



ABSTRACT

Our second TCFD report is a testament to our dedication to transparency and accountability. It provides a clear and thorough assessment of our financial decision-making processes, considering climate-related risks and opportunities. This report reinforces our commitment to aligning our strategies with climate goals, thereby ensuring responsible financial planning and governance.

Prashant Tiwari
Chief Sustainability Officer

TCFD REPORT (FY 2023-24)

Amara Raja Energy & Mobility Limited

(Formerly known as Amara Raja Batteries Limited)

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FORWARD LOOKING STATEMENT:

Some statements in this report regarding our business pertain to future expectations and are based on discussions about our market position, financial status, business strategy, and objectives for upcoming operations. These forward-looking statements can be recognised by terms like 'anticipates,' 'expects,' 'intends,' 'may,' 'will,' 'believes,' 'estimates,' 'outlook,' and other similar expressions used when discussing future operational, environmental and financial performance. Our forward-looking statements are based on our present expectations, reasonable assumptions, and assessments of projected trends. However, they are subject to risks, uncertainties, and external factors, which might cause actual results to differ from the projections stated in these statements, and we do not undertake any obligation to update or revise these statements except as required by law.

From the Desk of Executive Director



The purpose of Amara Raja Group of companies has been to transform and improve the quality of life by providing better access to better opportunities to more people all the time. For Amara Raja Group, sustainability has been at the core of what we do. We realize our pivotal role in India's ambition to become net zero by 2070 and switch to renewable energy and electric mobility.

Two years ago, we set ambitious sustainability targets for ourselves. In keeping with this, we have adopted sustainable business practices across all our operations. I am glad to share the significant strides we have taken towards achieving these environmental objectives. We aspire to achieve net zero emissions by 2050 and have implemented a comprehensive strategy with targets aligned with the decarbonization approach as defined by the Science Based Target Initiative (SBTi). Through several well-calibrated efforts, we have been able to reduce energy intensity by 19% and carbon footprint intensity by 38%. As of today, above 23% of our total energy consumption is renewable with an installed capacity of 62 MW. Besides reducing our carbon footprint, our impressive 83% sourcing rate for recycled lead and alloys reflects our commitment to fostering a circular economy. Towards circular economy, more than 83% of our raw material comes from recycled sources and we are setting up a lead recycling facility with a capacity of 1.5 LTPA capacity.

We plan to lead the energy transition by developing batteries for EVs and energy storage solutions. We are invested in start-ups in India and abroad venturing into advanced cell chemistry and new energy. We are setting up manufacturing facilities, including a lithium cell gigafactory in Telangana with a proposed capacity of 16 GWh and a battery pack assembly unit of 5GWh, with a total investment of INR 9500 Cr in phases. The entire project is slated to create around 4,500 direct jobs when fully operational, including around 800 jobs in the innovation centre.

The launch of the Amara Raja Sustainability Academy, an online training program, is designed to equip our workforce with the requisite knowledge and skills for driving responsible progress. The Academy offers customized programmes based on job roles. As of now, 300 leaders have initiated their learning at the Academy. The Sustainability Committee regularly reviews our sustainability performance to ascertain steady progress towards our goals. Additionally, we conduct life cycle assessments for our products to better understand and mitigate their ecological footprint.

These achievements have been recognised in our first attempt, we have secured a **"B" CDP rating** for climate action, a reflection of our dedication to our net-zero plans, not just within our operations but across our entire value chain. This recognition further inspires us as we continue to build on this momentum.

In line with our Net Zero commitment aligned with the SBTi Science-Based targets framework, we will continue to sharpen our focus on enhancing the efficiency, and utilization of RE Power through group

RE captive power and other Green Open Access Power models suggested by GoI and local state government schemes. While our Scope 1 emissions contribute to less than 2% of total GHG emissions, we have developed a road map to minimize these emissions also. We have been engaging with all raw material suppliers, which contribute to more than 50% of the total scope of 3 GHG emissions.

We continuously strive to enhance the sustainability of our Lead Acid Batteries as we strive for innovation and growth. Our focus on market segmentation, sustainability, technological integration, and customer service will help ensure that Lead Acid Battery continues to play a crucial role in the dynamic energy and mobility sectors.

Sincerely,

Harshavardhana Gourineni

**Executive Director
(Automotive and Industrial Business)**

From the Desk of the Chief Sustainability Officer (CSO)



I am pleased to announce the release of our second TCFD report and our revised Net Zero Plan, reflecting our unwavering commitment to sustainability and transparency. This TCFD report provides a thorough assessment of our climate-related financial risks and opportunities, reinforcing our alignment with climate goals and our dedication to responsible financial planning. It offers a structured approach across four critical areas: Governance, Strategy, Risk Management, and Metrics & Targets ensuring climate considerations are embedded in our core operations and overseen by senior leadership.

Our Net Zero Plan embodies a significant commitment to reducing emissions, advancing energy efficiency, and maximizing renewable energy use. Recognizing the vital role of renewable energy, we are investing in on-site and off-site renewable generation projects, aiming to set a high standard for sustainable energy practices. Additionally, we are actively engaging with stakeholders, including employees, customers, investors, and communities, whose insights and support are vital to achieving our shared goals.

We have built a robust governance structure, led by our Executive Director and Sustainability Committee, to oversee climate strategies and progress. Dedicated teams manage risk assessments, carbon reduction initiatives, and regular reporting, ensuring accountability and alignment with our sustainability ambitions.

This release marks an important step in our journey toward a sustainable future. I am grateful to everyone in our organization and our stakeholders who contribute to these impactful initiatives. Together, we are working to overcome challenges and build a greener, more sustainable world for future generations.

Sincerely,

Prashant Tiwari
Chief Sustainability Officer

Our commitment towards Carbon Disclosure Project



28.09.2024

To,

Carbon Disclosure Project,
4th Floor
60 Great Tower Street
London - EC3R 5AZ

Dear CDP Board of Directors,

As the Chairman & Managing Director of Amara Raja Energy & Mobility Ltd, I am proud to reaffirm our commitment to sustainable development, climate action, and transparency through our participation in CDP disclosures. We recognize that addressing climate change, reducing environmental impact, and enhancing corporate governance are vital to the long-term success of our organization and the preservation of our planet for future generations.

Our participation in CDP aligns with our strategy of mitigating climate risk and enhancing resilience to the impacts of climate change. Through this process, we committed to:

- Monitor and disclose our carbon emissions, energy usage, and water consumption across our operations including supply chains.
- Implement concrete actions to reduce our environmental footprint in line with the goals of the Paris Agreement and limit global warming to 1.5°C.
- Support and collaborate with our suppliers and customers to drive sustainability throughout our value chain.
- Engage in corporate governance practices that promote accountability, and transparency at all levels of the organization.

As part of this commitment, we have established targets for reducing our greenhouse gas emissions and improving energy efficiency. We are proud to contribute to the broader global movement toward a low-carbon, resource-efficient economy, and we pledge to continue enhancing our low-carbon performance year after year.

We look forward to our continued collaboration as we work toward a healthier, more sustainable future.

Sincerely,












Jaydev Galla
Chairman & Managing Director
Amara Raja Energy & Mobility Ltd

Email – jg@amararaja.com





Amara Raja Energy & Mobility Limited (Formerly known as Amara Raja Batteries Limited)
Corporate Operations Office: TERMINAL A, 1-3B/AMR/NR, Nanakramguda, Gachibowli, Hyderabad - 500 032, India.
Tel No. +91 40 23139000, Fax No. +91 40 23139001, E-mail: mktg@amararaja.com
Registered Office & Works: Karakambedi-517 520, Tirupati, Andhra Pradesh, India. Tel No: +91 877 2265000, Fax No. +91 877 2285600,
E-mail: amararaja@amararaja.com, Website: www.amararajaendm.com, Corporate Identification Number : L31402AP985PLC005305.

Our commitment towards SBTi Science Based Targets

<div style="display: flex; justify-content: space-between; align-items: center; margin-bottom: 10px;"> <div style="text-align: center;">  <p>SCIENCE BASED TARGETS <small>DRIVING AMBITION THROUGH CLIMATE ACTION</small></p> </div> <div style="text-align: center;"> <p><small>PARTNER ORGANIZATIONS</small></p>     </div> </div> <h3 style="margin-top: 10px;">COMMITMENT SELECTION</h3> <p>By signing this Commitment Letter, our organization indicates an intent to join the growing group of leading corporations that are setting emissions reduction targets in line with what climate science says is necessary. By doing so, we recognize the crucial role the business community can play in minimizing the risk climate change poses to the future of our planet.</p> <p>Thereby, I am pleased to confirm that <u>Amara Raja Energy and Mobility Limited</u> is committing to:</p> <p><input checked="" type="checkbox"/> Set near-term science-based emissions reduction targets in line with the SBTi Criteria and Recommendations, and submit them to the SBTi for validations within a maximum of 24 months.</p> <p>We acknowledge that our commitment will be recognized on the SBTi website as well as on our partner websites at We Mean Business. Companies who are participants of the UN Global Compact will also be recognized on the UNGC webpage.</p> <p>In addition, to align with the most ambitious aim of the Paris Agreement and to what science dictates is necessary to reduce the destructive impacts of climate change on human society and nature - to reach net-zero global emissions by 2050 at the latest in order to limit global warming to 1.5°C - my company is committing to:</p> <p><input checked="" type="checkbox"/> Set net-zero targets, including a long-term science-based target: My company commits to set long-term science-based targets to reach net-zero value chain GHG emissions by no later than 2050 in line with the SBTi Net-Zero Standard and submit it for SBTi validation within a maximum of 24 months. By committing to set a net-zero target, I also acknowledge that my company will join the Race to Zero campaign.^{1,4,5}</p> <p>Near-term science-based targets are 5-10 year GHG mitigation targets in line with 1.5°C pathways.</p> <p>Net-zero science-based targets are long-term targets that show companies how much they must reduce value chain emissions to align with reaching net-zero at the global or sector level in eligible 1.5°C pathways by 2050 or sooner. The SBTi defines the state of net-zero emissions for companies as reaching a state of no impact on the climate resulting from the organization's GHG emissions. Reaching a status of science-based net-zero emissions implies the following two conditions:</p> <p><small>¹ Companies that are eligible to join the Race to Zero must follow the SBTi's current fossil fuel policy. If companies have questions, please reach out to Race to Zero at race@sciencebasedtargets.org. ⁴ Companies must have valid near-term science-based targets (SBTi) that meet the SBTi Criteria to be eligible for a net-zero target, unless the long-term SBT year is 10 years or fewer from the date of submission. ⁵ Companies that are already part of the initiative can raise their ambition by also committing to set a net-zero target.</small></p> <div style="font-size: 8px; margin-top: 10px;"> <p>SBTi Commitment Letter Version 1.2 April 2023 6</p> <p> sciencebasedtargets.org @ScienceTargets /science-based-targets info@sciencebasedtargets.org </p> </div>	<div style="display: flex; justify-content: space-between; align-items: center; margin-bottom: 10px;"> <div style="text-align: center;">  <p>SCIENCE BASED TARGETS <small>DRIVING AMBITION THROUGH CLIMATE ACTION</small></p> </div> <div style="text-align: center;"> <p><small>PARTNER ORGANIZATIONS</small></p>     </div> </div> <ul style="list-style-type: none"> Achieving a scale of value chain emissions reductions consistent with the depth of abatement at the point of reaching global net-zero in pathways that limit warming to 1.5°C with no or low overshoot. Neutralizing the impact of any source of any residual emissions by permanently removing an equivalent volume of atmospheric CO₂.⁶ <p>Visit the SBTi Net-Zero webpage and review the Net-Zero Standard for more information. For financial institutions, the approach to net-zero emissions targets across the value chain is being developed.</p> <p>Sign the commitment</p> <p>Please register online, sign this document, and return a signed copy to commitments@sciencebasedtargets.org. The SBTi reserves the right to carry out due diligence reviews before accepting and publishing commitments.</p> <p>This SBTi commitment letter can be signed by any organization representative, but the commitment application form requires the contact details of a managerial level point of contact in the organization.</p> <p>Once this commitment letter is processed and you have received formal confirmation over email, your organization will be recognized as "Committed" on the SBTi website and the partner websites of UN Global Compact and We Mean Business. Organizations committing to set a net-zero target will also be added to the UNFCCC Race to Zero website provided the organizations are eligible to join at this time.</p> <p style="margin-top: 20px;">Company name: <u>Amara Raja Energy and Mobility Limited</u></p> <div style="display: flex; justify-content: space-between; margin-top: 20px;"> <div style="text-align: center;">  <hr style="width: 100%;"/> <p>Harshavardhana Gourinani</p> </div> <div style="text-align: center;"> <p>India</p> <hr style="width: 100%;"/> <p>Headquarters Country</p> </div> <div style="text-align: center;"> <p>1/June/2024</p> <hr style="width: 100%;"/> <p>Date</p> </div> </div>
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Key Highlights on the Climate Action

