Access the opportunities.

Is Nuclear Fusion the Big Breakthrough that will Redefine Global Energy Markets?

- **Fusion has the potential to be the abundant, safe and carbon-free source of power that's urgently needed.**
- **While the development of fusion is quickly progressing, nuclear fission is advancing too in a world seeking more energy.**
- **The VanEck Uranium and Nuclear Technologies UCITS ETF delivers diversified access to the industry's expansion and innovation.**
- **Investments in uranium and nuclear-related companies are subject to regulatory, political and technological risks, as well as commodity price volatility, which may impact company revenues and fund performance.**

When Commonwealth Fusion Systems (CFS), the nuclear power company, raised almost $900 mn in new funding in August 2025, it moved a step closer towards a landmark moment for nuclear fusion.[1] It plans to use the money to complete a fusion demonstration machine, followed by the world's first large-scale commercial fusion power plant in Virginia in the United States.

CFS and a handful of other innovators are getting closer to making fusion a reality. To do so, they aim to harness the same nuclear reaction that lights up the sun and the stars. The potential is huge: fusion would bring an era of abundant, carbon-free nuclear power it provides clean, virtually limitless energy.

While there remain significant engineering hurdles to overcome, CFS and other nuclear fusion generators could start to generate energy in the 2030s[2]. By the second half of this century, they could contribute a material part of the world's energy mix, according to estimates from the International Atomic Energy Agency (IAEA).[3]

Accelerating fusion's development, record sums of capital are being invested in fusion start-ups and venture funds. The EU's Fusion for Energy (F4E)[4] organization calls this an 'inflection point'.

But if nuclear fusion may be the future, nuclear fission is the present. Driven by surging demand for low-carbon electricity[5], there's a growing need for nuclear fission

[1] Commonwealth Fusion Systems. (2025, August 28). Commonwealth Fusion Systems raises $863 million Series B2 round to accelerate the commercialization of fusion energy. https://www.cfs.energy/news-and-media/commonwealth-fusion-systems-raises-863-million-series-b2-round-to-accelerate-the-commercialization-of-fusion-energy/
[2] Schenker, J. (2025, December 12). How AI will help get fusion from lab to grid by the 2030s. World Economic Forum. https://www.weforum.org/stories/2025/12/how-ai-will-help-get-fusion-from-lab-to-grid-by-the-2030s/
[3] International Atomic Energy Agency. (2025). IAEA world fusion outlook 2025 (IAEA/PAT/012). https://doi.org/10.61092/iaea.agh6-zpih
[4] Fusion for Energy. (2026). Bringing the power of the sun to Earth. European Joint Undertaking for ITER and the Development of Fusion Energy. https://fusionforenergy.europa.eu/
[5] World Nuclear Association. (2026). How can nuclear combat climate change? https://world-nuclear.org/nuclear-essentials/how-can-nuclear-combat-climate-change/

reactors and related innovations such as small modular reactors (SMRs) and other fission technologies. The VanEck Uranium and Nuclear Technologies UCITS ETF[6] allows you to gain exposure to the leaders in the nuclear industry today – from reactor manufacturers to uranium miners – and will evolve with the sector, including the development of nuclear fusion. However, investments in nuclear energy involve risks, including regulatory uncertainty, political and public acceptance challenges, cost overruns, and long project development timelines. Companies across the nuclear value chain may also be exposed to commodity price volatility, technological risks, and changes in government policy that could affect profitability and growth prospects.

A quiet evolution: from fission to fusion

As the global economy demands vast new supplies of low carbon electricity, investment and innovation are beginning to transform the nuclear power industry. It's a quiet evolution. Closest at hand are improvements in nuclear fission. But this looks increasingly likely to be followed by the development of commercial nuclear fusion, although considerable engineering and commercialization challenges remain.

Nuclear fission power plants have generated electricity since the 1950s, while fusion has long been considered the ultimate goal of nuclear energy research. Nuclear fission splits heavy atoms (typically uranium or plutonium) into smaller ones, releasing energy. However, it runs the risk of radioactive meltdowns and produces nuclear waste that can remain hazardous if not disposed of properly.

By contrast, nuclear fusion combines light atoms (primarily deuterium and tritium) into heavier ones, releasing energy. It provides clean, virtually limitless energy. Yet the process of producing it is challenging, requiring extreme heat as it effectively recreates the conditions of the stars.

