Economic Impact Report

Construction and Operation of a Small Modular Reactor Electric Power Generation Facility at the Idaho National Laboratory Site, Butte County, Idaho

Prepared for

Regional Economic Development for East Idaho (REDI)

Prepared by

Idaho Policy Institute, Boise State University

McClure Center for Public Policy Research, University of Idaho

Researchers

Dr. Geoffrey Black, Boise State University

Mr. Steven Peterson, University of Idaho

Final Copy

January 29, 2019

BOISE STATE UNIVERSITY
IDAHO POLICY INSTITUTE

University of Idaho
McClure Center for Public Policy Research

Contents

Section 1: Executive Summary 2

Report Organization 6

Section 2: Project and Study Overview 8

Summary of Proposed Project 8
Purpose of This Study 9

Section 3: Small Modular Reactors and the NuScale Design 11

General Description of Small Modular Reactors 11
NuScale SMR Design 12

Section 4: Economic Methodology and Data Sources 14

Overview of Economic Methodology 14

Data Used in This Analysis 16

Regionalizing This Analysis 19

Section 5: Overview of the Economy of Eastern Idaho 23

Regional Overview 23

Contrast between Urban and Rural 23

Top Regional Industries and Employers 24

Population Density 24
Population Growth 25
Population Demographics 25
Employment Changes by County 26
Employment by Industry 27
Construction Industry 29
Regional Unemployment Rates 31
Occupational Analysis 32

Section 6: Economic and Fiscal Impacts of Construction and Plant Operations 37

Summary of Economic Impacts from Construction Activities 37

Annual Manufacturing and Construction Impacts 37
Cumulative Manufacturing and Construction Impacts 38

Summary of Fiscal Impacts from Construction Activities 38

Annual Fiscal Impacts from Construction 38
Cumulative Fiscal Impacts from Construction 39

Summary of Economic Impacts from Operations 40
Summary of Fiscal Impacts from Operations 40
Enhancement of the Regional Economy and Future Economic Opportunities 41

Static versus Dynamic Analysis 41

Section 7: Summary and Conclusions 42
Summary of Economic and Fiscal Impacts from Construction and Operations 42
Caveats and Limitations of the Study 43
Supply Chain 43
Occurrence within Eastern Idaho 44
IMPLAN Model Adjustments. 44
Plant Construction. 44
Validation. 44
Section 8: References 45
Section 9: Appendices 48
Appendix A: Estimating Construction Costs 48
Appendix B: Economic Impacts at the Industry Level 52
Appendix C: Construction and Manufacturing Companies 53
Resumes of Economic Researchers 57
Geoffrey Black, Ph.D. 57
Steven Peterson, M.S. 57
General and Limiting Conditions 58
Support for this study 59

Section 1: Executive Summary

Project Overview	As part of its Carbon Free Power Project (CFPP) initiative launched in 2015, Utah Associated Municipal Power Systems (UAMPS) is undertaking, along with NuScale Power LLC, licensing and development actions for the development of a Small Modular Nucelar Reactor (SMR) facility in eastern Idaho (the Project). The U.S. Department of Energy issued a Site Use Permit to UAMPS for access to the Idaho National Laboratory (INL) site for the facility. The power plant will consist of twelve NuScale SMR modules, each rated at producing 60 megawatts of electricity (MWe). The NuScale 12-pack of SMR modules will have a rated net capacity of 685 MWe of power. The start date of on-site commencement of work in eastern Idaho is projected to be the second half of 2021, with an expected commercial operation date of the first module in 2026 and full comercial operation in 2027.
Overview of the Economic Impact Analysis	This study employs IMPLAN, the most widely used economic impact analysis model in the United States, to estimate the increased output (sales), gross regional product, employment, employee compensation and tax revenues resulting from the construction and operations of the Project. The analysis measures estimated impacts arising from the manufacturing and construction of the NuScale 12-pack within the regional economy. Expenditures occurring outside the region are excluded from the analysis. The construction period is estimated to be four years. After construction and connection to the power grid, the facility will generate ongoing economic and fiscal impacts each year over the lifetime of the plant. Employment, operations and maintenance data for the NuScale 12-pack power plant are utilized to estimate economic impacts from ongoing plant operations. Based on studies of the regional extent of employment, purchasing and other activities at the INL site, this study estimates the fiscal and economic impacts in the eastern

	Idaho regional economy, which consists of Bannock, Bear Lake, Bingham, Bonneville, Butte, Caribou, Clark, Custer, Franklin, Fremont, Jefferson, Lemhi, Madison, Oneida, Power and Teton County. Although the economic parameters of the regional economy are specified at the county level and incorporated into the economic modelling to estimate economic impacts of the Project, identification of the county-level supply chain, including the labor and materials derived in Idaho, is ongoing and has yet to be publicly identified. As a result, these county-level economic data are aggregated to create the eastern Idaho regional economy used for the economic modeling in this study. The impacts estimated in this analysis are provided at the level of the eastern Idaho regional economy.
Project Development Schedule	The Project has an expected construction period of four years. Economic impacts from construction of the facility are reported on an annual basis. It is anticipated that construction will be complete by 2026, with limited power production, and that commercial operation of all 12 SMR modules will commence in 2027. As the sequencing of the power module grid connection has not been made public, this study assumes that economic impacts from construction cease four years after commencing and that impacts from operations commence the following year. Given that the projected life of the facility is 40 years, the economic and fiscal impacts from commercial power production at the facility will be long lasting. These impacts may extend for a longer period; it is anticipated that the initial licensing period of 40 years is likely to be extended for 20 years, as is common with U.S. nuclear power plants.
Cumulative Construction Economic and	Cumulatively, the Project will create a total 13,422 job years in eastern Idaho over the four-year construction period.[1] In addition, these activities are estimated to

[1] Impacts from construction projects are temporary. Upon completion of the Project, the direct construction jobs, as well as the indirect and induced jobs to support direct construction jobs, will

Fiscal Impacts

increase labor income in the region by $644.18 million, and add over $2 billion in increased output in the region over the construction period. Further, construction at the site will increase state and local tax revenues by nearly $36.9 million, with federal tax revenues increasing by $142.98 million during the construction period.

Annual Economic and Fiscal Impacts

The Project's economic and fiscal impacts arise from construction activities, as well as ongoing operations of the facility. The largest annual impacts stem from the construction activities and expenditures during the four-year construction horizon. During this construction period, the Project is estimated to create an annual total of 2,000 direct jobs at the site[2], and an additional 1,356 jobs from the indirect and induced economic impact off-site (see Section 6 for an explanation of these direct, indirect and induced economic impacts). Thus, construction of the facility will create an additional 3,356 total jobs in the region each year over the four-year construction period. In addition, the Project will add $161.05 million in labor income and $516.41 million in increased economic output (sales) each year. Annually, state and local tax revenues will increase by $9.2 million, with federal tax revenues increasing by $35.7 million during the construction period.

In addition to the economic impacts during the manufacture and construction of the facility, operation of the power plant will create increased employment and economic activity in eastern Idaho on an ongoing basis over the life of the facility. The economic impacts

---

cease. Job years, measured as one job per one-year period, denote total increases in employment over the entire construction period. In this case, the annual number of direct, indirect and induced jobs are multiplied over the four-year construction period. Once the construction period has ended, the operation phase of the Project will begin. These activities create ongoing employment impacts and are measured in jobs on an annual basis.

[2] It is noted that NuScale has reported approximately 1,600 direct jobs will be created by the construction of the facility; the model used in this analysis estimates the creation of 2,000 direct jobs based on level of expenditures and type of construction activities at the site.

	from operations of the power plant are estimated to create 360 direct jobs at the site annually, and, through indirect and induced effects, will add a total of 667 jobs in the region each year over the estimated 40– to 60-year lifetime of the facility. The operations of the plant are estimated to increase labor income in the region by nearly $48 million, increase economic output in the region by an estimated $81.15 million, add $2.97 million to local and state tax revenues annually and add $10.86 million to federal tax revenues annually.

Report Organization

The report is organized as follows:

- **Section 1:** Provides an Executive Summary and description of report organization.

- **Section 2:** Contains an overview of the Project analyzed in this report, and the general approach of the economic analysis utilized.

- **Section 3**: Provides a description of SMRs in general and the NuScale design in particular. Included is a description of how SMRs differ in design and purpose from traditional utility-size nuclear power plants (NPPs), and advantages of the NuScale design in terms of capacity, production horizon, increased safety and other features. Also discussed is the role of SMRs in providing baseload power and supporting renewables such as wind and solar energy.

- **Section 4:** Discusses the economic impact methodology used in this study. This includes a general overview of Input-Output analysis and the specific model employed in this analysis, IMPLAN. Also included is a description of the data used in this analysis, including publicly available data, county-level parameters of the IMPLAN model and proprietary data received by NuScale Power LLC. An important dimension of this study is the focus on regionalizing these data to identify which of the manufacture, construction and operations activities are likely to take place in Idaho, resulting in the economic impacts estimated in this study.

- **Section 5:** Provides a description of the economy of eastern Idaho in which the Project and its associated economic impacts would occur. This includes descriptions of the current socioeconomic character of the region, including industries, population and employment patterns and future projections.

- **Section 6:** Presents principal results of the economic analysis, including estimated increases in employment, labor income, gross regional product (value-added) and economic output (sales) stemming from construction and operations of the NuScale power plant at the INL site. In addition to these economic impacts, details include:
    - Estimates of increases in tax revenues, including local property tax, sales and excise taxes and individual and corporate income tax revenues
    - Summary tables for increases in employment, earnings, output and tax impacts for the eastern Idaho region.

  This study also estimated impacts at the state level; however, nearly all estimated economic and fiscal impacts from the NuScale power plant at the INL site accrue to the eastern Idaho regional economy. Thus, impacts at the state level are only marginally different from those at the regional level.

- **Section 7**: Presents highlights of the economic impacts estimation. Summaries of the Project's effects on employment, labor income, output and tax revenues are included. Finally, limitations inherent in this analysis are discussed briefly.

- **Section 8**: Lists references used in this study, including previous similar analyses, as well as the data sources.

- **Section 9**: Contains three appendices that provide important clarification of the methodology and results of this study. Appendix A describes estimated expenditures from the manufacture and construction of the facility. These are presented in the Codes of Account categories commonly used for expenditures of large power plants. In addition, this section provides an explanation for how these total manufacture and construction expenditures for the NuScale power plant were adjusted to estimate the actual amount of expenditures likely to occur in eastern Idaho.[3] Appendix B provides detailed estimates of economic impacts from the construction and operations of the facility expressed in industry-level tables. Appendix C lists current construction and manufacturing companies in eastern Idaho and Idaho, respectively.

[3] A detailed explanation of the methodology and data sources used to estimate economic and fiscal impacts from operations and maintenance of the facility is provided in Section 4 of this report.

Section 2: Project and Study Overview

Summary of Proposed Project

As part of its Carbon Free Power Project (CFPP) initiative, Utah Associated Municipal Power Systems (UAMPS) is proposing a Small Modular Reactor (SMR) power generation facility to be located at the Idaho National Laboratory (INL) site in eastern Idaho. The CFPP was launched by UAMPS in 2015, and identified the NuScale SMR as the design with the necessary advantages to fulfill its mission of producing reliable, safe and carbon-free baseload power. These and other benefits associated with NuScale's SMR technology have elicited the support of the U.S. Department of Energy (DOE). In addition to early cost-sharing funding to further progress the NuScale design, the U.S. DOE more recently has provided significant funding awards to NuScale to conduct design finalization activities, ensure supply chain readiness and fulfill licensing requirements for the CFPP in eastern Idaho. The NuScale SMR project with UAMPS also has received two cost-share awards from the U.S. DOE to assist with costs of site selection and submission of a combined construction and operating license application (COLA) to the U.S. Nuclear Regulatory Commission (NRC). NuScale is the only SMR design to be reviewed by the U.S. NRC, submitting a Design Certification Application in late 2016. Current projections are for construction activities to begin at the INL site in 2021, with operation of the first modules in 2026 and the NuScale 12- pack expected by 2027 for all 12 modules [1], [2].

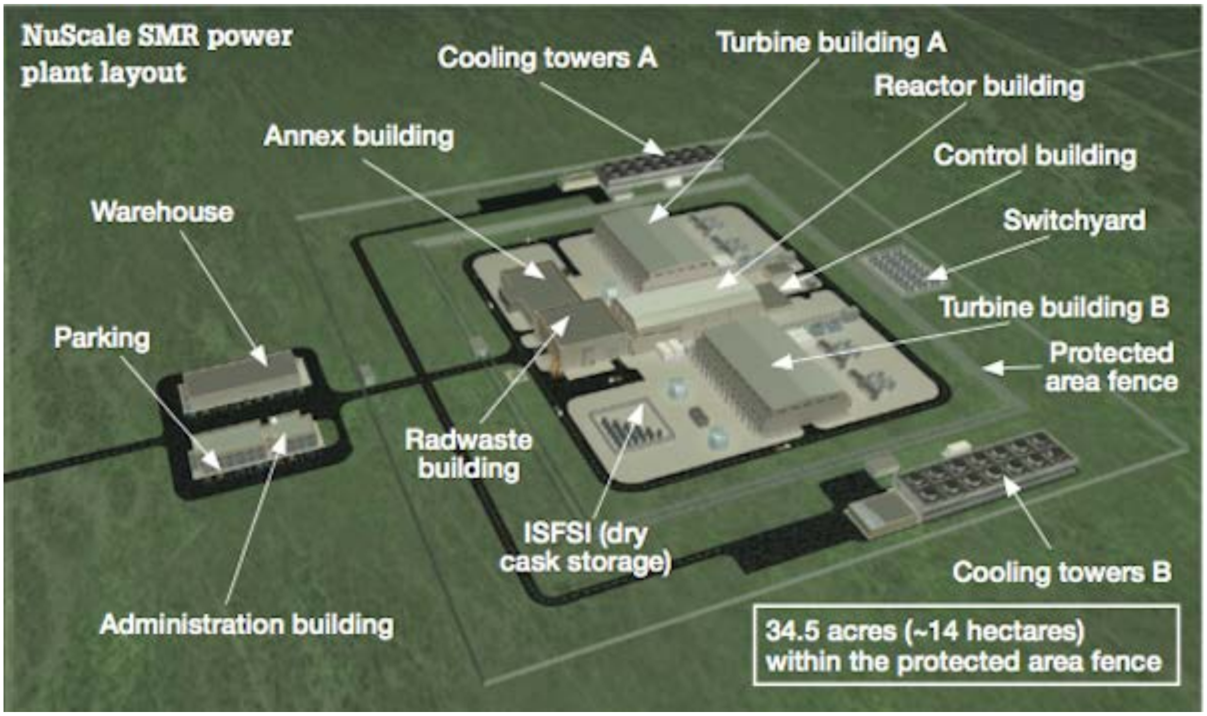
The UAMPS facility at the INL site will consist of twelve SMR modules from NuScale Power LLC. Each of these power modules has a rated net capacity of 60 MWe. The gross power output of the proposed 12-module facility is 720 MWe, with a net plant output of 685 MWe, after accounting for house load.[4] The facility is intended to produce baseload power for UAMPS, which is interested in, among other factors, developing carbon-free replacement power for its existing coal-fired power plants that are due to retire within the next several years, as well as to comply with additional energy market requirements.

