# Appendix A. Preliminary Economic Impact Analysis

This appendix offers a preliminary quantification of the economic benefits associated with advanced nuclear deployment. The analysis considers economic impacts in terms of jobs, gross state product, labor income, and tax revenue. The analysis considers the planning, construction, and deployment of two nuclear reactor types: (1) a large light water reactor (LLWR), and (2) a light water small modular reactor (lwSMR). Findings for each of these are quantified for, or scaled to, a size of 1 gigawatt-electric (GWe) to enable consideration of the scale of impact on a per-gigawatt basis.

This is a preliminary analysis to support the development of policy recommendations and deployment strategy for New York's Advanced Nuclear Master Plan and the broader process to consider the path towards reaching New York's 5 GW advanced nuclear goal. Further analysis will be published as part of the full Master Plan publication, scheduled for the end of 2026, and will provide additional insight into the workforce needs and economic opportunities for New York.

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## A.1 Inputs and Methodology

### Analysis Approach

The analysis uses the input-output (I/O) modeling software IMPLAN. Investment or economic activity in a sector is used as input into the model to estimate the ripple or multiplier effect on business, household, and government expenditures and employment. IMPLAN then generates economic impacts, categorized by direct, indirect, and induced effects. I/O models are static (as opposed to dynamic or equilibrium-seeking) and do not incorporate changes to labor or capital productivity over time, or changes to prices due to changes in supply or demand given an economic event.[1]

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[1] Since there are no statistical analyses run in the research team's use of I/O modeling, there is no margin of error to be calculated. However, the research team characterizes uncertainty in the modeling and results qualitatively where appropriate.

For both the development/construction phase and the operational phase of each installation, this analysis estimates:

1. The **total jobs** created in the state, across several categories:

| | |
|---|---|
| **Direct Jobs** | Jobs directly associated with the initial economic activity of a given investment or activity (e.g., changes in wages, production, or jobs). |
| **Indirect Jobs** | Jobs associated with the supply chain connected to the initial economic activity of the original investment or activity (e.g., purchases of goods and services or business tax impacts). |
| **Induced Jobs** | Jobs associated with additional household spending resulting from the additional direct and indirect employment that is generated from the initial economic activity of the original investment or activity (e.g., wages paid, household purchases, or household tax impacts). |

2. The **total labor** income generated. This reflects the wages, benefits, and payroll taxes paid to employees and payments received by self-employed workers or business owners.
3. The **value added**, or gross state product (GSP), associated with existing businesses and related supply chains. This reflects the total cost of production, minus the cost of intermediate inputs.
4. The incremental **local, state, and federal tax revenues** generated from these investments.

The model estimates operational impacts based on an assumed 40-year operational life, though annual impacts will continue as long as the plant is operational.

This analysis does not include:

- The rate of return on public or private investment.
- Quantitative analysis of supply chain onshoring and development opportunities. The quantitative analysis relies on existing NY supply chain capabilities and instead qualitatively addresses potential supply chain development opportunities further below in Section A.3 (Additional Supply Chain Opportunities).

The analysis results are split into two phases, the pre-operations phase—or the development and construction phase—and the operations phase.

For the pre-operations phase, the analysis applies the following steps:

1. Capital investment project cost data (CAPEX), divided into cost groups as Civil/Structural/Architectural, Nuclear Island, Conventional Island, Balance of Plant, Indirect Costs, and Owner's Services, was mapped to reactor component and industry codes.
2. Then, as a simplifying assumption due to the lack of granular cost data, component cost was estimated by equally distributing the CAPEX in each cost group listed above to each reactor component within the group.
3. Local content percentages, or the assumed amount of spending for each component captured by New York businesses, were applied to the project costs associated with each component. The derivation of these local content assumptions was based on the identification of nuclear-related firms in New York, and in-state industries that could feasibly provide support for generic activities, such as construction, engineering, balance of plant, and indirect services. The analysis assumes all nuclear island components are supplied from outside New York under the assumption that existing in-state firms do not currently produce parts for these reactors. It was also assumed that New York firms identified as nuclear suppliers can support the supply of components in the conventional island. All assumptions are based on existing industry capacity and do not assume any supply chain expansion.
4. The product of the component cost and the local content percentage is the final input into IMPLAN.

