DOE/ID-11383
Revision 13
INL/RPT-22-66637
Rev000

U.S. Department of Energy
Idaho Operations Office

FY 2022 Idaho National Laboratory Site Sustainability Plan

December 2021

Idaho National Laboratory

INTENTIONALLY BLANK

DOE/ID-11383
Revision 13
INL/RPT-22-66637
Rev000

FY 2022 Idaho National Laboratory Site Sustainability Plan

December 2021

Prepared for the
U.S. Department of Energy
DOE Idaho Operations Office

INTENTIONALLY BLANK

FY 2022 Idaho National Laboratory Site Sustainability Plan

December 2021

Approved by:

Robert D. Boston Digitally signed by Robert D. Boston Date: 2021.12.02 15:07:15 -07'00'

Robert Boston
Manager, Idaho Operations Office

Date

Approved by:

Connie M. Flohr Digitally signed by Connie M. Flohr Date: 2021.12.02 14:55:35 -07'00'

Connie M. Flohr, Manager
Idaho Cleanup Project

Date

Approved by:

John C. Wagner

November 29, 2021
Date

John C. Wagner, Ph.D.
Director, Idaho National Laboratory
and President, Battelle Energy Alliance, LLC

Approved by:

Frederick P. Hughes

11/30/21
Date

Frederick P. Hughes
Fluor Idaho Program Manager
Idaho Cleanup Project Core Contract

Approved by:

Ty Blackford

12/1/2021
Date

Ty Blackford
Program Manager
Idaho Environmental Coalition, LLC

INTENTIONALLY BLANK

EXECUTIVE SUMMARY

The mission of the Department of Energy (DOE) is to ensure America's security and prosperity by addressing its energy, environmental and nuclear challenges through transformative science and technology solutions. This *FY 2022 Idaho National Laboratory Site Sustainability Plan* (SSP) was developed to enable and sustain Idaho National Laboratory's (INL's) mission to discover, demonstrate, and secure innovative nuclear solutions, clean energy options, and critical infrastructure.

DOE Order 436.1, "Departmental Sustainability," provides requirements and assigns responsibilities for managing sustainability within DOE to ensure that DOE missions are carried out in a sustainable manner, to institute wholesale cultural change to factor sustainability into all DOE decisions, and to ensure DOE achieves sustainability goals. DOE Order 436.1 also requires DOE sites to commit appropriate personnel resources, establish a financing plan that prioritizes the use of life-cycle cost-effective private-sector financing, optimize the application of appropriations and budgeted funds, and establish specific performance measures and deliverables designed to achieve the listed requirements.

The SSP was developed according to the narrative requirements from the "FY 2022 DOE Site Sustainability Plan Guidance" document issued in September 2021. The SSP contains strategies and activities that will lead to continual energy, water, and waste reductions that move the INL site toward meeting DOE sustainability goals and requirements. The SSP summarizes energy and available fuel use reporting requirements and references criteria for instituting sustainable design. SSP requirements are integrated into each INL site contractor's Integrated Safety Management System and Environmental Management System (EMS). Finally, the Sustainability Program directives, based on this SSP, are integrated into INL/LTD-21-62463, *Annual Laboratory Plan 2021*, and operations and acquisition systems.

For the purposes of this document, the INL site consists of those facilities operated by Battelle Energy Alliance, LLC (BEA), Fluor Idaho, LLC, and the DOE Idaho Operations Office (DOE-ID). This SSP encompasses all contractors and activities at the INL site under the control of DOE-ID. The operations and activities of the Naval Reactors Facility are specifically excluded from this SSP.

This document serves as the overall SSP for the INL site. It is supplemented by individual contractor plans and strategies as needed. Updates to the SSP are anticipated annually with added specificity as projects are developed and requirements change.

The DOE Office of Environmental Management (EM) assumptions for this SSP include the successful completion of the Idaho Cleanup Project (ICP) Core mission and that the capability to certify, package, assemble, and complete Waste Isolation Pilot Plant shipments will continue until the contact-handled transuranic waste is shipped.

The intent of this SSP is to provide the overall sustainability strategy for the INL site during FY 2022 and provide a status of FY 2021 performance to the DOE goals. The FY 2021 performance status is derived from data input to the DOE Sustainability Dashboard (Dashboard). Due to the accelerated Dashboard schedule and the extended Fleet Automotive Statistical Tool (FAST) completion schedule, the fleet fuel data, Sitewide emissions data, and fleet fuel usage data were not finalized by the SSP and Dashboard submission deadlines.

The INL site contractors' EMS provides the framework and process for evaluating and monitoring emissions and related reduction activities. On an annual basis, appropriate sustainability targets are developed and monitored through the EMS to support the overall reduction in emissions. As DOE-EM programs complete projects, resource, and space management optimization results in reductions in energy and water consumption. Fugitive emission reduction is managed through ongoing waste and resource reductions.

The first ever INL Net-Zero Plan was authored and contains an aggressive set of goals and objectives to achieve carbon net-zero within ten years. Although EM operations will strive to minimize energy use,

waste, and emissions, the EM mission is not included in the net-zero goal. The plan follows the principles found in the Climate Adaptation and Resilience Plan (CARP), of which the first objective will follow the guidelines found in the Vulnerability Assessment and Resiliency Plan (VARP).

The INL site spent $15.6M in FY 2021 for facility, process, and equipment energy. Of this total, $12.5M was spent for building energy, $2.2M was spent for process energy, and $872K was spent on equipment fuel. Total utility and fuel costs in FY 2021 were almost identical to FY 2020. The INL site used 842.7 billion Btu for building energy, 134.6 billion Btu for process energy, 836 kgal of vehicle fuel, 253 kgal of equipment fuel, and 855 million gal of water.

Total energy intensity through FY 2021 decreased 5.7% from FY 2020, 8.0% from the FY 2015 baseline, and by 22.4% when compared to the FY 2003 statute goal baseline, primarily due to new energy-efficient buildings and construction of numerous efficiency upgrade projects. Water consumption was 19.4% lower in FY 2021 as compared to the FY 2007 baseline.

Preliminary data indicate transportation petroleum-based fuels reduction of 14.7% and alternative fuel use decrease of 53.4% compared to FY 2005. INL discontinued use of renewable diesel in the bus fleet which severely impacted both metrics.

Table ES-1 summarizes the FY 2021 performance status. A complete discussion of the FY 2021 status and planned FY 2022 actions toward meeting the goals and requirements are found in the body of this SSP.

Table ES-1. Executive Summary table of DOE sustainability goals.

Prior DOE Goal	Current Performance Status	Planned Actions and Contributions	Overall Risk of Non-Attainment
Energy Management			
Reduce energy-use intensity (Btu per gross square foot) in goal-subject buildings.	Energy-use intensity (EUI) was 141,958 Btu/ft² for FY 2021, a decrease of 8.0% from FY 2015 and 5.7% from FY 2020.	Seven light emitting diode (LED) lighting and controls projects are planned for FY 2022, providing $111K (1,820 MWh) in energy savings at total costs of $683K. Develop a large energy-reduction performance contract project from the compiled results of the energy and water audits.	**Medium/Financial** Low cost of energy and water make project payback difficult to justify on a life-cycle basis.
Energy Independence and Security Act (EISA) Section 432 continuous (4-year cycle) energy and water evaluations.	Energy and water evaluations were completed in 18 covered buildings in FY 2021. These audits represent 18% of the current covered buildings for the first year of the third 4-year audit cycle (June 1, 2020, through May 31, 2024). INL is on track with its planned and scheduled audits.	Complete annual energy audits for 25% of INL's 104 covered buildings for each year of the third 4-year audit cycle (June 1, 2020, through May 31, 2024). INL plans to audit 17 buildings in FY 2022.	**Low/None** INL's building audit program is fully established.

Table ES-1. (continued).

Prior DOE Goal	Current Performance Status	Planned Actions and Contributions	Overall Risk of Non-Attainment
Meter individual buildings for electricity, natural gas, steam, and water, where cost effective and appropriate.	100% of natural gas and 65.1% of electric usage metered at the building level.	One new INL building is planned for completion in FY 2022 and will have advanced metering. Work completed in FY 2021 on Fluor Idaho's Utility Control System project at Idaho Nuclear Technology and Engineering Center (INTEC) will provide the capability to capture electrical power use in facilities fed through substations and load centers. Meter 100% of appropriate covered buildings.	**Low/None** New INL buildings are specified for advanced metering and selected appropriate buildings are specified for sub-metering.
Water Management			
Reduce potable water-use intensity (Gal per gross square foot).	Water intensity was 140.2 gal/ft² in FY 2021, a decrease of 19.4% from FY 2007 and 1.4% from FY 2020.	Prepare and implement a water balance evaluation to identify high water-use intensity processes and buildings. Implement audit-identified low and moderate cost water conservation measures in covered facilities, including high-efficiency water technologies.	**Medium** Water usage is highly dependent upon the varying process water consumption at the Advanced Test Reactor (ATR) Complex.
Reduce non-potable freshwater consumption (Gal) for industrial, landscaping, and agricultural.	Not Applicable. Water obtained from the Snake River Plain Aquifer and is considered potable.	Industrial, Landscape, and Agricultural (ILA) water is not applicable.	**Low/None** ILA water is not used.

Table ES-1. (continued).

Prior DOE Goal	Current Performance Status	Planned Actions and Contributions	Overall Risk of Non-Attainment
Waste Management			
Reduce non-hazardous solid waste sent to treatment and disposal facilities.	Generated 2,695,757.0 lb (1,222.8 MT) of non-hazardous Municipal Solid Waste in FY 2021. In FY 2020, 2,562,397.5 lb (1,162.3 MT) was generated, resulting in an increase of Municipal Solid Waste (MSW) generated of 5.2% year-over-year (YOY). Diverted 59.6% of non-hazardous solid waste in FY 2021 by recycling 1,607,025.1 lb (728.9 MT) of materials.	Continue to educate personnel emphasizing the priority of waste reduction from the previous year. Continue to evaluate potential outlets and expansion of recyclable waste streams and impacts from COVID-19 telework directive. Explore glass recycle partnership with the City of Idaho Falls. Investigate and develop regional composting facility based on West Yellowstone pilot project.	**Medium** Fluctuations in building use including classified spaces, employee engagement, and market forces greatly affect this goal.
Reduce construction and demolition materials and debris sent to treatment and disposal facilities.	Generated 23,184.3 MT of construction and demolition (C&D) waste in FY 2021, compared to 20,041.5 MT in FY 2020, resulting in an increase of 15.68% of C&D waste generated YOY. Diverted 58.0% (29,657,122.3 lb or 13,452.2 MT) of its C&D waste in FY 2021.	Continue employee education and contract language inclusion and incorporate additional materials into current C&D waste diversion processes. Work with regional industrial recycle entities and develop strategy to recycle two construction wastes streams: concrete and gypsum.	**Medium** Construction continues to increase while markets accepting construction debris are limited. Cost of transporting to acceptable recycler is a major factor in the decision process.

Table ES-1. (continued).

Prior DOE Goal	Current Performance Status	Planned Actions and Contributions	Overall Risk of Non-Attainment
Fleet Management			
Reduce petroleum consumption.	*Preliminary data indicate* 800,420 gasoline-gallon equivalents (GGE) of petroleum-based fuels was used in FY 2021, a 14.7% reduction from FY 2005 and a 24.1% increase from FY 2020.	As INL implements its newly developed Net-Zero Plan, a greater emphasis will be placed on acquiring electric buses and heavy equipment along with electrifying its light-duty fleet and the installation of supporting charging stations. Optimize and right-size fleet composition by reducing vehicle size, eliminating underutilized vehicles, and acquiring vehicles to match local fuel infrastructure.	**Medium** The petroleum reduction goal will be challenging due to the cost and availability of electric motor coaches and heavy equipment.
Increase alternative fuel consumption.	*Preliminary data indicate* 35,657 GGE of alternative fuels was used in FY 2021, a 53.4% decrease from FY 2005 and a 68.1% decrease from FY 2020.	Determine less-costly sources of R99 for the interim while electric buses are being evaluated and procured.	**Medium** The alternative fuel increase goal will be challenging due to cost and availability of electric vehicles and the excessive cost of renewable diesel.
Acquire alternative fuel and electric vehicles.	Acquired 50 new light-duty vehicles in FY 2021, 12 of which were alternative fuel vehicles (AFVs) or EVs.	Identify the next group of petroleum-fueled vehicles for replacement with AFVs or EVs and ensure that all existing AFVs are replaced EVs when available. Work with General Services Administration (GSA) to achieve 75% or greater AFV and electric vehicle (EV) light-duty acquisitions.	**Medium** This goal has historically been met but may be difficult to meet in the future due to the availability of appropriate EV light-duty vehicle fuel types supplied by GSA.

Table ES-1. (continued).

DOE Goal	Current Performance Status	Planned Actions and Contributions	Overall Risk of Non-Attainment
Clean and Renewable Energy			
Increase consumption of clean and renewable electric energy.	Procured 17,977 MWh of Renewable Energy Certificates (REC) from Idaho Falls Power at a total cost of $85,390. This purchase of new renewable energy RECs, in addition to the 41.9 MWh of onsite generation (microgrid, and small photovoltaic) plus bonuses totals 18,690 MWh (8.5%) of renewable energy for FY 2021.	As INL implements its recently developed Net-Zero Plan, a greater emphasis will be placed on internal applications of renewable energy generation to meet this goal. Incremental increases of purchased RECs will continue to be made along with onsite generation to meet a minimum of the 7.5% goal each year YOY.	**Low** Established process for procuring RECs.
Increase consumption of clean and renewable non-electric thermal energy.	Two buildings with solar transpired walls to provide make-up air preheating.	Investigate the additional use of solar water heating, make-up air preheating, or ground source heat pumps in select locations.	**Medium** Due to the low cost of electric energy, it is challenging to justify the installation of thermal renewable.
Sustainable Buildings			
Increase the number of owned buildings that are compliant with the Guiding Principles for Sustainable Buildings.	At the end of FY 2021, 25 DOE-owned buildings were compliant with the Guiding Principles, which represents 25.25% of buildings. This includes six buildings less than 10,000 GSF.	Document Guiding Principles compliance on one new construction building in FY 2022 and three additional new construction buildings by the end of FY 2024. Implement additional audit-identified low- and moderate-cost ECMs at covered facilities that are targeted to document the Guiding Principles.	**Low** The 15% goal was achieved.
Acquisition and Procurement			
Promote sustainable acquisition and procurement to the maximum extent practicable, ensuring all sustainability clauses are included as appropriate.	100% of the contracts in FY 2021 contained applicable clauses.	Achieve 100% compliance. Continue to incorporate improvements to the Sustainable Acquisition Program, including procedures, policies, and enhanced work processes that increase visibility, availability, and use of sustainable products.	**Low** The goal continues to be achieved.

Table ES-1. (continued).

DOE Goal	Current Performance Status	Planned Actions and Contributions	Overall Risk of Non-Attainment
Efficiency and Conservation Measure Investments			
Implement life-cycle cost-effective efficiency and conservation measures with appropriated funds and/or performance contracts.	Six energy-reduction projects were completed in FY 2021 providing over $19K in energy cost savings. No additional Energy Savings Performance Contract (ESPC) projects were developed in FY 2021.	LED lighting projects are planned for 11 buildings. Continue to evaluate cost effectiveness of the ENABLE and other ESPC options.	**Low** While there are no current plans for an additional ESPC project, the INL site does have established plans and goals for projects awarded and targeted in FY 2022.
Electronic Stewardship and Data Centers			
Electronics stewardship from acquisition, operations, to end of life.	In FY 2021, 100% of electronic devices were reused or recycled; however, only 74.3% were recycled with a certified recycler.	100% of electronics are reused or recycled unless federal requirements dictate otherwise. Continue to partner with Information Management (IM) and Property Disposal Services to improve electronics end-of-life disposition.	**Low** This goal continues to be achieved.
Increase energy and water efficiency in high-performance computing and data centers.	Continued consolidating server infrastructure in the old High-Performance Computing (HPC) data center by virtualizing physical machines and taking advantage of cloud and container hosting options	Install and monitor advanced energy meters in all data centers and accurately quantify Power Usage Effectiveness (PUE).	**Medium** Low energy costs and long construction times may prohibit major investments in updated resiliency measures.

Table ES-1. (continued).

DOE Goal	Current Performance Status	Planned Actions and Contributions	Overall Risk of Non-Attainment
Organizational Resilience			
Implement climate adaptation and resilience measures.	INL emergency plans and emergency plan implementing procedures (EPIs) were reviewed and revised, as necessary. Operating policies and procedures were evaluated to determine whether they should be modified to consider organizational risks. Internal procedures were modified or developed to face the challenge of the pandemic.	Conduct detailed vulnerability assessments using the Vulnerability Assessment and Resiliency Planning process to identify projects that increase resilience. Emergency response, workplace safety and health, and updated scientific knowledge will be incorporated into all facets of organizational resilience, procedures, and protocols. Pursue life-cycle cost-effective energy resilience solutions that provide the most reliable energy to critical mission operations.	**Low to Medium** Investment upgrades in existing buildings are a long-term process. New buildings are being built to include resiliency measures.
Multiple Categories			
Reduce Scope 1 & 2 greenhouse gas emissions.	*Preliminary data indicate* Scope 1 & 2 emissions were 89,391.4 metric tons of carbon dioxide equivalent (MT CO_2e) compared to 84,019.9 MT CO_2e in FY 2020, for a YOY increase of 6.4% and a 36.6% reduction from the FY 2008 baseline.	Refine targeted list of high-value, low-cost ECMs with a focus on projects that reduce total emissions by 45% by the end of FY 2024. Reduce or minimize the quantity of toxic and hazardous chemicals acquired, used, or disposed that will assist INL in pursuing agency greenhouse gas reduction targets.	**Medium** INL has committed to be carbon net-zero by the end of FY 2031. Significant progress was made toward exceeding the overall goal, but YOY Scope 1 and 2 greenhouse gases (GHG) emissions may continue to vary.
Reduce Scope 3 greenhouse gas emissions.	*Preliminary data indicate* FY 2021 Scope 3 emissions were 15,586.6 metric tons of carbon dioxide equivalent (MT CO_2e) compared to 19,042.6 MT CO_2e in FY 2020, for a YOY reduction of 18.1% and a 55.8% reduction from the FY 2008 baseline.	Continue to encourage teleworking, video conferencing, and carpooling as effective ways to reduce the amount of air and ground travel, including employee commuting. Achieve a YOY 2% annual reduction for 5 years for a total 10% reduction.	**Medium** Significant progress was made toward exceeding the overall goal, primarily due to ongoing telework and travel restrictions. YOY Scope 3 GHG emissions may continue to vary.

INTENTIONALLY BLANK

CONTENTS

FIGURES

TABLES

ACRONYMS

AFV	alternative fuel vehicle
AMWTP	Advanced Mixed Waste Treatment Project
ASHRAE	American Society of Heating, Refrigeration, and Air Conditioning Engineers
ATR	Advanced Test Reactor
B20	biodiesel
BEA	Battelle Energy Alliance, LLC
Btu	British thermal unit
C&D	construction and demolition
CARP	Climate Adaptation and Resilience Plan
CAS	condition assessment survey
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CFA	Central Facilities Area
CPP	Chemical Processing Plant
D&D	decontamination and dismantlement
DOE	Department of Energy
DOE-ID	Department of Energy Idaho Operations Office
E85	ethanol 85
EAct 20	Energy Act of 2020
EB	existing building
EBR-I	Experimental Breeder Reactor I
ECM	energy conservation measure
EISA	Energy Independence and Security Act
EM	Office of Environmental Management
EMS	Environmental Management System
EO	Executive Order
EPA	Environmental Protection Agency
EPEAT	Electronic Product Environmental Assessment Tool
EPI	emergency plan implementing procedure
EROB	Engineering Research Office Building
ESL	Energy Systems Laboratory
ESPC	Energy Savings Performance Contract
EUI	energy-use intensity
FAST	Federal Automotive Statistical Tool
FEMP	Federal Energy Management Program
FIMS	Facilities Information Management System
FMCS	Facilities Management Control Systems
FY	fiscal year
GGE	gasoline-gallon equivalent
GHG	greenhouse gas
GSA	General Services Administration
gsf	gross square feet
HPC	high-performance computing
HVAC	heating, ventilating, and air conditioning
ICP	Idaho Cleanup Project
ILA	industrial, landscaping, and agricultural
IM	Information Management
INL	Idaho National Laboratory
INTEC	Idaho Nuclear Technology and Engineering Center
IRC	INL Research Center
IWTU	Integrated Waste Treatment Unit
LED	light emitting diode
LDV	light-duty vehicle

LGHG	low greenhouse gas
MCI	Motor Coach Industries
MFC	Materials and Fuels Complex
MT	metric tons
NC	new construction
PC	personal computer
PUE	power utilization effectiveness
R&D	research and development
RCRA	Resource Conservation and Recovery Act
REC	Renewable Energy Credit
RWMC	Radioactive Waste Management Complex
SA	sustainable acquisition
SMC	Specific Manufacturing Capability
SRIP	Sustainability Report and Implementation Plan
SSP	Site Sustainability Plan
STD	standard
TAN	Test Area North
UESC	Utility Energy Service Contract
VARP	Vulnerability Assessment and Resilience Planning
VDI	virtual desktop infrastructure
WMF	Waste Management Facility
YOY	year-over-year

OVERVIEW

Idaho National Laboratory site (INL site) is all operating contractors along with the Department of Energy (DOE) Idaho Operations Office (DOE-ID), and includes the Idaho Falls campus and the research and industrial complexes located 50 miles west of Idaho Falls (Figure 1). Idaho National Laboratory (INL) consists of those facilities operated by Battelle Energy Alliance, LLC (BEA). The Idaho Cleanup Project (ICP) Core consists of those facilities operated by Fluor Idaho, LLC (Fluor). BEA and Fluor Idaho include all facilities under their individual responsibility.

