ESRP PROGRAM MEASURE REFERENCE GUIDE

Typical Measure Life	**The Typical Measure Life is the estimated life of product calculated in years for energy efficiency savings calculations. The actual life of a product may vary. Measure Life is not a performance guarantee.**
Retrofits versus New Construction and Major Remodels	**Retrofits are replacement of existing equipment with new energy efficient equipment; whereas new construction or major remodel represents new equipment that services a new load or process. The baseline for a retrofit is energy performance of the existing equipment, whereas the baseline for a new construction or major remodel takes into consideration code requirements and/or industry standards.**
Incentive Rates	**Incentive rates in the Incentive Rate Reference Table are expressed in dollars per kWh saved; unless otherwise stated. Incentive rates are reviewed annually and may be updated prior to Open Enrollment and Open Season windows. Promotional incentive rates may be offered for a limited duration and may supercede standard incentive rates.**

CATEGORY	MEASURES	DESCRIPTION	SPECIAL CONSIDERATIONS
PROJECT DEVELOPMENT	Technical Analysis Study	An engineering study that identifies and analyzes all of the energy and water efficiency measure opportunities at a site.	The study should be comprehensive and performed by an experienced engineer (P.E. , CEM, etc). The study report should include a thorough description of the existing basline condition/systems as well as the proposed condition system. It should analyze the systems'energy and water consumption as well as estimate the proposed energy and water efficiency project costs.
WATER DELIVERY SYSTEM IMPROVEMENTS			
Motors/Drives	New Premium Efficiency Motors	Small incentives are available for new premium motors. The premium efficiency motor standards	The baseline for this measure is the efficiency rating of a new standard efficiency motor compared to the efficiency of a premium efficiency motor.

		apply to: • NEMA Design A- a three-phase, low voltage induction moter rated between 1 and 500 horsepower (hp), and • NEMA Desgin B- a medium-voltage 250 to 500 hp motor designed for service at 5,000 volts or less.	The difference between the efficiencies is used to calculate the energy savings. The incentive is based on the energy savings from the increased efficiency and the incremental cost of the premium efficiency motor. NEMA Design A/B does not have specifications for **motors larger than 500 hp**. Incentives for motors over 500 hp will be considered through a custom-approach.
	Variable Frequency Drives (VFD)	BPA recommends that all new VFD installations meet the IEEE 519 harmonics standard. This measure provides an annual energy savings of 10% to 30% of the calculated annual energy usage of the application. This measure applies to pumping operations that deliver, distribute, or transport irrigation water with qualifying VFDs from 7.5 to 1,000 horsepower (hp).	The incremental cost of a variable frequency drive is considered to be the entire cost of the drive, including installation costs in new construction and retrofit applications. The Ag VFD calculator, located in Resources & Tools Section (Available Support Documents) of the ESRP website, must be completed and attached to the ESRP Application. If the scope of the VFD project changes, a revised calculator is required as part of the Final Report. Incentives for VFDs over 1000 hp will be considered through a custom-approach.
Pumping Improvements	New Pump	This measure requires the installation of a new (e.g., newly manufactured) turbine or centrifugal-style irrigation pump to replace	If the motor nameplate is missing or unreadable, contact **ESRP@BPA.GOV** or your energy efficiency engineer to help you convert utility kilowatt readings to

		an existing pump. This measure applies to pumping operations that deliver, distribute, or transport irrigation water. Eligibile pumps range from 7.5 to 500 horsepower (hp). The existing pump being replaced must be centrifugal, turbine, or submersible turbine. The discharge head, column, and shaft can be reused.	horsepower. The new replacement pump must have the same or lower horsepower rating, unless it is coupled with a VFD. A New Pump Project Information Form (PIF) must be submitted as part of the Final Report. The New Pump PIF is located in the Resources & Tools Section (Available Support Documents) of the ESRP website. A change from a turbine pump to a centrifugal pump, or a centrifugal pump to a turbine pump, is allowed. This measure may be used alone or in combination with the retrofit measures, Variable Frequency Drive (VFD) for Centrifugal Agricultural Pumps or VFD for Turbine Agricultural Pumps. Incentives for pumps over 500 hp will be considered through a custom-approach.
	Pump Rebuilds	As an alternative to pump replacements, pump rebuilds may be a more cost-effective solution. Over time and through normal use, pumps become less efficient. This measure seeks to capture the incremental savings from rebuilding the pump.	Pump rebuilds are custom projects and require the establishment of a baseline energy use, calculated by metering and monitoring a pre-project period. After the installation is completed, an irrigation season of post-project energy use is compared to the pre-project energy use to deterime the energy savings. The incentive is based on the reduction in energy use, and the project cost. Prior to applying for this measure, it is recommended to contact **ESRP@BPA.GOV** or a technical representative to establish the pre-

