance clusters. Other needs of BPA include uncertainty and risk analysis, quantification of operational flexibility and effective and efficient ways to visualize and display large amounts of complex data to support real-time and planning decisions. The ultimate goal of the proposed research is to produce a robust and computationally efficient hybrid and parallelized framework for the real-time operation of multi-objective and multi-reservoir systems that accounts for uncertainty and flexibility. Starting TRL 4 ; Ending TRL 6	OSU	Dennis Mai	10/1/2012	9/30/2015	\$1,157,067
		0259	\$289,537	Short-Term Hydropower Production and Marketing Optimization (HyProM)	The proposed project focuses on the integrated short-term management of hydropower production and marketing over a period of up to 20 days ahead. Because of the significant uncertainty present in particular in meteorological forecasts, deterministic methods provide only sub-optimal results. Therefore, we aim at the development of techniques and tools enabling an integrated management of scenarios for both stream flow and load by deterministic and stochastic optimization techniques, joint system management for hydro power production and marketing under various hard and soft constraints and a proper visualization of the resulting information to support decision-making. Starting TRL 3 ; Ending TRL 7	Deltares	Chris Allen	10/1/2012	4/30/2015	\$1,166,100
		0265	\$273,470	Computationally Efficient, Flexible, Short-Term Hydropower Optimization and Uncertainty Analysis (SHOA) for the BPA System	This proposal describes the development of a short-term reservoir modeling system SHOA (Short-term Hydropower Optimization and Analysis). SHOA can be used to investigate the operation of reservoir systems with different descriptions of streamflows, forecast errors, load, and other sources of uncertainty. SHOA will be used to explore a range of model structures and computational procedures for addressing BPA's short-term reservoir operation challenges, including dynamic optimization algorithms. Starting TRL 2 ; Ending TRL 5	Cornell Univ	Steve Barton	11/7/2012	4/30/2016	\$1,528,821

Smart Grid

\$1,000,000

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Transmission Operations \$889,839	Richard Genece	0035	\$1,000,000	PNW Smart Grid Demo	The PNW Smart Grid project is a 5-year demonstration led by Battelle and partners including BPA, 11 utilities, 2 universities, and 5 vendors. The cost is \$178M, (\$89M private, \$89M ARRA-funded). BPA's contribution is \$10M., 5-year demonstration. The project will include 60,000 metered customers in 5 states. The project aims to substantially increase smart grid asset installation in the region by purchasing and installing smart grid technology. The project goals are to facilitate integration of wind and other renewable, quantify costs and benefits, develop two-way communication protocol, and advance interoperability standards. Starting TRL 6 ; Ending TRL 8	Battelle	Lee Hall	11/25/2009	1/31/2015	\$11,034,475
	Hardev Juj	0300	\$85,000	BPA RAS 2020	The project will research, develop, and prototype technology solutions to advance BPA RAS Strategy. Specifically, the project will address RAS modeling and system studies, RAS arming situational awareness, Intelligent RAS arming approaches, Adaptive RAS actions and Response-based RAS using wide-area synchronized measurements. Starting TRL 2 ; Ending TRL 8	BPA	Gordon Matthews	10/1/2013	10/30/2021	\$1,760,000
	Meg Albright	0046	\$75,000	Operations Real-Time Study Process Imprv	This project uses the innovative Operations Study Process Improvement environment to investigate options to reduce unnecessary risks and curtailments by accurately modeling near term system conditions for Operations study engineers following an unplanned outage or during extreme operating conditions. The study automation system will be designed to assist BPA Systems Operations engineers to calculate a reliable system Operating Limit (SOL) for real time operation of BPA's critical transmission paths such as the California Oregon Intertie (COI). The system will be built around PowerWorld's Simulator power flow that is used daily for off-line studies. Starting TRL 4 ; Ending TRL 8	BPA	Terry Doern	10/1/2007	9/30/2014	\$1,830,595
		0268	\$152,931	Verification and Validation of Transient Stability Models and Results	This project plans to develop an automated mechanism to verify transient stability simulation packages, used by BPA for their system analyses, against each other. This will be done by simulating WECC power system models in GE-PSLF, PowerWorld Simulator, PowerTech's TSAT and Siemens PTI PSS/E. The goal is to bridge the gaps identified in BPA's transmission roadmap and further BPA's cause in optimizing their transmission grid, by facilitating better planning studies and the consequent operational enhancements. This will be attained by increasing the confidence in the dynamic simulation studies of the BPA system, by an integrated software-verification and model-validation approach. Starting TRL 8 ; Ending TRL 9	University of Illinois	Terry Doern	11/1/2012	4/15/2015	\$624,085