The DOE Office of Environmental Management (DOE-EM) assumptions for this SSP include the successful completion of the Idaho Cleanup Project (ICP) Core mission. In particular, the Advanced Mixed Waste Treatment Project (AMWTP) began closure actions in FY 2020, which will continue in FY 2022. Storage facilities will remain operational while existing inventory is shipped for disposal.

AMWTP, Idaho Nuclear Technology and Engineering Center (INTEC), and Radioactive Waste Management Complex (RWMC) non-enduring buildings will transition to a cold, dark, and dry status as the cleanup mission progresses over the next 5 to 10 years, reducing energy use. Decontamination and decommissioning (D&D) will follow as funding allows.

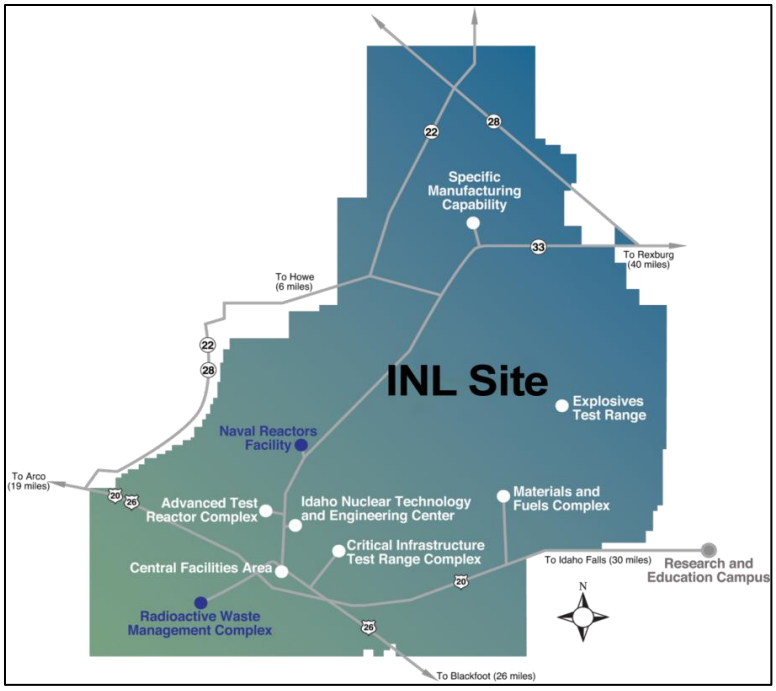


Figure 1. INL site map.

Work scope planned to be performed by the Idaho Cleanup Project in the next 5 to 10 years includes treating sodium-bearing waste, closing the INTEC Tank Farm, preparing and packaging of calcined waste, closing Accelerated Retrieval Project facilities at RWMC with placement of a final engineered barrier on the Subsurface Disposal Area, and completing treatment and shipment of mixed transuranic wastes. The trend is for reducing energy use after waste treatment, specifically, sodium-bearing waste and transuranic waste treatment completion.

INL is planning for moderate growth to further its missions with additional research laboratories and office buildings. The *INL Annual Laboratory Plan Fiscal Year 2021* provides an overview and details of conceptual laboratory growth. These growth areas include research programs related to nuclear reactor sustainment and expanded deployment, integrated fuel cycle solutions, advanced materials and manufacturing for extreme environments, integrated energy systems, and secure and resilient cyber-physical systems. Accordingly, INL facilities are expected to increase electric energy demand based on numerous new buildings and processes being designed and constructed.

The Naval Reactors Facility commenced operation of the Spent Fuel Handling Recapitalization Project in FY 2015, with significant construction between 2019 and 2025. This large project will not impact the INL site directly but will impact the electric distribution system that INL manages.

INL site growth is likely to increase energy use but will be balanced to some extent with decommissioning and renovation of older buildings and processes.

During FY 2021, INL developed a Net-Zero Plan, *INL Net-Zero: The Path Forward*. This plan outlines INL's approach to a sustainable, equitable, and resilient climate future. To achieve the goal of being carbon neutral within 10 years, INL plans to significantly reduce emissions through operational upgrades, a migration to an electric fleet with clean grid integration, and the establishment of onsite carbon-free electric generation.

1. ENERGY MANAGEMENT

1.1 Energy Usage and Intensity

Energy sources at Idaho National Laboratory (INL) site affected by this goal include electricity, natural gas, fuel oil, liquefied natural gas, and propane. Methods to reduce energy usage include capital project upgrades, alternative financing projects, operational modifications, and workforce behavior changes.

Many factors influence energy use, including numerous energy-intensive processes and inefficient buildings built before the current standards for energy efficiency and high-performance design. Due to the nature of the various INL site missions, many operations can be cyclical and result in a year-over-year (YOY) variance in energy consumption. As buildings are removed or processes are modified, INL site energy usage intensity can vary seemingly unrelated to actual overall reduction efforts.

The INL site typically uses energy audits and retro-commissioning to evaluate existing buildings for energy-reduction opportunities. These opportunities are developed into projects with the most cost-effective projects or projects that improve operating conditions being pursued for funding and implementation.

Energy data are routinely input into the EPA Portfolio Manager for 97 metered buildings to analyze and identify energy-use trends and anomalies. These trends and anomalies are discussed with facility managers and often result in the identification of low or no-cost modifications that reduce energy usage.

Since energy-intensive loads that are mission specific are excluded from the goal according to the *Guidelines Establishing Criteria for Excluded Buildings* published by Federal Energy Management Program (FEMP) on January 27, 2006, the Advanced Test Reactor (ATR) and its support buildings, the Engineering Research Office Building (EROB) High-Performance Computing (HPC) Data Center, the Collaborative Computing Center (C3) supercomputer, and two processes at the Energy Systems Laboratory (ESL) are currently excluded from the reporting goal but are not excluded from the responsibility to reduce energy use and greenhouse gases (GHGs) where practicable. These buildings are shown in Facilities Information Management System (FIMS) as excluded facilities and/or processes. The excluded square footage of these buildings appears on the excluded facilities list in Appendix A.

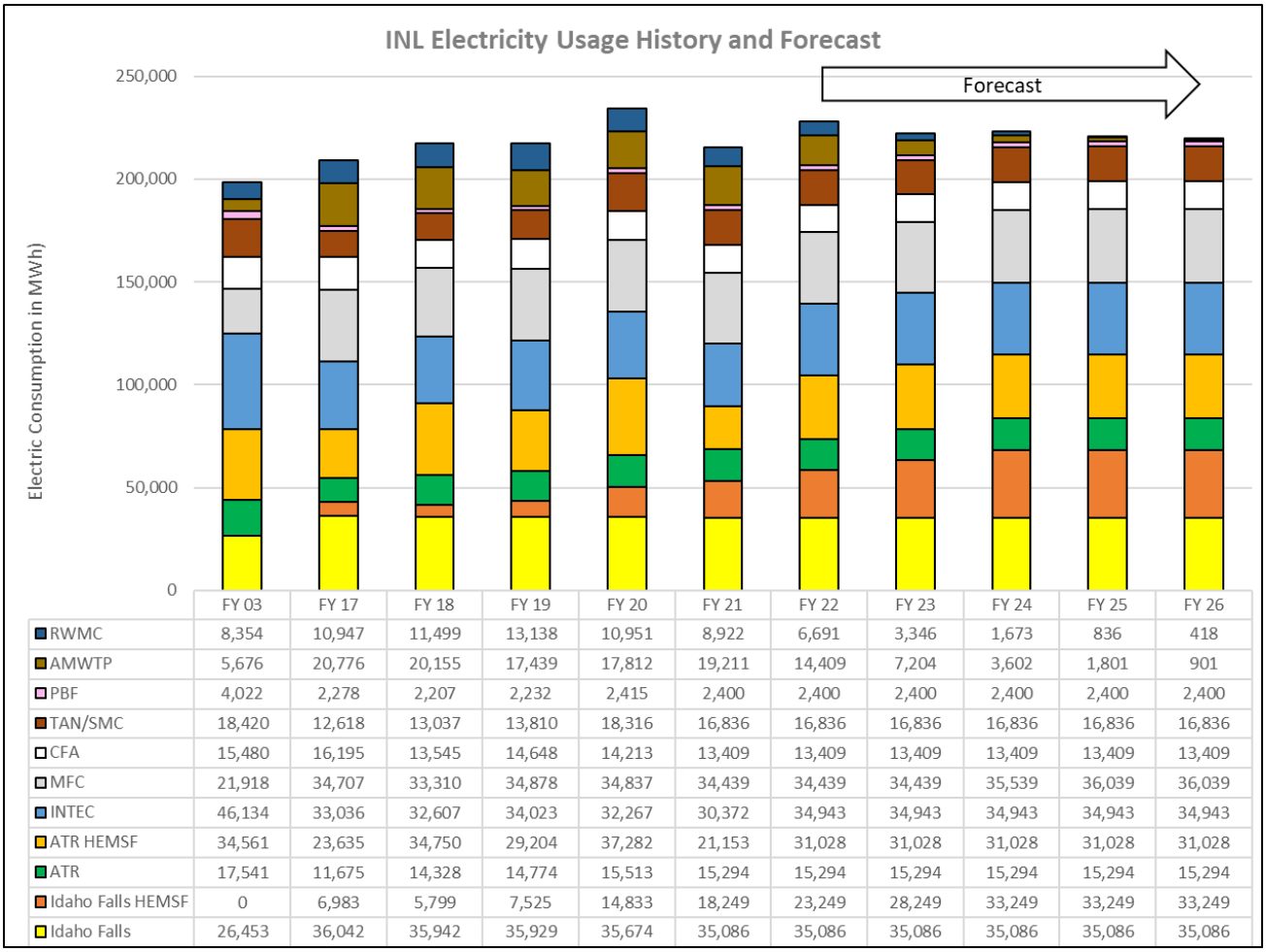
Inexpensive electric rates impact the cost effectiveness of energy-saving projects. While the INL site strives to implement energy-reduction projects, especially to meet Guiding Principles requirements, this goal continues to be a significant challenge.

1.1.1 Performance Status

As demonstrated through data calculated by the Dashboard, the energy-use intensity (EUI) for FY 2021 was 141,958.1 Btu/ft². When compared to the FY 2015 baseline of 154,357.7 Btu/ft², a decrease of 8.0% was observed along with a 5.7% decrease from FY 2020. However, using the current statute baseline for FY 2003 of 182,979 Btu/ft², a reduction of 22.4% has been achieved.

In FY 2021, INL completed energy-efficient light-emitting diode (LED) lighting upgrades in six buildings at a cost of $131.6K. Energy savings of over 130.8 MWh was achieved with annual cost savings totaling $19.3K. Additionally, two new energy-efficient boilers were installed in one Idaho Falls office building, replacing the almost 40-year-old unit original to the building.

Figure 2 illustrates historic and projected electric consumption, goal subject and excluded, for the INL site's major campus areas. Electricity consumption is expected to increase over the next 3 years as new building construction projects are completed. However, total energy consumption should have a decreasing trend after FY 2021 as AMWTP processes shut down and buildings begin D&D.



	FY 03	FY 17	FY 18	FY 19	FY 20	FY 21	FY 22	FY 23	FY 24	FY 25	FY 26
RWMC	8,354	10,947	11,499	13,138	10,951	8,922	6,691	3,346	1,673	836	418
AMWTP	5,676	20,776	20,155	17,439	17,812	19,211	14,409	7,204	3,602	1,801	901
PBF	4,022	2,278	2,207	2,232	2,415	2,400	2,400	2,400	2,400	2,400	2,400
TAN/SMC	18,420	12,618	13,037	13,810	18,316	16,836	16,836	16,836	16,836	16,836	16,836
CFA	15,480	16,195	13,545	14,648	14,213	13,409	13,409	13,409	13,409	13,409	13,409
MFC	21,918	34,707	33,310	34,878	34,837	34,439	34,439	34,439	35,539	36,039	36,039
INTEC	46,134	33,036	32,607	34,023	32,267	30,372	34,943	34,943	34,943	34,943	34,943
ATR HEMSF	34,561	23,635	34,750	29,204	37,282	21,153	31,028	31,028	31,028	31,028	31,028
ATR	17,541	11,675	14,328	14,774	15,513	15,294	15,294	15,294	15,294	15,294	15,294
Idaho Falls HEMSF	0	6,983	5,799	7,525	14,833	18,249	23,249	28,249	33,249	33,249	33,249
Idaho Falls	26,453	36,042	35,942	35,929	35,674	35,086	35,086	35,086	35,086	35,086	35,086

Figure 2. INL site electricity usage history and forecast.

The data center in Idaho Falls, which, along with the ATR Reactor, are high-energy mission-specific facilities excluded from the goal-subject energy-use reporting requirements.

Electric consumption may increase significantly in future years for construction and operation of the potential nuclear reactor demonstrations being considered. Further evaluation of this increased electric load will be performed during FY 2022.

Figure 3 outlines the total goal-subject energy used by fuel type and provides the current and forecasted EUI for goal-subject buildings.

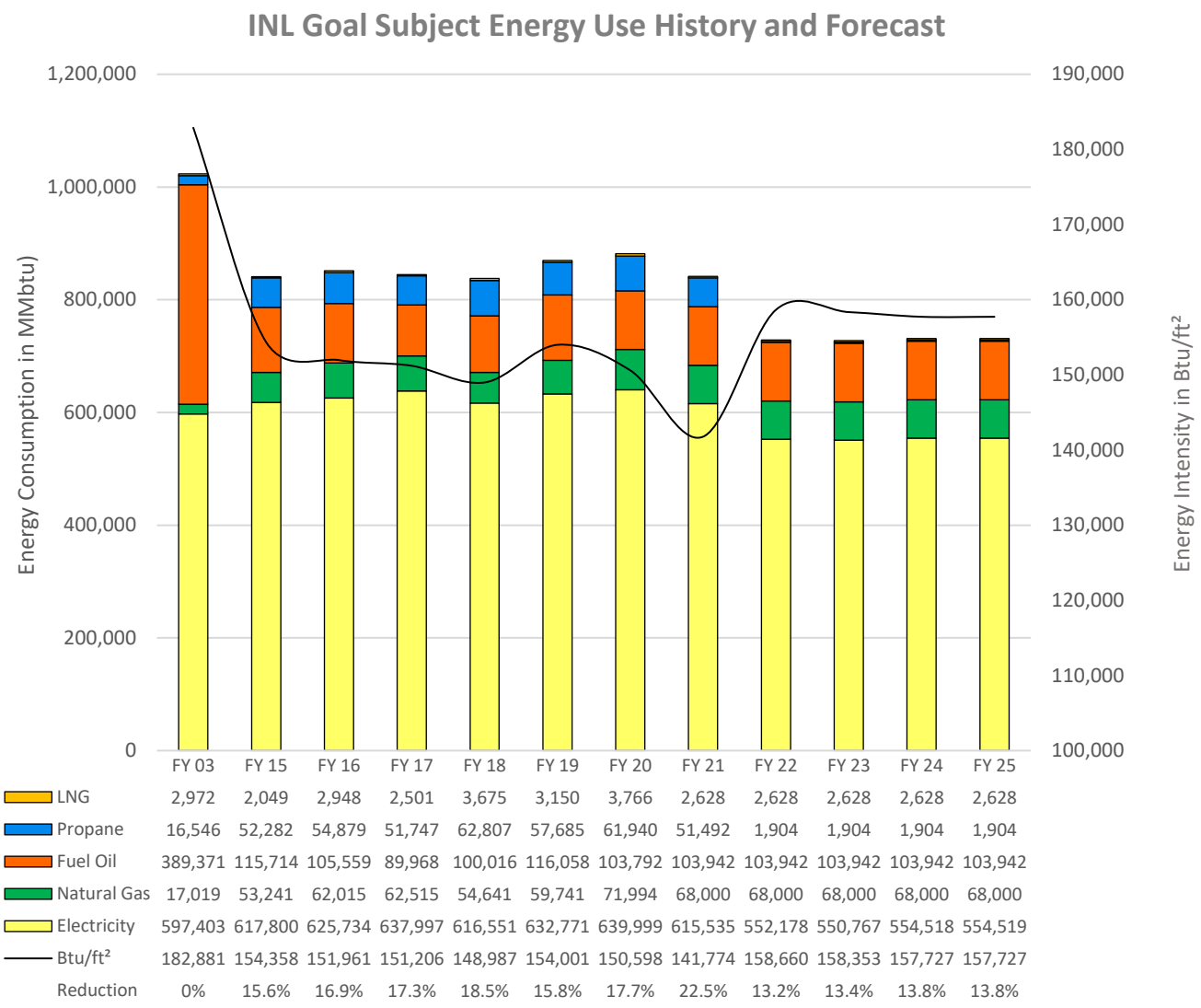


Figure 3. Goal-subject energy use and EUI history and forecast.

This chart shows fuel oil usage reduced significantly since base-year FY 2003 due to the ATR backup generator set being replaced with a large uninterrupted power supply system. Electric consumption and energy intensity were both reduced in FY 2021 due to the addition of newer more energy-efficient buildings.

Goal-subject electric energy and propane are both projected to decrease significantly beginning in FY 2022 as the AMWTP and RWMC areas begin a transition of shut down and D&D. During that period, the energy use for these buildings, along with the square footage, will be excluded under Part E of the Excluded Building guidance as they are transitioning out of the building inventory.

NOTE: *Due to the large building area associated with AMWTP/RWMC, the total EUI is expected to increase as this building area is excluded from the Goal-Subject EUI calculation.*

The higher EUI is forecast to slowly decrease from FY 2022 through FY 2025 due to the increased efficiency of new buildings under construction along with LED lighting upgrade projects that are planned for implementation.

INL completed an energy balance update in FY 2021 by evaluating emerging energy-use trends and evaluating selected buildings with higher energy-use intensities. Six buildings were evaluated for current

operational practices and recent system upgrades. The findings show several upgrades resulted in expected energy reductions, while unexpected equipment and system damage and deterioration continues to result in high-energy use intensity than would be expected with similar buildings. The energy balance update confirmed the causal relationship with outside temperatures and building energy-use intensity.

1.1.2 Plans and Projected Performance

INL is planning for moderate growth to further its missions with four additional support, laboratory, and office buildings through FY 2024. The *INL Annual Laboratory Plan* provides an overview and details of conceptual laboratory growth.

All new INL construction projects are guided by STD-139, "INL Engineering Standards," and by the *INL High-Performance and Sustainable Building Strategy*. These two documents reference a requirement for implementation of the Guiding Principles for High-Performance Sustainable Buildings, which requires an energy design of 30% better than the current American Society of Heating, Refrigeration, and Air Conditioning Engineers (ASHRAE) Standard 90.1, "Energy Standard for Buildings except Low-rise Residential Buildings."

Energy-related capital project upgrades are strategically funded primarily through the following funding sources:

- Direct and indirect funding and reinvesting cost savings from sustainable actions
- Special funding requests (third-party, DOE-based funding, line-item)
- Utility incentive programs
- Integration of sustainability into new infrastructure, major renovations, and maintenance activities.

Use of available utility incentive programs will be maximized along with the INL energy savings reinvestment program to help fund additional projects and/or reduce the cost to implement alternatively funded projects.

INL has six projects underway for completion in FY 2022 with a focus on LED lighting to reduce energy usage while significantly improving the indoor work environment. These projects are estimated to cost $350K and will reduce annual electric use by an estimated 968 MWh and provide savings of $65K. A highly reflective roof is planned for installation at the INL Research Center. In addition, as funding becomes available during FY 2022, INL will continue to focus on projects that directly influence the efficiency of buildings to reduce energy-use intensity. Additionally, Fluor has an LED lighting project planned for four buildings with an estimated energy savings of 852 MWh.