For the operations phase, external estimates of the on-site employment for each reactor type are distributed into industry categories and used to estimate a full spectrum of economic impacts. These assumptions are discussed in additional detail below.

## Technology

Analysis of each reactor type (LLWR and lwSMR) is based on a tailored set of component parts and nameplate capacity based on a representative commercially available reactor. This section provides context on the two reactor types selected for analysis, outlining distinguishing features of each reactor and links with existing or planned projects in the United States utilized to derive inputs.

For comparative purposes, the lwSMR analysis is produced on the basis of three lwSMR units in order to scale to approximately 1 GWe (see Table A-1). The additional capacity beyond the first reactor is assumed to require the same amount of investment and labor for the operational phase as the initial reactor. However, for the development and construction phase, economic impacts of the additional reactors were discounted from the initial reactor to capture project cost reductions associated with economies of scale, planning and construction efficiencies, and learning; in this respect the analysis is aligned with the approach to learning effects described in Appendix C (Cost Analysis – Inputs and Methodology). To make the final impacts comparable on a per gigawatt basis, the results generated from the analyzed capacity in Table A-1. Reactor Types and Capacity1 are then linearly adjusted—the LLWR results are adjusted downwards and the lwSMRs are adjusted upwards—to represent one gigawatt (GWe) of electric capacity.

**Table A-1. Reactor Types and Capacity**

| Reactor Type | Capacity per Typical Reactor | Number of Reactors Analyzed | Analyzed Capacity |
|---|---|---|---|
| Large Light Water Reactor (LLWR) | 1.11 GWe | 1 | 1.11 GWe |
| Small Light Water Reactor (lwSMRs) | 300 MWe | 3 | 900 MWe |

More research is needed to accurately reflect the economic benefits of the deployment of additional reactors, both at multi-unit sites and at standalone sites that may use the same EPC firms, support services, and supply chain. For example, operations phase impacts do not account for changes in staffing requirements with multiple units and are based on announced estimates of supported operational employment, instead of project costs as used in the planning and construction phase modeling and thus have greater variation.

## Reactor Components

For each reactor, the analysis assesses the original equipment manufacturer (OEM), engineering, procurement, and construction (EPC), Tier 1, Tier 2, and Tier 3 components required as inputs for construction and operations.[2] Each component was assigned a set of relevant North American Industry Classification System (NAICS) industry codes. The component mapping then serves as a foundation for the economic impact modeling. The components for the generic reactor types were modeled after commercially available reactors. The different types of components were mapped based on comprehensive reactor design schematics, and the cost of each component was based on the most granular, publicly available data. However, these models are still initial approximations and will require further refinement as technologies become more mature.

For the LLWR, the Westinghouse AP1000 was used as the basis, as the only commercially

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[2] OEMs are responsible for integrating and delivering the final system. Tier 1 suppliers provide fundamental components for the OEM. For a nuclear reactor, this would include components such as the reactor vessel or the control rod mechanisms. Tier 2 suppliers manufacture subcomponents assembled to form Tier 1 components. These include forgings, plates, fasteners, and other mechanical parts. Tier 3 suppliers include providers of the small components required for Tier 2 subcomponents and the materials used to produce them. This typically includes materials such as aluminum, stainless steel, and other alloys.

operational reactor of its type. For lwSMR analysis, the GE Vernova Hitachi BWRX-300 was used as a model for component part mapping, construction, and operations of the Small Light Water Reactor. These reactors are currently planned for or in deployment at Canada's Darlington Ontario Power Generation facility, the Tennessee Valley Authority's Clinch River site near Oak Ridge, Tennessee, and the American Electric Power's facility in Rockport, Indiana.

## Cost Assumptions

Planning and construction phase model inputs take the form of overnight capital expenditures. The overnight capital cost estimates are aligned with the Base Scenario greenfield costs detailed in the cost analysis as discussed in Appendix C (Cost Analysis – Inputs and Methodology). Total capital costs are distributed into Civil/Structural/Architectural, Nuclear Island, Conventional Island, Balance of Plant, Indirect Costs, and Owner's Services cost groups based on the U.S. Energy Information Administration's (EIA) January 2024 Capital Cost and Performance Characteristics for Utility-Scale Electric Power Generating Technologies report, using data from the case 9 capital cost analysis table 9-1 for the LLWR, and case 10 capital cost analysis table 10-1 for lwSMRs.[3] Using IMPLAN-estimated local content percentages from existing in-state nuclear firms as well as local content percentages from other relevant industries, New York firms are assumed to capture 16% of the total capital investment for the LLWR, and 15% of the total capital investment for lwSMRs.

The investment inputs into IMPLAN for the planning and operations phases are detailed in Table A-2 below.

The model assumes all projects require the same five-year planning phase, seven-year construction phase, and a 40-year operational life.

External on-site job estimates for each reactor type are used as inputs to calculate the broader operations phase economic outputs, including the supply chain and induced impacts. The on-site operations job estimates for the LLWR come from Koroush Shirvan's March 2022 Overnight Capital Cost of the Next AP1000 report, published by the MIT Center for Advanced Nuclear Energy Systems.[4] The on-site operations job estimates for the lwSMRs come from GE Vernova

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[3] U.S. Energy Information Administration, "Capital Cost and Performance Characteristics for Utility-Scale Electric Power Generating Technologies". January 2024. www.eia.gov/analysis/studies/powerplants/capitalcost/pdf/capital_cost_AEO2025.pdf

[4] Shirvan, Koroush, "Overnight Capital Cost of the Next AP1000". March 2022. web.mit.edu/kshirvan/www/research/ANP193%20TR%20CANES.pdf

Hitachi's October 2025 BWRX-300 General Description report.[5] In each case, operations and maintenance jobs are distributed by job type based on descriptions in table III of the Shirvan study.

**Table A-2. Model Input Data by Reactor Type**

| Model Inputs | Large Light Water Reactor (LLWR) | Small Light Water Reactor (lwSMRs) |
|---|---|---|
| Capacity (MWe) | 1,110 | 300 |
| Total Pre-Operations Capital Expenditures ($millions) | $13,403 | $5,022 |
| NYS Capture of Total Pre-Operations Capital Expenditures (% of total) | 16% | 15% |
| NYS Capture of Total Pre-Operations Capital Expenditures ($millions) | $2,198 | $762 |
| Planning Phase Model Input ($millions) | $938 | $149 |
| Construction Phase Model Input ($millions) | $1,260 | $613 |
| Operations Phase Model Input (annual jobs) | 404 | 150 |

## A.2 Results: Economic Impacts

This section presents the economic impacts to New York from the deployment of 1 GWe of installed capacity of LLWR and lwSMR reactors. All results are presented in 2025 dollars.

The results indicate that both technologies deliver roughly comparable economic benefits in the construction phase, though the lwSMRs appear to generate larger economic impacts in the operations phase. However, this analysis assumes the labor required for lwSMR operations scales linearly with increased capacity, which may not be true in practice. Since the lwSMRs are not yet deployed, the long-term employment demands of operating are more uncertain.

Overall, the LLWR is projected to generate $15 billion in total value added, while the lwSMR is projected to generate $20 billion. Both reactors are expected to create an average of roughly 1,000 annual construction jobs and between 1,000 and 1,400 permanent operational jobs for the LLWR and lwSMRs respectively (see Table A-3).[6]

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[5] GE Vernova Hitachi Nuclear Energy Americas LLC, "BWRX-300 General Description". October 2025. www.gevernova.com/content/dam/gevernova-nuclear/global/en_us/documents/carbon-free-power/005N9751-BWRX-300-General-Description.pdf

[6] Jobs for the pre-operations phase take the form of job-years, or one job supported for one year. To calculate the average individual jobs supported over time, total job-years may be divided by the estimated pre-operations timeframe, 12 years. Jobs for the operations phase take the form of annual jobs, or individual jobs supported each year for the lifetime of the facility.

**Table A-3. Summary Results: Planning, Construction, and Operations Outputs**

| *(2025$, millions, undiscounted)* | **Large Light Water Reactor (1 GWe)** | **Small Light Water Reactors (1 GWe)** |
|---|---|---|
| **Total Value Added** | $15,023 | $20,015 |
| Planning and Construction Phase | $1,977 | $2,161 |
| Operations (40 years) | $13,046 | $17,854 |
| Total Jobs Added | | |
| Planning and Construction Jobs (annual average) | 980 | 1,082 |
| Operations Jobs (permanent) | 1,071 | 1,470 |
| Total Labor Income | $8,243 | $10,912 |
| Planning and Construction Phase | $1,336 | $1,447 |
| Operations (40 years) | $6,907 | $9,465 |
| Total Taxes | $4,725 | $6,327 |
| Planning and Construction Phase | $469 | $519 |
| Operations (40 years) | $4,256 | $5,808 |

## Detailed Results: Large Light Water Reactor (1 GWe)

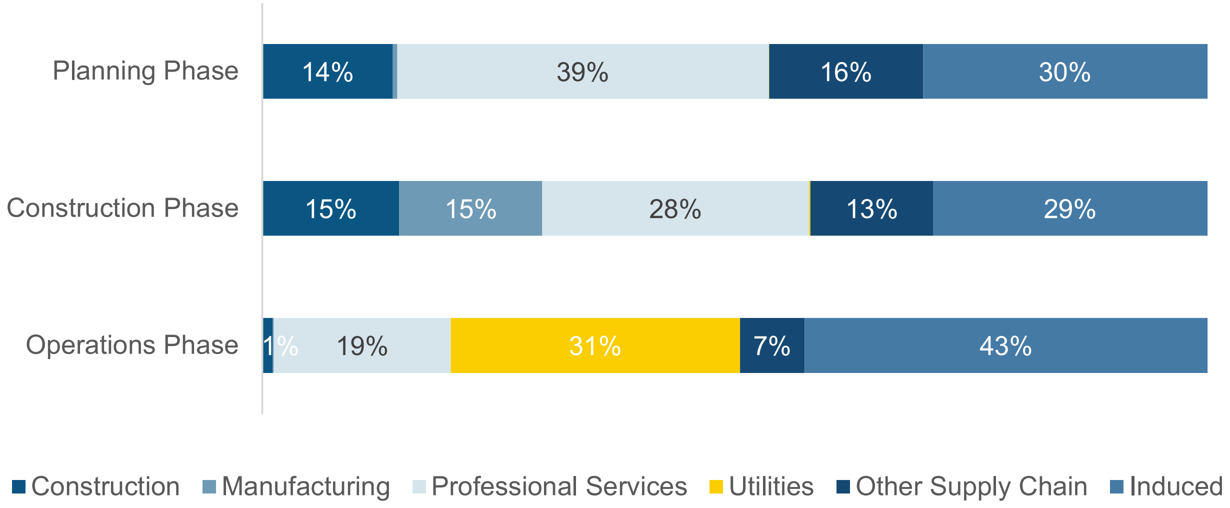
During the 12-year planning and construction phase, a LLWR is estimated to create about 11,750 job-years, an average of 980 jobs per year (see Table A-4). Job-years represent a full year of work and are significantly different than the total number of employees, which can fluctuate significantly throughout the construction period. The LLWR is estimated to create 1,070 permanent jobs, including 360 on-site, i.e., direct, jobs. Each year the project is operational, it is projected to generate $326 million in value added to the state economy, including more than $65 million in added state and local taxes.

Jobs in the planning phase are primarily in professional services, working on design, siting, and permitting activities (see Figure A-1). Jobs in the construction phase highlight the potential for component part manufacturing that existing firms in New York could capture, as well as the construction and professional services to support the deployment of the reactor. Operations phase jobs are primarily employed in the electric generating utility industry, and they stimulate relatively more induced jobs due to the above-average wages earned.

**Table A-4. Detailed Economic Impacts, LLWR**

| (2025$) | **Employment** | **Labor Income** ($) | **Value Added** ($) | | **Taxes** ($) |
|---|---|---|---|---|---|
| **Planning & Construction Phase** (total impacts over 12-year period, employment in job-years) | | | | | |
| Direct | 5,615 | $775 | $1,026 | Local | $90 |
| Indirect | 2,669 | $284 | $435 | State | $79 |
| Induced | 3,472 | $278 | $516 | Federal | $300 |
| **Total** | **11,758** | **$1,336** | **$1,977** | **Total** | **$469** |
| **Operations Phase** (Annual impacts, employment in number of jobs) | | | | | |
| Direct | 364 | $100 | $189 | Local | $43 |
| Indirect | 251 | $36 | $68 | State | $22 |
| Induced | 457 | $37 | $68 | Federal | $41 |
| **Total** | **1,071** | **$172** | **$326** | **Total** | **$106** |

**Figure A-1. Jobs by Industry, LLWR**



## Detailed Results: Small Light Water Reactor (1 GWe)

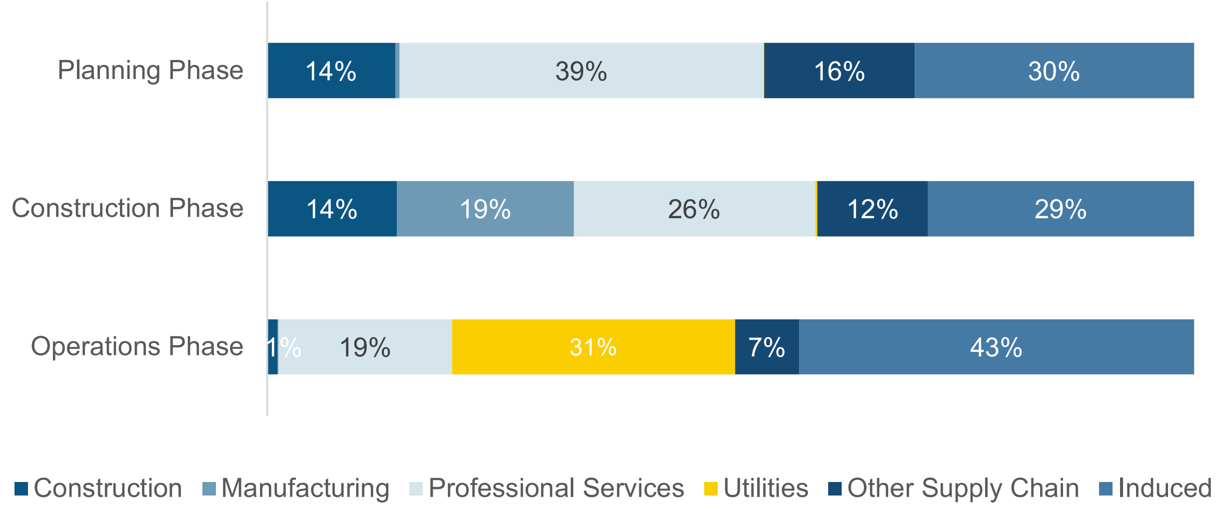
During the 12-year planning and construction phase, the lwSMR project is estimated to support about 12,980 job-years, an average of just over 1,080 workers a year (see Table A-5). The lwSMR is estimated to create 1,470 permanent jobs, including 500 on-site jobs. Each year the project is operational, it is projected to generate $446 million in value added, including more than $89 million in added state and local taxes.

**Table A-5. Planning and Construction Phase Outputs, lwSMRs**

| (2025$) | **Employment** | **Labor Income** ($) | **Value Added** ($) | | **Taxes** ($) |
|---|---|---|---|---|---|
| **Planning & Construction Phase** (total impacts over 12-year period, employment in job-years) | | | | | |
| Direct | 6,203 | $819 | $1,109 | Local | $105 |
| Indirect | 3,011 | $327 | $492 | State | $88 |
| Induced | 3,766 | $301 | $560 | Federal | $326 |
| **Total** | **12,980** | **$1,447** | **$2,161** | **Total** | **$519** |
| **Operations Phase** (Annual impacts, employment in number of jobs) | | | | | |
| Direct | 500 | $137 | $260 | Local | $58 |
| Indirect | 344 | $49 | $94 | State | $31 |
| Induced | 626 | $50 | $93 | Federal | $57 |
| **Total** | **1,470** | **$236** | **$446** | **Total** | **$146** |

Figure A-2 shows a comparable breakdown of jobs by industry as the LLWR. Jobs in the planning phase are primarily in professional services, and construction jobs involve relatively more manufacturing jobs. Like the LLWR, the lwSMR operations jobs are primarily employed in the electric generating utility industry, and they support relatively more induced activity.

**Figure A-2. Jobs by Industry, lwSMRs**



## A.3 Additional Supply Chain Opportunities

As discussed in Section A.1 (Inputs and Methodology), the economic analysis above reflects only the estimated economic opportunities for the existing New York supply chains and does not estimate the impacts of increasing the share of in-state components or otherwise expanding New York's nuclear supply chain. This section discusses such potential additional supply chain opportunities, both for nuclear reactor types analyzed above (LLWR and lwSMR), as well as two less mature technologies, a High-Temperature Gas (Helium) Cooled reactor (HTGR), and a Liquid Metal (Sodium) Cooled reactor (SFR) (Gen IV reactors). For the less mature Gen IV reactors, supply chain opportunities are more available for capture by a first mover, and could potentially be greater than more established technologies. The preliminary analysis presented here for such opportunities is qualitative, with further quantitative analysis to be made available with the full Master Plan publication.

Supply chain expansion opportunities can be captured in two ways. First, by expanding existing New York firms that produce relevant components, whether currently nuclear-specific or that can be adapted for advanced nuclear with relatively low barriers. Second, by developing new in-state capacity, i.e., onshoring, the production of key advanced nuclear components. Onshoring could potentially de-risk future projects by relieving supply chain bottlenecks and minimizing project timeline risk. Additionally, onshoring could extend the in-state economic benefits of nuclear deployment, including by potentially serving an export market for other states. Supply chain development strategies will differ depending on the State's objectives and the reactor or component in focus.

Supply chain opportunities are organized here by component tiers. Tier 1 suppliers provide major assemblies directly to the OEM. For a nuclear reactor, this would include components such as the reactor vessel or the control rod mechanisms. Tier 2 suppliers manufacture the subcomponents assembled to form Tier 1 components. These include forgings, plates, fasteners, and other mechanical parts. Tier 3 suppliers include providers of the small components required for Tier 2 subcomponents and the materials used to produce them. This typically includes materials such as aluminum, stainless steel, and other alloys.

Across all reactors there are opportunities for certain Tier 1, 2, and 3 components, such as sand, cement, pumps, and valves. In particular the State has capacity for Tier 3 components, specifically general cement and sand manufacturing for EPC. However, due to reactor design, each technology will have some unique opportunities, as discussed below.

## Large Light Water Reactor

New York has some existing supply chain capacity for Tier 2 components such as nuclear-qualified electrical components and wiring assemblies (e.g., firms that design and manufacture nuclear measurement and detection systems), heat exchangers (e.g., firms that design and supply heat transfer systems), industrial pumps and valves (e.g., firms that design and produce industrial-scale pump systems).

New York could invest in developing the supply chain for reactor pressure vessels, which are currently reliant on global supply (Japan, Italy, South Korea) and are very high-investment facilities unlikely to otherwise be brought to the US. Additionally, the specialized pumps and valves listed above are complex and are potential bottlenecks. New York could nuclear-certify and expand its existing production capacity to supply those Tier 2 components, pursuing both supply chain strategies – de-risking and leveraging existing firms – at once. Steam generators are another opportunity to de-risk, as these are currently reliant on global suppliers and require metals such as nickel, which has a global surplus but introduces heavy reliance on global supply and pricing.

## Light Water SMR

Similar to the LLWR, general cement and sand manufacturing for EPC could be a potential opportunity to leverage existing in-state capabilities. Additionally, supply chain opportunities for lwSMRs in New York include rebar steel, where existing in-state steel mills could be leveraged for nuclear deployment. In terms of building out new supply chain capacity, New York could invest in developing the supply chain and lowering production costs for reactor pressure vessels, which are currently reliant on the global market, as US-based suppliers are unlikely to be cost-competitive. Additionally, large forgings are key components that are currently reliant on global suppliers and could be brought onshore if made cost competitive.

## High-Temperature Gas (Helium) Cooled SMR

Supply chain opportunities for the HTGR that New York could pursue include nuclear-grade cement and concrete for the pre-stressed concrete reactor vessel and other cooling pipes, though existing suppliers may need to adapt to begin producing nuclear-grade products. Gen IV reactors use relatively large amounts of 316L steel due to their higher resistance to higher temperatures. There are several existing New York suppliers that could join the nuclear supply chain for 316L stainless steel (e.g., firms that shape and manufacture custom steel sheets, plates, pipes, rods, wires, and tubing) with some adaptation.

New York could invest in developing the supply chain for Tier 1 helium circulators. These components are still first-of-a-kind technologies; X-energy and EPRI are advanced in the R&D process, but long-term, large-scale manufacturing is still an opportunity for New York. Nuclear-grade graphite is a key requirement and there are few suppliers which could lead to critical bottlenecks. There are nuclear-grade graphite suppliers in Ohio and West Virginia, but supply is limited. New York can explore graphite mining opportunities under development in the North

Country. Fuel supply is a major concern, X-energy have patented the TRISO fuel pebbles which require a high concentration of HALEU and are used in their Xe-100 design. TRISO-X have received the first and only NRC license to operate a category II fuel fabrication facility for this HALEU fuel. Attracting a producer of HALEU could help alleviate fuel bottleneck concerns.

## Liquid Metal (Sodium) Cooled SMR

Supply chain opportunities for the SFR that New York could include salt manufacturing to meet the high demand for nuclear-grade sodium. This will be a high-volume component and existing in-state capacity will require significant adaptation for the SFR design, but the state's current industry can be leveraged. Additionally, several existing New York suppliers could join the nuclear-specific supply chain for industrial pumps and valves as well as 316L stainless steel, as discussed above. These components also require significant adaptation and nuclear certifications.

In terms of building out new in-state capacity, New York could invest in developing the supply chain for specialized manufactured components such as heat exchangers and steam generators that meet SFR isolation requirements, and Tier 2 materials for primary and intermediate sodium loops (e.g., SFR specialized pipes and valves). Additionally, sodium handling equipment in the balance of plant (e.g., purification, leak detection) could be an opportunity for development. HALEU fuel is a major bottleneck for Gen IV reactors and attracting early-stage fuel fabrication could alleviate this issue. Developing the supply chain of electromagnetic pumps could also alleviate bottleneck concerns, as these components have a small current market.