IDAHO STRATEGIC ENERGY ALLIANCE

RELIABILITY & RESILIENCY TASK FORCE REPORT

2023 ISEA Reliability and Resiliency Report

Executive Summary

The health of Idaho's economy depends on its ability to access reliable energy. While the state's energy industry has a strong track record of maintaining reliable service, increasing and emerging threats require partners in the private and public sectors to work continually to ensure Idaho is making the appropriate investments in reliability and resiliency projects. Minimizing the effects of energy disruptions requires building system resilience against major risks, fostering local talent, establishing mutual aid partnerships, and strategic investing.

Idaho has experienced rapid population growth within the past few years. Idaho has been identified as the second-fastest growing state within the past decade.[1] Not only are more individuals moving to the state, but tourism and the local industrial sector in Idaho has grown as well. As the number of people and businesses in Idaho increases, so does demand for affordable, reliable, and accessible energy.

Restoring energy access after a disruptive event is a complex task, and a speedy restoration requires significant logistical expertise, including skilled workers and specialized equipment. Major risks to the state's energy system include natural disasters like storms, wildfires, and droughts; infrastructure failures due to compromised or aging equipment, accidents or human error, cyberattacks, and physical attacks. Certainty in energy provision and access requires the consistent ability to meet energy demand despite these risks and supply energy to Idahoans when and where they need it.

The Idaho Strategic Energy Alliance (ISEA) created the Reliability and Resiliency Task Force and charged this group with preparing a report that reviews the opportunities and barriers to enhance energy reliability and resiliency in Idaho. This report 1.) discusses the importance of energy reliability and resiliency for the State's economy and overviews Idaho's energy risk profile, energy emergency planning documents, and legal authorities, 2.) reviews current state, local, federal, and private sector efforts to enhance reliability and resilience, 3.) considers opportunities and challenges to further improve reliability and resilience in Idaho, including: funding, planning, investment in infrastructure modernization, vegetation management, cybersecurity, supply chain constraints, and permitting and siting constraints, and 4.) discusses the importance of cost-effective investment in the state's energy infrastructure. The report concludes with acknowledgement of the following critical actions:

1. We must make strategic investments in hardening and modernizing our grid;
2. We must integrate our planning efforts between public, private, and community stakeholders to ensure we are mobilizing resources and planning instruments in a productive manner; and
3. We must improve state, local, and federal policies that support thoughtful infrastructure outcomes.

[1] America Counts Staff. 2021. "Idaho Was the Second-Fastest Growing State Last Decade." United States Census Bureau. https://www.census.gov/library/stories/state-by-state/idaho-population-change-between-census-decade.html.

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Acronyms List

ACES	Assessment of Capabilities in Energy Security
ADMS	Advanced Distribution Management System
AI	Artificial Intelligence
AMI	Advanced Metering Infrastructure
BIL	Bipartisan Infrastructure Law, referring to the 2021 Infrastructure Investment and Jobs Act
BLM	Bureau of Land Management
BPA	Bonneville Power Administration
BRIC	Building Resilient Infrastructure and Communities
CESER	U.S. Department of Energy Office of Cybersecurity, Energy Security, and Emergency Response
CISA	U.S. Department of Homeland Security Office of Cybersecurity and Infrastructure Security Agency
DEI	Diversity, Equity, and Inclusion
DER	Distributed energy resource
EERE	U.S. Department of Energy Office of Energy Efficiency and Renewable Energy
EIS	Environmental Impact Statement
EMAP	Emergency Management Accreditation Program
EPA	Environmental Protection Agency
ERO	Electric Reliability Organization
FEMA	Federal Emergency Management Agency
FERC	Federal Energy Regulatory Commission
FLISR	Fault Location, Isolation, and Service Restoration
FMCSA	Federal Motor Carrier Safety Administration
FRE	Fall River Electric
GDP	Gross Domestic Product
GET	Grid enhancing technology
ICT	Information and communication technologies
IDEOP	Idaho Emergency Operations Plan
IFP	Idaho Falls Power
IIJA	2021 Infrastructure Investment and Jobs Act
INL	Idaho National Laboratory
IOEM	Idaho Office of Emergency Management
IPUC	Idaho Public Utilities Commission
IRA	2022 Inflation Reduction Act
IRC	Idaho Integrated Response Center
IRP	Integrated Resource Plan
ISEA	Idaho Strategic Energy Alliance
kWhs	Kilowatt Hours
kV	Kilovolt
LNG	Liquid Natural Gas
LOLE	Loss of Load Expectation
ML	Machine Learning

MW	Megawatt
NASEO	National Association of Energy Officials
NEMA	National Emergency Management Association
NEPA	National Environmental Protection Act
NERC	North American Reliability Corporation
NOAA	National Oceanic and Atmospheric Association
NREL	National Renewable Energy Laboratory
OEMR	Idaho Office of Energy and Mineral Resources
PHMSA	Pipeline and Hazardous Materials Safety Administration
PNNL	Pacific Northwest National Laboratory
PV	Photovoltaic
RMP	Rocky Mountain Power, a subsidiary of PacifiCorp
SCADA	Supervisory control and data acquisition
SERT	State Emergency Response Team
SESP	State Energy Security Plan
SWIP	Southwest Intertie Project
UEC	United Electric Cooperative
USDA	U.S. Department of Agriculture
U.S. DHS	U.S. Department of Homeland Security
U.S. DOE	U.S. Department of Energy
U.S. EIA	U.S. Energy information Administration
WECC	Western Electricity Coordinating Council
WPSRC	Western Petroleum Shortage Regional Collaborative
WRAP	Western Resource Adequacy Program

Idaho Strategic Energy Alliance (ISEA)

In 2009, Idaho Governor Butch Otter established the Idaho Strategic Energy Alliance to enable the development of a sound energy portfolio that emphasizes the importance of an affordable, reliable, and secure energy supply. In October 2020, Governor Brad Little, through Executive Order 2020-18, continued the group's operation.

The ISEA is led by a Board of Directors that are selected by and serve on behalf of the Governor. This group and its task forces create opportunities for a wide variety of in-state energy experts to assist with the development of achievable and effective recommendations for improving Idaho's energy future.

The ISEA Board of Directors identified the topic of reliability and resiliency as an area where experts and policymakers can further develop their understanding of consumer and industry trends. As our power and transportation systems are becoming increasingly integrated and new technologies are being deployed at a rapid pace, it is important to understand how Idaho will be impacted. Consumers, industry actors, and policymakers have been increasingly interested in enhancing energy security through grid-hardening measures to ensure reliable and resilient power is accessible to Idahoans.

Acknowledgments

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Chapter 1: Energy Reliability and Resiliency

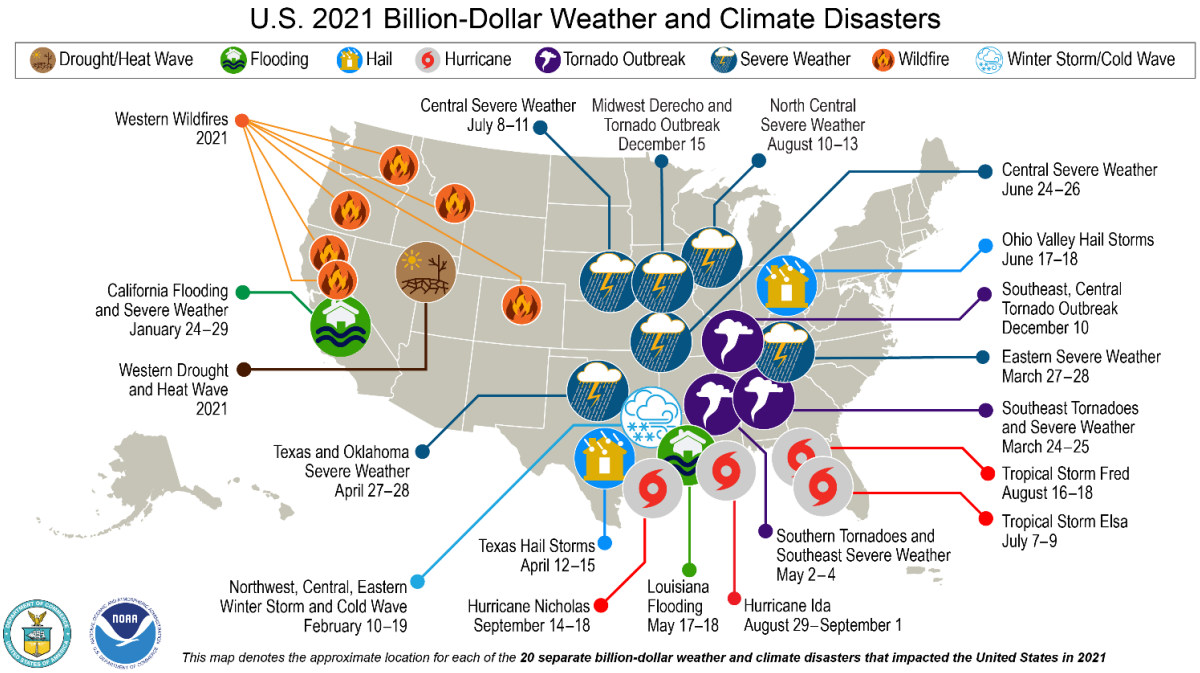

Figure 1: In 2021 the U.S. experienced 20 separate billion-dollar weather and climate disasters. Image courtesy of the National Oceanic and Atmospheric Administration.

What is Energy Reliability and Resiliency?

Keeping the lights on is becoming an increasingly complex task in the face of increasing weather and climate related disasters (Figure 1) and increasing penetration of variable generation and distributed energy resources on our electricity grid. Idaho consumes over 500 trillion BTUs or 160 billion kilowatt hours (kWhs) of energy per year.[2] Take a deeper dive and we quickly realize that we may take a lot of components of the energy sector for granted. Having access to affordable and predictable power is an imperative of modern civilization and human safety and a foundational element of our modern economy. Reliability and resiliency are two key aspects of our energy systems. Reliability is facilitated by a power grid that can stand up to fluctuations in weather and is durable when pitted against natural disasters, at a reasonable cost when set against alternatives. Resiliency is similarly facilitated, but further encompasses a system's ability to prepare, respond, and adapt rapidly to hazardous conditions so that interruptions of services can be prevented or limited in duration or frequency. Balancing these features, and many other considerations, requires thoughtful policy design and intentional strategic alignment across many diverse interests. In Idaho, stakeholders are working side by side to ensure the lights stay on now and long into the future.

