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ASP Isotopes: Unlocking the Building Blocks of the Future

The world as we know it is changing, and AI will both accelerate that change and alter the course of the future. I have started a journey down the wide path of understanding AI and which areas of life it will impact. Reading a book called “The Coming Wave” by Mustafa Suleyman has accelerated my journey. In trying to grow my knowledge I joined a company site visit trip in Pretoria and was filled with awe as to what South Africans can achieve. This was “a high level” trip. If you didn’t pay attention in science class when Mrs PHD explained the Periodic Table, you would have been lost at the first lab at the CSIR in Lynwood. ASP Isotopes is becoming a world changer in their field of practice. I have tried to make this easy reading by using AI to assist in the writing this article.



**Willie
Pelser**

One of my goals for 2025 is to expand my understanding and knowledge around AI. At this stage I can say that AI is much MORE than ChatGPT. The purpose of this note is not to try and explain AI but to summarise my journey into this field so far. Back in 2007 I read a book titled: “The World is Flat”, which had a profound impact on how I applied and researched the world’s economic systems thereafter. For

example, it led, amongst others, to our investment in Naspers. A few months ago, I finished a book titled, “The Coming Wave”, which again has changed my perspective and outlook dramatically.

I had the privilege to spend two days on a site visit with an American company called ASP Isotopes. (It is listed in the US but is actually a South African company.) The trip was part of my journey to understand the broader aspects of AI. At the outset, I will acknowledge that much of this article is the outcome of using AI tools to give you an overview of who ASP is and what it does. It is also worth mentioning upfront that this is not a signal that we are about to invest heavily into this company on behalf of clients. Much more work must be done through our investment process before we can make such a decision.

After reading the article I hope you will agree that we can be proud South Africans. The people employed by ASP are top scientists - amongst the best in the world - and the Intellectual Property is the outflow of research and development that has occurred since 1945 at places like Pelindaba, the CSIR and our universities.

SPEED READ

- AI will change everything we think we know or do, and in many cases, it will be to our advantage.
- ASP Isotopes uses technology that will benefit the medical field, the computer environment and who knows what else. The sky is the limit.
- Carbon-14 has the potential to earn you a healthy \$24 million per kilo, but you need to split the isotopes.
- Medical Isotopes are making huge strides in the fight against cancer.
- If you hold a PHD, you will easily fit in as an employee of ASP.

Imagine a world where everyday materials, from the sand under your feet to the air you breathe, holds incredible, hidden potential to revolutionize medicine, power, and technology. This is the world ASP Isotopes is tapping into. This South African-rooted company, listed on NASDAQ and planning a listing on the Johannesburg Stock Exchange, is at the forefront of a specialized field called isotope enrichment, aiming to become a crucial supplier for the medical, semiconductor, and green energy sectors

What Exactly Are Isotopes, and Why Do They Matter?

At its core, ASP Isotopes deals with isotopes, which are essentially different versions of the same chemical element. (I had to wrack my brain to visualise the Periodic Table – fortunately there were many displayed in the corridors of the labs we visited). Think of them like siblings in a family: they have the same last name (element) and the same number of protons and electrons, but they have slightly

different numbers of neutrons. This subtle difference in neutron count gives them unique properties, making some isotopes incredibly valuable.

To put it in perspective, a kilo of ordinary charcoal (carbon) might cost you about \$1. But if you take that carbon and enrich it to isolate just **Carbon-14 (C-14)**, it's value soars to **\$24 million per kilo**. Similarly, a bag of sand, which is mostly silicon, costs just a few cents. Yet, a kilogram of highly enriched **Silicon-28 (Si-28)**, purified to 99.995%, is valued at half a million dollars.

The value leap comes from these isotopes' specialized functions. For instance, in semiconductors (computer chips, the brains of our electronics), ordinary silicon contains impurities like Silicon-29 (Si-29) that hinder its electrical conductivity. By removing these "bad" isotopes and having pure Si-28, you can create chips that run thousands of times faster and at cooler temperatures. In medicine, specific isotopes can be precisely directed to target and kill cancer cells without the widespread damage of traditional chemotherapy.

The Global Isotope Challenge and ASP Isotopes' Solution

For decades, the supply chain for these critical isotopes has been fragile, often dominated by a single country – Russia. Many governments now view isotopes as vital for national security and daily life, leading to a pressing need for reliable, diverse suppliers. This is where ASP Isotopes steps in.