The U.S. DOE issued a Site Use Permit to UAMPS to evaluate potential sites at the INL for the NuScale power plant. UAMPS, in collaboration with the U.S. DOE, evaluated potential sites within the INL.

It was announced in late 2016 that an approved site was selected in the southern part of the 890 square mile INL site in eastern Idaho, near the junction of U.S. Highways 20 and 26 [5]. The NuScale power facility has an area of approximately 35 acres, as shown in Figure 1.

[4] A twenty percent (20%) increase in power per module was recently announced by NuScale Power LLC, with an increase in gross power to 720 MWe [3], [4].

Figure 1: NuScale Power Plant Site Area [7]



Purpose of This Study

The Idaho Policy Institute at Boise State University and the James A. and Louise McClure Center for Public Policy Research at the University of Idaho were contracted by Regional Economic Development for Eastern Idaho (REDI), in conjunction with NuScale, UAMPS, INL, Fluor and Idaho Falls Power, to conduct an analysis of the economic impacts in the Idaho Falls region stemming from the manufacture, construction and ongoing operations of the NuScale 12-pack power facility at the INL site in eastern Idaho. It is anticipated that the economic impacts on local and regional economies will be significant and of compelling interest to policymakers in the region and state.

Two main avenues for the generation of impacts on employment, incomes, overall economic activity and taxes were identified. The first stems from the manufacture and construction of the facility over the four-year construction period. The second stems from the ongoing operations and maintenance (O&M) activities at the facility over the 40–to 60-year production horizon of the facility.

The impacts of the construction phase of the NuScale facility will be caused by the large expenditures on labor, materials, manufacturing and other activities associated with construction of the facility. To estimate these impacts, the authors of this study obtained data on both the direct and indirect capital costs for the manufacture and construction of the NuScale 12-pack power facility. Although earlier studies estimated these costs to be approximately $2.895 billion [6], [7] data obtained by NuScale and the Energy Policy Institute of INL's Center for Advanced Energy Studies (CAES) place base construction costs of the facility at $2.469 billion.[5] It is important to note that not all of these expenditures will occur within the eastern Idaho region. Those that occur outside the region, for example at manufacturing facilities located in other parts of the country, will generate economic activity elsewhere. Therefore, this study obtained data from NuScale pertaining to the amount of manufacture and construction expenditures that are likely to occur within the eastern Idaho region. This was estimated at $1.408 billion, including some owners costs that are, by convention, excluded from the estimated $2.469 billion costs for manufacturing and construction, as described below in Section 2. It is these expenditures from the construction phase of the NuScale power facility that generate the economic impacts estimated in this study. The large economic benefits, anticipated prior to the commencement of this study, are shown to indeed be significant and are described in detail in Section 6 of this report.

While the impacts from construction of the facility are estimated to create substantial and important economic impacts in the region, these effects will occur over the four-year construction period of the facility. Although less on an annual basis compared to impacts from manufacture and construction, economic benefits to the region from ongoing operations of the facility will be long lasting. Moreover, these benefits will provide the impetus for positive and ongoing changes by providing skilled and well paid jobs, as well as sustained increased demand for materials and services throughout the region. The large increase in employment, incomes and economic activity due to the ongoing number of workers and wages at the facility itself comprise only part of the economic benefits of the operation of the SMR power plant. In addition, there will be increased demand for services and materials required for the plant's operation, as well as ancillary benefits stemming from increased economic activity and incomes in the area.[6] As with the impacts from the construction of the facility, these ongoing economic impacts from the plant's operations are detailed in Section 6 of this report.

[5] A detailed description of how these costs were estimated are provided in Appendix A of this report. The figure reported here does not include costs such as contingency, warranty and other fees.

[6] Impacts from direct employment at the plant, increased demand for materials and services in the area and increased economic activity from increased incomes in the area are known as direct, indirect and induced economic impacts, respectively, and are described in Section 4 of this report.

Section 3: Small Modular Reactors and the NuScale Design

General Description of Small Modular Reactors

Small modular reactors are defined by the International Atomic Energy Agency (IAEA) [8] and the Nuclear Energy Agency (NEA) [9] as those nuclear reactors producing less than 300MWe per module. Further, they are modular in nature, allowing for factory fabrication and transport for on-site assembly to a power plant location [10]. While there is wide variation in current SMR designs being developed worldwide [11], most SMRs share the characteristics of being modular, smaller and less expensive than traditional NPPs in terms of both total capitalized direct and indirect costs.

As compared to other energy sources, SMRs offer numerous safety and economic benefits. A partial list of the safety benefits include:

- passive heat removal, in which heat is dissipated from the reactor without operator or control system actions;
- below grade installation of the reactor pool and spent fuel storage for enhanced resistance to seismic events and improved security;
- integrated and simplified design with reduced componentry to increase accident-free operation;
- convection cooling in which vessel and componentry facilitate natural convection cooling of the core and vessel;
- smaller core and overall size that results in dramatically reduced footprint;
- reduced on-site inventory and increased security;
- reduced fuel risk and
- reduced emergency planning zone.

Economic benefits of SMRs include:

- smaller power modules lead to increased flexibility to add capacity over time and increase grid compatibility;
- lower capital costs and decreased construction time that reduce financial risk and financing costs;
- ability to pair with renewables, such as wind and solar;
- carbon-free baseload power to replace retiring coal plants;
- non-electric industrial or development applications by producing heat or process steam;
- modular design and factory fabrication that leads to reduced per-module costs;
- use of domestic resources to enhance manufacturing sectors in the economy and
- export opportunities internationally.

These and other benefits of SMRs have led the U.S. DOE to support SMR development with a number of programs. An early example of such support is the Financial Assistance Funding Opportunity Announcement that provided financial assistance through a cost-sharing arrangement for commercial development of SMRs. This was followed by a second round of such assistance and subsequent awards for assisting with licensing, supply chain development and other activities needed for SMR commercialization in the U.S. As a result of the impetus for near-term commercial SMR development, light-water SMR configurations are at the forefront of SMR designs, given the history of light-water pressurized reactors for commercial power production.

NuScale SMR Design

The NuScale SMR is a light-water SMR design in which the power module combines the reactor vessel, steam generators, pressurizer and containment in an integral package that eliminates reactor coolant pumps and large core piping. This effectively eliminates the risk of a large break loss of coolant accident, one of the most severe design basis accidents for large NPPs, such as the pressurized water reactor (PWR)-12. In addition, the power modules are installed below grade and enveloped with a seismically robust, steel-lined concrete pool [12]. Each power module has its own skid-mounted steam turbine-generator and condenser and generates 60 MWe; twelve power modules can be incrementally added for 720MWe gross (685 MWe net) total power [3], [4]. Due to their integrated design and cooling system, the size of the containment vessel in the NuScale power modules is significantly smaller than that in a PWR-12 nuclear plant.

The design differences between traditional NPPs and the NuScale SMR are detailed more fully in Section 4 of this report. Of note here are the differences in applications available to the NuScale design compared to other power sources. Although the NuScale SMR is suitable for supporting non-electric applications, such as process heat, the focus in the present study is the ability of the NuScale SMR to produce baseload power for UAMPS. It is important to note here that carbon-free power is produced at an efficiency level higher than other energy sources.[7] The multi-module design of the NuScale power plant allows plant output to be varied with little reduction in efficiency. This enables the facility to vary its output according to demand, and according to supply conditions throughout the grid. For example, when conditions are favorable to power production from wind and/or solar sources, this enables the NuScale plant to reduce output and load, following renewables. Utilities are able to expand their power portfolio by increasing deployment of renewable energy sources.

In addition to power generation, the NuScale SMR is suitable for non-electric industrial or development applications by producing heat or process steam. Examples of industrial

[7] The capacity factor rating of the NuScale SMR exceeds 95%. Not only is this higher than the average for traditional NPPs, it is also significantly higher than for other, non-nuclear power producing technologies, including renewables, coal and natural gas [14].

applications for process heat include chemical processing, enhanced oil recovery and synthetic fuel production. The NuScale system can be modified so that some modules provide electric generation, while other modules are dedicated to process steam or heat [13].

Section 4: Economic Methodology and Data Sources

Overview of Economic Methodology

Located at the INL, one of the largest employers in Idaho, the proposed SMR facility will generate even greater economic activity in the region; the facility will be a source of substantial job creation and economic output tax revenue increases at local and state levels.

As described earlier, economic impacts from the SMR power plant at the INL site stem from construction activities during the four-year construction period, as well as ongoing activities of plant operation and maintenance. Input-Output (I-O) analysis language captures the three types of economic and fiscal impacts that are pertinent in both cases.

1. *Direct effects*: These impacts stem from wages and salaries to employees of the facility or other firms directly involved in construction or operation of the plant. In addition, direct effects are a result of purchases from local suppliers for construction or operations activities.
2. *Indirect effects*: These impacts stem from purchases that the local suppliers make to other local suppliers. For example, when equipment is purchased from a firm doing business directly with the facility, that company must then purchase its inputs from others. The employment, income and output that come from these inter-industry effects constitute the indirect effects.
3. *Induced effects*: Subsequent economic impacts occur when households that receive income from either the facility or supplying firms make purchases of goods and services. These are termed the induced effects. For example, when employees of the facility and supplying firms spend their income on items such as food, clothing, entertainment and automobiles, these purchases stimulate economic activity throughout the study area's economy.

These avenues of economic impacts, direct, indirect and induced effects, are well known and can be accurately estimated using I-O analysis.

IMPLAN

The cumulative direct, indirect and induced effects constitute the total impacts of the facility on employment, personal income and total output in the study area. This study estimates these impacts on the counties in the eastern Idaho region surrounding the INL site by utilizing a sophisticated I-O model, known as IMPLAN. IMPLAN was originally developed for estimating effects of government operations, and has since been refined by private and public sectors to analyze a wide variety of economic activity such as business operations, capital investments, administration and management activities, government grants and government-sponsored research operations. As a result, IMPLAN is ideally suited for the type of economic analysis undertaken in this study.

The IMPLAN model disaggregates the Idaho economy into 536 industrial sectors, including several state and local government sectors, to account for flows of activity throughout the Idaho economy. By so doing, economic and fiscal impacts stemming from construction of the facility and its ongoing operations can be estimated. The IMPLAN model tracks the effects of employment and wages paid to employees of the power plant and firms directly involved in construction of the facility, as well as purchases from Idaho suppliers. It also tracks effects of the purchases made by these employees throughout the Idaho economy. Importantly, the model calculates the direct, indirect and induced effects on employment, labor income and output for each type of spending by the facility. The I-O model used for this study provides data on the economic structure of each county in Idaho, and therefore is able to analyze impacts on the eastern Idaho region, as well as the state as a whole.

This study determines the amounts and types of spending on construction activities at the facility. As described in Section 2 of this report, this amounts to $1.408 billion in expenditures occurring in the eastern Idaho region. It is important to note that this is money spent in Idaho. This volume of spending will generate the direct effects for the overall economy in the region. Wages paid to employees who reside outside Idaho are not included in this study. Similarly, expenditures on goods and services made to firms outside Idaho are not included here. While these would be included in determining the facility's impacts nationally, they are excluded from this regional analysis.

It is important to note that the economic and fiscal impacts stemming from the construction activities at the site only occur during the facility's four-year construction period. Subsequent to construction of the facility, the same type of impacts also occur on an ongoing basis due to ongoing operations of the power plant. Payments by the facility to its 360 direct employees, as well as expenditures paid to local suppliers, constitute the direct effects from ongoing operations and maintenance activities of the NuScale power plant. In addition, there are indirect and induced effects that cumulatively constitute the overall impact of the power plant's continuing operation and maintenance activities.

The economic impacts estimated here consist of increases in employment, labor income, gross regional product (value-added) and output (sales) from the construction and operations of the facility. Employment consists of the increased number of full-time jobs. Labor income consists of increases in wages and salaries. Value-added is analogous to the calculation of gross domestic product at the national level, but here is confined to the region being analyzed. Finally, output reflects the increase in total economic activity, often referred to as total sales, arising from the activities of the facility. The IMPLAN model estimates the direct, indirect and induced effects for each of these types of economic impacts. In addition, the model estimates the increases in local, state and federal taxes arising from construction and operation of the power plant. These consist of increased property, sales and excise and individual and corporate income tax revenues at the federal, state and local levels. In addition, estimates are provided for increased local property tax revenues. These fiscal impacts, along with the estimated economic impacts, are summarized in Section 5 of this study. The following subsection describes the data used in this analysis, data sources and areas in which additional data are needed to provide more detailed city and county level analyses.

Data Used in This Analysis

The data pertain to the two phases of commercial development of the SMR facility. The first phase consists of the manufacture and construction of the facility. The second phase entails ongoing operations and maintenance activities during the productive life of the facility.

Costs of Manufacture and Construction. To date, no SMR design has been commercially produced, creating uncertainty regarding the construction costs and commercial viability of this technology. To reduce this uncertainty, the researchers conducting this study recently estimated the costs of manufacture and construction of SMR designs in general and the NuScale design specifically. This estimate was part of a 2016 study conducted for NuScale Power LLC by the Energy Policy Institute, part of CAES at INL [15]. The research utilizes the common cost accounting system, termed the uniform Code of Accounts (COA) system of the U.S. DOE [16]. This cost accounting system has been used widely to estimate costs of large NPPs, and provide cost comparisons across nuclear and other energy producing technologies. The COA system is designed to be flexible enough to accommodate cost estimates for virtually any nuclear power design, as well as for cost comparisons of nuclear plants with conventional large-scale electrical power generation facilities. The COA system is used in this study to delineate expenditures for the manufacturing of SMR power modules and construction.