Reliability: the ability of the Bulk-Power System to withstand sudden disturbances while avoiding uncontrolled cascading blackouts or damage to equipment.[3]

Resiliency: the ability to avoid, prepare for, minimize, adapt to, and recover from anticipated and unanticipated energy disruptions.[4]

1.1 How Does Energy Reliability and Resiliency Impact Idaho's Economy

Idaho's economy relies heavily on the energy sector for predictable power generation and distribution. Without a reliable and resilient power grid, Idaho's businesses, governments and nonprofits would face insurmountable hardships. Over two-thirds of Idaho's average annual electricity is produced from affordable, renewable hydropower.[5] Hydropower provides Idaho with many strategic advantages that enable the state to keep consumer costs down while maintaining amongst the best reliability in the country, despite relatively low population density and occasionally challenging geography. The affordable and sustainable power available in Idaho has led to significant investment throughout the state from major companies looking to relocate to places where energy costs are low and power is clean and reliable. Countless start-ups have enjoyed the benefits of affordable and reliable energy in Idaho, as have our incumbent industries. The state, local communities, and private and consumer-owned utilities have made significant investments in energy generation and infrastructure that will be resilient and reliable long into the future, however, more needs to be done as Idaho grows and evolves. Currently, Idaho imports a significant percentage of its energy portfolio.[6]

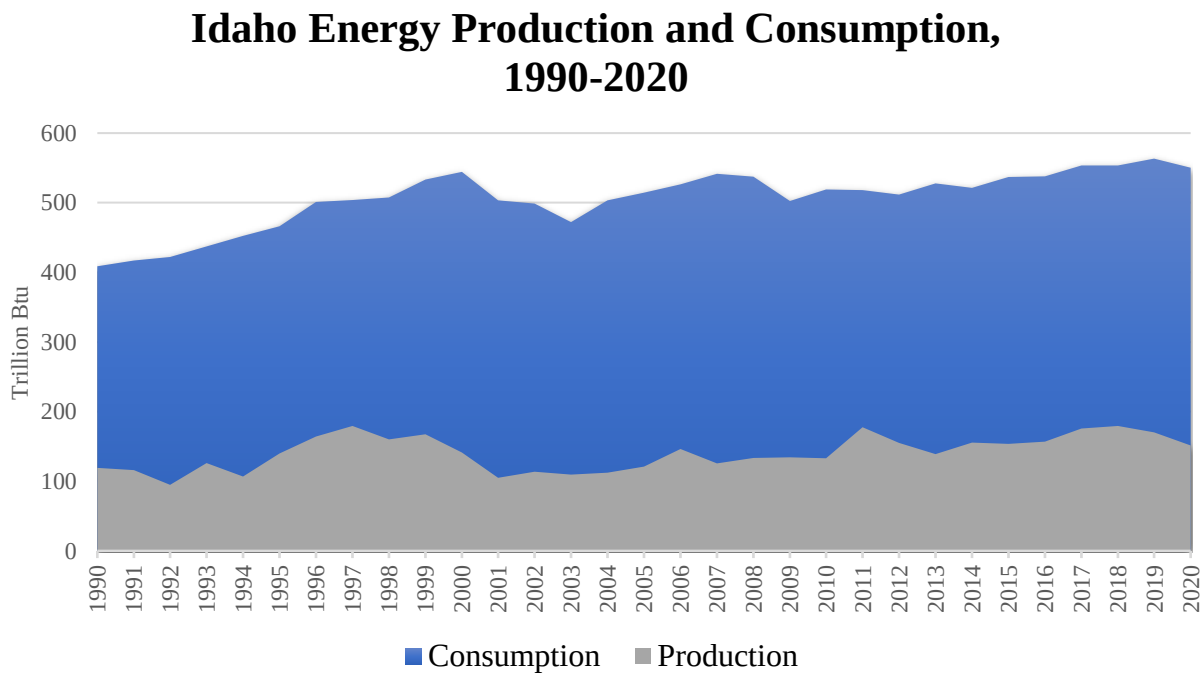

Figure 2: Idaho is an energy importer with energy production consistently less than consumption. Image courtesy of the Idaho Governor's Office of Energy and Mineral Resources (OEMR).

[2] U.S. Energy information Administration. "Idaho". https://www.eia.gov/state/?sid=ID
[3] 16 USC §824o(a)(4)
[4] 10 USC §101(e)(6)
[5] U.S. Energy information Administration. "Idaho". https://www.eia.gov/state/?sid=ID
[6] U.S. Energy Information Administration. "State Energy Data System." https://www.eia.gov/state/seds/seds-datacomplete.php?sid=ID#

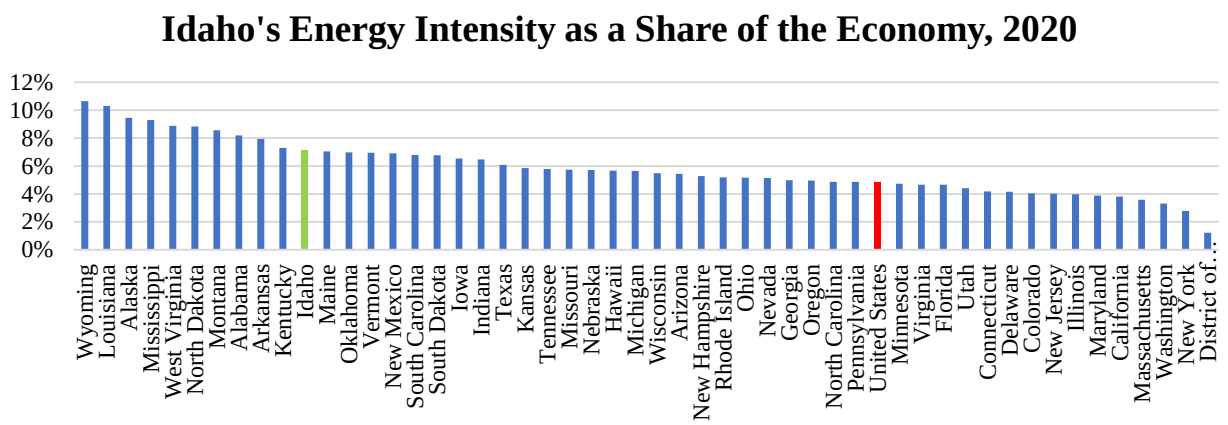

Figure 3: Idaho's energy intensity as a share of the economy. Image courtesy of OEMR. Note: Due to the rural nature of Idaho and the absence of a petroleum refinery in the State, Idahoans frequently spend more on transportation fuel than individuals who live in more densely populated regions of the country.

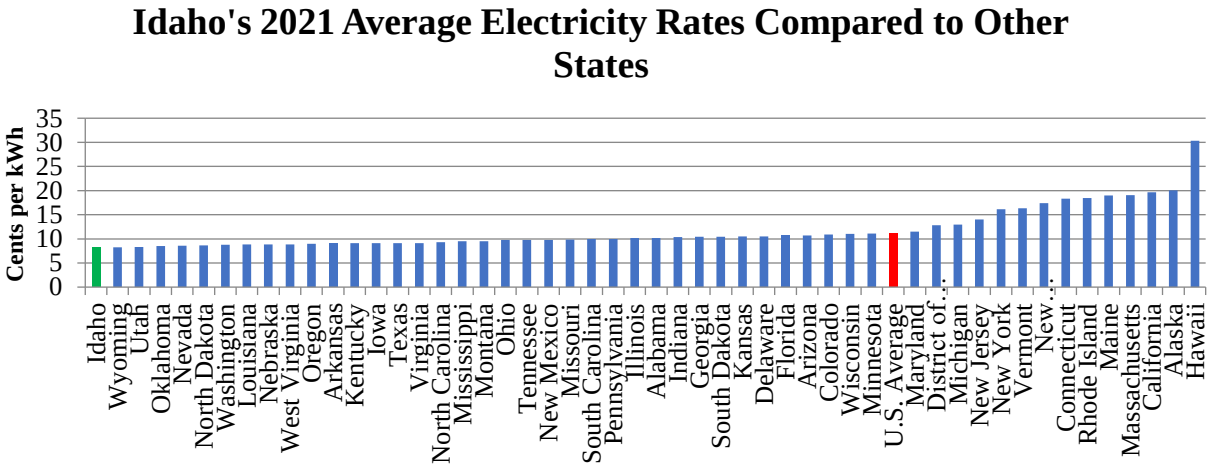

Figure 4: Idaho's 2021 average electricity rates compared to other states. Image courtesy of OEMR.

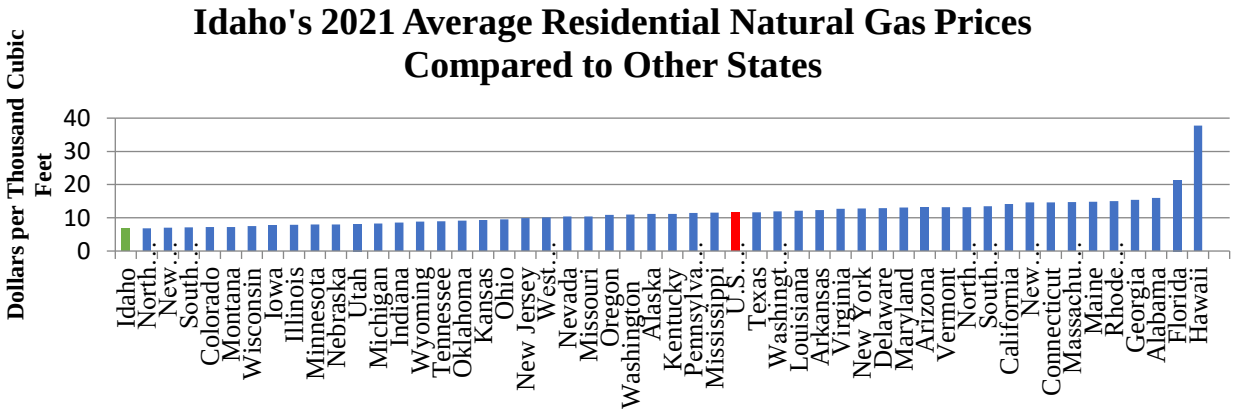

Figure 5: Idaho's 2021 average residential natural gas prices compared to other states. Image courtesy of OEMR.

Overall, Idaho produces 32% of the energy that it consumes and imports all petroleum products (Figure 2). To ensure energy access and availability, reliable transmission lines and pipelines between surrounding northwest states must be maintained, and in-state energy production should continue to be encouraged.

Electric power consumed in Idaho is produced both in and out of the state with transmission lines that are most densely clustered in the southern portion of the state. Over 70% of electricity consumed in Idaho comes from in-state sources like hydropower, wind, solar, and others.[7] The remaining electricity consumed in Idaho comes from neighboring states across the Western Interconnection and is generated from hydropower, wind, natural gas, coal, and other sources. The key components of Idaho's electric power system include power generation (for example, a dam, wind turbine, solar panel, or natural gas power plant), transmission lines, and transformers that convert the power transported to the appropriate voltage for transmission and later for distribution and consumption. Each component is critical for energy resilience and security.