Further energy intensity reductions will continue to be pursued though multiple strategies:

- Perform energy auditing on all covered buildings and implement cost-effective recommendations from these audits.
- Continue to evaluate high EUI buildings and determine best candidates for more thorough energy auditing and/or retro-commissioning and implement cost-effective retrofit projects.
- Satisfy sustainable acquisition requirements to purchase ENERGY STAR and FEMP-recommended devices.
- Meet Green Building goals for new and existing buildings (Guiding Principles for new construction and existing buildings).
- Continue educational campaigns to change employee behaviors (turn off lights and computers when leaving at the end of shifts, utilize power management when available, and avoid using space heaters, personal refrigerators, etc.).
- Completed construction of the Integrated Waste Treatment Unit (IWTU) in FY 2011 to allow treatment of the remaining wastes at the INTEC Tank Farm facility. Systems testing has resulted in various facility modifications since construction completion. As such, multiple test runs with

surrogate wastes in FY 2015, 2016, 2017, 2018, and 2019 have been conducted. Mixed waste treatment operations are anticipated began in FY 2021, and it is anticipated that the IWTU will require 5 to 7 years of operations to treat the remaining wastes at the INTEC Tank Farm facility. An increase in INTEC energy use is expected to occur during the treatment process. After the IWTU processing is complete, the Calcine Disposition Project may use a portion of the IWTU facility. The Calcine Disposition Project is also expected to be an energy-intensive treatment process.

- Fluor Idaho's planned actions for energy reduction include discontinuing processes as the cleanup mission and continuing D&D scope are completed. For selected enduring buildings, LED upgrade projects will continue as funds become available. Building modification currently underway at CPP-691 will include replacing building lighting with LED lighting. While significant portions of the cleanup mission are complete, EM operations will continue limited cleanup mission activities, processing wastes, and inactivating buildings and processes that are no longer needed.
- Determine if the Integrated Waste Treatment Unit operated by Fluor should be goal exempted.

1.2 EISA Section 432 Benchmarking and Evaluations

The INL site's goal for Energy Independence and Security Act (EISA) Section 432 energy and water evaluations is to assess approximately 25% of covered buildings each year to meet the requirement. Covered buildings are defined as those buildings that constitute at least 75% of facility energy use at each agency (42 U.S.C. 8253 (f)(2)(B)). The list of INL and Fluor Idaho covered buildings is updated annually in the Dashboard.

INL will complete ASHRAE Level 1 or Level 2 energy audits as follows:

- **ASHRAE Level 1 Audit:** This is the standard energy audit that is recommended for most of INL's covered buildings. The ASHRAE Level 1 Audit, sometimes called a "walk-through audit," involves minimal interviews with operating personnel, a brief review of facility utility bills and other operating data, and a walk-through of the facility, all geared toward the identification of glaring areas of energy waste or inefficiency. The data compiled is then used for the preliminary energy use analysis and report detailing low-cost/no-cost measures and potential capital improvements for further study. Typically, a Level 1 audit will only uncover major problem areas. Corrective measures identified are briefly described and include estimates of implementation costs, potential operating cost savings, and simple payback calculations.

  The Level 1 audit will validate previously completed audit reports, document changes to the operation, function, and condition of the building since the prior report, and advise if a more detailed Level 2 audit or RCx evaluation is warranted for the next audit cycle. Level 1 audits are typically recommended for low energy-use buildings such as warehouses, buildings with very simple configurations, and buildings that are in standby mode. ASHRAE Level 1 audit report expectations consist of a written report detailing the results of the audit scope as listed above. It may also be an addendum to the previous report, which includes a description of changes in the configuration, condition, energy or water consumption, and/or operation of the facility since the last audit was performed. It shall include a verification that the energy and water efficiency upgrade measures recommended from the previous report are implemented or are still applicable. For all recommended upgrade measures, a Level 1 audit includes a general count of affected equipment and systems. Energy simulation modeling is not required for Level 1 audits.
- **ASHRAE Level 2 Audit:** The ASHRAE Level 2 Audit is the audit level recommended for INL's more complex buildings. A Level 2 audit includes the preliminary ASHRAE Level 1 analysis, but also includes more detailed energy calculations and financial analysis of proposed energy efficiency measures. The financial, or life-cycle cost, analysis provides the facility owner with comprehensive understanding of the financial benefits of implementing specific energy efficiency measures. Utility bills are collected for a 36- to 48-month period to allow the auditor to evaluate the facility's energy/demand rate structures and energy usage profiles.

This type of audit identifies all energy conservation measures appropriate for the facility given its operating parameters. A detailed financial analysis is performed for each measure based on implementation cost estimates, site-specific operating cost savings, and the customer's investment criteria. Sufficient detail is provided to justify project implementation. The audit will validate the previously completed audit report, evaluate changes in annual energy usage, identify changes in building configuration, condition, or operation since the last audit, and/or recommend energy and water conservation measures based on the identified changes and/or new technologies. Detailed energy savings calculations or energy simulation modeling tools will be used to determine energy savings.

The Level 2 audit inspects the building envelope and documents deficiencies that will affect energy and water-use efficiency. It also provides equipment counts, locations, specifications, sizes, and conditions for energy and water consuming equipment including, but not limited to, HVAC systems, chillers, cooling towers, supply/exhaust fans, lighting controls, interior and exterior lighting fixtures, air compressors, fume hoods, and plumbing fixtures.

From the results of the Level 2 audit, a recommendation may be made to conduct a more detailed RCx evaluation in the next audit cycle to further evaluate and model building operational deficiencies and recommended improvements. Such recommendations will be noted in the report. The deliverable for each Level 2 audit is a written report detailing the results of the audit and may be an addendum to the previously completed report, as applicable, which includes a description of changes to the configuration, condition, energy or water consumption, and/or operation of the facility since the last audit was performed. The report discusses current or additional ECM recommendations as needed for building and/or process changes. It also includes a verification that the energy and water efficiency upgrade measures recommended from previous reports are either implemented or are still applicable.

ENERGY STAR Portfolio Manager is the tool used for energy benchmarking of buildings.

1.2.1 Performance Status

There are 97 buildings that have monthly energy data entered into Portfolio Manager for benchmarking purposes. Benchmarking data in Portfolio Manager is used for evaluating Guiding Principles' progress in building energy and water consumption reductions as well as tracking overall trends. For the FY 2021 reporting period, 93 buildings are expected to have sufficient monthly energy data available for the annual Compliance Tracking System upload.

There are 99 covered buildings that require energy audits. A total of 18 energy audits were completed in FY 2021, of which INL performed 18 energy audits and Fluor Idaho did not perform any audits.

In FY 2021, INL continued with a subcontract through Nelson Engineering, Inc. to perform energy and water evaluations in conjunction with condition assessment survey (CAS) inspections. The contract between Fluor Idaho and kW Engineering to perform energy and water evaluations, expired in 2021, but is anticipated to be renewed in FY 2022 between Jacobs and kW Engineering.

Benchmarking data from Portfolio Manager was analyzed and buildings were binned into six categories (laboratory, manufacturing, office, technology/science, and other) to compare the EUI amount buildings in each category. EUI by building type for 75 metered INL buildings with respect to the target energy intensity reduction goal is shown in Figure 4. Buildings that are higher than goal EUI are mainly in the categories of laboratory and technology/science. To help reduce EUI, INL plans to identify buildings with high EUI as candidates for energy retrofit upgrades and commissioning.

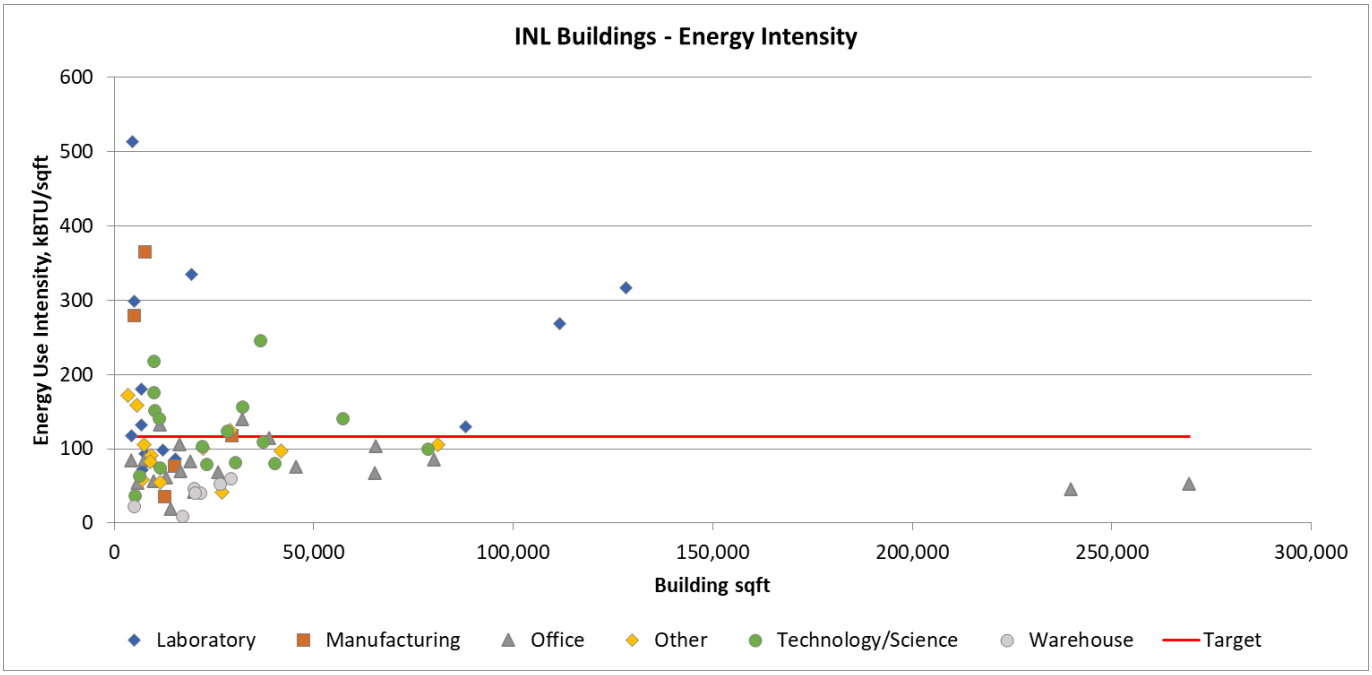


Figure 4. Building EUI relative to goal.

1.2.2 Plans and Projected Performance

INL will complete the FY 2022 energy and water evaluations in conjunction with CAS inspections by a common subcontractor to reduce the individual costs of both tasks. The order of buildings to be evaluated will consider the date of past audits and the schedule of needed CAS inspections with the intent that all covered INL buildings are evaluated over a 4-year period. The Idaho Cleanup Project plans to complete future a walk-through and ASHRAE Level 1 energy and water audits by working with a qualified subcontractor.

The ECMs identified by these evaluations are prioritized by payback period, potential to meet the Guiding Principles, and by the urgency or need of upgrades. As funding is available, these ECMs will be selected for implementation by a combination of priority and overall cost.

INL has developed the EISA Section 432 Covered Building and Energy Audit Schedule for the third energy audit 4-year cycle. Due to changes in INL's building inventory, this new 4-year schedule includes 99 covered buildings. INL plans to perform evaluations on 17 buildings in FY 2022 and will continue to prepare project implementation plans for the most cost-effective ECMs identified.

ECMs that were identified and proposed by the Fluor Idaho building energy audit subcontractor were further evaluated by relevant Fluor Idaho engineering staff for feasibility and prioritizing the implementation actions. Fluor Idaho updated their Sustainability Implementation Plan in 2020 to provide a process for prioritizing and implementing ECMs. Work completed in 2021 on Fluor Idaho's Utility Control System project at INTEC will provide the capability to capture electrical power use in facilities fed through substations and load centers.

Portfolio Manager will continue to be used as the energy and water consumption data warehouse and benchmarking tool to assist with overall consumption tracking and Guiding Principles evaluation. As new meters are installed on existing and new buildings, these buildings and the metered data will be entered into Portfolio Manager for benchmarking.

1.3 Facility Metering

Using a combination of the "Federal Building Metering Guidance" (November 2014 Update), Executive Order (EO) 13834 "Efficient Federal Operations," DOE Order 436.1 "Departmental Sustainability," and the DOE *Sustainability Report and Implementation Plan* (SRIP), appropriate opportunities for installing or upgrading utility metering were identified.

INL uses the Metering Planning Tool created in 2001 by the FEMP and updated regularly by INL. One file is maintained for the Idaho Falls buildings (Metering Planning Tool INL Site 602 FY-xx Update.xlsx), with a separate file maintained for the research and industrial and complexes (Metering Planning Tool INL Site 603 FY-xx Update.xlsx). These files are used to evaluate all INL covered building inventory for cost-effective and appropriate metering opportunities. These files show the currently planned meter installations for FY 2022 through FY 2024.

According to the Metering Guidance, all federal buildings, including owned and leased, are considered appropriate for energy or water metering unless identified for potential exclusion. The following exclusion criteria are used to select buildings that are not appropriate to be included and analyzed by the two spreadsheet tools for additional metering opportunities:

- Buildings with a planned removal or D&D date within the next four years (audit cycle)
- Buildings listed in FIMS as "Pending D&D," "Operational Standby," or "Shut Down"
- Buildings without an energy-consuming heating/cooling system or without significant process loads
- Buildings less than the minimum ft² thresholds in Table 1.

Table 1. Minimum ft² thresholds for metering.

Food Service/Sales	<1,000 ft²
Warehouses	<25,000 ft²
All Other Building Functions	≤5,000 ft²

In addition to providing a means of trending and validating energy savings, metering also provides proactive space management opportunities. Building energy and water usage information assists with benchmarking facility performance in Portfolio Manager, maintenance scheduling, enhanced resource utilization, and accurate space charge-back to building tenants. Advanced metering provides a method to encourage and validate employee behavior change and provides a dependable tool for facility managers to tune building systems and controls.

1.3.1 Performance Status

Through FY 2021, 65.1% of electric energy is metered on a building level.

There are 36 owned and leased buildings in Idaho Falls. Of these buildings, all 36 are metered for electricity on a building level basis with either standard or advanced metering. Two buildings have full-serviced leases.

There are 25 owned or leased buildings in Idaho Falls that use and are metered for natural gas. All these buildings are metered with standard gas meters.

Of the 36 buildings in Idaho Falls, 17 are metered for water along with one building that is billed through water-use calculations. There are also 14 buildings at the IRC Complex that are campus metered by a single meter.

The research and industrial complexes currently have electric meters installed at 87 covered and non-covered buildings, 64 of which have advanced meters while the remaining 23 have standard meters.

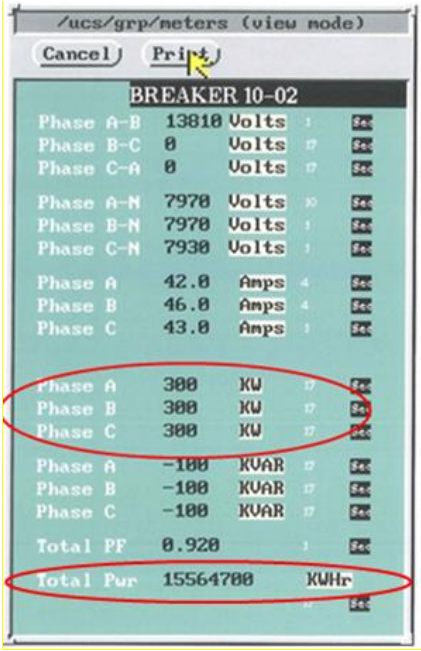
Two buildings at CFA share one liquefied natural gas storage tank and share the resultant natural gas for heating purposes: the CFA Dispensary and the CFA Fire Station. Both buildings have standard meters for natural gas, which are read monthly by hand.

As part of the MFC Energy Savings Performance Contract (ESPC) project that upgraded and consolidated the MFC central steam system to five individual buildings that would need steam distribution. Steam metering was installed on all five of these buildings. The remainder of the research and industrial complexes have several steam systems that may be further evaluated for applicability and cost effectiveness of steam metering.

All water that is pumped from the Snake River Plain Aquifer for the research and industrial complexes through deep wells is metered and the data compiled for annual reporting. Eight buildings located in the research and industrial complexes have building level water meters. Three new buildings occupied in FY 2021 will have a full years' worth of data in FY 2022.

Eight buildings at the ATR Complex are metered together as a process and are shown in FIMS as excluded buildings from the energy efficiency goals. The EROB HPC Data Center and two processes at ESL are also shown in FIMS as excluded facilities and/or processes. Similar to the EROB data center, the new Collaborative Computing Center's data center is separately metered from the building and is excluded from FY 2021 goal-subject energy reporting. The description and square footage of these buildings appears on the FY 2021 excluded facilities list in Appendix A.

The Utilities Control System (UCS) at INTEC allows for remote and automatic operation of the electrical distribution system from the control console located in CPP-1673. In FY 2021 a major upgrade to the INTEC UCS allowed for improved control of substations, power controls centers, and load centers INTECs controls for substation power. The INTEC UCS project recently completed a major upgrade to many of INTEC's controls for substations, power controls centers, and load centers. The UCS system allows for remote and automatic operation of the electrical distribution system from the control console located in CPP-1673. Part of this upgrade included the installation of the new UCS software, which will enhance metering capability across INTEC, and provided the capability for power consumption (kWh) to be recorded at one of two HMIP PCs within the INTEC control room (CPP-1673) as shown in **Error! Reference source not found.**.



Unit	Rungs of Code	Devices Controlled	Location	Platform
Substation 10 PLC	1588	11 breakers + 6 switches	CPP-613	PLC
Substation 15 PLC	1776	13 breakers + 14 switches	CPP-1782	PLC
Substation 20 PLC	828	3 breakers + 12 switches	CPP-644	PLC
Substation 60 PLC	1653	12 breakers	CPP-1684	PLC
PCC-85 PLC	1315	11 breakers	CPP-1788	PLC
Load Center 1 PLC	1610	25 breakers	CPP-1786	PLC
Load Center 2 PLC	1419	20 breakers	CPP-677	PLC
Load Center 3 PLC	1553	21 breakers	CPP-1787	PLC
Load Center 4 PLC	1241	15 breakers + 4 switches	CPP-1758	PLC
Load Center 5 PLC	1258	13 breakers + 4 switches	CPP-1762	PLC
Load Center 13 PLC	1431	13 breakers + 18 switches	CPP-1773	PLC
Load Center 14 PLC	1397	19 breakers + 4 switches	CPP-1764	PLC
GMS PLC	378	3 breakers	CPP-1684	PLC
UCS HMI Console 1		N/A	CPP-1673	PC
UCS HMI Console 2		N/A	CPP-1673	PC

Figure 5. INTEC Utility Control System project upgrade summary.

This successful modification has given INTEC the capability for power measurement at many of the 82 INTEC buildings and 12 trailers, including the 19 INTEC covered buildings listed in the Metering Planning Tool.

Fluor Idaho continues to monitor the advanced electrical meters that were installed in FY 2015 at CPP-652, CPP-663, CPP-1604, CPP-1606, and CPP-1650 and the standard electrical and steam meters at CPP-1696.

Most of the AMWTP buildings do not have utility meters installed. WMF-676 and WMF-635 have standard electricity and propane meters, and monthly consumption data is recorded into Portfolio Manager. WMF-636 has one electric meter and is also tracked in Portfolio Manager. There are no plans to install any additional meters at AMWTP because the facility is scheduled to be shutdown.

1.3.2 Plans and Projected Performance

Through FY 2022, 65.2% of electric energy is expected to be metered at the building level with one additional new building planned for completion during the fiscal year.

INL will continue to evaluate and develop metering plans for additional buildings that may meet the Guiding Principles, all new construction projects, and any other buildings that would benefit from metering on a case-by-case basis. There are no meter installations planned for existing buildings in FY 2022, but four new construction projects (with advanced metering) are scheduled to be completed through FY 2024.

The covered buildings list was evaluated and adjusted for the current building inventory and energy consumption trends. The revised covered buildings list includes 99 buildings that use 75% of the total electric energy use. The list indicates the buildings that are metered and those where the energy use is calculated. The covered buildings list is used to populate the Metering Upload Template for both Idaho Falls and the research and industrial complexes. The covered buildings list is a living document and will be updated annual to incorporate appropriate new buildings as they enter the building inventory.

Table 2 provides a summary of the number of buildings with meters and percentage of the electricity that is expected to be metered by the end of FY 2022.

Table 2. INL site electrical metering summary.

