RECLAMATION

Managing Water in the West

The Bureau of Reclamation's Sustainable Energy Strategy

Fiscal Year 2013-2017

U.S. Department of the Interior
Bureau of Reclamation

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Mission Statements

The U.S. Department of the Interior protects America's natural resources and heritage, honors our cultures and tribal communities, and supplies the energy to power our future.

The mission of the Bureau of Reclamation is to manage, develop, and protect water and related resources in an environmentally and economically sound manner in the interest of the American public.

Contents

Introduction

The Bureau of Reclamation has a long and successful history providing renewable, clean, reliable, and affordable hydropower to its customers. As technology and demands for power and water use evolved over the last 100 plus years, Reclamation has adapted to these changes to take advantage of new technologies to help meet the nation's water and energy needs. As the agency moves well into its second century, Reclamation will play an important role in developing and supporting renewable energy production, and the development, conservation, and the integration of emerging renewable energy technologies into the Nation's power grid.

Reclamation will continue to improve and enhance our renewable hydropower capabilities, but will also support the development of other non-hydroelectric renewable energy resources (N-HRE), such as wind, solar, and geothermal. Reclamation's sustainable energy strategy offers a framework that will position Reclamation to efficiently respond to the needs of our customers and to strategically plan for the future of renewable power development and production in the western United States.

Sustainable Energy Mission

Building on a century of agency experience in providing renewable, clean, reliable, and affordable hydropower, Reclamation seeks to facilitate the development, production, and integration of renewable energy in an environmentally and economically sound manner in the interests of its water and power customers and the American public alike.

In this pursuit, Reclamation will:

- Make sound business decisions; and
- Collaborate with Power Marketing Agencies (PMAs), other Federal agencies, customers, Indian tribes (Tribes), state entities, and other stakeholders.

Institutional Framework

Reclamation's history and current operating environment shape how we participate in renewable activities. All renewable development, including hydropower production, must balance multiple, sometimes conflicting objectives

in a fluid budgetary and regulatory environment. For example, renewable development must consider several factors including individual project authorities, permitted land uses, environmental constraints, and other contractual obligations related to flood control and water and power management.

Reclamation History

Established in 1902, the mission of Reclamation is to manage, develop, and protect water and related resources in an environmentally and economically sound manner in the interest of the American public. Reclamation projects provide agricultural, municipal, and industrial water; create and enhance fish and wildlife habitat; control flooding; offer recreational opportunities; and generate hydroelectric power.

Hydroelectric power generation, a form of renewable energy, is integral to Reclamation operations. Historically, hydroelectric power plants were added to Reclamation projects to power construction camp activities and pumping systems. Surplus power was sold to public preference customers, providing local industry, towns, and farms with low-cost electricity, and the generated power revenues were credited against project construction and operation and maintenance costs.

Today, Reclamation is the owner and operator of 53 hydroelectric plants with over 14.6 million kilowatts (kW) of installed capacity, and ranks as the second largest producer of hydroelectric power in the United States by generating over 40 billion kW hours of energy each year. This is enough to provide the equivalent annual energy needs of over 3.5 million households while offsetting 27 million tons of carbon dioxide. Furthermore, power revenues have provided over 10 billion dollars in project repayment to the United States.

Reclamation can build on this history of generating renewable hydropower from projects with multiple operational and legal obligations, and this expertise can provide a foundation for supporting further renewable development that includes both hydropower and N-HRE. In addition to the institutional expertise that Reclamation can provide to support renewable development, Reclamation's role in renewable energy is also being driven by other institutional and external factors. These factors include statutory, policy, operational, and external influences that both motivate and guide Reclamation's role in renewable energy activities.

Federal Renewable Statutes and Policy

Several Federal statutes provide a legal framework for Reclamation's efforts to increase energy conservation and optimize generation of clean, renewable energy. Those acts include: the Energy Policy Act of 2005 (Public Law 109-58); the Energy Independence and Security Act of 2007 (EISA) (Public Law 110-140);

and the Omnibus Public Land Management Act of 2009 (Public Law 111-11, Title IX Bureau of Reclamation Authorizations, Subtitle F – Secure Water).

In addition to statutes, Federal administration directives influence program activities. These include the Presidential Executive Orders (EO) 13423 and 13514. EO 13423, *Strengthening Federal Environmental, Energy, and Transportation Management*, was signed in 2007, building on a body of Federal work aimed at improving environmental and energy performance. It directs Federal agencies to implement a number of sustainable practices, including "energy efficiency and reductions in greenhouse gas emissions," and "use of renewable energy." EO 13514, *Federal Leadership in Environmental, Energy, and Economic Performance*, was signed in 2009 and establishes greenhouse gas (GHG) emission reductions as an overarching, integrating performance metric for all Federal agencies. EO 13423 and EO 13514 requires Federal agencies to establish and implement an Environmental Management System (EMS), which is a management tool to help an organization identify within its operations and activities environmental issues that may occur. Consistent with these EOs, the Department of the Interior has issued Secretarial Order 3285, *Renewable Energy Development by the Department of the Interior*, which establishes that encouraging the production, development, and delivery of renewable energy is one of the Department's highest priorities.

This is further illustrated in the Department's *Strategic Plan for Fiscal Years 2011–2016*, which features developing renewable energy potential as a strategy supporting the Department's goal of securing America's energy resources. In relation to this Strategic Plan, Reclamation has established 2016 performance targets related to hydropower facility reliability and generation availability during peak demand periods. The Strategic Plan also includes the Priority Goal on Renewable Energy Sources, seeking to increase approved capacity for production of renewable (solar, wind, and geothermal) energy resources on lands managed by the Department.

Reclamation's program activities are also influenced by the 2010 Sustainable Hydropower Memorandum of Understanding (Hydropower MOU) signed by the U.S. Army Corps of Engineers, U.S. Department of Energy, and the Department. The Hydropower MOU outlines and promotes shared goals between the signatory agencies for the development of clean, reliable, cost-effective, and sustainable hydropower generation in the United States.