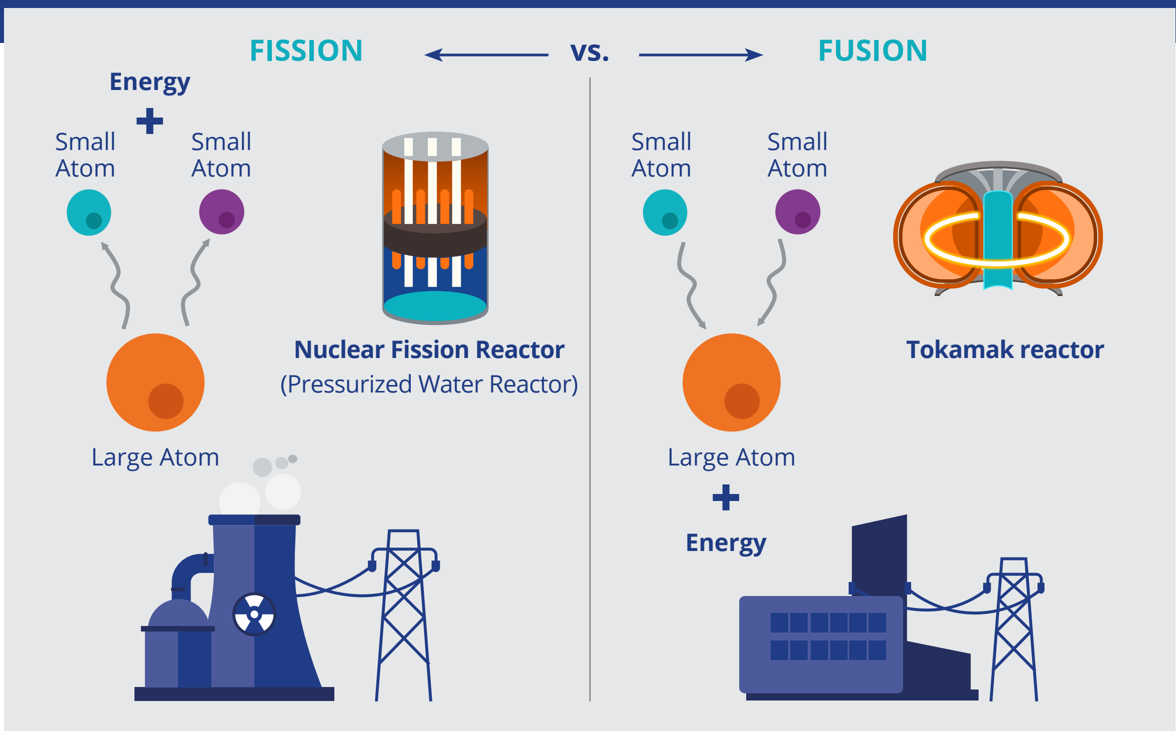
Fission's progress

As electricity consumption rises, there's a move to develop a new generation of reactors that are both safer and more efficient. Innovation is also focusing on the method of delivery through smaller reactors.

Known as generation IV reactors, the advanced fission reactors in development go beyond the current generation by using non-water coolants such as molten salt, gas or liquid metal, alongside high-temperature operations. The result is better fuel usage, less nuclear waste and hydrogen production.

Alongside gen IV reactors, thorium accelerator-driven systems are being developed. More abundant than

The chart below illustrates the main differences between fission and fusion reactors.



[6] VanEck. (2026). Nuclear ETF overview. https://www.vaneck.com/ucits/investments/nuclear-etf/overview/

uranium, thorium's waste has a shorter life. Further, accelerator-driven systems improve safety as their external particle accelerators can be turned off, so stopping the nuclear reaction and possible meltdowns. Thorium technology is in the demonstration stage, with Swiss start-up Transmutex[7] leading the field.

Turning to delivery, there's considerable interest in SMRs, using both current generation and gen IV technology. Their attraction is that they can be built in a factory and transported to site, so potentially reducing costs and the scope for cost overruns.