Metering Summary	Quantity
Covered Buildings for the Third Audit Cycle (June 1, 2020–May 31, 2024)	99
Covered Buildings Metered through FY 2021	76
Non-Covered Buildings Metered through FY 2021	47
Additional Covered Buildings to be Metered through FY 2022	1
Additional Non-Covered Buildings to be Metered through FY 2022	0
Total Buildings Metered through FY 2022	124
Percentage of Total Electricity Metered through FY 2022 (see BEA Metering Planning Spreadsheet Tools calculation)	65.2%

An electric metering equipment package was selected that will allow for remote meter data reading and compilation. The use of a standard meter with hand reading requirements is not typically considered an alternative for new installations.

- Veris Energy Meter BACnet capable
- APC Uninterruptable Power Supply
- Veris Amperage Sensors (3)
- Enclosures, conduit, wire, and miscellaneous as needed for final installation.

Costs for this metering package that is compatible with existing INL building control and data monitoring systems is approximately $8,500. Installation costs, including off-hour lock-out/tag-out for a complete building shut down to install the amperage sensors, are approximately $14,500 depending upon the building and complexity of the connections. Total installation cost for one meter and as entered into the metering planning tools is $23,000.

The INL Energy Manager and Senior Sustainability Analyst continue to track and evaluate all metered buildings for energy-use anomalies and efficiency improvements. Portfolio Manager is used for benchmarking of metered buildings and all energy and water reports are published in .pdf format on the internal Sustainability website.

The INL FMCS team is continuing to develop electricity consumption dashboards and implement SkySpark programming for more effective data management and improved energy trending.

The remaining covered buildings that are currently unmetered will be evaluated on a case-by-case basis to determine the cost effectiveness and applicability of metering and to progress toward the final goal of 100% covered buildings metered. Direct and indirect funding sources will be considered and requested as applicable to meet the goals of the SSP and the SRIP.

1.4 Non-Fleet Vehicle and Equipment Energy Use

Equipment usage is heavily dependent upon construction and building projects, repair and renewing of existing infrastructure and structures, and for seasonal needs such as dust mitigation and fire suppression.

1.4.1 Performance Status

Non-fleet vehicle energy use consists of gasoline, diesel, and propane fuels. In FY 2021, 253,075 gal of these various fuels was used in the non-fleet vehicles and equipment. Together, non-fleet vehicle and equipment energy use totaled 4% of the total energy use.

1.4.2 Plans and Projected Performance

INL plans to progress with evaluations of electric equipment and small transport and utility vehicles to ensure they meet INL demands year-round. Accordingly, INL will increase usage of electrical equipment instead of diesel equipment, where it can still meet the needs of the users.

1.5 Net-Zero

At INL, the driving force behind our nuclear and other clean energy research and development is creating clean, scalable, and sustainable energy solutions to address national and global needs while reducing environmental impacts.

INL will lead by example, committing to becoming a national carbon-neutral prototype and achieving net-zero emissions in INL operations within the next 10 years. Achieving net-zero means drastically reducing onsite emissions and offsetting the limited residual emissions from activities that are impossible to decarbonize. This is a substantial and long-term commitment. INL will use technology innovations and partnerships, increased efficiencies, and novel approaches to demonstrate the path forward for establishing a clean energy economy.

Although EM operations will strive to minimize energy use, waste, and emissions, the net-zero goal is exclusive to INL operations at this time.

1.5.1 Performance Status

As one member of the DOE Net-Zero Four Lab Pilot, INL developed an initial net-zero plan. INL/EXT-21-61673, *INL Net-Zero: The Path Forward* Plan was published in August 2021. This plan outlines INL's approach to a sustainable, equitable, and resilient climate future.

Major sections of the plan include current emissions profile, timeline and goals, key first mover projects for Scope 1 and 2 emissions, regional engagement, energy and environmental justice, public engagement, and governance.

1.5.2 Plans and Projected Performance

Reporting signals a responsible organization. One that is dedicated to being open and honest with its stakeholders. Through reporting, INL understands and better manages impacts on people and the planet. INL reports will identify and reduce risks, seize new opportunities, and take action towards becoming a responsible, trusted organization in a more sustainable world.

The following will be reported semi-annually:

- Progress toward the net-zero goals as laid out in the Net-Zero Plan
- Updates to the Net-Zero Plan
- Updates on public engagement
- Updates on progress with energy and environmental justice.

The following will be reported annually:

- INL Site Sustainability Plan
- Energy and Water Use
- GHG Emissions from Scope 1, 2, and 3.

2. WATER MANAGEMENT

Potable water is provided to all Idaho Falls building locations through the City of Idaho Falls municipal water system. Almost all the water use for these locations is metered with billing for both water supply and sewage treatment. Irrigation and the water use for several small buildings is calculated on building square footage and building function. All water at the research and industrial complexes is pumped from an underground aquifer and treated onsite. Each of the major areas at the research and industrial complexes have their own water pumping, treatment, and disposal facilities. All water at the INL site is considered potable and there are no alternate non-potable sources such as lakes, rivers, or streams. Therefore, industrial, landscape, and agricultural (ILA) water use is not applicable to the INL site.

There are several large process users of potable and raw water, including the ATR Reactor cooling system, the INTEC fuel storage pools, an industrial/construction tank filling system at the Central Facilities Area (CFA), the bus wash at CFA, and numerous HVAC and compressor cooling systems.

Due to the nature of the various INL site missions, many of these industrial operations and processes can be cyclical and result in varying usages of water throughout the year and from year to year. In addition, as buildings are removed and processes are shut down, the lower square footage can result in an increase in water-use intensity even as overall water usage is reduced.

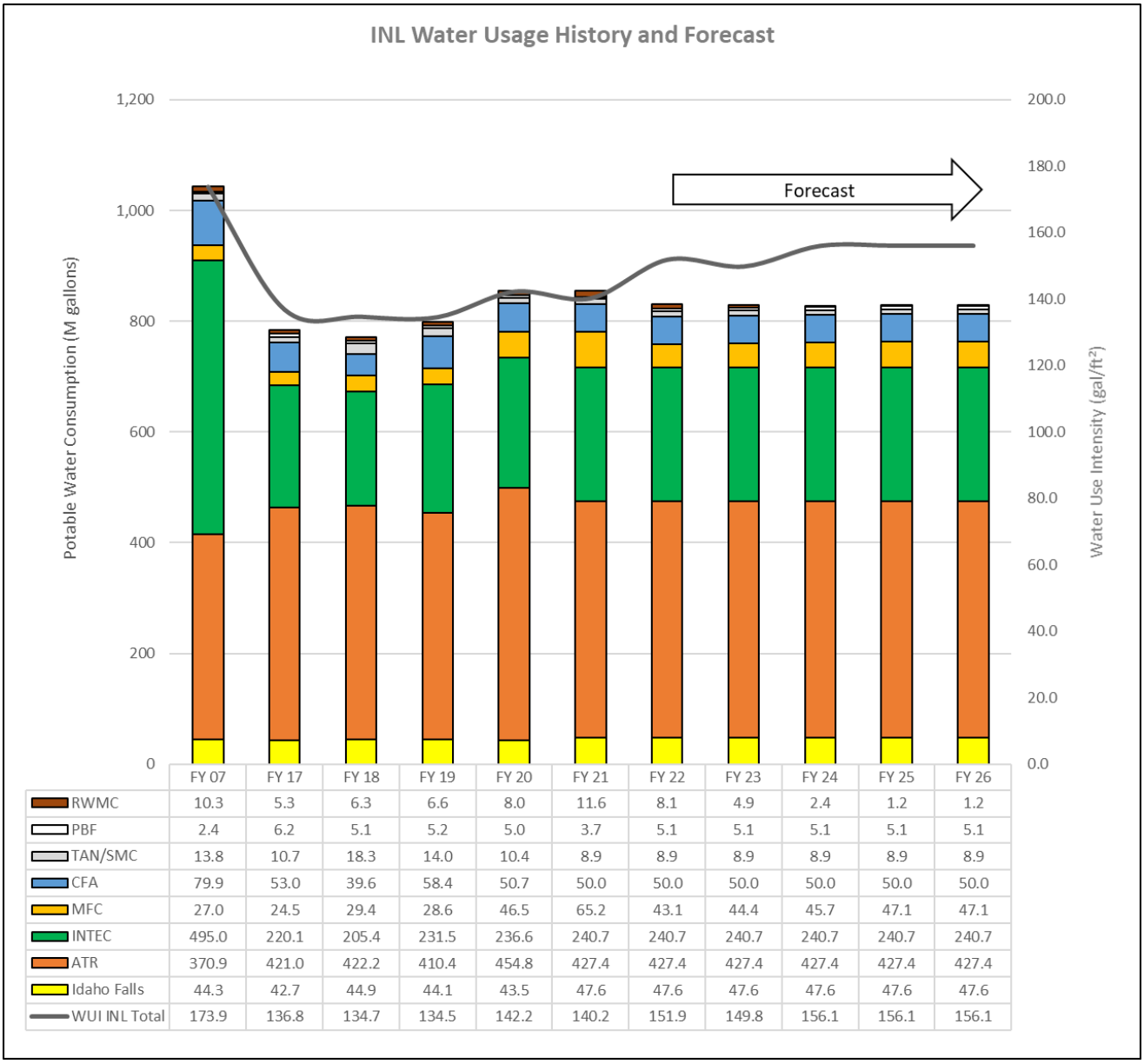
Due to the age of many buildings and utility systems, water leaks of varying degrees are common. The soil in the Snake River Plain is very porous, so most of these leaks are never seen on the surface and need special sonic instrumentation to identify and locate. As many areas have significant underground utilities and have the potential for soil contamination, it is very costly and time consuming to excavate to repair leaks. In several cases, core samples have been taken where leaks were identified only to find no evidence of the leaks themselves.

Inexpensive water and electric rates impact the cost effectiveness of water saving projects. While strides are made to implement water-reduction projects, water consumption is heavily dependent upon process usage and events or activities, such as wildfires, D&D, and construction work, so this goal will be somewhat of a challenge to maintain consistently.

The INTEC facility separates its potable and raw water systems. Although they both are supplied by the Snake River Plain Aquifer, they have their own separate wells, storage tanks, distribution pumps, and piping. The INTEC potable water system supplies restrooms, drinking fountains, personnel showers, safety showers, and eyewash stations. Some additional uses of potable water include a supply to a demineralized water system for process use at the IWTU facility. The INTEC raw water system supplies the INTEC fire water system, treated water system, and demineralized water system. When water losses from these piping systems occur, they are investigated to find and eliminate the leaks. The Environmental Restoration program is in compliance with the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA). INTEC has successfully located and eliminated numerous pipeline leaks over the past several years as part of a program to help dry up the perched water vadose zone to reduce mobilization and transport of contaminants.

2.1 Performance Status

A total of 855.2 M gal of water was used in FY 2021, resulting in a water usage intensity of 140.2 gal/ft², a decrease of 19.4% compared to the FY 2007 baseline (173.9 gal/ft²) and a 1.4% decrease from FY 2020. Water usage is shown in Figure 6.



	FY 07	FY 17	FY 18	FY 19	FY 20	FY 21	FY 22	FY 23	FY 24	FY 25	FY 26
RWMC	10.3	5.3	6.3	6.6	8.0	11.6	8.1	4.9	2.4	1.2	1.2
PBF	2.4	6.2	5.1	5.2	5.0	3.7	5.1	5.1	5.1	5.1	5.1
TAN/SMC	13.8	10.7	18.3	14.0	10.4	8.9	8.9	8.9	8.9	8.9	8.9
CFA	79.9	53.0	39.6	58.4	50.7	50.0	50.0	50.0	50.0	50.0	50.0
MFC	27.0	24.5	29.4	28.6	46.5	65.2	43.1	44.4	45.7	47.1	47.1
INTEC	495.0	220.1	205.4	231.5	236.6	240.7	240.7	240.7	240.7	240.7	240.7
ATR	370.9	421.0	422.2	410.4	454.8	427.4	427.4	427.4	427.4	427.4	427.4
Idaho Falls	44.3	42.7	44.9	44.1	43.5	47.6	47.6	47.6	47.6	47.6	47.6
WUI INL Total	173.9	136.8	134.7	134.5	142.2	140.2	151.9	149.8	156.1	156.1	156.1

Figure 6. INL site water usage history and forecast.

As further discussed in Section 2.2, Plans and Projected Performance, water-use intensity is expected to increase in the future as the AMWTP and RWMC areas begin a transition of shut down and removal.

INL completed an initial water balance in FY 2021 on the heavy process water loads using FY 2020 data. The resulting study showed the ATR Reactor is the major water user and is responsible for approximately 49% of the total water use at the INL site, see Figure 7.

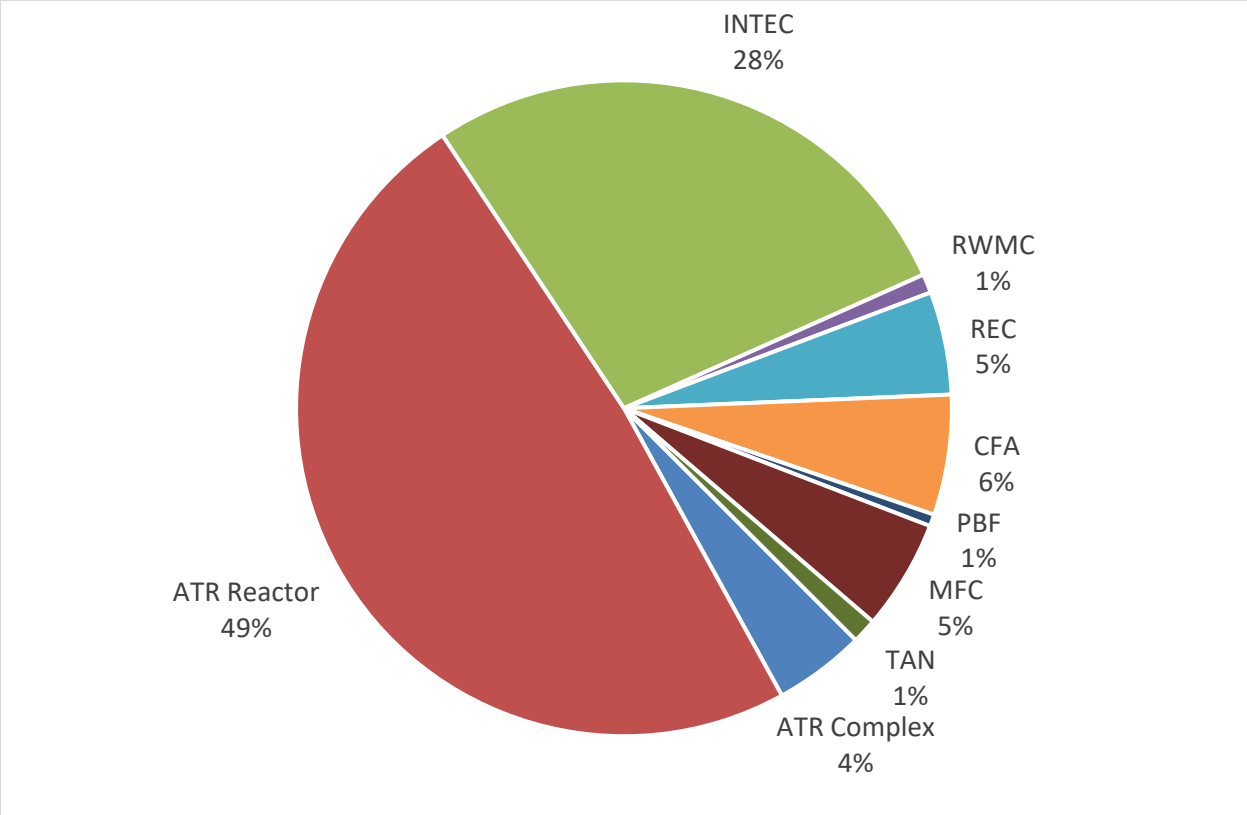


Figure 7. Water-use allocation by area and major process.

The ATR Reactor uses water to flow through the heat exchanger for cooling the storage canal and for the reactor cooling tower evaporation and make up. This heavy process water use is shown in comparison to the water used for potable water in buildings and irrigation for the remainder of the ATR Complex.

With its location in the high desert of Eastern Idaho, the INL site has little rainwater available for use as an alternative water resource, see Figure 8 from the FEMP website (https://www.energy.gov/eere/femp/rainwater-availability-map). Efforts have focused on reducing landscape water use by replacing turfgrass with xeriscape landscaping at existing buildings. Three new construction buildings came online in FY 2021 and were designed and built with low-water restroom fixtures and xeriscape landscaping per the Guiding Principles for Sustainable Federal Buildings.

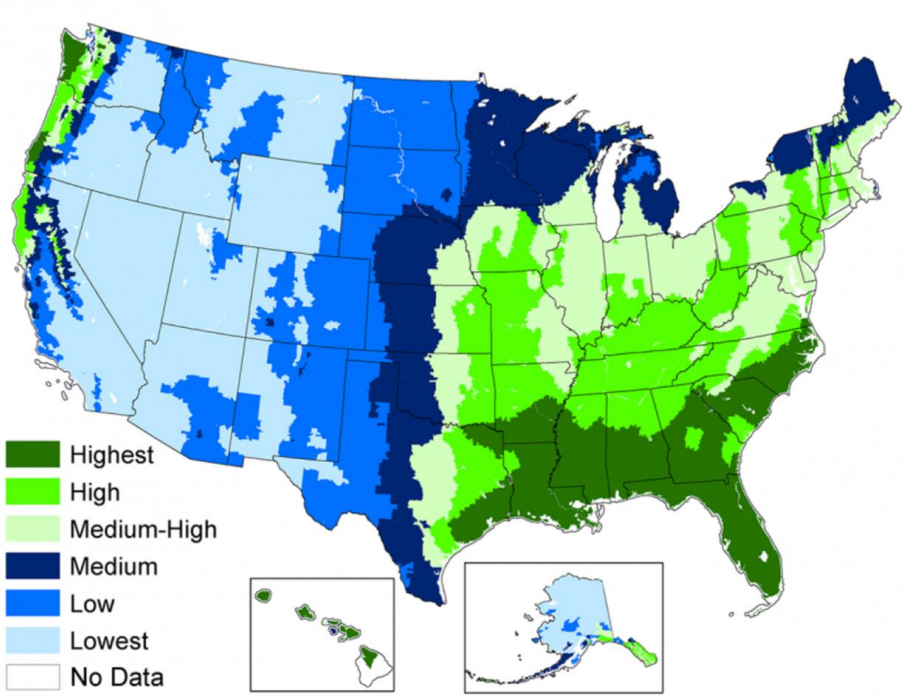


Figure 8. Rainwater availability map

2.2 Plans and Projected Performance

Activities and projects that will continue to contribute to water-use reductions include several ongoing tasks:

- Water meters are planned for installation on all new buildings to monitor and trend water consumption and savings.
- Sustainable INL will perform an update to the Water Balance evaluation concurrently with the annual update to the Energy Balance. The Water Balance update will include recommendations for additional building water meters to be installed per the Energy Act of 2020 (EAct 20).
- Per EAct 20, should DOE implement guidance to exclude water from high energy mission specific facilities then INL would prepare a white paper to support exclusion of the ATR Reactor water consumption from water performance requirements.
- Water-reduction opportunities identified by annual energy audits will be prioritized and implemented as are cost effective.
- INL will continue purchasing Environmental Protection Agency (EPA) WaterSense or other water-efficient products, which will be documented by sustainable procurement processes.
- DOE-EM missions, as they are completed, will contribute to water reductions. These include the AMWTP complex of buildings transitioning to shut down and D&D. However, AMWTP capabilities will continue to be maintained and operated until designated transuranic waste is treated and shipped for disposal.
- The remaining D&D building closure actions for the Fluor Idaho building reductions project a modest reduction in water use with significant building square footage reductions, increasing the water intensity ratio. The scope of projected operation/building closures at INTEC, with minimal building footage reduction from D&D, would not significantly impact those activities involving most of the water usage. The potential change in water intensity contributions from INTEC would not significantly affect the water intensity.

3. WASTE MANAGEMENT

Many factors influence the INL site's waste streams, including a fluctuating employee population, changes in mission direction, and the large land area on which facilities are located.

The INL site will continue to implement projects that reduce waste generation, work with recycling coordinators to identify waste reduction opportunities, increase the types and quantities of items sent for recycling, and evaluate implementing a composting pilot program.

While significant portions of the cleanup mission are complete, EM operations will continue limited cleanup mission activities, including processing and disposal of wastes.

The recycling program continues to educate employees to help change behaviors and increase participation in the recycling program. Similarly, the recycling coordinator continues to work with program personnel to identify waste minimization opportunities.