		0275	\$71,408	New remedial action scheme (RAS) prototyping work to avoid cascading caused by intermittent output of renewable energy resources	The objective of this project is to develop feasible new remedial action schemes (RAS) using synchrophasors and on-line contingency analysis will be studied. Concept of desired RAS is identified. Starting TRL 2 ; Ending TRL 3	Hitachi	Gordon Matthews	10/1/2012	2/15/2014	\$305,392
	0281	\$305,500	Impacts Due to Dynamic Transfers	BPA's plays a vital role in wind power development in the Pacific Northwest. Dynamic Transfer is essential to reliably integrate wind, smart grid and other devices that increase variability. RD 237 developed Dynamic Transfer algorithm. This research will identify 1. The factors that influence the Dynamic Transfers, 2. Identify allowable voltage variation in the transmission system, 3. Approach to minimize labor intensive Dynamic Transfer studies and, 4. Understand Dynamic Transfer limits change with respect to system operating conditions. Starting TRL 4 ; Ending TRL 7	BPA	Kathy DeBoer	1/25/2013	9/30/2014	\$621,742	

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Transmission Overhead \$508,570	Mike Staats	0310	\$200,000	New remedial action scheme (RAS) prototyping work to avoid cascading caused by intermittent output of renewable energy resources	Hitachi develops prototype of remedial action schemes (RAS) using synchrophasors and on-line contingency analysis, which can correspond to uncertainty output of renewable energy resources (RERs). This project will work to build the prototype with RTDS, studies the control algorism and evaluates the prototype actions by comparing off-line power system analysis tools. Project results will show the reliability and economy effect of new RAS, and identifies requirements for introducing it to real system. Starting TRL 4 ; Ending TRL 5	Hitachi	Gordon Matthews			\$447,251
		0023	\$433,570	EPRI P35: Overhead Lines	This program is designed to address the research needs of transmission asset owners and operators. The program includes projects focused on specific components (e.g., insulators, compression connectors, conductors, composite poles, and crossarms) as well as projects focused on issues (e.g., lightning and grounding, live working, and ransmission capacity). The program delivers a blend of short-term tools such as software, reference guides, and field guides, together with longer-term research such as component-aging tests and the development of sensors for monitoring the performance of line components. Starting TRL ; Ending TRL	EPRI	Mike Staats	1/1/2014	12/31/2014	\$433,570
		0023c	\$25,000	EPRI P35 Field Trial ACCC Conductor and Connectors	The project would research and evaluate swage style and non-compressive connectors. This project would also evaluate the long term performance of standard ACSS and expand the evaluation of ACSS HS285 and ACCC high-strength conductors, by testing at manufacturer's design temperature. Testing in Phase II was limited due to the number of conductor (7) and the maximum output of the test apparatus, as such; some conductors with higher design temperatures could not be brought to those temperatures. This project will reduce the number of systems tested and be able to raise the temperatures to the design value. Starting TRL ; Ending TRL	EPRI	Tyler Ashburn	1/1/2014	12/31/2016	\$50,000
		0023e	\$25,000	EPRI P35: Hi Temp Conductor and Connector Systems Ph II	The HTLS conductor-connector systems were designed with the intent to increase the capacity of a line through re-conductoring without the need for new structures or additional right-of-way (no rebuild). This project will collect more information on the anticipated benefits, risks, strengths, and weaknesses of these systems, which potentially could result in more/less need for maintenance activities or new maintenance methods. Starting TRL ; Ending TRL	EPRI	Jennifer Havel	1/1/2012	12/31/2014	\$75,000
		0023f	\$0	EPRI P35: Aeolian Vibration of Bundle Conductors	This project aims to develop a more rational, yet practically oriented tool for assessing the control/damping performance of spacer dampers when installed along a span. Due to the success of developing the EPRI Vibration 3.0 software tool for design and analysis of Aeolian vibration for single conductors, this research will expand the concept for single bundle conductors to bundle conductor vibration. The approach is to reduce a bundle conductor and a spacer damper to an equivalent of a single conductor and an equivalent of a mechanical impedance, respectively. Starting TRL ; Ending TRL	EPRI	David Atkinson	1/1/2014	12/31/2014	\$0