Finally, *The President's Climate Action Plan* released in June 2013 details the case for Federal action and leadership in response to climate change. Key elements of this strategy include accelerating and expanding the deployment of renewable energy projects, and implementing efficiency and conservation programs that can help reduce greenhouse gas emissions and prepare the nation for the impacts of climate change. Reclamation is uniquely positioned to support these Federal efforts through a variety of program areas. The Strategic Objectives

and Supporting Activities in this plan will contribute to the success of *the President's Climate Action Plan.*

Operating Environment

Renewable energy growth is largely being driven by state statutes, including state renewable portfolio standards, which create an increased demand for renewable energy supplies through mandated increases in renewable generation requirements. These requirements can drive interest in non-Federal development of renewable resources at Reclamation facilities and lands. Reclamation operates its hydropower facilities subject to the terms and conditions of water and power service contracts, and at most of these facilities, hydropower generation occurs in a water management context that involves operating reservoir systems to satisfy multiple objectives including making water and power deliveries, flood risk reduction, and satisfaction of environmental requirements. Reclamation supports and encourages the development of renewable generation resources on Reclamation project lands and facilities, but such development cannot negatively impact Reclamation's existing operations, the safety of our facilities, and other commitments.

This increase in renewable resources can also create unique challenges for the operations of the electric grid. Wind and solar resources are a clean, carbon emission-free source of renewable energy, but they are also intermittent. The Federal hydropower system can help provide balancing reserves to stabilize the electric grid, but Reclamation's primary objective is to deliver water within the water management constraints of each watershed. During the release of this water, generation is optimized to its highest use in order to deliver low-cost reliable energy to meet its contractual commitments to its power customers.

Trends in climate, watershed, and ecosystem conditions also hold potential for influencing Reclamation's renewable energy activities. Hydropower generation is affected by water supply availability, which depends on regional climate and watershed hydrologic conditions. As the climate is expected to continue changing,[1] energy demand trends and hydrologic conditions will be more complicated and difficult to predict. Trends in ecosystem health and the status of threatened and endangered species also affect water management and hydropower generation by affecting the environmental requirements on our operations. As identified in the Hydropower MOU, a challenge shared by Reclamation, USACE, and DOE is identifying new ways to develop clean, renewable hydropower energy that not only increases energy generation capacity, but also leads to improvements in ecosystem function and health.

[1] SECURE Water Act Section 9503 (c) – Reclamation Climate Change and Water 2011 Report.

Strategic Objectives

Within this institutional framework, we have identified six long-term Strategic Objectives to further Reclamation's Sustainable Energy Mission. These six long-term Strategic Objectives are:

1. Increase renewable generation from Reclamation projects.
2. Facilitate non-Federal development of renewable energy projects.
3. Increase energy savings and conservation at Reclamation projects.
4. Support integration of variable non-dispatchable renewable resources into the U.S. electrical grid.
5. Increase benefits of renewable energy through technological innovation.
6. Improve management efficiencies related to the implementation of renewable energy and energy savings projects.

Each Strategic Objective is supported through Supporting Activity projects. Supporting Activity projects are categorized as ongoing, short-term, or medium-term in nature.

Ongoing Supporting Activities include projects that Reclamation has been, and will continue to actively pursue in the future, such as modernization of Reclamation infrastructure. Short-term Supporting Activities are those projects that will be completed in 1-5 years. Medium-term Supporting Activities are those projects that will be completed in 5-10 years, and will build off short-term Supporting Activity accomplishments, as applicable.

For each Supporting Activity, select Reclamation offices will be assigned lead, support, and implementation roles. Appendix A identifies all Reclamation offices directly involved in this effort. Appendix B identifies office roles for each Supporting Activity.

A synopsis of each Strategic Objective and Supporting Activity follows.

1.0 Increase Renewable Generation from Reclamation Projects

Reclamation will collaborate with power customers, PMAs, and other stakeholders to increase capacities and efficiencies at Reclamation's existing hydropower plants where it is cost-effective and pragmatic, and identify opportunities for development of hydroelectric and other N-HRE resources such as wind, solar, and geothermal that can cost-effectively meet Reclamation's local power needs.[2]

[2] See Appendix C for further explanation of N-HRE resources.

Ongoing Supporting Activities:

1.1 Operate and Maintain Existing Reclamation Hydropower Resources

Continue to provide clean, renewable cost-based Federal hydroelectric power by maintaining Reclamation's existing infrastructure. Effectively maintaining existing resources ensures that Reclamation's hydroelectric units will be available to produce carbon-free renewable electricity when needed. Hydroelectric energy is currently the largest renewable energy resource available and effectively operating and maintaining our existing generation is the most cost effective way to continue to provide this service.

1.2 Generator Uprates

A generator uprate increases the generating capacity of a unit. Uprates necessitate an electrical and mechanical review of the capability and limits of all of the power equipment, from the penstock through the turbine, generator, bus, switchgear, transformer, and transmission system. These systems can be retained, modified, or replaced in order to obtain the optimum uprate level. Reclamation has consistently looked for opportunities to uprate units at its facilities, and through these efforts Reclamation has gained 2,864 MW of additional capacity from our existing power plants. The majority of Reclamation's units are currently sized at an optimum capacity, but there are still opportunities to add additional capacity. Reclamation will continue to work with our customers to take advantage of these opportunities when it shows economic value.

1.3 Turbine Replacements

Turbine replacements result in an improvement of the runner condition and therefore improve the overall unit efficiency. New turbine runner designs utilize a modern runner shape that is often more efficient than the older runner was in new condition. This efficiency gain can result in additional power generation with the same volume of water releases, or the same level of power generation with a smaller volume of water releases. Since 2009, Reclamation has replaced 20 turbines with an average increase in efficiency of approximately 3 percent. Reclamation has identified opportunities to increase efficiencies at 36 power plants through turbine runner replacements. Reclamation will continue to work with our customers to take advantage of these opportunities when it shows economic and water and energy conservation benefits.

Short-Term Supporting Activities:

1.4 Unit Dispatch Optimization

Computer-based unit dispatch optimization programs allow increased generation to be produced at a powerplant by operating the plant at its most efficient and optimal level. At most Reclamation facilities, a fixed water release dictates the available power capacity at any given time. Optimizing the plant to maximize the power generation based on plant conditions such as efficiency curves, rough

zones, outages, ancillary service demand, and the scheduled water release will maximize the energy per acre foot of water. This is equivalent to increasing plant efficiency through conventional methods such as generator rewinds, uprates, and turbine replacements. Grand Coulee and Hoover powerplants are now using optimization systems that have increased efficiencies by up to 3 percent and have resulted in as much as 87 MW of additional generating capability at any given time. It is expected that Reclamation could gain between 19 MW and 57 MW of additional generating capability if optimization systems are installed at Reclamation's remaining plants. Reclamation has developed a standardized unit dispatch optimization system and will begin installing that system at its power plants in 2013.

