



**Thorion**Energy

# Thorion Energy Shareholder Report 2024

Ultra Power Systems Limited  
(ACN 620 676 995) trading  
as Thorion Energy™

Level 1, 50 Kings Park Road  
West Perth WA 6005



Energy Firming **Technologies**



# Welcome from the CEO

## Dear Shareholder,

I am pleased to report to you that, despite some challenges, we have achieved solid progress on several fronts over the past year. These include formalising manufacturing and sales legal agreements with Viettel Manufacturing. (Vietnam government owned – Fortune 500 company, ranked 243), electrolyte production systems, State of Charge (SOC) monitoring apparatus (accurate and superior to mainstream manufacturers), and strengthening our supply chain. Additionally, we have improved our assembly and commissioning procedures as well as our Battery Management System (BMS) and delivered multiple new systems to the West Australian market.

These achievements occurred in the context of a difficult capital market, which hampered our capital raising program and necessitated a reduction in the pace of operations. This did not prevent Thorion Energy from advancing as articulated in the shareholder report.

*Bradley Appleyard*

### **Bradley Appleyard**

Co-founder, Chairman & CEO



Norseman Airport

## Sales & marketing

The general market has yet to fully understand the advantages of vanadium flow batteries, which means that we are looking forward to a surge in demand. Even so, there is currently an increasing flow of enquiries, which we carefully filter for suitability based on criteria that include size, complexity, location, and lead time. We currently have many projects in the pipeline at various stages of the sales cycle.

Towards the end of this shareholder report, I refer to the adverse capital markets. One of the consequences is that it places limitations on our supply chain. Accordingly, we have curtailed our marketing and sales efforts to ensure that we don't compromise our ability to deliver. Capital markets are now improving, and we are beginning to accelerate.

Currently, we have installations in a wide variety of applications, which includes mine-sites, semi-rural properties, an airport, and remote pumps. Installing, commissioning, and maintaining these has generated real world experience and considerable know-how.

The risk-off environment and policy framework this year has enabled Thorion to gain much know-how from diverse real-world project applications for renewable energy power generation and energy storage processes resulting in subsequent installation and commissioning proceeding with efficiency and performance, and importantly, the ability to remotely login and update software or optimising operational settings through analytics improving the battery module performance and value.

The photograph above is an example of a recent project completed for the Shire of Dundas – Norseman Airport. The Shire of Dundas in Western Australia's South-East required a solution for the electricity requirements for their new airport terminal building. The Shire required a clean energy source with 24/7 coverage.

The new airport terminal services are a vital link for the local community, 350 FIFO workers each week, as well as being on call for the Royal Flying Doctor Service (RFDS). The site is subject to extreme temperature variations throughout the year from below freezing in winter to above 50 degrees Celsius in summer. The CEO and elected members of the Shire of Dundas acknowledged LIRC Federal Government funding, Thorion Energy and SMEC Power and Technology teams for powering the new Norseman Airport.



Thorion Energy has recently deployed the above Stand-Alone Power Station (now commissioned) for Widgie Nickel's, Mount Edward operations, located around 700 km Southeast of Perth. Widgie Nickel is an ASX-listed explorer, with a unique consolidation of a vast 240km-square package of 'highly prospective' nickel and new economy metal prospects, within the prolific Eastern Goldfields nickel sulphide belt.

This installation houses 3 x Thorion Energy V40 Batteries, a 15kVA inverter with 120kWh of storage for the 8-man accommodation site along with ablutions, kitchen, workshop and offices that now operate independent of the 15 kVA generator on which they were dependent for 24 hours, 7 days per week.

The renewable energy power station substantially reduces energy and expensive fuel logistics and an unexpected and extremely positive benefit for workers is getting sound sleep through not hearing the constant rumble of a 15 kVA diesel engine, which required refueling every 48 hours. The camp occupants now enjoy the quiet of the West Australian bush. Should the sun refuse to shine there is the confidence of a full three days and nights of autonomy.



The electrical team from SMEC Power and Technology completing and commissioning battery models and control system for the next microgrid project.



