

Taskforce on Climate-Related Financial Disclosures (TCFD) Report 2023

ADANI PORTS AND SPECIAL ECONOMIC ZONE LIMITED

Contents

Executive Summary	3
TCFD Aligned Summary of Climate Action at APSEZ	5
Climate Change Governance	8
Climate-related Risks and Opportunities	13
Risk Management	39
Metrics and Targets	43

Executive Summary

Adani Ports & SEZ (APSEZ) is pioneering a sustainable route to development and profitability in the ports and logistics sector. During FY2022-23, the Company reported a 9% increase in cargo volume and a 22% increase in revenue, while GHG emissions intensity decreased by 4%. The overall renewable capacity of captive and PPA-based solar and wind power was at 34MW, with contracts for an additional 250MW of solar capacity given out for completion in the coming years. The firm obtained around 50% of its water from non-competing sources, such as water from other industries and sea water; treated 92% of its waste generated in line with the 5-R principle; and extended its green cover to 3,990 Ha of afforested mangroves area. In the previous five years, the amount of renewable energy in the electrical mix has climbed from near zero to 14%, reducing our emissions intensity of electricity use. While we have achieved considerable progress to date, we are committed to lift our goals even higher.

We have enunciated our goals to achieve Carbon Neutrality of the port business by 2025 and Net-Zero across APSEZ by 2040. The contract for 250MW of renewable electricity recently awarded, will help us replace emissions intensive grid electricity with zero emissions renewable electricity in future. Meanwhile, we received delivery of 338 batterybased internal-transfer vehicle (e-ITVs) last year to replace diesel based conventional ITVs. These e-ITVs once switched to renewable electricity, will cut down on scope 2 emissions. We have also refurbished Rubber Tyre Gantry Carnes (RTGS) and Quay Cranes to switch from diesel to electricity use. The other equipment such as Reach Stackers, Empty Container Handlers, Excavators, Forklifts and Dozers are also being explored to convert from diesel fuel to electricity or low carbon alternatives.

Clearly, our approach to solve our Net-Zero target zig-saw is to progressively switch the fossil-fuel consuming equipment to electricity or other clean energy sources like green hydrogen; and, simultaneously as a complementary step, deploy renewable sources of electricity to feed the electricity requirements. The renewable electricity could also be used to generate green hydrogen and other clean energy. This approach, however, would add to the overall emissions initially, given the high emissions intensity of the Indian grid, but gradually as we increase the share of renewable electricity, we expect to drastically reduce our emissions in future. We could also explore technologies for bioenergy and carbon capture and storage (CCS) if they become available in future.

APSEZ is also targeting 5,000Ha of mangrove afforestation and 1,200Ha of terrestrial plantation of which 3,990Ha of mangrove afforestation and 1,183Ha of terrestrial plantation have been attained by FY2022-23.

Given the nature of APSEZ's business, and its exposure to climate stressors, building resilience in infrastructure, processes and systems is necessary to provide a seamless

service to the customers. A climate resilient infrastructure will provide APSEZ a competitive advantage, as the frequency and intensity of extreme weather events intensify. A port which can withstand extreme weather events and emerge with minimum disruption would obviously have higher uptime and will also be a preferred choice for the customers. We are therefore investing in adapting our ports to the physical risks of climate change, with implementation of identified measures in the next 10 years.

In the medium to long term, we see material opportunities for APSEZ from the low carbon transition of the world economy. We are targeting Net Zero emissions by 2040, well before 2050, the IPCC target year for the world to limit the temperature rise to 1.5 ° Celsius. Having committed to Science Based Target Initiative (SBTi), we are currently working on our net zero plan which will be submitted to SBTi for validation in two years. We envision to build a large-scale low carbon energy system to make our ports energy hubs that will meet low carbon refueling needs, like green hydrogen, and onshore renewable power requirement of the ships calling our ports. For the ships with their own decarbonization requirements, we would be the port of choice, adding new customers and creating more business opportunity for our business.

Our three key steps in deepening alignment and enhancing an understanding of climate change risk and opportunities are: (i) assessment of climate vulnerability of our infrastructure; (ii) development of adaptation plan to reduce the vulnerability; and (iii) developing internal carbon pricing mechanism for our operations. Ports like Mundra and Hazira are situated in extreme water-stressed regions. In these areas, we maximize the use of treated wastewater from other industries, guided by our site-specific water plan.

At APSEZ, we are attractively placed to grow our business at a rate significantly higher than most of our industry peers. In the space of just 2-3 years, we expect to increase cargo volumes by 60% to 500 million metric tons, grow our rakes count from 75 to 200 and emerge as the world's largest private ports company and the country's largest transport utility by 2030. As we grow, we continue to retain our focus on customer and sustainability with an ambition to be among the most admired companies in the world.

TCFD Aligned Summary of Climate Action at APSEZ

Guided by the Philosophy of Reshaping Today for Better Tomorrow

Our Business

Adani Ports and Special Economic Zone Limited (APSEZ) is the largest port developer and operator in India, with a total operating capacity of 558 MMTPA (million metric tonnes per annum) and 12 domestic operating ports and terminals (including recently acquired Karaikal Port) with 60% of its capacity located on the west coast and the remaining on the east coast. The Company operates from six maritime states of India namely Gujarat, Maharashtra, Goa, Tamil Nadu, Andhra Pradesh, and Odisha and accounts for nearly onefourth of the cargo movement in the country. APSEZ enjoys an extensive footprint across India with excellent hinterland connectivity. The port facilities are equipped with top-ofthe-line cargo-handling infrastructure, enabling them to handle the largest vessels that call at Indian shores. APSEZ's ports can handle a variety of cargos, including dry cargo, liquid cargo, crude, and containers. The company is also developing a container transshipment port at Vizhinjam in Kerala.