 <p align="center">Governance</p>	<p>The following processes have been implemented</p> <ul style="list-style-type: none"> • The Chief Sustainability Officer (CSO) under the leadership of the Executive Director facilitates implementation of the TCFD requirements. • Sustainability aspects including Net Zero programs are overseen by the board during the quarterly review meetings. 	<ul style="list-style-type: none"> • Organization support including budgets needed for implementing TCFD requirements is approved by the Sustainability Committee. • CSO with the support of COO and functional heads is responsible for implementing the climate-action programs. • Climate-related disclosures are verified by a third-party assurance process as per ISAE 3000 standards.
 <p align="center">Strategy & Risk Management</p>	<ul style="list-style-type: none"> • Scenario analysis was led by the CSO under the leadership of the Executive Director and Sustainability committee members. • Scenario analysis has been undertaken to define the short-term and mid-term goals. • Physical risks such as impacts from the rise in floods and drought scenarios have been evaluated for the two operating sites in Andhra Pradesh. It is estimated that the financial impact due to physical risks would be as high as INR 2.75 billion under the “Do-Nothing scenario”. • Chronic risks from the rise in ambient temperature and its impact on the workers’ productivity and operations’ productivity have been evaluated and the financial impact would be as high as INR 4.05 billion under the “Do-Nothing scenario”. • Transition risks due to possible direct or indirect carbon prices in the operating markets in the short-term scenario have been estimated at INR 1.52 billion. 	<ul style="list-style-type: none"> • A Net Zero plan for covering the targets for 2027, 2032, and 2040 has been defined and the same has been published in the mainstream Integrated Report. • Clear roadmap has been identified to meet the targets for FY 2027, and FY 2032. • An Internal Carbon Price (ICP) of INR 1800 per tonneCO₂e has been considered as the minimum investment for meeting the Net Zero targets in the near-term scenario. • RE power sourcing through various Green Open Access mechanisms is emerging as a potential option for reducing Scope 2 emissions. • Since more than 52% of the GHG emissions will be generated from purchased goods (Scope 3 emissions), supplier engagement has covered more than 90% of the suppliers based on procurement value.



Metrics and Targets

GHG Emissions:

- Scope 1 emissions increased from 6159 Tons in FY 2023 to 6604 Tons in FY 2024 due to an increase in production throughout the operating facilities.
- Scope 2 emissions have reduced from 2,42,867 Tons in FY2023 to 2,09,781 Tons in FY 2024 due to an increase in the share of REPower in the total electrical energy consumption.
- There is a marginal increase (~1.1%) in the Scope 3 emissions from 4,00,948 Tons in FY 2023 to 4,05,699 Tons in FY 2024.

GHG emissions reduction programs implemented:

- Installed 62 MW of solar power units (solar rooftop and off-site solar power), which resulted in achieving 67,100 Tons of GHG emissions avoidance.
- Total REPower consumption has increased to 23.46% of the total electrical energy consumption, which helped to avoid 33,590 TPA of Scope 2 emissions.
- Implemented various energy conservation measures and achieved reduction in grid power consumption that resulted in the avoidance of about 3,700 Tons per year of GHG emissions.
- Implementation of energy conservation measures in the ZLD plant LPG consumption resulted in the reduction of about 858 TPA of GHG emissions.

Proposed GHG emission reduction Targets for 2027

- To achieve 30% reduction in Scope 1 and 2 emissions from the base-year FY 2022 levels.

Proposed GHG emission reduction Targets for 2032

- To achieve 60% reduction in Scope 1 and 2 emissions from the base-year FY 2022 levels.
- To achieve 30% reduction in Scope 3 emissions from the base-year FY 2022 levels.

1. Structure of the Report

1.1 Brief Overview of TCFD

The Task Force on Climate-related Financial Disclosures (TCFD) provides a global framework for companies to disclose climate-related financial risks and opportunities. It encourages transparency on how climate change impacts business strategy, operations, and financial performance. The TCFD's recommendations focus on four key areas: Governance, Strategy, Risk Management, and Metrics & Targets. Companies are expected to disclose how they identify, assess, and manage climate-related risks, the impact of climate scenarios on their strategies, and track their performance through measurable metrics (**Figure 1**). This ensures better decision-making for investors, stakeholders, and financial institutions regarding climate resilience and sustainability efforts. According to the **TCFD**, climate-related risks are classified into **physical risks** and **transition risks**:



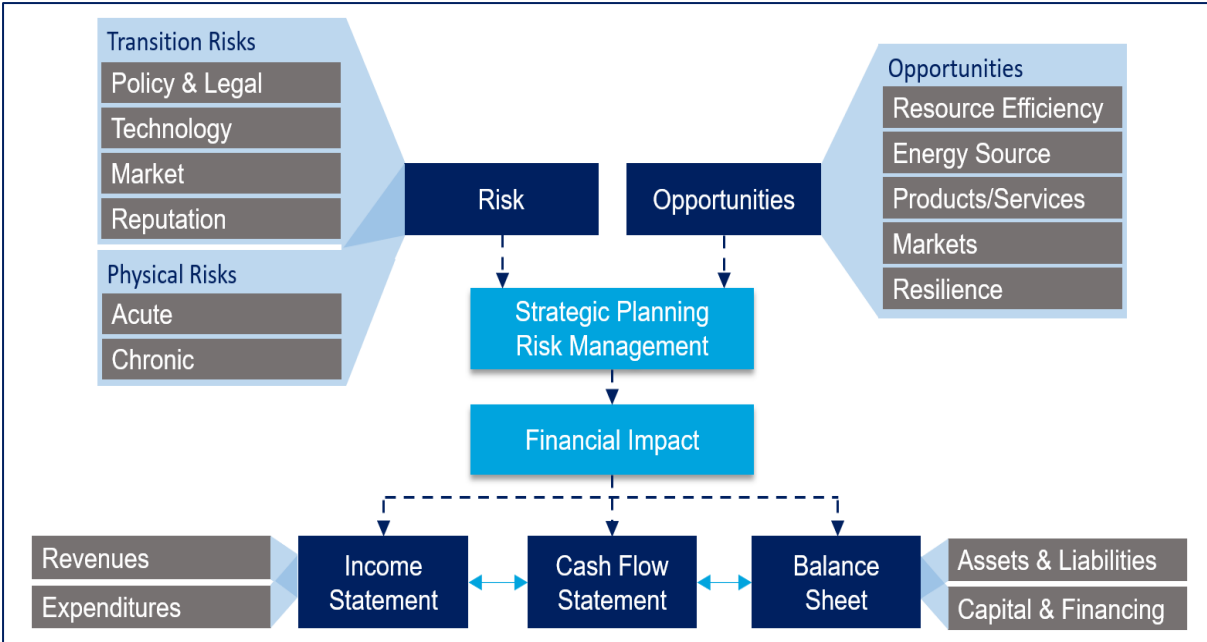
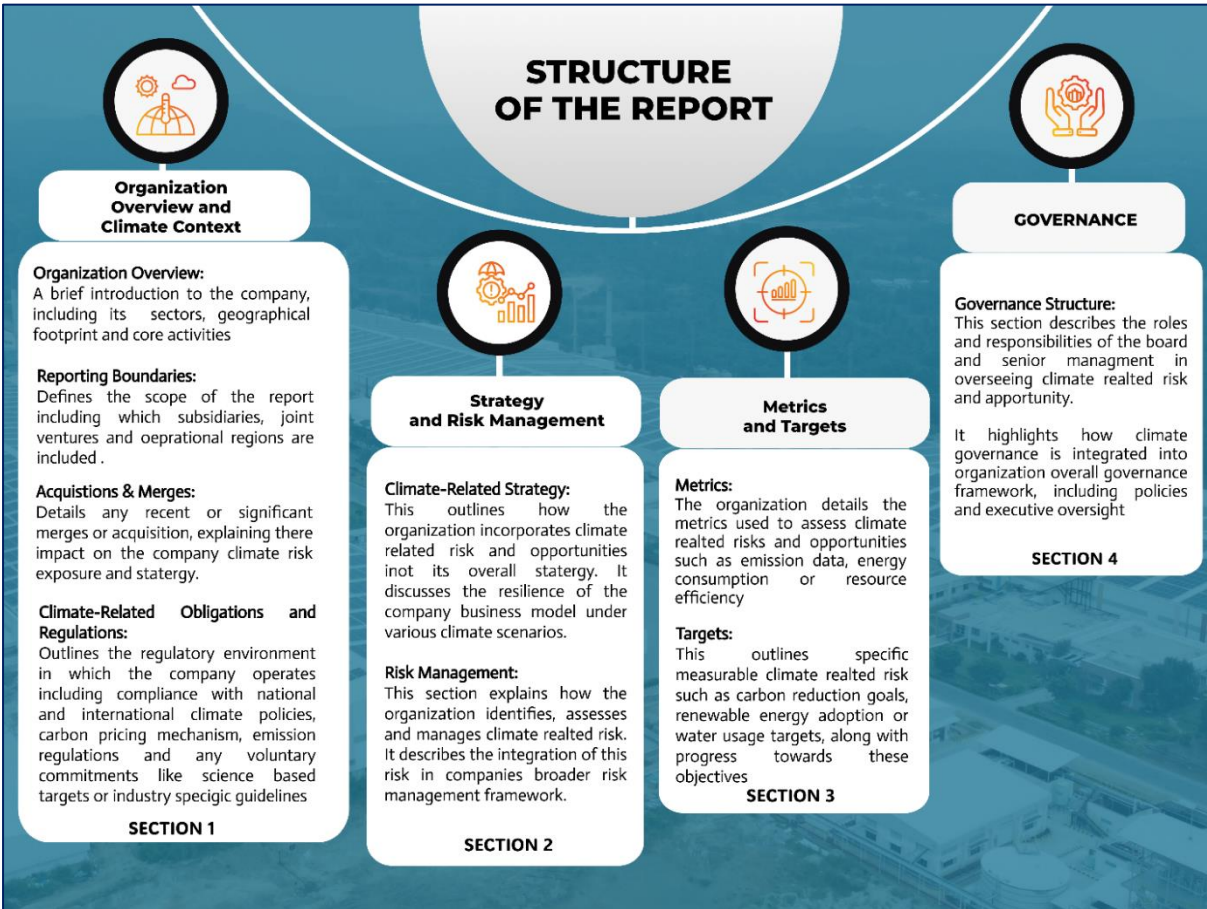
	<p>Physical risks arise from acute weather events (e.g., storms, floods, wildfires) or chronic climate changes (e.g., rising temperatures, sea level rise) that can directly impact assets, supply chains, and operations.</p>		<p>Transition risks result from the shift to a low-carbon economy, including policy changes (carbon pricing, regulations), market dynamics (shifting consumer preferences), and technological disruptions. These risks can affect the value of assets, operational costs, and market competitiveness.</p>
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Figure 1. Overview of the TCFD Requirements