Thorion Energy flow partner SMEC Power and Technology building the new electrical workshop increasing the floor area to 4000 square meters.



Formalising the agreements with Viettel

## Corporate

In March 2023, Thorion Energy was invited by Austrade (Australian Federal Government) to participate as delegates in a WA government trade mission to Thailand and Vietnam. The mission promoted Australia's expertise and capabilities in renewable energy, energy efficiency, and energy storage solutions. It provided a platform for Australian companies to identify and capture opportunities in the respective energy sectors.

A key result of this was the signing of a Memorandum of Understanding with Viettel, a Fortune 500 company and the largest in Vietnam. This was followed by formalising manufacturing and sales legal agreements and contracts (at the Australian embassy in Vietnam), with Viettel manufacturing for Vietnam and southeast Asia upon a successful technology transfer. Thorion Energy has plans to establish in Vietnam working with accounting and legal firms to establish transfer pricing in line with the respective government policy/regulations.

As well as Vietnam, Thorion participated in WA government trade missions to Thailand, India, and the Middle East resulting in introductions to owners, CEOs and key executives of large global companies keen to participate in the energy transition. Without these trade missions we would have had very little chance of being introduced to the CEOs of Fortune 500 companies securing valuable channels to market. Their respective companies represent extremely large potential demand.

For example, we have executed various non-disclosure agreements (NDA) and memorandum of understanding (MoU) with substantial corporations in the Middle East planning for 1,200 megawatts of battery storage demand per year, which is equivalent to 5,000 V40 battery modules every month. We have executed confidentiality agreements with several substantial (Fortune 500) companies from Southeast, and South Asia, the Middle East, and the U.S.



Thorion Energy is in discussions with partners including Bosch to design components for automated production including robotic assembly lines to meet the production requirements.

Our negotiations proceed with that proviso in mind. We operate in a cooperative environment with several companies as previously articulated and anticipate tangible outcomes to meet the challenges of long duration energy storage (LDES) being the pillar of the renewable energy transition.

Thorion participated in the WA Government Trade mission to the Middle East lead by the energy minister, The Hon. Reece Whitby attending back-to-back meetings throughout the Middle East engaging with significant corporations including ruling family investment banks. Consequently, The Hon. Reece Whitby accompanied by his Senior Policy Adviser, Rachelle Gill, Bibra Lake candidate Sook Yee Lai and Liaison Officer, Magdalena Celeski to discuss investment, policy and view products and the manufacturing facilities on the 10th of October

Premier Roger Cook has undertaken an historic trade mission to Indonesia, his first mission as WA Premier. Dubbed a “mega mission” because of the unprecedented number of delegates involved, it has kicked-off in the Indonesian capital Jakarta and involves more than 130 key Government and business representatives, including three members of the Cook Cabinet.



The Indonesia Connect Roadshow provides a platform to promote the State as a recognised and trusted partner, as well as a chance for WA businesses to engage in trade, investment and cultural exchange.

*“This historic trade mission to Indonesia will play a central role in Western Australia’s future and specifically the WA Governments plans to diversify our economy.”*

*“Indonesia is a recognised and trusted partner, and it is vital we explore new ways to that delivers investment opportunities and local jobs for Western Australians.”*

*“The sheer scale of this delegation demonstrates how seriously the WA Government and industry takes this relationship with Indonesia.”*

Thorion Energy was introduced to many senior ministers including meeting senior PLN management and Dahlan Iskan who is the former CEO of Indonesian newspaper publisher, Jawa Pos Group. He was the CEO of Indonesia’s State Electricity Company (PLN) from 23 December 2009 to 19 October 2011. He was Indonesia’s Minister of State-Owned Enterprises in the period October 2011 to October 2014. Thorion is currently engaged with PLN exploring local manufacturing.

