USDA-DOE Irrigation Modernization Programs and Case Studies
Introduction

Irrigation modernization sits at the nexus of economic wellbeing, environmental conservation, food resilience, and energy sector transformation. It is a long-term and large infrastructure investment with the ability to increase agriculture revenues and decrease cost of water delivery. These investments concurrently promote environmental objectives, such as reducing herbicide use, enabling precision agriculture that reduces fertilizer application, and leaving more water in-stream for fish and other aquatic wildlife. Irrigation modernization also includes adjacent investments, such as installation of distributed energy resources, including hydropower, solar, and wind, that increase community revenues and energy resilience.

Irrigation also accounts for approximately 80% of freshwater withdraw in the western United States. Much of the initial investment in irrigation systems occurred with the passing of the 1902 Reclamation Act. While some irrigation systems have been upgraded since then, many are far past their design life and in need of re-investment. Irrigation modernization can also be an enabler of agricultural decarbonization for farms that get their water from off-farm sources. Sector wide, direct emissions from agriculture account for about 11% of global GHG emissions, with livestock responsible for 66% and synthetic fertilizers for 13%.

There are multiple Federal Government programs through the United States Department of Agriculture (USDA) and Department of Energy (DOE) available to farmers and irrigation districts to support the financing of irrigation modernization projects. The purpose of this brochure is to provide case studies of current irrigation modernization projects being funded by Federal programs so that these innovative projects may be replicated by others based on their local needs and opportunities. The programs included in this brochure are:

- **DOE Water Power Technologies Office**– Invests in projects to advance hydropower, while also promoting water and broader societal objectives.
- **USDA Rural Development (RD) Community Facilities Programs** – Offer direct loans, loan guarantees and grants to develop or improve essential public services and facilities in communities across rural America.
- **USDA RD Rural Energy for America Program** – Provides guaranteed loan financing and grant funding to agricultural producers and rural small businesses for renewable energy systems or to make energy efficiency improvements. Agricultural producers may also apply for new energy efficient equipment and new system loans for agricultural production and processing.
- **USDA RD Electric Program** – Offers loans and loan guarantees to finance the construction of electric distribution, transmission, and generation facilities to maintain, expand, upgrade, and modernize America’s vast rural electric infrastructure.
- **USDA NRCS (Natural Resources Conservation Service) Watershed Protection and Flood Prevention Program (PL. 83-566)** – Provides technical and financial assistance to local organizations (project sponsors) for planning and carrying out watershed projects that help solve natural resource and related economic problems in a specific watershed. These issues can include watershed protection, flood prevention, erosion and sediment control, water supply, water quality, fish and wildlife habitat enhancement, and wetlands creation.
- **USDA NRCS Environmental Quality Incentives Program (EQIP)** – Provides technical and financial assistance to eligible producers to address natural resource concerns and deliver environmental benefits.
- **USDA NRCS Regional Conservation Partnership Program (RCPPP)** – Federal funding is amplified by partner contributions to achieve even greater conservation benefits on agricultural and private forestland across the nation.

The projects that these programs fund range from adding small in-conduit and environmentally benign hydropower to gravity fed irrigation systems; partnerships between farmers and government agencies to improve irrigation while developing conservation efforts; and new watering and de-watering patterns to reduce carbon emissions from rice production. The diverse areas of modernization in these projects, and the involvement of government agencies to support financials and knowledge sharing, show that there is a wide range of opportunities for farmers and irrigation districts to implement innovative technologies and methods to improve water use efficiency, reduce operation and maintenance costs, increase agricultural and energy revenue, and support environmental conservation.
Central Oregon Irrigation District
NRCS PL566 funding to replace existing canal with more efficient piping. Though not funded through PL-566 for hydropower, this project will allow hydropower to be added in the future.

Marysville Project
Funding from NRCS EQIP, NFCS, and the IWBR to reduce operational losses and energy savings through the installation of gravity-pressurized-pipelines.

Wetland Conservation Partnership
Funding through the USDA’s RCPP made possible for farmers within the Rainwater Basin to restore wetlands in their property while continuing to irrigate without affecting crop yield.

Lindsay-Strathmore Irrigation District
USDA Rural Development funding to address water leakage through the installation of steel piping and SCADA systems for automation.