As part of the 2016 EPI study [14], detailed costs of a traditional PWR-12 nuclear reactor plant were obtained from the U.S. DOE's Oak Ridge National Laboratory [17]. This detailed cost information for the PWR-12 NPP was used to estimate overnight costs of the NuScale 12-pack SMR power plant design. Cost estimates for nearly 500 categories of manufacture and construction activities and equipment covering every aspect of both direct and indirect capital costs for the PWR-12 NPP were provided to NuScale Power LLC.[8] NuScale Power LLC then estimated the corresponding costs of the NuScale SMR and harmonized these costs to accommodate the differences in design features of the NuScale and PWR-12 power systems. This entailed modifying the accounts applicable to the PWR-12 to reflect the reduced number of components and structures and integrated functionality inherent in the NuScale design. This approach provided an internal detailed bottom-up analysis of the capitalized direct costs and capitalized indirect costs of the NuScale SMR 12-pack power system. These cost estimates produced through the 2016 EPI study [15] represent the first detailed cost estimates for SMRs based on vendor-provided manufacturing and construction costs. While these cost estimates are detailed in nature, consisting of hundreds of individual categories of equipment, structures, activities and services needed for the manufacture and construction of the NuScale 12-pack

[8] These costs and the cost accounting system used to delineate direct and indirect capital costs for large NPPs are more fully described in Appendix A of this report.

SMR power plant, these detailed data have not been approved for public release by NuScale Power LLC. However, approval was obtained from NuScale Power LLC to release these data in aggregated form within the general categories of direct and indirect costs used in the COA framework. These direct and indirect cost estimates are the current public release figures being cited by NuScale Power LLC for the manufacturing and construction costs of the NuScale 12-pack power plant. Costs are detailed in Table 1 (in 2015 U.S. dollars).

Table 1: Major Cost Categories and Estimated Costs of the NuScale SMR Power Plants

General Description	NuScale SMR Cost
Capitalized Direct Costs	**$1,805,616,142**
- Structures and Improvements	$612,136,797
- Reactor Plant Equipment	$869,360,876
- Turbine Plant Equipment	$196,121,808
- Electric Plant Equipment	$34,982,052
- Heat Rejection Systems	$62,934,255
- Miscellaneous Plant Equipment	$30,080,354
Capitalized Indirect Costs	**$663,710,610**
- Design Services at Home Office	$130,978,572
- Field Construction Management	$60,906,859
- Field Construction Supervision	$246,930,385
- Field Indirect Costs	$224,894,794
Total Manufacture and Construction Costs	**$2,469,326,752**

The costs for manufacture and construction (Table 1) are used as the basis for this study. As described below in the subsection titled ‘Regionalizing This Analysis,’ modifications of these estimated costs are required to account for the fact that only part of these expenditures will occur within the eastern Idaho region. Thus, manufacture and construction expenditures are used to determine regional economic impacts of the NuScale facility.

Costs of Operations and Maintenance (O&M). The IMPLAN model used in this analysis can estimate economic impacts from nuclear plant operations based on direct labor used, O&M expenditures and revenue from electricity sales. For the direct labor approach, the number of workers at the facility can be entered into the IMPLAN I-O model nuclear power generating sector. Using the characteristics and multipliers incorporated in this IMPLAN industrial sector, the model will generate the types of economic impacts described above. Similarly, the IMPLAN model can incorporate wage and other expenditures necessary for operations and maintenance of a nuclear power facility to estimate O&M economic impacts. To increase the accuracy of

O&M impacts estimation, the IMPLAN model can use a combination of direct labor and expenditures to estimate impacts. Because this analysis includes both direct labor and expenditures data, that approach is used here. The third approach, in which electricity sales revenue from a NPP is used to estimate O&M economic impacts, is not appropriate for the present analysis; most of the electricity produced from the NuScale power plant will be purchased by out-of-state consumers.

For the direct labor approach, this study uses an estimate of 360 workers employed directly by the power plant itself to estimate the annual economic and fiscal impacts from ongoing O&M activities. This figure is provided by published reports from NuScale Power LLC [6], [7], industry publications [18] and proprietary data from NuScale Power LLC.[9] This direct employment figure is applied to the nuclear power generation sector of the IMPLAN model to estimate the direct, indirect and induced impacts from the plant's operations and maintenance activities. To increase the accuracy of these estimated impacts, annual O&M expenditures for the NuScale power plant also can be used to adjust the parameters of the nuclear power generation industrial sector of the IMPLAN model. This was done using aggregate non-fuel O&M expenditure estimates, with adjustments for the amount of these annual expenditures that are likely to occur outside the eastern Idaho region.[10]

To further increase the accuracy of O&M economic impacts estimates, this analysis also used proprietary data from NuScale Power LLC detailing the number, type and wages for all employees, as well as expenditures for services, materials, supplies and fuel for the annual operation of the SMR facility. These data were obtained as part of a 2017 study by the INL CAES affiliate EPI [14]. While these detailed data remain proprietary and have not been released for public dissemination by NuScale Power LLC, they were used here to further adjust the parameters of the IMPLAN nuclear power generation industrial sector. For example, based on detailed employment and wage data obtained from NuScale Power LLC, the average compensation package for workers at the SMR facility was adjusted downward from the parameter specified in the IMPLAN model. In the IMPLAN model, total compensation for workers in the nuclear power generation sector, including base salary, benefits, bonuses and on-site amenities, is specified as $180,000 average annual. For this study, total compensation per worker was adjusted to average approximately $104,000 annually. Adjusting this and other parameters of the IMPLAN model using data provided by NuScale Power LLC likely significantly increased the accuracy of estimated O&M economic impacts.

A major consideration in estimating economic impacts is specifying the area of interest. If, for example, a study is focused on determining the impacts of an activity on an economy-wide basis, such as the U.S. as a whole, using total costs of manufacture, construction and operations

[9] These data are contained in a proprietary NuScale Power LLC report [19].

[10] The process of regionalizing both manufacture and construction data, as well as O&M data are described in the following section.

may well be appropriate. However, if the area of interest is a specific region, then it is important to distinguish between impacts that are likely to occur within the region and activities that are likely to generate economic impacts outside the region. By not doing so, regional economic impacts are likely to be overestimated, perhaps significantly. Because the area of interest in this study is the eastern Idaho region, data on the manufacture, construction and operations of the SMR facility at the INL site must be adjusted to accurately reflect those expenditures likely to generate impacts within the region. A description of how the direct and indirect capital costs for the manufacture and construction of the facility, as well as how the annual O&M expenditures were adjusted to exclude those expenditures that are likely to occur outside the region, is provided below.

Regionalizing This Analysis

Elements of both the manufacture and construction expenditures and spending for the operation and maintenance of the facility will occur outside of the eastern Idaho region. As a result, it is important to regionalize the data used in this analysis to determine impacts likely to occur within the region and those likely to permeate into other regions of the country. For manufacture and construction activities, for example, the NuScale power modules themselves will be manufactured in fabrication facilities located in other areas. In the same vein, components such as turbine plant equipment, electric plant equipment and other elements of the facility will be made outside the region. Similarly, a portion of annual operations and maintenance costs of the SMR facility will be spent on materials not sourced from within Idaho. For example, nuclear fuel for the NuScale power facility will be manufactured elsewhere and shipped to the power plant. As a result, expenditures on the facility's nuclear fuel will not increase economic activity in the region, and are excluded from the impacts estimation in this regional analysis.

Regionalizing Manufacture and Construction Costs. As described above, it is important to note that only part of the costs of manufacture and construction of the SMR facility will occur at the INL site. The amount of these expenditures that generate Idaho economic impacts will vary according to the type of activity under consideration. For example, a higher portion of the building structure costs and site improvements are likely to occur within the region compared to expenditures on turbine plant equipment or reactor plant equipment, most of which will be brought in from outside the region. As such, this study obtained estimates from NuScale Power LLC as to the amount of direct manufacture and construction costs, listed in Table 1, that are likely to occur within Idaho [20]. As anticipated, only part of the costs associated with manufacturing and construction activities for structures and improvements, reactor, turbine and electric plant equipment, as well as heat rejection systems, will create jobs and other economic impacts in eastern Idaho. For each of these direct cost categories, amount of costs to be sourced or originating within Idaho were estimated by NuScale Power LLC [21].

Similarly, NuScale Power LLC validated the cost estimates determined by the 2016 EPI study [15] for capitalized indirect costs, and estimated the amounts of these categories likely to occur in Idaho [20]. As most of the indirect cost categories are related to construction activities at the site, all of the expenditures listed for field construction management, field construction supervision and field indirect costs are estimated to occur within eastern Idaho. None of the expenditures for the remaining indirect cost category, design services at home office, are determined to occur within Idaho. The direct and indirect cost expenditures for the NuScale power plant determined to be sourced or originating within Idaho are provided in Table 2.

Table 2: Estimated NuScale Manufacture and Construction Expenditures Occurring within Idaho

General Description	NuScale SMR Cost	Expenditures Sourced or Originating within Idaho
Capitalized Direct Costs	**$1,805,616,142**	**$744,613,814**
- Structures and Improvements	$612,136,797	$422,374,390
- Reactor Plant Equipment	$869,360,876	$234,727,437
- Turbine Plant Equipment	$196,121,808	$52,952,888
- Electric Plant Equipment	$34,982,052	$9,445,154
- Heat Rejection Systems	$62,934,255	$16,992,249
- Miscellaneous Plant Equipment	$30,080,354	$8,121,696
Capitalized Indirect Costs	**$663,710,610**	**$532,894,794**
- Design Services at Home Office	$130,978,572	$0
- Field Construction Management	$60,906,859	$60,906,859
- Field Construction Supervision	$246,930,385	$246,930,385
- Field Indirect Costs	$224,894,794	$224,894,794
- Owners Costs	$0	$130,978,571
Total Manufacture and Construction Costs	**$2,469,326,752**	**$1,408,342,423**

As shown above in Table 2, of the estimated $2.469 billion cost of manufacture and construction activities for the SMR facility, actual construction expenditures at the INL site are estimated to be $1.408 billion. The expenditures in Idaho include an estimated $130.98 million in owners costs which, by convention, are excluded from estimates of direct and indirect manufacture and construction costs because they are site-dependent rather than costs associated with the NuScale design. They are included here as these are expenditures, in addition to the direct and indirect costs listed above in Table 2, that are likely to occur in the region. These costs include items such as the costs of a site training center, some engineering services, staff development costs, and some intake and cooling structures. It is this estimate of direct and indirect costs of $1.277 billion as well as $130.98 million in additional owners costs, that is used to determine the economic impacts for construction.

Regionalizing Operations and Maintenance Costs. As described above, economic impacts from annual O&M activities were estimated using both the direct labor and annual expenditure data. It is important to note here that the estimate of 360 direct jobs at the facility does not need to be adjusted, as all of these jobs are due to direct employment at the facility; expenditures on wages, benefits and other compensation will occur within the eastern Idaho region. However, to fine-tune the analysis by incorporating estimated annual O&M expenditures, adjustments to these expenditures are needed, as some of the services, supplies and materials for the operation of the facility will be brought in from outside the region. As discussed previously, this analysis used non-fuel operations and maintenance expenditures for the facility, because all of the fuel for the plant will be sourced from outside the region. NuScale Power LLC provided an estimate of $67 million annually for overall non-fuel operations and maintenance of the facility, of which an estimated sixty-eight percent (68%) will occur within the eastern Idaho region [20], [21]. Therefore, an estimate of $45,560,000 annually is used in this analysis to improve the accuracy of regional economic impacts from operations and maintenance expenditures at the facility.

Data Needed to Further Regionalize This Analysis. This analysis is conducted at the level of the eastern Idaho economy. Based on previous studies of employment, purchasing and other activities of the Idaho National Laboratory [22], [23], [24] that generate economic impacts in the sixteen counties surrounding the site, this study used the county-level economic parameters and multipliers of the IMPLAN I-O model for the following counties: Bannock, Bear Lake, Bingham, Bonneville, Butte, Caribou, Clark, Custer, Franklin, Fremont, Jefferson, Lemhi, Madison, Oneida, Power and Teton. County-level economic data were then aggregated to create the eastern Idaho regional economy used in the economic modeling for this study. As a result, the economic and fiscal impacts reported here pertain to the region as a whole.

To provide a more detailed analysis at the specific county or city level, a detailed supply chain analysis needs to be performed and made available. Such a study could then indicate from which specific areas within the region different materials, labor, equipment and supplies needed for manufacture and construction of the facility will be sourced. Similarly, a detailed supply chain analysis also would provide needed information about specific sourced locations for materials, services, supplies and labor required for O&M activities. Identification of the supply chain for the SMR facility, at the county and city levels, is ongoing. Further, when supply chain details are identified, NuScale Power LLC has indicated that this information likely will not be made public far in advance of the beginning of construction activities at the site, and likely would occur after contracts with suppliers are signed [25]. As a result, the impacts estimated in this analysis are provided for the eastern Idaho regional economy as a whole.

Further delineation of the economic and fiscal impacts from the NuScale SMR power plant at the INL site, at the city or county levels, is likely not to be forthcoming for some time. However, the following section provides an overview of the regional economy to deepen an understanding of resources within the region to enhance development of the Project.

Section 5: Overview of the Economy of Eastern Idaho

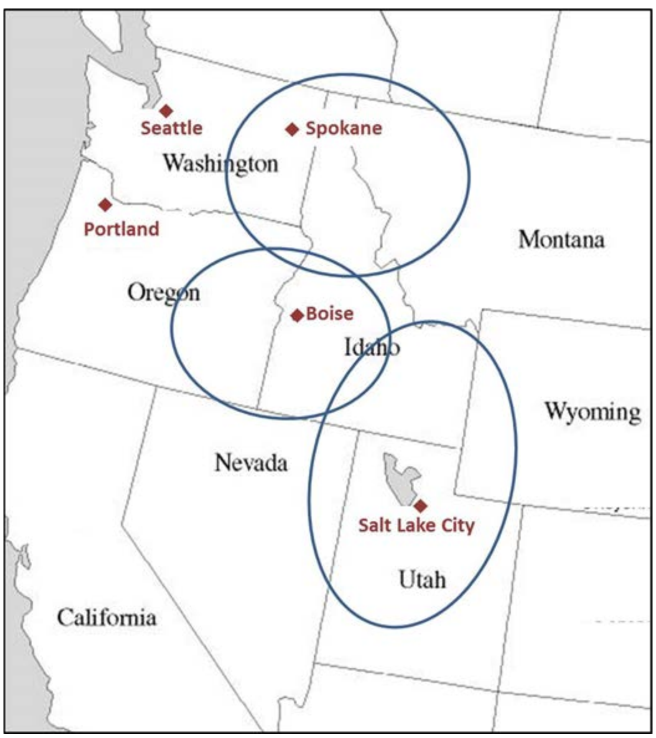
Regional Overview

In terms of political boundaries, Idaho is a single state. With respect to economic boundaries, Idaho has three distinct economies. The U.S. Bureau of Economic Analysis (BEA) divides the state of Idaho into:

1. The Boise economy: Eastern Oregon, southwest Idaho and central Idaho
2. The Spokane economy: Eastern Washington, northern Idaho, the southwestern region of Canada and part of western Montana
3. The Salt Lake City economy: Most of Utah, a portion of northwestern Nevada and southeast Idaho.