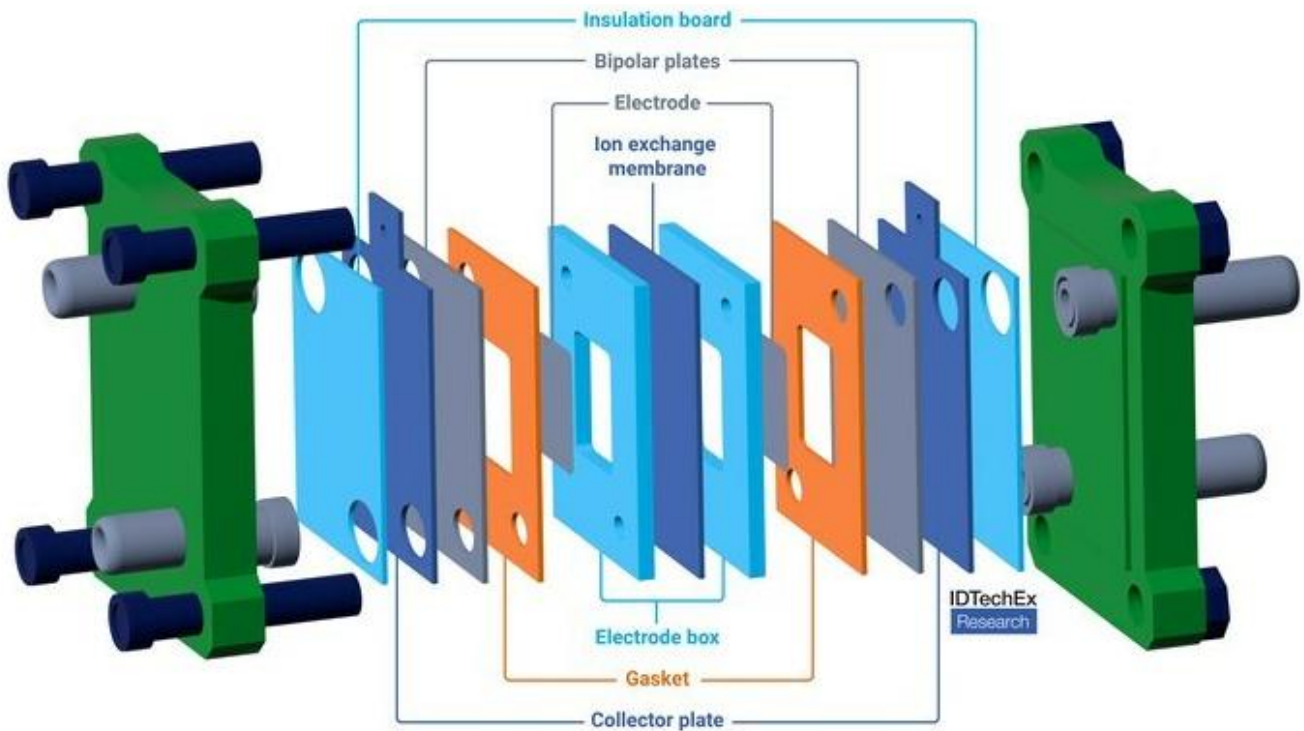
Thorion Energy has also executed several NDAs with substantial corporations resulting from the Government Trade Missions including the most recent based in the Middle East including several substantial (Fortune 500) companies from Southeast, and South Asia, the Middle East, and the U.S.





Thorion Energy is in discussions with partners including Bosch to design components for automated production including robotic assembly lines to meet the production requirements.

Our negotiations proceed with that proviso in mind. We operate in a cooperative environment with several companies as previously articulated and anticipate tangible outcomes to meet the challenges of large scale long duration energy storage (LDES) being the pillar of the renewable energy transition.



Components of a cell stack

## Supply chain

### **Electrolyte**

We have secured an alternate supplier of high-quality chloride-based electrolyte that has the capacity to supply Thorion Energy with short lead time at competitive pricing when compared with the previous supplier.