APSEZ's integrated services across three verticals - Ports, Logistics, and SEZ - have allowed it to form partnerships with prominent Indian businesses and will help the Company evolve into a transport utility that provides logistics infrastructure and services, ensuring service reliability and efficiency. APSEZ is the most diversified and largest private rail operator in India with 9 multimodal logistics parks (MMLPs) across North, West and South India. It is further engaged in developing 15+ MMLPs across India and 60 million sq ft of warehousing space by FY 2025-26 to provide first and last mile connectivity through vehicles (owned and leased).

Climate Change Context

As a sea-land interface and a point of convergence between various modes of transport, ports act as a gateway to trade, providing access to global markets. They are a critical element of the country's infrastructure and our customer's supply chain and logistics. By the fundamental nature of the sector, ports and associated infrastructure are at the frontline of climate impact. Continuity of this trade sector in the 'business as usual scenario' isthreatened by climate change. The resilience of these port infrastructures will be critical to global trade and commerce in the time to come.

The global climate policy to regulate greenhouse gas emissions is increasingly likely to influence how the demand for maritime transport evolves. We foresee commodity trade patterns evolving due to climate and policy considerations. Under all climate policy and commerce scenarios, we anticipate a significant increase in trade, with a change in distribution across commodities.

It is most likely and already evidenced that the world will transit more and more towards

greener fuels to combat climate change. The demand for greener and climate-resilient services will rise. We see these uncertainties and changes – direct and indirect-arising from climate change as an important element for us in the port and logistics sector.

Changes in the energy sector are an essential variant in the development of ports as energy commodities make up about 40% of seaborne trade (UNCTAD, 2016). Hence, the port development in terms of area, type of ships to berth, kind of cargo handled, and volume is bound to reshape as climate action continues to gain pace globally. Ports must be flexible and prepared for this change if competitiveness is to be maintained.

In future, ports will have to provide low carbon refueling facility and onshore renewable electricity supply to the berthed ships. The ports will be the hub for clean energy supply, like green hydrogen and other low-carbon energy; a mini-smart grid of green electricity that would provide plug and play options to ships on a mega scale; and a locationfor waste recycling & reuse and circular economy. In fact, ports could be the real catalystfor decarbonization of the entire shipping sector.

Risk to port infrastructure, operating conditions and sensitivity

The port business and associated infrastructure are at the front line of climate impact- exposed to extreme weather events, gradual sea-level rise and temperature increase. The global effect of climate change on ports will be disproportionate, depending upon the geography of the port. Ports that are based in cyclone zones will witness different consequences than those located in areas with fast-changing coastline and sea levels.

Ports in ecologically sensitive, fragile and active marine wildlife areas will experience greater pressure to respond and minimize the impact on natural marine ecosystems. Sea level rise, storm surges and waves are likely to induce major impacts on coastal transport hubs and networks, including transient or permanent flooding of seaports and connecting coastal roads and rail lines.

In addition, (UNTCAD,2017) large increases in coastal urban and industrial development associated with seaports observed in many regions will test the ability of coastal systems to respond effectively to climatic changes. The following indicators highlight the key climate related physical impacts that we are sensitive to:

- Coastal transportation assets have been more sensitive to extreme events, such as storm surges/ waves, heavy rain and wind events and heat waves, than to incremental changes in the mean climatic factors.
- Transport services are more sensitive to climate stressors than are physical assets, as thresholds e.g. delaying/ cancelling seaport services, are often lower than thresholds for damage to infrastructure.
- Assets are more sensitive to stressors whose occurrence is relatively unlikely in comparison to typical weather variability, like more sensitive to once-in-hundred-years

intensity of storm surge than gradual rise in temperature.

- In many regions, port operations are also affected by adverse wave conditions; harbor conditions can become difficult for the safe navigation and berthing of large freight vessels due to reasons like the penetration of long-period waves generated by swell waves propagating in groups.
- Challenges of berthing, navigation of port, loading and unloading due to heavy winds.

The resilience of these infrastructures will be critical to global trade and commerce in thetime to come. The transportation and logistics sector are among the top global greenhouse gas contributing sector. Decarbonization of the sector is taking place at various levels and we recognize our responsibility to reduce GHG emissions and are committed to the same.

Climate Change Governance

Climate change is an integral part of sustainability at APSEZ. We have a robustclimate change governance system outlined in the Sustainability Charter. It facilitates in implementing sustainability actions across the business, manage goal-setting, reportingprocesses, strengthen relations with external and internal stakeholders and ensure overall accountability.

At the Board level, we have formed the Corporate Responsibility Committee (CRC) for overseeing the implementation of our climate & ESG strategy and ensuring alignment of sustainability standards and climate-related risks and opportunities with our business. The committee also monitors and oversees progress on the sustainability goals, including climate-related goals and targets.

Our Board is supported by committees like the Corporate Responsibility Committee (CRC), Corporate Social Responsibility Committee (CSRC), Stakeholders' Relationship Committee (SRC) and Risk Management Committee

(RMC). The CRC oversees the implementation of our ESG strategy and policies and manages climate risks. Climate priorities are embedded across business areas, corporate and business unit levels, with the ESG team developing the Company's ESG agenda and supporting business functions in driving implementation. Business functions, in turn, are responsible for executing the climate agenda, tracking and monitoring performance.