Political boundaries rarely coincide with the integrated economic regions focused on these market centers. Eastern Idaho is situated in the Salt Lake City regional economy as the central place. Sub-regional trade hubs include the greater Pocatello and Idaho Falls economics (Figure 2).

Figure 2: U.S. BEA Economic Regions in Idaho



Contrast between Urban and Rural

Idaho is a state with two economies: urban and rural. The rural economy is based on agriculture and other natural resource industries, while the urban economy is based on rapidly growing high-technology and service companies. These two separate economies reflect Idaho's past, present and future, and both complement and compete with each other for resources. The eastern Idaho region is situated in a rural part of the state, and reflects its rural traditions. However, this region also contains large urban centers, such as the cities of Idaho Falls and Pocatello.

The population and economic growth in urban areas of the state have been rapid and robust (particularly those regions with high-technology industries and related services), while the growth of rural regions and natural resource-based economies have been modest or negative. The most impoverished regions in Idaho tend to be the most rural.

Top Regional Industries and Employers

The sixteen counties in eastern Idaho's economy constitute a diverse, robust and stable composition of industries that includes agriculture (potatoes, wheat and barley), agricultural processing, energy production, health care (several major medical centers, hospitals and clinics), higher education (three major universities and several smaller community colleges and technical schools), INL, high-tech manufacturing, basic manufacturing, mining, professional services, support services, retail and wholesale trade and tourism. Some of the largest employers include Brigham Young University-Idaho (with a student enrollment of 15,751 in 2018), Idaho State University (16,022 students in 2017), INL (including Battelle Energy Alliance, Bechtel Bettis and Bechtel BWXT), Eastern Idaho Regional Medical Center, Portneuf Medical Center, J.R. Simplot, Shoshone-Bannock Tribes and many others (Table 3).

Table 3: Major Regional Employers

Allstate Insurance Co.	Idaho Central Credit Union
Amy's Kitchen Inc.	Idaho State University
Aspire Human Services LLC	Idaho Steel
Basic American Foods Inc.	J.R. Simplot Co.
Battelle Energy Alliance	Melaleuca, Inc.
Bechtel Bettis	Mountain View Hospital
Bechtel BWXT	ON Semiconductor, Inc.
Brigham Young University-Idaho	Portneuf Medical Center
Century Link	Shoshone Bannock Tribes
CH2M-WG Idaho LLC	Union Pacific Railroad
Conagra Foods Packaged Food Co.	Varsity Contractors
Convergys Customer Management	Wal-Mart
Eastern Idaho Regional Medical Center	

Source: Idaho Department of Labor, 2018

Population Density

Eastern Idaho is composed of sixteen counties. Bonneville County (population: 114,651) is the largest and includes Idaho Falls. Bannock County (population: 83,034) is the second largest population and includes Pocatello. The region's population grew only 4.02% cumulatively from 2010 to 2018, lagging the U.S. (6%) and Idaho (9%). The 2018 population was 389,841 and total land area is 30,671 square miles. The density of the region is 12.7 persons per square mile (ppm) as compared to Idaho 20.6 (ppm) and U.S (86.8 ppm). Population density varied considerably in eastern Idaho from Clark County (0.48 ppm) to Madison County (83.5 ppm). Population density in the two most populous counties is: Bannock (73.8 ppm) and Bonneville (60.3). The state of Rhode Island has a density of 1014 ppm, in contrast.

Population Growth

The region has a stable employment base composed of a substantial number of living wage jobs, but population growth has been slow. Nine counties in the region lost population (Bingham, Fremont, Lemhi, Power, Caribou, Bear, Custer, Butte and Clark); most of these counties are rural. Four counties experienced population growth: Teton (12%), Bonneville (10%), Jefferson (8%) and Franklin (6%). Details are listed in Table 4.

Table 4: County Population Growth, 2010-2018

County Name	2010 Population	2018 Population	Change	Percent Change
Bonneville County	104,692	114,651	9,959	10
Bannock County	83,034	84,761	1,727	2
Bingham County	45,767	45,096	(672)	(1)
Madison County	37,586	39,469	1,883	5
Jefferson County	26,222	28,398	2,176	8
Franklin County	12,796	13,572	776	6
Fremont County	13,237	12,907	(331)	(2)
Teton County	10,153	11,321	1,168	12
Lemhi County	7,962	7,687	(276)	(3)
Power County	7,852	7,579	(273)	(3)
Caribou County	6,976	6,860	(117)	(2)
Bear Lake County	5,975	5,920	(56)	(1)
Oneida County	4,293	4,388	95	2
Custer County	4,360	4,004	(357)	(8)
Butte County	2,907	2,389	(518)	(18)
Clark County	979	842	(137)	(14)
Total	**374,791**	**389,841**	**15,050**	**4.02**

Source: Economic Modeling Specialists, International (EMSI) and U.S. Bureau of the Census

Population Demographics

Table 5 illustrates population demographics by race and ethnicity. The white, non-Hispanic population is approximately 85% of the total. The region has a sizeable Hispanic (10%), American Indian (3%) and Asian (1%) populations.

Table 5: Population Demographics, 2010-2018

Demographic	2010 Population	% Total	2018 Population	Change	% Change
American Indian/Alaskan Native, Hispanic	2,282	1	3,203	920	40
American Indian/Alaskan Native, Non-Hispanic	6,078	2	6,630	552	9
Asian, Hispanic	225	0	361	136	60
Asian, Non-Hispanic	2,909	1	3,311	402	14
Black, Hispanic	494	0	694	200	41
Black, Non-Hispanic	1,581	0	2,095	514	32
Native Hawaiian/Pacific Islander, Hispanic	105	0	107	3	2
Native Hawaiian/Pacific Islander, Non-Hispanic	467	0	673	206	44
Two or More Races, Hispanic	1,454	0	1,817	363	25
Two or More Races, Non-Hispanic	4,776	1	6,124	1,349	28
White, Hispanic	34,112	9	39,755	5,643	17
White, Non-Hispanic	320,308	85	325,071	4,762	1
Total	**374,791**	**100**	**389,841**	**15,050**	**4**

Source: EMSI and U.S. BEC

Employment Changes by County

Table 6 presents total employment (by county) in the region for 2010 and 2018. Detailed column information:

- Column one lists each county.
- Column two reports 2018 covered jobs, a narrow measure that counts only jobs with withholding by employers (Quarterly Census in Employment and Wages, U.S. Bureau of Labor Statistics).
- Column three lists 2010 U.S. BEA numbers, which represent a wider measure of employment that includes self-employed workers and other categories.
- Column four presents 2018 U.S. BEA numbers.
- Column five reports the job change from 2010 to 2018 by county.
- Column six lists the percentage change in jobs by county from 2010 to 2018.
- Column seven reports the average salary (i.e., earnings) per worker by county including fringe benefits.
- Column eight lists the number of businesses in each county.

Madison County had the fastest cumulative job growth (50%), followed by Teton County (31%) and Franklin County (22%). Clark and Butte County both lost jobs. Butte County's numbers are distorted, because INL is situated in that county; most workers live outside Butte County and commute into the county.

Region-wide, total employment grew 17% from 2010 to 2018. The average salary (including benefits) was $40,026, ranging from a low of $28,142 in Madison County to $56,920 in Caribou County (i.e., the location of mining operations), excluding Butte County. Bonneville County had the largest number of increased jobs (12,007), followed by Madison County (9,921) and Bannock (4,018) County.

Table 6: Total Employment, Average Compensation and Number of Businesses

County	2018 Jobs (QCEW)	2010 Jobs (BEA)	2018 Jobs (BEA)	2010 - 2018 Change	2010 - 2018 % Change	Avg. Earnings Per Job	2017 Establ. Bus.
Bonneville	51,657	59,222	71,229	12,007	20	$41,235	3,929
Madison	15,915	19,727	29,648	9,921	50	$28,142	1,034
Bannock	34,439	43,101	47,119	4,018	9	$39,626	2,378
Jefferson	6,778	10,024	11,847	1,823	18	$32,955	692
Bingham	15,460	21,446	23,092	1,646	8	$38,505	1,132
Teton	3,283	4,842	6,331	1,489	31	$32,045	539
Franklin	3,647	5,587	6,814	1,226	22	$30,845	412
Fremont	3,354	5,227	5,763	536	10	$35,167	404
Oneida	3,312	1,952	2,339	386	20	$29,511	141
Caribou	1,226	4,329	4,691	362	8	$56,920	296
Power	3,013	4,133	4,467	334	8	$44,491	244
Bear Lake	2,521	2,943	3,149	206	7	$31,854	247
Lemhi	1,640	4,139	4,257	117	3	$34,986	402
Custer	473	2,738	2,812	73	3	$31,465	253
Clark	1,520	673	670	(4)	(1)	$50,219	49
Butte	8,005	9,271	8,620	(652)	(7)	$101,001	146
Total	**156,243**	**199,356**	**232,846**	**33,489**	**17%**	**$40,026**	**12,298**

Sources: U.S. BEA; U.S. Bureau of Labor Statistics - Quarterly Census of Employment and Wages (QCEW) and EMSI

Employment by Industry

Table 7 reports employment by industry using the two-digit North American Industrial Classification Code (NAICS). Detailed column information:

- Column one presents the industry classification.
- Column two lists 2010 jobs per industry.
- Column three presents 2018 jobs per industry.
- Column four reports change in employment from 2010 to 2018 by industry.
- Column five lists average salaries (earnings) per job including benefits.
- Column six reports percentage change in jobs.
- Column seven reports the number of businesses per industry.

Some notable industries include the following: Educational services grew 103%, increasing by 6,111 jobs. Health care grew 22%, increasing by 4,327 jobs. Retail trade grew 18%, increasing by 3,944 jobs. Administrative/support/waste grew 38%, or 3,392 jobs. Manufacturing grew by 26% or 2,933 jobs.

Overall employment grew by 17% cumulatively from 2010 to 2018. The fastest growing industry was management-of-companies (170%), followed by educational services (103%), administrate support services (38%), manufacturing (26%) and accommodation and food services (24%).

Table 7: Employment by Industry

Description	2010 Jobs	2018 Jobs	2010 - 2018 Change	Avg. Earnings Per Job	2010 - 2018 % Change	2017 Establ.
Agriculture, Forestry, Fishing/Hunting	13,648	14,498	850	$34,145	6	530
Mining, Quarrying and Oil and Gas	1,364	1,627	263	$58,108	19	33
Utilities	553	624	71	$108,650	13	61
Construction	12,621	13,724	1,103	$40,456	9	1,544
Manufacturing	11,482	14,415	2,933	$57,066	26	461
Wholesale Trade	8,475	8,504	29	$49,636	0	615
Retail Trade	22,446	26,390	3,944	$27,670	18	1,388
Transportation and Warehousing	5,866	7,140	1,274	$45,359	22	485
Information	2,634	2,233	(401)	$40,758	(15)	156
Finance and Insurance	7,674	8,403	729	$45,568	9	628
Real Estate and Rental and Leasing	9,166	11,277	2,111	$25,775	23	426
Professional, Scientific/Technology	15,919	15,914	(5)	$63,825	(0)	1,083
Management of Companies	482	1,302	820	$66,575	170	60
Administrative/Support/Waste Management	9,034	12,426	3,392	$45,635	38	583
Educational Services	5,929	12,040	6,111	$22,388	103	121
Health Care and Social Assistance	19,563	23,910	4,347	$42,319	22	1,508
Arts, Entertainment and Recreation	3,322	3,824	502	$13,343	15	232
Accommodation and Food Services	11,729	14,497	2,768	$17,064	24	877
Other Services	8,126	9,823	1,697	$23,548	21	719
Government	29,309	30,273	964	$51,353	3	788
Unclassified Industry	15	0	(15)	$0	(100)	0
Total	**199,356**	**232,846**	**33,490**	**$40,026**	**17**	**12,298**

Source: U.S. BEA and EMSI

Construction Industry

Table 8 presents construction growth by county from 2010 to 2018. The region had 12,621 construction jobs in 2010, which increased by 1,103 jobs cumulatively, or 9%, by 2018, with 13,724 workers. The average salary plus benefits (i.e., earnings) was $40,456 and varies across the region from Teton County ($24,561) to Caribou County ($59,200).

The construction industry in the region will be the most impacted by construction of an SMR facility. The greater the labor availability within the region, the greater the economic impacts of the SMR project. If labor is imported from outside the region, then this will create an economic leakage that will proportionally reduce the economic impacts. Both the quantity of construction labor and skill sets will be important factors. A project of this magnitude will require a substantial amount of highly skilled labor.

Table 8: Construction Growth by County, 2010-2018

County	2010 Jobs	2018 Jobs	2010 - 2018 Change	2010 - 2018 % Change	Avg. Earnings Per Job	2017 Establish.
Jefferson	935	1,252	317	34	$37,569	143
Fremont	430	632	202	47	$37,350	62
Bonneville	4,110	4,284	174	4	$43,096	459
Madison	873	1,028	155	18	$34,970	138
Teton	610	743	133	22	$38,665	96
Bingham	1,404	1,445	41	3	$37,005	168
Caribou	338	378	40	12	$59,200	38
Franklin	415	441	26	6	$34,502	55
Oneida	67	89	22	33	$22,133	9
Lemhi	341	359	18	5	$37,414	54
Custer	170	187	17	10	$30,867	26
Butte	48	60	12	25	$36,291	9
Bear Lake	113	114	1	1	$24,561	20
Power	119	98	(21)	(18)	$31,206	13
Bannock	2,639	2,605	(34)	(1)	$43,999	251
Clark	<10	<10	Insf. data	Insf. data	Insf. data	3
Total	**12,621**	**13,724**	**1,103**	**9**	**$40,456**	**1,544**

Source: U.S. BEA and EMSI

Unemployment by Industry

Table 9 presents the total number of unemployed workers by industry as of April 20, 2018. Column details are as follows:

- Column one presents the industry.
- Column two lists the number of unemployed workers.

- Column three is the percentage of the total number of unemployed workers that are in each industry.
- Column four is the percentage of total number of unemployed workers in each industry at the national (U.S.) level.

For example, as of April 2018, approximately 17% of all unemployed workers at the national level were in the construction industry. At the regional level, 21% of all unemployed workers were in the construction industry. This translates to 1,014 construction workers in the eastern Idaho regional economy, and indicates there is available labor to be employed in the SMR construction. Further, there likely is hidden construction unemployment that will add to the pool of labor availability once the Project begins.