1.5 Develop Technical Guidance and Training on N-HRE Development

Reclamation will develop technical guidance for N-HRE facility and utility scale development providing criteria to identify and analyze project information and economics to determine possible future development.[3] Reclamation will train a core group of staff on the basic concepts of N-HRE, using the current contract with the National Renewable Energy Laboratory (NREL). This should include representatives from each Region and Denver in the areas of lands, facilities, and power.

Medium-Term Supporting Activities:

1.6 Facility Scale Federal Development of Renewable Energy Resources to Serve Reclamation Load

Reclamation will develop renewable generating resources such as facility scale hydropower and N-HRE resources to meet Reclamation's local power needs when it is cost-effective. Examples of local Reclamation load include Reclamation buildings and equipment where such load is otherwise met by local utility providers, or the facilities (such as recreation sites) are so remote that power sources have not been established. Priority will be given to installing facility scale renewable energy to meet part, or all, of the electrical load at Reclamation-owned and occupied buildings where the local market incentives and the economic benefits are justified. Typically this will be at facilities that do not currently use project use power. These projects will employ the technical guidance and training on N-HRE developed in Supporting Activity 1.5.

2.0 Facilitate Non-Federal Development of Renewable Energy Projects

Reclamation will collaborate with other Federal and non-Federal agencies and organizations to develop and implement policies that support and streamline renewable generation development. Reclamation will communicate with outside

[3] See Appendix B for further explanation on facility vs. utility scale resources.

entities on opportunities for renewable development and provide outreach on Reclamation's policies to develop those resources.

Ongoing Supporting Activities:

2.1 Update and Implement Policies and Guidance for Non-Federal Hydropower Development

Reclamation published a Lease of Power Privilege (LOPP) Directive and Standard (D&S) on September 28, 2012, that provides clearer direction on LOPP requirements while streamlining the approach to encourage responsible renewable development at Reclamation dams and canals. In doing this, Reclamation worked closely with its power and water customers and environmental stakeholders. Reclamation also participates in hydroelectric power licensing under the Federal Energy Regulatory Commission (FERC). Reclamation will build off of FERC and Department policies to create guidance for Reclamation employees that ensures organizational efficiencies when non-Federal hydropower development proceeds at a Reclamation site.

2.2 WaterSMART Water and Energy Efficiency Grants

WaterSMART Grants provide cost-share assistance on a competitive basis to irrigation and water districts, Tribes, states, and other entities with water or power delivery authority for projects that seek to conserve and use water more efficiently, **increase the use of renewable energy**, and improve energy efficiency, benefit endangered and threatened species, facilitate water markets, or carry out other activities to address climate-related impacts on water or prevent any water-related crisis or conflict. WaterSMART Grants will continue to provide cost-share assistance to support development of renewable resources.

2.3 Create Resource Assessments

Identify facilities and lands that are likely to be good candidates for renewable energy development. Reclamation has created conventional and small hydropower resource assessments for its dams and canals, as well as resource assessments for wind and solar potential on Reclamation lands that show where development potential may exist. These resource assessments have been shared with governmental and non-governmental entities through a variety of outreach measures. Reclamation will continue to support this resource assessment activity by performing a hydropower pumped storage resource assessment at Reclamation reservoirs. This activity will begin in calendar year 2013. Reclamation will continue to work with and support DOE and other entities that are developing renewable resource assessments.

2.4 Basin Scale Opportunity Assessments

Reclamation will continue working with DOE and the Pacific Northwest National Laboratory to apply an approach to hydropower and environmental assessment that emphasizes sustainable energy systems within the context of basin-wide environmental protection and restoration. Assessments incorporate climate

change models and can be used as a tool to inform future basin scale climate change analysis.

2.5 Outreach

Provide outreach to the public concerning renewable energy grant opportunities, development opportunities on Reclamation lands and facilities, and education on the Reclamation policies that govern that development.

Short-Term Supporting Activities:

2.6 Create and Implement Policies for Non-Federal N-HRE Projects.

Create policies and guidance on the use of land leasing authorities for the development of non-Federal renewable energy including wind, solar, geothermal and other renewable energy projects on Reclamation lands where such developments are compatible with project operations, existing land use plans, policies, and regulations; when it supports Reclamation's mission to deliver water and power, and to address customer's needs; and when the development requires minimal obligation of appropriated funds, or results in net revenue to benefit Reclamation projects; and when development will not adversely impact Reclamation's contractual obligation to its customers. Reclamation will work closely with other government agencies that have greater experience with N-HRE projects to incorporate these policy's best practices.

3.0 Increase Energy Savings and Conservation at Reclamation Projects

Energy savings and conservation at Reclamation projects allow for more renewable hydropower to be delivered to power preference customers. Reclamation will identify opportunities for long-term energy savings and conservation, and work with existing customers to realize these savings.

Ongoing Supporting Activities:

3.1 Energy and Sustainability Audits (Buildings)

Energy conservation measures (ECMs) and recommendations are being made third-party contractors based on energy and water evaluations of EISA-covered buildings and non-EISA-covered buildings greater than 5,000 gross square feet. EISA-covered buildings are those on commercial power and/or commercial water. Results of these evaluations will be used in planning budgets, implementation of energy and water savings, and GHG measures.

3.2 WaterSMART Water and Energy Efficiency Grants

WaterSMART grants provide cost-share assistance on a competitive basis to irrigation and water districts, Tribes, states, and others with water or power delivery authority for projects that conserve and use water more efficiently,

increase the use of renewable energy and **improve energy efficiency**, benefit endangered and threatened species, facilitate water markets, or carry out other activities to address climate-related impacts on water or prevent any water-related crisis or conflict. Delivering water often requires energy usage to move the water from point to point, and these water savings translate directly to energy savings.

Short-Term Supporting Activities:

3.3 Pumping Demand Response Study

Reclamation is seeking to understand the ability and benefits of managing electricity demands from pumping plants to promote the integration of renewable energy, strengthen the transmission network, and to potentially reduce the cost associated with moving water. Reclamation will collaborate with the PMAs and existing customers to conduct a study to quantify the capabilities of Reclamation's water delivery systems to provide such services and to quantify the costs and benefits of any upgrades that could further those capabilities.