Low electricity rates and natural gas prices have consistently attracted energy-intensive industries to Idaho, including mining, pulp and paper, agriculture, food processing, data centers, and computer chip manufacturing. Electric rates in Idaho fall below the United States average in all sectors by over 25%.[8] Idaho's average electricity rates and residential natural gas prices were the lowest among the fifty states in 2021 (Figure 4 and Figure 5). Idaho relies principally upon refineries in Utah and Montana for its supply of gasoline, diesel, and other refined petroleum products, which causes Idaho's prices for these products to be typically higher than the national average.[9] Overall, Idaho's energy expenditures equated to just over 7% of the State's Gross Domestic Product (GDP) in 2020, placing Idaho 11th for total energy costs compared to the rest of the states (Figure 3).[10]

1.2 Idaho Risk Profile

Expected threats or risks to Idaho's energy supply form the basis of all energy security, reliability, and resiliency activities across the state. According to the U.S. Department of Energy's (DOE) State of Idaho Energy Sector Risk Profile[11] (Idaho Risk Profile), past energy supply risks in Idaho have typically corresponded with weather-related outages or equipment- or human error-caused outages. Beyond historic threats, new risks to Idaho's energy supply are emerging, such as increased frequency of extreme weather events and cyberattacks. The Idaho Risk Profile specifies that the greatest natural disaster risks in Idaho are winter storms and extreme colds. Other natural hazards are wildfires, thunderstorms and lightning, and floods (Figure 6). Additionally, extreme weather events, such as wildfires, extreme heat, or extreme cold, in other parts of the Western

[7] U.S. Energy information Administration. "Idaho". https://www.eia.gov/state/?sid=ID
[8] Idaho Dept. of Commerce. "Idaho's Expanding Energy Economy". https://commerce.idaho.gov/content/uploads/2022/02/Idahos-Expanding-Energy-Economy.pdf
[9] AAA. "Gas Prices." https://gasprices.aaa.com/
[10] U.S. Energy Information Administration. "Total Energy Price and Expenditure Estimates (Total, per Capita, and per GDP), Ranked by State, 2020". https://www.eia.gov/state/seds/data.php?incfile=/state/seds/sep_sum/html/rank_pr.html&sid=US
[11] U.S. Department of Energy, "State of Idaho Energy Sector Risk Profile" [hereinafter Idaho Risk Profile], https://www.energy.gov/sites/prod/files/2016/09/f33/ID_Energy%20Sector%20Risk%20Profile.pdf.

Interconnection also create risks for Idaho by potentially limiting availability of imported electricity and natural gas.

The transmission and distribution of electricity, like energy supply, is also subject to diverse risks and hazards. Transmission and distribution line faults and overloads have caused the largest number of electric power outages in Idaho. The Idaho Risk Profile also evaluates risks to petroleum transportation and natural gas transmission, finding that the greatest risks to these systems are derailment, collision, or corrosion; and material and weld failures, respectively.[12]

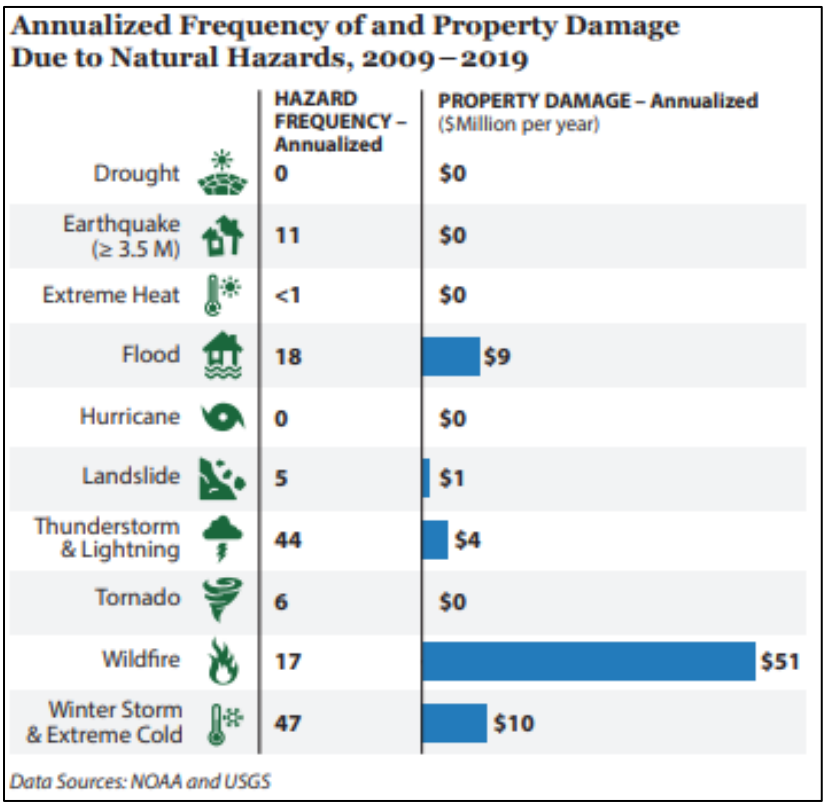

Figure 6: Natural hazards in Idaho. Image Courtesy of the U.S. DOE. This figure depicts Idaho's annual frequency of occurrence of natural hazards and annualized property loss due to natural hazards. A combination of equipment failures, severe weather events, and deliberate cyber- and physical attacks pose risks to every part of Idaho's energy system, including energy feedstocks, generation, transmission, and distribution.

[12] U.S. Department of Energy, "State of Idaho Energy Sector Risk Profile". https://www.energy.gov/sites/prod/files/2016/09/f33/ID_Energy%20Sector%20Risk%20Profile.pdf.

Chapter 2: Reliability and Resiliency Planning in Idaho

Idaho's energy landscape is dynamic and complex, with many intricacies that must flow together to work optimally. Many customers take energy access for granted and have received little information on how their energy needs are met, making the dialogue around reliability and resiliency all the more challenging. In a state with a growing population and increasing threats from wildfires, floods, and extreme weather events, planning has become a central tool in mitigating threats to the power grid and reducing the impacts of outages and shortages. Reliability and resiliency involve two types of planning efforts: 1.) strengthening grid reliability through planning, investment, innovation, and coordination that avoids or minimizes disruptions; and 2.) strengthening grid resilience through planning, preparing, mitigating, and recovering from disruptions. The Idaho Governor's Office of Energy and Mineral Resources (OEMR), ISEA, Idaho Public Utilities Commission (IPUC), and their partners in the private and public sectors work continually to ensure Idaho has accounted for current and future risks, and a plan is in place to stay ahead of these very real challenges. Energy providers of all shapes and sizes in Idaho are trending towards reliability and resilience metrics in their development and operations, seeing the benefits of being proactive and measured. This work, in sum, will assist Idaho in harnessing the tools it needs to support the energy security needs of a growing and changing economy.

2.1 State Plans

Idaho relies on five major planning documents, listed below, for its energy resiliency and reliability. Additional energy security related resources from state agencies are not listed but are often incorporated in the following major planning documents. Efforts are underway to reduce duplication between these documents, while enhancing security planning and empowering decision makers:

1. The ***2012 Idaho Energy Plan***[13], the Plan's objectives are to:
    - Ensure a secure, reliable, and stable energy system for the citizens and businesses of Idaho;
    - Maintain Idaho's low-cost energy supply and ensure access to affordable energy for all Idahoans;
    - Protect Idaho's public health, safety, and natural environment and conserve Idaho's natural resources;
    - Promote sustainable economic growth, job creation, and rural economic development; and
    - Provide the means for Idaho's energy policy to adapt to changing circumstances.

2. The ***Idaho Energy Security Plan***[14], published most recently in 2022, highlights four important elements of Idaho's energy landscape that will help state, local and federal partners navigate challenges in emergency situations:
    - Critical energy system identification

[13] Idaho Governor's Office of Energy and Mineral Resources. "2012 Idaho Energy Plan". https://oemr.idaho.gov/wp-content/uploads/2012-Idaho-Energy-Plan-1-10-Final-Version-PDF.pdf
[14] Idaho Governor's Office of Energy and Mineral Resources. "2022 Idaho Energy Security Plan". https://oemr.idaho.gov/wp-content/uploads/2022-Idaho-Energy-Security-Plan-Redacted.pdf

- Energy emergency management structures and processes
- Historical disruption context
- Energy resilience strategies

These key elements provide structure to what can be a chaotic environment. Whether its day-to-day operations or a unique disaster situation, knowing what goes where and who is available to help is key in Idaho's preparedness planning and response efforts.

3. The ***Idaho Hazard Mitigation Plan***[15], most recently amended in 2020, highlights Idaho's response effort regarding the following types of events: wildfire, flood, severe weather, avalanche, drought, earthquake, landslide, volcanic eruptions, civil disturbance, cyber disruption, hazardous materials, pandemic, radiological, or other Idaho hazards. The strategic section of the plan includes the State of Idaho's hazard mitigation goals:
   - Save lives and reduce public exposure to risk from natural, technological, and human-caused hazard events.
   - Reduce or prevent damage to public and private property from natural, technological, and human-caused hazard events.
   - Enhance coordination between federal, state, tribal, regional, local agencies, and nongovernmental organizations and consistency of hazard impact reduction policy.
   - Reduce the adverse economic and environmental impacts of natural, technological, and human-caused hazard events.
   - Enhance vulnerability and risk assessments through the development, collection, and analysis of data.

4. The ***Idaho Energy Landscape***[16] chronicles the sources and efficacy of Idaho's energy production and consumption. From hydropower to wind, to solar, to natural gas, to coal, or geothermal, Idaho relies on a host of diverse energy production and distribution systems, each with unique opportunities and challenges.

5. The ***Idaho Emergency Operations Plan***[17] highlights what numerous emergency responders or entities need to do in the event of an emergency situation. State, federal, and local partners have clear directives to achieve a systematic restoration of systems if there is a disaster or outage, based on the Federal Emergency Management Agency (FEMA) and U.S. Department of Homeland Security (DHS) emergency response protocols.

The state family of agencies tasked with overseeing energy reliability and resiliency in Idaho require clear guidance and support from the State Legislature and Governor to remain effective in their roles. In a changing world, having clear definitions about the roles and responsibilities of agencies is imperative. Idaho relies on an appropriate amount of legal authority established through regulatory and legislative processes to responsibly prepare, respond, mitigate, and adapt to disaster

[15] Idaho Office of Emergency Management. "State Hazard Mitigation Plan". https://ioem.idaho.gov/preparedness-and-protection/mitigation/state-hazard-mitigation-plan/
[16] Idaho Governor's Office of Energy and Mineral Resources. "2022 Idaho Energy Landscape". https://oemr.idaho.gov/wp-content/uploads/2023-Idaho-Energy-Landscape.pdf
[17] Idaho Office of Emergency Management. "Idaho Emergency Operations Plan". http://ioem.idaho.gov/wp-content/uploads/2020/07/2019-Idaho-Emergency-Operations-Plan.pdf

emergencies. The following authorities are key to maintaining reliable and resilient energy services.

2.2 Legal Authority

The Idaho Office of Emergency Management (IOEM) is the state's emergency management agency tasked by Idaho Code with providing assistance to the 44 counties and four tribes in managing man-made and natural disasters in the state. Key to the agency's role is developing and updating the state's Emergency Operations Plan (IDEOP) and Hazard Mitigation Plan. The IDEOP is a detailed all-hazards plan that establishes a framework for managing disasters in Idaho and develops mechanisms for state support to state, local, and tribal emergency managers. The Idaho Response Center (IRC) is housed within IOEM and is a central hub for coordination efforts and situational awareness during a disaster. IOEM ensures that partner agencies are trained and prepared to assist in managing disasters, is accredited by the Emergency Management Accreditation Program (EMAP) and is a division of the Idaho Military Division. IOEM is part of FEMA's Region 10 along with Oregon, Washington, and Alaska.