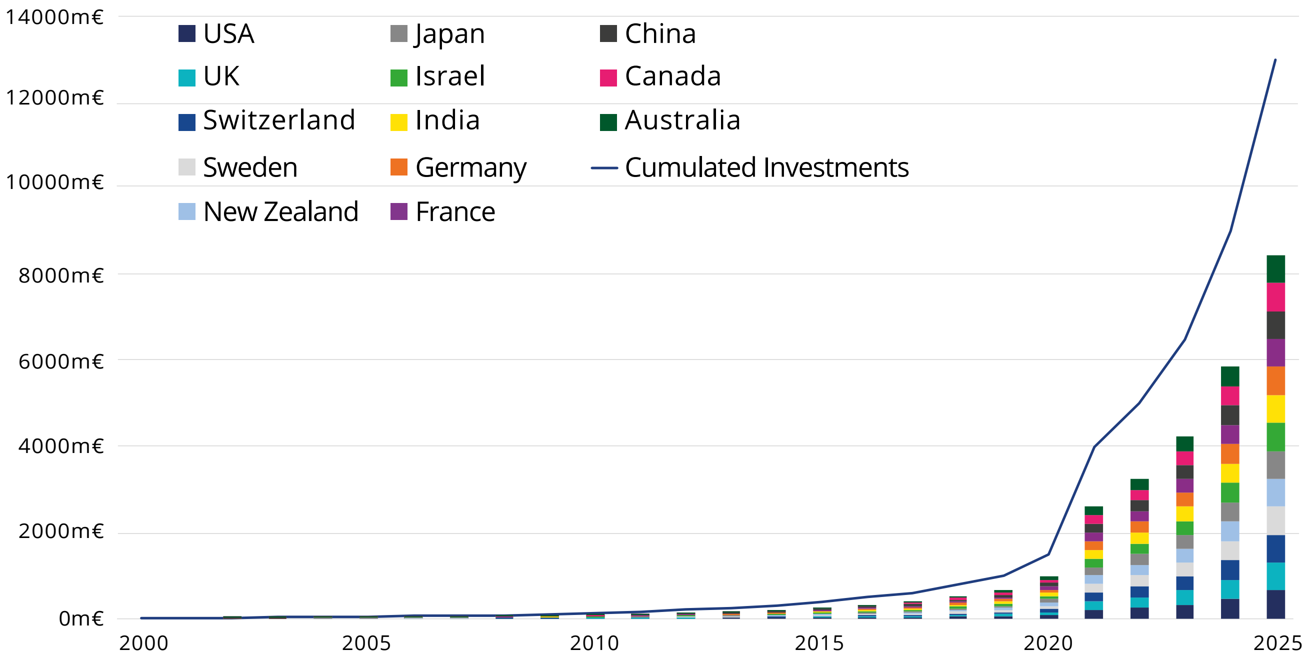
Fusion's approaching dawn?

Looking further into the future, reproducing the conditions of the stars within a fusion reactor on Earth is an enormous challenge. It involves heating isotopes of hydrogen (primarily deuterium and tritium) to temperatures exceeding 100 million degrees Celsius. At such heat, no physical material can contain plasma directly. However, investors appear to be increasingly confident that innovative engineering solutions can overcome this challenge. Private sector funding reached a cumulative €13 billion in September 2025, having risen from €9.9 billion in just three months, according to the EU's Fusion for Energy (F4E) organization.[8] That's almost ten times the €1.5 billion level five years earlier in 2020 – what F4E calls an 'inflection point'.

Several organizations are tackling the engineering barriers. Notably, ITER (the International Thermonuclear Experimental Reactor) is building a $40 billion international tokamak in France[9] – a doughnut-shaped device using powerful magnetic fields to confine and control fusion plasma at reactor-relevant conditions. ITER is entering the demonstration phase, aiming to prove that fusion can operate reliably and economically at commercial scale.[10,11]

Activity is broad and accelerating: the International Atomic Energy Agency (IAEA) reports more than 160 fusion facilities worldwide are planned, under construction, or operational, with nearly 40 countries already implementing dedicated fusion energy programs.[12]

Growth of global investments in fusion companies – from 2000 to 2025 (in millions of euros)



Source: Fusion for Energy. (2025). Global investment in the private fusion sector: F4E Observatory 2025. https://fusionforenergy.europa.eu/wp-content/uploads/2025/11/F4E_Observatory_2025_digital.pdf