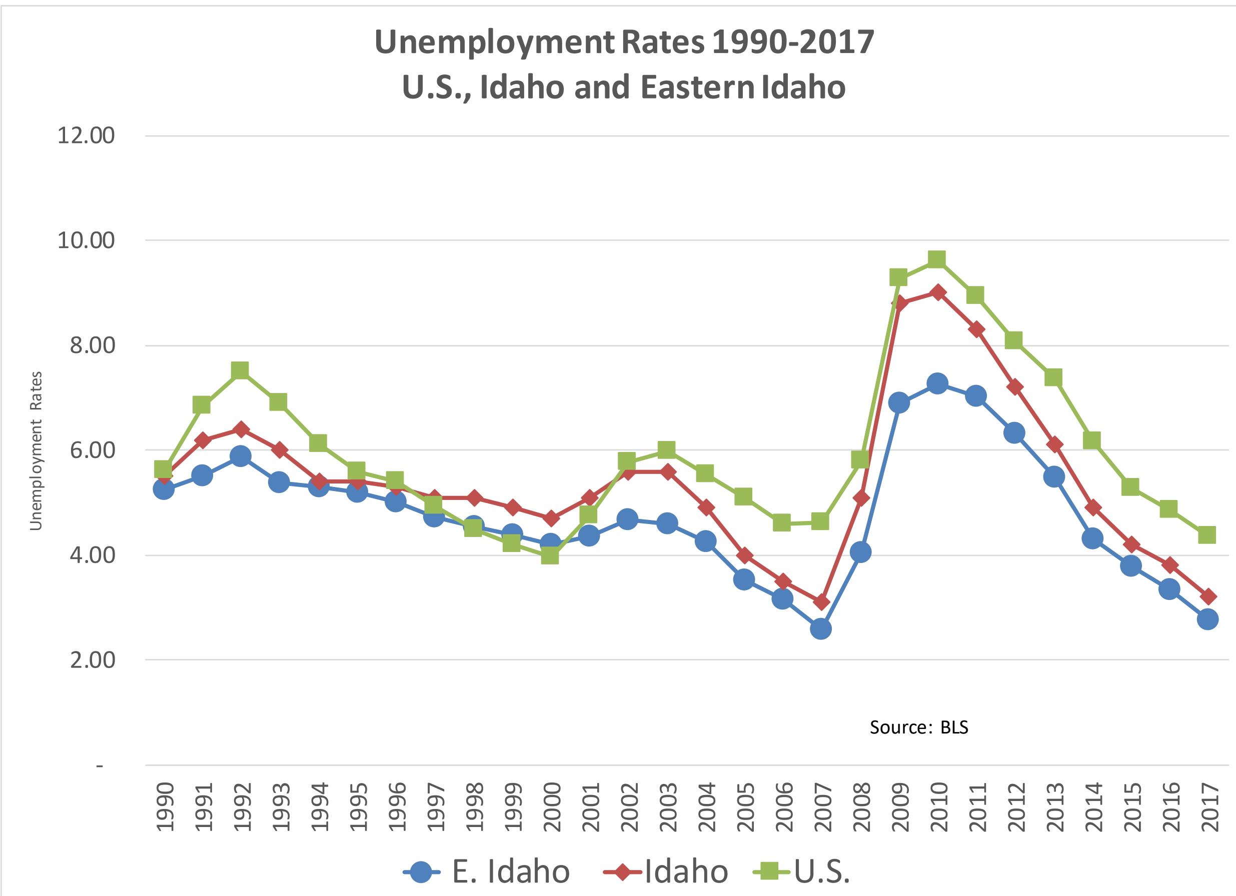
Table 9: Unemployed by Industry

Industry	Unemployed (April 2018)	% of Regional Unemployment	% of National Unemployment
Agriculture, Forestry, Fishing and Hunting	536	11	5
Mining, Quarrying and Oil and Gas Extraction	86	2	1
Utilities	22	0	0
Construction	1,014	21	17
Manufacturing	390	8	9
Wholesale Trade	178	4	3
Retail Trade	431	9	8
Transportation and Warehousing	229	5	4
Information	58	1	2
Finance and Insurance	76	2	3
Real Estate and Rental and Leasing	47	1	1
Professional, Scientific and Technical Services	177	4	4
Management of Companies and Enterprises	8	0	1
Administrative and Waste Management	488	10	13
Educational Services	110	2	2
Health Care and Social Assistance	347	7	8
Arts, Entertainment and Recreation	80	2	2
Accommodation and Food Services	193	4	6
Other Services (except Public Administration)	70	1	2
Government	145	3	2
No Previous Work Experience/Unspecified	209	4	7
Total	**4,892**		

Regional Unemployment Rates

Unemployment rates in the eastern Idaho regional economy traditionally have been below the national average due to the stable mix of industries. Unemployment was at a low in 2007 at 2.6% and hit a high of 7.3% in 2010. In contrast, the national unemployment peaked at 10.1% in 2009 (Figure 3). In the figure, the blue, red and green lines illustrate the unemployment rates for eastern Idaho, Idaho as a whole and the U.S., respectively. The eastern Idaho unemployment rate was 2.8% in 2017, below the Idaho (3.2%) and U.S. unemployment rates (4.4%).

Figure 3: Unemployment Rates: U.S., Idaho and Eastern Idaho, 1990-2017



Labor Force Statistics

Table 10 presents the most recent labor force statistics by county, metropolitan statistical area and major city. Madison County had the lowest unemployment rate of 1.7%, and Lemhi County had the highest unemployment rate at 4.7%. The U.S. unemployment rate was 3.9% and the Idaho unemployment rate was 2.9%.

Table 10: July 2018 Preliminary Labor Force Statistics

Seasonally Adjusted Data	CIVILIAN LABOR FORCE	UNEMP	% UNEMP	TOTAL UNEMP
COUNTIES				
BANNOCK	42,903	1,138	2.7	41,765
BEAR LAKE	2,831	88	3.1	2,743
BINGHAM	23,345	624	2.7	22,721
BONNEVILLE	54,583	1,292	2.4	53,291
BUTTE	1,347	40	3.0	1,306
CARIBOU	3,861	103	2.7	3,758
CLARK	429	10	2.4	419
CUSTER	2,060	85	4.1	1,976
FRANKLIN	6,890	138	2.0	6,752
FREMONT	7,765	192	2.5	7,573
JEFFERSON	13,282	295	2.2	12,987
LEMHI	3,472	161	4.7	3,311
MADISON	21,869	370	1.7	21,499
ONEIDA	2,295	49	2.1	2,246
POWER	3,966	119	3.0	3,847
TETON	6,239	149	2.4	6,090
MSAs				
IDAHO FALLS MSA (6)	69,211	1,627	2.4	67,584
POCATELLO MSA (8)	42,903	1,138	2.7	41,765
REXBURG MSA (9)	29,634	562	1.9	29,071
CITIES				
IDAHO FALLS	29,826	743	2.5	29,083
POCATELLO	29,071	766	2.6	28,305
REXBURG	15,668	270	1.7	15,398
United States*	162,245	6,280	3.9	155,965
STATE OF IDAHO	**852,714**	**24,603**	2.9	**828,111**

* In thousands SOURCE: Idaho Department of Labor

Occupational Analysis

Table 11 presents a regional occupational analysis at the two-digit Standard Occupational Classification (SOC) code. Column details are as follows:

- Column one is the average hourly earnings.
- Column two reports the number of jobs per occupation (2010).
- Column three reports the number of jobs per occupation (2018).

- Column four lists annual openings per occupation, which has two components: new job growth and replacement of workers retiring or leaving the company.
- Column five reports annual replacement rate, which is the percentage of employees retiring or leaving their jobs for other reasons.
- Column Six lists annual replacement jobs, which is the number of openings from workers retiring or leaving their companies for other reasons.

The construction industry had 13,111 jobs in 2018 and annual openings of 1,772. Of these, 1,153 were from retiring or job leavers, and 619 were new positions or openings.

Table 11: Regional Occupations

Occupations	Avg. Hourly Earnings	2010 Jobs	2018 Jobs	Annual Openings	Annual Replacement Rate	Annual Replacement Jobs
Management	$24.58	19,300	21,726	2,249	7.49%	1,512
Business and Financial Operations	$27.11	8,282	9,692	1,157	8.48%	741
Computer and Mathematical	$32.68	3,085	3,629	392	6.54%	214
Architecture and Engineering	$41.60	3,706	3,802	431	7.02%	249
Life, Physical and Social Science	$28.27	3,988	3,895	565	9.24%	356
Community and Social Service	$20.20	3,180	3,582	486	10.46%	339
Legal	$32.60	1,031	1,168	121	6.02%	65
Education, Training and Library	$18.89	11,493	13,153	1,552	8.54%	1,037
Arts, Design, Entertainment, Sports	$14.55	4,744	6,039	845	9.26%	478
Healthcare Practitioners	$34.09	7,740	9,926	923	5.21%	443
Healthcare Support	$13.28	4,613	5,268	755	11.11%	527
Protective Service	$20.53	3,029	3,558	444	9.91%	323
Food Preparation and Serving Related	$10.03	11,329	13,919	2,564	16.80%	2,058
Building and Grounds Cleaning/Maint.	$11.47	7,143	8,574	1,317	12.45%	940
Personal Care and Service	$10.75	8,169	10,749	1,940	14.15%	1,284
Sales and Related	$15.60	27,655	31,906	4,734	12.18%	3,530
Office and Administrative Support	$15.36	25,074	29,277	3,932	11.18%	2,940

Farming, Fishing and Forestry	$11.93	4,820	5,918	1,110	14.38%	775
Construction and Extraction	$18.29	11,609	13,111	1,772	9.91%	1,153
Installation, Maintenance	$20.16	7,716	8,714	1,132	9.41%	749
Production	$16.66	8,985	11,050	1,794	11.30%	1,097
Transportation and Material Moving	$16.59	11,901	13,229	1,979	11.70%	1,429
Military-only	$16.68	576	547	73	10.90%	62
Unclassified Occupation	$13.28	188	414	89	10.90%	31
Region Averages/Totals	**$18.54**	**199,356**	**232,846**	**32,353**		**22,333**

Source: EMSI

Table 12 presents a detailed analysis of construction and extractive occupations and craft skills. Detailed column information:

- Column one is the occupation or craft.
- Column two presents the number of jobs by occupation (2010).
- Column three lists the number of jobs by occupation or craft (2018).
- Column four is the job change per occupation.
- Column five is the percentage change from 2010 to 2018.

Table 12: Construction and Extractive Industry Detailed Occupations

Summary	2010 Jobs	2018 Jobs	Change	Percent Change
	11,609	13,111	1,502	12.9

Occupation	**2010 Jobs**	**2018 Jobs**	**Change**	**Percent Change**
First-Line Supervisors of Construction Trades and Extraction Workers (47-1011)	1,106	1,078	(28)	(3)
Boilermakers (47-2011)	21	14	(7)	(33)
Brickmasons and Blockmasons (47-2021)	166	144	(22)	(13)
Stonemasons (47-2022)	23	22	(1)	(4)
Carpenters (47-2031)	2,149	2,239	90	4
Carpet Installers (47-2041)	90	88	(2)	(2)
Floor Layers, Except Carpet, Wood and Hard Tiles (47-2042)	33	42	9	27
Floor Sanders and Finishers (47-2043)	19	10	(9)	(47)
Tile and Marble Setters (47-2044)	108	94	(14)	(13)
Cement Masons and Concrete Finishers (47-2051)	281	329	48	17

Terrazzo Workers and Finishers (47-2053)	4	4	0	0
Construction Laborers (47-2061)	2,457	3,008	551	22
Paving, Surfacing and Tamping Equipment Operators (47-2071)	85	68	(17)	(20)
Pile-Driver Operators (47-2072)	7	3	(4)	(57)
Operating Engineers and Other Construction Equipment Operators (47-2073)	597	680	83	14
Drywall and Ceiling Tile Installers (47-2081)	187	195	8	4
Tapers (47-2082)	35	33	(2)	(6)
Electricians (47-2111)	842	1,027	185	22
Glaziers (47-2121)	105	159	54	51
Insulation Workers, Floor, Ceiling and Wall (47-2131)	54	76	22	41
Insulation Workers, Mechanical (47-2132)	37	20	(17)	(46)
Painters, Construction and Maintenance (47-2141)	737	771	34	5
Paperhangers (47-2142)	11	6	(5)	(45)
Pipelayers (47-2151)	53	39	(14)	(26)
Plumbers, Pipefitters and Steamfitters (47-2152)	652	773	121	19
Plasterers and Stucco Masons (47-2161)	39	34	(5)	(13)
Reinforcing Iron and Rebar Workers (47-2171)	55	54	(1)	(2)
Roofers (47-2181)	207	233	26	13
Sheet Metal Workers (47-2211)	81	105	24	30
Structural Iron and Steel Workers (47-2221)	63	73	10	16
Solar Photovoltaic Installers (47-2231)	6	11	5	83
Helpers--Brickmasons, Blockmasons, Stonemasons and Tile and Marble Setters (47-3011)	26	23	(3)	(12)
Helpers--Carpenters (47-3012)	42	29	(13)	(31)
Helpers--Electricians (47-3013)	42	35	(7)	(17)
Helpers--Painters, Paperhangers, Plasterers and Stucco Masons (47-3014)	10	10	0	0
Helpers--Pipelayers, Plumbers, Pipefitters and Steamfitters (47-3015)	77	77	0	0
Helpers--Roofers (47-3016)	10	10	0	0
Helpers, Construction Trades, All Other (47-3019)	16	14	(2)	(13)

Construction and Building Inspectors (47-4011)	106	118	12	11
Elevator Installers and Repairers (47-4021)	13	8	(5)	(38)
Fence Erectors (47-4031)	49	44	(5)	(10)
Hazardous Materials Removal Workers (47-4041)	109	365	256	235
Highway Maintenance Workers (47-4051)	310	353	43	14
Rail-Track Laying and Maintenance Equipment Operators (47-4061)	43	25	(18)	(42)
Septic Tank Servicers and Sewer Pipe Cleaners (47-4071)	52	52	0	0
Miscellaneous Construction and Related Workers (47-4098)	62	60	(2)	(3)
Derrick Operators, Oil and Gas (47-5011)	3	3	0	0
Rotary Drill Operators, Oil and Gas (47-5012)	4	5	1	25
Service Unit Operators, Oil, Gas and Mining (47-5013)	10	18	8	80
Earth Drillers, Except Oil and Gas (47-5021)	43	41	(2)	(5)
Explosives Workers, Ordnance Handling Experts and Blasters (47-5031)	27	21	(6)	(22)
Continuous Mining Machine Operators (47-5041)	137	274	137	100
Mine Cutting and Channeling Machine Operators (47-5042)	17	7	(10)	(59)
Mining Machine Operators, All Other (47-5049)	7	3	(4)	(57)
Rock Splitters, Quarry (47-5051)	15	23	8	53
Roof Bolters, Mining (47-5061)	3	1	(2)	(67)
Roustabouts, Oil and Gas (47-5071)	10	12	2	20
Helpers--Extraction Workers (47-5081)	48	47	(1)	(2)
Extraction Workers, All Other (47-5099)	9	3	(6)	(67)

Source: U.S. BLS and EMSI

Section 6: Economic and Fiscal Impacts of Construction and Plant Operations

Summary of Economic Impacts from Construction Activities

The economic impacts from the manufacture and construction of the Project are significant, especially in the relatively rural eastern Idaho region. These impacts will provide large increases in a variety of economic activities, including employment, incomes and economic output, in the eastern Idaho region every year over the four-year construction period. Cumulatively, over the course of the construction horizon, these impacts will lead to dramatic increases in the levels of employment, incomes and economic activity in the area. The estimated annual economic and fiscal impacts from the construction of the facility are described first, followed by the cumulative impacts over the construction period.