3.4 Reclamation Sub-metering at Buildings and Facilities

Reclamation will increase utility metering at individual buildings to facilitate monitoring of existing energy and water usage and allow tracking after implementation of ECMs. Reclamation has targeted EISA-covered buildings within complexes that share a main utility meter for sub-metering. In general, these buildings represent the highest anticipated energy use and associated GHG emissions. Collection of this data will allow Reclamation to prioritize energy consumption at our facilities to identify the best opportunities for conservation of energy.

3.5 Reclamation Metering at Building and Structures on Station Power

Reclamation will increase metering at buildings and facilities using Reclamation station power in order to better understand baseline consumption and measure reductions in energy use and the corresponding increase in renewable hydropower to customers.

Medium-Term Supporting Activities:

3.6 Pumping Energy Efficiency Improvements Program

Reclamation will work with Bonneville Power Administration and Western Power Administration to create a pumping plant efficiency program based on the results of Supporting Activity 3.3. The program would help irrigators become more knowledgeable about ways to improve pumping efficiency and energy usage at irrigation pump sites.

3.7 Energy and Sustainability Audits (Powerplants and Pumping Plants)

Energy audits of Reclamation powerplants and pumping plants will be initiated to identify where energy savings can be realized. These energy savings will allow

more Reclamation generated renewable hydropower to be delivered to customers. These evaluations will be used by Reclamation leadership in planning budgets and implementation of energy and water saving measures. Pumping Demand Response Study results (Supporting Activity 3.3) will inform pumping plant energy audits.

4.0 Support Integration of Variable Non-Dispatchable Renewable Resources into the U.S. Electrical Grid

Reclamation can play an important role facilitating the successful integration of wind and solar energy into the electric grid. We will work closely with existing power customers, PMAs, Federal agencies and other stakeholders to ensure that the integration of these resources is done in the most responsible and cost-effective manner while meeting existing customer obligations. Variable generation differs from tradition generation in that it is an energy resource that provides very little power system capacity or reserves. Hydropower is the only existing renewable generation available to support variable generation by providing the power system reserves needed to maintain system dependability, stability, and reliability. There are various technical items that Reclamation can begin to address to prepare for more variable N-HRE integration into the grid.

Short-Term Supporting Activities:

4.1 Pumped-Storage Hydroelectricity Investigation

Pumped-storage hydroelectricity can be utilized to provide grid services that can regulate and support other non-dispatchable variable resources such as wind and solar. In essence, pumped-storage applications allow for more variable resources to be incorporated into the electric grid by storing variable renewable energy when it is generated at times when it is not needed, and dispatching that stored energy when it is needed. Reclamation has existing infrastructure that could be utilized to reduce the investment costs of developing pumped-storage resources. Reclamation will work with other Federal and non-Federal entities to explore whether existing Reclamation infrastructure could be converted to a pumped-storage application and whether new pumped-storage facilities can feasibly be constructed on Reclamation lands and projects.

4.2 Ancillary Services Costing Study

Reclamation has identified additional costs that could be incurred as a result of providing ancillary services to integrate variable renewable resources. These additional operation and maintenance costs result from additional starts/stops of units and increased ramping of units. Reclamation will work with the PMAs and existing power customers to ensure that these costs are allocated to the appropriate entities.

4.3 Quantifying Reclamation's Existing Flexibility to Integrate Variable Renewable Resources

While hydropower has the technical capability to support the integration of variable renewable resources, Reclamation's hydropower flexibility is limited by a variety of existing commitments. Reclamation will work with existing water and power customers and PMAs to quantify what flexibility exists within these commitments. Additionally, Reclamation will explore where opportunities exist to enhance Reclamation's capacity for providing ancillary services while not negatively impacting existing customer obligations.

4.4 Improve Hydropower Models Used in Renewable Integration Studies

Models for past industry studies regarding hydropower's ability to mitigate the impacts of variable generation on the power system, have been fairly simple and have not accurately captured the complexities of hydroelectric systems. Reclamation will work with the PMAs and other Federal agencies that engage in variable resource integration studies to improve those models.

4.5 Energy Storage Technology Assessment

Investigate the state of non-pumped storage energy storage technologies that can be utilized to integrate variable renewables (such as batteries, flywheels, etc.).

Medium-Term Supporting Activities:

4.6 Outreach and Collaboration

Work with PMAs and stakeholders to utilize the lessons learned from Supporting Activity studies (Supporting Activities 4.1 – 4.5) to determine how Reclamation's hydropower fleet can support the integration of variable renewable resources, while continuing to operate within authorized purposes.

5.0 Increase Benefits of Renewable Energy through Technological Innovation

Reclamation will work with other Federal agencies and technology developers to support research and innovation that allow for additional renewable resources to be brought online.

Ongoing Supporting Activities:

5.1 Collaborate and Coordinate on Research Activities with DOE and USACE under the Hydropower MOU

Reclamation will continue to work with its MOU partners on sharing information on research and d**e**velopment activities being conducted by each agency, and will identify opportunities to collaborate on such efforts. An example of a recent success of this collaboration is the Funding Opportunity Announcement that was

implemented by the Department and DOE to demonstrate renewable small hydropower technologies.[4]

5.2 Science and Technology Research Funding

The Science and Technology (S&T) Program funds research proposals that further Reclamation's Mission. Renewable energy has been identified as a high priority for S&T funding, and Reclamation will continue to identify and fund promising research activities that improve the reliability, efficiency, and operations and maintenance of Reclamation's hydropower portfolio, and promote the development and integration of renewable resources.

Short-Term Supporting Activities:

5.3 State of Technology Studies

Reclamation will conduct studies on the state of new renewable technologies, such as hydrokinetics, to inform investment decisions on the viability of integrating these resources into Reclamation projects. Reclamation will work closely with existing customers and PMAs to ensure that any investment decisions on these technologies are cost-effective and make sound business sense.

Medium-Term Supporting Activities:

5.4 Renewable Technology Demonstration Projects

Reclamation will actively pursue opportunities for demonstration projects that can increase renewable generation. These opportunities may be identified in State of Technology Studies (Supporting Activity 5.3). Reclamation will work with other Federal agencies, existing customers, and technology developers to identify and implement these and other renewable energy research opportunities. Potential examples of demonstration projects could include:

5.4.1 New Low Head Hydropower Technologies

These technologies could be tested and demonstrated at Reclamation sites to determine their technical and economic viability.

5.4.2 New Hydrokinetic Technologies

These technologies could be tested and demonstrated to determine their technical and economic viability and to determine the effect of these technologies on complex canal systems.