At the executive level, business risk management is the responsibility of the Head of ESG (Chief Risk Officer). The ESG Head reports directly to the CEO

to ensure independence from other functions. The Company has instituted a systematic risk management approach which comprises the creation of a Group level Risk Management Team to appraise changes in the external and internal business environments as and when they transpire (real-time) and implement counter measures. The ERM and risk assurance procedure is integrated with the business planning and compliance functions. In recent times, climate-related risks became important to APSEZ's risk management process. The ESG Head engages with the Risk Management and Audit Committee on all climate change

risks and including and updating them in the Company's Enterprise risk management. Chief Executive Officer (CEO) at the business unit level. At the site-level, environmental management team are responsible to identify and respond to climate change risk at the site along with cross-functional teams. Climate related issues are on the agenda of the board of directors and discussed annually.

Our cross-functional Sustainability Leadership Committee (SLC), led by the CEO, is responsible for ensuring the operationalisation of sustainability as part of our business strategy. At the site level, the departmental heads facilitate the implementation of our

sustainability strategy within their respective functions through the Sustainability Steering Committee (SSC).



Doard oversight	Corporate Responsibility Committee (CRC) Corporate Social Responsibility Committee (CSRC) stakeholder relationship committee (SRC) Risk Management Committee (RMC)	Quarterly meetings
Management oversight	Sustainability Leadership Committee (SLC) - Corporate Level	Sustainability Steering Committee (SSC) – site level
8 Working group	CORPORATE ESG TEAM Develops the Company's ESG Agenda and supports business functions in driving the implementation.	Site ESG team Responsible for the implementation and execution of the ESG agenda, tracking and monitoring performance.
	Business functions	and execution of

Responsible for the implementation and execution of ESG agenda, tracking and monitoring performance.

Climate Change Strategy

With our commitment to align our business strategy with the inclusion of climaterelated issues, APSEZ recognizes the critical importance of addressing climaterelated risks and opportunities.

Our climate strategy is built on the following **climate scenarios**:

- For physical risk, we have considered two scenarios: 1. SSP1-RCP2.6 corresponding to less than 2°C rise in temperature and, 2. SSP2-RCP4.5 for greater than 2°C rise in temperature. Both these scenarios were considered for two time frames, i.e. 2021-2050 and 2041-2070.
- For building business resilience to transition risks arising from the global commitment to low-carbon economy, we have again considered two scenarios: 1. IEA Stated Policy Scenario (IEA STEPS) which shows trajectory implied by today's policy settings corresponding to greater than 2°C rise in temperature, and 2. Customized publicly available transition scenario like IPR 1.5°C 'Required Policy Scenario' which builds on IEA Net Zero Emissions (IEA NZE) scenario and is aligned with the 1.5°C target.

Our climate strategy focuses on three key pillars: reducing our impact, building resilience and strengthening the system of our operations to the impacts of climate change and developing strong frameworks to integrate climate change considerations.

Three pillars of climate strategy

Reduce our impact: Through low carbon pathway commitments, reduce emissions in operations and supply chain. Building resilience: Enhance physical and strategic resilience of our operations and key stakeholders. Strengthen the system: Develop robust system to track and ensure integration of climate change in relevant business activities.

Our Position and Commitment

We are committed to contributing to a climate scenario aligned to Paris Protocoland one which does not lead to temperature rise beyond 1.5° Celsius. As a member of the Climate Ambition Alliance, we have committed to take up net zero emissions target. For the near term, we target to achieve Carbon Neutrality of the port business by 2025. Further, we are aiming to achieve net zero across APSEZ by 2040. We align with science-based target, and have committed to seek validation of this target by the Science Based Targets initiative in the next two years. We further endorse and commit

to United Nations CEO Water Mandate

Action Plan to achieve our Climate Targets

Climate action is a critical component of our sustainability efforts. As an organisation, we recognise that the impacts of climate change pose risks to our business, as well as to the communities and environment in which we operate. We have consistently conducted our business according to our climate strategy ensuring alignment with our near- and long-term commitments and compliance with regulations in all the jurisdictions applicable at our operations.

We made strong progress on our climate strategy last year. During the Fiscal Year 2023, overall, 338 battery operated internal transfer vehicles(e-ITVs) were installed across various locations. These vehicles have provision for charging with solar panels. We also finalized contract for around 250 MW of renewable electricity capacity with and independent power producer (IIP). Electrification of nine diesel cranes was completed and a fleet of nine Tata Nexon EVs was introduced at various sites to facilitate employee travel. Additionally, investment was made on different rail projects like electrification and upgradation of existing lines and equipment, which helped reduce energy use though modal shift and efficiency improvements. We spent on various solar power projects, water & wastewater treatment, storm water discharge and water efficiency measures.

Capex requirement: To meet the short- and medium-term climate targets, there is a substantial value of low-carbon transition capex required in future. Below are few key projects that may need significant capex:

- Electrification of transport system and replacement of other equipment with low carbon alternatives such as Reach Stackers, Empty Container Handlers, Excavators, Forklifts, Dozers, Electrification of Rail Transport, Electric Trucks. These projects are highly capital intensive and would require around ₹ 2,800 crore investment by 2030.
- Our 2025 target of 5,000Ha of mangrove afforestation and 1,200Ha of terrestrial plantation will help us offset residual emissions (estimated at 28% of BAU emissions) to meet Carbon Neutrality of the Port business by 2025. We have achieved 3,990Ha of mangrove afforestation and 1,183Ha terrestrial plantation till now and the remaining development will require ₹ 5-10 crore capex allocation by 2025.
- Other equipment like tugboats and dredgers have very high capital requirement for replacement. Moreover, for the lack of any viable technologies, the decarbonization could happen only towards the tail-end of our net zero target timeline of 2040.
- The current contracted capacity of about 250MW renewable electricity requires investment of ₹1,500 crore in the next two to three years. For the future requirement, we would need another around 450MW of renewable capacity which may need investment of another ₹ 2,700 crore by 2030.