Governance	Strategy	Risk Management	Metrics & Targets
<p>Disclose the organization's governance around climate-related risks and opportunities.</p>	<p>Disclose the actual and potential impacts of climate-related risks and opportunities on the organization's businesses, strategy, and financial planning where such information is material.</p>	<p>Disclose how the organization identifies, assesses, and manages climate-related risks.</p>	<p>Disclose the metrics and targets used to assess and manage relevant climate-related risks and opportunities where such information is material.</p>

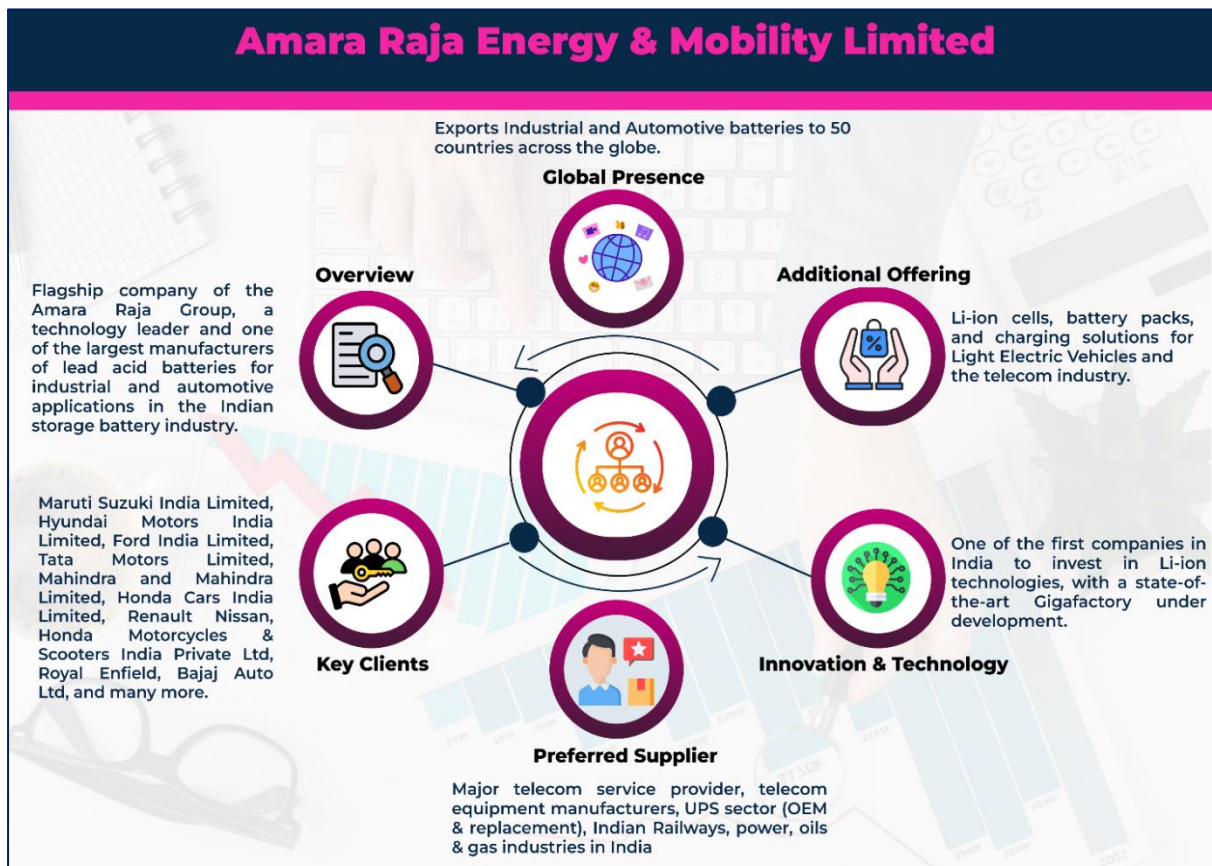


1.2 Structure of the Report



2. Organization overview and climate context

2.1 Organizational Overview



 AUTOMOTIVE Powering your Journey Amara Raja Energy & Mobility is India's largest automotive batteries and allied products manufacturer with brands that are the preferred choice with retail customers as well as OEMs. The products are exported to over 50 countries worldwide.	 INDUSTRIAL Powering Innovation Amara Raja offers a wide range of batteries for segments like UPS, Telecom, Railways, Motive, Defence etc. It was the pioneer in manufacturing Valve Regulated Lead Acid (VRLA) batteries in India.	 ADVANCED CELL TECHNOLOGIES Powering the Future Amara Raja offers Li-ion cells, battery packs and charging solutions for Light Electric Vehicles and telecom industry. It is one of the first companies to invest in Li-ion technologies in India with a state-of-the-art Gigafactory in the works.
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ARE&M operates several subsidiary companies, including:

- (1) Amara Raja Batteries Middle East (FZE) (ARBME), which handles trading operations in the Middle East,
- (2). Amara Raja Circular Solutions Private Limited (ARCS), is in the process of establishing a lead-acid battery recycling facility in Cheyyar, Tamil Nadu,
- (3). Amara Raja Advanced Cell Technologies Private Limited (ARACT), with factory set up in Mahbubnagar, Telangana, is into manufacturing of lithium-ion batteries & other advanced cell technologies,
- (4). Amara Raja Power Systems Limited (ARPS), which manufactures EV chargers.

Continually expanding our footprint to reach new markets and customers, our presence spans numerous industries across 50+ countries, the majority of which are situated along the Indian Ocean Rim. Our manufacturing operations encompass 9 state-of-the-art facilities in India, ensuring top-notch quality for our diverse range of products. Additionally, we maintain a network of twenty-two offices both in India and abroad, strategically positioned to serve our clientele worldwide.

During the fiscal year 2023-24, ARE&M achieved an annual standalone turnover of INR 112,603 million. ARE&M saw approximately 8% revenue growth in FY 2023-24 compared to the previous fiscal year (FY 2022-23).

ARE&M operates facilities in Tirupati and Chittoor districts of Andhra Pradesh, India with a total workforce of 9313 (Including ARTS trainees). The company counts prestigious companies such as Maruti Suzuki India Limited, Hyundai Motors India Limited, Daimler Trucks AG, Ford India Limited, Tata Motors Limited, Mahindra and Mahindra Limited, Honda Cars India Limited, Renault Nissan, Honda Motorcycles & Scooters India Private Ltd, Royal Enfield, Bajaj Auto Ltd, Airtel Ltd, Schneider Electric, Indus towers Ltd among its clients. ARE&M exports industrial and automotive batteries to over 50 countries worldwide. In India, the company's top-tier automotive and home UPS/Inverter batteries are distributed under the Amaron and PowerZone brands through an extensive retail network. These products and services are favoured by major industries, including telecom (service providers and equipment manufacturers), UPS, Indian Railways, Motive, and Power and Gas sectors.

Environmental risks and opportunities are integral to ARE&M's financial planning. We are focusing on strategic investments in sustainable energy, innovation in clean technologies, and managing environmental risks, while aligning our capital expenditures with our long-term sustainability goals. This ensures that we not only comply with regulatory requirements but also capitalize on opportunities in the evolving global energy landscape. Recognizing the critical role of R&D, we are establishing the E-positive Energy Labs, a state-of-the-art innovation and research facility in Hyderabad, Telangana. A significant part of this facility is dedicated to collaborating with customers, supplier partners, start-ups, and innovation entities to create an ecosystem for innovative technologies. ARE&M is India's first AGM (Absorbent Glass Mat) two-wheeler and car battery manufacturer.

Our focus for the upcoming fiscal is on research and development, circularity, capacity optimization, and geographic expansion into new markets. We plan to introduce more value-added products such as AGM batteries, further incorporate stamped grid technology to reduce conversion costs and raw material usage for future performance requirements. We are the first Company in India to manufacture Valve Regulated Lead Acid (VRLA) batteries that provide performance reliability, consistency, durability and minimal maintenance, even in the most demanding situations. ARE&M launched Auxiliary battery featuring Multi-Stamp Grid Technology, meets new age electric vehicle test requirements, reliability, and performance.

The Group is investing in Gigafactory for manufacturing lithium-ion cells and investing in technology start-up companies to leverage capabilities for the new energy business. Our commitment to sustainable growth through the creation of a circular economy will be further strengthened by our investment into a greenfield Battery Recycling Plant in Tamil Nadu, this will eventually cater to around 25% to 30% of overall raw material requirements. Advanced New Lead Acid Technologies: Promising advancements made in advanced lead-acid and alternate chemistry storage technologies signify our commitment to pushing the boundaries of energy storage. Amara Raja Power Systems (100% Subsidiary) is in to manufacturing of Industrial Chargers, Integrated Power Systems, EV Chargers for 2W and 3W applications and other energy management devices.

2.2 Reporting Boundaries

This TCFD report is aligned with the mainstream report (Integrated report) of ARE&M for FY 2024. The following facilities and activities have been considered while evaluating the climate-related risks and opportunities for the organization and the Net Zero program.

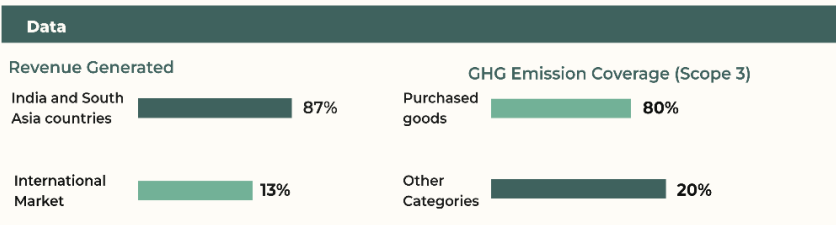
Reporting Boundaries

Embracing Eco-Friendly Practices for a Greener Tomorrow

Activities considered while evaluating the climate-related risks and opportunities for the organization and the Net Zero program.

Climate-related risks and opportunities for the organization and the Net Zero program

Revenue	GHG emissions coverage
<p>About 87% of the revenue is generated from the India and South Asian countries</p> <ul style="list-style-type: none"> All company owned manufacturing facilities. Battery component manufacturing facility. 13% of the revenue is generated from the international market, especially the Middle East, and Africa 	<ol style="list-style-type: none"> Scope 1 emissions: use of fossil fuels (fuel oil, natural gas, and acetylene), refrigerants, lube oil trading. Scope 2 emissions: Grid power and REPower are used through various models. Scope 3 emissions: <ul style="list-style-type: none"> Purchased goods (80% of Scope 3) - Secondary Lead, Sulphuric acid, Polypropylene, Lubricants, and traded Tubular Batteries). Other categories (20% of scope 3) - upstream transport, downstream transport, business travel, employee commuting, downstream leased assets.