Contracted (offsite) Wastewater Treatment and Municipal Waste Disposal strategies:

- Encourage the reduction of wastewater generation (implementation/usage of low-flow sanitary systems)
- Encourage pollution prevention opportunity assessments for new applicable research and development (R&D) and campus activities.

3.1 Municipal Solid Waste Recycling and Waste Diversion

3.1.1 Performance Status

A total of 2,695,757.0 lb (1,222.8 MT) of non-hazardous municipal solid waste was generated in FY 2021. In FY 2020, 2,562,397.5 lb (1,162.3 MT) was generated, resulting in an increase of Municipal Solid Waste (MSW) generated of 5.2% YOY. A diversion rate of 59.6% for non-hazardous solid waste in FY 2021 was accomplished by recycling 1,607,025.1 lb (728.9 MT) of materials, including co-mingled materials, office paper, cardboard, scrap metal, wood, cooking oil, toner cartridges, plant mail, and wood pallets. A total of 493.8 MT of landfilled non-hazardous MSW was generated in FY 2021 and 505.3 MT in FY 2020, resulting in a reduction of 2.3% of materials sent to landfill.

The *INL Site Pollution Prevention Plan* (DOE/ID-10333) describes the pollution prevention practices.

INL continued the co-mingled recycling and paper shredding programs at CFA, Materials and Fuels Complex (MFC), ATR Complex, and Idaho Falls during FY 2021. All INL employees can participate in the co-mingled recycling program, which allows a variety of recyclable materials to be placed in one collection bin. Except for Specific Manufacturing Capability (SMC), due to security constraints, all INL employees have the responsibility to participate in the paper shredding recycling program, which includes regular office paper and controlled unclassified information materials. Fluor Idaho continues a comprehensive co-mingled recycling and paper shredding program. Reminders on recycling programs available to employees at work and at home are provided routinely in the CORE Notes along with changes in the company, and home programs. CORE Note: "*Be Mindful of Waste this Holiday Season"* provided tips for wrapping gifts in environmentally friendly supplies for reuse or recycling.

INL continues to utilize several processes to reduce the quantity and toxicity of hazardous chemicals. The processes follow the simple reduce, reuse, and recycle steps to help achieve the overall goal. INL uses chemical coordinators and environmental personnel to help ensure the requested materials are needed, are not available through an exchange/sharing program, and that the smallest/most appropriate quantity is being ordered. INL also stipulates the use of the EPA's Green Chemistry Tools (https://www.epa.gov/greenchemistry/green-chemistry-resources#tools) to help chemical coordinators identify greener alternatives to requested chemicals.

Researchers at Idaho Falls facilities (INL Research Center [IRC], Energy Innovation Laboratory, and ESL) are networked by the chemical coordinator. The chemical coordinator can identify any existing

chemical stock should a researcher need a small quantity of a particular chemical that already exists at INL. This program helps to ensure that the chemicals are used for their intended purpose and have a continuous turnover of inventory. The program also reduces the time to acquire needed chemicals without having to purchase new chemicals as chemical coordinators actively search for existing inventory to preclude new purchases.

Chemical coordinators purchase acceptable chemicals with their own chemical purchase cards, increasing traceability and improving efficiency for the requestor. The INL Procurement organization and chemical coordinators screen subcontractor procurement requirements, ensuring that less-hazardous chemicals are used when available. INL integrated environmental, waste management, and industrial hygiene functions maintain chemical reviews and evaluations to identify existing product inventory and less-toxic substitutions prior to purchase. INL is working actively and continually toward a reduction of inventories through the avenues of acquisition, use, and disposal.

INL continues to purchase additional four-wheeled paper shredding bins and dual-bin recycling stations to better promote and equip facilities to participate in the recycling program. In the third quarter of FY 2018, restrictions were put in place that limited plastics eligible for recycle due to a lack of domestic and international plastic recycling facilities. Existing image-based recycling station signage was revised to indicate which plastic materials are no longer accepted in the co-mingled recycling stream. While FY 2021 MSW generation increased by 5%, the amount sent to landfill decreased by 2%.

The INL Hazardous Waste Management Act/Resource Conservation and Recovery Act (RCRA) Permit requires that all operating contractors conduct and complete a source reduction evaluation review and written plan in accordance with the procedures and format provided in the "EPA Waste Minimization Opportunity Assessment Manual" (EPA/625/7-88/003). This review and plan are submitted to the Idaho Department of Environmental Quality every 4 years, the latest on March 25, 2019, and must include detailed descriptions of any programs for contractors to assist generators of hazardous and mixed waste in reducing the volume (quantity) and toxicity of wastes produced.

The AMWTP facility continues to use soft-sided over-pack containers, soil sacks, and macro bags in lieu of corrugated steel "cake boxes" for containment of degraded waste boxes. These containers are less expensive, weigh less, and require less material to manufacture. As a result, less fuel is required for transportation and the volume of radioactive waste destined for land disposal is reduced. In addition, six drum overpacks made of plywood are utilized to get six drums of waste into the box line troughs for processing more efficiently. AMWTP continues to investigate additional opportunities to use less packaging and lighter, more reusable containers to fulfill its missions. Efforts to improve packaging efficiency will be pursued if a better alternative is discovered for packing materials that will reduce waste.

INL incorporates a "Sustainability" review of new activities as well as pollution prevention reviews through the Environmental Compliance Permit process, allowing waste diversion activities to be identified earlier in the project life-cycle and implementation costs to be built into project budget estimates. Fluor Idaho incorporates reviews of chemical use and storage, use, reuse, and recycling of resources and waste generation and management of new activities through the Environmental Checklist process. These environmental aspects are reviewed by the Pollution Prevention coordinator to identify waste reduction or waste diversion opportunities early in the project.

INL landscaping contractors use mulching mowers at the Idaho Falls buildings to return grass clippings to the lawn rather than taking them to a landfill. In FY 2021, approximately 190,000 lb. of grass clippings were diverted from the landfill.

INL cafeteria contractors continued to recycle their used cooking oil through a contracted vendor, while Fluor cafeterias are extending their frying oils by using a double filtration system and putting filter pod fryer oil extenders in the oil. The pods are left in the oil overnight to help absorb impurities, which allow for extended oil life.

Fluor and INL advertised through Core Notes and iNotes, respectively, and encouraged participation in the Plastic Free July EcoChallenge to increase awareness about plastic pollution through several educational resources including children's activities and bring about change by encouraging people to not use plastic.

3.1.2 Plans and Projected Performance

Plans and projected performance for FY 2022 will continue to:

- Evaluate the impacts of the pandemic on the MSW waste diversion program. Although FY 2020 waste diversion seemed to be negatively impacted by the maximum telework directive, FY 2021 did not have the same apparent impact.
- Educate and encourage employees to reduce their waste generation and participate in the recycling and paper shredding programs.
- Evaluate potential outlets and the expansion of recyclable waste streams, such as food wastes, glass, and biomass waste.
- Reduce the use of printing paper through a campaign for users to ensure printers and copiers are set to duplex printing. Printing paper with at least 30% post-consumer fiber is required.
- Meet or exceed this goal as funding is allocated to further optimize the current waste diversion systems and modify contracts, and to divert selected waste streams if markets are available.

3.2 Construction and Demolition Recycling and Waste Diversion

3.2.1 Performance Status

A total of 23,184.3 MT of construction and demolition (C&D) waste was generated in FY 2021, compared to 20,041.5 MT in FY 2020, resulting in an increase of 15.68% of C&D waste generated YOY. A diversion rate of 58.0% (29,657,122.3 lb or 13,452.2 MT) of C&D waste was accomplished in FY 2021.

The CFA landfill continued diverting asphalt removed from paved surfaces and stockpiling for future reuse on resurfacing projects.

INL continued a volumetric measurement for recycled metals and facility C&D materials generated during construction activities. Both materials are excessed and, as a result, are diverted from the landfill.

Fluor Idaho's diversion of C&D waste in FY 2021 was limited to non-radiological scrap metal and recycled universal waste from limited D&D activities. Due to the radiological potential of most Fluor Idaho's C&D waste from D&D waste management activities, most Fluor Idaho's C&D waste continued to be landfilled. Fifteen cargo containers slated for scrap or disposal were repurposed for reuse at several Fluor facilities negating the need to procure new cargo containers.

Fluor Idaho personnel submitted a pollution prevention opportunity assessment for the Subsurface Disposal Area surface barrier construction. The assessment proposed using D&D waste as part of the grade-fill layer during construction of the surface barrier at the Subsurface Disposal Area, rather than sending it to the landfill. In addition to the waste diversion, the action will save approximately 48,000 gal of diesel fuel and eliminate approximately 498 metric tons of greenhouse gas emissions. The proposal has been approved by the applicable agencies.

3.2.2 Plans and Projected Performance

INL intends to perform the following actions to enhance the C&D waste diversion process:

- Incorporate standard instructions on management (diversion) of asphalt wastes for subcontractors performing paving work in the Environmental Compliance Permit process

- Engage construction subcontractors to solicit best practice ideas relative to INL logistics and market potential, especially during the design and construction process of new buildings.

INL incorporates metals recycling into D&D tasks when allowed under the current DOE policy for recycling metals. Fluor Idaho will incorporate metals recycling into D&D tasks when feasible but anticipates continuance of existing metals recycling practices as part of ongoing D&D operations in general. Fluor Idaho currently excesses existing metals, where the Property Disposal Office bids out the scrap to vendors who recycle.

4. FLEET MANAGEMENT

The large land area on which the INL site facilities are located requires long commutes (typically over 50 miles each way) to the research and industrial complexes and an extensive fleet to provide transportation and equipment for operations. INL operates and maintains a large bus fleet with 79 over-the-road motor coaches to provide daily commute services for nearly 3,000 workers at the research and industrial complexes. Operation of the INL and Fluor Idaho subcontracted bus fleets helps to improve overall safety on the roads while reducing GHG emissions from both government- and privately owned vehicles. As the only remaining large bus fleet in the DOE complex, INL continues to use this fleet as a test bed for the advancement of fuel efficiency, real-world transportation, and transportation fuels R&D.

4.1 Fleet Petroleum Consumption

Continued implementation of diversified strategies for reducing fossil fuel use and carbon emissions associated with light- and heavy-duty vehicles. These strategies affect DOE's petroleum fuel usage through fuel usage reduction and fuel switching activities.

4.1.1 Performance Status

In FY 2021 preliminary data show 800,420 gasoline-gallon equivalents (GGE) of petroleum-based fuels was used, a 14.7% reduction from 938,197 GGE in base-year FY 2005, but a 24.1% increase from 644,853 GGE in FY 2020. Total fuel usage (petroleum and alternative) increased by 10.5% from 756,499 GGE in FY 2020 to 836,077 GGE in FY 2021. The petroleum usage is a compilation of all the INL site contractors, and the total of unleaded gasoline and diesel fuels as reported into the Fleet Automotive Statistical Tool (FAST) database. INL discontinued its use of renewable diesel (R99) in FY 2021 due to the high unit cost of over $7.00/gallon.

Generally, the INL-managed fleet, including buses, trucks, and light-duty vehicles, are fitted with Zonar telematics equipment: global positioning systems, electronic-verified inspection report hardware and software, and ZPass asset tracking for riders. This equipment tracks vehicle location, mileage, speed, and other diagnostic data; upgrades and automates vehicle inspections; and electronically logs bus riders. Use of the telematic devices improves safety and efficiency of INL-managed fleet vehicles; enhances bus routing, lot use, and ridership data; and streamlines vehicle pre-trip safety/maintenance checks.

- In FY 2021, INL acquired a Caterpillar D6XE Crawler Tractor dozer with an electric drive. IBL also installed and is currently evaluating a no-idle system on an agency owned bucket truck. This allows the bucket to run without idling the truck.

INL continues to perform the following activities as funding permits:

- Install solar panels on all regular run buses to help keep the batteries charged while the buses sit idle over the weekends. This helps reduce the load on the charging systems and ensures that the buses start during cold temperatures.
- Utilized low-speed electric vehicles in place of diesel-powered utility task vehicles (UTVs). Initial reviews are positive regarding safety features (i.e., outside mirrors and a backup camera), as well as slower deacceleration than the diesel-powered UTVs. However, heating performance is still an issue.

4.1.2 Plans and Projected Performance

INL and Idaho Transportation department partnered together on a signal phase and timing project. The project creates a "Green Wave" that will allow INL coaches with a dedicated short range communication radio to communicate with the light signal at the intersection. The light will stay green longer so coaches can proceed without stopping and idling at the intersection. In addition to developing software for a more efficient driver training program, INL is pursuing the installation of Vision Systems Smart-Vision, an intelligent mirrorless rearview system to reduce wind resistance and increase fuel efficiency.

Additional reductions in petroleum-based transportation fuels will be obtained through numerous identified projects and activities as funding allows:

- Institute the INL net-zero plan to use renewable diesel in FY 2022 as an interim step prior to complete elimination of petroleum-based fuels in the fleet.
- Continue efforts to build and install no-idle solar-powered HVAC systems on additional buses.
- Continue the installation of no-idle solar-powered HVAC systems on additional light-duty vehicles.
- Support further testing and deployment of a commercial no-idle system with MCI and Bergstrom. MCI, Bergstrom, and INL will partner to evaluate the data and encourage potential commercial implementation and offering of the no-idle system as an option in General Services Administration (GSA)-leased vehicles.
- Fluor Idaho will continue to evaluate its use of light-duty vehicles and bus commuting methods.

4.2 Fleet Alternative Fuels Consumption

Continued development of diversified strategies for increasing alternative fuel consumption and reducing carbon emissions associated with the operation of light- and heavy-duty vehicles. These strategies affect DOE's alternative fuel consumption primarily through fuel-switching activities.

4.2.1 Performance Status

In FY 2021, preliminary data show 35,657 GGE used of alternative fuels—a decrease of 53.4% from 76,436 GGE in base-year FY 2005, and a decrease of 68.1% from 111,646 GGE in FY 2020. These usages are a compilation of all INL site contractors and the total of each of the various alternative fuels as reported into the FAST database. The decreased use of alternative fuel consumption was due to the discontinuation of the use of renewable diesel due to the high unit cost and a reduction in E85 use.

In FY 2021, INL continued to encourage alternative fuel usage by:

- Completing installation of four two-port electric vehicle (EV) charging stations for fleet vehicles. A total of 21 EV charging stations with 42 ports are available for INL fleet.
- Allowing staff to use two Chevrolet Bolts at no charge around the central facilities' area campus to help with familiarization to electric vehicles operations.
- Encouraging use of employee personal electric vehicles through the laboratory-wide process for employee use of the EV charging stations on a cost-recovery basis.
- Continuing to increase the number of electric UTVs.
- Participating in a Yellowstone-Teton Clean Cities Coalition forum to encourage and cooperate with commercial trucking companies and state agencies on biodiesel fuel use.
- Right sizing the fleet with more flex-fuel vehicles capable of using E85 and to maximize alternative fuel use.
- Providing flex-fuel vehicle custodians quarterly reports detailing the percentage of E85 usage compared to unleaded gasoline usage and encouraging use E85 fuel. This method of encouraging self-governing through information has led to increases in E85 fuel use.
- Hosting two fully electric buses from New Flyer of America, Inc. and MCI for future use consideration at INL. Hosting provided the EV Technologies organization an opportunity to evaluate the capabilities of the INL ABB charging system.

An important development occurred in FY 2020 that will affect E85 use and alternative fuel goals. The E85 fueling station at CFA was shut down in August 2020 due to deterioration of the fuel island. E85 fuel is readily available in Idaho Falls.

Additionally, INL determined that funding R99 in FY 2020 was not in the best interest of the taxpayer as the cost is three to four times more than petroleum diesel. In March 2020, INL started using regular diesel in the bus fleet and will continue to do so until R99 is available at a more reasonable cost.

4.2.2 Plans and Projected Performance

Plans for FY 2022 include:

- Increasing the number of EVs in the light-duty fleet in conjunction with the increase of EV infrastructure Sitewide.
- Evaluating using R99 in INL buses and medium-duty diesel trucks.
- Partnering with Ballard and INL hydrogen subject matter experts to develop a hydrogen fuel cell system to charge the batteries on a fully electric motor coach, which would extend the range of current coaches.
- Installing three additional grid-sourced EV charging stations across INL in FY 2022. INL will continue to evaluate additional electric vehicle charging stations and install, as appropriate and cost effective, as the INL-managed electric vehicle fleet continues to expand.
- Evaluating electric equipment, such as hybrid diesel/electric bucket trucks and additional electric-only vehicles, to ensure they can meet demands of work crews year-round. Accordingly, INL will increase usage of electric-powered equipment instead of diesel equipment, where it can be utilized and still meet the needs of the users.

4.3 Light-Duty Vehicle Acquisition

Light-duty fleet vehicles are procured almost exclusively through the GSA vehicle-leasing program. A rotation schedule based on vehicle age and mileage determines when vehicles are returned to GSA. Working closely with GSA on the light-duty fleet replacement schedule has historically allowed the INL site to favor the replacement of petroleum-fueled vehicles with AFV.

4.3.1 Performance Status

Acquired 50 new light-duty vehicles in FY 2021, 12 of which were AFVs.

Working with GSA, INL light-duty vehicle acquisitions totaled 47 new vehicles in FY 2021, of which 12 were AFVs, (including four electric), and 35 were gasoline-only vehicles. INL typically requests all existing AFV replacements to be E85-capable, but several were replaced by GSA in FY 2021 with gasoline-only vehicles. Currently, INL has 344 vehicles in its light-duty vehicle fleet, of which 245 are AFVs. The remaining 99 vehicles are a variety: six electric, 90 gasoline, and three gas-hybrid vehicles. The current mix of AFVs in INL's light-duty fleet is 71%.

In FY 2021 Fluor Idaho received three replacement vehicles from GSA, all of which were gasoline-only vehicles. Fluor Idaho works through GSA to procure light-duty vehicles, and typically request all AFV replacements to be E85-capable. Currently, Fluor Idaho has 115, light-duty vehicles, of which 109 are AFV E85/unleaded flex-fuel, five are regular unleaded, and one is a gasoline hybrid electric.

4.3.2 Plans and Projected Performance

Continued focus on a light-duty fleet configuration of 100% AFVs when available.

The INL fleet manager will identify the next gasoline vehicles for replacement with AFVs and will work with GSA to ensure that existing AFVs are replaced with comparable new AFVs when available. INL will also continue to leverage vehicle telematics to track fuel usage and ensure that only alternative fuels are used in AFVs.

Fluor Idaho will continue to replace aging light-duty vehicles with AFVs as they are available throughout the duration of the project. For FY-2022, Fluor Idaho has requested 6 PHEVs from GSA.

INTENTIONALLY BLANK

5. CLEAN AND RENEWABLE ENERGY

As outlined in the INL Net-Zero Plan, the envisioned onsite carbon-free electric generation includes advanced planning and conceptual design for nuclear energy generation from small modular reactors supplying electricity through the grid, and from small reactors connected to a micro grid. Consideration will be given to more traditional renewable generation sources, such as wind and solar from private energy developers and will be supplemented with carbon-free energy generation from servicing utilities.

Idaho Power supplies 79% of electrical load, while Idaho Falls Power provides 21%. Two other utilities (Fall River Electric and Rocky Mountain Power) provide very incidental loads under 1%. The electric energy source mix as determined from the FY 2020 electric consumption is illustrated in Figure 9.

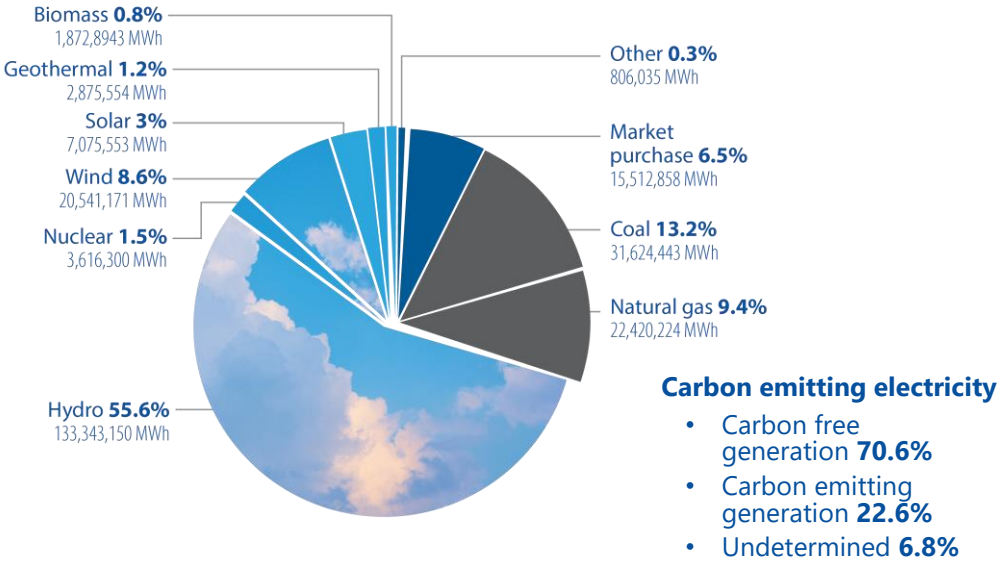


Figure 9. INL site energy source mix.