Return on Environmental Investments

Values in ₹ '00,000	FY 2019	FY 2020	FY 2021	FY 2022	FY 2023					
Capital Investments	9,700	5,500	4,022	20,969	76,740					
Operating Expenses	4,200	3,600	3,594	2,355	2,559					
Total Expense	13,900	9,100	7,616	23,324	79,299					
Savings, cost avoidance, income, tax incentives, etc.	916	991	353	770	3,603					

Climate-related Risks and Opportunities

This section outlines APSEZ's climate strategy, highlighting the risks and opportunities relevant to our operations over short-term, medium-term, and long-term timeframes. Our climate strategy aligns with internal targets and long-term commitments, and it aims to enhance our resilience, sustainability, and overall business performance.

APSEZ's climate strategy encompasses three distinct timeframes:

- Short-term (0-3 years): In line with our internal commitment to become carbon neutral across ports by 2025, the short-term horizon focuses on actions and initiatives that can lead us towards this target. During this period, we are prioritizing measures that will reduce our carbon footprint and promote sustainability within our operations.
- 2. Medium-term (3 to 10 years): The medium-term timeframe aligns with our financial and operational planning timelines. During this period, we will continue to strengthen our efforts towards emission reduction and further integrate climate considerations into our business strategies.
- Long-term (>10 years): Looking ahead to the long-term horizon, APSEZ has set an ambitious goal of achieving net zero emissions by 2040. This long-term commitment reflects our dedication to sustainability and contributing to the global efforts to combat climate change.

While climate-related risks are crucial to address our long-term sustainability, APSEZ also recognizes the numerous opportunities that climate action presents. Our sustainability strategy (inclusive of climate change), refined over the years, is designed to identify and capitalize on these climate-related opportunities while simultaneously mitigating risks. By doing so, we aim to enhance our business operations, strengthen our supply chain, and positively influence our revenue and overall business strategy.

APSEZ remains fully committed to its climate strategy, and we believe that by proactively addressing climate-related risks and seizing opportunities, we can continue to grow as a sustainable and responsible ports and logistics company. Our pursuit of carbon neutrality by 2025 and net zero emissions by 2040 reflects our dedication to a greener future, where we contribute to the global fight against climate change while driving value for our stakeholders and the communities we serve.

Low-carbon shipping: As a port operator, transition pathway of the shipping sector will affect our business. Any ambiguity in the long-term policy for the shipping industry with respect to energy transition poses risk to us. Shipping is one of the major sectors where emissions abatement is difficult for the want of feasible low-carbon

technologies and cost-effective solutions. However, as the low carbon technologies mature, ships will depend on ports for their requirement for green fuel refueling, onshore renewable power supply, carbon capture & storage (CCS) and waste recycling & disposal. APSEZ, with timely adoption of technologies, can benefit from the transition in shipping sector. On the contrary, if no action is taken to meet the changing demand, we may lose the customers to our competitors. Since it requires significant investment and long construction time for these infrastructures to develop, a clear transition pathway and hence policy certainty is necessary. The planning for long term investment is further complicated with no clear winner emerging in technology space for clean, feasible, scalable and cost-effective alternative to traditional bunker fuel.

Low carbon products: Global markets are changing with the shift in customer and consumer demand. The shift is influenced by individual choice and the evolving policy landscape marked by the objective of achieving a low carbon world. It may result in two major changes for us; 1. the cargo mix may significantly change and 2. the customers would look for more climate-friendly ports. With 40% of the global cargo movement being of fossil fuels, the transition in energy system will bring a significant shift away from it. This is both a risk and an opportunity for us. With our traditional revenue model at risk there is opportunity in bunkering of renewable energy (like hydrogen). However, diversification away from fossil will require planning and investment for new space and infrastructure to handle diverse cargo which will need policy support from the government.

We recorded negative growth of 33.9% in thermal coal traffic in FY22 accounting for 26% of our total volume. The share slightly increased to 27% in FY23, but it is still much lower than the share in the past. We have, over the years, shifted away from handling predominantly coal cargo earlier to mixed cargo now. The industry is expected to respond to a reduced demand for oil tankers and coal carriers and deploy more ships for transporting hydrogen, ammonia and alternative fuels and ports must be prepared to handle them too.

The customers preference for more sustainable and greener ports is gradually increasing because of their own commitments to reduce climate and environmental footprints in their supply chain. This is a positive change which will benefit us because of our strong commitments to fight against climate change and promote environment protection.

Tech-led changes: Adoption of new technology is essential for the ports in the lowcarbon scenario. We see new technologies shaping the day-to-day activities of the ports. Automation of equipment and option to remotely control operations at the port, including running equipment from faraway place, monitoring processes remotely, etc. will be necessary to reduce exposure of the port staffs to extreme weather and hence keep the port activities up and running even during harsh weather conditions. The technologies like IoT5g networks, big data platforms, trade blockchain solutions will add resilience and improve efficiency of the operations. The port and logistics sector along with the shipping industry must also transform to adjust to changing customer preference for greener product and sustainable supply chain. With e-commerce platforms providing wider options to purchase from any part of the world, the flow of high value e-commerce products is more time sensitive than conventional cargo movement, putting extra stress on the just-in-time cargo flows.

