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Nuclear Spent Fuel Market - Global Industry Size, Share, Trends, Opportunity, and Forecast, Segmented By Type of Reactor (Pressurized Water Reactor (PWR), Boiling Water Reactor (BWR), Gas-cooled Reactor (GCR), Pressurized Heavy Water Reactor (PHWR), Others), By Storage Type (Wet Storage, Dry Storage), By Application (Energy Production, Research and Development, Defense and Military, Others), By Region 7 Competition, 2020-2030F

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Abstracts

Market Overview

The Global Nuclear Spent Fuel Market was valued at USD 16.78 billion in 2024 and is projected to reach USD 23.04 billion by 2030, growing at a CAGR of 5.27%. This market encompasses the handling, storage, transportation, and disposal of spent nuclear fuel—radioactive material left after it has been used in a nuclear reactor to generate electricity. As nuclear energy becomes a critical component of global low-carbon strategies, the quantity of spent fuel requiring management continues to rise. Due to its high radioactivity and thermal output, spent fuel demands advanced systems for safe cooling, containment, and long-term disposal. The market includes wet and dry storage technologies, transportation containers, reprocessing services, and deep geological repositories, all designed to meet stringent safety and regulatory requirements across diverse applications such as energy production, research, and defense.

Key Market Drivers

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Increasing Global Demand for Nuclear Energy to Meet Carbon Neutrality Goals

The growth of the Nuclear Spent Fuel Market is being propelled by the expanding adoption of nuclear power as a clean energy solution aligned with global decarbonization goals. As countries work toward achieving net-zero emissions, nuclear energy is being increasingly embraced for its ability to produce electricity with minimal carbon emissions. This rise in nuclear deployment is directly contributing to the accumulation of spent fuel, necessitating enhanced infrastructure and technology for its management and disposal.

According to the International Energy Agency (IEA), global nuclear capacity is expected to double by 2050 under sustainable development scenarios. Nations such as China, India, and the UK are aggressively expanding their nuclear portfolios—with China planning to build 150 reactors by 2035. This surge is driving substantial investment in dry and wet storage systems, reprocessing technologies, and deep geological repositories. Given the long-term hazards posed by high-level radioactive waste, sophisticated containment and monitoring systems are essential, making effective spent fuel management a vital component of the nuclear energy ecosystem.

Key Market Challenges

Regulatory Complexity and Policy Inconsistencies Across Jurisdictions

A major challenge for the Nuclear Spent Fuel Market lies in the fragmented regulatory landscape across countries. Each nation maintains its own safety, environmental, and security protocols for managing spent fuel, resulting in inconsistent policies that hinder global standardization. The absence of a universal framework complicates cross-border operations and increases compliance burdens for companies engaged in storage, transportation, and disposal services.

Diverse national regulations, shaped by political climate, public perception, and nuclear legacy, create uncertainty and delays in project execution. For instance, Finland and Sweden are advancing deep geological repositories, while countries like the U.S. and Germany face political and legal hurdles in establishing permanent solutions. This regulatory disparity restricts investor confidence and impedes the scale-up of global spent fuel management infrastructure, slowing innovation and adding to operational complexity for service providers in the sector.

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Key Market Trends

Increasing Investments in Lightweight Energy Storage for Electric Aviation

A notable trend impacting the Nuclear Spent Fuel Market is the rise in investments related to lightweight energy storage systems for electric aviation applications. The aerospace sector, encompassing both civilian and defense domains, demands compact, high-energy-density solutions to support the growing shift toward electrified aviation. Lithium-sulfur batteries are gaining attention for their superior specific energy and lightweight characteristics, making them well-suited for electric aircraft, UAVs, and surveillance platforms.

As national governments and private entities prioritize sustainable aviation, collaborations between aerospace firms and battery developers are increasing. These partnerships aim to optimize lithium-sulfur chemistries for flight performance, efficiency, and safety. Support from public R&D programs and environmental initiatives further accelerates these efforts, positioning lightweight battery innovation as a transformative force in aviation and adjacent high-tech sectors.

Key Market Players

Orano

Westinghouse Electric Company

Holtec International

AREVA

NAC International

Hitachi Zosen Corporation

GE Hitachi Nuclear Energy

Rosatom State Corporation

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Cameco Corporation

Mitsubishi Heavy Industries

Report Scope:

In this report, the Global Nuclear Spent Fuel Market has been segmented into the following categories, in addition to the industry trends which have also been detailed below:

Nuclear Spent Fuel Market, By Type of Reactor:

Pressurized Water Reactor (PWR)

Boiling Water Reactor (BWR)

Gas-cooled Reactor (GCR)

Pressurized Heavy Water Reactor (PHWR)

Others

Nuclear Spent Fuel Market, By Storage Type:

Wet Storage

Dry Storage

Nuclear Spent Fuel Market, By Application:

Energy Production

Research and Development

Defense and Military

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Others

Nuclear Spent Fuel Market, By Region:

North America

United States

Canada

Mexico

Europe

Germany

France

United Kingdom

Italy

Spain

South America

Brazil

Argentina

Colombia

Asia-Pacific

China

India

Japan

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South Korea

Australia

Middle East & Africa

Saudi Arabia

UAE

South Africa

Competitive Landscape

Company Profiles: Detailed analysis of the major companies present in the Global Nuclear Spent Fuel Market.

Available Customizations:

Global Nuclear Spent Fuel Market report with the given market data, TechSci Research offers customizations according to a company's specific needs. The following customization options are available for the report:

Company Information

Detailed analysis and profiling of additional market players (up to five).

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