Morris Rice Farms
Funding from NRCS EQIP to reduce ground water dependencies by upgrading to surface water irrigation system.
Lindsay-Strathmore Irrigation District in California\textsuperscript{2,3}

Lindsay-Strathmore Irrigation District’s improvement project is a prime example of investing to modernize irrigation infrastructure. The funding for this project came from the USDA Rural Development’s (RD) Community Facilities Program. The district’s service area covers 15,700 acres and includes approximately 115 miles of water pipelines; however, 80% of those pipelines have deteriorated leading to significant water leaks and loss, surface runoff, damage to roads, hazardous road conditions, high-repair costs, and water waste. The district developed a phased approach to address these concerns.

The district and USDA RD started a partnership in 2017 to replace 10 miles of leaking steel irrigation pipeline, most of which most had been in operation since 1937. In addition, the district continues to upgrade its supervisory control and data acquisition system to monitor and control the pumping plants and reservoir throughout the district. This project is being funded through a $11.3 million Community Facilities Loan for over 40 years at 3.25% interest. Through this loan, the district can reduce or even end water loss while creating savings for its patrons and the surrounding rural community.

Evenly distributing water reduces overall requirement

Arkansas farmer, Steve Stevens, evenly distributes water to his crops with computerized hole selection (CHS) in polypipe using 25% less water than before and saving him tens of thousands of dollars in reduced pumping costs. CHS considers elevation, field rise and fall, tube pressure, and water volume to help producers get an even application of water throughout their field. Mr. Stevens has also used EQIP funding to plant conservation cover crops to increase water holding capacity and reduce fertilizer inputs. He has also used EQIP to create a monitoring program to measure the amount of water and nutrients leaving the field as runoff. Through this monitoring, he has been able to reduce his input costs.

\textbf{Figure 1. Aerial View of the Lindsay-Strathmore Irrigation District.}
Reducing Groundwater Dependencies in Arkansas

With up to $16 billion annually in economic activity, agriculture is Arkansas’ main industry and the state produces half of the rice in the U.S. Through technical and financial assistance, Natural Resources Conservation Service (NRCS) is helping producers develop Irrigation Water Management Plans that address their needs and benefit resource concerns.

The Morris Farm, established in 1892 in Lonoke County, has the distinction of producing the first rice crop in Arkansas in 1902. The first irrigation well in the state was also dug on the farm. In the early 1980s, the Morrises constructed a 60-acre reservoir containing approximately 600 acre-feet of water storage to help with their irrigation needs.

Now, Richard Morris, and his family farm 1,320 acres primarily growing rice, corn, and soybeans. Thanks to adding a 17-acre reservoir, a 1,329-foot-long tailwater pit, land leveling, pipe drops, and underground pipelines installed through a 2016 NRCS Environmental Quality Incentives Program (EQIP) contract, the farm is able to irrigate using 100% surface water. The farm gained 133 acre-feet of water storage through the reservoir and tailwater pit.

The Morris Farm used this system combined with irrigation water management techniques to win the 2018 Arkansas “Most Crop Per Drop” Contest for rice. They used alternating wetting and drying, nutrient management, multiple inlet rice irrigation with polypipe, and weather stations to reduce their water use by one third of the statewide average for rice.

Overall, the Morris Farm reduced its water consumption by 40%. By combining surface water conversion with advanced irrigation techniques and using surface water, the Morris Farm has reduced pumping costs by 90% compared to using groundwater systems. The specific amount of EQIP funding for these producers cannot be disclosed; however, the program can provide up to $450,000.

Alternative wetting and drying reduces greenhouse gas emissions

Alternating wetting and drying is a relatively new technique for producing rice. This practice allows the water level in rice paddies to draw down up to 4 inches below the surface before pumping the water back on the field. This reduces greenhouse gas (methane [CH4] and nitrous dioxide [N2O]) production by 45–90%. In addition, the fields capture any rain falling during the summer months; this results in a 25–40% savings of the normal water used, depending on the summer rainfall amount. This is one of many irrigation water management techniques available through EQIP.
Central Oregon Irrigation District\textsuperscript{5,6}: Piping of the Pilot Butte Canal for Hydropower Generation and Water Conservation

Central Oregon Irrigation District (COID) delivers water from the Deschutes River to about 45,000 acres through a system of more than 700 miles of canals and laterals. The District also generates renewable hydropower from two facilities on each of its main canals. The Siphon Power Project has a capacity of 5.5 MW using water from the Central Oregon Canal and then returning the flow back to the Deschutes River approximately 1 mile downstream. The Juniper Ridge facility has a capacity of 3.3 MW using water from the Pilot Butte Canal (PBC) that is then used for irrigation. Hydropower has diversified the District’s revenue stream and allows the District to pursue additional modernization projects to save water.