In the meantime, we are continuing a program with a local process specialist business to develop proprietary electrolyte manufacturing modules. Other processing facilities that you may have heard being developed with Murdoch University of can only produce sulfuric acid-based electrolytes. When we launch our own facility, Thorion will be produce patented chloride-based electrolyte in Australia and one of the few in the Southern hemisphere. The project is progressing well, having successfully produced chloride-based electrolytes on a small scale. Murdoch University provides Thorion Energy with ongoing advice on the more technical aspects of chemical processes and management.

### **Cell stacks**

As to cell stacks, we aim to produce our own in the near to mid-term future. We are currently liaising with a local specialist in plastics to formulate the best combination of seals and gaskets. Additionally, we are evaluating different membranes, electrodes, and bipolar plates in terms of their suitability for different applications. As the associated image shows, these are critical components of a cell stack.

In parallel with this process, we have identified selected suppliers of high-performance cell stacks

with whom we are liaising on an ongoing basis as we evaluate their cell stacks in relation to chloride-based electrolyte. Choosing high quality and performance cell stacks by sophisticated manufacturing will enable Thorion Energy to complement the current supplier, which is sub-optimal in important respects, particularly on lead time, cost and performance, and quality. This interim measure will supply our short-to-medium-term supply chain requirements as our sales volume increases.

### **Battery Management System**

The battery management system (BMS) is crucial to the operation of the respective battery. It is the battery intelligence and processes, controlling critical parameters such as cut-off voltages, current, and pump speed. It is also responsible for monitoring key performance aspects and responding to error signals generated by out-of-range behavior. Additionally, the BMS will integrate the respective battery with inverters and external sources of charge, such as solar, wind, and the Grid.

Thorion Energy has devoted considerable time and resources to developing our proprietary BMS, of which version 1 is operating successfully. This includes not only the hardware, firmware and software code which enables analytics, performance and optimisation of parameters remotely. Subsequent versions of the BMS will expand on the capabilities and enable even higher battery efficiency and effectiveness as the coordination between sensors and controller improves.

## Research & Development

### State Of Charge

There has been excellent progress in the program. In particular, we are excited by the work Murdoch University has done for us in the field of State of Charge (SOC) measurement. This is a crucial aspect of maintaining precision control over battery behavior and therefore optimising performance.

While most manufacturers offer SOC measuring devices they are limited in accuracy and applicability. Accuracy, because they rely on voltage, which is an indirect measure that relies on the electrolyte being in a balanced state. Considering that the SOC of each tank is the primary means of determining whether the battery is imbalanced, the voltage method is of limited use because it relies on the battery being balanced.

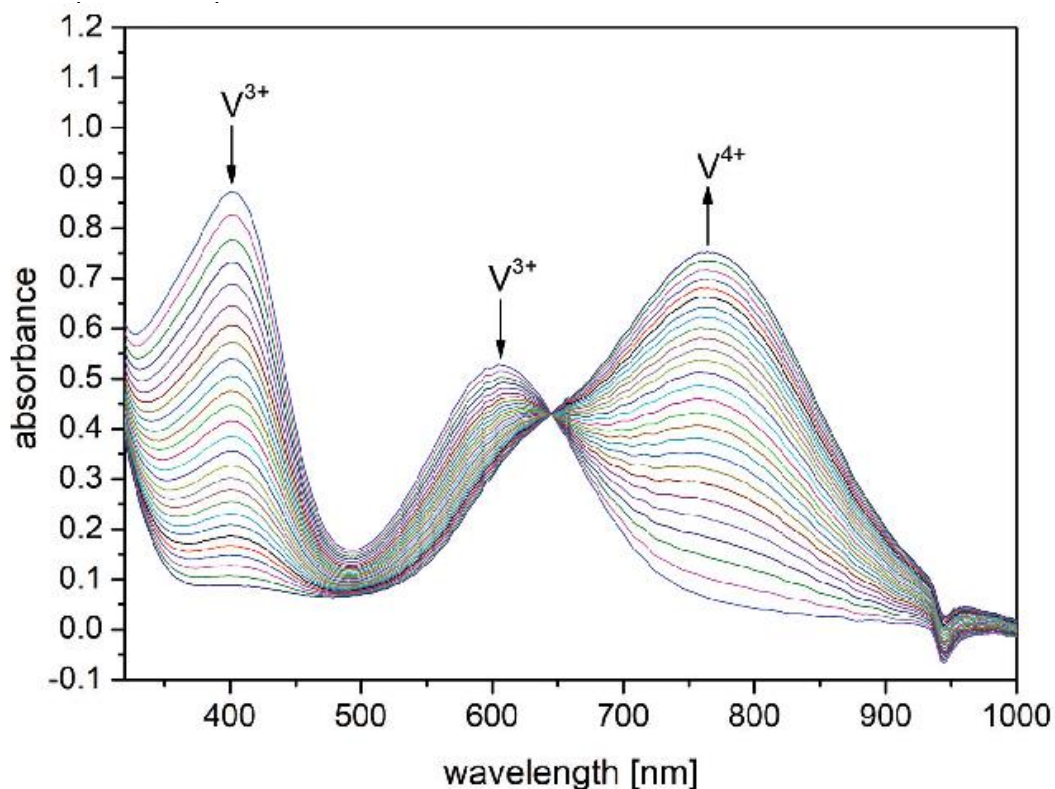
The method being developed in conjunction with Murdoch University gives direct insight into chemistry, which is the only true indicator of SOC. Technology is being developed in iterations of increasing sophistication, potentially culminating in a real time configuration that will measure and signal accurate SOC in real time.