The current generation mix from the local utility providers is dominated by abundant older hydroelectric and limited availability of new renewable electricity. However, INL's primary electrical supplier, Idaho Power, currently owns interests in three coal generation plants, with plans to eliminate those interests in two of them by 2025 and evaluate options for continued emissions reductions from the third plant. Idaho Power is committed to its goal of 100% clean energy generation by 2045 and Idaho Falls Power is almost 100% clean electricity generation, both of which will dramatically change the mix of renewable energy generated at the utility level.

As INL's Net-Zero Plan is developed and implemented over the next 10 years, INL will make an annual purchase of renewable energy certificates (RECs) from Idaho Falls Power to supplement growing internal generation. As an interim step, REC purchases support INL net-zero goals by providing the green attributes of locally generated and consumed renewable energy from the Horse Butte Wind Farm.

The current REC purchase goal is outlined in EPAct 2005 Section 203 (42 USC 15852), which requires that renewable energy consumption is "not less than 7.5%" in FY 2013 and each fiscal year thereafter. INL calculates the number of RECs to purchase based on the total amount of electricity used in the previous year. Generation from onsite renewable electric sources is subtracted from the total electricity usage to determine the quantity of RECs needed to meet the current 7.5% requirement.

Purchased RECs meet all Western Renewable Energy Generation Information System requirements, are Green-e Energy Eligible, are retired on behalf of the INL site, and the generation sources were placed into service within 15 years prior to the beginning of this fiscal year as required. RECs purchased from Idaho Falls Power satisfy the third-level priority of renewable energy purchases as the INL site is using the energy produced from the RECs purchased.

During annual retro-commissioning, energy audits, existing lease updates, and new lease negotiations, the installation of renewable energy generation is considered, and the payback evaluated. INL R&D continues to investigate the potential installation of numerous renewable energy technologies that can assist INL to meet its net-zero and onsite renewable energy generation goals.

5.1 Performance Status

INL has one solar transpired wall on the IRC Records Storage Facility at the Idaho Falls campus and one other transpired solar wall at MFC. These two solar walls provide a combined total of 92,302 kWh equivalents of renewable thermal energy. Due to needed HVAC upgrades, the use of the third solar wall on MFC-782 was discontinued in FY 2021.

INL maintains numerous small photovoltaic systems (1,200 watts or less) for applications, such as remote air monitoring, environmental monitoring, well instrumentation, evaporative pond circulation, signage lighting, and a solar walkway light. These small onsite photovoltaic systems generated a calculated 220 kWh.

INL continued to develop the Renewable Energy Microgrid research project at ESL IF-685. This project capacity is currently at 29 kW from predominately solar renewable sources. In FY 2021 a second solar array was constructed. This new array will be connected to the microgrid during FY 2022, which will increase the project's generation capacity. The energy generated from this project is used to offset the energy used in the ESL's west high bay. In FY 2021, the microgrid produced 41,636 kWh of renewable electricity for total INL onsite generation of 41,856 kWh.

In addition to the onsite generation from the microgrid, and small photovoltaic systems, INL procured 17,977 MWh of blended source RECs from Idaho Falls Power at a total cost of $85,390. REC costs continue to increase nationwide based on demand and INL continues to use a local supplier of RECs to satisfy the third-level priority as described earlier. This purchase of new renewable energy RECs, in addition to the 41.9 MWh of onsite generation, totals 18,019 MWh (8.2%) of renewable energy for FY 2021. Table 3 summarizes the renewable energy consumption and RECs purchased in FY 2021.

Table 3. Renewable energy consumption for FY 2021.

Total Grid Electric Consumption (MWh)	7.5% Purchase Goal (MWh)	FY 2021 Onsite Generation (MWh)	FY 2021 Purchased RE (MWh)	FY 2021 Purchased RECs (MWh)	Total Renewable Energy, Onsite + RECs (MWh)	Total Renewable Electricity with Bonuses (MWh)
219,805	16,485	41.9	0	17,977	18,019	**18,690**
Percentage						**8.5%**

5.2 Plans and Projected Performance

In FY 2022, INL will purchase RECs from Idaho Falls Power and/or generate renewable energy from the microgrid or other research projects at a minimum of 7.5% of the total electric energy consumption. INL will complete the connection of the second solar array at ESL IF-685.

Over the next 5 years, INL will significantly expand its quest to consider renewable onsite energy generation with a continuing long-term goal of all generation onsite or grid-purchased being clean and renewable. In addition to onsite renewable energy generation and utility provided clean energy, locally generated RECs will be purchased as needed to reach the goal with a minimum annual purchase of 7.5% as currently required in the *2020 Sustainability Report and Implementation Plan (SRIP)*.

An update to the *INL High-Performance and Sustainable Building Strategy* is planned for FY 2022 and will include an expanded section on renewable energy including solar hot water heating.

6. SUSTAINABLE BUILDINGS

INL has incorporated the Guiding Principles into appropriate management documents, including STD-139, "INL Engineering Standards," and the INL/EXT-10-17808, *INL High-Performance and Sustainable Building Strategy* (INL HPSB). The INL HPSB includes sections on ASHRAE 90.1 and fossil fuel reduction for new construction design. Sustainability concepts in general are interwoven into 13 separate INL policies, plans, and execution documents. Fluor Idaho has incorporated the Guiding Principles into Fluor Idaho documents, including engineering standards, and they are interwoven into separate policies, plans, and execution documents.

6.1 Performance Status

Three new construction Guiding Principle compliant buildings were added in FY 2021. There are 93 buildings greater than 10,000 ft² that are appropriate to consider for the Guiding Principles. At the end of FY 2021, 25 DOE-owned buildings were compliant with the Guiding Principles, six of which are less than 10,000 ft² (see Table 4). Including the six small buildings, a total of 99 buildings are applicable for Guiding Principles.

INL has documented the Guiding Principles for an additional 10 buildings that are leased buildings.

Table 4. Buildings meeting the Guiding Principles (DOE-owned).

Building Name	Building Number	Sqft	New (NC) or Existing (EB)	GP Achieved Fiscal Year
ATR Technical Support Building	TRA-1608	16,567	NC	2011
Radiological & Envir Sciences Lab	IF-683	13,383	NC	2013
Health Physics Instrument Lab	CF-1618	15,484	EB	2013
Irradiated Materials Characterization Lab	MFC-1729	12,147	NC	2013
Radiological & Envir. Sciences Office	IF-601	20,078	EB	2014
Records Storage Facility	IF-663	21,716	EB	2014
CFA Medical Facility	CF-1612	22,417	EB	2014
Machine Shop Bldg	MFC-782	5,096	EB	2015
IRC Office Building	IF-602	45,619	EB	2016
CFA Transportation Complex	CF-696	81,102	EB	2016
Engineering Office Building	MFC-710	11,418	EB	2016
Office/Three Labs	CF-612	9,872	EB	2016
ATR Test Train Assembly Facility	TRA-1626	4,483	EB	2016
Security Building	MFC-701	5,825	EB	2016
ATR Simulator Training Facility	TRA-679	10,114	EB	2017
CFA Fire Station	CF-1611	29,099	EB	2017
Instrument & Maintenance Facility	MFC-791	16,332	EB	2017
Office Building	CF-615	9,685	EB	2017
Reactor Building & Annex	EBR-I-601	27,152	EB	2017
RHLLW - Administration Building	B21-631	3,947	NC	2017
MFC Research Collaboration Facility	MFC-1742	12,956	NC	2020
SMC Warehouse	TAN-1617	17,176	NC	2020
ATR Complex Security Building	TRA-1644	11,367	NC	2021
ATR Maintenance Support Building	TRA-1643	33,023	NC	2021
MFC Administration Building	MFC-1747	18,901	NC	2021

Table 5 shows achievement of Guiding Principles by the number of buildings and building square foot. With the addition of the three new buildings this year, the 15% target has been exceeded for Guiding Principles buildings by building count. The right-hand column of the table includes the six buildings less than 10,000 ft^2 in the "Applicable Buildings" count and square foot per the "Implementing Instructions for Executive Order 13834 Efficient Federal Operations."

Table 5. Guiding Principles achievement.

Guiding Principles Metric	**>10,000 GSF Goal**		**With Bonus Credit for Buildings <10,000 GSF**	
	Count	GSF	Count	GSF
Total Applicable Buildings	93	3,684,213	99	3,723,121
Total Guiding Principles Buildings	19	436,051	25	474,959
Percent Guiding Principles Achieved	20.4%	11.8%	25.3%	12.8%

6.2 Plans and Projected Performance

INL has four additional DOE Office of Nuclear Energy new buildings that are planned to implement the Guiding Principles. These buildings are shown in Table 6. INL will continue to evaluate the existing building stock for additional candidates.

Table 6. New buildings targeted to meet the Guiding Principles (FY 2022–FY 2024).

Building Name	**Building Number**	**GSF**	**New Construction (NC) or Existing Building (EB)**	**Target Year**
TAN Vehicle Maintenance Building	TAN-691	11,600	NC	2022
ATR Reactor Support Building	TRA-1649	19,000	NC	2023
Sample Preparation Laboratory	MFC-1743	42,000	NC	2023
MFC Security Building	MFC-1748	14,400	NC	2024
Totals	**4 buildings**	**87,000**		

After Guiding Principles documentation is completed for the targeted buildings, the INL site will be exceeding the goal with 29% by count of buildings with respect to the 10,000 ft^2 goal (15% by GSF).

Two significant barriers to documenting the Guiding Principles in existing building are the older building stock and the challenge of cost effectively implementing the modifications needed to meet the energy and water-reduction goals. Energy and water upgrade opportunities can be modeled to reach the reduction goals, but due to high local construction costs and relatively inexpensive power and water rates, the payback periods of these projects often exceed the life expectancy of the equipment and the remaining life of the building. INL will continue to encourage all building modification projects to meet the 30% better than ASHRAE requirement from the Guiding Principles.

The INL site buildings targeted to meet the Guiding Principles do not include buildings owned by DOE-EM. Since the DOE-EM mission is to reduce footprint and complete cleanup, the existing building life is either too short or too uncertain to invest in upgrades for most DOE-EM buildings.

INL will continue to pursue Guiding Principles and ASHRAE 90.1 efficiency standards for all new construction projects as are cost effective and appropriate. Fossil fuel reduction in design was included in the previous revision of the INL HPSB. INL's net-zero efforts for INL include plans to reduce fossil fuel use.

New construction projects will continue to be guided by “INL Engineering Standards” (STD-139) and the INL HPSB. Energy efficiency requirements of 30% better than ASHRAE 90.1 are incorporated into these documents. The INL HPSB is scheduled for update in FY 2022 at which time the 2020 Guiding Principles will be added.

Highly energy-efficient lighting, roofing, and automation systems continue to be installed in new buildings and during retrofit activities. The result is not just an increase in the resilience of the building, but of the surrounding community, by decreasing demand on available resources and infrastructure.

INTENTIONALLY BLANK

7. ACQUISITION AND PROCUREMENT

7.1 Performance Status

Reports indicate 100% of the contracts in FY 2021 contained applicable sustainable acquisition (SA) clauses. The information below is for INL and Fluor only. DOE information was assumed to be included in the Federal Procurement Data System and reported separately.

Table 7. FY 2021 sustainable acquisition progress.

FY 2020 Sustainable Acquisition (SA) Progress	
Metric	**Total**
Number of Eligible Contract Actions	63
Number of Contract Actions w/SA Clauses	63
Percent of Contract Actions w/SA Clauses	100%
Total Eligible Contract Dollars ($)	$16,720,125
Total Contract Dollars ($) w/SA Clauses	$16,720,125
Percent of Contract Dollars w/SA Clauses	100%

INL maintains SA language in contracts and requires suppliers of standard desktop computers to provide items designated as Electronic Product Environmental Assessment Tool (EPEAT) Silver or better. In May 2020, INL updated the standard terms and conditions to incorporate the SA clauses.

INL subcontractor requisitions are routed through a review process that includes a check for potential SA products. Documentation of the manufacturer's literature on the product's attributes are electronically attached to the requisition and maintained as part of the procurement record. Products are suggested, if not already specified, and the supplier is required to provide a listing and quantity of the SA products upon completion of the project. Fluor subcontract requisitions are also routed through a review process that includes a check for potential SA products.

In FY 2021, INL introduced an online, web-based query function to allow easier access to the biobased purchase data; however, the tracking of these products is still only available by verifying each product individually, outside of the procurement system.

INL continues to use commodity codes and category IDs (CATIDs) related to SA products to enhance automated tracking and reporting within the current system.

- Preference Program: INL's automatic document generation system was used to further incorporate SA language. For example, INL requires its supplier of standard desktop computers to provide items designated as EPEAT Silver or better.
- Estimation, Certification, and Verification: INL requires suppliers (e.g., construction services, office products, paper products, janitorial products) to deliver spend reports listing the designated product versus preferred purchases. In addition, INL has developed standard reports that provide the summary data necessary for reporting spending for recycled content products and janitorial products.
- Annual Review and Monitoring: INL conducts an annual assessment of the SA program to ensure that the appropriate clauses are in place.

Fluor Idaho reduces and minimizes the quantity and toxicity of hazardous chemicals and materials through a procurement process that encourages environmentally preferable purchases. One of the objectives stated in the Fluor Idaho management procedure for the acquisition of material and services is to utilize products and materials that contain recycled and biobased content when practical. Purchase requisitions are screened by an assigned procurement specialist for environmentally preferable materials.

INL does not have a reliable or automated method for tracking only biobased purchases. INL developed a review and tracking process to identify biobased products purchased and list of CATIDs to be maintained to make review of purchase records better. In FY 2021, INL purchased three biobased product types and spent $4,946 on biobased products. INL anticipates a similar or slight increase in the biobased products purchased for FY 2022.

7.2 Plans and Projected Performance

As regulations and reporting increase, many changes and additions continue to be in SA requirements. INL plans to continue the following actions to improve their SA programs:

- Develop better resources for subcontractors to incorporate SA and biobased product purchases into their projects and improve reporting process to INL.
- Enhance the current ordering system to increase SA and biobased product visibility to the laboratory community.
- Conduct a campaign to increase the education and awareness of SAs and biobased products and their effect on performance requirements.
- Ensure personnel resources are adequate and aligned in accordance with the proper organizational roles and responsibilities.
- Enhance appropriate mechanisms to augment the existing reporting requirements and track compliance with this goal. INL Procurement has purchased new acquisition software and anticipates increased functionality in tracking purchases that meet the SA attributes when the program is implemented.

Due to the EM cleanup mission, incorporation of additional sustainable acquisition contract clauses into Fluor Idaho subcontracts, including reporting requirements, will be considered, if feasible. Fluor Idaho assisted DOE through compliance with DOE Acquisition Regulation 953.223-78, “Sustainable Acquisition Program,” as required by the Fluor Idaho contract.

8. EFFICIENCY AND CONSERVATION MEASURE INVESTMENTS

8.1 Performance Status

8.1.1 Efficiency and Conservation Measures

Six energy conservation projects were implemented in FY 2021 and an additional seven projects are planned in FY 2022. These projects are summarized in Table 8.

Table 8. FY 2021 and FY 2022 sustainability projects summary.

Project	Cost ($)	Energy Savings (kWh)	Energy Cost Savings	Project Status
Completed in FY 2021				
INL – IF-627 Whole Building LED Lighting	$36,329	35,704	$4,097	Operational
INL – IF-606 Annex LED Interior Lighting	$26,120	36,169	$6,159	Operational
INL – IF-638 TLED Lighting	$9,539	11,400	$2,668	Operational
INL – CF-622 High Bay LED Lighting	$34,144	27,175	$1,919	Operational
INL – CF-681 Whole Building LED Lighting	$15,001	16,588	$2,471	Operational
INL – PBF-608 Interior LED Lighting	$10,525	3,848	$1,992	Operational
FY 2021 TOTAL	**$131,658**	**130,884**	**$19,306**	
To be Completed in FY 2022				
INL – IF-602 LED Lighting	$144,910	502,892	$28,752	Identified
INL – IF-639 TLED Lighting	$33,263	169,312	$12,993	In Progress
INL – IF-670 LED Lighting	$80,585	44,608	$8,431	In Progress
INL – CF-601 North End LED Lighting	$26,250	14,644	$2,162	Awarded
INL – CF-623 Whole Building LED Lighting	$25,897	21,330	$3,679	Awarded
INL – CF-664 High Bay LED Lighting	$38,850	214,968	$9,327	Identified
Fluor – LED Lighting Project from Energy Audits for CPP-604, CPP-659, CPP-663, CPP-698, and CPP-1604	$333,000	851,800	$46,000	Proposed Postponed until FY 2022
FY 2022 TOTAL	**$682,755**	**1,819,554**	**$111,344**	

8.1.2 Performance Contracts

INL has one active ESPC project in the maintenance stage at MFC. This project has provided consistent and defendable energy reduction as documented from annual measurement and verification reports developed by the Energy Services Contractor (ESCo) and reviewed, validated, and approved by DOE-ID. This project has struggled to provide energy cost savings as the actual unit costs for fuel oil and electricity have not escalated as estimated by the original project development.

MFC ESPC Project included boiler and compressor replacements, lighting and HVAC upgrades, and solar thermal wall installations at the MFC Complex for an installed cost of $33M. The project was completed in 2010 and is in Year 11 (maintenance stage) of a 16-year contract term.

INL has compiled the cost-effective ECMs developed by the energy audit and retro-commissioning activities completed from FY 2014 through FY 2021, into a comprehensive project opportunity that would upgrade specific technologies across INL. This project has a rough order of magnitude cost estimate of over $2.6M and may make an acceptable alternatively funded project, possibly using the ENABLE ESPC funding mechanism. INL will continue to evaluate this opportunity in FY 2022 to determine if it, or a larger project, is a good candidate for an ESPC or if it can and should be funded, in whole or in part, internal to INL.

The primary challenge to implementing alternatively funded projects continues to be the low cost of electricity already used as a major energy source. Inexpensive water and long payback periods also affect performance contract viability.

8.1.3 Appropriations/Direct Obligations

As a government entity, there are limited funding acquisition pathways. There is no standard formula for funding sustainability initiatives. However, potential funding strategies reflect five main sources:

- Direct and indirect funding and reinvesting cost savings from sustainable actions
- Special funding requests (third-party, DOE base funding, and line item)
- Utility incentive programs
- Integration of sustainability into new infrastructure, major renovations, and maintenance activities
- ESPCs and UESCs.

In FY 2021, $131,658 was spent on various energy-related upgrade projects, while also spending $100,395 on energy auditing activities for a total of $232,053. Spending levels for continued efficiency upgrade projects and audits for future years are $778,843 planned for FY 2022 and $391,629 estimated for FY 2023.

The base Sustainable INL Program is managed with indirect funding. However, because indirect budgets are typically constrained, it is difficult to fund many of the planned potential sustainability projects. INL can use utility incentives and internal energy savings reinvestment funding to implement additional facility energy upgrades. Strategic investment dollars are prioritized at a senior leadership level and balanced against laboratory needs.

At the end of December 2021, the current Fluor Idaho contract will end. The new contract with Jacobs will allow them the opportunity to submit funding requests for work activities as they become known. This process will allow Jacobs more latitude to request funding for ECMs, and other sustainability projects as they are identified and determined to be feasible.

8.1.4 Training and Education

The “Federal Buildings Personnel Training Act of 2010” has been reviewed and determined that current Energy Manager Training and Certification meets the requirements of this Act.

INL employs one certified energy manager, accredited through the Association of Energy Engineers. The energy manager along with a senior energy analyst, engineers, facility managers, and project managers use specialized training to identify, develop, and implement energy-reduction projects based on all available energy-use data and trends, mission criteria, and FIMS.

Fluor Idaho has evaluated job functions and determined that Energy Manager Training and Certification are applicable to Fluor Idaho operations and will continue to evaluate them for implementation.

8.2 Plans and Projected Performance

The focus will continue on individual cost-effective projects that lead to overall energy and water reductions in targeted buildings. Seven fully developed LED lighting retrofit projects are planned for completion in FY 2022 as listed in Table 8**Error! Reference source not found.**. However, ongoing material supply issues may impact INL's ability to complete these projects by fiscal year end. INL will continue to leverage indirect and direct funding along with utility incentives and funding in the INL reinvestment program to develop and implement additional small retrofit projects.