COID is in the process of implementing the Smith Rock-King Way Infrastructure Modernization Project which will pipe about 8 miles of the Pilot Butte Canal (PBC) and associated laterals, one of the district’s primary canal systems. The project will reduce seepage and evaporation from the open canal and conserve an estimated 30 cubic feet per second of water throughout the irrigation season. The conserved water will be shared with neighboring North Unit Irrigation District (NUID) during the summer, improving water delivery reliability for farmers that often experience water shortages. In return, NUID will release an equal volume of water from Wickiup Reservoir during the winter season to increase streamflow in the Deschutes River and improve habitat and water quality conditions for fish and aquatic species including the federally-listed Oregon spotted frog and bull trout.

The project will provide pressurized water to patrons, reducing the energy needed for individual pumps and related costs. Pressurized water also opens the possibility for on-farm efficiency improvements such as more advanced sprinkler systems that use less water. The project will reduce operations and maintenance costs for the District because maintaining a piped system is much less time intensive than an open canal. Public safety will also be improved along the new pipeline by reducing the risk of drowning, flooding, and other accidents associated with open canals.

Piping the PBC also has the potential for additional hydropower sites which would increase power generation. If installed, these power plants would translate to an annually energy generation of over 40,000 MWh with potential revenue of $48.6 million over 23 years. Installing the additional hydropower plants would cost approximately $29.6 million.

The Smith Rock-King Way Infrastructure Modernization Project is estimated to cost $42 million. The District is in the process of securing up to $25 million from the Natural Resources Conservation Service (NRCS) Watershed Protection and Flood Prevention Program (PL. 83-566). Additional funding will likely come from grants and low interest loans. Using a performance-based contract, support could come from companies like Google, Apple, and Facebook that have data centers in Central Oregon to finance, develop, and sell the power generated by the District.
Tumalo Irrigation District, Oregon

Tumalo Irrigation District (TID) provides irrigation water to 667 patrons and 7,417 acres in Deschutes County, Oregon. Water is delivered through a series of open canals and ditches, which lose approximately 30% to seepage and evaporation. Open canals also create operations and maintenance challenges and require patrons to use pumps to deliver water to fields. Irrigation diversions and reservoir operations contribute to low flows in the Deschutes River and Tumalo Creek, which affects water quality and habitat quality for fish and aquatic species.

TID is currently installing a multi-phase irrigation modernization project to improve water conservation, water delivery reliability, and public safety. The project will replace 69 miles of open canals and laterals with gravity-pressurized high-density polyethylene buried pipe over the next 10 years. Piping will eliminate seepage and evaporation losses and conserve 48 cfs of water, equivalent to 15,115 acre-feet per year. Water saved by the project will enhance streamflow and habitat conditions in the Deschutes River and Tumalo Creek while improving the economic sustainability of local agriculture.

Piping will also allow pressurized deliveries to farms in the district which will reduce or eliminate the need for pumping to irrigate 7,002 acres. This will reduce energy use by 4,000 MWh annually translating to more than $385,000 per year in savings for patrons. The project will stretch the water supply by increasing the reliability and efficiency of water delivered for irrigation while permanently reducing the water amount diverted and legally protecting saved instream water. The project will cost an estimated $43 million with up to 75% of the funding coming from the NRCS Watershed Protection and Flood Prevention Program (P.L. 83-566).

Wetland Conservation Partnership Creates Opportunity for Landowners in Nebraska

Funding through the USDA’s Regional Conservation Partnership Program (RCPP) was made available to farmers within the Rainwater Basin to restore wetlands in their property, improve irrigation efficiency, and maximize crop yields. The approach with this conservation effort was to use variable rate irrigation to apply irrigation inputs based on crop water needs and restore wetlands on less productive flood-prone acres. Without this technology and flexibility in the RCPP, farmers using a center pivot could not cross through a restored wetlands. Restoring wetlands within the Rainwater Basins is critical because these wetlands support millions of migratory birds during their biannual migrations from wintering grounds to breeding grounds and provide significant recharge to the underlying High Plains Aquifer.