			project baseline and the post-project Measurement & Verification plan.
	Reduce Pumping Plant Friction Loss	As fluids flow through pumps, pipes, and fittings, resistance decreases pumping pressure and velocity. This adversely affects pumping efficiency. Excessive friction loss leads to high horsepower (hp) requirements and increased energy consumption. The amount of energy lost due to friction depends on a number of factors. This measure intends to capture operation and maintenance improvements that improve the overall efficiency of the plant.	Broken or damaged equipment is eligible for this incentive; however, the replacement parts must improve the overall system's efficiency. If applicable, water savings must be captured on the application. Reducing pumping plant or distribution system friction loss or water losses are custom projects and require the establishment of a baseline energy use for the pre-project period. After the installation is completed, an irrigation season of post-project energy use is compared to the pre-project energy use to deterime the energy savings. The incentive is based on the reduction in energy use and the project cost. Prior to applying for this measure, it is recommended to contact ESRP@BPA.GOV or a technical representative to establish the pre-project baseline and the post-project Measurement & Verification plan.
Sprinkler System Improvements on Pressurized Systems		Incentives are available for irrigation hardware upgrades, which include new sprinkler nozzles, drain	This package of measures apply to on-farm irrigation systems receiving

	gaskets, goose necks, drop tube, regulators, and sprinklers.	pressured water from an Irrigation District pumping water with Reserved Power. This package of measures does not apply to on-farm applications pressurizing water using power from their local utility. Pressurized sprinkler systems often use a combination of pressurized water from Reserved Power and booster pumps that are energized by the local utility. Only the portion of the sprinkler system that is served by Reserved Power is qualified for an ESRP program incentive. The incentive may be calculated using the incentive rates as defined in the Incentive Rate Reference Tableor may utilize a prescriptive approach (e.g. $7 per sprinkler nozzle). A full list of prescriptive incentives is available upon request.
System Lift Reduction	This measure is intended to capture energy savings from changing the water source by calculating the reduction of head (or change of height captured in feet). Typical projects include decommissioning wells and developing new pumping stations that utilize surface water as the primary water source. This measure is commonly implemented with new energy efficient pumps with variable frequency drives.	System Lift Reduction projects are custom projects and require the establishment of a baseline energy use. The baseline is calculated by metering and monitoring an existing pump's performance in a pre-project period. After the installation is completed, an irrigation season of post-project energy use is compared to the pre-project energy use to deterime the energy savings. The incentive is based on the reduction in energy use and the project cost. Prior to applying for this measure, it is recommended to contact ESRP@BPA.GOV or a technical representative to establish the pre-

			project baseline and the post-project Measurement & Verification plan.
Water Delivery	Existing Pipe Lining (CML)	Cement Mortar Lining (CML) is used for rehabilitating existing steel and cast iron pipes designed to transport water. Troweled CML may reduce friction loss, repair leaks, and extend service life.	These measures do not apply to catastrophic breaks or repairs. Calculation of the water savings potential is required.
	Canal Lining and Sealing	Incentives are available for relining upgrades to existing canals and to convert existing open canals to closed piping delivery systems.	Project must be an upgrade to an existing system. Calculation of the water savings potential is required.
	Canal and Lateral Piping (plastic & fiberglass)	Converting laterals to an enclosed conduit helps reduce seepage loss and contributes to water savings.	Calculation of the water savings potential is required.
Water Management	Advanced On-farm Water Management	Advanced on-farm water management entails decision-making based on crop status, soil moisture, weather, and evapotranspiration as	This measure is only applicable to on-farm applications that receive Reserved Power electrical rates and water from eligible irrigation districts. On-farm applications that receive power from their local utility do not qualify. Calculation of the water savings potential is required.

		means to reduce water and energy consumtpion.	
	System Upgrades	System upgrades are operational with maintenance improvements that increase system efficiency and deliver water savings.	Simple payback of improvement must be greater than one year. Calculation of the water savings potential is required.
	Automated Gates (real-time flow and controls)	Incentives are available for automated gates equipped with real-time metering and communication. Being able to accurately measure and control water flows has the potential of saving millions of gallons of water each year. An ideal method of flow control would be to use automated flow gates with real-time metering. When integrated into active canal systems, irrigators globally are finding up to 60% in water savings using this technology.	Project costs related to the calculation of the water savings and feasibility studies may be included in total project costs. Calculation of the water savings potential is required.