[7] Transmutex. (2026). Transmutex | Innovators in sustainable energy. https://www.transmutex.com/
[8] Fusion for Energy. (2025). Global investment in the private fusion sector: F4E fusion observatory report (2nd ed.). https://fusionforenergy.europa.eu/wp-content/uploads/2025/11/F4E_Observatory_2025_digital.pdf
[9] ITER Organization. (2026). Building ITER. https://www.iter.org/building-iter
[10] MIT Energy Initiative. (2015, August 10). A small, modular, efficient fusion plant. https://energy.mit.edu/news/a-small-modular-efficient-fusion-plant/
[11] EUROfusion. (n.d.). Demonstration power plant (DEMO). https://euro-fusion.org/programme/demo/
[12] MIT Energy Initiative, & MIT Plasma Science and Fusion Center. (2024). The role of fusion energy in a decarbonized electricity system. https://energy.mit.edu/wp-content/uploads/2024/09/MITEI_FusionReport_091124_final_COMPLETE-REPORT_fordistribution.pdf

Among them, CFS, the US nuclear fusion company, plans to commission its demonstrator, SPARC, by 2027[13], aiming to create what it hopes will be the first net-energy fusion system (meaning it generates more energy than it requires to operate) – although this remains a projection and the outcome is uncertain. After the demonstrator, CFS intends to build a Virginia-based commercial nuclear fusion plant, ARC, for deployment in the early 2030s, subject to technical and practical milestones.

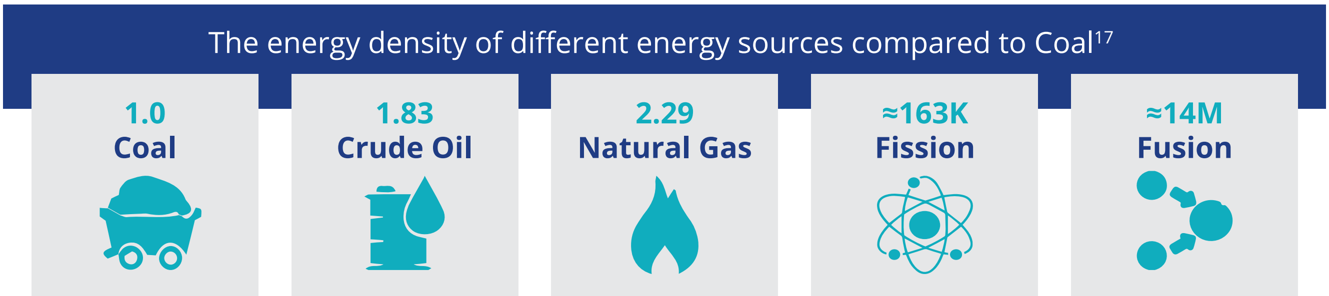
The chart below illustrates the potential power of fusion energy compared to other energy sources, using the energy density of coal as a reference baseline. The key point is that fusion fuel's energy density is roughly eighty six times greater than fission's, and nearly 14 million times greater than natural coal.

But challenges remain around scaling reactor designs, material resilience under extreme conditions, and the cost and speed of industrial deployment. What's more, the encouraging surge in investment also raises the risk of inflated expectations and uneven capital allocation across technologies at very different stages of maturity.

AI escalates demand for carbon-free energy

Despite nuclear fusion's remaining engineering hurdles, there's already interest in the power it may eventually generate. In 2025, Google and CFS made history when the tech giant signed the world's first agreement to buy fusion energy. It committed to buying energy from CFS's first planned commercial plant in Virginia from the early 2030s. This agreement secures 200 megawatts of safe, clean energy, meeting Google's rising electricity needs for AI data centers and cloud computing.[14]

As the big US hyperscaler tech companies' needs for clean electricity grow, they are also buying power generated by traditional nuclear fission power plants. For instance, Microsoft and Constellation Energy recently entered a 20-year, $1.6 billion agreement to restart a dormant reactor at Three Mile Island in Pennsylvania[15]. This is just one of several similar agreements involving Amazon, Google and Microsoft. Nuclear fusion's share of global electricity generation could reach 15% by 2075 and 27% by 2100, according to analysis by the IAEA.[16] The greatest growth comes in the second half of this century and reflects the world's growing demand for zero-carbon, dispatchable energy generation.



