

# MGA Thermal - Investment Memo

## 1. Executive Summary

MGA Thermal is an Australian company developing thermal energy storage (TES) solutions, focusing on enabling 24/7 renewable energy by converting variable renewable generation into a reliable supply of process heat and electricity [1]. Their core technology revolves around Miscibility Gap Alloy (MGA) blocks, a form of phase change material that stores energy as latent heat [16]. The company has secured funding from ARENA, Shell, and other investors [5, 12], and has a demonstration plant operational in Tomago, New South Wales [16].

### SWOT Analysis:

#### Strengths

Patented MGA block technology with high energy storage capacity (200-300% more than traditional TES) [1].

Scalable and modular design suitable for various applications and sizes [1].

Ability to integrate with existing infrastructure, such as power stations [14].

Strong government support and funding through grants and initiatives focused on renewable energy and decarbonization [4, 5].

Potential for long-duration energy storage (hours to days) [1].

#### Weaknesses

Limited operational history beyond demonstration plant, making long-term performance validation challenging [16].

Dependence on specific raw materials for MGA block manufacturing, potentially creating supply chain vulnerabilities [1].

Relatively high upfront capital costs compared to traditional energy sources, although aiming for cost parity [15].

Limited brand recognition and market presence compared to established energy storage providers.

Lack of publicly available, detailed performance data from independent testing and verification.

#### Opportunities

Growing demand for long-duration energy storage solutions to support the increasing penetration of variable renewable energy sources [1].

Expanding into new markets and applications, such as industrial process heat, district heating, and cogeneration [1, 14].

Collaborating with established engineering firms to provide turnkey solutions [15].

Securing joint development agreements with strategic partners to accelerate deployment [15].

Leveraging the circular economy by using readily available and sustainable materials for MGA block production [1].

#### Threats

Competition from other energy storage technologies, such as lithium-ion batteries, pumped hydro storage, and other thermal energy storage solutions [6, 13, 7, 8].

Changes in government regulations and policies regarding renewable energy and energy storage, which could impact project economics and incentives [4].

Technological advancements in competing energy storage technologies that could render MGA Thermal's technology obsolete [13].

Project delays and cost overruns during construction and commissioning of commercial-scale projects.

Negative public perception or environmental concerns related to the manufacturing, operation, or disposal of MGA blocks.

### Key Verdict:

MGA Thermal presents a compelling investment opportunity within the growing long-duration energy storage market. The patented MGA block technology offers a scalable and potentially cost-effective solution for storing renewable energy and providing on-demand heat and power. However, the company is still in the early stages of commercialization and faces significant competition and risks. A **Wait** strategy is recommended. Further monitoring of the demonstration plant's performance, commercial partnerships, and cost reduction efforts is crucial before considering investment.

## 2. Product Deep Dive

MGA Thermal's core product is their thermal energy storage system (TESS) based on MGA blocks [14]. These blocks store energy in the form of latent heat, which is absorbed or released during a phase change [16].

### Features:

- **High Energy Density:** MGA Thermal claims their system offers 200-300% greater energy storage capacity compared to traditional thermal energy storage systems [1].
- **Scalability:** The modular design of the MGA blocks allows for easy scaling of the storage capacity to meet different application requirements [1].
- **Long Duration:** The system is designed for long-duration energy storage, ranging from hours to days [1].
- **Safe and Sustainable:** The MGA blocks are made from non-toxic and readily available materials [1]. The molten material is fully encapsulated. [1].
- **Integration with Existing Infrastructure:** The system can be integrated with existing power plants and industrial facilities, allowing for efficient utilization of existing equipment [14].
- **Versatile Output:** The stored energy can be discharged as process heat, steam, or electricity [14, 16].
- **Automated charging & Discharging:** Utilizes pre-existing equipment and proven technology [14].
- **High Temperature application:** Can be used for high temperature processes such as green hydrogen production [5].

**Tech Stack:**

While the specifics of the tech stack are not entirely public, based on the available information, the following can be inferred:

- **MGA Blocks:** The core technology is the proprietary MGA block composition, which consists of a miscibility gap alloy designed for high thermal conductivity and stable phase change properties.
- **Thermal Energy Storage System (TESS):** This system comprises the MGA blocks, a heating and cooling system, and a control system [14]. The heat transfer fluid (likely oil or molten salt) circulates through the block matrix to charge and discharge the thermal energy.
- **Control System:** A sophisticated control system manages the charging and discharging process, optimizing energy efficiency and ensuring safe operation. This likely involves sensors, actuators, and a programmable logic controller (PLC) or similar industrial control system.
- **Materials Science & Engineering:** The company relies heavily on materials science and engineering expertise to develop, test, and optimize the MGA block composition.
- **Data Analytics:** Data from the demonstration plant and future commercial installations will be used to monitor performance, optimize system parameters, and predict maintenance needs.
- **Cloud Infrastructure:** Assumed to use standard cloud infrastructure for data analysis.

**User Experience (UX):**

As an energy storage provider targeting industrial and grid-scale applications, the direct user experience differs from consumer-facing products. The primary users are plant operators, engineers, and energy managers. Key UX elements include:

- **Turnkey Solutions:** MGA Thermal aims to offer turnkey solutions, simplifying integration for customers [15].
- **Remote Monitoring and Control:** Users need a robust remote monitoring and control interface to track system performance, adjust operating parameters, and receive alerts.
- **Data Visualization and Reporting:** Clear and intuitive data visualization tools are essential for understanding system performance, identifying trends, and optimizing energy usage.
- **Reliability and Uptime:** High reliability and minimal downtime are crucial for industrial applications.
- **Safety Features:** Robust safety features and protocols are essential to prevent accidents and ensure safe operation.

**3. Market Landscape**

The energy storage market is rapidly growing, driven by the increasing penetration of renewable energy sources and the need for grid stabilization [1]. Thermal energy storage is a segment within this market, offering a cost-effective and scalable solution for storing thermal energy for various applications.

**Key Competitors:**

Competitor Technology		Key Features	Pricing	Strengths	Weaknesses
Rondo Energy [13]	Thermal Energy Storage (using heated bricks)	Stores energy as heat in bricks, using thermal radiation to power industrial processes.	Not publicly available.	Focus on industrial decarbonization, proven technology.	Limited to high-temperature heat applications, may not be as versatile as other TES technologies.
	Thermal Energy Storage (using solid carbon)	Stores energy as heat in blocks of solid carbon to power global industry.	Not publicly available.	High temperature storage, focus on industrial decarbonization.	Still early stage, needs demonstration at scale.
Malta Inc.	Molten Salt Thermal Storage	Stores electricity as heat using molten salt.	Not publicly available.	Long-duration storage, high energy density.	High capital costs, potential environmental concerns related to molten salt.
Energy Dome	CO2 Battery	Stores electricity by compressing CO2 into a liquid.	Not publicly available.	Long-duration storage, uses readily available materials.	Lower round-trip efficiency compared to other energy storage technologies.
Fourth Power	Molten Salt	Molten Salt Technology	Not publicly available.	Long duration, good for industrial use.	Early stage company.
PLUSS [13]	Phase Change Materials (PCMs)	Uses PCMs to store thermal energy for cooling and heating applications.	Varies depending on the application.	Wide range of applications, mature technology.	Lower energy density compared to other TES technologies, temperature limitations.

*Note: Pricing information for competitors is generally not publicly available and requires direct engagement with the companies.*

**Market Trends:**

- **Growing demand for long-duration energy storage:** As renewable energy sources become more prevalent, the need for long-duration storage solutions to balance supply and demand is increasing [1].
- **Focus on decarbonization:** Industries are under pressure to reduce their carbon footprint, driving demand for thermal energy storage solutions that can utilize renewable energy sources.

- **Government support and incentives:** Governments worldwide are providing incentives and funding for renewable energy and energy storage projects.
- **Increasing energy prices:** High energy prices are making energy storage solutions more economically attractive.

## 4. Business Model

MGA Thermal's business model revolves around providing thermal energy storage solutions to industrial and grid-scale customers.

### Revenue Streams:

- **Turnkey System Sales:** Selling complete thermal energy storage systems to customers, including the MGA blocks, heating and cooling system, and control system.
- **Engineering and Design Services:** Providing engineering and design services to customers for integrating the MGA Thermal system into their existing infrastructure.
- **Maintenance and Support Services:** Offering maintenance and support services to customers to ensure optimal system performance and uptime.
- **Energy Sales:** Potential future revenue stream from selling stored energy to the grid or directly to customers, although this would likely involve a separate business entity or partnership.
- **Licensing of Technology:** Licensing the MGA block technology to other companies for specific applications or geographic regions.

### Pricing Strategy:

MGA Thermal aims to offer a cost-competitive solution compared to traditional energy sources, such as natural gas. Their pricing strategy likely involves:

- **Value-Based Pricing:** Pricing the system based on the value it provides to customers, such as reduced energy costs, improved reliability, and reduced carbon emissions.
- **Cost-Plus Pricing:** Calculating the cost of manufacturing, installation, and service and adding a profit margin.
- **Competitive Pricing:** Benchmarking prices against competing energy storage technologies and adjusting prices to remain competitive.

### Cost Structure:

Key cost drivers for MGA Thermal include:

- **Raw Materials:** The cost of materials used to manufacture the MGA blocks.
- **Manufacturing:** The cost of manufacturing the MGA blocks and other system components.
- **Installation:** The cost of installing the system at the customer's site.
- **Engineering and Design:** The cost of providing engineering and design services.
- **Research and Development:** The cost of developing new MGA block compositions and system improvements.
- **Sales and Marketing:** The cost of sales and marketing activities.

## 5. Traction & Risks

### Traction:

- **Demonstration Plant:** The company has successfully commissioned a 5 MWh demonstration plant in Tomago, New South Wales [16].
- **Customer Interest:** MGA Thermal claims to have reached a milestone with customer interest for 20 GWh of energy storage [5].
- **Funding:** The company has secured funding from various sources, including ARENA, Shell, Main Sequence Ventures, Varley Holdings, Melt Ventures, and New Zealand's Climate Venture Capital Fund [5, 12].
- **Partnerships:** MGA Thermal is collaborating with Toshiba, Graphite Energy, Knode and Tronox. [5, 17].

### Risks:

- **Technological Risk:** The MGA block technology is relatively new, and there is limited long-term operational data to demonstrate its reliability and performance.
- **Manufacturing Risk:** Scaling up the manufacturing of MGA blocks to meet commercial demand could be challenging.
- **Market Risk:** The energy storage market is competitive, and MGA Thermal faces competition from other energy storage technologies.
- **Regulatory Risk:** Changes in government regulations and policies regarding renewable energy and energy storage could impact project economics and incentives.
- **Financial Risk:** The company needs to raise significant capital to fund its growth plans.
- **Supply Chain Risk:** Dependence on specific raw materials for MGA block manufacturing creates a potential supply chain vulnerability.
- **Competition Risk:** Competitors exist with similar technologies [6, 7, 8, 13].

### Legal/Regulatory Risks:

- **Environmental Regulations:** Compliance with environmental regulations related to the manufacturing, operation, and disposal of MGA blocks.
- **Safety Regulations:** Compliance with safety regulations related to the operation of the thermal energy storage system.
- **Permitting:** Obtaining necessary permits and approvals for constructing and operating thermal energy storage projects.

## 6. Founding Team

The specific backgrounds and track record of the entire MGA Thermal team are not readily available. However, based on the information in the provided documents, key individuals include:

- **Dr. Alexander Post:** Involved in the Knowledge Sharing Report of the ARENA project [11].
- **Baxter Langlar:** Involved in the Knowledge Sharing Report of the ARENA project [11].

*It is recommended to perform thorough due diligence on the founding team and key management personnel to assess their experience, expertise, and track record in the energy storage industry.*

## 7. Strategic Conclusion

MGA Thermal has developed an innovative thermal energy storage technology with the potential to play a significant role in the transition to a cleaner energy future. The company has achieved several milestones, including the commissioning of a demonstration plant and securing funding from reputable investors.

However, MGA Thermal is still in the early stages of commercialization and faces significant risks and challenges. The technology needs to be validated through long-term operational data, manufacturing processes need to be scaled up, and the company needs to secure commercial contracts to generate revenue.

### Recommendation:

A **Wait** strategy is recommended. Before considering investment, the following milestones should be achieved:

- **Demonstration Plant Performance:** Collect and analyze long-term performance data from the demonstration plant to validate the reliability, efficiency, and cost-effectiveness of the MGA block technology.
- **Commercial Contracts:** Secure commercial contracts with industrial or grid-scale customers to demonstrate market demand and generate revenue.
- **Manufacturing Scale-Up:** Successfully scale up the manufacturing of MGA blocks to meet commercial demand while maintaining quality and cost control.
- **Competitive Analysis:** Continuously monitor the competitive landscape and assess the advancements of other energy storage technologies.
- **Team Expansion:** Understand key team members and their track record.

By waiting for these milestones to be achieved, investors can better assess the risks and potential rewards of investing in MGA Thermal.

## References

- [1] Www (<https://www.mgathermal.com/>)
- [2] Maly secures \$1.6 million pre-Seed to speed up GCC expansion plans - Wamda
- [3] April 19, 2023 08:00 AM Eastern Daylight Time
- [4] The Minister for Industry, Science and Technology, Karen Andrews, announced the 21 projects and companies which have been selected to share over \$10 million in funding on Monday 13 July 2020.
- [5] We are thrilled to share we have been awarded funding of \$1.27 million from the Federal Government's Australian Renewable Energy Agency (ARENA) to fund our pilot MGA Thermal Energy Storage.
- [6] Competitors and Alternatives to Microsoft 365
- [7] Competitors and Alternatives to Adobe
- [8] Competitors and Alternatives to Google Drive
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