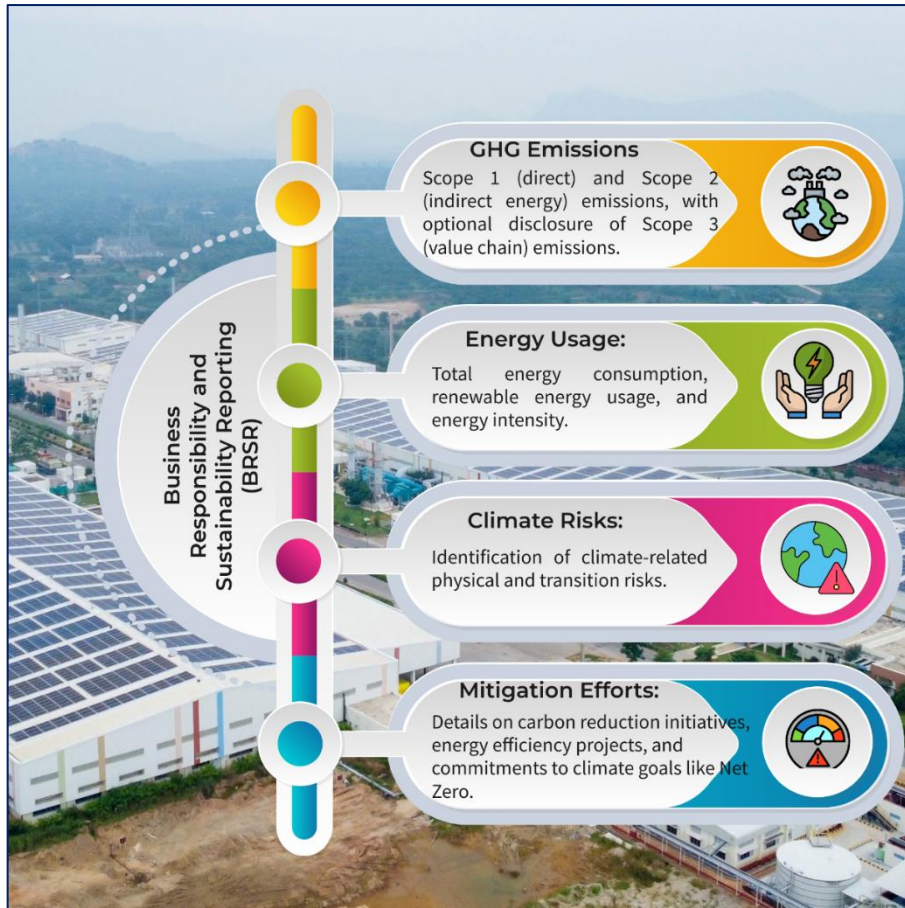
2.3 Acquisitions, and Mergers

In February 2024, Group company Mangal Industries Limited's Plastic Component for Battery Business division merged into ARE&M, which specializes in injection moulding for battery plastic components. Following the merger of Mangal Industries' Plastic Component for Battery Business division into ARE&M in February 2024, GHG emissions (Assured by an independent assurance agency against ISO 14064-1 standard) amounting to 16,424 tons of CO2e have been factored into the company's decarbonization plan, with heightened reduction targets for Scope 1 and Scope 2 emissions.

2.4 Climate-Related Obligations and Regulations

ARE&M has been constantly monitoring the changing ESG requirements by the regulatory agencies, clients, investors/banks, OEMs, and customers. The following aspects have been mapped while evaluating the climate-related risk and opportunities with a specific reference to transition risk.

- Under SEBI's **Business Responsibility and Sustainability Reporting (BRSR)** framework, companies must disclose climate change and GHG-related metrics, including:



- India's **Nationally Determined Contributions (NDCs)**, under the Paris Agreement, outline its climate commitments to reduce greenhouse gas emissions and enhance climate resilience. Key targets include:



3. **Reserve Bank of India (RBI) Guidelines**¹ has introduced draft guidelines on climate risk and scenario reporting, aligned with the TCFD framework.
4. **Client and market requirements** - Corporate net zero requirements are playing a significant role in driving supply chain decarbonization efforts. As companies commit to achieving net zero emissions, they are increasingly looking beyond their own operations to address emissions generated along their entire supply chain.
5. **The anticipated rise in coal and fuel oil costs** in India is driving a push towards greater adoption of renewable power sources. As traditional fossil fuel prices escalate, businesses are increasingly turning to renewable energy options to mitigate operational expenses and reduce reliance on volatile energy markets.
6. **Carbon tax:** India currently does not have a direct carbon tax but implements an implicit carbon pricing mechanism through excise duties on coal and other fossil fuels.
7. **The Indian carbon trading scheme** presents new opportunities for companies to participate in carbon markets, reduce emissions, and generate revenue. By trading carbon credits, companies can offset their carbon footprint, comply with regulations, and demonstrate environmental stewardship.
8. **The India Green Open Access Rules 2022** offer fresh avenues for corporate decarbonization by allowing businesses to procure renewable energy directly from generators. This regulation enables companies to reduce their carbon footprint, enhance energy security, and lower electricity costs while supporting the growth of renewable energy sources.
9. **The cost of Energy Certificates (ECERTs)** in India can vary from INR 700 to 1000 per tonne of CO₂e depending on market dynamics, demand-supply factors, and regulatory changes. Typically, ECERT prices are influenced by factors such as renewable energy generation, compliance requirements, and trading volumes in the market.
10. **The Carbon Border Adjustment Mechanism (CBAM)** under the EU's Carbon Social Responsibility Directive (CSRD) is likely to impact Indian exports to the EU. Indian exporters may face additional costs or restrictions if their products do not meet the EU's emissions standards.

¹ [Reserve Bank of India - Database \(rbi.org.in\)](https://www.rbi.org.in)

3. Strategy and Risk Management

This section outlines ARE&M's approach and analysis of climate-related risks, opportunities, and risk management. Physical risk aspects and transition risks have been evaluated using published scenario analysis tools.

3.1 TCFD Requirements and Our Approach

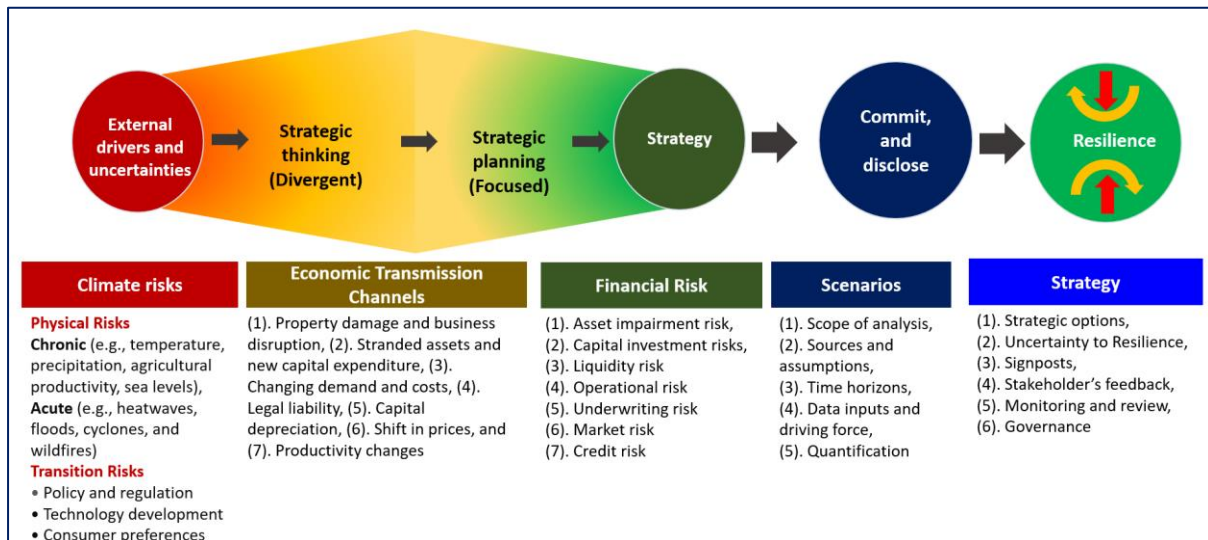
As per TCFD, strategy is defined as “an organization's desired future state. An organization's strategy establishes a foundation against which it can monitor and measure its progress in reaching that desired state. Strategy formulation generally involves establishing the purpose and scope of the organization's activities and the nature of its businesses, taking into account the risks and opportunities it faces and the environment in which it operates”.

Physical risks include a range of factors, such as natural disasters, supply chain disruptions, infrastructure vulnerabilities, or accidents. The severity and likelihood of risks and their potential financial implications on ARE&M are evaluated through interaction with board-level committees based on the location of their assets and their exposure to climate-related incidents in the past.

Transitional risks, which arise from technology advancements, regulatory changes, market shifts, or societal trends, are also thoroughly examined. Our Senior Leaders bring in their expertise and industry knowledge to identify potential transitional risks that could significantly impact our business, either by presenting new opportunities or posing substantial challenges. Clarity on the financial and strategic impact on our business is achieved through the finalization of identified potential risks, which enables us to align our efforts, resources, and strategies to effectively manage and mitigate these risks.

ARE&M has also adopted various Climate Scenario Analysis techniques aligned with the Intergovernmental Panel on Climate Change (IPCC). Details of the same are presented below (Figure 2). Scenarios represent credible and coherent visions of the future, built upon internally consistent assumptions about influential factors and relationships. We utilized two scenarios to explore a range of potential risks and opportunities associated with climate change. These scenarios are widely accepted and recommended by the Task Force on Climate-Related Financial Disclosures (TCFD) for Climate Scenario Analysis. However, we recognize that each scenario is based on certain assumptions that may not capture all possible outcomes. Given the diverse nature of risks and their potential financial implications, we view Climate Scenario Analysis as an ongoing and evolving process, enabling us to continually assess and adapt to changing circumstances.

Figure 2. Overview of Integrating Scenario Analysis in the Organizations' Climate Action Strategy



<p>Physical Risks</p>	Acute <ul style="list-style-type: none"> • Increased severity of extreme weather events such as cyclones and floods <hr/> Chronic <ul style="list-style-type: none"> • Changing weather patterns and rising mean temperature and sea levels
<p>Transition Risks</p>	Policy and Legal <ul style="list-style-type: none"> • Increased pricing of GHG emissions • Enhanced emissions-reporting, obligations • Mandates on and regulation of existing products and services • Exposure to litigation <hr/> Technology <ul style="list-style-type: none"> • Substitution of existing products and services with lower emissions options • Unsuccessful investment in new technologies • Costs to transition to lower emissions technology <hr/> Market <ul style="list-style-type: none"> • Changing customer behavior • Uncertainty in market signals • Increased cost of raw materials <hr/> Reputation <ul style="list-style-type: none"> • Shifts in consumer preferences • Stigmatization of sector • Increased stakeholder concern or negative stakeholder feedback

3.2 Global Climate-Related Risk Scenarios

Global Temperatures continue to rise:

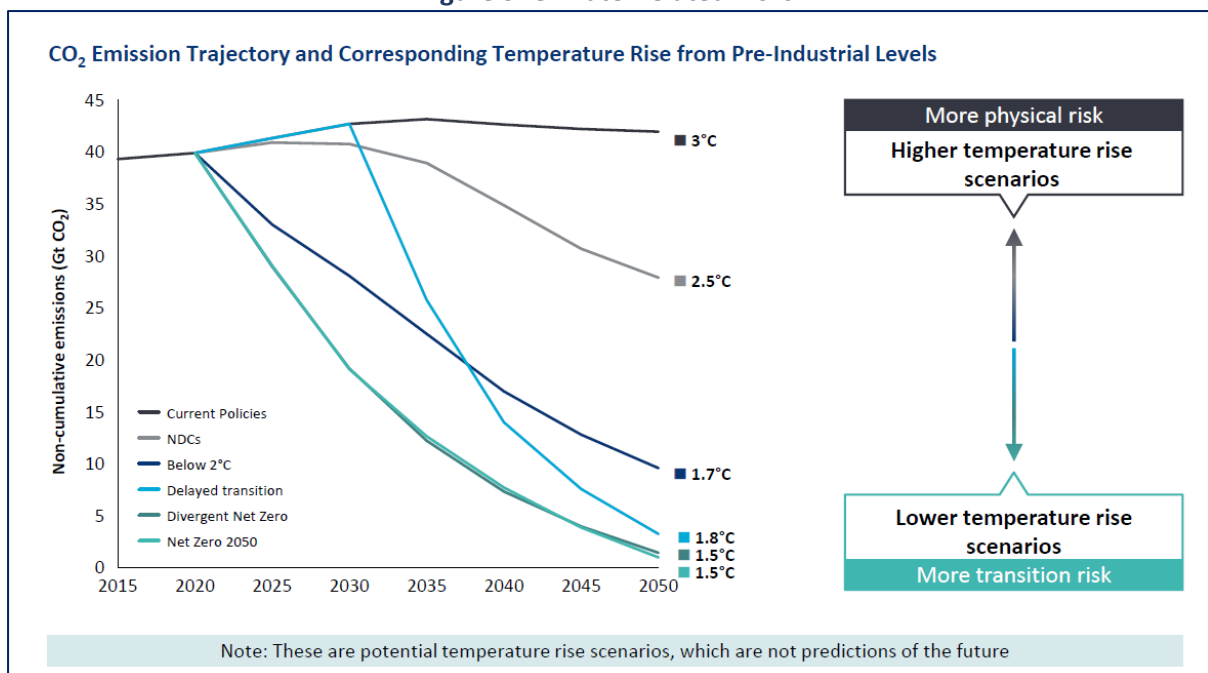
As per the 2023 IPCC's² report, human-induced global warming of 1.1 degrees C has spurred changes to the Earth's climate that are unprecedented in recent human history. The world has already experienced a 1.1 °C of temperature rise and it will continue to increase at the current rate of implementation of NDCs. The report also projected that Climate impacts on people and ecosystems are more widespread and severe than expected, and future risks will escalate rapidly with every fraction of a degree of warming.