The transportation requirement for certain product would also see a complete change with technology like 3-D printing which will print 3-D products with perfection at the demand site itself. The push for recycling-reuse of products will also change the demand of certain products.

Switch to renewable electricity: Our current demand for electricity is 3,85106 MWh per year which if we replace with renewable electricity, we could realise a benefit of \gtrless 231 crore per year which arises because of lower cost of renewable electricity generation for us in collaboration with other IIPs compared to the cost of grid electricity we purchase. As per our calculation, we could save \gtrless 6 on every unit of renewable electricity we generate vs. we purchase from the grid. To realise this opportunity, we need 220MW of renewable capacity with a total investment of \gtrless 1,320 crore which could be paid back in 6 years.

Internal carbon pricing: Internal carbon pricing helps our organisation reduce GHG emissions, navigate and mitigate the potential financial impacts of existing and anticipated GHG regulations, drive low carbon investments and energy efficiency within the organisation. At APSEZ, prior to project implementation, we conduct a thorough evaluation of greenhouse gas (GHG) projects from a financial perspective. If the projected GHG emissions are high, we prioritise the assessment of better technologies that can help reduce emissions. This approach ensures that our projects not only meets financial objectives but also contributes to environmental sustainability by actively seeking and adopting cleaner and more efficient solutions. We also leverage ICP as a strategic tool to align with stakeholder expectations and catalyse behavioural changes within our operations. APSEZ has implemented an internal carbon pricing mechanism, applying a price of US\$ 20 per metric ton of CO2 equivalent (tCO2e) on all Scope 1 and Scope 2 emissions from its operations. The Company sets aside an equivalent cumulative amount for investment in renewable projects and energy efficiency measures. As a result, in the fiscal year 2022- 23, APSEZ generated a fund of US\$ 7.6 million through this carbon pricing measure.

Investment on mitigation measures: Our attempt to address technology risks is now leading us to opportunities with our mitigation measures. In FY2023, around ₹ 384 crore was spent on electrification of equipment of which ₹ 347.7 crore alone was spent to purchase electric ITVs and to develop infrastructure for its charging and

maintenance. The e-ITVs have a payback of 4-5 years post which the project will give us a positive return. The spending on electrification of cranes and other equipment was to the tune of ₹ 19.9 crore and on the conveyer system of ₹ 16.7 crore in FY2023 which have a payback of about 3 years.

Around ₹ 331 crore of the capex was on different rail projects like electrification and upgradation of existing lines and equipment, which helped reduce energy use though modal shift and efficiency improvements. We achieved emissions reduction by shifting ceramics transportation from Morbi to Mundra in Gujarat from road to railway. This will reduce GHG emissions more than 50,000 tons by 2025, equivalent to taking 20,000 cars off the road. We made investments of ₹ 5.4 crore in various solar power projects and ₹ 8.6 crore in projects linked to water and wastewater treatment, storm water discharge and water efficiency measures.

Climate Transition and Physical Risk

Climate change risks are divided into two parts: transition risks and physical risks. The impact of these risks keeps shifting with time, based on sensitivity factors and our resilience to the risks. The magnitude of impact of the climate change risks is assessed through an array of indicators embedded into our risk management tool. We have identified primary drivers for physical and transition risks and the potential impacts associated with these risks. It includes impacts due to changes in acute and chronic physical risks and transitioning to low-carbon operations and supply chains. Risks related to potential damage to operations due to physical hazards, change in energy mix and its quantity, our emission profile, cost of procuring green or renewable energy, legal, and regulatory dimension of risk, changing market demand, and business aspects like cargo mix into the risk matrix. This assessment also provides a direction to prioritization in addressing the risks and anticipating the change within the climate risks in future.

We review all our new investments from the perspective of climate change, emerging regulations, policy and technological developments, changing market demand, etc. The primary objective is to undertake systematic investment in our existing operations to reduce the stress of climatic changes on the current assets and minimize our contribution to climate change by reducing our emissions in the entire value chain. While doing so, the Company sincerely considers the opinions of its investors and all stakeholders. We also take into account communities' exposure to climatic risk in all our operations and future investments.

Risk Intensity and Anticipated Movement

Timeframe of	Transition Risk						Physical Risk	
Risk Occurrence	Regulatory	Legal	Technology	Market	Reputation	Acute	Chronic	
Short Term	Medium	Low	Medium	Low	Medium-	Medium	Low	
Long Term	High	Low	Low	High	High	High	High	
Movement of	f							
Risk			1			1		

Opportunities for the Company arise through resource efficiency, new low carbon services, and our ability to serve diverse markets better. Addressing the risk to our operations provides us with the opportunity to build climate-resilient infrastructure and value chain that continues to operate under more significant climate-related risks. Thus, climate change poses risk to the business, but responding to transitional and physical risks also opens new avenues of climate-related opportunities.

Transition Risks

Transition risks arise from changing regulatory and legal landscape, technology and market scenarios posed by decarbonization and carbon neutral pathway and reputation loss based on the perception of the stakeholders. For the assessment of climate-related transition risks arising for our business, we have considered global transition to a 1.5°C consistent pathway and greater than 2°C pathway for the two timeframes, i.e. 2021-2050 and 2041-2070. There is a wide range of 1.5°C-consistent pathways (IPCC SR15, Chapter 4), but all of them require a rapid reduction in GHG emissions to net zero by 2050. The pathways with consideration for a slightly delayed start, require even steeper decline later and negative emissions post-2050 to bring down temporary overshoot in temperature beyond 1.5 °C. Any deep reduction in emissions would, however, depend on technology and policy options of carbon-free energy systems, electrification of transport and industry, zero-carbon electricity generation, technology for carbon capture and storage (CCS) and negative emissions technologies, like Bio-Energy and Carbon Capture & Storage (BECCS), Direct Air Carbon Capture and Storage (DACCS).