5.4.3 Superconductors

Superconductors could be demonstrated at a Reclamation hydropower facility. Superconductors may have the potential to increase output from existing hydropower plants by 15 percent or more.

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[4] Details on the projects funded under the Department/DOE funding opportunity announcement are available at http://www.doi.gov/news/pressreleases/Departments-of-Energy-and-Interior-Award-Nearly-17-Million-for-Advanced-Hydropower-Technologies.cfm.

5.4.4 Adjustable Speed Pumped Storage

Currently there are no adjustable speed pumped storage systems in the United States. Adjustable speed can greatly increase the flexibility of these resources. Reclamation will work with existing customers and other government and non-governmental entities to identify where these research opportunities exist.

5.4.5 Demonstration of Integrated Wind/Solar/Hydro/Storage System

Energy storage technologies could be utilized in conjunction with variable N-HRE projects to provide dispatchable power to remote Reclamation projects.

5.5 Innovative Systems Research Focusing on Energy Efficiency and Renewable Generation Installations for Reclamation Activities

Reclamation will actively pursue research opportunities to identify technologies or systems improvements that can reduce energy usage, increase efficiencies, and/or integrate small-scale renewable technologies into existing Reclamation project operations. Research opportunities may be identified in State of Technology Studies (Supporting Activity 5.3). Reclamation will work with existing customers and other government and non-governmental entities to identify where these research opportunities exist.

5.6 Systems Level Optimization

Reclamation will work with other MOU Agencies to begin investigating and expanding our optimization efforts to include hydrologic forecasting and multi-plant systems-level optimization. Reclamation will work with the PMAs to determine if these systems are improvements upon existing capabilities and are ready for deployment.

5.7 Increase Environmental Performance

Working with Tribes, the environmental community, the owners of non-Federal hydropower facilities, Federal and state agencies, and other stakeholders, Reclamation will actively pursue opportunities that preserve or improve ecosystem function, our natural and cultural heritage, and recreational opportunities while increasing or maintaining existing generation capabilities. For example, enhanced environmentally friendly performance could include demonstrating technology advances in equipment such as fish-friendly turbines, or testing and implementing water-use optimization tools that can enhance environmental objectives while optimizing hydropower production.

6.0 Improve Management Efficiencies Related to the Implementation of Renewable Energy and Energy Savings Projects

Reclamation will identify and put into practice opportunities to improve organizational efficiencies when implementing renewable energy and energy

savings projects. Reclamation will work with other Federal agencies to identify best practices that can be utilized within Reclamation's organization. These opportunities include policy revisions and development, streamlined contracting mechanisms, information sharing, data management, and a variety of other program management activities.

Ongoing Supporting Activities:

6.1 Support the activities identified under the framework of the Hydropower MOU

Reclamation will continue to collaborate and work with DOE and USACE to align priorities and objectives related to sustainable hydropower activities.

6.2 Environmental Management System

All Regions in Reclamation have established and continue to implement an EMS that addresses the aspects specific to each region's operations and activities that have potential environmental impacts. The EMS addresses commonly recognized environmental aspects such as resource consumption, energy savings, and conservation. When programs and activities addressing the environmental aspects of an organization are integrated into an EMS, managers can more easily assess, prioritize, monitor, and assign responsibility for its environmental issues.

Short-Term Supporting Activities:

6.3 Improve Contracting Methods to Increase Efficiencies in the Implementation of Energy Savings Measures and Renewable Energy Development

Reclamation will work with other Federal agencies to identify best practices that can be used to further Reclamation's Renewable Energy Strategic Direction goals.

6.4 Improve the Quality and Availability of Hydropower Operations Data

Data utilized in variable generation integration models have not been easily accessible at the required timescales. Reclamation will work with the PMAs and other Federal agencies to design data collection systems that capture the appropriate level of hydropower operational data to further these analyses.

6.5 Increase Regional Involvement in Verifying and Tracking Reclamation's Energy and Water Use and Costs and Conservation Measure Implementations

Reclamation has designed an energy and water use and cost reporting database for capturing monthly energy (all categories) and water use and cost for verifiably and consistently reporting energy, water, and GHG emission in the Annual Sustainability and Greenhouse Gas Data Report. Regional directors and the Reclamation Senior Sustainability Officer certify the data, which is the basis of

the OMB Sustainability and Energy Scorecard, and evaluate Reclamation's success in meeting targets set in the Department Strategic Sustainability Performance Plan.

Implementation

As noted in Appendix A, the planning, management, and implementation of the activities described above will be distributed to a number of Reclamation offices (as defined in the responsibility matrix noted in Appendix B). These offices will function in a lead, support, or implementation role depending upon the activity. For each activity where an office is designated the lead, that office will coordinate with the offices responsible for support and implementation, and develop an implementation plan for their work in support of Reclamation's Sustainable Energy Strategy.

The Power Resource Office (PRO) will serve as the lead office to track and report on the agency's activities in support of Reclamation's Sustainable Energy Strategy. The PRO will gather data from these offices to produce an annual report on the status of Reclamation's Sustainable Energy Strategy.

Appendix A – Key Reclamation Offices

Power Resources Office

The PRO serves as the lead for Reclamation renewable energy activities. To achieve these strategic objectives, the PRO will develop policy, provide guidance, and collaborate with Federal agencies, non-Federal groups, utilities, and Reclamation customers. The planning, management, and implementation of key tactics is to be distributed to a variety of Reclamation offices.

Research and Development Office

The S&T Program is the primary research and development arm of Reclamation. In collaboration with an array of external partners, including the NREL, the DOE National Labs, Electric Power Research Institute, Center for Energy Advancement and Technological Innovation, academia, and other research based organizations, the S&T Program will evaluate potential technical advances in renewable generation and integration as well as opportunities for energy savings.

Policy and Administration

Policy and Administration (Policy) will lead the strategic efforts on energy and water savings and GHG emissions reductions at Reclamation buildings, and will provide guidance on non-hydro renewable development on Reclamation lands.

Energy activities within the purview of Policy are delegated to the appropriate group/programs as follows:

Maintenance Services Division (MSD)

The MSD coordinates Reclamation facility operations and maintenance, and tracking and reporting of energy, water, and GHG emissions at facilities. In this role, the MSD works with the regions on energy and sustainability evaluations, conducting retrofits, monitoring energy and water use, and allowing for efficiency gains and energy savings at Reclamation facilities.