² <https://www.wri.org/insights/2023-ipcc-ar6-synthesis-report-climate-change-findings>

3.3 Identification of climate-related risks for ARE&M Business Operations

In scenario analysis, a high-temperature rise (e.g., 3-4°C) leads to greater physical risks, such as extreme weather events, rising sea levels, and resource scarcity, directly impacting infrastructure, supply chains, and operations. Corporates face damage costs, disrupted services, and increased insurance premiums. Conversely, a low-temperature rise (e.g., 1.5-2°C) scenario is achieved through aggressive climate actions, leading to transition risks. These include regulatory changes, carbon taxes, and shifts to renewable energy, impacting high-emission industries. Companies may face stranded assets, market shifts, and compliance costs as they transition to low-carbon models (Figure 3).

Figure 3. Climate-Related Risks



Source: IIASA NGFS Climate Scenarios database, REMIND model; End of century warming outcomes shown.

3.3.1 Physical Risks

Physical Risks

Chronic risks: ARE&M has assessed both physical and transition risks. Physical risks include flooding of operational plants at the Tirupati & Chittoor District of Andhra Pradesh India, increase in operating costs due to a rise in ambient temperatures. ARE&M has identified flooding as a highly impacting acute physical risk at our operating plants in Andhra Pradesh, India through scenario analysis using the climate change-related data projections provided by the World Resource Institute and World Bank Knowledge Exchange Portal³. It is projected that the number of heaviest rainfall days in the area will increase to 5 to 6 days in a year and such events may occur once in three to five years. Taking these factors into account, financial risk has been estimated as INR 2750 million with a consideration of the number of days the plant would undergo shut-down due to flooding in the operation or supply and value chain. Recognizing the impact that these events could have on our revenue by disrupting plant operations, we are actively evaluating risk mitigation measures to safeguard business continuity and ensure the resilience of our operations in the face of a changing climate and increased flood risks. As per the WRI water risk tool, ARE&M facilities fall under the moderate water scarcity area for the 2030 scenario, hence acute risks due to droughts at the operating plants are not a significant risk.

The estimated annual increase in operational costs resulting from chronic physical risks is based on several factors, including the heightened usage of HVAC systems and a rise in employee absenteeism due to health issues exacerbated by the effects of climate change. The following assumptions have been made to estimate the financial impacts to the organization based on the published information on climate change impacts on the business: (1). Reduces 2% GDP (overall productivity of business), (2). 3 to 5% increase in HVAC costs, (3). Cuts the life of electrical motor winding insulation by 5%, (4). Increase in raw material cost by 2.5%, (5). Increases worker absenteeism by about 3%, (6). Reduces fuel economy by about 5%. These factors have been carefully considered to project the potential financial impact on our operations to the tune of INR 4040 million and to develop appropriate strategies to address and mitigate these risks proactively.

³ [Home | Climate Change Knowledge Portal](#)

3.3.2 Transition risks

Transition risks

The following anticipated transition risks have been mapped:

The anticipated rise in coal and fuel oil costs in India is driving a push towards greater adoption of renewable power sources. As traditional fossil fuel prices escalate, businesses are increasingly turning to renewable energy options to mitigate operational expenses and reduce reliance on volatile energy markets. Embracing renewables not only offers cost stability but also aligns with sustainability goals, promotes environmental responsibility, and helps future-proof businesses against escalating fuel costs in India's evolving energy landscape.

Client and market requirements - Corporate net zero requirements are playing a significant role in driving supply chain decarbonization efforts. As companies commit to achieving net zero emissions, they are increasingly looking beyond their own operations to address emissions generated along their entire supply chain. This shift is driving suppliers to adopt more sustainable practices to meet the evolving expectations of their customers. Furthermore, as more companies prioritize sustainability in their procurement decisions, suppliers that can demonstrate a commitment to decarbonization and offer low-carbon products and services are gaining a competitive edge. This is pushing other suppliers to follow suit to remain competitive in the market and secure business from environmentally conscious customers.

Carbon tax: India currently does not have a direct carbon tax but implements an implicit carbon pricing mechanism through excise duties on coal and other fossil fuels. The Clean Environment Cess on coal, for instance, indirectly taxes carbon emissions. In the future, India may adopt a more formal carbon tax or emissions trading system (ETS) as it transitions to a low-carbon economy. This would align with global trends and strengthen India's climate commitments under its Net Zero by 2070 target. Due to the absence of any carbon tax mechanism in India, the transitional risks due to carbon tax policies are also not envisaged until 2030. Since ARE&M is currently not involved in business activities in Europe, the carbon border adjustment mechanism is not applicable as of now. If ARE&M is not to adopt climate mitigation measures and continues with a business-as-usual scenario, its carbon emissions (Scope 1 and 2) are projected to reach 460965 tons by 2027 business-as-usual scenario.

The TCFD recommendations specifically recommend that organizations consider a set of scenarios, including a '2°C or lower scenario' in line with the 2015 Paris Agreement. This low-carbon scenario is centred on 'transition' risks and looks at the rapid changes (policy, technology, market, and reputational risks) that will be needed to cut emissions in line with the Paris Agreement.

3.3.3 Opportunities

Opportunities

The **Scope 1 reduction opportunities**: The Scope 1 emissions from the operating sites contribute to less than 1% of the total GHG emissions. Since the existing operating sites have already adopted cleaner fuels for heating of material and steam generation for ZLD operations, GHG emissions from the fossil fuel at the operating sites are not a priority at this juncture. Although the Scope 1 emissions from refrigerant use are less than 0.5% of the total GHG emissions, these emissions contribute to more than 45% of the Scope 1 emissions. It is proposed to phase out the air conditioning units utilizing high GWP refrigerants in a phased manner.

Energy conservation: Scope 2 emissions contribute to about 35% of the total emissions. The majority of the Scope 2 emissions are attributed to charging the battery before dispatching it to the market. Energy efficiency is a constant drive at AR&EM operations. It is also projected that about 30 million KWHR per year of electrical energy will be conserved by the end of 2027 due to the adoption of various energy conservation measures, which can result in a reduction of about 20,000 Tons per year of GHG emissions.

Green Open Access Power becomes cheaper: The Green Power Tariff mechanism suggested by GoI under the Green Open Access Rules 2002 indicates an electrical energy tariff difference of INR 4 to 5 per KWHR as against the grid power cost of INR 7 to 8 per KWHR. Based on this information, the payback period of the solar power installation will be in the order of 5 to 6 years. ARE&M has invested about INR 2622 million towards RE and energy conservation measures that have resulted in GHG emissions to the tune of 67,100 TPA. Based on this information the internal carbon price is estimated as USD 30 per tonne of GHG over a solar power plant life span of 15 years. ARE&M is exploring sourcing of green power from various sources in line with the Green Open Access Rules 2022 issued by GoI. This includes the purchase of RE power from the state electricity boards as per Green Power Tariff regulations, solar power plant operators as per Green Open Access Rules, or Group Captive RE Power projects. Based on the above rationale, ARE&M has estimated the likely internal carbon price as INR 1800 per tonne of CO₂e (USD 20 per tonne).

Scope 3 emission reduction opportunities: Purchased goods contribute to more than 80% of the Scope 3 emissions. The majority of Scope 3 (Purchased goods) is attributed to the procurement of primary lead, secondary lead, and traded batteries. The following GHG reduction plan will be adopted to reduce the Scope 3 (purchased goods) emissions by 30% by the end of 2032 in line with the Science Based Targets (SBTi): (1). Reduced grid emission factors from current levels of 0.716 KG/KWHR to less than 0.55 KG/KWHR by the end of 2030 will help to reduce the scope 2 emissions of the suppliers significantly, (2). Our major primary lead suppliers have already committed to net zero plans, (3). Commissioning of 150,000 Tonnes Per annum battery recycling facility at Cheyyar. Due to the adoption of RE & Liquefied Natural Gas instead of Furnace Oil use at our facility as part of the Scope 1 and Scope 2 emission targets of 60% at our own facilities by 2032, the GHG emissions from the secondary lead recycling will be reduced significantly, (4). We are engaging with all secondary lead recyclers and encouraging them to adopt carbon reduction targets and switch over to cleaner fuels.

Opportunities

Transport-related emission reduction opportunities (Scope 3 emissions): Using CNG, blended ethanol fuels, and electric trucks in India reduces fuel costs by offering cheaper alternatives to diesel. CNG vehicles benefit from lower fuel prices and reduced maintenance, while electric trucks, despite higher upfront costs, offer long-term savings through lower energy expenses and fewer mechanical parts, reducing operational and fuel expenditures significantly. As a part of the Net Zero Plan, it is committed to reducing the transportation-related emissions in the upstream and downstream activities by 30% from the base year FY 2022 by the end of FY 2032. The following initiatives have been proposed to meet the targets: (1). Fuel Efficiency & Alternative Fuels: Shift a portion of the fleet to CNG and biodiesel to reduce emissions. (2). Route Optimization Systems: Using route optimization software to minimize fuel use and travel time. (3). Shift to Rail (Ro-Ro Services): Maximize the use of India's Roll-on Roll-off (Ro-Ro) services to reduce road congestion and emissions. (4). Fleet Maintenance: Implement regular fleet maintenance to ensure better fuel efficiency. (5). Use of larger trucks: Investing in larger trucks with better fuel efficiency to reduce overall trips.

India's emerging carbon trading scheme⁴, launched under the National Action Plan on Climate Change (NAPCC)⁵, helps corporates monetize carbon offsets by allowing them to trade carbon credits earned through emission reductions. Companies that surpass their carbon reduction targets generate surplus credits, which can be sold to businesses that exceed their emissions limits. This incentivizes cleaner technologies and energy efficiency. By participating in the market, corporates can not only meet regulatory requirements but also generate revenue from their green initiatives, aligning profitability with sustainability. The scheme encourages the adoption of low-carbon solutions and fosters a competitive carbon market in India.

3.3.4 Summary of Scenario Analysis

Scenario Analysis

All the identified physical and transitional risks have been meticulously categorized into short-term, medium-term, and long-term goals (Table 1). This comprehensive classification allows us to prioritize and address these risks with appropriate strategies based on their timeframes. By aligning our efforts with these categorized goals, we ensure a systematic approach to managing and mitigating potential challenges across different time horizons, fostering resilience and sustainability in our business operations.