Through RCPP funding, Hamilton County farmer, Gayle Marsh, has adopted the variable rate irrigation, integrated the restored wetland into his operation for cattle grazing, and provides vital habitat in the Rainwater Basin wetland area in South Central Nebraska. Marsh said, “This new, whole-field approach has helped my farm operation grow from flood-prone cropland to a different use, without a substantial loss of income. It’s working well.”
Marysville Project in Idaho

NRCS Idaho is working with the North Fremont Canal Systems (NFCS) and private landowners on a canals-to-gravity pressurized-pipelines project known as the Marysville Project in the Ashton area northeast of St. Anthony, Idaho. The Marysville Project improves irrigation efficiencies by reducing operational losses associated with open conveyance systems and by facilitating on-farm improvements in irrigation water management and irrigation system upgrades. It also significantly reduces energy consumption by replacing electric motors and pumps with pressure from gravity. Marysville consists of five phases of planning, design, and construction. Four of the phases were completed between 2008 and 2019. Phase 5 has received funding and is expected to be operational in 2023. When fully completed, the gravity-fed system will serve more than 20,000 acres, remove approximately 5,000 horsepower (hp) from the electrical grid, and cost approximately $37 million.

Figure 6. NRCS Idaho State Irrigation Engineer Dan Murdock checks out a delivery of 54-inch diameter PVC pipe.

Primary funding for the project comes from NFCS shareholders, NRCS EQIP funds and the Idaho Water Resource Board, which provided low-interest loans to NFCS. In addition, the Bonneville Power Administration (via Fall River Electric, the local electrical utility) provided funding to participating landowners based on power savings realized from the project.

Marysville is an open ditch to gravity-pressurized pipeline conversion. The benefits to stakeholders of this irrigation modernization project include:

- Water quantity improvements (approximately 10,000 acre-feet per year) that are expected to positively impact both surface and ground water supplies. This is especially important as aquifer recharge has become an issue in the state.
- Increased crop production from more certain water supply and reliable water delivery system.
- Water quality improvements related to facilitation of efficient on-farm systems and elimination of all lower quality surface return flow to the Henry’s Fork (Idaho).
- More than 5,000 hp taken “off the grid” resulting in lower energy costs.

Irrigation modernization can create carbon credits

On June 14, 2017, Chris Isbell and six other farmers—two from California and five from Arkansas and Mississippi—became the first to sell carbon credits generated from rice farmers to Microsoft. These farmers tested out a radical idea; by implementing conservation practices on their crops, rice farmers could reduce methane emissions and thereby generate a carbon credit that could later be sold on the carbon market. Their voluntary conservation practices not only generated carbon credits but also reduced energy consumption and water use critical to both regions.

The sale of the carbon offset credits, managed by Terra Global Capital, to Natural Capital Partners on behalf of its client Microsoft, rewards the farmers for their activities and demonstrates credibly measured environmental benefits. “Being the first of a kind emission reduction from sustainable rice production, Microsoft valued the innovation by farmers and the investment in technology to catalyze measuring and monitoring emission reductions,” said Rob Bernard, Chief Environmental Strategist at Microsoft.

A diverse group of like-minded partners guided the farmers through the process including Terra Global Capital, American Carbon Registry, USDA NRCS, California Rice Commission, White River Irrigation District, and the Environmental Defense Fund. This public-private partnership was funded by NRCS under the Conservation Innovation Grants program and Entergy Corporation, an integrated energy company, through its Environmental Initiatives Fund.
References


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## USDA and DOE Programs on Irrigation Modernization