Transition Risk Assessment Approach

Aligning to this, APSEZ has identified and assessed transition risks emerging from climate change scenarios corresponding to a 1.5°C warming and greater than 2°C warming for two-time periods: 2020-2039 and 2040 to 2050. In the process the following assessments were done to build future scenarios.

a. We identified the emerging climate-related regulations aligned with NDCs and commitments towards net zero.

b. Included all the policies, regulations, standards, and transition to technological risk

that may impact our business.

c. Evaluated the market, reputational and change in customer preference and financial impact on the business.

Assumptions have been made for conducting transition risk assessment, like significant increase in APSEZ's share of renewable electricity, availability of viable technologies for electrification/low-carbon transition of heavy equipment, regulations supporting climate mitigation and adaptation, adoption of automation and digital technologies and shift of the energy system from fossil fuel to low-carbon fuel use.

We also conducted comprehensive desk research to understand:

- Current and emerging regulations and policies (globally and in India),
- Ongoing market changes and demand for low-carbon products and services,
- Changing consumer behaviour with greater awareness towards climate-related issues, and global and national targets to restrict warming by 1.5 °C by the end of the 21st century.

This enabled us to identify the key transition risk drivers in regulatory, legal, market, and reputation risk categories.

Financial Impacts of Transition Risks

Transition risks can have various financial impacts on a ports and logistics company like APSEZ. Transition risks refer to the potential economic consequences that arise from the process of global shift to a low-carbon, sustainable, and resilient business model. These impacts can affect the company's financial performance and value.

The key transition risk drivers that pose potential financial impacts on APSEZ can be summarized as follows:

- Carbon Pricing Mechanisms: The introduction of carbon pricing mechanisms such as carbon taxes and emissions trading systems may pose additional costs to APSEZ. These mechanisms assign a monetary value to GHG emissions, prompting companies to either reduce their emissions or pay for them. APSEZ may face additional expenses for GHG mitigation measures or as taxes on existing emissions, affecting its operational costs.
- 2. Regulations on GHG Emissions for Shipping: The revised IMO 2023 strategy sets ambitious targets for reducing GHG emissions from ships. APSEZ being a port operator, will have indirect impacts of the shipping sector's energy transition plan. Ships, if required by regulation to cut their emissions, will depend on ports for green fuel refueling and onshore renewable power supply. Any ambiguity in the long-term policy for the shipping industry with respect to energy transition poses risk to us since it requires significant investment and long construction time for these

infrastructures to develop. The planning for long term investment is further complicated with no clear winner emerging in technology space for clean, feasible, scalable and cost-effective alternative to traditional bunker fuel.

- 3. Demands for Low-Carbon Services: The evolving policy landscape towards achieving net zero emissions from various sectors including shipping has led to increased demand for low-carbon services. Customers are seeking climate change friendly ports and the entire supply chain, putting pressure on APSEZ to procure new low carbon technologies with significant investments.
- 4. Renewable Energy Restrictions: APSEZ aims to increase the proportion of renewable electricity for all its operations. However, there remains uncertainty about the policy on inter-state transmission of renewable electricity and the limit imposed on captive generation and open access.

To address these key transition risks, APSEZ adopted a proactive approach to sustainability and align its operations with evolving policies and customer demands. Investing in low carbon equipment, adapting port operations to lower emissions, and pursuing renewable energy sources could help mitigate potential financial impacts and secure the company's position as a leader in providing low-carbon services. Additionally, actively engaging with regulatory authorities to address renewable energy restrictions and exploring innovative solutions to reduce emissions can help APSEZ navigate the changing landscape and ensure its long-term success. For instance, increased direct costs due to emerging regulations on carbon pricing mechanisms pose a significant risk to APSEZ with a high likelihood and magnitude of impact.

The carbon pricing mechanism operates by assigning a monetary value to these emissions, prompting emitters to make a choice between reducing their emissions or paying for them. With a net-zero target of 2070 and updated Nationally Determined Contributions (NDCs), the Indian government recently introduced a draft national carbon market scheme in July 2023. If India finalizes its carbon pricing policy in the short term, APSEZ's revenue could face financial impacts.

APSEZ has taken several initiatives to reduce emissions, especially Scope 1 and 2, by switching to low-carbon emitting sources of fuel and energy. We have committed to becoming carbon neutral for Ports by 2025 and net zero across APSEZ by 2040. We have started implementing an internal carbon pricing mechanism, charging for Scope 1 and 2 emissions at the rate of \$20/ tons of CO2e. We assumed a 25% higher price than the carbon price averages (that is, USD10-15 per tons of CO2e) in the voluntary carbon market in India. This initiative has generated a fund of ₹ 62.3 crore in the FY 2022-23, which is earmarked for investments in renewable projects and energy efficiency measures, contributing to climate mitigation efforts including energy efficiency measures, fuel

switch, solar power installation and projects linked to water and wastewater treatment, stormwater discharge and water efficiency measures.

Table shows a summary of the transition risk assessment study conducted with the ongoing strategies taken up by APSEZ to mitigate these transition risks from materializing having substantial financial impacts on the company.