OTHER IMPROVEMENTS			
Air Compressor System Improvements		Incentives are available to improve the efficiency of air compressor systems. Typical improvements include pressure reduction, eliminating air leaks, hardware replacement, controls, new VFD-driven air compressors, heat recovery, and air temperature reduction.	For application submission, complete the Compressed Air Calculator located in Resources & Tools Section (Available Support Documents) of the ESRP website. A revised calculator is required as part of the Final Report if scope changes occur.
Building Shell	Insulation	Incentives are available for electrically-heated facilities, which includes both single-family residences and non-residential buildings.	For residential type applications, attic, floor, and wall insulation applications must be installed according to the BPA Residential Weatherization Specs and Best Practices Guide Final installed R-values for a reportable measure must meet the required final R-value, at a minimum. However, if a physical barrier prevents the full depth of insulation from being installed, which may be common in non-residential applications, then the R-value shall meet the maximum achievable R-Value within the available space.
	Windows		Installation of replacement window

			assemblies must have a National Fenestration Rating Council-rated U-value of 0.30 or lower.
Custom Projects		Custom incentives are available for all types of energy efficiency improvements. A custom approach will be leveraged when a technology or application does not have a prescriptive incentive rate or is not defined by the ESRP Measure Reference Guide. Prescriptive incentive rates are typically calculated using 'per unit', 'per horsepower', 'per ton' or 'per square feet' metrics.	All custom projects require the establishment of a baseline of energy use. The baseline is calculated by metering and monitoring existing equipment in a pre-project period. After the installation is completed, the post-project energy use is compared to the pre-project energy use to deterime the energy savings. The incentive is based on the reduction in energy use and the project cost. Prior to applying for this measure, it is recommended to contact ESRP@BPA.GOV or a technical representative to establish the pre-project baseline and the post-project Measurement & Verification plan. The measure life of the proposed energy efficiency improvement will determine the incentive rate.
Distribution Efficiency Improvements		Incentives are available for operating and maintaining transformer equipment that result in energy savings. Learn more about the types of measures available at Re-conductor and Transformer Calculator	Eligibility is for Irrigation Districts that receive transmission services directly from BPA and/or have transformer usage metered. The incremental cost of a variable frequency drive is considered to be the entire cost of the drive in new construction and retrofit applications. For application submission complete the Distribution System calculator located in Resources & Tools Section (Available

			Support Documents) of the ESRP website. A revised calculator is required as part of the Final Report if scope changes occurred.
Engine Block Heaters		Incentives are available for energy efficient onsite block heater upgrades and vehices.	The forced-circulation generator engine block heater must replace a thermosiphon, electric-resistance block heater or be a new block heater. The generator or vehicle engine must be stationary and fixed. Post-condition, installed generator engine block heaters must be forced-circulation heaters.
HVAC	Building Automation	Incentives are available for electrically-heated facilities, which include single family residences and non-residential buildings. Typical energy measures include ducted and ductless heat pumps, building controls, and thermostats. Additionally, non-residential facilities may be eligible for energy efficiency measures that facilitate cooling and ventilation.	Building automation incentives take into account the hardware and software solutions to monitor and manage loads through set points, setbacks, and scheduling.
	Efficient Equipment		The incremental cost is the difference between the cost of a standard code HVAC (unit) and a premium-efficiency HVAC (unit).
	Connected/Smart Thermostats/ Advanced RTU Controls		BPA does not recommend smart thermostats be installed to control variable-speed heat pumps as savings and compatibility are are uncertain at this point. Advanced RTU controls cannot be incentived in tandem with connected thermostats measures.
	Fan and Cirulcating Pump Variable Frequency Drives		The incremental cost of a variable

	(VFD)		frequency drive is considered to be the entire cost of the drive in retrofit applications.
LED Lighting & Controls		Incentives are available for the replacement of interior and exterior LED lighting, delamping, and controls.	For application submission, request the program's technical assistance. The lighting calculator was moved online and not available as an MS Excel spreadsheet. Lighting strategies that increase lighting energy usage are not eligible.
Water Heating		Incentives are available for heat pump water heaters (HPWH). Other eligible measures include pipe insulation, efficient circulating pumps, and thermostatic shut-off valves (TSV).	Replace the old electric resistance or fossil fuel water heater. The Unitary and Split-System HPWHs must be listed on BPA's HPWH Qualified Product List.
	*The ESRP Measure Reference Guide is a condensed set of eligible energy efficiency measures that are commonly implemented in the Energy Smart Reserved Power (ESRP) program. If you are pursuing a measure that is not listed in the reference guide, please contact **ESRP@BPA.GOV** for further assistance. The ESRP Incentive Rate Reference Table is supplemental to this guide and provides incentive caps by measure for retrofit and new construction/major remodel projects.*		