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<td>DOE's Water Power Technologies Office (WPTO)</td>
<td>Hydroelectric Project</td>
<td>DOE funds technology development and demonstration projects for hydropower generation.</td>
<td>Individuals, organizations, and private sector companies</td>
<td>Areas without existing hydropower generation</td>
<td>The maximum term for loans under the EECUP is 15 years, unless the funding relates to ground-source or rooftop photovoltaic systems, in which case the term is up to 25 years.</td>
<td>Interest rate is typically fixed for the term of the loan. Rates vary based on creditworthiness.</td>
<td>Grant applications due each year; contact your State Energy Director for more information.</td>
<td>DOE WPTO is funding Idaho National Laboratory and Pacific Northwest National Laboratory in the Irrigation Modernization project, which is part of its larger effort to develop and deploy hydraulic technologies.</td>
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<td>USDA Rural Development (RD) Community Facilities</td>
<td>Program (EP)</td>
<td>EP provides loans and grants to develop or improve essential public and community facilities in rural areas.</td>
<td>Individuals, organizations, and private sector companies</td>
<td>Areas with populations of less than 50,000 and an average income of less than 80% of the area median income.</td>
<td>The program does require that funds be used to improve energy efficiency and/or reduce peak demand on the customer side of the meter, modify the electric load to reduce in overall system demand, stimulate a more efficient use of existing electric facilities.</td>
<td>Interest rate is fixed for the term of the loan. Rates vary based on creditworthiness.</td>
<td>Contact your State Energy Director for more information.</td>
<td>This is specific to irrigation projects, such as line pipe replacement, and new system loans for agricultural production and processing.</td>
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<td>USDA Rural Development (RD)</td>
<td>Rural Energy for America Program (REAP)</td>
<td>REAP provides guaranteed loan financing and grants to eligible rural areas for renewable energy projects.</td>
<td>Individuals, organizations, and private sector companies</td>
<td>Areas with populations of less than 50,000.</td>
<td>The program does require that funds be used to improve energy efficiency and/or reduce peak demand on the customer side of the meter, modify the electric load to reduce in overall system demand, stimulate a more efficient use of existing electric facilities.</td>
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<td>USDA Rural Development (RD)</td>
<td>Electric Program (EP)</td>
<td>EP provides leadership and capital to maintain, expand, upgrade, and modernize America's vast rural electric infrastructure.</td>
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<tr>
<td>USDA Natural Resources Conservation Service (NRCS) Environmental Quality Incentives Program (EQIP)</td>
<td>The EQIP provides technical and financial assistance to eligible producers to address natural resource concerns and deliver environmental benefits such as improved water and air quality, conserved ground and surface water, increased soil health, and reduced soil erosion and sedimentation, improved or created wildlife habitat, and mitigation against drought and increasing weather volatility.</td>
<td>&quot;The EQIP is a competitive program and applications are ranked based on national, state, and local factors. Contracts are developed for applications that are selected and approved for funding. Payments are made to the participant upon the completion and certification of the project. The EQIP focuses on activities that meet NRCS standards and specifications. In general, payment schedules are based on regional and local data and payments range from 50% up to 90% of the anticipated costs.&quot;</td>
<td>&quot;Agricultural or forestry management producers who have an interest in the agricultural or forestry operation (such as owners or renters) and are in compliance with Food Security Act provisions and adjusted gross income requirements may be eligible. Additionally, the 2018 Farm Bill authorizes direct program assistance to Water Management Entities which are public or semi-public entities such as irrigation districts, groundwater management districts, aquifers, land grant from Mercedes, or similar entities, that have jurisdiction or responsibilities related to water delivery or flood management to eligible lands.&quot;</td>
<td>Includes agricultural land and public land if the lands part of the production operation, the producer has control of the land, and the land is necessary to address an identified resource concern.</td>
<td>&quot;NRCS offers about 200 unique conservation practices and activities designed for working farms, ranches, and forests. NRCS financial assistance can cover part of the costs of implementing conservation practices. This link to all the conservation practices: <a href="https://www.nrcs.usda.gov/wps/portal/nrcs143_026849/">https://www.nrcs.usda.gov/wps/portal/nrcs143_026849/</a>.&quot;</td>
<td>Payments are based on regional payment schedules which states can adjust for local conditions.</td>
<td>Application is for EQIP financial assistance are accepted throughout the year. States set one or more deadlines (or backup dates) during the fiscal year to assess and rank applications for funding. States are required to post outreach materials including state payment schedules and ranking criteria at least 30 days prior to a deadline.</td>
<td>The Morris Farm used NRCS technical assistance to design an on-farm irrigation system. The system converts the irrigation water supply from critically scarce groundwater to abundant surface water. Morris Farm used EQIP to construct 133 ac-feet of surface water storage through an irrigation storage reservoir, a tailwater recovery pit, and additional ancillary practices such as a pumping plant, irrigation land leveling structure for water control and irrigation pipeline. The 120 ft reduction in pumping head from groundwater to surface water resulted in an 80% reduction in energy use.</td>
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<td>USDA NRCS Watershed and Flood Prevention Program (PL-566)</td>
<td>The Watershed Protection and Flood Prevention Program (PL-566) helps units of federal, state, local, and tribal governments (project sponsors) protect and restore watersheds. This program provides for cooperation between the federal government, the states, and their political subdivisions to work together to prevent erosion, floodwater, and sediment damage; to further the conservation of development, use, and disposal of water, and to promote the conservation and proper use of land in authorized watersheds. Eligible units of government (i.e., sponsors) request a preliminary investigation study to determine project feasibility from the state conservationist in their state.</td>
<td>Sponsors must be a legal unit of government and/or Indian Tribes with the ability to acquire real property, water, mineral, and other rights, carry out operations and maintenance of the project, and acquire permits and the authority to levy taxes or other means to finance the local share of expenses.</td>
<td>Includes primarily private land with at least 20% of the total benefits directly related to agriculture, including rural communities.</td>
<td>&quot;NRCS offers financial and technical assistance through the program for the following purposes: - Erosion and sediment control - Water shed protection - Flood prevention - Water quality improvements - Rural, municipal, and industrial water supply - Water management - Fish and wildlife habitat enhancement - Hydropower source.&quot;</td>
<td>This varies according to the authorized purpose.</td>
<td>Applications for the preliminary investigation may be taken throughout the year.</td>
<td>Tumalo Irrigation District’s (TIS) Irrigation Modernization Project is a large agricultural water conveyance efficiency project. The project modernizes 1.9 miles of 90&quot; irrigation canals and 66.9 miles of laterals through conversion of open canals to pipelines. The project meets the Agricultural Water Management purpose of PL-566. The work will address water loss in district conveyance systems, water delivery and operations inefficiencies, stream flow for fish and aquatic habitat, and risks to public safety from open irrigation canals.</td>
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### USDA NRCS Regional Conservation Partnership Program