Summary of Transition Risk Assessment Analysis

TRANSITION	EINANCIAL	IMPACT L	.EVEL		
RISK	DRIVERS	Short- term	Medium- term	Long- term	STRATEGY TO MITIGATE/RESPONSE TO RISK
Current Regulations: State specific regulation on the purchase of renewable electricity	Increased cost to meet climate commitments	Medium	Low	Low	Our goal is to transition all our operations to 100% renewable electricity by 2025, up from the current 14%. However, our largest port operation in Mundra faces challenges in installing renewable power plants due to state laws limiting wind-based renewable energy capacities to 50% of the total power requirement contracted through the grid. Though solar power plant regulations have eased, the restrictions on wind power are hindering our renewable energy target for Mundra. Presently, we can achieve a maximum of 62% energy generation from renewables under the existing regulations. We anticipate Government of India to levy a carbon tax of 20USD/TC02e, if the commitments are not met. The expected financial risk would be INR 4.3 crores.

TRANSITION	EINIANCIAL	IMPACT LEVEL					
RISK		Short-	Medium-	Long-	STRATEGY TO MITIGATE/RESPONSE TO RISK		
	DRIVERS	term	term	term			
					To manage the risk, we will have to purchase emission reduction certificates, incurring an annual cost of approximately INR 2.67 crores.		
Emerging Regulations: Carbon pricing mechanism	Increased direct cost to the company due to imposed carbon tax on emissions	Medium	Medium	Low	With a net-zero target of 2070 and updated Nationally Determined Contributions (NDCs), the Indian government recently introduced a draft national carbon market scheme in July 2023. If India finalizes its carbon pricing policy in the short term, APSEZ's revenue could face financial impacts. APSEZ has implemented an internal carbon pricing mechanism, charging \$20 per ton of CO2 emissions for Scope 1 and 2. This initiative generated a fund of ₹ 62.3 crore in FY 2022-23, directed towards investments in renewable projects and energy efficiency measures		
Technology: Transition to lower- emission technology	Increased capital expenditure in terms of investment in new low emission technology	Medium	Low	Low	APSEZ is adopting lower-emission processes and investing in new equipment and technologies aligned with sustainability standards in response to climate change and evolving regulations. Investments in electrifying cranes and conveyer systems were made (₹ 19.9 crore and ₹ 16.7 crore, respectively). ₹ 384 crore was		

TRANSITION		IMPACT LEVEL					
		Short-	Medium-	Long-	STRATEGY TO MITIGATE/RESPONSE TO RISK		
RIJK	DRIVERS	term	term	term			
					spent on electrifying equipment, including the purchase of electric Internal transfer vehicles (ITVs) and infrastructure development.		
Market: Changing customer behaviour	Decreased revenues due to reduced demand for products and services	Low	Low	Low	APSEZ proactively responds to market risks by reducing reliance on coal cargo and diversifying into mixed cargo. To navigate changing customer demands and the energy transition, APSEZ is strategically designing ports to handle a diverse range of products, including sustainable energy sources through infrastructure development and collaboration with stakeholders.		
Reputation: Increased stakeholder concern or negative stakeholder feedback	Decreased access to capital; increased cost of capital	Low	Low	Low	APSEZ is extensively working on enhancing ESG performance by implementing sustainable practices, reducing carbon footprint, promoting social responsibility, and ensuring good corporate governance. APSEZ publishes comprehensive and credible integrated annual reports and TCFD report highlighting the company's sustainability initiatives, performance, and future targets. APSEZ's business strategy successfully integrates ESG considerations and climate- related issues into the company's overall		

TRANSITION	EINIANCIAL	IMPACT LEVEL			
		Short-	Medium-	Long-	STRATEGY TO MITIGATE/RESPONSE TO RISK
RIJK	DRIVERS	term	term	term	
					business strategy. This includes Incorporating sustainability and emission reduction goals into key performance indicators (KPIs) and executive compensation to emphasize the company's commitment to responsible practices.
					APSEZ conducted scenario analyses to assess the potential financial impacts of transition risk and the required capital allocation. This can help in identifying and addressing vulnerabilities proactively.

Opportunities from climate transition

The climate transition opportunity arises from renewable electricity generation. Given that we incur much lower cost in generating renewable electricity in collaboration with IIPs, we can save a significant amount on our operating expenses every year. The renewable electricity generated could also be used to provide onshore power to the ships calling the port to generate additional revenue. Additionally, there are opportunities in clean fuel generation and storage, like green hydrogen and ammonia.

Switch to renewable electricity: Our current demand for electricity is 3,85106 MWh per year which if we replace with renewable electricity, we could realise a benefit of ₹ 231 crore per year which arises because of lower cost of renewable electricity generation for us in collaboration with other IIPs compared to the cost of grid electricity we purchase. As per our calculation, we could save ₹6 on every unit of renewable electricity we generate vs. we purchase from the grid. To realise this opportunity, we need 220MW of renewable capacity with a total investment of ₹ 1,320 crore which could be paid back in 6 years.

Physical Risks

Recognizing the financial implications and business risks of climate change, we conducted a Climate Change Vulnerability Risk Assessment of the infrastructure related to port operations. The expert agency completed the vulnerability, exposure and adaptation response development based on the guidelines suggested by IPCC and the best practices for climate risk analysis.

The assessment was revised this year by updating the analysis with the latest climate model outputs and scenarios to identify climate-related risks due to physical hazards (acute and chronic). An additional scenario corresponding to less than 2°C warming scenario (SSP1-RCP2.6) is added in addition to the analysis initially conducted using more than 2°C of warming scenario (SSP2-RCP4.5) for two-time frames (2021-2050 & 2041-2070). The changes in acute physical hazards (in terms of severity and frequency) and long-term changes in chronic hazards are quantified with respect to the baseline period to identify the impacts of changes in the likelihood of identified risks on APSEZ's direct operations. The assessment subsequently identifies potential financial implications on APSEZ's direct cost, revenue, expenditure, and other indirect costs. Significant risks and associated impacts were identified at an asset level each port corresponding to the physical climatic hazards.