### Electrolyte

There is also considerable research and development in the area of chloride-based electrolyte production. The team at Murdoch University are providing advice on the highly technical aspects of the production process while another team from a chemical process specialist are concentrating on industrialising the process. As mentioned before, we have successfully produced electrolyte at a smaller scale and are working towards upscaling the process.

### Electronics

Another stream of development has to do with electronics, which is the way in which the battery interfacing with the environment, such as solar, wind charging, and the electrical grid. The interface and scaling of battery modules with various energy sources and the electricity grid is an extremely complex engineering process which requires a sophisticated Battery Management System. There has been substantial investment in engineering which can only be developed through real-world field testing dedicated to interfacing our battery modules with external charges and loads.



Experimental output of SOC R&D

## Capital raising

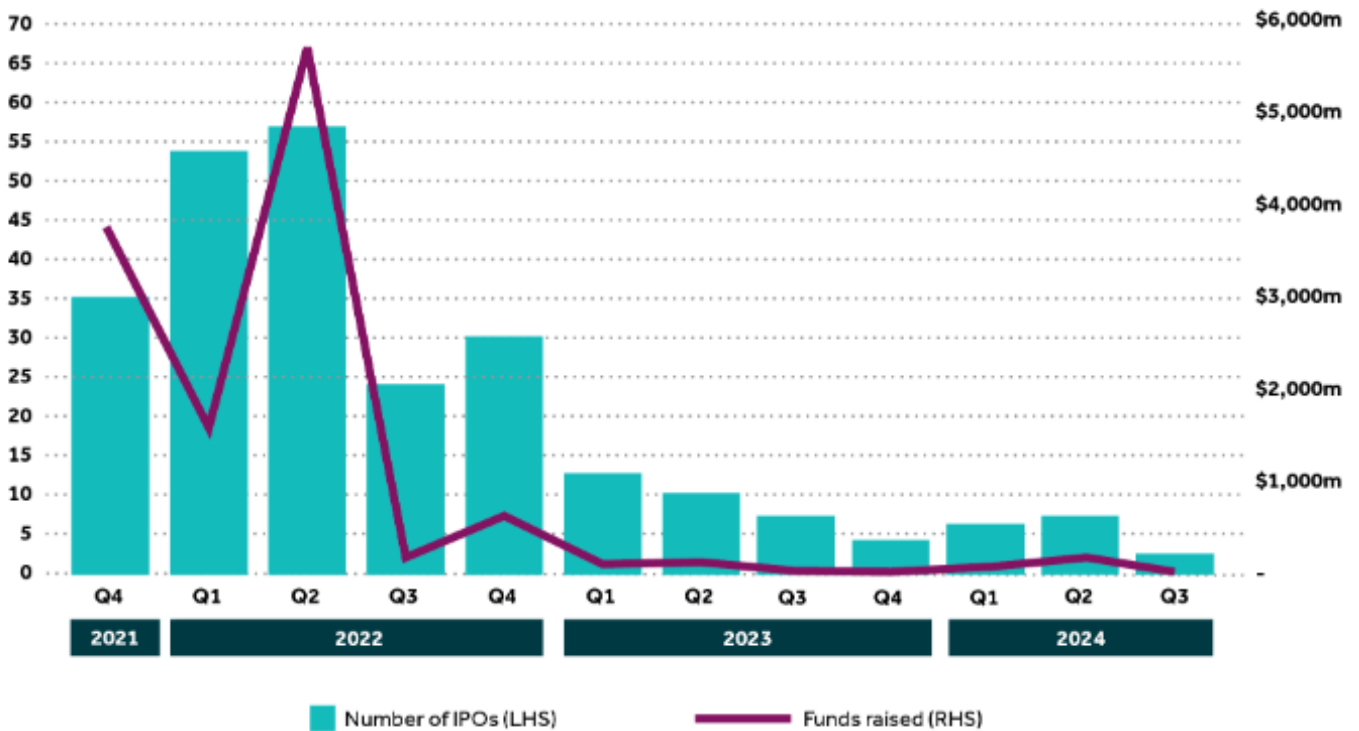
Fresh capital is crucial to our success until we reach positive cash flow from operations. We have been largely successful in raising sufficient capital to aggressively achieve our aims in the past. However, recent circumstances triggered by post-COVID dynamics such as high inflation, high cost of living, and high interest rates have created what is known as a "risk off" market as evidenced by the collapse of Australian Zinc Bromine battery maker, Redflow. Despite receiving substantial government support they were unable to find matching equity funds in the capital markets.

There are positive signs from the U.S and Thorion professional advisers anticipate seeing recovery in 2025 and we are now experiencing a surge in investment interest and partnering with Thorion to access substantial channels to market.

Another indicator of the current circumstances is the substantial reduction in initial public offerings IPOs on ASX. This is graphically illustrated in the chart below.