The oversight and maintenance of the Idaho Energy Security Plan is the responsibility of OEMR. OEMR coordinates the plan review and update processes, including documenting changes to this plan, distributing this plan to key stakeholders, submitting the updated plan for appropriate review, and storing a paper and electronic version of this plan for archival purposes. OEMR is also responsible for maintaining and updating the Idaho Energy Plan and Idaho Energy Landscape.

Executive Authority

Idaho Code §46-1006 defines the powers and duties of the adjutant general at the IOEM. The adjutant general, in all disaster services, shall represent the Governor, and on behalf of the governor, coordinate all activities of state agencies in disaster services. Idaho Code 46-1008 defines the Governor's powers and responsibilities during an emergency. The Governor may issue executive orders, proclamations with the force and effect of law. The Governor may declare a disaster emergency if s/he finds a disaster has occurred or a disaster or threat of disaster is imminent. Idaho Code §46-1010 authorizes the Governor to make emergency or disaster service compacts with any state or province of Canada if it is desirable to meet problems of emergency or disaster planning, prevention, response, or recovery.

Executive Order No. 2022-04, Assignments of All-Hazard Prevention, Protection, Mitigation, Response and Recovery Functions to State Agencies in Support of Local and State Government Relating to Emergencies and Disasters gives IOEM the authority to coordinate state and federal emergency response, recovery and mitigation operations during emergencies and disasters.

The following Idaho statutes specifically address aspects of emergency management and acts of terrorism:

- The Idaho Disaster Preparedness Act of 1975, amended by the Idaho Homeland Security Act of 2004, Idaho Code §46-10.
- The Post-Attack Resource Management Act, Idaho Code §67-5506.
- The Terrorist Control Act, Idaho Code §18-8101.
- The Emergency Relocation Act, Idaho Code §67-102.

- Martial Law and Active Duty, Idaho Code §46-6.

Local Jurisdictions Authority

Idaho Code §46-1009 requires each county to maintain a disaster agency or participate in an intergovernmental disaster agency that has jurisdiction over the entire county to facilitate the cooperation and protection of the county in disaster prevention, preparedness, response, and recovery. Idaho Code §46-1011 provides the mayor or chairman of county commissioners, within their political subdivision, the sole authority to declare a local disaster emergency and such declaration will be promptly filed with the local county recorder. The purpose of the declaration of a local disaster emergency is to activate the response and recovery aspects of any local or intergovernmental disaster emergency plans and furnishing of aid and assistance.

Idaho Public Utility Commission (IPUC) Authority

Idaho Code §61-509 authorizes the Idaho PUC to direct railroad corporations to increase the number of trains, cars, or motive power or change timing of trains or cars, change the time schedule for their running, or change the stopping places it thinks reasonable to accommodate, transport traffic or freight transported or offered for transportation.

Idaho Code §61-533 authorizes the Idaho PUC to declare an emergency, with or without notice, upon finding that an inadequacy or insufficiency of electric power and energy or natural or manufactured gas that threatens the health, safety, or welfare of citizens of Idaho.

Idaho Code §61-534 authorizes the Idaho PUC, upon declaration of an emergency, to require suppliers of electrical power and energy or natural or manufactured gas to curtail service in accordance with PUC approved curtailment plans.

Idaho Code §61-535 authorizes the Idaho PUC, upon declaration of an emergency, to order the curtailment of electric power and gas consumption by consumers as the PUC finds reasonable and necessary.

Idaho Administrative Procedures Authority

IDAPA 11.13.01 incorporates federal regulations 49 CFR §390.23 allowing a motor carrier or driver operating a commercial motor vehicle to apply for a waiver from regulations 49 CFR 390 through 399 during an emergency.

For more information, please refer to the 2022 Idaho Energy Security Plan Appendix J – Summary of Laws and Regulations on Energy Security and Energy Emergency Planning, and Appendix I Western Petroleum Shortage Response Collaborative (WPSRC) – Collaborative Regional Framework and Collaborative Development Guide.

Federal Authority

The Stafford Act, PL 93-288 as amended, constitutes the statutory authority for most federal disaster response activities especially as they pertain to FEMA and FEMA programs.

49 USC §108 defines the powers and duties of the administrator at the Pipeline and Hazardous Materials Safety Administration (PHMSA). The administrator shall carry out duties and powers to

protect against the risks to life, property, and the environment that are inherent in the transportation of hazardous material in intrastate, interstate, and foreign commerce.

49 CFR §390.23 provides any motor carrier or driver operating a commercial motor vehicle to provide emergency relief during an emergency an exemption from regulations in 49 CFR §390 through 399, including but not limited to vehicle weight limits and hours-of-service of drivers. The exemption is only effective when a regional emergency has been declared by the President of the United States, the Governor of a State, or their authorized representative, a local emergency has been declared by a federal, state, or local government official with the authority to declare an emergency, or the Federal Motor Carrier Safety Administration (FMCSA) has declared that an emergency exists that justifies an exemption. 49 CFR §390.25 authorizes the FMCSA to extend the 30-day time period of an exemption for a regional emergency after approval from the Regional Director in the region.

6 USC §313 defines the powers and duties of the administrator of FEMA. The administrator is responsible for working with state, local, and tribal governments, federal agencies, emergency response providers, and nongovernmental organizations to build a national emergency management system to prepare for, protect against, respond to, recover from, and mitigate against the risk of natural disasters, acts of terrorism, and man-made disasters.

2.3 Federal and Regional Support and Regulation

In the event of an emergency, the western states have established mutual aid groups (Figure 7) and agreements to ensure resources are available across states lines, in coordination with the federal government. Additional planning resources are available in coordination with the U.S. DOE including the Office of Cybersecurity, Energy Security, and Emergency Response (CESER) and Office of Energy Efficiency and Renewable Energy (EERE), the National Association of State Energy Officials (NASEO) including WPSRC, FEMA, the National Emergency Management Association (NEMA), the Cybersecurity and Infrastructure Security Agency, and FMCSA.

Leveraging the informational and operational resources these mutual aid groups and federal and regional support agencies provide can advance energy reliability and resiliency through enhanced planning frameworks, coordinated emergency response, and integration of current best practices and research.

Additionally, it is important to note the roles of the Western Electricity Coordinating Council (WECC), North American Electric Reliability Corporation (NERC), and Federal Energy Regulatory Commission (FERC). The resources and services provided by these agencies are often used by states in reliability and resiliency planning and policy efforts.

- WECC promotes bulk electric system reliability for the entire Western Interconnection system and is the regional entity responsible for compliance monitoring and enforcement. WECC's Western Assessment of Resource Adequacy and other key documents provide critical data for states to consider in their planning.[18]

[18] WECC. "Western Assessment of Resource Adequacy". https://www.wecc.org/_layouts/15/WopiFrame.aspx?sourcedoc=/Reliability/2022%20Western%20Assessment%20of%20Resource%20Adequacy.pdf&action=default

- NERC is an international regulatory authority whose mission is to assure the effective and efficient reduction of risks to the reliability and security of the grid. NERC develops and enforces Reliability Standards; annually assesses seasonal and long-term reliability; monitors the bulk power system through system awareness; and educates, trains, and certifies industry personnel. NERC is the Electric Reliability Organization (ERO) for North America and is subject to oversight by FERC and governmental authorities in Canada.[19]
- FERC is the United States federal agency that regulates the transmission and wholesale of electricity and natural gas, and transportation of oil by pipeline, in interstate commerce. As part of that responsibility, FERC:[20]
    - Approves the siting of interstate electric transmission projects and natural gas pipelines and storage facilities
    - Assesses the safe operation and reliability of proposed and operating liquefied natural gas (LNG) terminals
    - Licenses and inspects private, municipal, and state hydroelectric projects
    - Protects the reliability of the high voltage interstate transmission system through mandatory reliability standards
    - Monitors and investigates energy markets

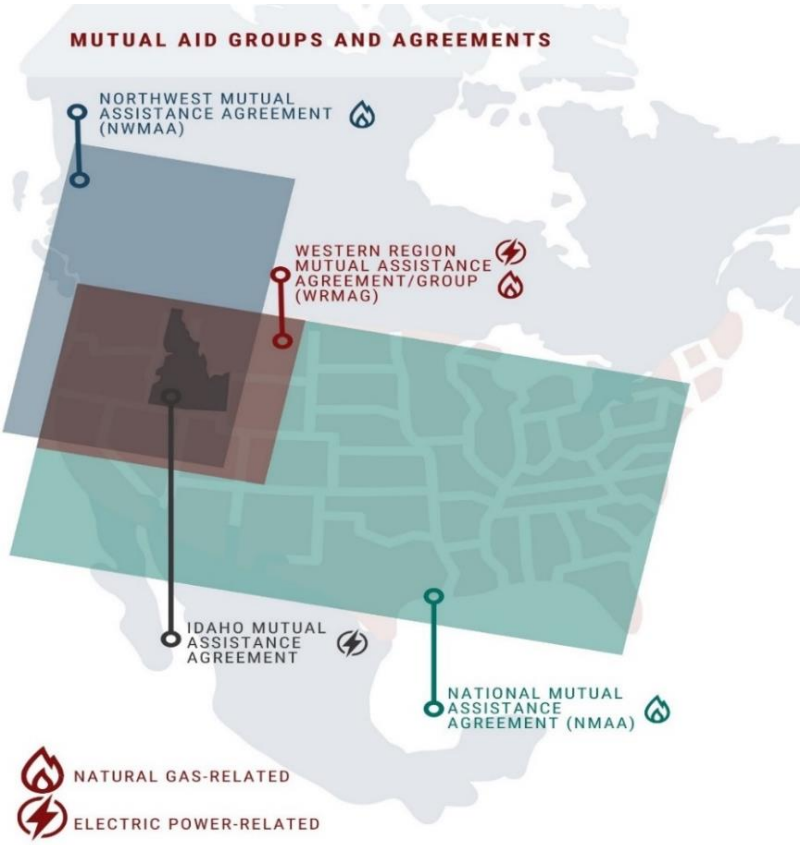

Figure 7: Mutual aid groups and agreements. Image courtesy of OEMR.

[19] NERC. "About NERC". https://www.nerc.com/AboutNERC/Pages/default.aspx
[20] FERC. "What FERC Does". https://www.ferc.gov/what-ferc-does

2.4 Reliability and Resiliency Infrastructure Projects

State, local, federal, and private sector efforts to enhance reliability and resiliency are critical to Idaho's energy security. The recent investments made by the U.S. Congress through the Infrastructure Investment and Jobs Act (IIJA) and Inflation Reduction Act (IRA) in energy security and infrastructure are significant.[21] These investments are meant to advance meaningful transitions to cleaner energy and energy equity, as well as a more robust and hardened grid overall.