Annual Manufacturing and Construction Impacts

On an annual basis, Table 13 shows the estimated economic impacts arising from the direct, indirect and induced effects related to construction of the SMR power plant at the INL site in eastern Idaho. Each type of impact for every year of the construction period is listed, as are the relevant impact multipliers.

Table 13: Annual Economic Impacts of Construction

Impact Type	Employment	Labor Income	Value-Added	Output
Direct Effect	2,000	$111,398,774	$201,182,294	$352,081,106
Indirect Effect	521	$22,435,533	$34,970,369	$71,424,367
Induced Effect	834	$27,211,149	$47,300,779	$92,900,217
Total Effect	3,356	$161,045,455	$283,453,442	$516,405,689
Multipliers	1.68	1.45	1.41	1.47

As listed in Table 13, 2,000 workers will be directly employed each year during the four-year construction of the facility, with increased labor income amounting to over $111 million annually. The indirect and induced economic effects of the construction activities will yield an additional 1,356 jobs and increased labor income of nearly $50 million. Overall, the construction of the SMR power plant will account for increased employment of 3,356 jobs and increased labor income of over $160 million annually in the eastern Idaho region.

In addition to job creation and increased labor income, construction of the facility will increase gross domestic product in the region by a total of $283.4 million annually, and increase overall economic activity by over $516 million annually. These are highly significant additions to the regional economy, and are large economic impacts by any measure, especially for a relatively rural region such as eastern Idaho.

Cumulative Manufacturing and Construction Impacts

While the annual impacts from the construction and manufacturing activities of the facility are large, the cumulative impacts over the four-year construction period are truly remarkable, especially in the relatively rural regional economy of eastern Idaho. Cumulatively over the four-year period for manufacture and construction, a total of 13,422 job years will be created in the region.[11] This consists of 8,000 direct job years and 5,422 additional job years from the indirect and induced effects of the Project. Labor income in the region will increase by nearly $645 million, gross domestic product in the region by over $1.13 billion and total output in the region will increase by over $2 billion. These results are shown in Table 14.

Table 14: Cumulative Economic Impacts of Construction for All Four Years

Impact Type	Employment	Labor Income	Value-Added	Output
Direct Effect	8,000	$445,595,095	$804,729,176	$1,408,324,423
Indirect Effect	2,086	$89,742,130	$139,881,476	$285,697,466
Induced Effect	3,337	$108,844,596	$189,203,116	$371,600,867
Total Effect	13,422	$644,181,821	$1,133,813,767	$2,065,622,755
Multipliers	1.68	1.45	1.41	1.47

Summary of Fiscal Impacts from Construction Activities

In addition to the dramatic increases in employment, income and overall economic activity generated by the manufacture and construction of activities at the INL site, these impacts will result in further increased tax revenues for the local, regional and state governments in Idaho. Tables 15 and 16 present estimated fiscal impacts from the construction of the facility on an annual and cumulative basis.

Annual Fiscal Impacts from Construction

Annual increases in tax revenue stemming from the construction activities at the site are shown in Table 15.

Table 15: Annual Fiscal Impacts of Construction

Taxes	Property	Sales and Excise	Personal and Corporate Income	Total
State and Local	$2,928,058	$4,683,277	$1,611,907	$9,223,243
Federal		$1,038,137	$34,706,554	$35,744,690

Several features of the fiscal analysis performed here are worthy of note. First, as the facility will be located on federal property, no property taxes are directly paid to local governments.

[11] See Footnote 1 on page 3 of this report for an explanation of job years.

Rather, payment in lieu of taxes (PILT)[12] for such development projects are made to compensate local governments for their inability to levy property taxes in these cases. Further, in 2018, the Idaho legislature passed House Bill 591 that provides a property tax exemption for property exceeding $400 million with projects in which new capital investments exceed $1 billion. In addition, House Bill 592 exempts part of the facility from state sales tax, depending on how much is used for research and development purposes. At the time of this analysis, the precise impacts of these bills had yet to be quantified. As a result, this analysis omits direct property, sales and excise taxes for state and local governments. These taxes will, however, be paid by employees and suppliers of the facility. As a result, indirect and induced fiscal effects are included. For federal tax revenue estimates, there are no property tax revenues generated. In addition, given that the exemptions provided at the state level are not applicable to federal taxes paid by the facility, its employees and suppliers, the direct, indirect and induced fiscal impacts are included here.

It is important to note that the fiscal impacts presented in Table 15 occur every year during the construction of the SMR power plant. As shown, there will be significant increases in tax revenues at the local, state and federal levels in addition to the increased employment, income and economic activity generated by the construction of the facility. On an annual basis, these activities will add nearly $3 million in local property taxes annually over the construction period. Added revenues from sales, excise, individual and corporate income taxes will further increases tax revenues in the state. Tax revenues in Idaho will increase by over $10 million annually during the construction period, with increases in federal tax revenues of just under $36 million annually.

Cumulative Fiscal Impacts from Construction

Over the four-year construction period, tax revenues from the construction of the SMR power plant are substantial, as shown in Table 16. Total fiscal impacts over the entire construction period amount to $36.9 million in additional state and local tax revenues, and over $142 million in additional federal tax revenues.[13]

---

[12] Payments in lieu of taxes (PILT) are payments made by the federal government to local governments due to the inability of local governments to collect property taxes on federal lands within their boundaries. PILT funds are aimed at helping local governments offset revenue losses stemming from property tax revenue losses on non-taxable federal lands, recognizing that local governments provide police, firefighting and other services on these federal lands within their boundaries. In 2017, PILT payments totaled $3,101,566 to the five counties in which the INL is located (Butte, Bingham, Bonneville, Jefferson and Clark counties).

[13] For cumulative state tax revenues estimates, the direct fiscal impacts are removed and only the indirect and induced effects are included, as described in the section on annual fiscal impacts.

Table 16: Total Fiscal Impacts of Construction over All Four Years

Taxes	Property	Sales and Excise	Personal and Corporate Income	Total
State and Local	$11,712,233	$18,733,107	$6,447,631	$36,892,971
Federal	-	$4,152,546	$138,826,215	$142,978,761

Summary of Economic Impacts from Operations

The economic and fiscal impacts detailed above are limited to the period of construction of the SMR power plant. While large and significant, it is the ongoing impacts from the continued operations of the SMR power plant that will yield long-term impacts for the regional economy and will, much as the INL itself, add greatly to the level and stability of the eastern Idaho economy. Table 17 summarizes economic impacts from the facility's operations.

Table 17: Annual Economic Impacts of Operations

Impact Type	Employment	Labor Income	Value-Added	Output
Direct Effect	360	$37,523,037	$56,227,522	$45,850,967
Indirect Effect	61	$2,287,739	$3,436,648	$7,770,266
Induced Effect	246	$8,077,649	$14,007,981	$27,531,042
Total Effect	667	$47,888,424	$73,672,151	$81,152,275
Multipliers	1.85	1.28	1.31	1.77

As seen in Table 17, the facility itself will provide 360 permanent, full-time jobs, and, with the added indirect and induced effects, will increase employment in the area by a total of 667 jobs. This increased employment will add nearly $48 million to labor income in the region. The addition to the region's gross domestic product totals nearly $74 million annually, and the increase in total economic activity totals just over $81 million annually. It should be noted that these are annual additions to the regional economy, and will occur every year for the 40-, or likely 60-, year life of the facility.

Summary of Fiscal Impacts from Operations

Ongoing operation of the SMR power plant at the INL site will provide important increases in tax revenues for the regional, state and federal governments on an annual basis over the projected productive life of the facility. These annual increases in tax revenues are summarized in Table 18.

Table 18: Annual Fiscal Impacts of Operations

Taxes	Property	Sales and Excise	Personal and Corporate Income	Total
State and Local	$555,446	$888,406	$1,528,182	$2,972,034
Federal	-	$196,932	$10,664,371	$10,861,303

As can be seen by comparing Tables 15 and 18, annual increases in local and state tax revenues are higher during the construction phase of the SMR power plant at the INL site. However, the continued operation of the facility over several decades provides ongoing annual contributions to local governments in the region, as well as to state tax revenues. For example, operations of the facility will contribute nearly $3 million annually in state and local tax revenues, and, as a result, contribute needed revenues for school district funding and other important pillars of the Idaho economy.

Enhancement of the Regional Economy and Future Economic Opportunities

Static versus Dynamic Analysis

It is important to note that the substantial economic benefits of the SMR facility detailed above are derived from a standard methodology in economic analysis that uses static I-O modelling of a region's economy. The assumptions of these models are that a given economy can accommodate the creation and operation of a large scale project, such as the SMR power plant under consideration here, and that the structure of the regional economy will remain relatively stable even after such a project is complete and operational. In the case of the SMR project analyzed here, however, the increased level of employment, incomes, business activity and other economic impacts for the construction and operation of the SMR facility will, over time, generate increased business and employment opportunities in the region that are likely to enhance the overall character of the regional economy and lead to further increases in business opportunities, employment and economic development.

Regional Economic Enhancements

The creation of economic opportunities outside construction and operation of the SMR power plant would be beneficial to the regional economy in addition to those identified in this report. For example, visits to the region by potential SMR power plant site delegations may become a significant source of income for eastern Idaho. Groups may include business leaders, chambers, elected officials, etc. Further, the regional skills acquired and supply chain developments garnered during construction and operation of the facility could well lead to opportunities for Idaho businesses to provide materials and skilled labor to other SMR power plant sites or related businesses. These would lead to long-term enhancements to the regional economy that are not captured in this analysis.

Section 7: Summary and Conclusions

Summary of Economic and Fiscal Impacts from Construction and Operations

The purpose of this report is to quantify many of the benefits expected in the eastern Idaho region by the development of the SMR power plant at the INL site near Idaho Falls. This report clearly demonstrates the facility's role in significantly increasing employment, incomes and economic activity in the region. Key findings of this study are summarized below.

Construction and manufacture activities from the Project will provide significant increases in eastern Idaho employment and labor income.

On a yearly basis, direct employment at the facility will increase by 2,000 jobs annually for four years. With the additional indirect and induced effects of these activities, the total effect on employment in the region will amount to 3,356 jobs annually. This increased employment will add an estimated $161 million in labor income in eastern Idaho on a yearly basis during construction of the Project.

Over the entire construction period of the facility, manufacture and construction of the SMR power plant will increase total employment in the region by 13,422 job years. This increased employment will add over $445 million in direct labor income, with a total increase of over $644 million in labor income in eastern Idaho.

Construction and manufacture activities from the Project will generate large increases in economic output in the region.

For each year during the construction period, the SMR power plant will increase the gross domestic product of eastern Idaho by over $283 million annually, and increase total economic activity in the region by over $516 million. The cumulative effects over the construction period are increases in regional gross domestic product and overall output of $1.13 billion and just over $2 billion, respectively.

Tax revenues in the region and Idaho will increase significantly due to construction and manufacture of the Project.

State and local tax revenues will increase by more than $36 million over the construction period, with federal tax revenues increasing by an estimated $142 million. On an annual basis over the construction period, state and local tax revenues will increase by $9.2 million, and federal tax revenues will increase by nearly $36 million.

Annual operations of the Project will provide ongoing additions of 667 jobs annually to the eastern Idaho region and nearly $48 million in labor income.

With direct employment of 360 jobs and the additional indirect and induced effects from annual expenditures on operations and maintenance activities, total employment in the region will increase by 667 jobs annually. Because of this increased employment, labor income in the region will increase by $47.9 million for each year of life of the Project.

The Project's ongoing operations and maintenance activities will result in significant increases in overall economic output throughout the region and tax revenues.

Economic activity resulting from operation of the facility will increase the region's total output by over $80 million annually over the life of the Project. As a result, local and state tax revenues will increase by nearly $3 million, with increases in federal tax revenues of nearly $11 million annually.

Further benefits.

In addition to increased employment, labor income, economic output and tax revenues stemming from the construction and operation of the Project, the facility will provide an ongoing stabilizing force to the eastern Idaho economy. That is, economic and fiscal impacts arising from the facility will be continuous and stable due to the nature of the baseload power production from the plant. These benefits will help to mitigate the effects of cyclical declines and growth in other sectors of Idaho's economy. Further, while many benefits of the facility are demonstrated in this report, it is important to realize that there likely are many additional benefits that are difficult to quantify. Given the nature of personnel hired for plant operations, for example, these include the effects of adding to the highly skilled workforce already at the INL site. In short, the added economic benefits to the region, added tax revenues and other benefits stemming from the sustained presence of the facility are anticipated to be significant contributors to the quality of life in the communities surrounding the facility and across Idaho.

Caveats and Limitations of the Study

There are several important caveats and limitations to this study that should be noted.

Supply Chain.

Given that SMR power plant construction and manufacturing is still in the planning and development process, specific supply chains are currently being determined and established; this information has not been released publicly. Therefore, in conducting this analysis, this study relied heavily on the existing construction production and supply chain characteristics identified by the IMPLAN database. The results are highly sensitive to potential changes in the supply chain. For example, NuScale has identified BWX Technologies (BWXT) as a manufacturer of components of the NuScale power module. Given that BWXT has a regional office at the INL site, the extent to which this firm participates at the regional level in module manufacturing would increase economic and fiscal impacts for manufacture and construction of the facility.

Occurrence within Eastern Idaho.