INL has numerous potential ECMs developed from the results of the energy audits completed during FY 2014 through FY 2021. INL evaluated and prioritized 771 ECMs by technology and cost effectiveness and has completed 66 of the ECMs to date. These 771 ECMs range from relatively inexpensive control system schedule modifications to more complex and costly capital projects. INL will continue to streamline the remaining ECMs in a comprehensive project opportunity and identify potential funding for completion.

Training opportunities such as Energy Exchange, utility energy efficiency seminars, and online training will be used to keep staff educated and up to date on certification requirements.

INL prepared an Implementation Approach white paper to further evaluate various funding options and project approaches to implement the remaining ECMs identified by the completed energy audits. This white paper focuses on options to explore for at least 50% of the ECMs being constructed through performance contracting as required to meet EAct 20 Section 1002.

INL will continue to evaluate the cost effectiveness and practicality of using the ENABLE ESPC process to implement projects identified by the ongoing energy and water evaluations. Every effort will be made to bundle like project technologies into an alternatively funded project and expedite the development and approval lead time. Technologies that might be bundled into an ESPC project for INL include:

- Exterior lighting upgrades for all Idaho Falls buildings and parking lots
- Chiller, heat pump, and air conditioning system and controls upgrades
- Interior LED lighting
- Motor retrofits.

INTENTIONALLY BLANK

9. TRAVEL AND COMMUTE

9.1 Air Travel, Ground Travel, and Commute Data

9.1.1 Performance Status

In FY 2021, employees flew 3,469,989 airlines miles, a decrease of 80.0% from the FY 2020 total of 17,371,973 miles. Employees also drove 937,190 business-related miles in rental cars and personal vehicles, a decrease of 37.7% from the FY 2020 total of 1,470,840 miles. These decreases are attributed to the severely restricted business travel due to the impacts and protective measures implemented during the pandemic for all of FY 2021.

In FY 2021, the INL site extrapolated employee commute survey from the average of the last 3 years when employee commute surveys were conducted (FY 2018, FY 2017, and FY 2016) to estimate the total number of miles driven by employees, either to/from work locations or bus stops. The commute surveys gathered data on the work schedule, work locations, number of days buses are used, number of days that are teleworked, and number of weeks away from work (sick days, holiday, personal leave, etc.). Employee responses are computed and extrapolated to determine total miles traveled for input into the Dashboard. In addition to the bi-annual extrapolation for employee commuting, a telework factor was used based on the reported percentages of employees teleworking during the pandemic, by work location. Commute miles were extrapolated and factored based on the average number of employees working at each facility location, the number of employees teleworking or working a hybrid schedule (assumed 2 days onsite and 2 days teleworking) for each of the months in FY 2021 and reported response rates from the previous surveys conducted.

In FY 2021, employees were estimated to have commuted 27,497,346 miles to/from their work location, a decrease of 8.2% over the number of miles commuted in FY 2021. A total of 76,760 miles were attributed to human-powered transportation, such as walking and biking. The reduction in commute miles is directly related to the teleworking practices employed during the pandemic.

INL continues to reduce employee commute by transporting employees with a modernized bus transportation system, taking nearly 2,000 cars off the road per day. By streamlining the INL mass transit system that provides safe, efficient, and sustainable transportation to work for INL employees throughout the eastern Idaho region, INL encourages travel behavior changes to reduce fossil fuel consumption and increase highway safety. In doing so, INL models future trends in mass transit to local government planning across the region. Other actions include instituting a park and ride system, eliminating the cost to INL employees for using the bus system, adding additional buses to accommodate increased ridership, and relocating employees to Idaho Falls offices.

INL has installed 21 EV charging stations since 2018. All stations are Level 2 chargers, including one unit that is solar powered and off-grid. A total of 42 charging ports are available primarily for INL fleet operations, and a program was established in FY 2019 to allow employees to use the EV chargers on a cost reimbursed basis. Usage data and fee collection are completely automated and tracked monthly. An information website was created for ease of use including safety, EV charging program sign-up, maps, and program rates.

AMWTP has developed its own rideshare program that currently aids over 75% of its workforce in their commute. In addition, four contracted buses are used by approximately 60 workers daily on a 4-day per week, 10-hour per day shift. These processes have significantly reduced emissions generated by employee commuting.

9.1.2 Plans and Projected Performance

Implementation of projects that reduce employee commuting will continue by encouraging the use of the bus system and reducing unneeded travel. As these projects and activities are implemented, corresponding commute mile reductions will occur. INL is increasing the number of employees while

Fluor Idaho and DOE-ID are decreasing or are stable; therefore, the INL site will likely experience an increase in employee commuting miles and travel. EV station installation is planned for one major campus area in FY 2022, completing Phase 1 of the EV charging program installation. As electric vehicles are procured for fleet use, additional areas will be considered for installation and existing areas expanded.

Employee commute reduction tactics:

- Change commuting habits by encouraging carpooling and increased INL bus use
- Increase telework and create telework centers, based on the success shown during the pandemic and maximum telework practices (resulted in approximate 28% reduction in commuting miles over pre-pandemic commuting miles)
- Promote use of emission-free commute transportation sources such as walking and biking and provide bike-friendly building enhancements, such as secure bike storage/lockers or bike racks.

Employee travel reduction strategies:

- Continue to use video and web conferencing to hold virtual meetings to avoid travel when possible
- Reduce air travel, particularly short-range (<300 miles) air travel, except when required for the INL site mission
- Reduce car rentals by promoting carpooling and public or group transportation modes at conferences and other meetings while on business travel.

9.2 Regional and Local Planning

9.2.1 Performance Status

As the INL site's primary contractor responsible for land management and Sitewide transportation, INL maintains excellent relationships with local community planning groups and government entities including the cities of Idaho Falls, Blackfoot, Arco, Rexburg, and Pocatello, as well as the Idaho counties of Bonneville, Butte, Bingham, and Bannock. Interactions include transportation infrastructure and maintenance, facility planning locations, traffic patterns, and future infrastructure needs.

Although limited, existing community transportation infrastructure usage is encouraged. INL works with local and state agencies on transportation planning by providing input and sponsoring awareness events to promote employee-commuting ridership.

Bicycling remains a seasonal method of commuting to the Idaho Falls campus with increasing awareness of personal fitness and energy conservation. Several buildings have changing rooms and showers available for bicycle commuters. Nearly all Idaho Falls buildings have designated bicycle spaces and INL continues to explore the possibility of covered parking for cycling and motorcycle commuters. INL encourages walking and bicycling as means of travel within campus boundaries. Long-range development envisions continuous improvement of a bicycle and pedestrian-friendly environment.

Along with community partners, a series of virtual and live activities were created to celebrate Earth Week in Idaho Falls. Activities included plogging (collecting trash while running) on favorite walking/running routes, community bike ride, virtual art contest, live events at an urban farm with several classes to choose from, and a food drive. The combination of virtual and in-person events allowed community members to participate in activities at their pace. INL's K-12 Education program published a suite of new hands-on activities that used common household items and could be completed in under 1 hour. Information was sent across several media platforms, including iNotes, Facebook, Twitter, and the City of Idaho Falls virtual IF Earth Day website.

Fluor played a key role through leadership and by providing social media and management of the virtual event. In addition, Fluor provided "What is Soil?" and "Become a Scientist by testing your own

soil” activity page in support of the Clean Earth, Green Earth theme for the Newspaper in Education insert to the Idaho Falls Post Register.

9.2.2 Plans and Projected Performance

INL continues to work with the following state and local planning organizations:

- American Bus Association
- Idaho Strategic Energy Alliance
- Yellowstone-Teton Clean Cities Coalition
- Pocatello Regional Transit
- Idaho Transportation Department.

Sustainable development encompasses an integrated approach during the refurbishment and planning of future facilities and infrastructure, which is consistent with the *INL Annual Laboratory Plan Fiscal Year 2021*. INL site land, campus, and space planning is a critical element in transforming INL to meet DOE national nuclear R&D goals. The major objective for land, campus, and space utilization is to consolidate and co-locate like activities, and plan and prepare to support future mission needs. INL capabilities are consolidated around three main campuses (the ATR Complex, MFC, and Idaho Falls campus) with each campus supporting specific missions based on capabilities and functions.

INTENTIONALLY BLANK

10. FUGITIVES AND REFRIGERANTS

10.1 Performance Status

The fugitive and refrigerant emissions are from emissions generated from 39 fugitives and refrigerants used in INL site operations. The total fugitive and refrigerant emissions for FY 2021 are 137.1 MT compared to 110.45 MT in FY 2020. There was no change in the inventory of sulfur hexafluoride in FY 2021.

The INL site maintains preventative maintenance schedules for all refrigerant equipment, conducts repairs, and removes and replaces refrigerants with certified refrigerant technicians. INL chemical coordinators and environmental personnel conduct reviews of chemicals and projects to identify ozone depleting chemicals and refrigerants that have high global warming potentials and ensure restricted chemicals are not being procured.

10.2 Plans and Projected Performance

The INL site will continue to look for ways to minimize usage through practicing timely preventative maintenance repairs and will continue to work with facilities personnel to find appropriate substitutes that could have a lower global warming potential, especially in cases where projects are proposing to use sulfur hexafluoride or other high global warming potential chemicals.

INTENTIONALLY BLANK

11. ELECTRONIC STEWARDSHIP AND DATA CENTERS

11.1 Purchase of EPEAT-Registered Products

11.1.1 Performance Status

The standard for procurement of desktop computers, workstations, and laptops is to meet or exceed EPEAT Silver and wherever possible, EPEAT Gold standards. In FY 2021, 68.2% of eligible electronics acquisitions met EPEAT standards.

The EPEAT acquisitions rate was impacted in FY 2021 due to computer purchases that were made based on availability to ensure success of laboratory missions during the COVID crisis, including work from home requirements.

FY 2021 achievements:

- INL was one of 75 winners nationwide of the 2021 EPEAT Purchaser Award, achieving the 5-Star Award level.
- INL promoted the standard for new electronic equipment and hardware to be a minimum of ENERGY STAR 5.0 Category B rating and wherever possible, Category A Energy Rating. Dell™ Energy Smart is enabled from the manufacturer. Dell eSMART settings are used wherever possible.
- INL Information Management (IM) continues to promote and maintain up to 300 virtual desktop infrastructure (VDI) thin client computers in FY 2021.
- Fluor Idaho continued to procure ENERGY STAR monitors and computers that are registered as EPEAT when applicable to the procurement.

11.1.2 Plans and Projected Performance

INL will continue to evaluate electronics acquisition requests to ensure that non-standard electronics are registered with EPEAT whenever possible.

Additional expansion of VDI computers will be considered wherever it makes sense and budget allows.

11.2 Power Management

11.2.1 Performance Status

Power management controls are in place on all eligible computer systems. In FY 2021, 100% of eligible personal computers (PCs), laptops, and monitors have power management controls.

Power Management settings are configured when the computers are imaged for the first time. This is done with at imaging with the PowerCfg.exe with all computer receiving a “Balanced” power plan.

Power management policy require the considerations of teleworking restraints and issues (remote personal computers that go to sleep cannot be accessed remotely; therefore, the computers will need to have some of their power management setting configured on a case-by-case basis.

INL currently has both a policy and procedure that covers the responsibility and directions for implementing and maintaining power management on PCs and monitors to shut down PCs (and peripherals) when not in use. The laboratory-wide procedure covers 100% of INL IM-managed systems and excludes sensitive and mission-critical equipment. It also calls for owners of self-managed systems to implement the “company-standard” power management settings. Administrators of self-managed computers are given instruction on how to set the power management settings on their computers. The number of variances was reduced to improve the end user’s experience.

INL's written guidance contains instructions for both power management and configuration management software deployed on all INL computers, ensuring that 100% of the eligible monitors and computers on INL-managed systems have ENERGY STAR power management settings in place.

Power management default settings are on all eligible Fluor Idaho computer systems. Desktop configuration hardware complies with ENERGY STAR and DOE standby power requirements. However, certain production and plant operations systems were not configured to automatically conserve energy (i.e., control room systems and camera monitors, as those systems are safety and operations related and must remain in the "on" position). Fluor Idaho employees are prevented from making changes to conservation settings by Fluor Idaho cybersecurity policies.

11.2.2 Plans and Projected Performance

Focus will continue on efforts on improved power management that are cost effective and least disruptive to performers and will continue to work with IM to improve power management.

To support remote work, INL IM will expand the use of VDI (Virtual Desktops) to replace traditional desktop computers in INL facilities. These VDIs will require less power and require no physical space, giving users the choice of physical onsite office space—traditional office versus a temporary "hoteling space" while onsite.

11.3 Automatic Duplexing

11.3.1 Performance Status

At the end of FY 2021, 100% of managed equipment has duplex printing enabled, where possible.

The INL site manages print services for all networked printers and multifunction devices. This includes setting all managed printers to automatically duplex print with the ability for individuals to select single-sided printing on a per-job basis. Additional non-networked copiers are enabled to duplex print where applicable.

Additionally, instructions for individual printers are posted on the internal INL Sustainability–Electronic Stewardship website with directions to have INL Operations Center assist in setting their printers to default duplex print, where available.

11.3.2 Plans and Projected Performance

Efforts will continue to encourage and enable duplex printing on all printers, copiers, and multifunction devices while assessing new opportunities to improve sustainability of printing operations and continuing to reduce the number of personal printers.

Additionally, INL IM will require business justification for purchasing smaller, stand-alone printers versus using larger group or department-wide enterprise printers.

11.4 Electronics End of Life

11.4.1 Performance Status

In FY 2021, 100% of electronic devices were reused or recycled. Of that total, 13.3% was sent to a certified recycler, Technology Conservation Group of Portland, Oregon, who was certified under the Responsible Recycling (R2) Certification and Recycling Industry Operating Standard (RIOS^{TM}), 61.0% was donated or reused, and 25.7% was recycled through a local non-certified recycler. Sending electronic devices for reuse or recycle meets the GSA definition for recycling electronics.

The INL site provides an effective electronics disposition program for reusable equipment, which is just one aspect of the overall Property Management System that is requirements driven and flows down from federal requirements to a comprehensive set of procedures. The system utilizes transfer provisions for onsite use and GSA electronic screening provisions to promote reuse by other federal and state agencies, and offers reuse programs, including donations and sales, following GSA requirements for disposition.

INL maintains procedures through a series of controlling documents, including, but not limited to, LWP-8000, "Environmental Instructions for Facilities, Processes, Materials, and Equipment," PDD-2000, "Property Management System Description," and iQ-Work Smart process flows. These procedures outline the procedural steps required when materials and equipment require disposition for both users/generators and disposal personnel. Specifically, in LWP-8000, Section 4.8, there are requirements for reuse and/or donation of working electronic products and for use of a certified recycler should the materials not be reusable.

Currently, Fluor Idaho reuses computer equipment when applicable. Fluor Idaho sells un-reusable computer equipment to electronics recyclers that use environmentally sound management practices. Fluor Idaho will comply with any applicable federal, state, and local laws, and regulations, and implement the following instructions:

- Send all computer equipment received for recycling at the end of their useful life, including those that are broken and obsolete, to electronics recyclers that use environmentally sound management practices.
- Perform due diligence when selecting an electronics recycler to verify that the recycler will handle and process electronic equipment consistent with all federal, state, and local regulations, and in an environmentally sound manner.

INL PC redistribution collected electronics, shredded hard drives, and recycled the materials through a certified recycler. In FY 2021, INL recycled approximately 8.9 MT of electronics through a certified recycler.

As an alternative to traditional recycling, INL, through multiple transfer/donation programs (Education and Research Transfer Program, Laboratory Equipment Donation Program, and Computers for Learning) was able to transfer 871 computers and other various electronic laboratory equipment to local high schools and universities. These transfers were beneficial to DOE and local schools. They prevented the destruction of the equipment and allowed the schools to increase their laboratory capabilities along with various science, technology, engineering, and mathematics (STEM) programs and activities with little-to-no expense and extend the life of over $4.3M worth of equipment.

11.4.2 Plans and Projected Performance

Continued focus on efforts that are cost effective and least disruptive to performers. Work will continue with IM and Property Disposal Services to improve electronics end-of-life disposition.

11.5 Data Center Efficiency

11.5.1 Performance Status

Efforts to consolidate data centers for greater efficiency continued throughout FY 2021. Actions completed or ongoing include:

- Closing two server locations at the Information and Operation Research Center during the first quarter of FY 2021 and virtualizing physical machines where possible reducing overall power consumption in the consolidated EROB data center
- Continuing to improve the cooling efficiency for the newly configured, consolidated data center located in the EROB, formerly the HPC data center

- Continuing improvement of hot-cold aisle containment to decrease system loads and increase the effectiveness of heat transfer
- Orienting servers and racks to achieve better efficiency
- Shutting down and eliminating non-needed servers
- Raising supply water temperature to minimize energy use and maximize potential free-cooling time
- Installing modern and efficient HVAC units in the Willow Creek Building server room, ensuring connectivity to the facility management control system for optimal performance.

11.5.2 Plans and Projected Performance

INL will continue consolidating server infrastructure in the old HPC data center by virtualizing physical machines and taking advantage of cloud and container hosting options. This will reduce overall power and cooling needs.

Replace a 30-ton computer room air condition (CRAC) unit with a 20-ton unit at the EROB data center.

DOE-HQ purchased licenses for a data center infrastructure management tool called Nlyte. INL has reserved licenses for INL use but has not initiated implementation. Plans to secure funding to implement Nlyte are being developed while INL continues to focus on server consolidations.

INL anticipates Nlyte's Data Center Infrastructure Management (DCIM) software solution will help automates the management of INL assets, resources, processes, and people throughout the entire life cycle of the computer infrastructure. The software provides full visibility of all assets in a data center, allowing Information Management teams to monitor energy usage and receive alerts when thresholds are exceeded.

DCIM software also helps with data center design and infrastructure planning, by assisting with determining the optimum placement of new hardware. This translates to more efficient data centers, lower operating costs, and increased productivity.

In the future, Power Usage Effectiveness (PUE) calculations will include the performance of our entire fleet of data centers around the laboratory—not just our newest and best facilities. INL will also continuously measure throughout the year—not just during cooler seasons.

12. ADAPTATION AND RESILIENCE

Resilience includes the ability to withstand and recover from deliberate attacks, accidents, or naturally occurring threats or incidents. Energy resiliency is the ability to prepare, prevent, and recover from energy and water disruptions that impact mission assurance on federal installations. This means providing reliable power under routine and off-normal conditions, including those caused from extreme weather events.

As outlined in Executive Order 14008, *Tackling the Climate Crisis at Home and Abroad*, the DOE Climate Adaptation and Resilience Plan (CARP) issued in August of 2021, and Climate Adaptation Policy Statement build upon prior DOE actions taken to bolster adaptation and increase the resilience of DOE facilities and operations. These values and ideals are paired well with the INL site mission.

12.1 Performance Status

INL began transitioning to a telework platform on March 16, 2020. Over 80% of INL employees, or nearly 4,000 staff, began working from home in mid-March with only essential personnel reporting to their normal work locations. By the end of FY 2021, 44% of INL staff continued to telework.

Several operation changes were made and continue. Extensive plans and guidance were issued on the use of face masks, hand sanitizer, employee travel, visitors, internships, new hires, returning to work, and time recording. The telework process and approvals were revised. Operational changes in badging, medical, shuttles, bus service, cafeteria, office cleaning, meeting room use, and physical distancing are in place. Decision trees were developed and used when potential exposure occurs, and reporting requirements are in place if a positive case occurs. Communication and updates are constant via internal communication processes, including dedicated webpages with the latest company guidance, statistics, and policies.

In response to the COVID-19 pandemic, Fluor Idaho developed PLN-6035, “ICP Core ESH&QA PLAN for Essential Mission Critical Operations/Minimum Safe Operations,” to better address reduction of staff due to emergency conditions. The plan implements emergency management procedures and incorporates PLN-5200, “Fluor Idaho Continuity of Operations Plan.” Beginning in March 2020, more than 800 Fluor Idaho employees were provided with a MobiKEY, which provides employees access inside the firewall, allowing them to work from home. As a result, the Employee Resource Manual was revised with a new Telework Policy. A webpage with updated COVID-19 information was created for Fluor Idaho employees on the internal website, and a required reading training on COVID-19 mitigation protocols was implemented for all employees. Following the release of COVID-19 restrictions, work performed under the existing the Idaho Cleanup Project will be reconstituted as outlined in PLN- 6035.