The Regional Conservation Partnership Program (RCPP) co-invests in conservation projects to address resource concerns at a regional scale. Federal funding is amplified by partner contributions to achieve even greater conservation benefits on agricultural and private forestland across the nation, including eight NRCS defined critical conservation areas.

Interested partners submit proposals for projects ranging from $250K to $10M. The standard project includes 70% financial assistance that will be delivered to eligible producers/landowners while the remaining 30% is reserved for technical assistance to support the project. To receive funding under an RCPP project, producers/landowners apply through partner or local USDA service centers.

"An eligible partner may include an agricultural or silvicultural producer association or other group of producers, a state or unit of local government including a conservation district, an American Indian tribe, a farmer cooperative, an institution of higher education, a water district, irrigation district, acequia, rural water district or association, or other organization with specific water delivery authority to producers on agricultural land, a municipal water or wastewater treatment entity, and an eligible entity as identified by NRCS pursuant to 7 CFR part 1468. This also includes an organization or entity with an established history of working cooperatively with producers on agricultural land, as determined by the Secretary, to address local conservation priorities related to agricultural production, wildlife habitat development, and NIPF management, or critical water quality, sediment, or other natural resource concerns. Producers/landowners have separate eligibility requirements outlined in the RCPP rule and funding opportunities."

RCPP projects must be carried out on agricultural or nonindustrial private forest land or associated land on which NRCS determines an eligible activity would help achieve conservation benefits and benefit agricultural land.

RCPP makes funds available for eligible activities similar to those of other NRCS programs (i.e., ACEP-ALE, ACEP-WRE, CSP, EQIP, HFRP, and PL-566).

This varies.

RCPP annually posts funding opportunities for RCPP classic and alternative funding arrangements (AFA) projects. Annually, partners for nearly completed projects can request a renewal if their project is deemed highly successful. Application periods for producer/landowner contracts vary by project and are set by NRCS in coordination with the lead partner.

NRCS awarded $1.6M in federal funding to the Middle Cedar Partnership Project which will be matched by $1.6M in partner contributions, including the lead partner, the City of Cedar Rapids. The first phase of the project—led by the Iowa Soybean Association—developed watershed plans throughout the region. In the next phase, efforts have focused on farmers’ implementation of conservation practices to address the nitrate issue in the watershed. Early results show that the project is working. Fields planted with cover crops in the fall have averaged 32% lower nitrate concentrations moving off farm fields than fields not planted with cover crops, as measured over three growing seasons and a variety of weather conditions. Over 17,000 acres of cover crops are under contract through the RCPP with contractual commitments extending to 2020.