



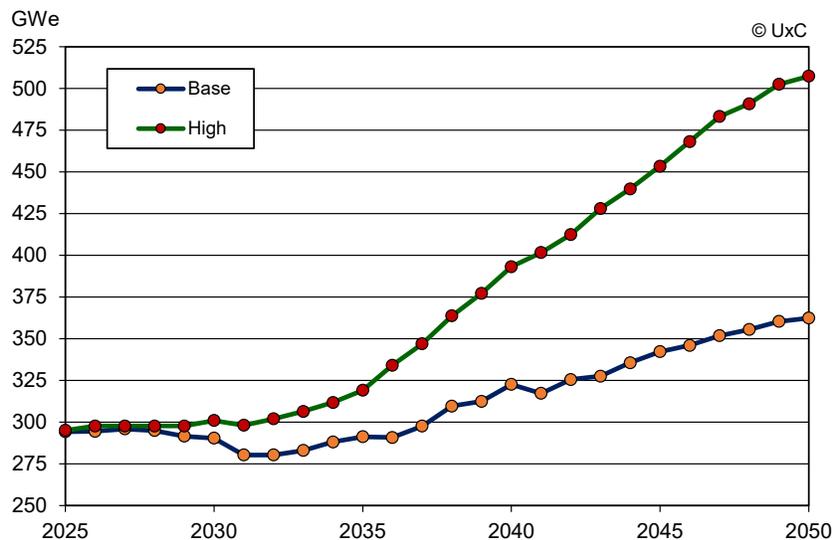
## International Nuclear Market Size & U.S. Export Analysis

UxC, LLC (UxC), a global leader in nuclear market research and analysis, has prepared this special analysis for the Nuclear Energy Institute with a specific focus on the nuclear market outlook and nuclear market size projections based on multiple scenarios. This report’s primary objective is to analyze global and regional nuclear power outlooks over the period to 2050 based on varying levels of future optimism about the growth of nuclear power. For this analysis, UxC has excluded all current and future nuclear capacities for markets captured by either China or Russia to identify the nuclear markets accessible to U.S. suppliers. Based on these nuclear power outlooks, UxC has extrapolated the resulting potential nuclear market size projections and interpreted what this means in terms of export opportunities for U.S. nuclear suppliers and potential U.S. job creation.

### Total Focus Market Nuclear Power Projections

The outlook for nuclear power globally is positive, but much of the near- and medium-term growth is from reactors being built by China and Russia. Thus, UxC has evaluated the nuclear outlook in a Focus Market that includes the U.S., Canada, Europe, Japan, South Korea, India, along with several other high prospect countries across Southeast Asia, Middle East, Africa, and Latin America. Within this Focus Market, Base and High case projections were evaluated, with the Base Case reflecting a 0.8% compound annual growth rate (CAGR) driven by moderate new reactor deployment mainly after 2035 of ~131 GWe by 2050 along with gradual annual reductions in the existing reactor fleet totaling ~62 GWe lost by 2050. The High Case is much more optimistic with a 2.2% CAGR incorporating ~250 GWe added by 2050 and only ~37 GWe lost over that period. As seen in Figure 1, the Base Case rises to 362.4 GWe by 2050, while the High Case accelerates to 507.3 GWe by 2050.

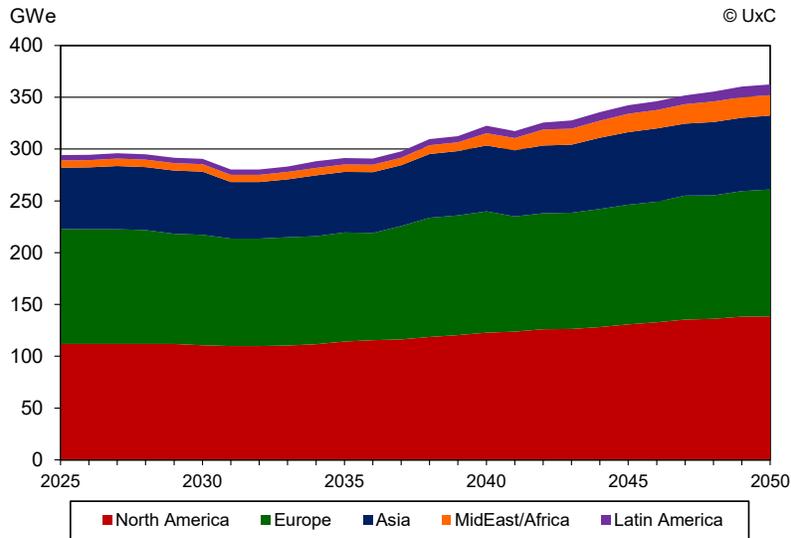
**Figure 1. Focus Market Base & High Case Nuclear Power Capacity, 2025-2050**