Transmission Planning \$2,071,795	Dmitry Kosterev	0023g	\$25,000	EPRI P35: Compression Fittings – Mitigation Measures	The "Mitigation Measures for Compression Fittings for High-Temperature Operations" project investigated different mitigation methods that can be applied to "high risk" compression fittings. While the research showed promising mitigation measures, the complete mitigated system must be well understood before these measures can be applied successfully. Further research is thus required to address these knowledge gaps in order to bring these mitigation measures to practical applications with confidence. This amendment covers the additional tasks to be performed under this new research to achieve this objective. Starting TRL ; Ending TRL	EPRI	Tyler Ashburn	1/1/2013	12/31/2015	\$75,000

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		0269	\$195,000	Voltage Management: VIP Approach	This project is based on initial research done under TIP 51. The Voltage Instability Predictor provides a fast indication of voltage stability risks to system operators using wide-area synchronized measurements. The project's objective is to advance the development and demonstrate a Voltage Instability Predictor in BPA synchro-phasor application lab. Starting TRL 2 ; Ending TRL 6	Quanta	Gordon Matthews	12/1/2012	11/30/2014	\$743,693
		0282	\$25,000	Transmission Power Flow Controls for Bulk Grid Optimization	The project will test the hypotheses that a well planned transmission upgrade adding power flow control to the main grid can provide an increase to operating transfer capability (OTC) and total transfer capability (TTC), while maintaining or increasing reliability and operating flexibility, at a better benefit/cost ratio than a new line build addressing the same constraints. The final goal is to provide a list of projects that have tested results and are available for Transmission Planning to move into the Planning Process, as determined appropriate Starting TRL 3 ; Ending TRL 6	BPA	Scott Lissit			\$27,538
		0283	\$61,000	Impact of Power Electronic Loads on the Grid Stability	This project is based on initial research done under TIP 50 and 51. The fraction of power electronic loads is expected to increase over the next decade. The project will evaluate the impact of power electronic loads on power system stability, including dynamic voltage stability, damping of power oscillations, and frequency response. The project will look at a wide number of power electronic loads, such as VFDs, consumer electronics, and Electric Vehicle Charges. The project will simulate, test and evaluate various designs that make electronic loads friendly to the power grid. This project is coordinated with a larger nation-wide DOE CERTS project. Starting TRL 5 ; Ending TRL 6	BPA	Steve Yang	10/1/2012	9/30/2016	\$185,542
		0289	\$500,000	Wide Area Damping Control Proof-of-Concept Demonstration	Recent efforts by the Bonneville Power Administration (BPA) have identified control schemes that can mitigate inter-area power oscillations through increased damping. This project includes the frequency sensor specifications, the communications link specifications, actuation device specifications, and the design of the high level supervisory control system that monitors system damping and identifies potential failures of the damping control system and takes autonomous corrective action. The goal of this research and development effort is to perform a proof-of-concept demonstration of a wide area damping controller system. Starting TRL 3 ; Ending TRL 6	Sandia	Jisun Kim	10/1/2012	9/30/2015	\$2,035,000
		0299	\$50,000	Synchrophasor Linear State Estimator and PMU Data Validation and Calibration	The proposed project will explore development and implementation of data mining and validation tools for the incoming synchrophasor data. Two parallel research tracks will enable the project to pursue 1) a PMU-based linear state estimator for data prediction, validation, calibration, and robust state estimate of the 500kV power system, and 2) data mining techniques and applications that will include baselining, event detection, oscillation monitoring and detection, and bad data correction. Starting TRL 2 ; Ending TRL 7	BPA	Ryan Quint	10/1/2013	9/30/2017	\$440,000