Thorion is now experiencing a surge of activity with international partners and venture capital companies mostly from outside of Australia. Thorion has signed several NDAs with well-known global manufactures, venture capital and securities corporations. Engineering, utilities, industry and end-users are independently gaining knowledge about high-energy capacity flow batteries for long duration energy storage and specifying accordingly.

### Number of IPOs and funds raised by quarter



Source: S&P Capital IQ and Nexia analysis

Chart showing decline in capital markets

The hesitancy of the capital markets has slowed progress around the world. Fortunately, in line with our conservative financial policy, Thorion is neither burdened with debt nor high overheads. With substantial R&D tax reimbursements lodged, Thorion can progress commercial activity until the market turns now showing positive activity in line with leading institutions before accelerating technical and commercial progress.

## **Summary**

It is only the beginning of a vast emerging industry and much remains to be done before we reach our desired level of momentum. Most importantly, we need to raise fresh capital to drive our progress, particularly in product development and automated production.

There has been considerable forward movement. We are much closer to the production of electrolyte manufacturing modules and our own cell stacks. We have greatly improved our ability to handle more complex applications, having considerably expanded our know-how and systems, which is of the highest value, and Thorion is rolling out renewable energy projects with an ever-increasing pipeline.

Let me take this opportunity to thank you. We will endeavor to improve our communications as we accomplish milestones, investment, additional personnel and commercial success. We remain focused on developing technology and international manufacturing and sales partnerships that build value in Thorion Energy. Despite the current challenges, we look forward to making significant advances in 2025.

On behalf of the Board of Directors I extend our thanks to you for your support to date and look forward to achieving further milestones on our journey towards creating and providing valuable products and services to the vast energy storage market.

Sincerely,



**Bradley Appleyard**

Co-founder, Chairman & CEO