Sources: Energy density. (2026). Energy Education. https://energyeducation.ca/encyclopedia/Energy_density, Max-Planck-Gesellschaft. (2025). Nuclear fusion: European joint experiment achieves energy record. Max-Planck-Gesellschaft. https://www.mpg.de/21522737/0208-plas-jet-rekord-2024-151590-x

[13] Commonwealth Fusion Systems. (2026). SPARC: Proving commercial fusion energy is possible. Commonwealth Fusion Systems. https://cfs.energy/technology/sparc/
[14] International Atomic Energy Agency. (2025). IAEA world fusion outlook 2025 (IAEA/PAT/012). https://doi.org/10.61092/iaea.agh6-zpih
[15] Crosdale, C. (2024, October 9). Microsoft taps nuclear power to fuel growing AI demand. Global Finance Magazine. https://gfmag.com/economics-policy-regulation/microsoft-three-mile-island-nuclear-power-ai-demand/
[16] International Atomic Energy Agency. (2025). IAEA world fusion outlook 2025. https://www-pub.iaea.org/MTCD/publications/PDF/p15935-25-02871E_WFO25_web.pdf
[17] All data are expressed as multiples of energy density (MJ/kg), using coal as the baseline at 24 MJ/kg

The respected Plasma Science and Fusion Center at the Massachusetts Institute of Technology (MIT) has also estimated possible future fusion generation. The chart below sets out which countries MIT anticipates will use nuclear fusion to generate electricity in the next 30 years.

A diversified approach to investing in nuclear's evolution

VanEck Uranium and Nuclear Technologies UCITS ETF (NUCL)

The VanEck Uranium and Nuclear Technologies UCITS ETF[18] offers investors an opportunity to gain from the nuclear industry's revival and ongoing innovation through a single diversified investment vehicle. It currently provides exposure to companies involved in uranium mining and investments, industrial companies with activities in the nuclear industry, and nuclear technology/infrastructure companies.

The ETF is structured to capture the transition from traditional uranium and fission technologies to the anticipated commercialization of fusion and other advanced systems. Nuclear's innovators are actively monitored and publicly listed companies become eligible for inclusion in the ETF once they meet its investability and liquidity requirements.

Currently, NUCL has limited to no direct exposure to nuclear fusion companies. This could change in the future if firms such as Commonwealth Fusion Systems (CFS) become publicly listed and meet the index's eligibility criteria. In addition to fusion, NUCL provides exposure to advanced nuclear fission and small modular reactor (SMR) technologies through companies such as Oklo[19], a U.S.-based developer of next-generation fission power plants, which are more closely aligned with the index's revenue-based eligibility criteria.

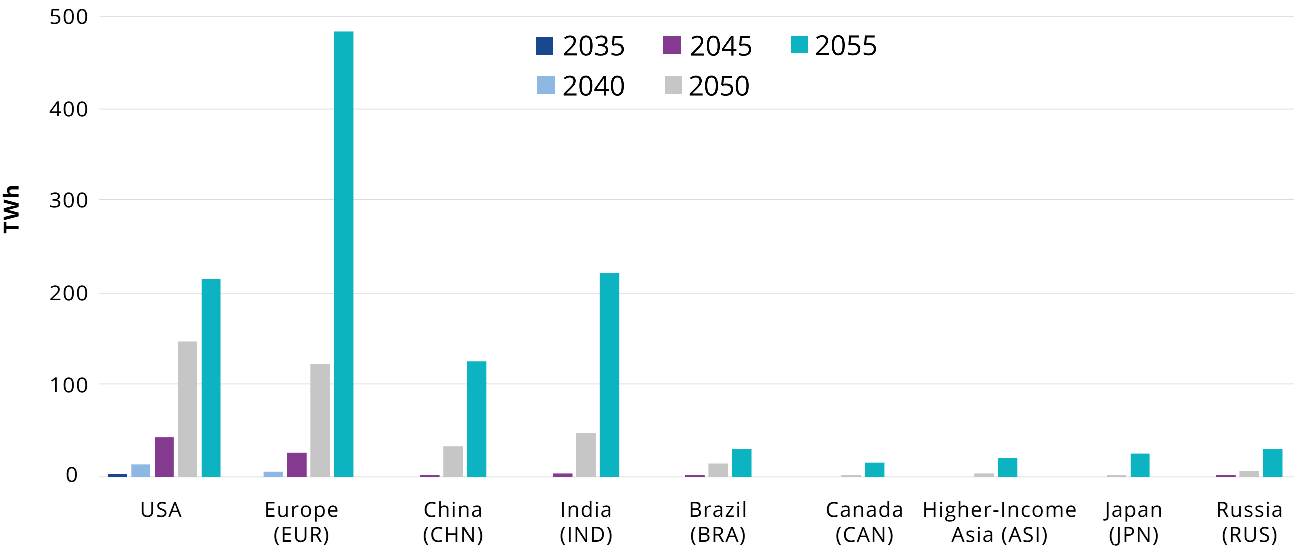
With many nuclear and fusion-related enterprises still in the early stages of development, they can be capital-intensive and may operate at a loss for extended periods. Given these risks, a diversified ETF may offer a prudent and diversified approach for gaining exposure to the sector.

Despite its diversified and rules-based approach, investment in NUCL is subject to several risks. The nuclear industry is highly regulated and dependent on government policy, public acceptance, and long-term political support. Changes in regulation, licensing requirements, or energy policy may delay projects, increase costs, or negatively impact company valuations.

In addition, NUCL may be exposed to commodity price volatility, particularly in uranium markets, as well as supply

MIT Outlook on Electricity Generation from Fusion

Electricity generation from fusion technology in major world regions (United States, Europe, China, India, Brazil, Canada, Higher-Income Asia, Japan, Russia) over the 2035-2055 period



Source: MIT Energy Initiative.[20]

[18] VanEck. (2026). Nuclear ETF overview.
[19] Oklo Inc. (2026). Overview. Oklo overview page
[20] MIT Energy Initiative, & MIT Plasma Science and Fusion Center. (2024). The role of fusion energy in a decarbonized electricity system. https://energy.mit.edu/wp-content/uploads/2024/09/MITEI_FusionReport_091124_final_COMPLETE-REPORT_fordistribution.pdf

chain disruptions and geopolitical risks that can affect nuclear fuel availability and project economics. As a thematic ETF focused on a relatively narrow segment of the energy market, NUCL may experience higher volatility than broader equity indices, and adverse developments within the nuclear sector could disproportionately impact performance.

Performance History (%) – Calendar by Year

	2021	2022	2023	2024	2025
ETF	–	–	–	29.06	68.91
MVNUCLTR (Index)	–	–	–	29.91	69.96

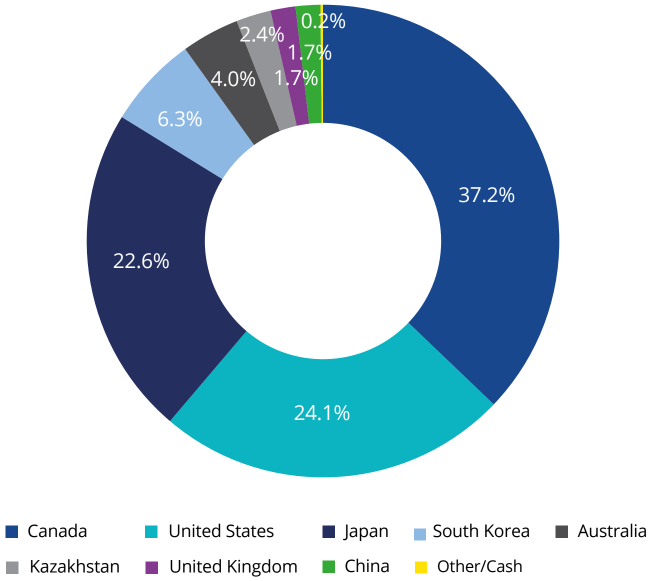
Past performance is not a reliable indicator of future results. The value of investments and the income from them can go down as well as up, and investors may not get back the amount originally invested.(country exposure).

End note

This is an exciting moment for the evolution of nuclear energy and fusion especially. Indeed, F4E, the organization shaping the EU's backing for ITER, states in a recent report that "pursuit of fusion energy has entered a new and decisive phase, transitioning from a primarily public research endeavour to a dynamic arena for private investment."[21]

In conclusion, nuclear fusion has the potential to fundamentally reshape the global energy landscape and is the ultimate illustration of the quiet but significant evolution underway in the nuclear sector. Yet it remains at an early stage, as do some of the innovations in nuclear fission. A broad-based ETF provides exposure to the sector's quiet evolution and possible growth, while diversifying the risks.

Country exposure of VanEck Uranium and Nuclear Technologies UCITS ETF – NUCL



Source: Morningstar data as 31/03/2026 (country exposure).

Author

Alessandro Valentino
Product Manager,
VanEck

Performance of VanEck Uranium and Nuclear Technologies UCITS ETF – NUCL

Source: Morningstar data since inception of the fund (03/02/2023) till 05/04/2026. Past performance is not a reliable indicator of future results. The value of invest-ments and the income from them can go down as well as up, and investors may not get back the amount originally invested.

[21] Fusion for Energy. (2025, September). Global investment in the private fusion sector. https://fusionforenergy.europa.eu/

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