## Regional Nuclear Growth Trajectories

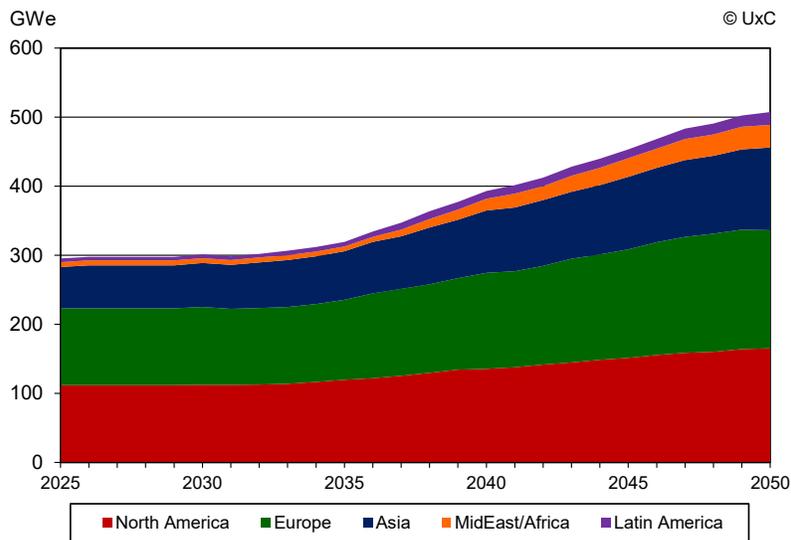
Five regional markets were evaluated: Asia, Europe, Latin America, Middle East/Africa, and North America. Again, all current and future reactors built by Russia and China were excluded from the analysis. Figure 2 presents the regional outlook under the Base Case. This shows that North America and Europe are the two largest markets, but faster growth is projected in North America, which has a 0.9% CAGR. Asia, which is in third place, shows a CAGR of 0.8%. Middle East/Africa has the highest CAGR at 4.2%, and Latin America is also high at 2.8%, although both markets are much smaller in size.

**Figure 2. Base Case Nuclear Capacity by Region, 2025-2050**



As seen in Figure 3, all regions see significantly more pronounced growth under the High Case by 2050. Europe adds the most capacity at 60 GWe, followed closely by Asia at 59.5 GWe. North America rises by 53.4 GWe, while Middle East/Africa adds 25.7 GWe. Latin America also adds a notable 13.5 GWe.

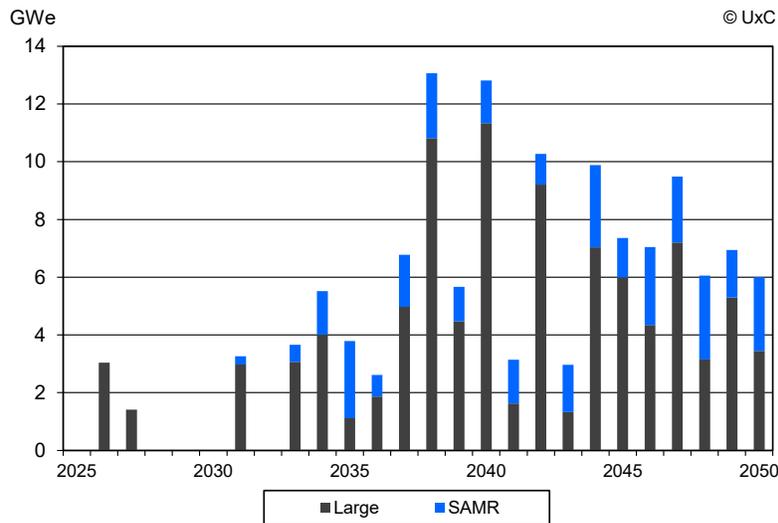
**Figure 3. High Case Nuclear Capacity by Region, 2025-2050**



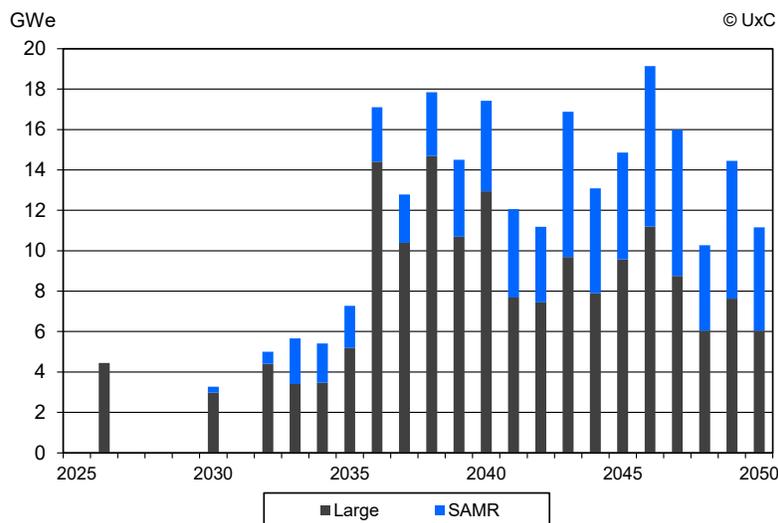
## New Reactor Technologies

The selection of reactor technologies to meet this growing nuclear capacity requirement is another important factor to consider. Although the near-term outlook is primarily centered on extended operation and new construction of large, traditional reactor types (e.g., light water reactors [LWRs] and pressurized heavy water reactors [PHWRs]), the longer-term future is likely to see a transition to a mix of emerging new technologies, including small, advanced, and micro reactors (SAMRs). There are many promising SAMRs in various stages of design, licensing, and development, with many U.S. companies at the forefront. While some initial projects are already underway to prove these advanced designs, there is strong anticipation that the post-2030 period will see a more rapid buildout of the next generation of advanced nuclear reactors. Over time, SAMRs will begin to see increasing market penetration given multiple drivers propelling these designs forward. The percentage of non-traditional reactor designs could reach upwards of 25% of the total market by 2050 under the Base Case (see Figure 4) and up to 32% under the High Case (see Figure 5).

**Figure 4. Base Case New Reactors by Technology Type, 2025-2050**



**Figure 5. High Case New Reactors by Technology Type, 2025-2050**



## Global Nuclear Market Capital Expenditures

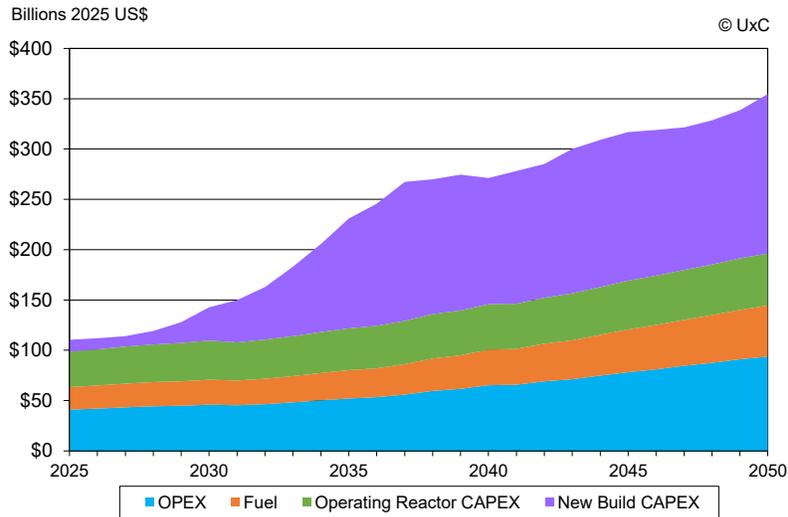
UxC has used various assumptions and approaches to assess the current and potential future nuclear market size for the Focus Market in this study. To derive estimates for nuclear market sizes, the following aspects have been analyzed:

- Operating reactor expenditures (OPEX), focusing on costs related to external labor and materials/supplies needed to maintain and operate both existing and future reactors
- Fuel costs for both new and operating reactors
- Operating reactor capital expenditures (CAPEX), such as capital upgrades and other sustaining CAPEX needed to keep reactors running over the long term
- New reactor CAPEX, including expenses for both large reactor designs and SAMR projects

UxC has applied an average annual inflation rate of 2.5% to all the market size projections.

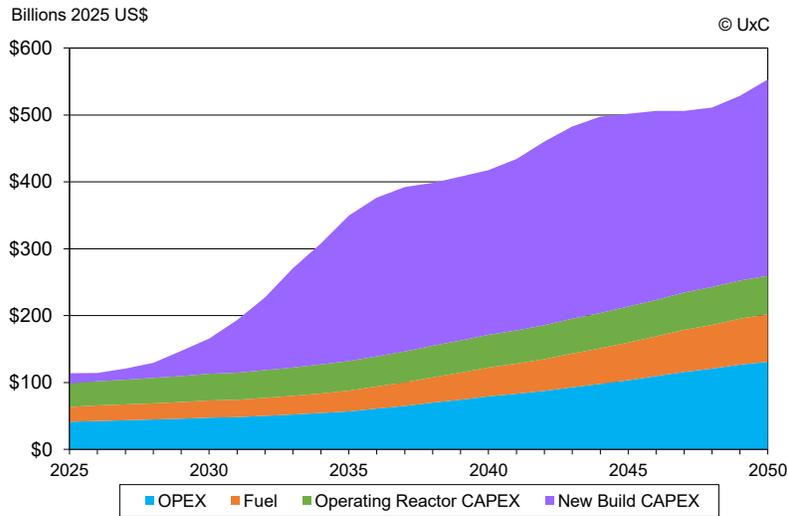
Combining all OPEX and CAPEX for the Base Case, the following Figure 6 shows that the annual market size rises significantly from around \$110 billion to about \$355 billion by 2050. The largest increases are driven by new build CAPEX, but the rising number of reactors in the Focus Market over time also results in steady increases in OPEX and Fuel expenditures over the forecast period.

**Figure 6. Base Case Total Market Size by Component, 2025-2050**



Under the High Case, the market size projections rise significantly more. Combining all OPEX and CAPEX for the High Case, Figure 7 on the next page shows the annual market size rising rapidly to roughly \$553 billion by 2050. Similar to the Base Case, the largest increases are from new build CAPEX, but the rapidly rising number of reactors in the Focus Market also results in substantial increases in OPEX and Fuel expenditures over the forecast period.

**Figure 7. High Case Total Market Size by Component, 2025-2050**



## Implications for the United States

Many U.S. companies already active in this industry stand to gain considerable revenues if the available Focus Market expands to between 362.4 and 507.3 GWe by 2050, with cumulative market expenditures in the range of \$6.1 trillion (Base) to \$9.1 trillion (High) over the 25-year period. Large sums of money will have to be spent in the relevant markets to maintain the existing reactors and build the numerous new reactors. Thus, opportunities will not be limited just to the construction sector as operating units will require a host of ongoing support services, fuel supplies, and other inputs over the forecast period.

Naturally, the traditional markets of North America and Western Europe as well as parts of Asia, such as Japan and South Korea, remain fertile ground for U.S. suppliers. However, U.S. suppliers have yet to make major inroads into some of the key international growth markets. Over time, it is anticipated that U.S. companies will make further progress in accessing the larger growth markets in Asia, Africa, Middle East, and elsewhere. However, achieving these exports will require concerted effort by the industry, as well as supportive U.S. government policies, including:

- Strong support for a domestic U.S. nuclear build-out to prove new technologies that can provide a launching pad for widespread international sales
- Consistent championing of U.S. nuclear suppliers globally through trade promotion and direct diplomacy in key markets
- Direct investments and export financing to enhance U.S. nuclear suppliers' competitiveness
- Maintaining a pro-business and pro-trade focus that includes limited tariffs and restrictions on key imports required by the U.S. nuclear industry



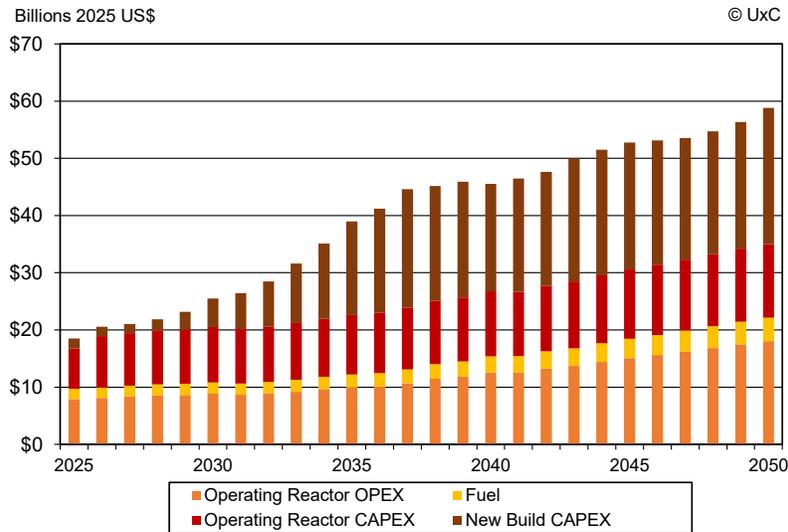
## U.S. Nuclear Export Potential

The U.S. nuclear industry remains a leader in the world and has multiple opportunities for global exports. UxC considers the following to be the most promising prospects for U.S. nuclear suppliers:

- U.S. vendors continue to have an advantage in selling services and components to existing reactors. U.S. suppliers also have significant advantages in terms of sales to support international reactor lifetime extensions.
- Although most global new builds are expected to be based on large reactor technologies (e.g., 1000+ MWe light water reactors), there will also be an expansion of the SAMR market. In addition to leading existing NSSS vendors like Westinghouse and GE Vernova-Hitachi, U.S. firms have several of the world's top SAMRs under development. As long as U.S. projects can be proven in a timely manner, U.S. vendors should be able to access a sizeable portion of the global SAMR market.
- U.S. suppliers active in engineering services, component supply, technical services, and related areas will be able to access the expanding international operating reactor services market.
- U.S. fuel vendors should also see increasing growth from exports, especially in the areas of UF<sub>6</sub> conversion and fuel fabrication as well as related engineering and other fuel services.

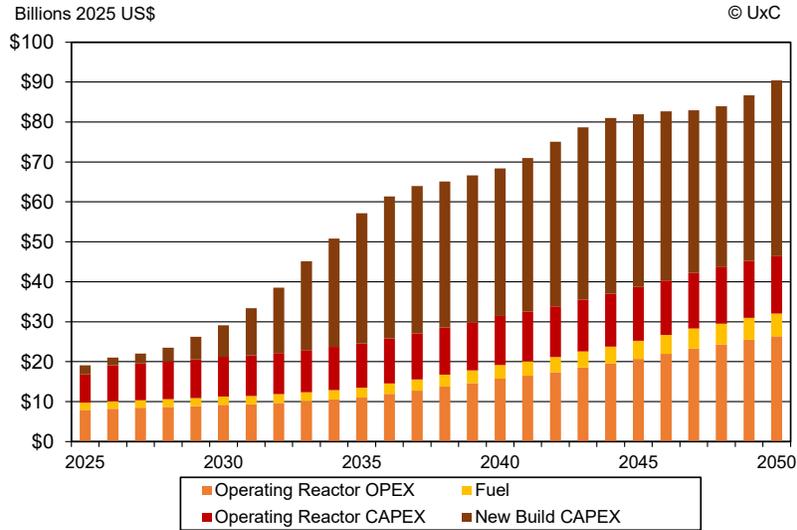
According to the Base Case, the international U.S. nuclear export potential rises from the current level of around \$19 billion annually to \$59 billion annually by 2050 (see Figure 8 below).

**Figure 8. Base Case U.S. Nuclear Market Revenues, 2025-2050**



Meanwhile, under the High Case, the global U.S. nuclear export potential rises to \$90 billion annually by 2050 (see Figure 9 on the next page).

**Figure 9. High Case U.S. Nuclear Market Revenues, 2025-2050**



## U.S. Job Creation

According to UxC analysis, there is significant potential for U.S. job creation from nuclear-related exports to the Focus Market. Under the Base Case, U.S. jobs created by nuclear market exports rise from a current level of around 92,000 annually to nearly 165,000 by 2035. Given inflationary factors, the rise in export dollars in the future does not result in the same level of consistent job growth, although export jobs remain steady at the ~160,000 level throughout the period 2035-2050. Meanwhile, under the High Case, jobs created by U.S. nuclear market exports rise more significantly. It goes from the current level to over 250,000 jobs annually by 2040 and stays near that level through 2050. The following Figure 10 presents the U.S. job creation potential for U.S. exports under the two scenarios.

**Figure 10. Base & High Case U.S. Nuclear Export Jobs, 2025-2050**