Land Resources Division (LRD)

The LRD manages the public use of Reclamation land. Accordingly, the LRD will provide guidance on non-hydro renewable development on Reclamation lands.

Program Management Office (PMO)

The Reclamation WaterSMART Program managed under the PMO promotes water conservation and energy efficiency through the administration of grants, scientific research, and technical assistance.

Technical Services Center (TSC)

The TSC is Reclamation's engineering, science, research, and support center for projects related to water and energy resources. The TSC provides expertise to Reclamation's programs, regions, and area offices and will be an integral support arm for the implementation of the Sustainable Energy Strategic Plan.

Management Services Office (MSO)

The MSO provides leadership to Reclamation's administrative programs, business analysis, financial management, supply and property management, and acquisition management.

Regional, Area, and Facility Offices

Reclamation regional, area and facility offices will be responsible for the implementation of many of the activities identified in Reclamation's Renewable Energy Strategy (see Responsibility Matrix below) and for the operation and maintenance of Reclamation's renewable energy infrastructure. Acting as Reclamation's front-line, regional and area offices will work directly with Reclamation customers and renewable energy producers.

Appendix B – Implementation Matrix

Strategic Objective		Supporting Activity		Responsibility Lead(L)/Co-Lead(CL)/Support(S)/Implement(I)					
				PRO	S&T	Policy	MSO	TSC	Region/Area/Facility Offices
1	Increase Renewable Generation from Reclamation Projects	1.1	Operate and Maintain Existing Reclamation Hydropower Resources	S	S		S	S	L/I
		1.2	Generator Uprates	S	-	-	S	S	L/I
		1.3	Turbine Replacements	S	-	-	S	S	L/I
		1.4	Unit Dispatch Optimization	L	S	-		S	S/I
		1.5	Develop Technical Guidance and Training on N-HRE Development	S	L	S		S	I
		1.6	Facility Scale Federal Development of Renewable Energy Resources to Serve Reclamation Load	S	S	S	S	S	L/I
2	Facilitate Non-Federal Development of Renewable Energy Projects	2.1	Update and Implement Policies and Guidance for Non-Federal Hydropower Development	L		S		S	I
		2.2	WaterSMART Water and Energy Efficiency Grants	S		L/I			S/I
		2.3	Create Resource Assessments	L/I	S			S	-
		2.4	Basin Scale Opportunity Assessments	L	S			S	S/I
		2.5	Outreach	L/I					S/I
		2.6	Create Policies for Non-Federal N-HRE Projects	S	S	L			I
3	Increase Energy Savings and Conservation at Reclamation Projects	3.1	Energy and Sustainability Audits (Buildings)			L/I		S	S

Strategic Objective	Supporting Activity	Responsibility Lead(L)/Co-Lead(CL)/Support(S)/Implement(I)					
		PRO	S&T	Policy	MSO	TSC	Region/Area/Facility Offices
	3.2 WaterSMART Water and Energy Efficiency Grants	S		L/I			S/I
	3.3 Pumping Demand Response Study	CL	CL	S	S	S	S/I
	3.4 Reclamation Sub-metering at Buildings and Facilities			L	S	S	S/I
	3.5 Reclamation Metering at Buildings and Structures on Station Power	CL		CL	S	S	S/I
	3.6 Pumping Energy Efficiency Improvement Program	CL	CL	S		S	I
	3.7 Energy and Sustainability Audits (Power Plants and Pumping Plants)	L		S	S	S	S/I
4 Support Integration of Variable Non-Dispatchable Renewable Resources into the U.S. Electrical Grid	4.1 Pumped-Storage Hydroelectricity Investigation	L/I	S		S	S	S
	4.2 Ancillary Services Costing Study	CL/I	CL/I		S	S	S
	4.3 Quantifying Reclamation's Existing Flexibility to Integrate Variable Renewable Resources	CL/I	CL/I		S	S	S
	4.4 Improve Hydropower Models Used in Renewable Integration Studies	CL/I	CL/I		S	S	S
	4.5 Energy Storage Technology Study	CL/I	CL/I		S	S	S
	4.6 Outreach and Collaboration	L/I	S				S/I

Strategic Objective		Supporting Activity		Responsibility Lead(L)/Co-Lead(CL)/Support(S)/Implement(I)					
				PRO	S&T	Policy	MSO	TSC	Region/Area/Facility Offices
5	Increase Benefits of Renewable Energy through Technological Innovation	5.1	Collaborate and Coordinate on Research Activities with DOE and Corps of Engineers under the Hydropower MOU	S	L			S	S
		5.2	Science and Technology Research Funding	S	L /I			S	S/I
		5.3	State of Technology Studies	CL	CL			S	S/I
		5.4	Renewable Technology Demonstration Projects	CL	CL		S	S	S/I
		5.5	Innovative Systems Research Focusing on Energy Efficiency and Renewable Generation Installations for Reclamation Activities	S	L		S	S	
		5.6	Systems Level Optimization	CL	CL		S	S	S/I
		5.7	Increase Environmental Performance	S	L	S	S	S	S/I
6	Improve Management Efficiencies Related to the Implementation of Renewable Energy and Energy Savings Projects	6.1	Support activities identified under the framework of the Hydropower MOU	L	S	S		S	S/I
		6.2	Environmental Management System (EMS)			L			S/I
		6.3	Improve Contracting Methods to Increase Efficiencies in the Implementation of Energy Savings Measures and Renewable Energy	S	S	S	L	S	S/I

Strategic Objective	Supporting Activity		Responsibility Lead(L)/Co-Lead(CL)/Support(S)/Implement(I)					
			PRO	S&T	Policy	MSO	TSC	Region/Area/Facility Offices
		Development						
	6.4	Improve the Quality and Availability of Hydropower Operations Data	L	S	S	S	S	S/I
	6.5	Increase Regional Involvement in Verifying and Tracking Reclamation's Energy and Water Use and Costs and Conservation Measure Implementations	S		L			I

Appendix C – Non-Hydroelectric Renewable Energy

Executive Summary

This appendix is intended to supplement Reclamation's Renewable Energy Strategic Direction document, providing further examples, considerations, and guidance on how non-hydroelectric renewable energy can fit into Reclamation's renewable energy portfolio.

N-HRE plays a role in Reclamation's renewable energy portfolio's future to meet its mission, departmental objectives, and identified customer needs. Reclamation has maintained a partnership with NREL to better understand the market conditions and considerations for renewable development within Reclamation's footprint. Development must consider a range of factors including available budget, local renewable resources, permitted land uses and environmental constraints, existing loads and market prices, and viable business models.

N-HRE Development

Generally, based on resource availability and energy markets in Reclamation's service area, solar and wind development have the greatest potential economic and mission benefits for Reclamation and out stakeholders.

Both facility-scale and utility-scale renewable energy can help meet the Department's and Reclamation's strategic goals including:

1. Reduction in GHG emissions
2. Reduced losses from electricity transmission
3. Facilitate non-Federal development of renewable energy projects
4. Increase energy savings and conservation at Reclamation projects
5. Improve management efficiencies related to the implementation of renewable energy and energy savings projects

At Reclamation's hydroelectric plants, the renewable energy of falling water is converted into enormous quantities of electricity. N-HRE is produced using other natural resources such as sunlight, wind, and geothermal heat. Solar energy is used directly for heating and lighting homes and other buildings and is also converted through several technologies into electricity. Wind energy is converted into electricity by turning large wind turbine

generators. Finally, geothermal heat is used directly to heat water and buildings, or to generate steam for electric power production.

Availability of N-HRE Resources in the Reclamation West

Solar and wind are the most common forms of N-HRE energy in Reclamation's service area. The Reclamation West has some of greatest concentrations of solar and wind resources in the nation. Solar is most viable in the southwestern portion of the U.S., such as in Reclamation's Mid-Pacific and Lower Colorado Regions. Wind is most prevalent on Reclamation lands in the Great Plains Region, especially in Wyoming and Montana. The potential is limited for geothermal energy on Reclamation lands.

Partnership with the NREL

Reclamation has an inter-agency agreement with NREL to explore the use of N-HRE resources to meet the Department of Interior objectives and Reclamation's mission. Reclamation has collaborated with NREL on west-wide reconnaissance analysis of solar and wind potential and on detailed assessments of development on specific Reclamation lands. These joint investigations have helped Reclamation better understand the renewable energy market, the factors which determine viability of any specific development, and the most practical business models for development for different-sized installations. The results of these investigations can be found at: http://www.nrel.gov/docs/fy12osti/53697.pdf

Reclamation's Use of N-HRE

Renewables can be used to meet a wide array of Reclamation needs and objectives, both on a *facility scale* – where renewable energy is used to supply some or all of the power demand for a Reclamation building or structures – and on a *utility scale* – where renewable generation is massed in a complex large enough to produce significant amounts of electricity for the power grid.

Meeting Departmental Objectives

Both facility-scale and utility-scale renewables can help meet Departmental goals for GHG reduction and increased use of renewable energy. Installing renewable generation on site decreases Reclamation's production of GHG and also reduces energy losses associated with electricity transmission.

Facility-scale Renewable Energy

Those office buildings, pumping plants, and water treatment facilities which operate on commercial power could potentially use renewable energy to meet all or a portion of the facility load. In general, solar energy is more practical for meeting facility-scale needs than is wind generation. Solar can be placed at different locations at a facility such as a roof or parking lot.

Reclamation's History

Facility-scale solar generation was installed during the early 2000's at several Mid-Pacific Region office complexes. Recovery Act funding was also used to install solar generation in the Upper Colorado and Lower Colorado Regions.

Factors Controlling Feasibility

Facility-scale solar is most feasible where:

- Energy prices are high: >$0.09-$0.10/kW hour
- Amount of sunlight is high: >275-300 days per year[1]
- Incentives are available to subsidize the cost of development, such as the tax credits, local utility incentives, and renewable energy portfolio usage targets found in California, Arizona, Colorado, and New Mexico.
- Sufficient space is available on rooftops, parking lots, or adjacent open land to site a solar installation capable of meeting a significant fraction of facility demand.

A combination of these factors makes the economics most attractive for investment in a facility-scale installation. See http://www.nrel.gov/docs/fy12osti/53697.pdf for example analyses of return on investment for specific solar installations at Reclamation facilities. Additional site analyses are proceeding and will be included in the above report upon completion.

Practical Business Model

Most facility-scale renewables installations are too small to interest private developers[2] (rule of thumb, under 1 MW), so the more practical business model is for Reclamation to fund the installation and directly benefit from reduced energy costs and any associated credits. In some locations, local incentives offered by the utility exist that reduce the cost of installing a solar energy project.

Utility-scale Renewable Energy

Utility-scale development is generally defined as that generating 5-10 MW or larger (enough to supply 5,000-10,000 homes) of wholesale energy. This is purchased and distributed by a utility such as Pacific Gas and Electric (PG&E) or Xcel Energy.

History

Reclamation was an early experimenter in utility-scale N-HRE, including the testing of very large wind turbines at Medicine Bow, Wyoming, in the late 1970s.

Matching N-HRE with Reclamation's Mission

Utility-scale solar or wind development helps Reclamation meet Federal objectives and has the potential to assist Reclamation in meeting its mission to deliver water and power and address customer needs. The following examples illustrate ways that N-HRE can support Reclamation's mission:

- Implementing on-site renewable energy generation to meet large Reclamation loads, such as for pumping plants or water treatment plants when old power contracts expire and costs increase.

[1] http://www.nrel.gov/gis/images/map_pv_national_lo-res.jpg

[2] As a rule of thumb, flat space of approximately 10,000 square feet are required to obtain the interest of a private developer, or >100 kW of capacity. Again, this is very dependent on the location, local incentives, and market electricity rates.

- Reducing power transmission and distribution losses, or avoiding transmission constrained areas.
- Reducing transmission costs or otherwise optimizing the use of the electric grid by making energy exchanges between Reclamation's Power Marketing Agency and other utilities.
- Improved reliability by co-locating solar near low-load critical infrastructure, such as control centers, to provide back-up power in the event of grid emergencies and widespread power outages.
- Mitigating price shocks to customer groups, such as the examples stated below.

Navajo Generating Station (NGS), Arizona. Through the Colorado River Basin Project Act of 1968 (Public Law 90-537), Congress authorized the Federal government's participation in NGS in conjunction with creation of the Central Arizona Project (CAP), a 336-mile water distribution system built to deliver more than 1.5 million acre-feet of Colorado River water annually from Lake Havasu in western Arizona to agricultural users, Indian tribes, and millions of municipal water users in Maricopa, Pinal, and Pima counties, Arizona.

The Environmental Protection Agency issued a draft Best Available Retrofit Technology ruling pursuant to the Regional Haze Rule, which focuses on improving visibility in sensitive (Class 1) areas, including national parks and wilderness areas. There are 11 national parks and wilderness areas within 300 km of NGS, including the Grand Canyon.

Under these constraints, renewable energy options to power the CAP pumping could become an attractive alternative. (http://www.nrel.gov/extranet/ngs/)

Central Valley Project, California. A PG&E contract, which provides for transmission service to deliver pumping power to San Luis and Dos Amigos projects at $53,000/yr., expires in 2016. After expiration of the contract, customers must pay the PG&E tariff which raises the cost of delivering power to $10 million/yr. The Western Area Power Administration is building a line to carry 80 percent of this load, however, it will take 10 years to build. Solar on Reclamation lands could reduce the load needed to be carried over the transmission system and provide power at reduced rates if it were installed on Reclamation lands close to the load.

Klamath Basin Project, California or Oregon. In 2006, a power contract expired in the Klamath Basin area, resulting in sharp adjustment of project electricity rates with prevailing retail rates. This normalization occurred over a 3-year period for California irrigators and is occurring over a 7-year period for Oregon irrigators. This price adjustment to energy rates – a 1000 percent to 1500 percent increase – could cripple an agricultural industry operating on narrow margins. Utility scale N-HRE is being evaluated as one option to help replace the low-cost energy lost as a result of the expiration of this contract.

These are just three recent examples where renewable energy might provide a solution to complex issues facing Reclamation and its customers. NREL is also working with some of these projects to more specifically look at the benefits that N-HRE can provide.

Factors Controlling Feasibility

Utility-scale solar or wind generation is most feasible when:

- Energy prices are high: >$0.09-$0.10/kWh
- Amounts of sun and wind resources are great: >275-300 days per year and >300-350 W/m^2 respectively.[3]
- Incentives are available to subsidize the cost of development, such as state and Federal tax credits, local utility incentives, and renewable energy portfolio usage targets.
- Large amounts of land are available.
- Providing power to existing Reclamation loads encounters physical or economic transmission constraints.
- Transmission capacity is available nearby to deliver renewable energy to the grid.
- Potential exists to exchange energy to reduce transmission costs.[4]
- Located in the states with strong incentives such as California, Arizona, Colorado, and New Mexico.
- The states with the strongest wind resources are Wyoming and Montana.

However, utility-scale renewable energy development features evolving technologies in a market with changing regulations and incentives, so each situation must be evaluated based on local market conditions, balancing authority requirements, environmental considerations, project related goals, and project specific costs.

Practical Business Model

Several business models are available to Reclamation to develop utility-scale solar. Based on the experience of other Federal agencies, the more practical and feasible approach is to facilitate private development. Facilitating utility-scale development by private parties allows Reclamation to minimize its costs and resource-use related to site development, contracts, environmental studies, feasibility studies, reliability studies, interconnection agreements, power purchase agreements, and other project related needs. These costs are typically covered by the private developer, who has greater access to incentive programs than a Federal agency.

A wide range of agreements, contracts, and procedures have already been developed by the Bureau of Land Management (BLM) and can be found at its Web site under the section entitled BLM Solar and Renewable Energy Policies: http://solareis.anl.gov/documents/index.cfm.

[3] http://www.nrel.gov/gis/images/80m_wind/awstwspd80onoffbigC3-3dpi600.jpg.

[4] Exchanges are where energy is due to be delivered at one substation point but instead the energy is delivered or exchanged at another substation point that is closer to the loads being served, therefore saving on transmission costs.

Use of Reclamation Lands

Utility-scale development typically occurs through land leases to private investors and revenue is based on lease rates, capacity of the project, and the energy produced. Reclamation has a process for considering and permitting uses on withdrawn lands, ensuring that such uses are with authorized project purposes, existing resource management plans, public safety and environmental objectives, along with other criteria (http://www.usbr.gov/lands/429.pdf).

For N-HRE development, structures are installed that will remain in place for the term of the lease, typically 20 years. The presence of the structures may limit or exclude other activities on those lands. On the other hand, lease payments for these developments can provide a source of revenue for project repayment or for supporting other land use activities, such as recreation.

Local Market Conditions

The renewable energy market has developed rapidly over the last several years due primarily to state adoption of Renewable Portfolio Standards (RPSs) and associated incentives for investment. For example, in 2000, Bonneville Power Administration had zero MW of renewable energy in its balancing authority, and in 2012, it has nearly 5000 MW of wind energy available. Each region has a different and changing landscape for renewables development, including customer concerns, customer needs, transmission requirements, reliability constraints, demand for renewable energy, and integration considerations.

For example, the local cost of energy drives renewable energy development, and in many localities, low cost natural gas, has reduced the cost of electricity. Because of this, many developers have cancelled or postponed plans for renewable energy projects. However, in some markets energy prices and incentives are high enough to develop utility-scale renewable energy, such as those in California and Arizona.

In addition, the state RPSs requires the use of renewables as a fraction of total state energy demand. The recent economic recession has significantly reduced energy consumption in some areas, bringing states which formerly were well below their RPS target now being close to attainment. This has reduced some of the incentives for further development of renewable resources.

These uncertainties reinforce that Reclamation's investment in N-HRE should be focused on supporting long-term mission requirements in a cost-effective way, rather than simply taking advantage of local incentives.

Customer Concerns

Energy markets have gone through dramatic changes in the last decade, becoming more dynamic and complex. The national push to develop and incorporate renewable energy into the grid has further complicated grid management. These changes have brought new opportunities but also new concerns to Reclamation's power customers as utilities and regulatory agencies try to balance the interest of renewable energy developers with those of traditional customers and traditional energy providers, including Reclamation. While

the impacts of renewable energy vary across regions and balancing areas, customer concerns about increased renewable penetration include:

- Diversion of hydropower generation to increase support for renewable integration.
- Increased pressure to sell Reclamation power at market rates, therefore making it more expensive to support agriculture.
- Reduced available generation capacity for preference customers.
- Increase in energy prices due to increased energy portfolio costs and costs of grid management.
- Increase in operation and maintenance costs for Reclamation's hydropower assets.
- Less system flexibility to provide excess power to customers and generate extra revenue which results in decreased rates.

Recognizing this environment allows Reclamation to address the complex issue of renewable energy integration into the grid while continuing as an active participant and advocate for its customers.