This analysis explicitly assumes that $1.408 billion of direct economic activity (i.e., expenditures) from the construction of the Project will occur in the eastern Idaho regional economy. To the extent that some of these expenditures may occur outside the region, the economic impacts will be proportionally reduced. We also assumed that all the labor will be provided by eastern Idaho residents. To the extent that labor is imported from outside the region, the impacts will be proportionally reduced. The magnitude of these economic impacts is highly sensitive to the degree to which they occur within the regional economy or alternatively leak out of the economy.

IMPLAN Model Adjustments.

This study makes some adjustments to the IMPLAN parameters in conducting the analysis. For example, the average compensation package per (direct) construction worker was adjusted to be about $56,000, including fringe benefits, given a construction project of this size and magnitude. For ongoing SMR power plant operations, an average total compensation package of about $104,000 was assumed in the analysis. The economic impacts of the SMR power plant operations were limited to operation of the plant itself, as well as expenditures associated with distribution of the electricity from the plant.

Plant Construction.

This study assumed linear annual construction impacts over the four-year construction period. 2015 was used as the IMPLAN model year. All dollar results are expressed in constant 2015 U.S. dollars.

Validation.

The methodology and results from this study were validated in two ways. First, inputs for the regional expenditures for construction (Table 2) were entered into an alternate I-O model, the Economic Modeling Specialist, International (EMSI) model, to validate and compare with IMPLAN results. Results from the EMSI model helped validate employment, income, value-added and output impacts provided here. Second, the multipliers obtained from this study were calculated and found to be similar to those expected of large construction projects. For example, the jobs multiplier for construction was 1.68. For every direct construction job, a total of 1.68 jobs are created in the economy, or an additional 0.68 jobs were added to the economy from indirect and induced impacts. The operations jobs multiplier was 1.85, and the output/sales construction multiplier was 1.467. For plant operations, the output/sales multiplier was 1.77. These multipliers are consistent with the results normally found in similar I-O analyses, and lend credence to the results estimated for this study.

Section 8: References

[1] Michael Brasel, Director, Project Cost Management, NuScale Power LLC. Email communication, May 2018.

[2] NuScale Power LLC, Carbon Free Power Project. Retrieved August 2018 from https://www.nuscalepower.com/projects/carbon-free-power-project.

[3] Ray, R. Can SMR Technology Revitalize the Business of Nuclear Power? *Power Engineering*, June 13, 2018.

[4] J. Reyes, Chief Technology Officer, NuScale Power LLC. Personal communication, August 2018.

[5] ModernPowerSystems, preferred site identified for first NuScale SMR plant, October 2016.

[6] J. Suringa, Chief Financial Officer, NuScale Power LLC. NuScale Plant Market Competitiveness and Financeability, NuScale Exposition, August 2015.

[7] M. McGough, Chief Commercial Officer, NuScale Power LLC. NuScale Power Advanced SMRs: Update on Design, Licensing, and Deployment, Platts 12th Annual Nuclear Energy Conference, February 2016.

[8] International Atomic Energy Agency (IAEA). http://www.iaea.org/NuclearPower/Downloads/Technology/meetings/2011-Jul-4-8-ANRT-WS/3_USA_mPOWER_BABCOCK_DELee.pdf, 2011.

[9] Nuclear Energy Agency. Current Status, Technical Feasibility and Economics of Small Nuclear Reactors. Organization for Economic Cooperation and Development – Nuclear Energy Agency, 2011.

[10] Small Modular Reactors (SMRs). U.S. Department of Energy Office of Nuclear Energy, http://www.energy.gov/ne/nuclear-reactor-technologies/small-modular-nuclear-reactors.

[11] Aydogan, F., Black, G., Black, M., Solan, D. Quantitative and Qualitative Comparison of Light Water and Advanced Small Modular Reactors (SMRs). *Journal of Nuclear Engineering and Radiation Science*, 2015.

[12] Ingersoll, DT. An Overview of the Safety Case for Small Modular Reactors. *Proceedings of the ASME 2011 Small Modular Reactors Symposium*, 2011.

[13] NuScale Power. Diverse Applications. https://www.nuscalepower.com/benefits/diverse-applications.

[14] Black, G., Aydogan, F., Koerner, C. Levelized Cost of Electricity: Cost Evaluation for NuScale Power LLC. Energy Policy Institute, December 2017.

[15] Black, G., Aydogan, F., Peterson, S. Labor, W., Solan, D. Economies of Small – Economic Evaluation Report for NuScale Power LLC, Energy Policy Institute, October 2016.

[16] Economic Modeling Working Group. Cost Estimating Guidelines for Generation IV Nuclear Energy Systems, Revision 4.2. GIF/EMWG/2007/004. Generation IV International Forum, Economic Modeling Working Group, September 2007.

[17] Holcomb, D., Peretz, F., Qualls, A. Advanced High Temperature Reactor Systems and Economic Analysis, Rev 0.ORNL/TM-2011/364 September 2011. Oak Ridge National Laboratory, 2011.

[18] Nuclear Energy insider, NuScale Targets SMR Staff Costs below Nuclear Energy Average, May 2018.

[19] NuScale Power LLC, NuScale Power Plant Operations and Maintenance Plan, Revision 3, 2010.

[20] Michael Brasel, Director, Project Cost Management, NuScale Power LLC. Letter: Input to the Economic Impact of the NuScale Plant in Eastern Idaho, April 24, 2018.

[21] Michael Brasel, Director, Project Cost Management, NuScale Power LLC. Email communication, April 2018.

[22] Black, G., Holley, D., Church, J. Impacts 2010: The Economic Impact of the Idaho National Laboratory. Report for Battelle Laboratories and the U.S. Department of Energy, 2011.

[23] Black, G., Holley, D., Church, J. Impacts 2006: The Economic Impact of the Idaho National Laboratory. Report for Battelle Laboratories and the U.S. Department of Energy, 2006.

[24] Black, G., Holley, D., Church, J. Impacts 2001: The Economic Impact of the Idaho National Laboratory. Report for Battelle Laboratories and the U.S. Department of Energy, 2001.

[25] Michael Brasel, Director, Project Cost Management, NuScale Power LLC. Telephone communication, April 2018.

[26] International Atomic Energy Agency. Economic Evaluation of Bids for Nuclear Power Plants, 1999 edition. Technical Reports Series No. 396, 2000.

Section 9: Appendices

Appendix A: Estimating Construction Costs

This study uses the direct and indirect capital costs estimates derived from the 2016 EPI study [14] discussed in this report. As described, the EPI study utilized the common cost accounting system that has been used for several years in large NPP cost comparison estimates. This is the uniform COA system of the U.S. DOE Energy Economic Data Base (EEDB). This cost accounting system has been adopted by the IAEA [26][14], and formalized by the Generation IV International Forum Economic Modeling Working Group [16]. Utilizing a common cost accounting methodology facilitates uniformity and consistency when assessing the capital costs of NPPs across designs and across time.

The general COA consists of six major cost categories. These are shown in Table A-1.

Table A-1: Major Cost Categories in the Codes of Account System

Account	Description	
10	Capitalized Pre-Construction Costs	Costs associated with land acquisition, permits, licensing, studies and reports, other pre-construction costs and contingency on these costs.
20	Capitalized Direct Costs	Costs of structures and improvements, reactor, turbine, and electrical equipment, heat rejection system, simulator, miscellaneous and special materials and contingency on direct costs.
30	Capitalized Indirect Costs	Field indirect costs, construction supervision, commissioning and start-up costs and demonstration test run.
40	Capitalized Owner’s Costs	Costs of staff recruitment and training, staff housing, staff salary-related costs, other owner’s capitalized costs and contingency on owner’s costs.
50	Capitalized Supplementary Costs	Shipping and transportation costs, spare parts, taxes, insurance, initial fuel core load, decommissioning costs and contingency on supplementary costs.
60	Capitalized Financial Costs	Escalation, fees, interest during construction and contingency on financial costs.

[14] For a lengthy description of the IAEA accounts at the three-digit level, see the IAEA document [25]. Although the IAEA system differs somewhat from the EEDB system at the three-digit level, the capitalized direct cost accounts of these two systems coincide.

For estimation of manufacture and construction costs, relevant COA categories are capitalized direct costs (Account 20) and capitalized indirect costs (Account 30). These are listed in Table A-2.

Table A-2: Components of Capitalized Direct and Indirect Costs

Main Account Categories	**Two-Digit Sub-Accounts**	**Three-Digit Sub-Accounts**
20 Capitalized Direct Costs		
	21 Structures & Improvements	
		211 Site Prep & Yard Work
		212 Reactor Building
		213 Turbine Generator Buildings
		214 Security Building
		215 Reactor Services Building
		216 Radioactive Waste Building
		218 Other Buildings
	22 Reactor Plant Equipment	
		221 Reactor Equipment
		223 Safety Systems
		225 Fuel Handling System
		227 Reactor Instrumentation and Control
	23 Turbine Plant Equipment	
		231 Turbine Generators
		233 Condensing System
		234 Feed Heating System
		236 Turbine Generator Instrumentation
	24 Electric Plant Equipment	
		241 Switchgear Generator Equipment
		246 Power & Control Cables & Wiring
	25 Heat Rejection System	
		251 Structures
		252 Mechanical Equipment
	26 Miscellaneous Plant Equipment	
		261 Transportation & Lift Equipment
		262 Air, Water, Plant Fuel Oil & Steam Service Systems
		263 Communications Equipment
		264 Furnishings & Fixtures
		265 Wastewater Treatment Equipment
30 Capitalized Indirect Costs		
	31 Design Services at Home Office	
	34 Field Construction Management	
	35 Field Construction Supervision	
	36 Field Indirect Supervision Costs	
	38 General & Administrative	

Within each three-digit code of account, expenditures are further detailed in numerous listings, depending on the type of structure or equipment being estimated. Given the level of detail in most sub-three digit account code listing, cost estimates for the PWR-12 reactor from the Oak Ridge National Laboratory study [16] contain nearly 500 separate cost items. These were used to prepare direct and indirect cost estimates for the NuScale SMR 12-pack power plant.

As described earlier, these detailed cost estimates for the PWR-12 reactor were submitted to NuScale Power LLC. Due to the design integration and simplification of typical light-water SMR designs in general, and for the NuScale SMR design specifically, several modifications to the PWR-12 COA framework were needed to provide initial estimates of SMR designs in general and the NuScale SMR design in particular. First, several categories of components and costs for the PWR-12 reactor can be removed from SMR cost estimation. For example, SMR designs do not have any pipes between the reactor core and steam generators, and, similarly, between the reactor core and pressurizer. As a result, costs delineated in the PWR-12 estimates for such piping in the pressure boundary of the reactor coolant system can be assumed to be zero for SMR cost estimation. Additional modifications include some field costs in the COA for reactor plant equipment to reflect the increased level of factory assembly in the case of SMRs relative to large NPPs.

Further adjustments were needed to account for the specific design features of the NuScale power module. At a general level, the NuScale facility consists of a much more compact package than other systems, and concentrates functions and systems that are distributed across systems, units, buildings and space in a large PWR. More specifically, NuScale’s reactor vessel is an integrated design that contains all the major reactor coolant systems along with steam generators and integral pressurizer. A typical PWR reactor vessel does not house steam generators and a pressurizer. The PWR pipes between the steam generator, pressurizer, reactor coolant pumps and the reactor do not exist in NuScale’s design because it is an integrated design. There are no reactor coolant pumps since NuScale’s reactor coolant system relies on natural circulation. Further, NuScale’s containment is a simpler design than a typical PWR containment, with the NuScale design being much smaller than a typical PWR containment. As a result, NuScale’s Emergency Core Cooling System (ECCS) is substantially simplified compared to a large PWR, due to the unique containment design and immersion of the entire module in a large pool of water. In the PWR-12 system, the ECCS employs several active and mechanical components that do not exist in NuScale’s design. Some of these components are accumulators, active valves and the containment spray. These additional components and active systems provide additional points of necessary monitoring, inspection and maintenance, as well as potential failure. These and other design features of the NuScale SMR facility necessitated eliminating some of the three-digit COA from the PWR-12 cost estimates and combining others. This bottom-up process consisted of several iterations with NuScale researchers to ensure that individual costs, components and systems were neither duplicated nor omitted from the analysis.

While there is a significant level of detail in the direct and indirect capital cost estimations for the SMR 12-pack provided by NuScale Power LLC for the 2016 EPI study, much of this information remains proprietary. However, for the present study for REDI, NuScale Power LLC released these data at the two-digit COA level for public dissemination. These are the total manufacture and construction costs that form the basis for the analysis used here. Table A-3 duplicates the information in Table 1, with the corresponding two-digit COA categories included as a third column (in 2015 U.S. dollars).

Table A-3: Major Codes of Account and Estimated NuScale Costs

Code of Account	General Description	NuScale SMR Cost
20	**Capitalized Direct Costs**	**$1,805,616,142**
21	Structures and Improvements	$612,136,797
22	Reactor Plant Equipment	$869,360,876
23	Turbine Plant Equipment	$196,121,808
24	Electric Plant Equipment	$34,982,052
25	Heat Rejection Systems	$62,934,255
26	Miscellaneous Plant Equipment	$30,080,354
30	**Capitalized Indirect Costs**	**$663,710,610**
31	Design Services at Home Office	$130,978,572
34	Field Construction Management	$60,906,859
35	Field Construction Supervision	$246,930,385
36	Field Indirect Costs	$224,894,794
	Total Manufacture and Construction Costs	**$2,469,326,752**

As described earlier in Section 4 of this report, these expenditure estimates were then adjusted to account for expenditures that are likely to occur outside the region. It is these adjusted cost estimates that are used to estimate the economic and fiscal impacts described in Section 6.

Appendix B: Economic Impacts at the Industry Level

The following tables provide detailed impacts assessment for ten industries most impacted by the construction and operation of the SMR power plant at the INL site. Table B-1 shows the impacts from construction of the plant. Table B-2 presents the impacts from plant operations.