Electric power providers across the west are adopting modern technologies including battery storage, grid-enabling devices, flexible renewable options like geothermal, pumped hydropower energy storage, distributed energy, demand side resources, and advanced nuclear reactors including small modular reactors and microreactors. The menu of opportunities is extensive, and ISEA, with partners, is evaluating the viability of these options for Idaho carefully and systematically. State and local government are working collaboratively with industry to ensure a resilient and reliable energy sector, which in-turn supports Idaho's economic needs now and in the future.

State & Local Projects

Below is list of completed and ongoing state and local projects of note that impact or focus on energy reliability and resiliency. These projects include infrastructure and planning components across the energy landscape. They would not be possible without the guidance and vision of state decision- and policy makers, private sector energy companies, and power providers that are able to determine their community's needs and ensure the appropriately sized option is implemented. This list is not exhaustive, there are many additional energy reliability and resiliency projects in Idaho that are not included.

Entity	Project Description
Idaho Office of Emergency Management (IOEM)	The IDEOP is the foundation document for the implementation and coordination of disaster emergency response and recovery operations in the State of Idaho. This plan provides the framework of responsibilities for response and recovery operations from emerging or potential threats (emergencies) and disasters. Additionally, the IDEOP establishes responsibilities for state departments and agencies, non-profit and volunteer organizations, and private sector partners that comprise the State Emergency Response Team (SERT). The SERT is organized and structured using a combination of Incident Command System and Emergency Support Function models. The SERT organization may engage all State of Idaho agencies that serve as Coordinating, Primary, and Support Agencies and appropriate non-governmental partners. The SERT organizational

[21] Infrastructure Investment and Jobs Act of 2021. https://www.congress.gov/117/plaws/publ58/PLAW-117publ58.pdf; Inflation Reduction Act of 2022. https://www.congress.gov/117/plaws/publ169/PLAW-117publ169.pdf

	structure has been adopted to ensure modularity, expanding to incorporate all elements necessary for the type, size, scope, and complexity of a given emergency or disaster incident. This flexibility is key for robust response capabilities. The IDEOP describes the methods the state will utilize to receive and issue notifications, coordinate resources, handle requests for assistance, and provide aid to political subdivisions. The premise of the IDEOP is that all levels of government share the responsibility for working together in preventing, preparing for, responding to, and recovering from the effects of an emergency or disaster event. The IDEOP is based on the principle of self-help at each level of government. Each level of government is responsible, by law, for the safety of its citizens. Additionally, IOEM has established the new Idaho IRC in Boise that is state of the art with significant capabilities, empowered by the IDEOP and SERT. Establishment of the IRC enhances the state's overall response and coordination capabilities. These combined resources ensure Idaho is well-equipped in the event of a major emergency that threatens energy uptime.
Idaho Governor's Office of Energy and Mineral Resources (OEMR)	OEMR published the 2022 Idaho Energy Security Plan in January to update the original 2012 Idaho Energy Assurance Plan. The plan describes the current energy landscape in Idaho and the risks it faces, provides present-day best practices for energy emergency response, and identifies strategies for building and enhancing energy resiliency. OEMR also established the Energy Resiliency Grant Program in 2022. The program enables the state to work collaboratively with private industry to leverage federal funding opportunities for grid hardening projects.
Idaho Strategic Energy Alliance (ISEA)	At the directive of the ISEA Board of Directors, the ISEA task forces on Reliability and Resiliency (the authors of this report) and Energy Infrastructure – Grid Modernization are developing planning documents, reports, and processes to advance energy security throughout the state and ensure timely and thoughtful leverage of federal funding sources for long range grid needs. Some of these areas are highlighted in Chapter 3 for reference.
Blaine County	Blaine County partnered with the cities of Bellevue, Hailey, and Ketchum, St. Luke's Hospital, and Sun Valley Water and Sewer District on a FEMA Hazard Mitigation Grant application through IOEM for the Wood River Valley (WRV) Climate Mitigation & Energy Resilience Microgrid Project Scoping. The microgrid Project Scoping will investigate, evaluate, and recommend a Microgrid solution to increase energy reliability and resilience for critical infrastructure in the WRV. The application identifies additional partners including the Idaho National Laboratory (INL), National Renewable Energy Laboratory (NREL), and University of Idaho. If the application is funded, the outcome of the project will provide the basis for a "shovel ready" Building Resilient Infrastructure and Communities (BRIC) construction grant application.

Private Projects

Private investment in energy resilience and reliability can be challenging, with markets and regulatory approval processes not always supporting needed infrastructure and investment for legacy platforms and renewables alike. Nevertheless, utilities work diligently towards building out reliable infrastructure on a proactive basis. Along with transmission and generation projects, Idaho's utilities also provide and participate in programs to assist businesses and individual consumers with energy efficiency, cost mitigation, and planning.

Expansion of solar and wind power in particular have proven to be scalable in parts of Idaho, however these renewable energy sources face either market uncertainties, high start-up costs, storage challenges, or reliability challenges. As these technologies continue to evolve and expand, more opportunities may arise for integration. According to various utility Integrated Resource Plans (IRPs), the western interconnection is also making room for geothermal, natural gas, nuclear, pumped hydropower storage, and hydrogen, among other resource options including demand side resources. Idaho is strategically oriented in these discussions thanks in part to the immense resources and talent pool at the INL. Public-private partnerships, scalable go-to-market investments, and technological advancements are rapidly expanding the portfolio of energy production, storage, transmission, and distribution possibilities. These possibilities are articulated in the investor-owned-utility IRPs, linked here or available on their websites[22]:

Idaho Power IRP	PacifiCorp IRP	Avista IRP

Below is a list of completed and ongoing private projects of note that focus on energy reliability and resiliency. These projects are submitted on behalf of ISEA Task Force members, are focused strictly on electricity, and do not represent a complete list of private sector investments in reliability and resiliency across the state. These projects include infrastructure and planning improvements across Idaho's energy landscape aimed at hardening and modernizing aging grid infrastructure to enhance grid reliability and resiliency.

[22] Idaho Power. "Our 20-year Plan". https://www.idahopower.com/energy-environment/energy/planning-and-electrical-projects/our-twenty-year-plan/; PacifiCorp. "Integrated Resource Plan". https://www.pacificorp.com/energy/integrated-resource-plan.html; Avista. "Integrated Resource Planning". https://www.myavista.com/about-us/integrated-resource-planning

Utility	Project Description
Fall River Rural Electric (FRE)	FRE is constructing a redundant 115 kilovolt (kV) transmission line from Drummond to Mack's Inn. The project will be adding a ring bus with breakers to create a loop feed with increased protection and sectionalization capability. FRE will also be adding a Supervisory Control And Data Acquisition (SCADA) system with remote control capability and is working to implement fire mitigation improvements at large.
United Electric Co-Op (UEC)	UEC is adding feeder ties between local substations for system redundancy and resiliency, as well as automated outage and crew communication for improved response time and fire mitigation improvements that will increase wildlife protection and energy reliability.
Idaho Falls Power (IFP)	IFP is engaged in joint transmission construction with PacifiCorp to increase capacity and provide redundancy in the region. Additionally, IFP is currently installing a remotely controlled Advanced Distribution Management System (ADMS) with an automated Fault Location, Isolation, and Service Restoration (FLISR) system to improve distribution restoration and resiliency. IFP has also recently completed a black start microgrid test with hydrogeneration and energy storage in conjunction with INL and is considering developing a hydrogen/natural gas peaking plant to enhance reliability in their service territory.
Idaho Power	Idaho Power adopted a probabilistic-based method, Loss of Load Expectation (LOLE), to evaluate the reliability of the most recent IRP portfolios. Idaho Power planned for the system to meet a reliability threshold of 1 event in 20 years or a LOLE of 0.05 days per year. Additionally: • Idaho Power is building an 80 megawatt (MW) stand-alone battery storage project in the Melba, Idaho area for reliability purposes. • Idaho Power is partnering with Micron Semiconductor to contract 40 MW of solar photovoltaic (PV) output. Idaho Power is also acquiring 40 MW of battery storage to be co-located with the contracted solar PV. • Idaho Power is constructing four distributed energy storage projects to be located in the four separate distribution stations. The distributed energy storage projects will contribute to transmission and distribution asset deferral and will be used to meet system peak load. • Idaho Power upgraded three natural gas units to improve reliability and capacity during summer operations, completed in 2022. • Idaho Power recently completed the Cloverdale-Hubbard 230 kV line, in conjunction with the Boise Bench-Cloverdale, Cloverdale-Locust 230 kV line terminations, and the addition of a 230 to 138 kV transformer at the Cloverdale station. The projects help support reliability in the western Treasure Valley area. • A single transmission line serves the Twin Falls-Shoshone area; when the

	transmission line experiences an interruption, all the customers that depend on that line lose power. Idaho Power is installing power circuit breakers to maintain power to the customers in the area when a section of the transmission line is interrupted, thus increasing reliability in the area.
PacifiCorp	PacifiCorp has recently completed several major projects in southeastern Idaho to improve reliability and resiliency in the region. • PacifiCorp installed 700 MWs of redundant transformer capacity, including a more resilient substation design. PacifiCorp constructed the Goshen to Rigby 161 kV transmission line to provide reliability for line outage contingencies in the region. • PacifiCorp converted transmission and substations infrastructure from 69 kV to 161 kV to provide additional capacity and reliability in the Rexburg area. • PacifiCorp planned substation and distribution expansions in the Rigby, Ruby, Idaho Falls and Mud Lake areas that will provide greater capacity and reliability • PacifiCorp's advanced metering infrastructure project currently underway will provide system data and situational awareness that will assist in operational reliability.

Federal Projects

The federal government and U.S. Congress have and will continue to make significant investments in energy resiliency and reliability through legislation such as the IIJA and IRA. Formula and competitive grant funding, as well as other financial incentives including tax credits, will flow towards grid hardening and energy efficiency projects. Competitive demonstration and implementation opportunities may be viable in Idaho through strategic partnerships between INL, utilities, and state and local governments. The various offices within the U.S. DOE, U.S. Treasury Department, and U.S. DHS are key strategic funding partners for privately and publicly owned utilities of all shapes and sizes, as well as state agencies and local governments. Recent federal investment from the U.S. Congress have trended towards grid hardening as wildfire, flood, and drought concerns elevate in Idaho and the west. However, policy, regulatory, and permitting hurdles can provide challenges for implementation at the state and local levels. Current federal efforts in this space are highlighted below:

Entity	Project Description
Idaho National Laboratory (INL)	INL and Idaho Falls Power began studying the benefits of hydroelectric microgrids in 2016. In April 2021, the entities successfully tested and stabilized the hydroelectric microgrid; this means the hydroelectricity produced by the city's Lower, Old Lower, and City hydroelectric plants can provide enough energy to power a variety of essential facilities should they become disconnected from the grid. INL also supported the development of the Idaho Infrastructure Guidebook. This report serves as a basic overview of Idaho's critical infrastructure sectors and their relation to the economy, supply chains, and potential hazards. Subjects analyzed include energy, water, wastewater, information and communication technologies, transportation, hazardous materials, health and medical, agriculture, state economics, and natural hazards. Trends within these sectors are analyzed to draw out forecasts of potential future outcomes, demands, and risks. Individual county appendices present a broad overview of the state of infrastructure within each of Idaho's 44 counties. The Guidebook was created in coordination with IOEM.
U.S. Department of Energy (DOE) Office of Electricity	The U.S. DOE's "Building a Better Grid" Initiative, launched on January 12, 2022, will catalyze the nationwide development of new and upgraded high-capacity electric transmission lines, as enabled by the 2021 BIL. The initiative brings together community and industry stakeholders to identify national transmission needs and support the buildout of long-distance, high-voltage transmission facilities that are critical to reaching the Biden Administration's goal of 100% clean electricity by 2035 and a zero-emissions economy by 2050. As one of the first steps, the U.S. DOE is conducting the National Transmission Planning Study to identify transmission that will provide broad-scale benefits to electric customers; inform regional and interregional transmission planning processes; and identify interregional and national strategies to accelerate decarbonization while maintaining system reliability.[23] In partnership with the Pacific Northwest National Laboratory (PNNL) and NREL, the U.S. DOE will collaborate with industry stakeholders, communities, and regional and local governments to help identify pathways for necessary large-scale transmission system buildouts that meet regional and national interests.
DOE Office of Cybersecurity, Energy Security, and	CESER is leading a variety of IIJA provisions including: State Energy Security planning (sec. 40108), Enhancing Grid Security through Public-Private Partnerships (sec. 40121(C)), Energy Cyber Sense (sec. 40122), Rural and Municipal Utility Advanced Cybersecurity Grant and Technical

[23] U.S. DOE. "National Transmission Planning Study". https://www.energy.gov/gdo/national-transmission-planning-study

Emergency Response (CESER)	Assistance (sec. 40124), Cybersecurity for the Energy Sector Research, Development, and Demonstration (sec. 40125(B)), Energy Sector Operational Support for Cyber Resilience (sec. 40125(C)), Modeling and Assessing Energy Infrastructure Risk (sec. 40125(D)), and potentially other programs under the 2022 IRA. To support this work CESER created an Energy Security Planning Resource Hub as a one-stop-shop for resources designed to support state and local government officials' energy security planning programs. The Hub includes State and Regional Energy Risk Profiles, State Energy Security Plan (SESP) Resources, the Assessment of Capabilities in Energy Security (ACES) Tool and more.[24]

The list of projects throughout this chapter is not comprehensive, as many stakeholders have ongoing planning and implementation efforts underway. Going forward, prioritization of federal investment for energy security planning, grid hardening, transmission upgrades, technological advancement, energy efficiency, and cybersecurity in Idaho and across the U.S. are expected to continually increase.

[24] U.S. DOE. "Office of Cybersecurity, Energy Security, and Emergency Response". https://www.energy.gov/ceser/office-cybersecurity-energy-security-and-emergency-response

Chapter 3: Analysis of Reliability and Resiliency Potential in Idaho

Idaho's power system has been and remains resilient. However, current and looming challenges throughout the sector exist that should be better understood to allow energy providers and stakeholders to make more informed decisions about potential actions to preserve or increase resiliency.

Factors including growing energy system interdependency with other critical sectors; national security threats from foreign and domestic actors; cybersecurity challenges from increased digitalization of the electricity system; weather pattern and climate changes; new clean energy policies and environmental advocacy; increased economic development in higher risk locations prone to wildfires, drought, and flooding; and the increased penetration of variable generation and distributed energy resources alongside the retirement of baseload resources introduce new operational and regulatory challenges. These challenges call for a holistic view of resiliency to be adopted and may also provide opportunities to improve reliability and resiliency.

Even if a specific threat to resiliency is agreed upon, what is the appropriate level of investment for ratepayers, investors, or taxpayers to bear to address that threat? Are appropriate resiliency levels and associated funding amounts being approved? Are there adequate mechanisms for regulatory or legislative consideration of these questions?

Many stakeholders across Idaho and regionally are looking to provide recommendations for policy and regulatory solutions to these questions. The remainder of this chapter will review some of the opportunities and challenges energy providers face when looking to invest in infrastructure to improve system reliability or resiliency, and focus strictly on the electricity system.

3.1 Opportunities for Enhancing Grid Reliability and Resiliency: Funding

The 2021 IIJA is a primary funding stream for current resiliency and reliability infrastructure investment opportunities in the U.S. Electric utilities, guided by policy and regulation from state energy offices, regulatory commissions, and local boards, will have significant opportunities to upgrade their operations and structures through these funds over the next decade. Additional financial incentives from the 2022 IRA are not included in the following list, but the IRA includes significant investments that will also create opportunities in Idaho. The following sections of IIJA are of particular interest for electricity system actors looking to invest in resiliency and reliability projects across the state:

Topic Area	IIJA Section Description
Planning Provisions — helping frame the needs and opportunities for Idaho's energy sector	Sec. 40108 – Establishes a financial assistance program for states to assess the existing energy security circumstances in the state and propose methods to strengthen the ability of the state in a State Energy Security Plan.
	Sec. 40121 – Enhancing Grid Security Through Public-Private Partnerships. The DOE Secretary along with DHS, state PUCs, and electric reliability organizations shall carry

	out a program to develop and voluntarily implement self-assessments and modeling to assess physical security and cybersecurity of utilities; assist in threat assessment and cybersecurity training, and provide training for cybersecurity supply side management
	Sec. 40105 – Designates National Interest Electric Transmission Corridors. States shall issue reports on transmission capacity constraints and congestion. • Provides FERC with siting jurisdiction and federal eminent domain powers in DOE-established National Interest Electric Transmission Corridors when states fail to approve a project within one year. • Pre-empts state siting jurisdiction and eminent domain powers as they relate to siting electric transmission projects. FERC can approve siting one-year after the later of: (I) the date the application is filed; and (II) the date on which the national interest corridor was designated, or the application has been denied.
Mining provisions—pertinent to long term energy security and alternative transportation metrics	Sec. 40701 – Authorizes $11.3 billion allocated by Secretary of Interior over 15-years in annual grants for abandoned mine land and water reclamation projects in the Surface Mining and Reclamation Act of 1977.
	Sec. 40704 – Authorizes $3 billion to states and tribes for abandoned hard rock mine reclamation.
	Sec. 40210 – Authorizes $100 million in competitive grants to institutions of higher education and national labs, among others, for critical minerals mining and recycling research, with a $10 million cap on individual awards.
Carbon provisions:	Sec. 40302 – Carbon Utilization Program. Program for research, development, and demonstration for carbon utilization.
Energy Security provisions	Sec. 40101 – Preventing Outages and Enhancing the Resilience of the Electric Grid. Authorizes $5 billion to utilities, states and others for activities, technologies, equipment, and hardening measures to reduce the likelihood and consequences of disruptive events (*see* 40101(c)(1)(A)-(L). • Grants are for activities that are supplemental to existing hardening efforts to reduce the risk of power lines owned or operated by the entity from starting a

	wildfire or increase the ability of the entity to reduce likelihood and consequences of disruptive events. States give priority to projects that will generate the greatest community benefit.
	Sec. 40103 – Electric Grid Reliability and Resilience Research, Development, and Demonstration. Authorizes $6 billion to states and rural communities via the Energy Infrastructure Federal Financial Assistance Program to invest and demonstrate innovative and new approaches to transmission, storage, and distribution infrastructure to enhance regional grid resiliency. • Includes $5 billion for energy improvement in rural or remote areas states, local governments, and utilities and $1 billion to rural or remote areas to carry out activities to improve the resiliency, safety, reliability, and availability of energy (areas with populations of less than 10,000). • Also includes the Energy Infrastructure and Resilience Framework, a study to assess the resiliency, reliability, safety, and security of energy infrastructure in the U.S.
	Sec. 40107 – Authorizes $3 billion for the Smart Grid Investment Matching Grant Program.
Transmission provisions	Sec. 40106 – $50 million for the Transmission Facilitation Program and Fund to facilitate the construction of electric power transmission lines and related facilities. $2.5 billion revolving loan fund that allows DOE to serve as an anchor tenant for a new transmission lines or upgrades of an existing line.
Hydropower provisions	Sec. 40334 – $2 million per year for Pumped Storage Hydropower, Wind and Solar Integration and System Reliability Initiative. State energy offices, utilities, electric cooperatives, higher education entities, or a consortium of above are eligible to receive financial assistance to carry out project design, transmission studies, power market assessments, and permitting for pumped hydro projects.

Additional funding streams at the federal level include FEMA BRIC grants, U.S. DOE funding opportunities, and U.S. Department of Agriculture (USDA) funding opportunities.[25]

[25] FEMA. "Building Resilient Infrastructure and Communities". https://www.fema.gov/grants/mitigation/building-resilient-infrastructure-communities; USDA. "Funding Opportunities". https://www.nifa.usda.gov/grants/funding-opportunities; U.S. DOE. "Grants". https://www.grants.gov/learn-grants/grant-making-agencies/department-of-energy.html

State Energy Assurance and Security Planning

Across the nation, state and local officials are partnering with the private sector to reduce risks and vulnerabilities to critical energy infrastructure and safeguard public safety through energy security planning. Energy security planning ensures a reliable and resilient supply of energy through efforts to identify, assess, and mitigate risks to energy infrastructure and to prepare for, respond to, and recover from events that disrupt energy supply. State Energy Security Plans (SESP) also provide information and rationale for energy providers when deciding whether or not to invest in resiliency or reliability projects. Idaho's 2022 SESP describes the state's energy landscape, stakeholders, processes, and energy resiliency strategies. The plan details how a state, working with energy partners, can secure its energy infrastructure against physical and cybersecurity threats; mitigate the risk of disruptions; enhance the response to and recovery from energy disruptions; and ensure that the state has secure, reliable, and resilient energy infrastructure. Additional plans relating to energy security in Idaho are described in Section 2.1.

Improving energy security plans requires implementing an effective process for continuously improving them. For example, in Idaho's 2022 SESP, Appendix K outlines guidance for revising and updating the plan, including suggested timeframes and review opportunities. Continuous improvement of plans provides important opportunities for enhancing energy security, reliability, and resiliency across the state. The ISEA Reliability and Resiliency Task Force have identified the following areas for improvement in the next iteration of the Idaho SESP:

1. Transmission constraints
    a. The ISEA Reliability and Resiliency Task Force request OEMR to utilize data driven analytics to identify transmission constraints in the next iteration of the Idaho SESP. Such data could be pulled from investor-owned-utility IRP's, IPUC, the WECC, the Bonneville Power Administration (BPA), the U.S. Energy Information Administration (EIA), and other entities. Analyses should:
        i. Identify areas within Idaho that experience high levels of transmission congestion and transmission related outages and provide strategies or recommendations for improvement,
        ii. Identify opportunities to leverage geographical diversity of load and renewable resources to move power across the western interconnection; and
        iii. Include consideration of permitting and siting constraints for transmission and distribution infrastructure.
2. Drought impacts
    a. The ISEA Reliability and Resiliency Task Force requests OEMR to utilize data driven analytics to identify the impacts of severe drought on Idaho's energy system. Such data could be pulled from the EIA, the National Oceanic and Atmospheric Administration (NOAA), BPA, and hydropower dam operators throughout the state. Analysis should address the impacts of climate change and the socioeconomic outcomes for various communities and businesses across the state who may be more susceptible to the negative impacts of energy insecurity resulting from drought.
3. Socioeconomic impacts
    a. The ISEA Reliability and Resiliency Task Force requests OEMR to consider

socioeconomic impacts within analyses included in the next iteration of the SESP as they relate to Diversity, Equity, and Inclusion (DEI). The effects of power disruptions and climate change on low-income and minority citizens, or generally disadvantaged communities, especially in rural areas and areas with limited economic opportunities is often compounded. Some tools that could be used to improve DEI related analyses could be pulled from WECC, BPA, and the Council on Environmental Quality's climate and economic justice screening tool.[26] Analyses and planning activities should include expanded work within Idaho's tribal communities.

Additional opportunities for continuous improvements in the Idaho SESP include expanded wildfire coordination between state and federal agencies, utilities, and local stakeholders, exploration of emerging grid enhancing technologies (GETs) benefits, and further integration of the tools and resources of INL. The work to improve state energy assurance and security planning should leverage existing studies, datasets, and expertise from industry actors, INL, Idaho universities, federal agencies such as the U.S. DOE, EIA, WECC, and others.

Infrastructure Modernization

There are many opportunities available to modernize and harden Idaho's electricity infrastructure to enhance electric grid redundancy and resiliency in the event of disruptions.

Opportunity	Description	Constraints
Buildout of high voltage transmission infrastructure	Building new transmission lines relieves transmission congestion and allows for new generation assets to come online. New transmission lines also enable the benefits of geographical diversity of weather patterns across a wide footprint (load diversity and renewable energy diversity). Figure 8 depicts planned transmission buildout by Idaho investor-owned utilities from 2024-2030 (Figure 8).	The projects described have faced hurdles throughout the permitting and siting processes which created major time delays for project development. Federal and state permitting processes are not uniform or complimentary across jurisdictions, which leads to unnecessary costs and delays that ultimately disincentivize competition for major transmission buildout. There are opportunities to remedy permitting and siting conflicts to streamline buildout.
Undergrounding transmission and distribution infrastructure	Undergrounding at-risk transmission lines and distribution infrastructure provides opportunities to prevent outages from natural hazards such as	Undergrounding is very expensive and often most needed in areas served by rural municipal and

[26] The Council on Environmental Quality. "Climate and Economic Justice Screening Tool". https://screeningtool.geoplatform.gov/en/#3/33.47/-97.5

	falling trees, windstorms, and wildfire. Example: Kootenai Electric received a $10 million FEMA BRIC grant to underground approximately 50-miles of lines after a significant wind event caused major disruptions in the area.	cooperative utilities, which typically have less access to major rate bases to offset major capital investments. Obtaining grant funding for undergrounding work requires extensive resources.
Buildout of domestic energy generation	After nearly 20 years of over-capacity, the West is facing a risk of resource shortfalls complicated by more variable generation (resulting from the ongoing transition from large capacity baseload generation assets to variable renewable assets such as wind and solar), a projected increase in demand from electrification of transportation and buildings, and more frequent and extreme weather and climate events. The need to build new generation assets to maintain reliability in face of these challenges has become critical. Additionally, Idaho has an opportunity to build generation assets in-state and reduce reliance on imports.	Similar to developing transmission assets, generation buildout is often constrained by complex and burdensome permitting and siting requirements. There are opportunities to streamline permitting and siting through legislation and rulemaking.
Western Power Pool's Western Resource Adequacy Program (WRAP)	WRAP is a regional resource adequacy planning and compliance framework that leverages the existing bilateral market structure and (for participating entities) imposes obligations for compliance and charges for non-compliance. WRAP provides opportunities to enhance and increase reliability for entities across the western interconnection while maintaining existing responsibilities for reliable operations and observing existing frameworks for planning, purchasing and delivering energy.	Program design is meticulous but gives opportunities for states to advocate for their unique interests. With coordination and visibility across participants, the WRAP facilitates resource sharing across the region and paints a more accurate, regional picture of resource needs and supply.
Expanded or enhanced regional electricity markets	Expansion of the Western Energy Imbalance Market to include an Extended Day Ahead Market, development of the Southwest Power Pool's Western Energy Imbalance Service Market and the Markets+	Expansion of regional electricity markets requires difficult governance negotiations. Idaho's unique load shape and geographic locations must be advocated

	Program, and efforts to develop a Western Regional Transmission Organization increase the efficient and optimal dispatch of electricity system resources, ultimately delivering economic benefits through lower electricity costs and less transmission congestion. These markets also facilitate the integration of variable energy resources and improve visibility into system planning needs.	for to ideally position the state within such markets and prevent out-of-state policies from impacting electricity rates in the state.

Year	Utility	Investment Type	Voltage (kV)
2024	PacifiCorp	Windstar to Aeolus (Gateway West)	230
2024	PacifiCorp	Aeolus to Mona	500
2024	LS Power	Midpoint to Robinson (SWIP North)	500
2026	PacifiCorp	Oquirrh to Terminal	345
2026	PacifiCorp, BPA, Idaho Power	Boardman to Hemingway	500
2027	PacifiCorp	Bridger/Anticline-Populous (Gateway West)	500
2028	PacifiCorp, Idaho Power	Gateway West Segment 8, Hemingway to Midpoint #2	500
2030	PacifiCorp, Idaho Power	Populus to Hemingway (Gateway West)	500

Figure 8: Major Planned Transmission Projects by Idaho Investor-Owned Utilities, 2024-2030. Image courtesy of OEMR. Figure 8 depicts transmission facilities included in the preferred resource strategy from each utility based upon their most recent IRPs or IRP Updates.

Wildfire Mitigation

Utilities perform wildfire risk mitigation planning to ensure continued safe and reliable delivery of electricity. The planning is done in coordination between a variety of state and federal agencies, as well as local communities with focus on collaboration, preparedness, and response; all critical to maintaining a reliable and resilient infrastructure. As planning and response has enhanced over time, more public-private partnerships have formed with many electric utility providers and operators making significant investments in wildfire prevention and increased resiliency. This section will use Idaho Power's Wildfire Mitigation Plan, programs, and other investments as examples of potential opportunities for enhanced wildfire risk management. Integrating plans,

programs, and investments such as Idaho Power's into state level plans is critical to holistic resilience planning.

Idaho Power Wildfire Mitigation Plan: Zoning for At Risk Communities

In their 2022 Wildfire Mitigation Plan, Idaho Power evaluated wildfire risk across its service area as well as existing and proposed transmission corridors to assess and potentially expand existing mitigation practices, while also evaluating the implementation of new mitigation protocols. The primary objectives of Idaho Power's Wildfire Mitigation Plan are to identify and implement strategies to accomplish the following:

- Reduce wildfire risk associated with Idaho Power's transmission and distribution facilities and associated field operations.
- Improve the resiliency of Idaho Power's transmission and distribution system in a wildfire event, independent of the ignition source.
- Comply with all wildfire mitigation requirements established by its regulators.

Idaho Power has also leveraged opportunities to significantly invest in programs that advance smart vegetation management strategies and deploy advanced technology to assist in vegetation management.

Transmission Asset Management Programs	Description
Aerial Visual Inspection Program	Perform annual patrols and document identified defects according to priority. Complete repairs according to priority definition.
Ground Visual Inspection Program	Perform annual patrols and document identified defects according to priority. Complete repairs according to priority definition.
Detailed Visual (High Resolution Photography) Inspection Program	Perform 10-yr cycle patrols and document identified defects according to priority. Complete repairs according to priority definition.
Wood Pole Inspection and Treatment Program	Perform 10-yr cycle patrols and document identified defects according to priority. Complete repairs according to priority definition.
Cathodic Protection and Inspection Program	Perform 10-yr structure-to-soil potential testing on selected towers with direct-buried anodes. Perform 10-yr rectified and ground-bed testing on Impressed Current Corrosion Protection (ICCP) systems. Annually inspect and record DC voltage and current readings on rectifiers. Complete repairs and adjustments.

Wood Pole Wildfire Protection Program	Inspect and install wraps on selected poles.

Distribution Asset Management Programs	Description
Wood Pole Inspection and Treatment Program	Perform 10-yr cycle patrols and document identified defects according to priority. Complete repairs according to priority definition.
Line Equipment Inspection Program	Complete annual inspection and data analysis and mitigate defects.
Ground Detailed Inspection Program	Perform annual patrols and document identified defects according to priority. Complete repairs according to priority definition.
Distribution Infrastructure Hardening Program	Complete annual work plan.

Transmission Vegetation Management	Description
Pre-fire season inspection and mitigation	Perform annual pre-fire season inspection and mitigate noted “hot-spots”
Line clearing cycles – strive to maintain 3-yr cycle for valley areas & 6-yr cycle for mountain areas	Complete annual cycle pruning work plan
Tree removals – hazard trees	Remove targeted hazard trees
100% Quality Assurance (QA)/Quality Control (QC) audits in Red Risk Zones (RRZs) and Yellow Risk Zones (YRZ)	Complete annual QA/QC audits
Distribution Vegetation Management	**Description**
Pre-fire season inspection and mitigation in RRZs and YRZs	Perform annual pre-fire season inspection in RRZs and YRZs and mitigate noted “hot-spots”
Line clearing cycle – strive to maintain 3-yr cycle	Complete annual cycle pruning work plan
Mid-cycle pruning in RRZs and YRZs	Complete annual cycle pruning work plan in RRZs and YRZs
Tree removals – cycle busters/hazard trees	Complete annual cycle pruning work plan
Targeted pole clearing	Complete annual targeted structures
100% QA/QC audits in RRZs and YRZs	Complete annual QA/QC audits

Technology and Innovation

Technologies and innovations over the decades to come will help make America's critically important power system and electric grid more secure, sustainable, affordable, equitable, and resilient. Significant investment from the U.S. Congress in technology and innovation in the energy sector has unlocked many new opportunities for researchers from public and private sectors

to develop, access, and deploy cutting edge solutions to modern day power grid constraints, reducing risks and enhancing energy security across the nation.

The emergence of new technologies, planning and operating techniques, grid architecture, and business models are leading the way towards a modernized power grid. Several clusters of technologies (for power generation, storage, transmission, and power electronics) comprise the elements of "no-regret" investments for the future grid.

Three specific and significant technologies are delineated related to communication, advanced grid management, and automation.

- **Communication:** A modernized grid requires a strong communications backbone, SCADA systems, advanced metering infrastructure (AMI), and other grid-edge sensing technologies.
- **Advanced grid management systems:** A modernized grid also requires implementation of ADMS that can enhance visibility and control of distribution systems, accommodate advanced operations (islanding, microgrids, and seamless transition to grid-connected mode), and enhance protection system and outage management systems. This ultimately enables very high penetration of distributed energy resources (DERs) in a secure manner.
- **Coordination, automation, and control:** Coordination, automation and control practices will be needed to coordinate thousands of grid-edge assets in a decentralized way that involves distributed generations, storage devices, and customer-side demand management such as demand response. Machine learning (ML) and artificial intelligence (AI) techniques should be leveraged to enable these coordination and automation needs.

All three technologies and innovations involve the ways in which data about the grid are collected through sensors and processed from various locations at various time scales. This is critical for 1.) ensuring security and privacy, 2.) making decisions for grid-wise planning and operations at multiple time scales, 3.) ensuring reliability and resiliency, 4.) coordinating and where possible automating data, and 5.) making actions based on control principles and market mechanisms. Additional innovation in modeling, simulation, and emerging grid architecture tools are needed for grid planning decisions, operational decisions, and real-time decisions.

3.2 Barriers to Enhancing Grid Reliability and Resiliency:

Funding

Grid hardening and modernizations projects like those exemplified throughout this report are often extremely expensive. While the benefits of reliability and resiliency investments are clear, issues regarding cost allocation and the resources required to obtain funding support often pose major barriers. Striking a balance between private investment and publicly available opportunities through grants and federal infrastructure programs is challenging, especially in a time of major population growth and a changing economy in Idaho.

Additional limitations exist related to the staffing and technical expertise needed to secure and administer grant funding. Many smaller municipal or co-operative utilities have limited staff and may lack the resources to write applications for major grant awards and concurrently administer

them in compliance with federal standards and requirements. Timing can also create challenges for many smaller organizations, especially those that are not able to re-open their budget to allow for allocation of matching funds for grant opportunities. In some cases, funding partnerships and assistance can be made available for certain entities through other units of government, consultants or Community and Economic Development entities at the state, local or regional levels.

Supply Chain Constraints

With the push toward clean energy and increased demand for smart technology, manufacturers need batteries, which require an excess of critically important minerals and materials to meet consumer demand. However, the global pandemic, geopolitical unrest, and other major disruptions have had massive consequences on global and domestic supply chains; leaving materials such as transformers that used to take 32-weeks to receive to now being 156-weeks out. Supply chain constraints are already having devastating effects on the capabilities of the energy industry in deploying resilient and reliable new infrastructure and is not expected to self-correct anytime soon.

For example, the lithium-ion battery industry relies heavily on the mining of raw materials and production of the batteries, both of which are vulnerable to supply chain interference. China currently dominates the global lithium-ion battery supply chain, producing 79% of all lithium-ion batteries that entered the global market in 2021. The country further controls 61% of global lithium refining for battery storage and electric vehicles and 100% of the processing of natural graphite used for battery anodes. China's dominant position in the lithium-ion battery industry and associated rare earth elements is cause for concern both to companies and governments in various countries around the world.[27]

COVID-19, the war in Ukraine, and inevitable geopolitical unrest will continue to affect global supply chains. After surging by about 60% in 2022, energy prices are projected to decline 11% in 2023, according to the World Bank.[28] Just like any other industry, the energy sector has been and will continue to be impacted by these factors.

Additionally, the Society of Petroleum Engineers estimates that up to 50% of skilled workers in the energy sector could retire within the next five to seven years, presenting an immense challenge to the industry. A lack of training resources domestically and the cost of recruitment and retention have added to the shortage of skilled workforce labor. Rapid advances in technology impact not only the talent needed, but how employers compete for available talent. Overall, both material and workforce supply shortages pose a significant threat to current and future energy security.

[27] Statista, Share of the Global Lithium-Ion Battery Manufacturing Capacity in 2021 with a Forecast for 2025, by Country (last visited Aug. 1, 2022). https://www.statista.com/statistics/1249871/share-of-the-global-lithium-ion-battery-manufacturing-capacity-by-country/

[28] The World Bank. "Currency Depreciations Risk Intensifying Food, Energy Crisis in Developing Economies". https://www.worldbank.org/en/news/press-release/2022/10/26/commodity-markets-outlook

Cybersecurity

The modern grid is increasingly dependent on information and communications technologies (ICT) to enable a more safe, secure, sustainable, affordable, and resilient grid. However, the more the grid uses digital communication technologies, the greater the risk of cyber-attacks.

Cybersecurity, when properly implemented, is not cheap. Investing in the people, processes, and technology needed require adequate funding and ongoing technological innovation. Leaders like INL have provided cutting edge solutions and scalable support to the energy industry, but uncertainty and sensitivity remains. Federal, state and local partners include CISA, Governor Little's Joint Cyber Task Force and Idaho Cybersecurity Consortium, the Boise State University Cyber Security Lab, and many others. Enabling partners to continue helping to improve general understanding of cybersecurity risk and the deployment of solutions requires legislative and congressional directive, as well as financial support.

On the State level, IOEM is actively utilizing grant funding to increase cyber resiliency, partnering with Idaho Information Technology Services to build an Idaho Cyber Fusion Center, developing a State Cybersecurity Incident Response Plan, and is working to plan and fund future cyber related programs at local jurisdictions.

Permitting and Siting

Long permitting and siting timeframes prevent or discourage the rapid development of physical redundancy in the energy system and create unnecessary costs for project developers. Energy security risk increases from delays to needed infrastructure buildout as the rapid deployment of new generation and transmission is critical for a reliable and resilient energy future.

For example, the high voltage transmission projects discussed earlier in this report (Boardman to Hemingway, Gateway West, and SWIP North) have each been undergoing permitting and siting processes for over a decade and are still not entirely cleared for construction. Avoiding or mitigating this risk through innovative legislation or policy solutions would be significant in streamlining grid modernization.

Several environmental barriers exist in the permitting of energy infrastructure, most of which are administered by the federal government. While environmental protection and regulation is critically important to preserving natural resources and long-term sustainability, streamlining options to prevent duplicative or overly burdensome efforts should be considered.

- Public lands: National Environmental Protection Act (NEPA) requires environmental review of actions taken on federal lands. With Idaho being 63% public lands, it is difficult to site any large-scale projects without undergoing NEPA review. Federal administrations have looked for ways to streamline NEPA without jeopardizing environmental impacts through timelines and page limits but should go further to help alleviate some of the duplicity and time commitments of review alongside other environmental review

requirements highlighted below. This is critical to achieve the goals of the transitioning to a clean energy economy.

  - The Bureau of Land Management (BLM) is the governing authority for permitting on most federal lands in Idaho. An Environmental Impact Statement (EIS) is required for permitting energy infrastructure that could have significant impacts on the environment. The BLM is committed to turning around EIS as part of the permitting process within three years. However, this does not include EIS pre-work which can be somewhat discretionary. EIS pre-work through approval can take 8 – 10 years for projects with significant environmental impact.
  - The federal government has designated energy corridors, and recently completed the Section 368 Energy Corridors Final Report, to help enable the development of energy infrastructure. The designation of energy transport corridors in land and resource management plans identifies the preferred locations to avoid significant known resource and environmental conflicts, promote renewable energy development in the west, improve reliability, relieve congestion, and enhance the capability of the national grid to deliver electricity.[29]
  - In addition to corridors, the BLM has prepared a programmatic EIS to evaluate issues related to wind energy development in the west, including Idaho.[30] In December 2022, the BLM also announced the start of a process to update programmatic EIS to evaluate issues related to solar energy development in the west, including Idaho.[31]

- Wetlands: The Environmental Protection Agency (EPA) defines wetlands as "areas where water covers the soil or is present either at or near the surface of the soil all year or for varying periods of time during the year, including during the growing season." The Clean Water Act dictates much of what can be done and processes to mitigate impacts to wetlands. Wetland banks with conservation credits and debits are one manner in which wetland impacts can be mitigated.[32]
- Sage Grouse: The impacts of energy infrastructure and how permitting is treated depends largely on the federal executive administration at the time of the permitting request. Area depicted as habitat for sage grouse are avoided in permitting transmission. Because they are not a listed/protected species under the Endangered Species Act, there are no clear rules or requirements for permits. Studies are required, however the requirements within the studies are not well developed and can depend on local and federal jurisdiction.
- Eagles and Migratory Birds: Although removed from threatened and endangered species lists in 2007, the Bald and Golden Eagle Act of 1972 still offers protection. This, along with the Migratory Bird Treaty act instill protections and mitigation requirements within permitting processes.
- Private Land Development: Barriers to energy development are less onerous when utilizing private lands. Although many of the permitting requirements may be similar to federal land, the absence of stipulations for use of public land is a benefit. Also, educating private land holders on the permitting process has yielded benefits in time savings and cost.

[29] West-Wide Energy Corridor. "West-Wide Energy Corridor Information Center". https://www.corridoreis.anl.gov/
[30] U.S. BLM. "Wind Energy Development Programmatic EIS Information Center". https://windeis.anl.gov/
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Chapter 4: Cost Effectiveness of Enhanced Reliability and Resiliency Efforts

Having reliable and resilient energy does not just mean keeping the lights on. There is also a responsibility to keep prices affordable. Local businesses, nonprofits and governments all rely on predictable energy costs when making their annual budgets and formulating their pricing for goods and services. These features are central to Idaho's robust economy. Equitable, accessible, and reliable energy services are required and especially important in lower income communities and areas with constrained economic opportunity. Healthcare systems rely heavily on energy resources to provide care, which can result in life-safety risks in many cases. Point of sale systems, electric vehicle charging, the internet, and the many other features of the current and future economy will continue to rely heavily or entirely on our power infrastructure.

Cost effectiveness is a somewhat subjective notion. What may be affordable for some could be out of reach for others. When considering the needs of the community, many factors must be considered, including: baseline needs for keeping the lights on, business bottom lines and product affordability (pass-through costs), business retention realities especially in rural communities, site selection competitiveness for business growth or business attraction, the multiplier effect of dollars spent locally staying in the community, workforce needs, strategic advantages for cities and regions, and public utility commission cost metrics. All of these elements, and more, must converge to determine what a "cost effective" rate should look like.

Energy being foundational to everything in Idaho creates both challenges and opportunities when it comes to grid reliability and resiliency. The economic ripple effects of outages or cost constraints from the kitchen table to the corporate boardroom affects all Idahoans. Making smart, thoughtful strategic investments in grid hardening efforts will help to keep costs as manageable as possible and ensure Idaho's energy future is a bright and productive one.

Conclusion

Grid reliability and resiliency touches on many important features of Idaho's well-being and is determined by many significant inputs. This report synthesizes many of the strengths, weaknesses, opportunities, and threats that our energy ecosystem faces. Knowing what our realities are is important and the associated action items are critical:

1. We must make strategic investments in hardening and modernizing our grid;

2. We must integrate our planning efforts between public, private, and community stakeholders to ensure we are mobilizing resources and planning instruments in a productive manner; and

3. We must improve state, local, and federal policies that support thoughtful infrastructure outcomes.

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