The company utilizes two proprietary technologies to enrich isotopes, developed over 20 years of research and development here in South Africa.

- **Aerodynamic Separation Process (ASP):** This method is similar to a centrifuge, where gas is spun rapidly inside a tube, using specialized designs to separate isotopes based on their mass. It's notably less expensive to build than traditional centrifuges, requires a smaller footprint, offers more operational flexibility, and is particularly good at enriching lighter isotopes like Silicon-28 and Carbon-14, which traditional centrifuges struggle with.
- **Quantum Enrichment (QE):** This cutting-edge technology uses precisely tuned lasers to separate isotopes based on their unique energy properties. It's highly selective and uses less energy, achieving extremely high enrichment factors for a wide range of elements. This was incredible to witness!

Both technologies are designed to be cost-effective, modular, scalable, and environmentally friendly, producing no nuclear waste. Because their technologies are classified as "dual-use" (meaning they could potentially be used for

less desirable purposes), ASP Isotopes' plants are under strict international safeguards by the International Atomic Energy Agency (IAEA), which can inspect them with just two hours' notice.

Transforming Industries: ASP Isotopes' Three Key Verticals

ASP Isotopes is strategically focused on three multi-billion-dollar markets:

1. **Medical Isotopes (Pharmaceuticals):** This is currently the highest-margin and highest-cash-flow segment for the company.
 - a. **Targeted Cancer Treatment.** A prime example is Ytterbium-176 (Yb-176), which is used to produce Lutetium-177 (Lu-177). Lu-177 is a "radiotherapeutic" that can attach to specific tumors (like prostate cancer) and deliver precise radiation, effectively killing cancer cells with minimal side effects, unlike chemotherapy. A significant breakthrough recently occurred when the FDA approved a Lu-177 based drug for earlier use in prostate cancer treatment, essentially tripling the market potential just by ASP Isotopes providing a reliable supply chain. Lu-177 is also showing promising results for neuroendocrine tumors (pancreatic and GI tract cancers), lung cancer, ovarian cancer, and more.
 - b. **Advanced Imaging and Other Therapies.** Gadolinium-160 (Gd-160) is used to create Terbium-161 (Tb-161), another powerful cancer therapeutic that offers even more precise targeting, capable of treating both large tumors and tiny "microtumors". Another example is Nickel-64 (Ni-64), which leads to Copper-64 (Cu-64), considered a "world-class isotope" for PET scans, which creates detailed images of metabolic processes in the body to detect diseases like cancer. Furthermore, Zinc-68 (Zn-68) is vital for producing Gallium-68 (Ga-68), another isotope highly demanded for PET and SPECT scanning. Finally, Carbon-14 (C-14) is used in drug development to track how compounds break down in the body and even has potential for tiny batteries with thousands of years of life.
 - c. **Vertical Integration with Pet Labs.** The company owns Pet Labs, which has over 90% market share in South Africa's radio pharmacy market. This allows ASP Isotopes to integrate its isotope production directly into the supply chain for patients, increasing efficiency and margins. Pet Labs plans to expand by adding cyclotrons (machines to convert stable isotopes into medical ones) in key U.S. states and other developing economies.
2. **Semiconductor Isotopes (Silicon):** This area holds immense potential for the future of electronics.

- a. **Cooler, Faster Chips:** By enriching Silicon-28 (Si-28) to incredibly high purity levels, ASP Isotopes can remove impurities that cause heat and inefficiency in microchips. This allows for cooler, faster chips that require no changes to existing manufacturing processes.
- b. **Quantum Computing:** Pure Si-28 is also ideal for quantum computing, as its “zero spin” characteristics help maintain stability for qubits, the basic units of quantum information.
- c. **Market Development:** To accelerate the adoption of Si-28, ASP Isotopes is giving away samples to universities worldwide for study. The goal is to drive down production costs significantly (targeting \$20 per gram compared to the current \$500 per gram) so that pure silicon can be used in almost any electronic application, leading to an “explosion” in market size.