		0303	\$149,793	Dimensionality Reduction and Early Oscillation Detection Using Online Synchrophasor Data	The goal of this project is the introduction and test of a novel online data driven security monitoring and assessment framework based on widely deployed synchrophasors in power systems. Opportunities for dimensionality reduction of massive online synchrophasor data exist. This suggests that for a large power system, the set of raw synchrophasor measurements lies in a much reduced lower-order space. This in turn can be exploited to develop a computationally efficient online early event detection tool for power system operators. Starting TRL 2 ; Ending TRL 7	Texas A&M University	Gordon Matthews	10/1/2013	9/30/2016	\$941,537
		0305	\$250,000	Data Integrity and Situational Awareness Tools (DISAT)	This project will focus on handling the substantial amounts of data provided from PMUs and will employ algorithms to clean this data. Real-time situational awareness tools will be applied and adapted to create insightful analyses and displays. This work will focus on the business challenges of handling PMU data, detecting and cleaning bad data, deploying data mining tools to provide insight, and baseline performance and detect deviations from the baseline. This effort will result in a final report discussing how these challenges were met, as well as prototypical software which can be used to address these challenges. Starting TRL 2 ; Ending TRL 6	PNNL	Gordon Matthews	10/1/2013	9/30/2014	\$500,000
		0306	\$272,399	A Robust and Intelligent Bad-Data Detection Technique for PMU based Oscillation Monitoring & Control	This proposal will evaluate the impact of bad data on oscillation monitoring algorithms, and develop a novel data mining based technique for bad data detection, correction, and data validation in PMU measurements. A key aspect of the proposal is the development of a singular value decomposition Starting TRL 2 ; Ending TRL 3	GE Global Research	Gordon Matthews	10/1/2013	2/28/2015	\$869,053

Project Category	Sponsor	TIP No	FY14 BPA Budget	Project Name	Abstract	Lead Org	BPA Project Mgr	Project Start Date	Project End Date	Total Budget incl. Cost Share
	Hardev Juj	0050	\$ 100,000	Inter-Area Oscillation Damping Controls	This project assesses oscillation damping risks in the Western Interconnection. The project develops a roadmap of solutions to address the oscillation damping risks. Currently, the project has three main focus areas: (i) activities to improve modeling and analysis of power oscillations, (ii) applications to give system dispatchers an awareness of oscillations and low damping conditions, (iii) controls to dampen inter-area power oscillations either on transmission. The project supports BPA capital investment in the synchro-phasor technology. Starting TRL 2 ; Ending TRL 9	BPA	Dmitry Kosterev	10/1/2007		\$1,246,741
		0051	\$250,000	Response-Based Voltage Stability Controls	This project assesses voltage stability risks and researches methods to improve the voltage stability and controls in the Pacific Northwest power system. The project started with a nation-wide panel of leading voltage stability experts scoping the existing and emerging voltage stability risks and framing specific research areas. Currently, the project has 3 focus areas: 1.dynamic voltage stability risks due to changing characteristics of electrical loads, 2. voltage stability controls to enable reliable integration of wind integration, 3. using synchronized wide-area measurements for controls and situational awareness, including the development of BPA synchro-phasor application labs. Starting TRL 3 ; Ending TRL 9	BPA	Dmitry Kosterev	10/1/2007	9/30/2015	\$2,817,997
		0256	\$58,603	EPRI P40.019: Flexible Planning	This project will work on transmission planning, which considers both economic and reliability aspects in one process and the evaluation of system flexibility to respond to increased ramps in demand caused by an increase in variable generation. This will include ensuring that transmission is considered in measuring flexibility adequacy and the ability of newer resources such as demand response and storage to offer flexibility. Flexibility metrics will be proposed so that they can be adopted by bodies such as NERC to ensure flexibility adequacy in systems aiming for high penetrations of VG. Case studies will be extended from 2011 work to show the need (or otherwise) of such a metric. Starting TRL 4 ; Ending TRL 5	EPRI	Stan Williams	1/1/2013	12/31/2013	\$238,818
		0274	\$ 160,000	Development and Demonstration of Applications for BPA and FCRPS Compliance with Modeling Standards and Performance Monitoring	This project will develop and integrate a comprehensive set of model validation and performance monitoring applications for BPA and FCRPS participants. Project approach includes (a) developing a consistent set of dynamic performance requirements, (b) establishing a good baseline for power plant model / performance, (c) continual monitoring of power plant dynamic performance using synchronized wide-area measurements. The project is expected to reduce the compliance costs with the NERC MOD-06 and -027 Standards and WECC business practices. Starting TRL 4 ; Ending TRL 8	BPA	Dmitry Kosterev	10/1/2012	9/30/2016	\$418,747
Transmission Substation			\$683,033							
	Richard Becker	0025	\$350,244	EPRI P37: Substations	This program helps substation owners enhance safety, reliability, equipment life, and performance, as well as maximize the return on asset investments despite limited resources. It offers a portfolio of tools and technologies such as decision support analytics and transformer monitoring. The program also includes resources such as failure databases and aging models to improve transformer and circuit breaker life management and training materials for systems operators. Program results help operations and maintenance engineers extend equipment life, optimize maintenance costs, reduce outages, and reduce switching errors. Starting TRL 4 ; Ending TRL 5	EPRI	Richard Becker	1/1/2014	12/31/2014	\$350,244
		0025a	\$35,000	EPRI P37: Substation Seismic Studies	Collaboration of Utilities to study performance and qualification of high voltage substation equipment. Results obtained from this project will be used to develop industry standard seismic qualification procedures, design criteria, and provide seismically qualified equipment for utility purchase. Starting TRL 4 ; Ending TRL 5	EPRI	Leon Kempner	1/1/2014	12/31/2014	\$65,000
		0025b	\$25,000	EPRI P37: Testing Guidelines and Utility Practices for Multi-Vendor Equipment and Systems Based on IEC 61850 Standard - Phase II	The proposed research will collaborate with utility users, vendors, IEC working groups and subject-matter experts to develop a function specification and requirements, from end user perspective, for performing corrective maintenance and testing, which include replacement of failed equipment, upgrade of IED firmware and research the next generation testing and maintenance approaches based on the innovative monitoring and diagnosis functions in IEC 61850 standard and technologies. Starting TRL 4 ; Ending TRL 5	EPRI	Aaron Martin	10/1/2013	10/1/2015	\$40,000

Project Category	Sponsor	TIP No	FY14 BPA Budget	Project Name	Abstract	Lead Org	BPA Project Mgr	Project Start Date	Project End Date	Total Budget incl. Cost Share
		0025d	\$0	EPRI P37: Spare Transformer Strategy Development - 14 month project	The EPRI supplemental project, 'Development of Substation Equipment Spares Strategy Methodology, Analytics and Guidelines for BPA', will be used to develop a common methodology, framework, and application for evaluating the benefits of spare transformer strategies. The results of the project will depend on actual progress. One desired end goal would be to update and improve BPA's existing spare transformer strategies (Emergency Restoration Guides) by applying quantitative tools developed by EPRI. Another end goal would be the ability to measure how transformer repair/replace decisions and sparing strategies effect BPA's ability to deliver power at cost. Starting TRL ; Ending TRL	EPRI	Martin Monnig	8/9/2013	10/30/2014	\$0
		0278	\$102,789	Transformer Bushing Performance	The purpose of this project is to investigate the failure modes of older transformer bushings and mitigation options for the BPA power grid. Worldwide earthquake performance of older transformer bushings has demonstrated the extreme vulnerability, with many failures and significant loss of transformer capacity. The performance of the BPA power grid is important to maintain a reliable supply of energy. Without a reliable power grid the research performed under the TI Road Map preferential topics would not be accessible. Therefore this research indirectly supports the FY13 TI Road Map preferential topics. Starting TRL 6 ; Ending TRL 8	BPA	Leon Kempner	8/1/2013	9/15/2014	\$200,147
		0291	\$170,000	Substation Seismic Performance	The purpose of this project is to investigate the seismic performance of BPA existing substation designs. This project will analyze typical 115kV, 230kV, and 500kV substation bay configurations. The seismic vulnerability of existing installations will be determined and selected mitigation options will be evaluated. Mitigation options could include new design standards for equipment replacement and/or supplemental damping devices. One damping device that will be included was developed under a separate TI research project. This project is significant for establishing available mitigation options to reduce the seismic vulnerability of BPA's legacy transmission system. Starting TRL 1 ; Ending TRL 6	BPA	Mike Riley	7/12/2013	9/30/2014	\$197,924