All sustainable activities support energy resiliency and by default, make the INL site a more resilient institution. Sustainable activities include:

- Replaced an aged underground diesel storage tank with an above ground version, increasing environmental protection and lessoning the impact on the environment. An interim step as INL moves toward net-zero emissions.
- Included the Sustainable Acquisition clauses in INL electronics acquisition blanket purchase orders. As noted in the INL Green Purchaser award, using EPEAT products reduces energy use, helping reduce electric load and demand.
- Ensured INL procurement requirements lend preference to use local suppliers and manufacturers, shortening the supply chain and reducing the chances of delivery disruptors.
- Completed annual update of operational procedures and processes to address sustainability, emergency planning, and operational resiliency.
- Completed numerous energy and water-reduction projects resulting in lower energy use and load demands on the servicing utility.

- Continued evaluating and considering alternative energy solutions ranging in scope from microgrid renewable generation to potential small modular reactor projects capable of providing local clean alternative energy.

In FY 2014, the University of Idaho participated in developing a vulnerability assessment, one of the first vulnerability assessments completed by DOE. University of Idaho and INL used a common framework for assessing vulnerability that considers exposure, sensitivity, impact, and adaptive capacity to assess vulnerability. In FY 2021, University of Idaho experts determined that updates to the climate models were not needed. However, impacts to operating systems and affected buildings continue to be evaluated.

Comprehensive emergency response procedures are in place that cover all INL site facilities:

- INL procedures include PLN-114, "Idaho National Laboratory (INL) Emergency Plan/Resource Conservation and Recovery Act (RCRA) Contingency Plan," which addresses the elements of, and is the primary component in defining and directing the INL Emergency Management Program. The plan implements DOE policy and requirements for an emergency management system and a RCRA contingency plan specified in LRD-16100, "Emergency Management System," which includes citations to DOE O 151.1D, "Comprehensive Emergency Management System," and other DOE requirements. The plan was updated in FY 2021.
- Fluor Idaho procedures include PLN-2012, "ICP Core Emergency Plan/RCRA Contingency Plan," and the emergency response elements that are required in DOE O 151.1D, "Comprehensive Emergency Management System," for INTEC, RWMC (AMWTP and Accelerated Retrieval Project), and the Fluor Idaho operated buildings in Idaho Falls.
- The Fluor Idaho ISO 14001:2015 certification surveillance audit performed in August 2021 resulted in continued certification and the INL certification was renewed in September 2020. The next surveillance audit is tentatively scheduled for August 2022.

Several INL Emergency Management procedures were updated to better prepare the INL site for naturally occurring phenomenon, including PLN-4267, "INL Continuity of Operations Plan." INL's emergency plans and emergency plan implementing procedures (EPIs) are reviewed at least annually and revised if necessary. The plans and EPIs may be revised based on:

- Changes in emergency planning or company operations, policy, concept of operations, procedures, organization and staffing, and facility operations and/or mission
- Direction of the DOE-ID Emergency Management Program administrator
- Failure of emergency plan implementing procedures during drills, exercises, and real events
- Results of audits, evaluations, appraisals, and self-assessments
- New facility information.

12.2 Plans and Projected Performance

The concept of resiliency is evolving in real time. The COVID-19 era will require professionals to be strategic overseers with a lens for long-term outcomes. In this season of change, all built environments will require careful reconsiderations, and it will fall to facility management to promote a building culture that stands on the pillars of safety, quality, and efficiency.

INL will be guided by science to build resilience into DOE-ID-managed lands, facilities, and equipment. A general framework used in resiliency planning includes identifying exposure, translating that exposure into potential impacts, prioritizing risk, devising solutions, and securing funding. INL will work with internal and external stakeholders to address threats to missions and programs. Priority actions include:

- Develop a plan and commence implementation of the five priority adaptation actions found in the CARP: (1) Assess Vulnerabilities and Implement Resilience Solutions, (2) Enhance Climate Adaptation and Mitigation Co-benefits, (3) Institutionalize Climate Adaptation and Resilience Across INL Policies, Directives, and Processes, (4) Provide Climate Adaptation Tools, Technical Support, and Climate Science Information, and (5) Advance Deployment of Emerging Climate Technologies.
- Updating the existing Climate Vulnerability Assessment (priority 1 of the CARP) and incorporate all the requirements of the Vulnerability Assessment and Resiliency Plan (VARP). The classic planning approach as adopted from the VARP itself will be used:
  - Establish planning team (first quarter of FY 2022)
  - Update critical asset and infrastructure (second and third quarter of FY 2022; and continuous)
  - Characterization of climate trends and events was completed previously, but will be validated (second quarter of FY 2022)
  - Determine Likelihood of climate change hazards (third quarter of FY 2022)
  - Characterize the impacts, a continuation and refinement of what was done previously (third quarter of FY 2022)
  - Develop Risk Matrix (third quarter of FY 2022)
  - Identify Solutions (fourth quarter of FY 2022)
  - Develop Portfolio of Solutions, including funding pathways (fourth quarter of FY 2022)
  - Reassess plan and monitor results (FY 2023 and beyond)
- Investing in research and supplying critical data and information
- Implementing actions that highlight benefits of new technologies, innovative resource management, and infrastructure improvements that will improve the resiliency of DOE-ID's operating footprint
- Investigating and evaluating using FEMP's Technical Resilience Navigator or LEED's RELi 2.0 Rating Guidelines for Resilient Design and Construction.

INL continues the process of incorporating resilient design into new and existing buildings. Program leads and engineers are well versed on the trends associated with resilient design. As this new field emerges and expertise becomes more refined, controlling documents will be targeted for incorporating resiliency tactics. A fully mature program is still being defined.

Highly energy-efficient lighting, roofing, and automation systems continue to be installed in new buildings and during retrofit activities. The result is not just an increase in the resilience of the building, but of the surrounding community, by decreasing demand on available resources and infrastructure.

Processes and actions for future activities include the following (for both new and existing buildings):

- Incorporate resilient design and management into the INL facilities planning process
- Identify and evaluate vulnerabilities to natural hazard risks (e.g., storm events, localized flooding, extreme temperatures, and wildfires)
- Consider enhanced fire-proofing strategies and designs
- Consider designs for enhanced drought tolerance
- Ensure continuity of operations and access to electricity in the event of an extended power outage
- Improve energy performance of building envelopes, such as new compressors to increase reliability and efficiency at INTEC and IWTU

- As appropriate, use information modeling to assess design options and to improve decisions based on life-cycle analysis
- When cost effective, adopt passive and natural design strategies overactive and mechanical systems.

The INL site is well positioned to address the need for organizational resilience elements in future plans. With leadership commitment, the INL site will continue to ensure that the appropriate events and risk elements are considered as part of the INL site programs and planning activities. Policies and procedures will be evaluated to determine whether they should be modified to consider organizational risks. Emergency response, workplace safety and health, and the most updated scientific knowledge will continue to be incorporated into all facets of organizational resilience.

With the Fluor Idaho contract scheduled to end in December 2021, initial planning for the completion of the VARP has begun; however, because of the contract change, Jacobs will provide greater input into the completion of the plan. The VARP for the Idaho Cleanup contract is scheduled for completion in FY 2022.

Appendix A

Excluded Buildings Self-Certification

INTENTIONALLY BLANK

Appendix A
Excluded Buildings Self-Certification

DOE SUSTAINABILITY DASHBOARD DATA
SELF-CERTIFICATION FORM

FROM: **U.S. Department of Energy, Idaho Operations Office, Idaho National Laboratory**
Office of Nuclear Energy, Lead Program Secretarial Office

TO: Sustainability Performance Division

DATE: **11/10/2021**

SUBJECT: BUILDING EXCLUSION SELF-CERTIFICATION FORM FOR THE ENERGY INTENSITY GOAL OF EISA 2007

Each building or group of buildings excluded under the criteria for a Part G or Part H exclusion is/are metered for energy consumption and their consumption is reported annually.

If any building has been excluded under the criteria for Part H for impracticality, then all practicable energy and water conservation measures with a payback of less than 10 years have been installed. A justification statement that explains why process-dedicated energy in the facility may impact the ability to meet the goal has been provided in the Dashboard Energy Exclusions Report.

I certify that the buildings listed on the Excluded Buildings List produced by the Sustainability Dashboard dated November 3, 2021 for the Idaho National Laboratory meet the exclusion criteria in *Guidelines Establishing Criteria for Excluding Buildings* published by FEMP on January 27, 2006.

Jason L. Anderson
DOE Site Office Official – printed name

Jason Anderson
DOE Site Office Official – signature

11/10/2021
Date

Contact Information:
Anderson, Jason L.
Title: Environmental Protection Specialist,
DOE Idaho Operations Office
Phone: (208) 526-0174
Email Address: andersjl@id.doe.gov

Or: Ischay, Christopher P.
Title: INL Sustainability Program Manager
Phone: (208) 351-5245
Email Address: Christopher.Ischay@inl.gov

INTENTIONALLY BLANK

U.S. Department of Energy

Sustainability Performance Office - Sustainability Dashboard

Energy Consuming Excluded Buildings and Trailers List

11/3/21

FY 2022 INL SSP / FY 2021 Energy Reporting to the DOE Sustainability Dashboard

Program Office **NE**

Site **602** **Idaho National Lab - Idaho Falls REC**

Site **603** **Idaho National Lab - Scoville**

Site #	Property ID	Real Property Unique ID	Property Name	Exclusion Part	Property Type	Gross ft²	Goal Subject ft²	Excluded ft²
602	B60-606	205829	Boise Outreach Office #2	C - Full Service Lease	Building	1,520	0	1,520
Justification Comments: The offices rented in the Boise Outreach Office #2 include a full-service lease where all utilities are included in the lease. The utility account is owned and maintained by the building owner so the energy and building are excluded from the Goal Subject energy usage and energy intensity. B60-606 is excluded based on Exclusion Part C. Ernest Fossum, CEM 11/3/21								
602	B60-607	218017	University of Utah Research Park	C - Full Service Lease	Building	3,869	0	3,869
Justification Comments: The offices rented in the University of Utah Research Park include a full-service lease. The utility account is owned and maintained by the building owner so the energy and building is excluded from the Goal Subject energy usage and energy intensity. B60-607 is excluded based on Exclusion Part C. Ernest Fossum, CEM 11/3/21								
602	IF-654	96845	Engineering Research Office Bldg	G - Separately Metered Intensive Load(s)	Building	239,746	234,461	5,285
Justification Comments: INL is excluding the EROB High Performance Computing (HPC) data center due to its significant use of energy that is not impacted by traditional building level energy efficiency improvements. The EROB HPC uses 5,285 ft² in EROB and is separately metered from the rest of the office building. The EROB HPC along with IF-654A are excluded based on Exclusion Part G. Ernest Fossum, CEM 11/3/21								
602	IF-654A	205463	EROB Mechanical Building Annex	G - Separately Metered Intensive Load(s)	Building	1,083	0	1,083
Justification Comments: INL is excluding the EROB High Performance Computing (HPC) data center due to its significant use of energy that is not impacted by traditional building level energy efficiency improvements. IF-654A is solely responsible for cooling of the HPC servers and is separately metered. IF-654A is excluded based on Exclusion Part G. Ernest Fossum, CEM 11/3/21								
602	IF-661	219136	Idaho Falls ICP Training Center	C - Full Service Lease	Building	4,650	0	4,650
Justification Comments: The Idaho Falls ICP Training Center is a leased building with a full-service lease. Energy use for this building is metered, but the account is owned and maintained by the building owner so it is excluded from the Goal Subject energy usage. IF-661 is excluded based on Exclusion Part C. Ernest Fossum, CEM 11/3/21								
602	IF-692	219285	Collaborative Computing Center	G - Separately Metered Intensive Load(s)	Building	65,336	51,689	13,647
Justification Comments: INL is excluding the data center portion of the IF-692 Collaborative Computing Center due to its significant use of energy that is not impacted by traditional building level energy efficiency improvements. IF-692 is a new INL building/data center, is a high process/computing energy user, is expected to grow signicantly over the next several years, and is separately metered. The IF-692 Data Center is excluded based on Exclusion Part G. Ernest Fossum, CEM 11/3/21								
602	IF-694	218732	N&HS Laboratory & Training Facility	C - Full Service Lease	Building	23,610	0	23,610
Justification Comments: The N&HS Laboratory and Training Facility is a leased building with a full-service lease. Energy use for this building is metered, but the account is owned and maintained by the building owner so it is excluded from the Goal Subject energy usage. IF-694 is excluded based on Exclusion Part C. Ernest Fossum, CEM 11/3/21								

This report qualifies DOE Owned, DOE Leased, Contractor Leased, Contractor License and Permit buildings and trailers where the Excluded Facilities (GSF) is greater than zero.

U.S. Department of Energy

Sustainability Performance Office - Sustainability Dashboard

Energy Consuming Excluded Buildings and Trailers List

11/3/21

FY 2022 INL SSP / FY 2021 Energy Reporting to the DOE Sustainability Dashboard

Program Office **NE**

Site **602** **Idaho National Lab - Idaho Falls REC**

Site **603** **Idaho National Lab - Scoville**

Site #	Property ID	Real Property Unique ID	Property Name	Exclusion Part	Property Type	Gross ft²	Goal Subject ft²	Excluded ft²
603	TRA-640	96650	Hazardous Chem Storage Bldg	G - Separately Metered Intensive Load(s)	Building	1,891	0	1,891
Justification Comments: The ATR and its three support buildings use 62% of the total electricity consumed at the ATR Complex area. This building is one of three small incidental buildings that are campus metered with the four primary ATR Buildings. Energy use for these buildings is separately metered from the rest of the ATR Complex. TRA-640 is excluded based on Exclusion Part G. Ernest Fossum, CEM 11/3/21								
603	TRA-670	96138	ATR Reactor Building	G - Separately Metered Intensive Load(s)	Building	127,989	0	127,989
Justification Comments: Advanced Test Reactor (ATR) process energy use. The ATR and its three support buildings use 62% of the total electricity consumed at the ATR Complex area. This building is one of the four primary ATR Buildings. Energy use for these buildings is separately metered from the rest of the ATR Complex. TRA-670 is excluded based on Exclusion Part G. Ernest Fossum, CEM 11/3/21								
603	TRA-671	96139	ATR Cooling Tower Pumphouse	G - Separately Metered Intensive Load(s)	Building	3,568	0	3,568
Justification Comments: Advanced Test Reactor (ATR) process energy use. The ATR and its three support buildings use 62% of the total electricity consumed at the ATR Complex area. This building is one of the four primary ATR Buildings. Energy use for these buildings is separately metered from the rest of the ATR Complex. TRA-671 is excluded based on Exclusion Part G. Ernest Fossum, CEM 11/3/21								
603	TRA-672	96140	Pump House & Well #4	G - Separately Metered Intensive Load(s)	Building	404	0	404
Justification Comments: Advanced Test Reactor (ATR) process energy use. The ATR and its three support facilities use 62% of the total electricity consumed at the ATR Complex area. This building is one of the four primary ATR Buildings. Energy use for these buildings is separately metered from the rest of the ATR Complex. TRA-672 is excluded based on Exclusion Part G. Ernest Fossum, CEM 11/3/21								
603	TRA-674	96652	Diesel Generator Bldg	G - Separately Metered Intensive Load(s)	Building	704	0	704
Justification Comments: Advanced Test Reactor (ATR) process energy use. The ATR and its three support facilities use 62% of the total electricity consumed at the ATR Complex area. This building is one of the four primary ATR Buildings. Energy use for these buildings is separately metered from the rest of the ATR Complex. TRA-674 is excluded based on Exclusion Part G. Ernest Fossum, CEM 11/3/21								
603	TRA-676	92397	ATR Fitness Center	G - Separately Metered Intensive Load(s)	Building	2,146	0	2,146
Justification Comments: The ATR and its three support facilities use 62% of the total electricity consumed at the ATR Complex area. This building is one of three small incidental buildings that are campus metered with the four primary ATR Buildings. Energy use for these buildings is separately metered from the rest of the ATR Complex. TRA-676 is excluded based on Exclusion Part G. Ernest Fossum, CEM 11/3/21								
603	TRA-689	131170	Dynamic Learning Facility	G - Separately Metered Intensive Load(s)	Building	5,359	0	5,359
Justification Comments: The ATR and its three support facilities use 62% of the total electricity consumed at the ATR Complex area. This building is one of three small incidental buildings that are campus metered with the four primary ATR Buildings. Energy use for these buildings is separately metered from the rest of the ATR Complex. TRA-689 is excluded based on Exclusion Part G. Ernest Fossum, CEM 11/3/21								

This report qualifies DOE Owned, DOE Leased, Contractor Leased, Contractor License and Permit buildings and trailers where the Excluded Facilities (GSF) is greater than zero.

Appendix B

DOE Sustainability Dashboard Summary Report

INTENTIONALLY BLANK

Appendix B

DOE Sustainability Dashboard Summary Report – FY 2021

Comprehensive Scorecard Summary - INL FY 2021					
Facility Management					
	Energy Intensity	**FY 2003 (baseline)**	**FY 2021**	**% Change**	
	Energy Intensity (Btu/GSF)	182,978.6	141,958.1	**-22.4%**	
	Energy Intensity	**FY 2015 (baseline)**	**FY 2021**	**% Change**	
	Energy Intensity (Btu/GSF)	154,357.7	141,958.1	**-8.0%**	
	Renewable Electricity	**FY 2021 Electricity Consumption**	**FY 2021 Renewable Electricity w/ Bonuses**	**% of Total**	
	Total (MWh)	220,161	18,690	**8.5%**	
	Clean Energy	**FY 2021 Total Energy Consumed (MMBtu)**	**FY 2021 Renewable Energy w/ Bonuses**	**% of Total**	
	Total (MMBtu)	977,268	69,021	**7.1%**	
	Potable Water Intensity	**FY 2007 (baseline)**	**FY 2021**	**% Change**	
	Water Intensity (Gal/GSF)	173.9	140.2	**-19.4%**	
	Non-Potable Water Consumption	**FY 2010 (baseline)**	**FY 2021**	**% Change**	
	Total ILA Water (million gal)	0.0	0.0	**N/A**	
	Sustainable Buildings	**>10,000 GSF Building Count Total Applicable**	**FY 2021 >10,000 GSF Guiding Principles Certified**	**% of Buildings**	
	Performance (%)	93	19	**20.4%**	
	Sustainable Buildings	**Building Count Total Applicable + Bonus for Small Bldgs**	**FY 2021 Guiding Principles Certified + Bonus for Small Bldgs**	**% of Buildings**	
	Performance (%)	99	25	**25.3%**	
Fleet Management					
	Fleet Petroleum	**FY 2005 (baseline)**	**FY 2021**	**% Change**	
	Total Petroleum (GGE)	938,197	800,420	**-14.7%**	
	Fleet Alternative Fuel	**FY 2005 (baseline)**	**FY 2021**	**% Change**	
	Total Alternative (GGE)	76,436	35,657	**-53.4%**	
Waste Management					
	Municipal Solid Waste		**FY 2021**	**%**	
	Non-diverted Waste		493.8	**40.4%**	
	Total Diverted Waste		728.9	**59.6%**	
	Total Waste (metric tons)		1,222.8	100.0%	
	Construction & Demolition		**FY 2021**	**%**	
	Landfilled C&D Waste		9,732.1	**42.0%**	
	Diverted C&D Waste		13,452.2	**58.0%**	
	Total C&D Waste (metric tons)		23,184.3	100.0%	
Electronics Stewardship					
	Electronics Acquisition	**EPEAT Acquired**	**Total Acquired**	**%**	
	Total Acquired	3,484	5,111	**68.2%**	
	Electronics Recycling	**Transferred / Recycled**	**Non-Certified Recycler**	**Amount Disposed**	**%**
	Total Electronics Waste (metric tons)	50.143	17.364	67.507	**74.3%**
	Power Management (PM)	**Total Owned**	**PM Enabled**	**Exempt**	**%**
	Total Items	39,606	39,488	118	**100.0%**
	Duplex Printing	**Total Owned**	**Duplex Enabled**	**Incapable**	**%**
	Total Printers	724	658	66	**100.0%**
Acquisition					
	Sustainable Acquisition (SA)	**Contract Reviewed**	**Contracts Actions with SA Clauses**	**Total Contract Dollars with SA Clauses**	**%**
	Number of Contracts and $	63	63	$16,720,125	**100.0%**
Greenhouse Gas Management					
	Scope 1 & 2 Greenhouse Gas Emissions	**FY 2008 (baseline)**	**FY 2021**	**% Change**	
	Total (MtCO2e)	141,005.1	89,391.4	**-36.6%**	
	Scope 3 Greenhouse Gas Emissions	**FY 2008 (baseline)**	**FY 2021**	**% Change**	
	Total (MtCO2e)	35,252.5	15,586.6	**-55.8%**	