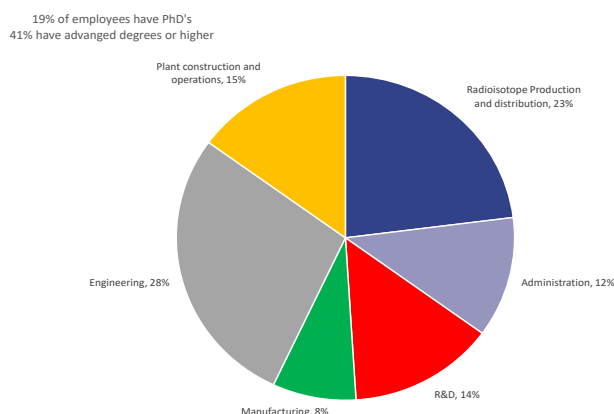
3. **Nuclear Energy (Quantum Leap Energy - QLE):** This division focuses on the next generation of nuclear fuels.

- a. **Fuelling the Future:** The world needs to double electricity output while keeping carbon emissions flat by 2050. Many countries are looking to nuclear energy, specifically Small Modular Reactors (SMRs), which are smaller, cheaper, and faster to build than traditional reactors.
- b. **HALEU Supply:** SMRs require a new type of uranium fuel called High-Assay Low-Enriched Uranium (HALEU). Currently, there’s no Western supply, and Russia, the previous dominant supplier, is no longer a viable option, causing significant delays for SMR projects.
- c. **Cost-Effective Production:** QLE aims to solve this shortage. A key advantage is their ability to potentially reuse nuclear waste (“tails”) from past enrichment to create HALEU, which could dramatically reduce costs. This unique capability could make QLE the most competitive HALEU producer globally.
- d. **Strategic Partnerships:** QLE has signed a partnership agreement with NECSA, the South African Nuclear Energy Corporation (the expertise at Pelindaba!), to build a nuclear fuel plant, and has a key agreement with TerraPower, Bill Gates’s company, a leading SMR developer.
- e. **Lithium for Fusion:** QLE also plans to produce Lithium-6 (Li-6), a high-margin product essential for fusion energy, a clean energy source still in development.
- f. **Spin-off:** The QLE division is slated to be spun off as a separate public company later this year, allowing current ASP Isotopes shareholders to own shares in both entities.

The Road Ahead: Strong Foundations and Growth Potential

ASP Isotopes’ success is rooted in its dedicated team of 153 scientists and engineers, with the vast majority based in South Africa - only 3% of the workforce is non-South African. The company actively recruits top graduates from South African universities and ensures employees have a stake in the company (25% at this stage) through equity, fostering a highly motivated workforce.

ASP ISOTOPES’S: EMPLOYEE PROFILE



The workforce is the cream of the crop in their fields of study and expertise

The company’s focus is firmly on commercialization and generating revenue, shifting from purely scientific pursuits to market-driven production. With the technology for enriching uranium already proven through the commercial production of Ytterbium-176, ASP Isotopes is poised for rapid growth.

Looking ahead, the company aims for its ASP Isotopes segment to become cash flow positive by the second half of 2025 as it plans a ramp up in production. With numerous “catalysts” expected in the coming months, including new construction, purchase agreements, and the QLE spin-off, ASP Isotopes believes it is well-positioned to capitalize on significant market opportunities in critical sectors worldwide. Furthermore, it aims to have a secondary listing on the JSE, after it completes the acquisition of Renergen, a local producer of helium.

If you find this article quite technical, spare a thought for me over the past few days as I have visited labs and enjoyed dinners where all the conversation is in “Periodic Table Code”! It was certainly both fascinating and enlightening. Whilst we all have much still to learn, the one thing I can be certain of is that what is coming in the larger universe of AI will be mind-blowing.



Our next seminar will be held in September in Johannesburg and the Midlands. The topic will be communicated in due course."



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Topic: **To be announced**

Natal Midlands

Date: 11th of September, 2025

Venue: Christ Church Howick, 23 Mare Street, Howick

Morning Time: 10am for 10.30am

Evening Time: 5.30pm for 6pm

Johannesburg

Date: 9th of September, 2025

Venue: Rosebank Union Church, Cnr Winne Mandela Drive and St Andrews Road, Hurlingham

Time: 7am for 7.30am

Cape Town

Date: N/A

Venue: SSISA Conference Centre, Boundary Road, Newlands, Morne du Plessis Boardroom, 4th floor

Time: 7.30am

Venue: ABRU Motor Studio, Lourensford Wine Estate, Somerset West

Time: 5.30pm for 6pm



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