- Short-Term: 0 to 5 Years (2022 to 2027)
- Medium-Term: 5 to 10 Years (2027 to 2032)
- Long-Term: 10 to 28 Years (2032 to 2050)

⁴ [Carbon Market | BUREAU OF ENERGY EFFICIENCY, Government of India, Ministry of Power](#)

⁵ [doc202112101.pdf](#)

Table 1. Summary of Scenario Analysis

Risk Type	Transitional Risk	Transitional Risk	Acute Physical	Acute Physical	Chronic Physical
Risk	Increase in customer preferences for low carbon footprint products. Increase in banks and investors' focus on client-resilient investments.	Expansion of the international market can attract Carbon Border Adjustment Mechanisms in the mid-term scenario.	Heavy precipitation could lead to water logging and flooding at the operating plants in Andhra Pradesh, India.	Possible increase in drought frequency leading to water scarcity at the operating facilities.	An increase in ambient temperatures and heat Stress can lead to reduced workers' productivity, an increase in HVAC costs, and reduced electrical equipment efficiency etc.,
Likelihood	Very Likely	Very Likely	Likely	Less likely	Very Likely
Impacts	Rise of fuel costs, supply chain disruptions due to non-compliance with Net Zero programs, Risk of losing advantage and market share in emerging markets		Increased capital expenditures		Increased indirect (operating) costs
Risk Rating	High	Medium	High	Low	High
Timeline	Short- term	Mid Term	Medium – Term	Long-Term	Long-Term
Financial Implications	INR 691 million per year by the end of 2027	INR 833 million per year by the end of 2027	INR 2750 million per three to four years flood cycle	Not envisaged in the short-term and mid-term scenarios.	INR 450 million
Methodology	Based on the Do-Nothing scenario, the Scope 1 and 2 emissions (based on revenue generated from the domestic operations) by the end of 2027 will be in the order of 345723 TCO _{2e} . Considering the prevailing ECERT value of INR 2,000 per tonne of CO _{2e} , the financial implication will be INR 691 million per year.	Based on the Do-Nothing scenario, the Scope 1 and 2 emissions (based on revenue generated from the domestic operations) by the end of 2027 will be in the order of 115241 TCO _{2e} . Considering the prevailing ETS market price of USD 85 per tonne of CO _{2e} , the financial implication will be INR 833 million per year by the end of 2027.	Considering the heaviest rainfall days in the area will increase to 5 to 6 days in a year which might result in floods at the operating facilities that can lead to production disruptions and financial loss of INR 2750 million once in three to four years of such flood incidents.	Not applicable	The estimated annual increase in operational costs resulting from chronic physical risks is based on several factors, including the heightened usage of HVAC systems and a rise in employee absenteeism due to health issues exacerbated by the effects of climate change. These factors have been carefully considered to project the potential financial impact on our

Risk Type	Transitional Risk	Transitional Risk	Acute Physical	Acute Physical	Chronic Physical
					operations and to develop appropriate strategies to address and mitigate these risks proactively.
Opportunity	Invested in solar power generation, with a capacity of 62 MW. Additionally, AREM has ambitious plans to procure an additional 279 MW equivalent of green power over the next decade.	Invested in solar power generation, with a capacity of 62 MW. Additionally, AREM has ambitious plans to procure an additional 279 MW equivalent of green power over the next decade.	We are committed to conducting thorough asset integrity evaluations to assess the vulnerability of our assets to floods and high-humidity environments. This evaluation process will enable us to identify areas of potential risk and implement mitigation measures. This includes the construction of protective infrastructure, the implementation of advanced drainage systems, and the adoption of effective flood prevention measures. It has been considered that we may invest at least 50% (INR 1375 million) of the anticipated financial impact in mitigating the climate-related risk.	Not applicable	We will take proactive measures that will focus on reducing indoor thermal emissions and improving work zone comfort for increased productivity. Transitioning to energy-efficient motors will improve operational reliability and reduce energy consumption. Strategies will include minimizing heat sources and optimizing ventilation systems for a comfortable working environment. It has been considered that we may invest at least 50% (INR 225 million) of the anticipated financial impact in mitigating the climate related risk through various activities such as improving the HVAC system and employee wellbeing, supply chain and value chain management.

3.3.5 Risk Management



ARE&M has been adopting the following risk management process:

- ARE&M has established clear governance structures for climate risk management, and assigned roles to the Executive Director, Chief Sustainability Officer (CSO), Chief Operations Officer, plant and functional heads. CSO is primarily responsible for planning and coordinating the activities related to scenario analysis, conducting internal capacity-building training, organizing scenario analysis workshops with all relevant stakeholders finalizing the risks and opportunities matrix, and presenting the proposal to the board.
- Scope 1, 2, and 3 emissions were audited and assured by an external agency as per SAE 3000 standards
- Net Zero plans are published in the mainstream report (integrated report 2024)⁶



- Relevant information on the organizational context has been obtained from various departments such as marketing heads, plant heads, divisional heads, and various functional heads.
- Published information on climate change-related data such as temperature, and floods, drought frequencies have been obtained from the IPCC 2023 report, the World Bank Climate Change Knowledge portal, for the operational sites and major raw material supplier operating areas.

⁶ amararajaeandm.com/Files/AnnualGeneralMeetingFiles/2023/ARE&M_Integrated_Report_FY_2023-24.pdf

- Information on the clients and market needs on the Scope 3 emission reporting and decarbonization obligations have been obtained from the marketing team and evaluated the transitional risk due to market preferences.
- Information on the geographies (markets) proposed to be covered under business expansion plans to evaluate the applicability and implication of local regulations on the organizations' transitional risk scenarios
- Collected energy and GHG emission data from all major raw material suppliers and engaged them every month to evaluate the possible transitional risks
- Based on the above data, information, and stakeholders' consultations, a detailed scenario analysis has been developed with areas of concern, the possible magnitude of financial impacts, time horizons of the impact, and investments needed to reduce the risks
- A leadership team workshop was conducted on 19th August 2024 and the scenario outcomes (risks and opportunities) were debated and finalized
- The scenario was approved by the Executive Director of the company and presented to the board and a Net Zero commitment letter was signed by the Chairmen and Managing Director of the organization, who is the highest authority in the organization
- The outcomes and recommendations of the scenario analysis will be considered in the business continuity plan and business plan of the organization for the FY 2024:25.
- To enhance the quality of the scenario analysis, an external ESG expert has been engaged



- The following risks were evaluated which are significant to the organization
 - Rise in temperature, heat waves, flood risk, and drought risk.
 - Transition risks (e.g., rising fossil fuel prices, climate action policy changes including NDCs, and customer requirements).
- Risks associated with productivity loss and HVAC costs due to rising temperatures and heat waves have been identified as major risks in the mid-term scenario (5 to 10 years).
- While drought-related risks are not significant to the business operations for the next 10 years, flood risk has been identified as a possible risk in the mid-term scenario (5 to 10 years).



- India energy outlook reports and current trends and future projections of fuel prices
- IPCC 2023, AR6 Synthesis report⁷
- The Climate Change Knowledge Portal (CCKP)⁸
- Aqueduct Water Risk Atlas⁹
- Nationally Determined Contributions (NDCs)¹⁰ progress reports
- Carbon price trends published by the World Bank¹¹ and Carbon Barometer data published by Kepos Capital¹²



As a part of the scenario analysis and also to understand the organization's context, the following internal and external stakeholders have been consulted.

- Internal departments – operating sites plant heads, marketing head, finance, procurement, technology, R&D, corporate reporting, and sustainability team
- External stakeholders – All raw material suppliers who contribute to more than 80% of the Scope 3 emissions.

⁷ [AR6 Synthesis Report: Climate Change 2023 – IPCC](#)

⁸ [Home | Climate Change Knowledge Portal](#)

⁹ [Aqueduct Water Risk Atlas | World Resources Institute](#)

¹⁰ [2023 NDC Synthesis Report | UNFCCC](#)

¹¹ [State and Trends of Carbon Pricing 2024](#)

¹² [Carbon Barometer™](#)



- Each of the identified significant risk aspects has been evaluated for the financial impact on the business. Transition risks were found to be the most impacting material topics for the organization. The risk mitigation plan and budget required for decarbonizing the Scope 2 emissions have been estimated and presented to the board for necessary approvals
- Quantify the potential financial implications of identified climate risks on operations, revenues, and assets.

4. Metrics and targets

As per the TCFD reporting requirements, the following aspects have been reported: (1). Disclose the metrics used by the company to assess climate-related risks and opportunities in line with its strategy and risk management process, (2). Disclose Scope 1, Scope 2, and, if appropriate, Scope 3 greenhouse gas (GHG) emissions, and the related risks, and (3). Describe the targets used by the company to manage climate-related risks and opportunities and performance against targets.

4.1 Metrics considered

The following metrics have been adopted to assess climate-related risks and opportunities:

- Local meteorological data such as ambient temperature and precipitation
- Annual production of batteries in MnAh
- Annual revenue from domestic and international markets
- Cost of fuels and electricity (Rs. Per L of diesel and Rs per Kg of LNG)
- Total energy use intensity (GJ/MnAH)
- Specific electrical energy consumption (KWHR/MnAH)
- REenergy use (% of total electrical energy used)
- Cost of REpower procurement and tariff (Rs/KWHR)
- Scope 1, 2 and 3 emissions (tons per year)
- GHG emission intensity for each Scope category (T/MnAH and T/Million Rs earned)
- Financial impacts reported due to physical risks (Mn Rs per year)
- Financial impacts reported due to transition risk factors (Mn Rs per year)
- Investments projected for climate action-related projects (Mn. Rs)
- Internal carbon price considered (Rs per tonne of CO₂e)
- Investments made for climate action-related projects
- Financial savings due to the adoption of energy conservation measures (Mn Rs/year)
- Financial savings due to the adoption of REpower through various modes (Mn Rs/year)

4.2 GHG emissions

We prioritize meticulous carbon emissions management in alignment with the Greenhouse Gas Protocol (GHGP) and ISO 14064 standards. We actively pursue initiatives to minimize our carbon footprint through dedicated carbon emissions reduction projects and enhanced energy efficiency measures. Emphasizing sustainability, we integrate renewable energy sources, notably solar power, into our energy strategy. Details of Scope 1, 2, and 3 emissions are presented in the following **Table 2**.

The primary source of Scope 1 emissions in the facility are use of diesel for power generation in the DG sets during the emergency grid power outage scenarios, and lead melting furnace. LPG is used for generating a boiler in the Zero Liquid Discharge (ZLD) plant and ground transporting forklifts and vehicles at the plants. Small quantities of Acetylene are used for process requirements in the plant. Scope 1 emissions contribute to less than 1% of the total reported GHG emissions. Hence scope 1 reduction activities will not have any major GHG reduction gains under the Net Zero program during the short-term and mid-term scenarios. Scope 2 emissions account for about 33% of the total emissions. It can be noted that in spite of the increase in sales revenue by about 8% from the previous year, the Scope 2 emissions are reduced by about 15% from the previous year. This is attributed to the adoption of various energy conservation measures and also the increase in the use REpower. The specific emissions (total of Scope 1 and 2) have been reduced to 15.1% from the previous FY. There is a marginal change of 1.2% increase in the Scope 3 emissions when compared with the previous FY.