Table B-1: Industries Most Impacted by Construction Activities

Top Ten Industries Impacted by SMR Plant Construction				
Including the Direct, Indirect, and Induced Impacts				
Annually Over Four Years				
Industry	Total Employment	Total Compensation	Gross Regional Product	Total Output (Sales)
Construction of SMR Facilities	2000	$ 111,398,774	$ 201,182,294	$ 352,081,106
Wholesale trade	107	$ 7,129,119	$ 12,507,074	$ 22,362,372
Architectural, engineering, and related services	52	$ 2,903,373	$ 2,928,078	$ 6,946,373
Real estate	51	$ 360,658	$ 3,857,836	$ 6,494,291
Limited-service restaurants	50	$ 767,217	$ 1,714,920	$ 3,403,485
Full-service restaurants	50	$ 843,664	$ 904,707	$ 2,010,409
Retail - Nonstore retailers	36	$ 396,084	$ 1,125,192	$ 2,832,987
Retail - General merchandise stores	36	$ 934,626	$ 1,424,966	$ 2,336,621
Commercial and industrial machinery and equipment rental and leasing	34	$ 2,302,847	$ 4,444,749	$ 7,277,967
Retail - Miscellaneous store retailers	34	$ 581,008	$ 653,434	$ 1,140,380

Table B-2: Industries Most Impacted by Ongoing Plant Operations

Top Ten Industries Impacted by SMR Plant Operations				
Including the Direct, Indirect, and Induced Impacts				
Industry	Total Employment	Total Compensation	Gross Regional Product	Total Output (Sales)
Electric power generation - Nuclear	360.1	37,536,724.1	56,271,876.6	45,926,141.6
Full-service restaurants	18.2	312,455.7	335,063.5	745,422.7
Limited-service restaurants	14.3	223,526.0	499,636.0	992,733.9
Real estate	12.4	87,844.8	939,646.8	1,585,135.6
Wholesale trade	9.8	657,319.2	1,153,177.7	2,057,368.2
Hospitals	9.6	688,840.5	725,257.5	1,356,087.8
Marketing research and all other miscellaneous professional, scientific, and technical services	9.5	205,901.1	198,132.2	450,744.7
Retail - General merchandise stores	9.0	235,707.0	359,367.7	584,913.5
Maintenance and repair construction of nonresidential structures	7.9	304,981.3	421,171.5	1,104,044.0
Offices of physicians	7.9	607,383.0	576,638.4	939,240.7

Appendix C: Construction and Manufacturing Companies

Tables in this appendix list all construction and manufacturing companies in eastern Idaho.

Table C-1: Eastern Idaho Construction Companies

Companies	Address
AECOM	501 W. Broadway, Idaho Falls, ID 83402
Allegheny	2225 W. Broadway Ste. C, Idaho Falls, ID 83402
American Fabrication	2517 W. Omni Dr., Idaho Falls, ID 83402
Battelle Energy Alliance, LLC	2525 Fremont Ave., Idaho Falls, ID 83402
Bonneville Industrial Supply	515 S. Utah Ave., Idaho Falls, ID 83402
BWX Technologies, Inc.	1075 S. Utah Ave. Ste. 327, Idaho Falls, ID 83402
CH2M Hill	151 N. Ridge Ave. #150, Idaho Falls, ID 83402
Curtiss-Wright	1350 Whitewater Dr., Idaho Falls, ID 83402
Diversified Metal	3710 N. Yellowstone Hwy., Idaho Falls, ID 83401
Fluor	1580 Sawtelle St., Idaho Falls, ID 83402
GSE Performance Solutions, Inc.	150 Merchant Dr., Montrose, CO 81401
Huntington Ingalls Industries	4101 Washington Ave., Newport News, VA 23607
Idaho Falls Power	140 S. Capital Ave., Idaho Falls, ID 83402
Idaho Office of Energy and Mineral Resources	700 W. Jefferson St., Boise, ID 83702
Idaho Valve and Fitting	6230 S. Heritage Ln. #2, Idaho Falls, ID 83402
Interemch, Inc.	1675 Pederson St., Idaho Falls, ID 83402
International Isotopes	4137 Commerce Cir., Idaho Falls, ID 83401
MARCOM	45 Shoup Ave. #218, Idaho Falls, ID 83402
Moxie Endeavors	348 1st. Ave., Pocatello, ID 83201
Nuclear Care Partners	354 W. Sunnyside Rd., Idaho Falls, ID 83402
ORANO	2070 W. Broadway, Idaho Falls, ID 83402
Premier Technology	1858 W. Bridge Rd., Blackfoot, ID 83221
Stoller Newport News Nuclear (SN3)	2647 S. 60th E., Idaho Falls, ID 83401
Studsvik ScandPower	1070 River Walk Dr., Idaho Falls, ID 83402
U.S. Department of Energy, Idaho Operations Office	1955 Fremont Ave., Idaho Falls, ID 83402
UAMPS	155 N. 400 W., Salt Lake City, UT 84103
Walsh Engineering Services	330 Shoup Ave. # 300, Idaho Falls, ID 83402
Zachry Nuclear Engineering, Inc.	410 Memorial Dr. Ste. 205, Idaho Falls, ID 83402

Table C-2: Eastern Idaho Manufacturing Companies, Separated by County

Company	County
DYKMAN CONSTRUCTION, INC.	BANNOCK
GEFFS MANUFACTURING, INC.	BANNOCK
LIVEFREE EMERGENCY RESPONSE, INC.	BANNOCK
ON SEMICONDUCTOR CORPORATION	BANNOCK
SEMICONDUCTOR COMPONENTS INDUSTRIES, LLC	BANNOCK
VIRGINIA TRANSFORMER COMPANY	BANNOCK
BATTERY SYSTEMS, INC.	BANNOCK
FIREPROOFDATA	BANNOCK
J.R. SIMPLOT COMPANY	BANNOCK

JONCORP, INC.	BANNOCK
LESKE ENTERPRISES, LLC	BANNOCK
NAZKO MANUFACTURING & DISTRIBUTING CO.	BANNOCK
REPSEL CORPORATION	BANNOCK
RETSEL MANUFACTURING, INC.	BANNOCK
ROGERS MACHINERY	BANNOCK
SOLBRIG ELECTRONICS, INC.	BANNOCK
VENMAC	BANNOCK
VTCU CORP.	BANNOCK
ACENTRA MEMORY KEEPER	BANNOCK
GALAXY COMPUTERS, LLC	BANNOCK
NOIZ TOYZ	BANNOCK
OCTAGON AIR SYSTEMS, INC.	BANNOCK
POCATELLO RACEWAY	BANNOCK
S M J PLASMA WORKS	BANNOCK
SENTINEL ENTERPRISES CORP.	BANNOCK
TESSENDERLO KERLEY, INC.	BANNOCK
THE GRIND	BANNOCK
ISAACS HYDROPERMUTATION TECHNOLOGIES, INC.	BINGHAM
DON CHERYL SHELTON	BINGHAM
INDEPENDENT PUMP & MANUFACTURING, INC.	BINGHAM
LOUV A TROLL SUPERIOR	BINGHAM
SECOND CHANCE AIR, LLC	BINGHAM
SPUDNIK EQUIPMENT COMPANY, LLC	BINGHAM
USA DEF, LLC	BINGHAM
VIP AUTOMATIONS, INC.	BINGHAM
AGPARTS MANUFACTURING, INC.	BINGHAM
BRAD HORSLEY ELECTRIC	BINGHAM
CROP PRODUCTION SERVICES, INC.	BINGHAM
EUREKA COMPOST	BINGHAM
MILESTONE INTERNATIONAL, INC.	BINGHAM
U S A FERTILIZER	BINGHAM
AGRASIZER, INC.	BONNEVILLE
AMERICAN FABRICATION, INC.	BONNEVILLE
AQUA-TRONICS, INC.	BONNEVILLE
C P I CONTROL PROTOCOLS INTERNATIONAL	BONNEVILLE
DIVERSIFIED METAL PRODUCTS, INC.	BONNEVILLE
GOSHEN PHASE II, LLC	BONNEVILLE
HOOKER TACTICAL SAFETY & DEFENSE EQUIPMENT, INC.	BONNEVILLE
HYDRO LOGIC, INC.	BONNEVILLE
IDAHO LABORATORIES CORPORATION	BONNEVILLE
IDAHO STEEL PRODUCTS, INC.	BONNEVILLE

INTERNATIONAL ISOTOPES INC.	BONNEVILLE
INTREPID TECHNOLOGY & RESOURCES BIOGAS, INC.	BONNEVILLE
JOHNSON WB INSTRUMENTS, LLC	BONNEVILLE
RADQUAL, LLC	BONNEVILLE
SUEZ WTS USA, INC.	BONNEVILLE
2 M COMPANY, INC.	BONNEVILLE
ANDERSEN MANUFACTURING, INC.	BONNEVILLE
ARMORY PLASTICS, LLC	BONNEVILLE
ATS INLAND NW, LLC	BONNEVILLE
BIOLOGIQ, INC.	BONNEVILLE
EASI-LINE PRODUCTS, LLC	BONNEVILLE
KATHY TRILLHAASE	BONNEVILLE
KILNS ETC, LLC	BONNEVILLE
LEWIS RETAIL, INC.	BONNEVILLE
NCL ACQUISITION CORP.	BONNEVILLE
NORTHWEST COSMETIC LABORATORIES, LLC	BONNEVILLE
PRESS-A-PRINT INTERNATIONAL, LLC	BONNEVILLE
RYAN SELLERS YOUTH MEDIA	BONNEVILLE
WESTERN STATES CIRCUIT BREAKERS, INC.	BONNEVILLE
APPLIED ORGANIC SOLUTIONS, INC.	BONNEVILLE
B&V TECHNOLOGY, INC.	BONNEVILLE
CREEKSIDE TECHNOLOGIES, LLC	BONNEVILLE
HILLAM CUSTOM CONTROLS, INC.	BONNEVILLE
IDAHO ASPHALT SUPPLY, INC.	BONNEVILLE
IDAHOAN FOODS, LLC	BONNEVILLE
INTERMOUNTAIN POLYMERS	BONNEVILLE
KVO COUNTERTOPS, LLC	BONNEVILLE
MELALEUCA, INC.	BONNEVILLE
MIKES CUSTOM CORP.	BONNEVILLE
MISKIN SCRAPER WORKS, INC.	BONNEVILLE
MOUNTAIN WEST BIO-TEC, LLC	BONNEVILLE
PATRICIA PANKAU LICENSED DIE	BONNEVILLE
POTATO SEED SOLUTIONS, LLC	BONNEVILLE
QAL-TEK ASSOCIATES, LLC	BONNEVILLE
QUICK MACHINE SHOP	BONNEVILLE
RAM PHARMA, INC.	BONNEVILLE
REVEL STOKE	BONNEVILLE
RSI VIDEO PRODUCTION	BONNEVILLE
SUMMIT HOME AUDIO & CONTROLS	BONNEVILLE
SUPERIOR SYSTEMS	BONNEVILLE
TABLES PLUS FENCE & DECK CO.	BONNEVILLE
TETON VIDEO SERVICES	BONNEVILLE

WESTERN HYDROGEN	BONNEVILLE
ARR-MAZ PRODUCTS, L.P.	CARIBOU
MONSANTO COMPANY	CARIBOU
AGRIUM U.S., INC.	CARIBOU
ITAFOS CONDA, LLC	CARIBOU
NU-WEST INDUSTRIES, INC.	CARIBOU
NU-WEST MINERALS, INC.	CARIBOU
SERV PHILLIPS BACKHOE	CARIBOU
SIMPSON AVIATION	CARIBOU
GENTILE VALLEY MANAGEMENT, INC.	FRANKLIN
MAPLE CREEK BACKHOE SERVICE	FRANKLIN
CRITTER DEN	FREMONT
ALMOR SALES & CONSULTING, LLC	FREMONT
DAVIS MACHINE CO.	FREMONT
BEE QUEEN AIR SPECIALTIES, INC.	JEFFERSON
CANDO IDAHO	JEFFERSON
FORMAN PUMP SERVICE	JEFFERSON
HANSEN INDUSTRIES, LLC	JEFFERSON
TRACK METRIX, INC.	JEFFERSON
JONES CRANE SERVICE	JEFFERSON
M&M CUSTOM APPLICATION, INC.	JEFFERSON
PURE WATER PLUS	JEFFERSON
AMET, INC.	MADISON
MATRIX DRILLING PRODUCTS COMPANY	MADISON
PRINTSPACE 3D, LLC	MADISON
IDAHO PROSTHETICS & ORTHOTICS	MADISON
TNT SATELLITE AND HOME THEATER	MADISON
WEST TECH MACHINE	MADISON
ALLEN ENTERPRISES	MADISON
FERTILE PEAT PRODUCTS, LLC	MADISON
GD MINI BACKHOE SERVICE	MADISON
PLATINUM ENTERPRISES, INC.	MADISON
PURGATORY HUMIDORS	MADISON
STARWEATHER AG, LLC	MADISON
SUMMIT PRODUCTIONS	MADISON
SUTTON AIR COMPRESSOR	MADISON
CERTIFIED DEF, LLC	ONEIDA
AMS, INC.	POWER
BD WIND DOWN, LLC	POWER
FREE WIND, LLC	TETON
JIM FARRIER	TETON
WEST POINTE ELECTRIC, INC.	TETON

Resumes of Economic Researchers

Geoffrey Black, Ph.D.

Dr. Geoffrey Black is a professor in the Department of Economics at Boise State University and a research associate at the Idaho National Laboratory's Center for Advanced Energy Studies. He obtained his Ph.D. from the University of Washington with fields in Natural Resource Economics, Public Finance and Public Policy Economics. He performs research on economic development, public policy and energy strategy. Dr. Black also performs analyses on the economic impacts of public and private research and development activities, deployment strategies for new energy technologies and the fiscal implications of state and national economic policy proposals. Recent projects include the fiscal and economic effects of both renewable and nuclear energy projects, the role of federal research facilities in regional economic development, economic impacts of urban and rural development projects and others. Dr. Black works with both domestic and international entities on these issues, has published numerous academic papers and both public and private reports and given numerous presentations to industry and legislative groups, academic and industry conferences, research institutions and development agencies across the U.S. and internationally.

Steven Peterson, M.S.

Steven Peterson is a Clinical Assistant Professor in Economics at the University of Idaho, where he has been employed for 25 years. His research specialty is local and regional economic analyses, specializing in economic impact assessments. Mr. Peterson has conducted over 100 economic impact assessments, touching on nearly every industry in the region and the state.

General and Limiting Conditions

This report is the product of a research project contracted with Boise State University and the University of Idaho by Regional Economic Development for East Idaho (REDI). While this document is believed to contain accurate and correct information, neither REDI, Boise State University, the University of Idaho, nor any institution thereof, nor any of their employees, makes any warranty, express or implied, nor assumes any legal responsibility for the accuracy, completeness or usefulness of any information, apparatus, product or process disclosed, or represents that its use would not infringe on privately owned rights. Reference herein to any specific commercial product, process or service by its trade name, trademark, manufacturer or otherwise, does not necessarily constitute or imply its endorsement, recommendation or favoring by REDI or member institutions of Boise State University and the University of Idaho. The views and opinions of the authors expressed herein do not necessarily state or reflect those of REDI or member institutions of Boise State University and the University of Idaho.

Support for this study provided by the following: