OCEAN WALL

ASP isotopes

ASP Isotopes – Enriching Our Future One Industry at a Time

February 2025

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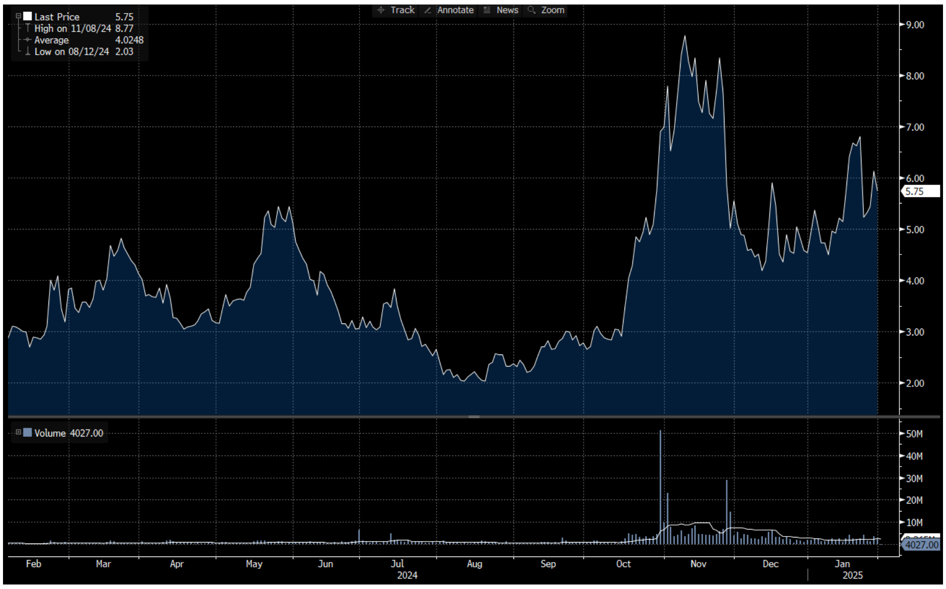
COMPANY PROFILE

ASP Isotopes (ASPI) is a leader in isotope enrichment technology for the medical, green energy and industrial sectors. Of particular interest is the Company's ability to produce specialised isotopes where Russia has historically dominated the supply chain.



Ticker: ASPI
Exchange: NASDAQ
Sector: Chemicals
Founded: 2021
Stock Price: US$5.75
Market Cap: US$410m
Av. Daily Vol: 4.1m shares
Performance Since IPO: +105%
Performance YTD: +16.4%

Data as of 03/02/2025

ASP ISOTOPES – AT A GLANCE

ASPI's advanced technology platform leverages 20 years of R&D history to enrich isotopes in varying levels of atomic mass. Its innovative technology is designed to manufacture a diverse range of isotopes to meet the growing demand in the Nuclear Medicine, Semiconductors, and Nuclear Energy industries. In addition, we believe ASPI has the ability to benefit from an increasingly bifurcated geopolitical environment, given Russia is responsible for 85% of stable isotope production globally.

As a business, ASPI focuses on three target markets:

- **Medical Isotopes (ASP Isotopes & PET Labs)** - Opportunity to be one of the few producers in the undersupplied global medical isotopes market, which is anticipated to grow from $5.1bn in 2022, to $11.4bn by 2032, growing at a CAGR of 8.8%. This will be driven by increasing prevalence of cancers, rising demand for personalised medicine, and growing technological advancements in diagnostic imaging modalities.
- **Semiconductors (ASP Isotopes)** - The global semiconductor market is on track to surpass $1tn by 2030. ASPI is partnering with the global semiconductor industry to supply large quantities of Silicon-28 through 2030 and beyond to allow the industry to unlock the significant performance (speed and heat reduction) benefits that arise from switching to Si28 Nanowires.
- **Nuclear Energy (Quantum Leap Energy)** - ASPI's wholly owned subsidiary, "Quantum Leap Energy" ("QLE"), is looking to address the multi-billion-dollar opportunity in the nuclear sector, by applying its Quantum Enrichment technology to uranium to produce the essential fuels for next-generation nuclear power plants.

WHAT ARE ISOTOPES?

A family of people often consists of related but not identical individuals. Elements have families as well, known as isotopes. Isotopes are members of a family of an element that all have the same number of protons but different numbers of neutrons.

Two isotopes of the same element often have identical chemical properties but differ in mass and therefore in physical properties. There are stable isotopes, which do not emit radiation, and there are unstable isotopes, which undergo radioactive decay and emit radiation. The latter are called radioisotopes.

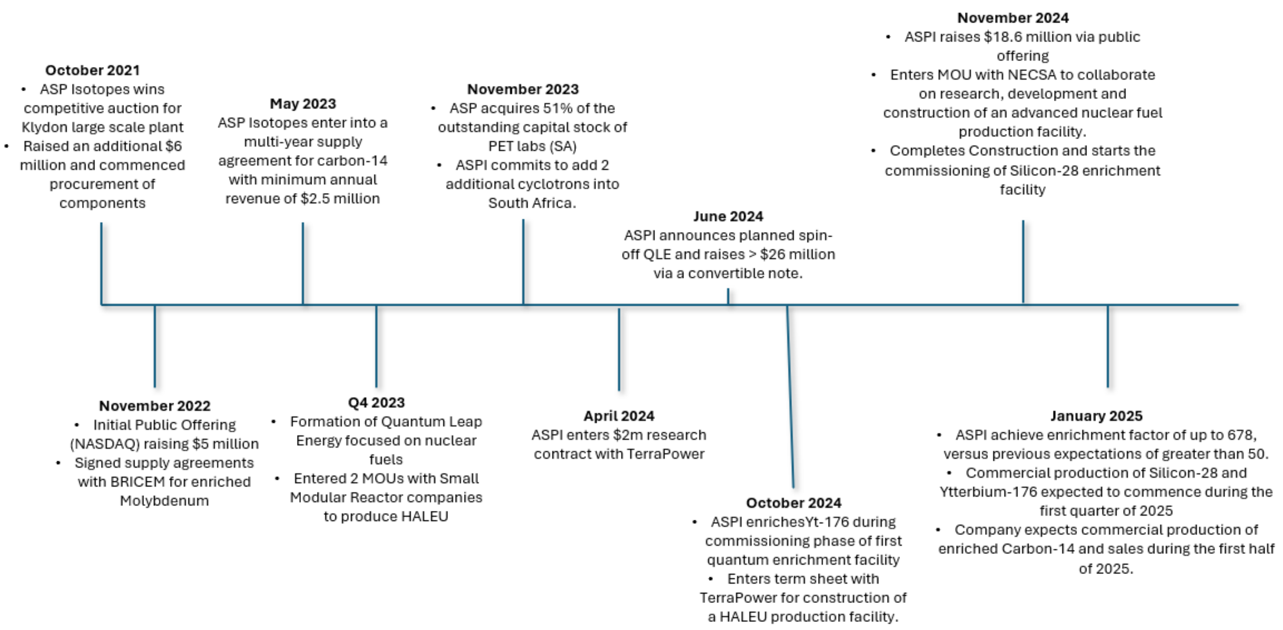
The number of protons in a nucleus determines the element's atomic number on the periodic table. For example, carbon has 6 protons and its atomic number is 6. Carbon occurs naturally in three isotopes: carbon 12, which has 6 neutrons (plus 6 protons to equal 12), carbon 13, which has 7 neutrons, and carbon 14, which has 8 neutrons. Most elements in the periodic table have multiple isotopes.

The addition of even one neutron can dramatically change an isotope's properties. Carbon-12 is stable, meaning it never undergoes radioactive decay. Carbon-14 is unstable and undergoes radioactive decay with a half-life of about 5,730 years (meaning that after 5,730 years half of the material will have decayed to the stable isotope nitrogen-14). This decay means the amount of carbon-14 in an object serves as a clock, showing the object's age in a process called "carbon dating."

Isotopes have unique properties, and these properties make them useful in diagnostics and treatment applications. They are important in nuclear medicine, oil and gas exploration, basic research, and national security.[1]

ASPI, via their two proprietary technologies; Aerodynamic Separation Process ("ASP") and Quantum Enrichment ("QE"), aims to enrich natural isotopes into higher concentration products, which could be used in several industries.

COMPANY TIMELINE [2]



Paul Mann, Founder and CEO of ASPI, discovered the former company (Klydon) in 2020 when it was in financial distress. ASPI obtained the relevant permits required to own and operate their plants in South Africa and then

[1] https://www.energy.gov/science/doe-explainsisotopes
[2] https://aspisotopes.com/

acquired the assets during a competitive auction from business rescue (bankruptcy). The auction was held in October 2021 where ASPI was the only buyer with the required permits (nuclear). At that time, Paul estimated the book value of the assets to be worth $15-20m and paid $750k for them. ASPI have subsequently spent ~$30m developing the assets. In November 2022, ASPI listed on NASDAQ, raising $5m in its initial public offering. Since incorporation, ASPI has raised approximately $100 million of equity capital.

There are currently three plants owned by ASPI all of which are located in Pretoria, South Africa. These plants are small in footprint and modular in design allowing for rapid capacity expansion. A single unit costs between $2.5-30m depending on the size, and can be built in just 9-12 months, providing both accessibility and scale.

The Company has two proprietary enrichment technologies:

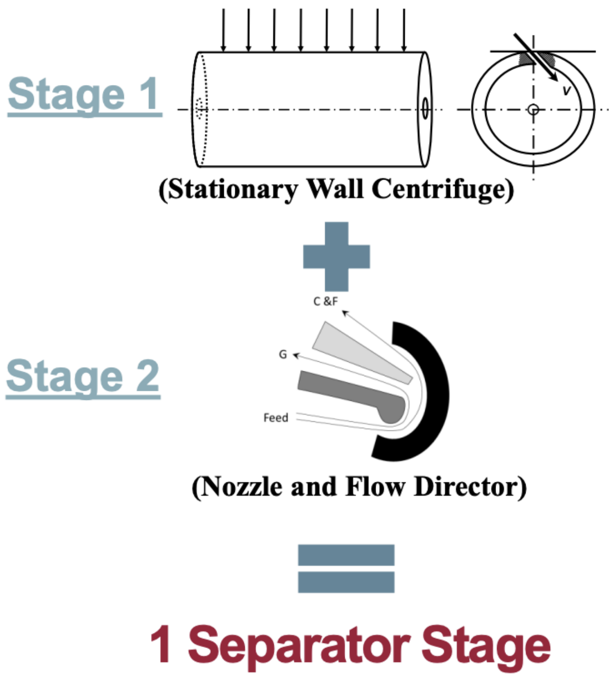
1. Aerodynamic Separation Process (ASP)
2. Quantum Enrichment (QE)

AERODYNAMIC SEPARATION PROCESS ("ASP")

ASP has its origins in the South African Government Uranium Enrichment Program of the 1980s and has been developed over the last 18-years by ASP scientists, since leaving the program.

The ASP device separates gas species and isotopes using an aerodynamic technique similar to a stationary wall centrifuge. The isotope material in raw gas form enters the stationary tube at high speed, the gas then follows a flow pattern that results in two gas vortexes occurring around the geometrical axis of the separator.

The isotope material becomes separated as a result of the spin speed of the isotope material reaching several hundred meters per second. A component of each tube then feeds isotope material to the respective ends of the separator where they are collected.



Source: ASP Isotopes

Benefits of a Stationary Wall Centrifuge:

- No moving parts vs a conventional centrifuge
- No unique materials are required
- Cost-efficient at small scale
- High Separation Efficiency
- Enrichment of lighter isotopes
- Enrichment at high temperatures

During 2025, ASPI expects to produce carbon-14 from the smaller of their two isotope enrichment facilities (production previously expected to start in 2024 but feedstock shipping was delayed). Carbon-14 has applications in the pharmaceutical and agrochemical industries. The estimated global market size for carbon-14 is likely ~$10 million per annum. Historically, Russia was the sole supplier of carbon-14, but there has been little availability since the start of 2022 and customers are looking for alternative suppliers. ASPI's isotope enrichment facility can produce over 400 grams per year and the company has signed a multi-year take-or-pay contract with its Canadian partner for a minimum of $2.5m per year. ASPI has said that it believes that the gross margin on this product is similar to a pharmaceutical, or ~85%.

At ASPI's second isotope enrichment plant, silicon-28 (applications for quantum computing) will be produced during 2025.

Silicon has three isotopes with masses of 28, 29 and 30. Silicon-29 which accounts for approximately 4% of naturally occurring silicon has a negative spin around the nucleus which means it is a poor conductor and inhibits an increase in 'clock speed' which is the number of cycles a processor executes per second. Most of the power consumption of a GPU is cooling.

Silicon-28, however, has zero spin making it a much better conductor of heat. If you are able to improve thermal conductivity, it is widely believed that semiconductors will use significantly less power.

The ASPI silicon-28 plant has >50,000 components, the majority of which are made in house. Management estimates that it would cost ~$25m to rebuild the plant (including shipping to Iceland would be $30m but would be 3x the output).

The silicon-28 plant has a capacity of >50kg per year, and the current cost per kilogram is $550,000. This price only makes sense on smaller, research-related volumes, and in order for integration in consumer products prices will need to be significantly lower, or where price isn't an inhibitor of use. ASPI believe that they already have demand for approximately 5% of this capacity but the company expects to receive additional orders after the plant has entered commercial production.

Once commercial production starts, we expect new silicon-28 contracts to be announced thereafter. In addition, ASPI intends to send research samples to various academic institutions for research purposes.

The nearer term revenue opportunity is likely to be single-digit millions of dollars. We believe that Rosatom is currently the only other company able to enrich these isotopes. ASPI believes that the gross margin on these isotopes is lower than that achieved on carbon-14, but is still high at ~75%.

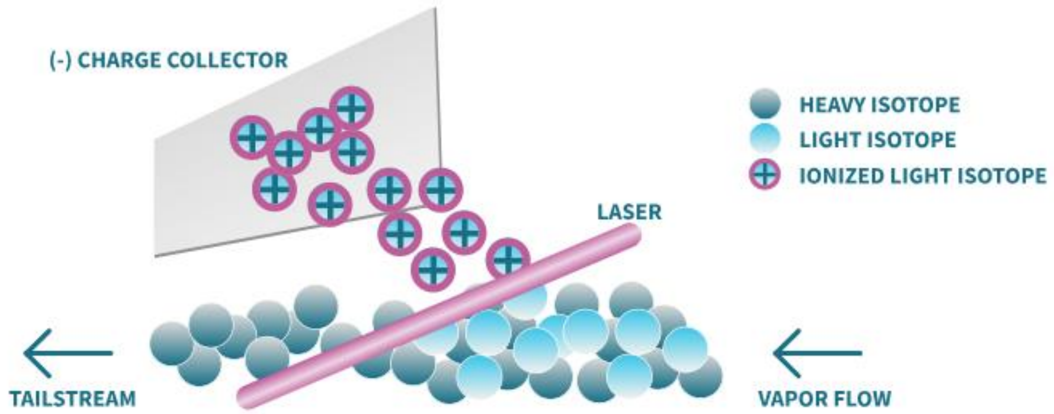
While ASPI is currently focused on the production of the isotopes mentioned above, there are various other isotopes that are of interest including zinc-67/68, ytterbium-176, nickel-64, xenon-129/136 (all applications for nuclear medicine), as well as chlorine-37 and lithium-6 (applications for nuclear energy), and germanium-70/72/74 (applications for quantum computing). Each isotope has varying market opportunities, some present multi-billion-dollar addressable markets, while others are in the tens of millions.

Interestingly, plants present interoperable characteristics as well, meaning that an enrichment facility can be reconditioned to produce a different isotope in just 3-6 months and minimal cost, allowing ASPI to adapt to varying market conditions and opportunities. Operational flexibility mitigates Supply/Demand risk.

For future plants, ASPI expects to operate a model on a joint venture structure whereby ASPI will provide technology and expertise, and their partners provide investment capital in return for supply security at advantageous prices. This capital light model is designed to allow ASPI to roll out plant units at scale, without significant shareholder dilution. This is part of the strategy for 2025 and beyond, with the goal to start generating free-cash flow, expanding product lines, and ultimately starting the construction of additional plants for other isotopes. ASPI plans to open the first isotope enrichment facility outside of South Africa in 2026.

QUANTUM ENRICHMENT

ASP Isotopes' QE technology, protected by trade secrets, leverages differences in ionization energy between isotopes. Using a highly precise laser, it induces chemical changes to separate and enrich isotopes. Unlike other methods, QE can enrich both solid and gaseous feeds, potentially lowering enrichment costs significantly. The process is particularly efficient for elements in solid form or difficult to gasify. It involves vaporizing a metal and passing it through a laser beam tuned to ionize the target isotope, which is then separated using a negatively charged collector plate, enhancing the efficiency and purity of the enrichment.



An "enrichment factor" or "separation factor" refers to a measure of how effectively a process can separate isotopes where it indicates the ratio of the concentration of a desired isotope in the enriched product compared to its concentration in the original mixture, essentially showing how much the desired isotope has been "enriched" through the separation process; a higher separation factor means better separation efficiency.

Recent results from QE demonstrated an enrichment factor of up to 678, versus previous expectations of greater than 50. This compares to an enrichment factor of less than 20 for other laser-based enrichment approaches.

Currently, ASPI has a QE plant for Ytterbium-176, a stable isotope used to produce Lutetium-177, which is used to treat prostate and other cancers. The Ytterbium-176 plant is about to finish commissioning at which point it can start to produce product. The feedstock for the plant has natural abundance of 12% Ytterbium-176 and finished product needs to be enriched to 99.75%. The market price for Ytterbium-176 is expected to be ~$20,000,000/kg, ASPI expect to have 1kg of capacity from the current plant but believe that they have demand for 2kg.

A new plant is therefore a priority. Similarly, we expect new Ytterbium-176 contracts this year once commercial production is proven.

PET LABS

PET Labs was founded in 2005 by Dr Gerdus Kemp who is widely regarded as one of the leading scientists in radiopharmaceuticals globally. Dr Kemp wants PET Labs to become one of the leading radiopharmaceutical producers globally.

In October 2023, ASPI entered into a joint venture by acquiring 51% of PET Labs, a radioisotope company in the nuclear medicine sector. Nuclear medicine uses radiation to provide diagnostic information about the functioning of a person's specific organs, or to treat them. Diagnostic procedures using radioisotopes are now routine.

Radiotherapy can be used to treat some medical conditions, especially cancer, using radiation to weaken or destroy particular targeted cells.[3] Over 40 million nuclear medicine procedures are performed each year, and the global radio pharmacy market size is likely >$10bn per annum and growing at a CAGR close to 10%. Driving this growth is:

- **Medical imaging** - The demand for advanced imaging procedures, such as PET and SPECT scans, is increasing.
- **Cancer treatment** - The prevalence of cancer is increasing, and new oncology radiopharmaceuticals are being developed.
- **Personalized medicine** - The demand for personalized medicine is increasing.
- **Aging population** - The aging population is increasing, and chronic diseases like cancer and heart disease are more common in the elderly.

Key players in this market today include Bayer AG, Bracco Imaging, Cardinal Health, Eli Lilly, Curium Pharma, Lantheus, and Novartis.

Currently PET Labs services all government hospitals in SA treating 100-120 patients a day by operating a single Siemens cyclotron from their facility in Pretoria. Revenue for 2024 was ~$4m at ~70% gross margin.

Each radiopharmacy needs its own cyclotron ($1.6m) and 'hot cells' plus other ancillary equipment ($4.4m) – total cost $6m. These units can produce ~300 doses per day and are expected to have a 3–4-year cash payback.

- **Cyclotrons**: are particle accelerators using magnets that spin a positively charged electron 72,000,000/second. Management believes that a cyclotron should have a ~30% IRR.
- **Hot Cells:** are used the nuclear-medicines industry. They are required to protect individuals from radioactive isotopes by providing a safe containment box in which they can control and manipulate the equipment required. In PETS Labs case they use these hot cells to produce molecules.
- **Stable isotopes:** it is widely believed that 85% of stable isotope production is produced by Russia. These are not radioactive so can be shipped in UPS packages for example. This means ASP Isotopes does not need to set up isotope production facilities internationally for stable isotopes, unlike the production of radioisotopes, which requires local distribution.

PET Labs is committed to add multiple cyclotrons per year for the next 10 years. The company has ordered a second cyclotron which will go to Cape Town. This will improve margins significantly as a dose of a radioisotope lose about half of its radioactivity (radioactive decay) during the journey to Cape Town because of the duration of the journey and the isotopes' short half-life. In addition, ASPI intends to invest >$10m into South African

[3] https://world-nuclear.org/information-library/non-power-nuclear-applications/radioisotopes-research/radioisotopes-in-medicine.aspx

radioisotope production capabilities during the next five years, and over time, aim to roll out the PET Labs playbook in many other frontier economies.

The moat for the business is vertical integration. ASPI will provide the stable isotopes and PET Labs will process them into radioisotopes. There is ambition to leverage this moat to scale internationally.

PET Labs is also a market leader in gaseous and chemical testing. They can identify impurities in '*parts per trillion',* the most advanced facility of its kind on the continent. They plan to license this out at some point, but it will not be a major % of revenues. This is essential for ASPI to accurately determine enrichment levels and impurity levels in finished products.

PET scans can also quantify the growth of cancer cells and can accurately determine the rate of spreading. This allows doctors to more accurately adjust chemotherapy treatments. Similarly, some of the diagnostic tests from PET Labs can identify in your 20s if you are susceptible to diseases such as Alzheimer's.

One opportunity for growth is in mobile radiopharmacies (literally radiopharmacies on mobile trucks). This will have particular applications in emerging markets where there is currently no infrastructure, and this may allow PET Labs to '*seed the market'*.

This process is starting in South Africa where two more cyclotrons are being delivered, where one started operation in May 2024 and the other expected to come online by 2026 in Cape Town. In 2025, PET Labs expect to be producing many advanced radioisotopes including lutecium-18, galium-68, technicium-99, and copper-64.

CURRENT CONTRACTS

ASPI currently has various contracts executed for 2025, which we believe will likely generate $25-35m of revenue this year, with contracts varying from annually recurring to one-off payments. Revenue guidance has not yet been provided by management but given the capacity of these plants there is the opportunity to flex up contracts for certain isotopes when commercial production is proven.

	Contract 1	Contract 2	Contract 3	Contract 4	Customer 5	Customer 6
Customer	BRICEM	RC-14	Undisclosed	US SMR Company	US Semiconductor Company	Industrial Gases Company
Customer Location	China	Canada	United States	United States	Undisclosed	Undisclosed
Product	Moly-100	Carbon-14	Enriched Isotope	Nuclear Fuel Research	Silicon-28	Silicon-28
Deal Value (2024)	$2.5-27m	$2.5-3.8m	$9m	$2m	Undisclosed	Undisclosed
Deal Type	Annually Recurring	Annually Recurring	One-Off	One-Off	Undisclosed	Undisclosed
Deal Date	Nov-22	Jun-23	May-23	Apr-24	Apr-24	June-24

ICELAND

ASPI has stated that it is expecting to start the construction of its fourth plant in Iceland during 2025 to capitalise on lower electricity costs associated with the ASP enrichment process. These plants will be manufactured in South Africa where technological and engineering expertise of historic plant builds can be leveraged, and then shipped to Iceland in modular components meaning on-site build times can be expedited. These plants can be shipped in ~6 months.

Management expects the first plant to be up and running in Iceland by mid-2026 and aim to have four plants up and running there within 3-4 years, subject to customer demand. ASPI will likely not do any QE there as QE does not require as much power when compared to ASP technology.

Regarding economics of Iceland plant build out, cash payback depends on the terms of the build. ASPI have stated that they expect customers to part fund the plants and or use debt facilities. If the customer does not pay for the plant, management would estimate a 3-year cash on cash payback.

ASPI have highlighted emerging interest from customers for Xenon-129 which has applications in medical imaging. The plan was to produce Zinc-68 or Nickel-64 from the first plant in Iceland but given how promising recent QE results have been these products may be better produced using QE.

ASPI PRODUCT MATRIX

Isotope	Application	Est. Annual Market Size (m$)	Est. Current Market Price ($/kg)	Est. Year of Commercialisation	Known Competitors	Production Method
Carbon-14	Medical Tracing	10	$24,000,000	2025	Rosatom	ASP
Silicon-28	Semiconductors	30	>$500,000	2025	Rosatom / Silex	ASP
Ytterbium-176	Oncology Treatment	15	$20,000,000	2025	Rosatom / Shine	QE
Zinc-68	Medical Diagnostics	20	$250,000 - $2,000,000	2025	Rosatom / Urenco	QE
Nickel-64	Oncology Treatment	32	$40,000,000	2025	Rosatom	QE
Gadolinium-160	Medical Imaging	Unknown	$30,000,000	2026	N/A	ASP
Xenon-129	Medical Imaging	Unknown	Unknown	2026	Rosatom / Urenco	ASP
Uranium-235 (HALEU)	Nuclear Fuel	1000	$18,000-20,000	2027	Rosatom / Centrus / SILEX	QE

**ASPI also has the ability to produce many additional isotopes including various radioisotopes for which prices vary significantly based on factors such as patients' weight, distance to radiopharmacy, time of procedure, and hundreds of other factors. ASPI is well positioned to tailor production of enriched products to future demand / high-value contracts going forward.*

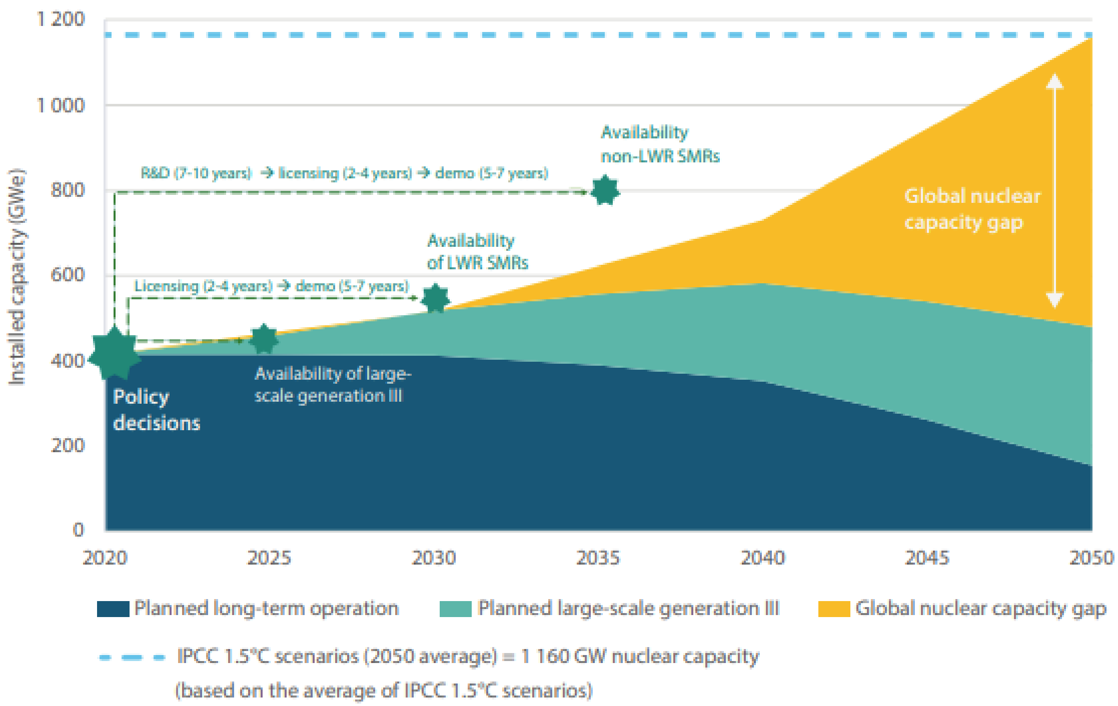
NEXT-GENERATION NUCLEAR POWER

There is near global consensus that nuclear power presents one of the most effective solutions to the climate crisis, with over 30 countries pledging to triple nuclear capacity by 2050 at last years' COP29. Today, nuclear power already accounts for 10% of global electricity production, and 25% of low-carbon power.[4]

There are, undoubtably, issues around scaling the construction of traditional nuclear power plants, which presents one of the key obstacles global economies must overcome if they are to meet their nuclear ambitions. We continue to see Western economies in particular struggling to bring new-build nuclear projects in on budget, or on schedule. In fact, at a cost of up to £46bn (£10m per MW) the UK's Hinkley Point C will cost five times more than it costs to build a new nuclear power plant in South Korea, for example.[5]

Small Modular Reactors (SMRs) and Advanced Modular Reactors (AMRs) are an emerging solution to the current scalability issues around nuclear reactor construction, and therefore financing. SMRs are advanced nuclear reactors that have a power capacity of up to 300 MW(e) per unit, which is about one-third of the generating capacity of traditional nuclear power reactors.

The NEA estimates that, by 2050, SMRs could reach 375 GW of installed capacity in an ambitious case, nearly matching the current global installed capacity of 392 GW.[6] The IAEA reports that there are more than 80 SMR designs and concepts globally. Four SMRs are in advanced stages of construction in Argentina, China, and Russia, with several existing and newcomer nuclear energy countries conducting SMR research and development.[7]



Source: NEA *(note this does not include the recent pledge to triple nuclear capacity at COP28/COP29)*

[4] https://world-nuclear.org/information-library/current-and-future-generation/nuclear-power-in-the-world-today.aspx#:~:text=Nuclear%20energy%20now%20provides%20about,of%20the%20total%20in%202020).
[5] https://www.ft.com/content/1157591c-d514-4520-aa17-158349203abd
[6] https://www.oecd-nea.org/upload/docs/application/pdf/2023-02/7650_smr_dashboard.pdf
[7] https://www.iaea.org/topics/small-modular-reactors

In the US specifically, the NRC expects it will receive 25 licensing applications in the next five years for SMRs and AMRs, but has only approved one design to date (NuScale). Timelines for deployment vary based on technology and regulatory readiness, with some designs expected to be demonstrated and commercialised before 2030 and others to follow later in the 2030s.

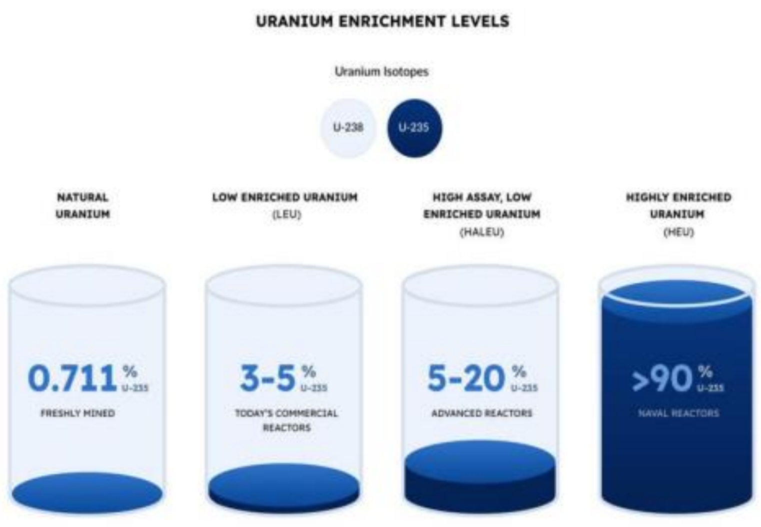
Nonetheless, the expectation is that SMRs will play a pivotal role in reaching net zero, with more reactors coming onstream through the 2040s and 2050s that will help us sustain our climate objectives.

The benefits of SMRs are:

- Safety: facility protection systems, including barriers that can withstand design basis aircraft crash scenarios and other specific threats, are part of the engineering process being applied to new SMR designs.
- Modularity: the ability to be able to put major components of the reactor together in a factory, requiring limited onsite preparation.
- Cost: reduced capital investment due to the lower plant capital cost, mainly associated with modularity.
- Location: SMRs can provide power for applications where large plants are not needed or sites lack the infrastructure to support a large unit, creating far better site flexibility.
- Efficiency: SMRs can be coupled with other renewable energies or fossil fuels to leverage resources and produce higher efficiencies and multiple energy end-products, while increasing grid stability and security.
- Economic: deployment of a 100 MW SMR could create 7,000 jobs and generate more than $1 billion in sales.[8]

HALEU – MARKET SIZE AND DEMAND

Where traditional nuclear reactors require low-enriched uranium, or LEU, which is uranium enriched to 3-5% U-235 (the fissile isotope in uranium), many SMR and AMR designs require an enrichment level approximately five times this amount, or up to 19.75% U-235 (close to 70% of SMRs studied by the NEA require HALEU). For context, weapons grade uranium requires an enrichment level of around 90% U-235. When uranium is enriched to between 5-19.75% U-235, it is known as high-assay low-enriched uranium, or HALEU.



Source: Centrus Energy

[8] https://www.energy.gov/ne/benefits-small-modular-reactors-smrs#:~:text=SMR%20designs%20have%20the%20distinct,applied%20to%20new%20SMR%20design.

HALEU has numerous advantages over traditional LEU, as it allows smaller reactor fuel assemblies. Smaller reactor designs produce less waste, exhibit true interoperability between reactors, and inherent safety features. As a fuel source, it is incredibly energy dense, and just 750 grams of HALEU can meet an average American's electricity needs for life.[9]

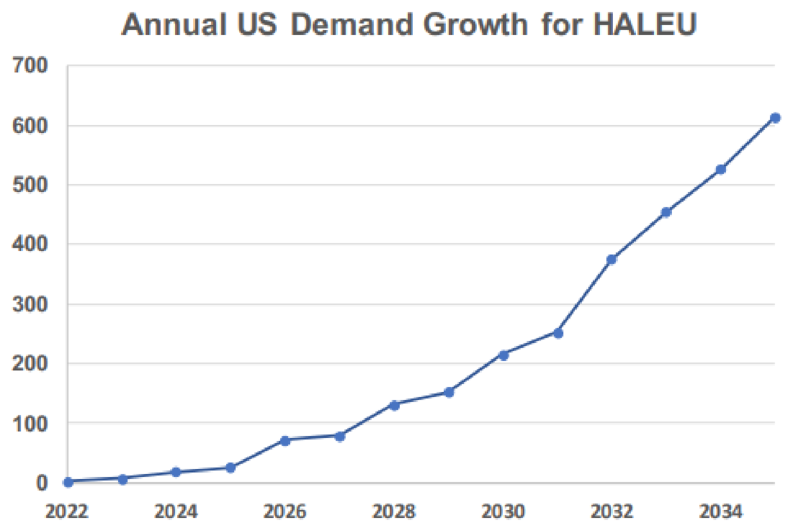
The problem is that the only commercial volumes of this fuel are produced in Russia - which is unsurprising given their dominance in isotope enrichment - and the many countries who oppose Putin's illegal invasion of Ukraine no longer see Russia as a viable counterparty with which to do business.

The scarcity of HALEU is becoming a major problem for many SMR developers. For example, Bill Gates' TerraPower delayed the start-up of its Natrium Reactor by two years from 2028 to 2030 due to the lack of availability of HALEU. Many other SMR developers are finding themselves in a similar position.[10]

In addition, cost is becoming a problem. US-based SMR developer Oklo, for example, estimates a 14% IRR from their reactors assuming a cost of HALEU of ~$7,000/kg. However, today's prices for HALEU are more like ~$20,000/kg, taking IRRs to 0. The three inputs for determining the price of HALEU are: uranium ore (U3O8), conversion to UF6, and then enrichment (Separative Work Units or "SWU"). These components make up the nuclear fuel cycle and have seen between 50% - 400% increases since Russia's invasion of Ukraine.

While commercialisation of these reactors is not likely until the end of the decade, there is market demand for HALEU that exists today. For example, in 2020, the DOE selected two companies for awards under the Advanced Reactor Demonstration Program (ARDP). Both reactor designs require HALEU and can be operational in about seven years. Today, it is estimated that the companies selected for the demonstration pathway will require HALEU for their reactors now to support fuel fabrication ahead of reactor startups.

The Nuclear Energy Institute (NEI), estimates that by 2035, US domestic demand for HALEU could reach >600 MT.[11] A 2021 report compiled by the Idaho National Laboratory found that total cumulative HALEU requirements by 2050 could be as high as 7,175 MT. Starting In 2027, HALEU is needed in small amounts for reactor demonstrations, then increases as more reactors are deployed, reaching ~520 MT per year in 2050, split two thirds for reloads and one third for start-up cores for new reactors.[12]



Source: NEI

[9] https://investors.centrusenergy.com/static-files/058b474a-c135-4600-a84b-e9908864a7af
[10] https://world-nuclear-news.org/Articles/HALEU-fuel-availability-delays-Natrium-reactor-pro
[11] https://www.nei.org/CorporateSite/media/filefolder/resources/letters-filings-comments/NEI-Letter-for-Secretary-Granholm_HALEU-2021.pdf
[12] https://fuelcycleoptions.inl.gov/SiteAssets/HALEU%20Requirements%20for%20Net-zero.pdf

To put these numbers into perspective, Centrus Energy in the US has capacity to produce approximately 1 MT per year from their 16 advanced centrifuges, ramping up to 6 MT per year. Replacing Russian enrichment capacity for HALEU is contingent on a multi-billion-dollar investment to build 11,000 additional centrifuges which will take 6-7 years according to Centrus' CEO Amir Vexler.[13][14] As such, the NEI have stated that the US will need to acquire HALEU from international suppliers in the near term to support the larger goal of deploying advanced reactors in the US in a timely manner.

The promise of SMRs, coupled with an uncertain market for reactor fuel, has given birth to various government initiatives designed to accelerate the commercialisation of these projects, particularly in the US:

- **HALEU Availability Program**: The US Department of Energy (DOE) established this program to ensure access to HALEU for civilian domestic research, development, demonstration, and commercial use. The program aims to spur demand for additional HALEU production and private investment in the nation's nuclear fuel supply infrastructure.
- **Inflation Reduction Act**: This act invests $700 million to support the development of a domestic supply chain for HALEU through various activities under the HALEU Availability Program.
- **Funding Opportunities**: The DOE announced up to $80 million in funding to support industry partners developing innovative technologies and approaches to strengthen the HALEU supply chain in the US. This funding will support demonstration projects, engineering or pilot scale projects, and earlier stage applied research and development projects
- In January 2024, the UK government announced it will invest £300 million to launch a HALEU programme, making the UK the first country in Europe to launch such a nuclear fuel strategy. A HALEU production hub is planned for the North West of England, with UK Energy Secretary, Claire Coutinho, highlighting *"We stood up to Putin on oil and gas and financial markets; we won't let him hold us to ransom on nuclear fuel."* [15]

The market for next-generation SMRs is evolving, but the scarcity of affordable fuel represents one of the, if not the major, bottlenecks in commercialising these projects on schedule and on budget.

QUANTUM LEAP ENERGY (QLE)

Through its wholly owned subsidiary, Quantum Leap Energy LLC (QLE), ASPI aims to enter the nuclear fuel market by 2027 and expects to enrich uranium to 19.75%. The laser-based enrichment method promises affordability, lower production costs, and efficient construction, positioning HALEU and nuclear power as a cost-effective alternative to traditional, carbon-intensive electricity production.

As previously mentioned, QE achieves the separation of two isotopes by taking advantage of the slight differences in the transition energy between two isotopes. This method is described as a "quantum mechanics" method. Using lasers to produce a large number of photons, atoms can be selectively photonised and then electrically separated. The isotopic selectivity of enrichment is very high and can likely produce the desired enrichment in a single step.

To date, the QE enrichment method has proven the ability to produce highly enriched uranium at a lab scale, although not since the 1980s. However, since this process was done, lasers have improved dramatically, becoming much cheaper and more efficient. ASPI constructed the QE ytterbium-176 plant for $2.5m in just nine months.

[13] https://www.youtube.com/watch?v=KbDLjRIJl2g
[14] https://www.energy.gov/ne/articles/centrus-produces-nations-first-amounts-haleu
[15] https://www.world-nuclear-news.org/Articles/UK-to-launch-HALEU-production-programme

The reason this was such a significant milestone is because enriching uranium and ytterbium uses very similar processes. The main difference is that the temperature at which uranium-235 vaporises is approximately 4x higher than that of ytterbium-176; otherwise, the enrichment processes have significant overlap. The similarities between ytterbium, nickel and uranium will mean that the construction of this facility will significantly reduce the time required to construct a HALEU facility.

This is an engineering challenge ASPI feel confident they can overcome and have maintained their timelines for commercial quantities of production by 2027 assuming all the required regulatory permits are obtained. Management has said that regulatory barriers and licensing is likely the most significant challenge in constructing a uranium enrichment facility using Quantum Enrichment and the Company is currently in advanced discussions with three countries to obtain these licenses.

The potential of the QLE technology gained public recognition via two Memorandum's of Understandings (MoUs) with two US-based SMR companies to supply HALEU in 2023. ASPI has received interest from potential customers totaling over $30bn of HALEU demand at recent market prices by 2037.

Then, in October 2024, it was announced that ASPI had entered into a term sheet with Bill Gates' TerraPower for the construction of a HALEU production facility. The term sheet anticipates TerraPower providing seed capital for the construction of the facility as well as a long-term supply agreement for the production capacity of the facility.

In addition, ASPI received a regulatory boost via an MOU with the South Africa Nuclear Energy Corporation (NECSA) that will enable the Company to accelerate the construction of an advanced nuclear fuel facility. ASPI confirmed that their scientists have already been active at Pelindaba and the construction of the first of two HALEU test facilities has been completed, with plans for a second test facility to complete during 2025, paving the way to start comprehensive testing of ASPI/QLE technologies on the production of HALEU.

QLE estimates that the capital cost of constructing a Quantum Enrichment plant for uranium enrichment is less than $100m, approximately 85% cheaper than that of a traditional gas centrifuge enrichment facility. We estimate that this cost could come down even further as they replicate plant manufacturing processes (reminder that ytterbium plant cost $2.5m).

Quantum Enrichment plants are modular, so their construction time is faster and more flexible than known competing technologies. In addition, the enrichment facilities are smaller than traditional gas centrifuges which means they can place them near fuel fabrication facilities for enhanced security of production and transportation. The Company expects operating costs to be comparable to or cheaper than costs for other methods of uranium enrichment.

In terms of construction time, the Company expects a uranium enrichment facility could be built in approximately 18-24 months (from receiving necessary licenses) and production volumes would gradually ramp up to the final capacity of 20 MT per year per unit.

ASPI is looking to solve the issue of affordability. Initially, ASPI expects to use LEU or natural uranium (ore) as a feedstock, which will maximise the production volume of HALEU whilst still providing satisfactory gross margins. Because of the high selectivity associated with Quantum Enrichment, the Company believes it may be able to enrich depleted tails (waste from other enrichers).

The company expects to transition to this lower cost feedstock after a few years. Not only will this provide a solution to a growing environmental problem (71,000 tonnes of waste is added to global reserves per annum), but this gradual change in feedstock should result in substantially higher gross margins and allow the Company to price HALEU at a lower price than any competitor and open up emerging markets customers who require a cheap, reliable source of energy.

Commercialising the production of HALEU from depleted tails would complete the circular economy for nuclear, and would be a game changer for the industry, CO2 emissions targets and how ESG, energy transition, climate, and green funds, look at the whole uranium sector and nuclear value chain.

Subject to licensure, ASPI believes it can produce commercial quantities of HALEU by 2027 that would satisfy the anticipated demand from all advanced reactors currently in development, at a lower price than competitors.

ASPI – FINANCIAL OVERVIEW

In Millions of USD 12 Months Ending	2021 Y~ 12/31/2021	2022 Y 12/31/2022	2023 Y 12/31/2023	Current/LTM 09/30/2024	2024 Y Est 12/31/2024	2025 Y Est 12/31/2025
Market Capitalization	–	56.7	87.6	380.3		
- Cash & Equivalents	3.0	2.4	7.9	51.6		
+ Preferred & Other	0.0	0.0	2.5	3.3		
+ Total Debt	0.9	0.8	1.9	35.9		
Enterprise Value	–	55.2	84.1	368.0		
Revenue, Comparable	–	–	0.4		4.1	32.8
Growth %, YoY	–	–	–		846.8	700.0
Gross Profit	–	0.0	0.1			
Margin %	–	–	32.1			
EBITDA	–	–	-15.8			
Margin %	–	–	-3,654.7			
Net Inc, Comparable	–	–	-16.3			
Margin %	–	–	-3,762.9			
EPS, Comparable	–	–	-0.49		-0.57	-0.15
Growth %, YoY	–	–	–		-16.3	73.7
Cash from Operations	–	-2.9	-5.4			
Capital Expenditures	–	-4.5	-2.3	-8.4		
Free Cash Flow	–	-7.4	-7.7			

COMPETITOR ANALYSIS

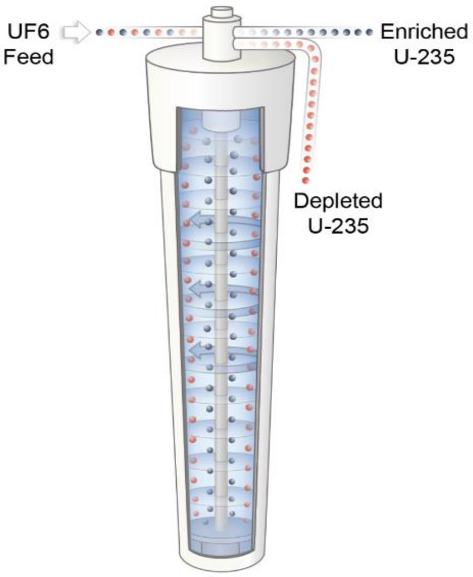
The competitive landscape for uranium enrichment is inherently limited, due to huge barriers to entry and regulation. Uranium enrichment is highly controlled and regulated by the IAEA and licensing of new facilities is an extremely costly and timely process. Most enrichers are either government owned or state sponsored. Globally, there are five major producers of LEU, but we believe only Russia has produced commercial quantities of HALEU. Below we list two listed competitors but note that other competitors include Urenco, Orano and CNNC.

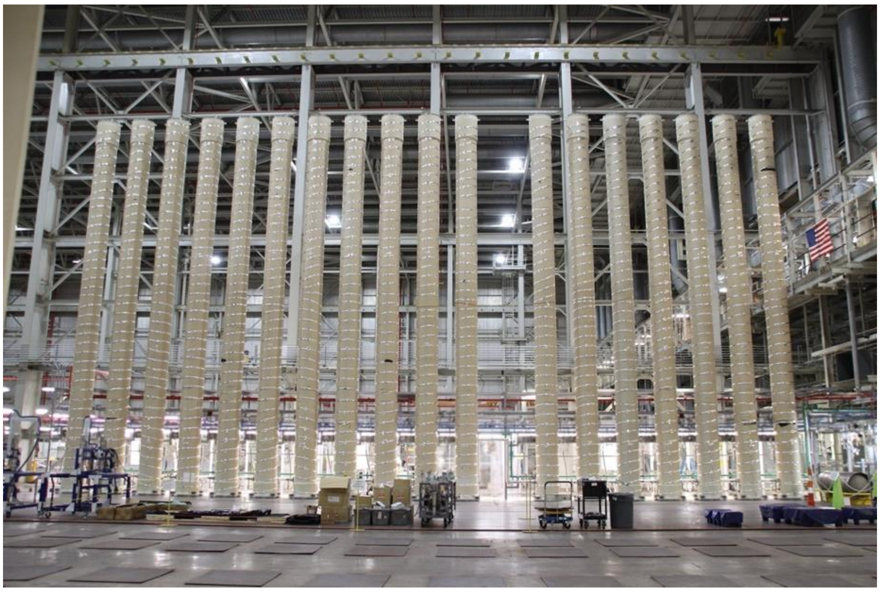
CENTRUS ENERGY

Centrus Energy is a US$1.3bn market cap, NYSE listed uranium enrichment company, generating over $394m of revenues in the last 12 months from uranium sales (85% of which was from sales of LEU). Centrus does not actually produce any LEU and has no SWU capacity to produce LEU. Instead, Centrus relies on Russia's TENEX for SWU (enrichment) capacity, and then sells this product at a mark up to US utilities.

Centrus started to produce their first volumes of HALEU in 2023 using centrifuge enrichment. Centrifuges are 40 ft cylindrical tubes that have rotors inside that spin incredibly fast, the centrifugal force created by the spinning rotor concentrates the heavier U-238 isotopes at the outer wall of the rotor and the lighter U-235 isotopes toward the rotor center.

Since the desired enrichment level cannot be achieved in one centrifuge, several machines must be connected in a series in what is called a "cascade".[16] A centrifuge enrichment plant is made up of multiple cascades as you can see on in the image on the right below.





Source: Centrus Energy

For context, the capacity of Centrus' 16-centrifuge cascade, that began operations in October 2023, will be modest – about 900kg (0.9 MT) of HALEU per year. According to Centrus, a full-scale HALEU cascade, consisting of 120 centrifuge machines, with a combined capacity to produce approximately 6 MT of HALEU per year, could be brought online within about 42 months of securing the necessary funding according. Centrus could add an additional HALEU cascade every six months after that.

However, there are inherent technological issues with trying to enrich uranium to 19.75% using centrifuges. This is because you cannot enrich uranium-235 without producing uranium-234 using a centrifuge. Uranium-234, as it undergoes radioactive decay, emits alpha and thorium-230, which stick to the walls of a centrifuge. South Africans found that their enrichment process was half as effective when trying to enrich uranium-235 to more than 10% using a centrifuge, due to uranium-234 causing malfunctions.

ASPI anticipates being able to produce multiple metric tons (MT) annually at a cost of a few tens of millions of dollars (estimated build time for a new plant is >12 months assuming licenses and permits are in place), potentially making ASPI's enrichment method substantially cheaper and more scalable.

	Quantum Enrichment Plant	Gas Centrifuge
Capital Cost per Plant	<$100 million	>$800 million
Energy Use (kWh) per SWU	<40	50-240
Construction Time	2-3 years	2-3 years
Levelized Cost per SWU*	<$50	$140

[16] https://world-nuclear.org/information-library/nuclear-fuel-cycle/conversion-enrichment-and-fabrication/uranium-enrichment.aspx

CENTRUS ENERGY – FINANCIAL OVERVIEW

In Millions of USD 12 Months Ending	2020 Y 12/31/2020	2021 Y 12/31/2021	2022 Y 12/31/2022	2023 Y 12/31/2023	Current/LTM 09/30/2024	2024 Y Est 12/31/2024	2025 Y Est 12/31/2025
Market Capitalization	280.1	717.2	475.5	852.9	1,266.0		
- Cash & Equivalents	152.0	193.8	179.9	201.2	194.3		
+ Preferred & Other	53.9	0.0	0.0	0.0	0.0		
+ Total Debt	120.8	111.8	111.2	99.7	89.6		
Enterprise Value	302.8	635.2	406.8	751.4	1,161.3		
Revenue, Adj	247.2	298.3	293.8	320.2	394.0	397.0	419.7
Growth %, YoY	17.9	20.7	-1.5	9.0	14.9	24.0	5.7
Gross Profit, Adj	97.6	114.5	117.9	112.1	99.5	96.3	113.1
Margin %	39.5	38.4	40.1	35.0	25.3	24.3	27.0
EBITDA, Adj	61.5	77.4	70.5	63.2	49.2	47.2	63.8
Margin %	24.9	25.9	24.0	19.7	12.5	11.9	15.2
Net Income, Adj	6.3	135.3	51.1	87.2	78.6	36.3	46.3
Margin %	2.5	45.4	17.4	27.2	19.9	9.1	11.0
EPS, Adj	0.62	9.75	3.41	5.62	4.97	2.33	2.77
Growth %, YoY	—	1,480.68	-65.06	65.09	57.90	-58.51	18.86
Cash from Operations	67.1	50.0	20.6	9.1	-3.0		
Capital Expenditures	-1.4	-1.2	-0.7	-1.6	-3.9	-3.7	-1.2
Free Cash Flow	65.7	48.8	19.9	7.5	-6.9	19.6	131.7

SILEX SYSTEMS

Silex Systems is a US$890m market cap, ASX listed technology company focused on the commercialisation of their SILEX laser enrichment technology. The technology was invented by Dr Michael Goldsworthy (current CEO) and Dr Horst Struve (retired) in the 1990s at Lucas Heights, Sydney. The ASPI Laser team have decades of experience in constructing laser systems and actually constructed and sold the lasers to Silex Systems.

ASPI believe that Quantum Enrichment is superior to SILEX enrichment because the higher selectivity means that Quantum Enrichment allows for the production of HALEU in a single step and doesn't require cascading laser systems.

However, given the strategic nature of uranium enrichment, little information has been publicly disclosed regarding the SILEX technology. The technology is classified by Australian and US Governments with no patent disclosures permitted. Silex currently has a baseline commercialisation estimate for 2030+.

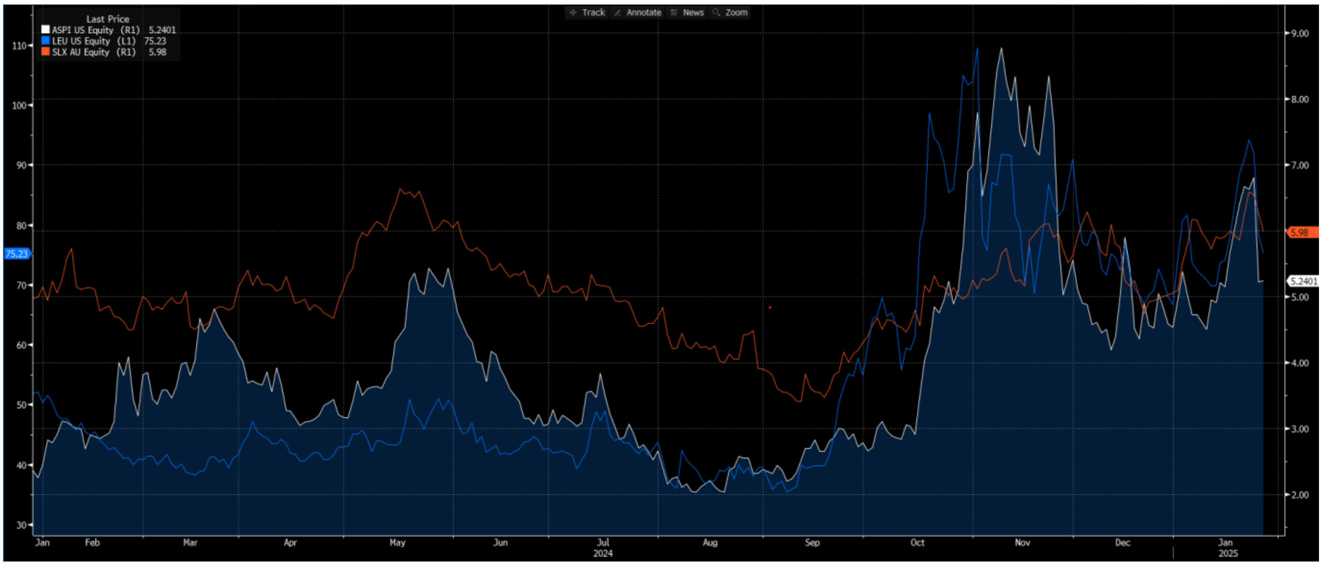
	Gaseous Diffusion	Centrifugation	Atomic Vapor Laser Isotope Separation (AVLIS)	Silex Systems	Quantum Leap Energy
Cost	High capital cost	Capital 1/10 of Diffusion	Low Capital, small size	Low Capital, small size	**Low Capital, small size**
Speed	High pressure	High speed	U metal 3000K	Adiabatic expansion nozzles (10 – 20K)	**U metal 3000K**
Technology Notes	High technology	Rotor design & material	Selective Photoionization	Laser excitation transmission by skimmer	**Enhanced resonant multiphoton ionization**
Selectivity	Selectivity α ≥ 1.003	Selectivity α ≥ 1.15	Selectivity α ≥ 10-50	Selectivity α ≥ 2 - 20	**Selectivity α ≥ 50**
SWU	2500 kWh/SWU	50 kWh/SWU	40 kWh/SWU	Estimate < 50 kWh/SWU	**40 kWh/SWU**
Stages Required	500 Stages to reactor grade	50 Stages	1-2 Stages	1-2 Stages	**Single stage**

Source: ASP Isotopes

SILEX SYSTEMS – FINANCIAL OVERVIEW

In Millions of USD 12 Months Ending	2021 Y 06/30/2021	2022 Y 06/30/2022	2023 Y 06/30/2023	2024 Y 06/30/2024	Current/LTM 06/30/2024	2025 Y Est 06/30/2025	2026 Y Est 06/30/2026
Market Capitalization	116.6	297.5	618.6	842.6	887.3		
- Cash & Equivalents	4.8	3.5	1.9	12.6	12.6		
+ Preferred & Other	0.0	0.0	0.0	0.0	0.0		
+ Total Debt	0.0	0.7	0.5	0.8	0.8		
Enterprise Value	111.8	294.7	617.2	830.8	875.5		
Revenue, Adj	1.5	3.2	6.2	8.5	8.5	1.4	0.7
Growth %, YoY	106.5	112.5	110.1	39.8	36.2	-84.0	-50.0
Gross Profit, Adj	–	–	–	–			
Margin %	–	–	–	–			
EBITDA, Adj	-3.2	-0.8	-0.2	1.0	1.0	-23.1	-24.4
Margin %	-206.3	-24.2	-3.3	11.2	11.2	-1,705.2	-3,597.9
Net Income, Adj	-5.2	-6.9	-11.7	-14.9	-14.9	-21.0	-13.7
Margin %	-334.9	-215.6	-187.7	-176.1	-176.1	-1,550.3	-2,018.9
EPS, Adj	-0.03	-0.04	-0.05	-0.06	-0.06	-0.08	-0.05
Growth %, YoY	11.86	-20.56	-67.09	-18.89	-15.78	-28.70	35.80
Cash from Operations	-3.6	0.3	-1.6	4.0	4.0		
Capital Expenditures	-0.1	-0.1	-0.1	-0.2	-0.2	-4.9	-1.3
Free Cash Flow	-3.7	0.2	-1.6	3.8	3.8	-25.7	-14.9

RELATIVE PERFORMANCE – ASPI / SLX / LEU



RISKS

GEOPOLITICAL

From the perspective of ASPI, operating in South Africa presents certain political risks that need to be carefully considered. The country has a complex political landscape characterized by historical inequalities, socio-economic challenges, and ongoing political tensions.

Key risks include…

- Policy Uncertainty: South Africa's political environment is marked by frequent policy changes and debates, which can impact businesses operating in various sectors. ASPI may face challenges in forecasting regulatory changes and adapting its strategies accordingly.
- Political Instability: South Africa has experienced periods of political unrest and protests, often driven by issues such as corruption, unemployment, and inequality. Such instability can disrupt business operations, threaten safety, and lead to economic uncertainties.
- Corruption and Governance: Corruption remains a significant concern in South Africa, affecting government institutions and business practices. ASPI must navigate the risks associated with bribery, extortion, and opaque decision-making processes when conducting operations and engaging with local stakeholders.
- Labour Relations: South Africa has a history of labour strikes and disputes, which can disrupt production, affect supply chains, and impact profitability. ASPI needs to carefully manage its relationships with labour unions and ensure compliance with labour laws to mitigate these risks.
- Economic Challenges: South Africa faces economic challenges such as high unemployment rates, inequality, and sluggish growth. These factors can affect consumer demand, market dynamics, and investment opportunities for ASPI.

TECHNOLOGICAL

There are inherent technological risks associated with the ASPI and QLE technology given the nascence of both the science and its applications.

As previously mentioned, the QLE enrichment method has not been applied to uranium since the 1980s, and while management is optimistic that the Quantum Enrichment process, coupled with vastly improved technology, will provide a basis for commercialisation, this is in no way guaranteed and as such production timelines could extended.

REGULATORY

Given the nature of the products that ASPI and QLE aim to produce, there are regulatory and permitting barriers that need to be overcome. This is particularly relevant for the HALEU business given the safety risks associated with radioactive material.

While conversations are advancing with various governments, entering new markets, particularly in the nuclear sector, can be a highly bureaucratic and time-consuming process, which might negatively impact production timelines. Other potential licensing risks could include supply-chain components such as transport, import or export licenses for key equipment such as lasers.

PERSONNEL

Given the technical nature of ASPI and QLE operations, there are many specialist personnel including but not limited to engineers, scientists, mathematicians, and physicians. Worth highlighting is that the Company currently has a 100% retention rate for its employees but should key personnel stop working for the Company for whatever reason, this too could negatively impact production timelines and commercial viability of various products.

FINANCING

While ASPI and QLE intend to operate a model on a joint venture structure whereby partners provide investment capital in return for technology, expertise, and supply security, there will be financing requirements as the Company continues to grow. As such, generic financing risks will apply but might be exacerbated given the nature of the Company's operations.

RAISE HISTORY

Date	Type	Shares (m)	Price ($)	Value ($m)
Oct-24	Equity Offering	2.75	6.75	$18.59
Jul-24	Equity Offering	13.8	2.50	$34.5
Jul-24	QLE Convertible	-	-	$25.4
Sep-23	Equity Offering	9.95	$0.95	$9.1
Mar-23	Equity Offering	3.16	$1.58	$4.99
Sep-22	IPO	1.5	$4.00	$6.00
Feb-22	Pre-IPO	3	$2.00	$6.00
Sep-21	Pre-IPO	16	$0.25	$4.00

SHAREHOLDERS

	Holder Name	Portfolio Name	Source	Opt	Position↓	% Out
			All	All		
1.	Paul Mann		Form 4		6,824,093	9.56
2.	AK Jensen Investment Management Ltd		Form 4		6,746,874	9.45
3.	Sergey Vasnetsov		Annual Re...		3,838,607	5.38
4.	AWM Investment Co Inc		13G		3,659,586	5.13
5.	Vanguard Group Inc/The		ULT-AGG		2,820,757	3.95
6.	Blackrock Inc		ULT-AGG		2,702,629	3.79
7.	TIANNE HOLDINGS PTY LTD		Annual Re...		2,353,772	3.30
8.	BNP Paribas SA		ULT-AGG		2,247,826	3.15
9.	CARLEIN INVESTMENTS		Annual Re...		2,097,424	2.94
10.	Telemark Asset Management LLC	Telemark Asset Management LLC	13F		1,700,000	2.38
11.	Ainscow Robert		Form 4		1,219,992	1.71
12.	Geode Capital Management LLC	Geode Capital Management LLC	13F		1,118,423	1.57
13.	Duncan Moore		Form 4		1,069,553	1.50
14.	MARSHALL WACE		ULT-AGG		1,000,714	1.40
15.	Elista LLC		Form 4		1,000,000	1.40
16.	Philadelphia Financial Management of San Francisco...	Philadelphia Financial Management of San Francis	13F		991,863	1.39
17.	State Street Corp		ULT-AGG		853,695	1.20
18.	GSA Capital Partners LLP	GSA Capital Partners LLP	13F		770,989	1.08
19.	Alyeska Investment Group LP	Alyeska Investment Group LP	13F		747,022	1.05
20.	Wider Todd		Form 4		710,230	0.99

MANAGEMENT TEAM

ASPI has a highly qualified management team comprising of scientific, commercial, and financial executives with proven track records.

Paul Mann, Chairman of the Board, Chief Executive Officer
Paul Mann co-founded ASP Isotopes in September 2021 and serves as the Chairman of the Board of Directors and Chief Executive Officer. Paul has more than 20 years of experience on Wall Street, investing in healthcare and chemicals companies, having worked at worked at Soros Fund Management, Highbridge Capital Management and Morgan Stanley. Paul started his career as a research scientist at Procter and Gamble, and has an MA (Cantab) and a Master of Engineering from Cambridge University, UK where he studied Natural Sciences and Chemical Engineering. He is also a CFA charter holder.

Dr. Hendrik Strydom, PHD, Chief Technology Officer
Dr. Strydom has over thirty years of experience in isotope enrichment. He co-developed the isotope separation technology, known as “Aerodynamic Separation Process” (ASP), which is the technology backbone of ASP Isotopes. Hendrik’s work on the separation of isotopes started when he was employed as a scientist at the South African Atomic Energy Corporation (AEC), where he specialized in the laser separation of heavy isotopes. Hendrik left AEC in 1993 to co-found Klydon, an isotope enrichment company based in South Africa. Dr. Strydom holds a PhD (Physics) from the University of Natal.

Heather Kiessling, Chief Financial Officer
Prior to joining ASP Isotopes, Heather served as Managing Director at Danforth Advisors LLC, a life science consulting firm. Prior to joining Danforth Advisors, Heather held finance leadership roles at Cytonome/ST, LLC and AutoImmune Inc. and started her career as an auditor at Price Waterhouse. Heather is a CPA and holds a BA from University of California, San Diego, and an MBA from University of Michigan Graduate School of Business.

Robert Ainscow, Chief Operating Officer
Robert Ainscow co-founded ASP Isotopes in September 2021 and serves as the Chief Financial Officer. He has more than 20 years' experience in finance, having worked at Morgan Stanley, Bear Stearns and Investec Bank. He started his career in the legal and regulatory department with responsibility for M&A and capital markets oversight. He later transitioned into the capital markets business units and became a Senior Transactor, structuring a broad range of bespoke transactions and funding programs for balance sheet assets on behalf of clients. Mr Ainscow holds a BA (Law & Modern Languages) from Bristol UWE in the UK.

Gerdus Kemp, MD, PhD, CEO of PET Labs
Dr Kemp served as Medical Director at Klydon and Molybdos. He holds a PhD in Inorganic Chemistry from the University of Johannesburg and is currently a lecturer in Radiography at the University of Pretoria.

Xandra Van Heerden, PhD, Head of R&D
Dr van Heerden transitioned to industry as part of the R&D department at a major bio-engineering firm, leading a team in developing wound care devices and skin substitutes. She later became General Manager of a sister company, overseeing multiple bio-medical projects in product research, design, and training. Her extensive experience includes project management, engineering management, and commercialization of R&D processes.

Hendrik Van Wyk, Head of Engineering
Hendrik has extensive experience in the EPCM sector, beginning his career in the petrochemical, and water industries. He later transitioned to the renewable energy sector, where he played a key role in business development and energy storage systems. Since joining the isotope industry in 2016, Hendrik has successfully designed, procured, constructed, commissioned, and operated several plants. He holds a BEng in Chemical Engineering (Cum Laude) from the University of Pretoria (2012), a PGDip in Nuclear Science and Technology with a focus on Nuclear Technology Management from North-West University (2023) and has completed a course in Technology Management at the University of Pretoria (2022).

AUTHOR

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