Figure 4. Scope 1 and Scope 2 Emissions

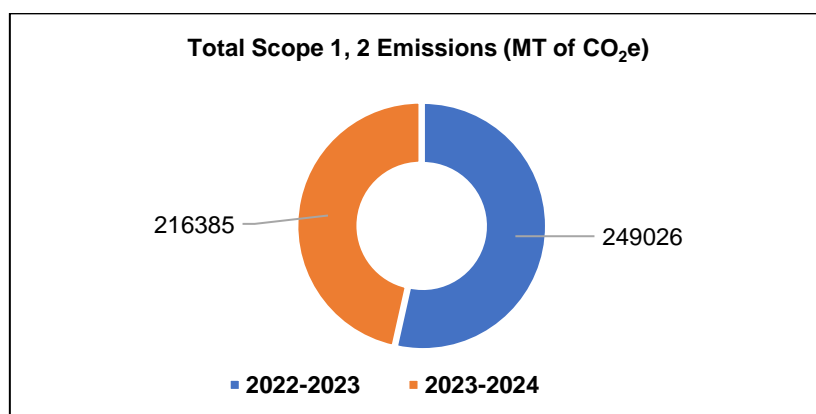


Figure 5. Scope 1 and Scope 2 emission per revenue

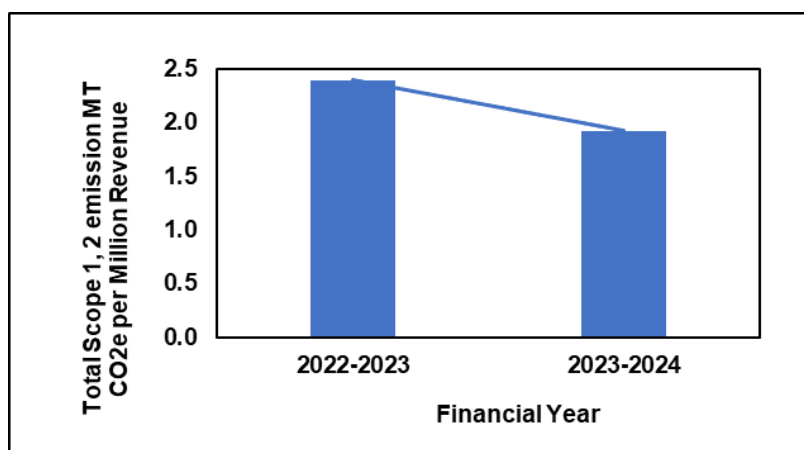


Table 2. GHG Emissions for the FY2023 and FY2024

S.NO	Parameter	Units	FY 2023:24	FY 2022:23	Projected emissions under Do-Nothing Scenario		Decarbonization plan in line with the Net Zero Plan presented in this document	
					FY 2026:27 (ref) ¹³	FY 2031:32 (Ref) ¹⁴	FY 2026:27 (ref) ¹⁵	FY 2031:32 (Ref) ¹⁶
A	Total Scope 1 emissions (Break-up of the GHG into CO2, CH4, N2O, HFCs, PFCs, SF6, NF3, if available)	Metric tonnes of CO2 equivalent	6604	6159	9774	14362	9774	14362
B	Total Scope 2 emissions (Break-up of the GHG into CO2, CH4, N2O, HFCs, PFCs, SF6, NF3, if available)	Metric tonnes of CO2 equivalent	209781	242867	451191	509284	179,356	93,712
C	Total scope 1 and 2 emissions	Metric tonnes of CO2 equivalent	216385	249026	460965	523646	189130	108074
D	Total Scope 3 emissions (Break-up of the GHG into CO2, CH4, N2O, HFCs, PFCs, SF6, NF3, if available)	Metric tonnes of CO2 equivalent	405699	400948	562378	832714	-	-
E	Total Scope 1, 2 and 3 emissions	Metric tonnes of CO2 equivalent	622084	649974	1023343	1356360	-	-
F	Total revenue for the FY (Mn Rs)		112,603	103,860	-	-	-	-
F	Total Scope 1 and Scope 2 emission intensity per rupee of turnover (Total Scope 1 and Scope 2 GHG emissions /	Metric tonnes of CO2 equivalent per Mn Rs.	1.9	2.4	-	-	-	-

¹³ Emissions scenario for FY2027 (Do-Nothing scenario) has been developed based on the following assumption: (1). Average revenue growth of 13%, and the emissions are expected to grow in promotion to the revenue growth, (2). Emissions from the battery component manufacturing facility, which is demerged with ARE&M in February 2024, (3). No decarbonization initiatives have been considered.

¹⁴ Emission estimation scenario FY2032 (Do-Nothing scenario): All the assumptions specified under the FY2027 scenario will be considered, and in addition to this, the following assumptions are considered: (1). The revenue growth rate for the period 2027 – 2032 has been projected as 8% YoY growth, and the GHG emissions will also increase in similar rate during this period, (2). As per published information by MOEFCC, the grid emission factor will reduce from its current level of 0.716 Kg/KWHR to less than 0.55 Kg/KWHR by the end of 2030 due to the implementation of NDCs by the GoI.

¹⁵ It is assumed that the electrical energy use intensity will reduce by 1.5% YoY basis until FY2026:27 with a cumulative GHG emission removal of about 20,300 Tons per year by the end of 2027. Installation of additional 6.5 MW Rooftop solar power units at the facilities and utilization of green power through green open access will result in the reduction of 2,71,835 T of CO2e by the end of 2027

¹⁶ It is projected that additional GHG emissions will be removed due to additional REPower use through the Green Open Access Procurement process.

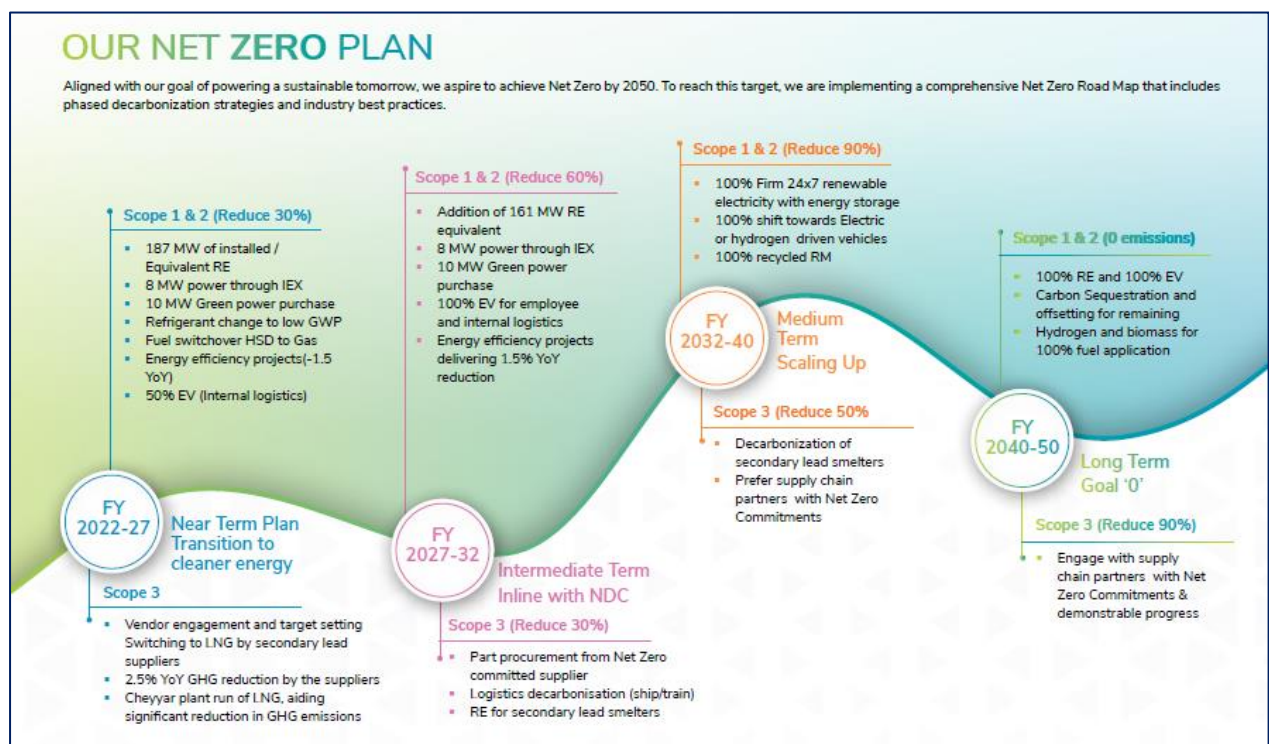
S.NO	Parameter	Units	FY 2023:24	FY 2022:23	Projected emissions under Do-Nothing Scenario		Decarbonization plan in line with the Net Zero Plan presented in this document	
					FY 2026:27 (ref) ¹³	FY 2031:32 (Ref) ¹⁴	FY 2026:27 (ref) ¹⁵	FY 2031:32 (Ref) ¹⁶
	Revenue from operations)							
G	Total GHG emissions intensity per rupee of turnover (Scope 1, 2 and 3 GHG emissions / Revenue from operations)	Metric tonnes of CO2 equivalent per Mn Rs.	5.5	6.2	-	-	-	-

4.3 GHG emission reduction targets

ARE&M is committed to adopting the Net Zero Plan as per the Science Based Targets (SBTi). The Net Zero Plan is presented in Table 3.

- **Scope 1 and 2 emission reduction targets:**
 - To limit to 189,600 T CO₂e at the end of 2027 (60% of baseline level of FY2022),
 - To limit to 1,00,800 T CO₂e at the end of 2032 (30% of baseline level of FY2022),
 - Achieve 90% reduction at the end of 2040.
- **Scope 3 emission reduction targets**
 - More than 80% of the supply chain (by economic value) has already been achieved on date,
 - Achieve 30% reduction (short-term), by FY32

Table 3. Net Zero Road Map



5. Governance

According to the TCFD recommendations, governance is defined as “the system by which an organization is directed and controlled in the interests of shareholders and other stakeholders”. Governance establishes the framework and procedures by which the organization's goals are defined, progress is monitored, and outcomes are assessed.

5.1 Board Oversight

The board conducts ESG performance review quarterly which includes climate actions and plans as part of the agenda. The board reviews Business Responsibility and Sustainability Report (BRSR) along with a detailed presentation on key ESG aspects, energy, and carbon emissions, principle-wise status of ARE&M w.r.t the identified 9 principles of BRSR, Key Sustainability KPIs are reviewed by the Board. The board is apprised of the Tier two Sustainability Committee’s work and progress of identified projects. The inputs by board members are discussed in the Sustainability committee to further refine the ESG vision for the organization.

Currently, we have six Tier 1 committees which directly or indirectly involves in all levels of climate change actions. The six committees are,



Committee Responsible for Oversight	Review Frequency
<i>Audit Committee</i>	<i>Need Based / Half Yearly</i>
<i>Corporate Social Responsibility Committee</i>	<i>Quarterly</i>
<i>Nomination and Remuneration Committee</i>	<i>Need Based</i>
<i>Stakeholder Relationship committee</i>	<i>Half Yearly</i>
<i>Risk management committee</i>	<i>Half Yearly</i>
<i>Loan and Investment committee</i>	<i>Need Based</i>

5.2 Risk Management Committee

The Risk Management Committee is responsible for reporting progress on our risk mitigation efforts to the Board on a quarterly basis and plays a vital role in strategic supervision and devising the organization’s long-term strategic risk management approach. This committee meets quarterly to ensure a common approach that is consistent with the ARE&M's strategy and policy on climate change.

The role of the risk management committee in climate change is to identify, assess, and manage the risks and opportunities associated with climate-related impacts that can affect the organization's operations, financial performance, and reputation. The Risk Management committee is chaired by one of our Independent Directors and other members of the committee include an Independent Director and the President of the New Energy Business. Climate change poses various risks and opportunities to businesses, and the risk management committee plays a critical role in integrating climate considerations into the organization's overall risk management framework. Some key responsibilities of the risk management committee in climate change include:

- **Identifying Climate Risks:** The committee identifies and evaluates climate-related risks that can arise from physical impacts (e.g., extreme weather events, sea-level rise), transition risks (e.g., policy changes, technological advancements), and reputational risks associated with the organization's climate performance.
- **Assessing Materiality:** The committee determines the materiality of climate risks by considering their potential impact on the organization's financial performance, long-term strategy, and stakeholder interests.
- **Scenario Analysis:** The committee conducts scenario analysis to assess the organization's resilience to various climate-related scenarios, such as different levels of global warming or changing regulatory environments.
- **Developing Climate Resilience Strategies:** The committee collaborates with relevant stakeholders to develop strategies and action plans to build resilience against climate-related risks and capitalize on potential opportunities arising from the transition to a low-carbon economy.
- **Monitoring Climate Performance:** The committee oversees the monitoring of the organization's climate performance, including its progress towards reducing greenhouse gas emissions, energy efficiency improvements, and climate-related targets.
- **Integration into Enterprise Risk Management (ERM):** The risk management committee integrates climate-related risks and opportunities into the organization's enterprise risk management (ERM) framework, ensuring they are considered alongside other business risks.
- **Disclosure and Reporting:** The committee ensures that climate-related risks and performance are appropriately disclosed and reported to stakeholders, in line with relevant reporting frameworks and standards (e.g., TCFD, GRI).
- **Capacity Building:** The committee may provide training and capacity building for employees and management to enhance their understanding of climate-related risks and opportunities and to foster a climate-resilient culture within the organization

5.3 Sustainability Committee



We have established a Tier 2 Sustainability committee under Executive Director (ED) and convened by the Chief Sustainability Officer (CSO) to define the ESG roadmap & monitor progress on a monthly basis.

Our Executive Director (ED) is a member of ARE&M’s Board of Directors and chairs the Sustainability Committee which plays a role in providing overall guidance on all identified key ESG issues and reviews the company’s progress towards sustainability goals.

We have taken ambitious targets on energy & carbon, water and wastewater management, circular economy, improving diversity as well as continue doing good for communities where we operate. The year is marked by a renewed effort to build sustainability capability amongst leaders. We have trained more than 100 leaders / managers through our online Amara Raja Sustainability Academy. We have also engaged with our supply chain partners and built consensus on a common ESG vision including climate change and collaboration for the greater good.

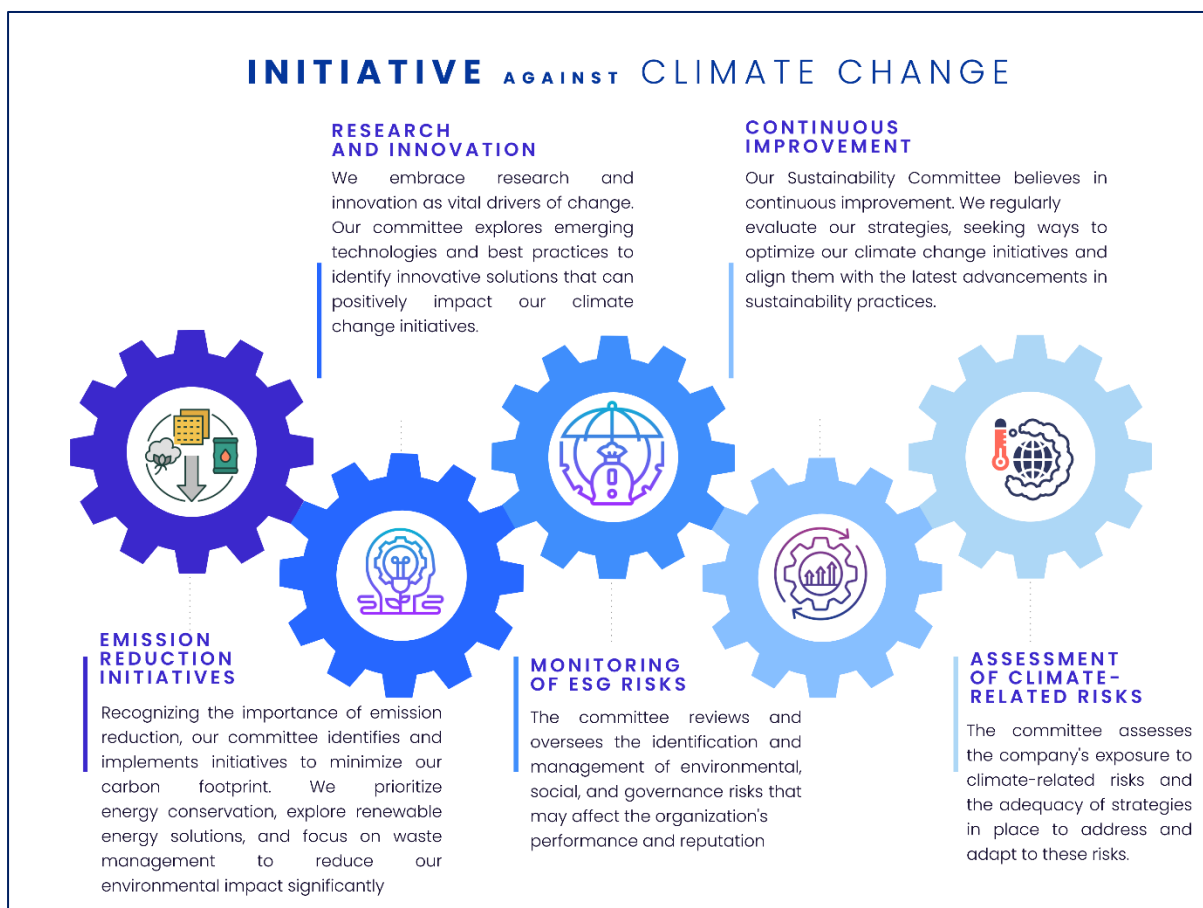
The key deliverables of the Sustainability committee are,

▪ Identifying climate-related risks & formulating strategies to mitigate those risks
▪ Develop & roll out ARE&ML sustainability framework and assurance protocol
▪ Define ESG goals and monthly monitoring of progress
▪ Build ESG capability within the organization
▪ Review ESG projects (planned/potential) and provide inputs/ support
▪ Conduct periodic benchmarking and bring in external/customer perspective

FY 2023-24 Agenda items for Sustainability Committee

MANUFACTURING	SUPPLY CHAIN	PEOPLE	CSR	GROUP SUSTAINABILITY
<ul style="list-style-type: none"> • Energy & Carbon • Water including RWH & Waste Water • Waste management • Occupational Health Exposure reduction • Safety – Targets on leading indicators 	<ul style="list-style-type: none"> • Suppliers engagement on ESG • BWMR plan • Inclusion of ESG in SCOC/ ARIBA 	<ul style="list-style-type: none"> • Improving gender diversity • Employee CSR volunteering • Risk Assessment (HR) 	<ul style="list-style-type: none"> • Projects and beneficiaries • Impact assessment and action plans • Community grievance process • Employee volunteering 	<ul style="list-style-type: none"> • ESG Capability building program • ESG software • BRSR/ Sustainability report • Benchmarking • Life cycle assessment • UNGC etc.

Sustainability Committee plays a pivotal role in addressing the climate risks. It is tasked with driving our sustainability initiatives, ensuring we contribute positively to the initiatives against climate change.



5.4 Management's Role

The management team at Amara Raja Energy & Mobility Limited consistently evaluates various risks and opportunities for the company, which includes a specific focus on climate-related factors. These

considerations encompass areas such as regulatory changes, the availability and accessibility of fossil-free energy sources, the potential to enter green markets, and the risks and opportunities that may impact our climate performance.

5.5 Director on Board

Our Executive Director (ED) is a member of ARE&ML's Board of Directors and chairs the Sustainability Committee which plays a role in providing overall guidance on all identified key ESG issues and reviews the company's progress towards sustainability goals. The board is briefed on various climate-related issues, yearly targets, site performance, and progress of targets by our ED. ED is also authorized to sanction CAPEX & OPEX budgets and other necessary resources for the implementation of climate adaptation and mitigation actions. Our ED's responsibilities also include taking decisions related to Procurement, Human Resources, Finance, Legal, and operations which support the implementation of our Climate strategy.

5.6 Chief Sustainability Officer (CSO)

Chief Sustainability Officer (CSO) Oversees the overall execution, mission, and efficacy of the sustainability program and its function. He is the convener of monthly Sustainability committee meetings & member of the high-level Growth Committee (GROCOM). GROCOM constitutes of all the Business Heads, Group function heads, and senior leaders from all businesses of the Group. This committee focuses on the review & approval of group-level policies including for sustainability and climate change along with tracking and driving the progress on group-level priority projects.

The following are his key responsibilities:

- Assesses and analyses company policies and processes in accordance with the organization's commitment to sustainability.
- Brainstorms and identifies creative ways to balance business obligations and sustainability outcomes.
- Build capacity within the organization on matters related to sustainability & climate change.
- Proposes and implements strategies to address various environmental concerns including climate change, energy use, conservation, reduction of pollution, recycling, building and facility design, and general education on sustainability.
- Evaluates the efficacy of sustainability programs; recommends and implements improvements as necessary.
- Conduct benchmarking across sectors and identify projects to mitigate any adverse environmental impacts
- Compiling comprehensive reports that clearly outline the identified climate risks, their likelihood, and potential consequences.
- Collaborating with internal stakeholders and effectively communicating climate risks to external stakeholders via sustainability reports, and disclosure frameworks (e.g., BRSR, Sustainability report, CDP, TCFD).

5.7 Chief Operating Officer (COO)

The Chief Operating Officer is a member of the high-level Growth Committee (GROCOM) as well as the Sustainability Committee. The following are his key responsibilities:

- Ensuring regulatory compliance.
- Assess climate-related risks and formulate operation-level policies and procedures to mitigate the same.
- Collection of ESG & Climate-related data and metrics.
- Set targets for energy conservation & emission reductions and drive energy efficiency projects.
- Identification, Implementation, and monitoring of climate action programs.
- Promote ongoing dialogue with internal and external stakeholders in order to develop constructive and transparent relationships.
- Champion culture changes within the organization through engagements & capability building.

ABBREVIATIONS

AIPA	Apex Committee for Implementation of Paris Agreement
ARE&M	Amara Raja Energy & Mobility Ltd
CAPEX	Capital Expenditure
CDP	Climate Disclosure Project
CPCB	Central Pollution Control Board
CMD	Chairman & Managing Director
CSO	Chief Sustainability Officer
COO	Chief Operations Officer
BoD	Board of Directors
BRSR	Business Responsibility & Sustainability Report
ED	Executive Director
FSB	Financial Stability Board
GHG	Greenhouse gas
GRI	Global Reporting Initiative
IEX	Indian Energy Exchange
IPCC	Intergovernmental Panel on Climate Change
KPI	Key Performance Indicator
MOEF&CC	Ministry of Environment, Forest & Climate Change
NDC	Nationally Determined Contributions
OPEX	Operating expense
RCP	Representative Concentration Pathway
REC	Renewable Energy Certificate
SBTi	Science-Based Targets Initiative
SEBI	Securities and Exchange Board of India
SPCB	State Pollution Control Board
IR	Integrated Report
TCFD	Task Force on Climate-related Financial Disclosures



Disclaimer: This report is focused on climate-related risks and opportunities following the recommendations of the TCFD. Further information on other ESG topics can be found in ARE&M's BRSR and Integrated Report FY24. This report contains forward-looking statements based upon current expectations and assumptions regarding anticipated developments and other factors. They are not historical facts, nor are they guarantees of future performance since they are subject to numerous assumptions, risks and uncertainties, which change over time. Forward-looking statements speak only as of the date they are made, and various factors could cause actual performance to differ materially from that expressed or implied by these forward-looking statements. ARE&M assumes no duty to, and does not undertake to, update forward-looking statements. ARE&M aims to evolve its disclosures in the future to provide meaningful information to stakeholders by adapting it to new facts and regulation impacting the changing climate landscape. We welcome and encourage our stakeholders to provide feedback on this report by contacting us via pt1@amararaja.com .