We also conducted a comprehensive port-wise climate adaptation planning assessment for 13 ports and terminals (including Vizhinjam and Colombo)

providing implementation timeframe and expected cost implication of adaptive measures. Impact-specific adaptation measures for assets under high and very high-risk categories were identified and are being implemented in a phase-wise approach for the ports with high vulnerability to identified climatic risks (based on the outcomes of relative climate vulnerability-risk assessment study for 13 ports and terminals).

Climate-related risks and resilience strategies identified in the adaptation plan are highly relevant and are always included in discussions related to APSEZ's growth strategy due to the magnitude of associated financial impacts to respond to the risks posed by changes in chronic climatic hazards.

Methodology for Physical Risk Assessment

Physical climate risk assessment is a two-stage process.

Stage 1: Relative physical climate risk assessment

A relative climate risk assessment was conducted for 12 ports and terminals in India and one in Sri Lanka under the projected climate scenarios for acute and chronic physical hazards. It includes the identification of hazard-specific indicators to derive the frequency and severity of physical hazards to understand the likelihood and severity of hazards. The outcome of the study includes the identification of ports with high susceptibility to different physical hazards and prioritizing ports for phase-wise implementation of adaptation planning.

2. Stage 2: Detailed organization-level physical climate risk assessment

Initially, key assets and business operations which are crucial for APSEZ are identified. The second step is to assess the impacts of physical hazards (from the outcomes of phase 1) and map the possible financial implications on different assets, supply chains, and the workforce. With the help of projections related to APSEZ's business, organizational-level outcomes are derived to identify financial impacts. Further, climate resilience strategies for different risks have been identified and assessed. We then mapped the cost of managing these climate-related risks which already have been implemented and are in the process of implementation. This study enabled us to identify more physical risk drivers due to changes in chronic and acute hazards.

Parameters considered:

1. Frequency of heatwaves, floods (inland and flash), cyclones, annual mean temperature and annual precipitation, and sea level rise in projected time periods with reference to the baseline period

2. Changes in severity or intensity or magnitude in projected time periods with reference to the baseline period

Summary of Physical Hazard Assessment (Acute and Chronic Hazards)

Physical Climatic Hazards		Scenarios	Impact with respect to Baseline (All ports and terminals)		Impact with respect to Baseline (Ports and terminals along Western Coastline)		Impact with respect to Baseline (Ports and terminals along Eastern Coastline)	
			Short- to Medium- term (2021- 2050)	Long- term (2041- 2070)	Short- to Medium- term (2021- 2050)	Long- term (2041- 2070)	Short- to Medium- term (2021- 2050)	Long- term (2041- 2070)
Acute	Inland Floods	ssp1-rcp2.6						
		ssp2-rcp4.5						
	Flash Floods	ssp1-rcp2.6						
	ssp2-rcp4.5							
	Heatwaves	ssp1-rcp2.6						
		ssp2-rcp4.5						
	Cyclone	ssp1-rcp2.6						
		ssp2-rcp4.5						
Chronic	Water Stress	ssp1-rcp2.6						
	(Change in Precipitation)	ssp2-rcp4.5						
	Heat Stress	ssp1-rcp2.6						
	(Change in Temperature)	ssp2-rcp4.5						

Sea Level Rise	ssp1-rcp2.6			
	ssp2-rcp4.5			

	<u>Colour</u>	
<u>Impact Level</u>	<u>Category</u>	Description of impact
Very Low Impact		Ports and terminals not exposed or not significantly exposed to historical or projected risks
Low Impact		Few ports and terminals exposed to historical or projected risks
Moderate		
Impact		Majority of the ports and terminals exposed to historical or projected risks
		Majority of the ports and terminals significantly exposed to historical or projected
High Impact		risks
Very High		
Impact		All ports and terminals significantly exposed to historical or projected risks

Financial Risks of Physical Climate Hazards

APSEZ, being one of the largest port operators in the country, is significantly impacted by physical hazards, particularly extreme climate events. The Company faces risks from tropical storms, storm surges, coastal flooding, intense precipitation, and heatrelated stress. These events pose a serious threat to the physical infrastructure of the ports, leading to structural damage, submersion, water damage, and increased siltation and sedimentation. As a result, port operations are affected by operational delays, business interruptions, traffic congestion, and higher maintenance requirements.

The identified risks have financial implications for APSEZ, including reduced revenues due to operational delays and stoppages, infrastructure damage, increased postevent maintenance costs, and higher direct expenses for their operations.

Furthermore, rising sea level presents a significant concern for APSEZ, especially for ports in low-lying areas. The submergence of ports due to rising sea levels disrupts existing shipping routes, necessitates the establishment of new routes, and increases fuel consumption, leading to financial implications and operational challenges.

The company is expected to incur substantial costs due to damage resulting from the extreme weather event, including repairs to infrastructure, equipment, and facilities. These expenses will contribute significantly to the overall losses. Additionally, there may be subsequent consequences such as higher insurance premiums due to increased risk. The Company will also be responsible for compensating customers for any losses or damage suffered because of disrupted operations while prioritizing the well-being of injured employees through medical treatment and support. These financial implications extend beyond immediate business disruption and encompass repair expenses, insurance adjustments, customer compensation, and employee welfare considerations.

Outlook for Financial Implications of the Risk

Extreme Weather Events and port losses: According to a report by the Indian Ministry of Earth Sciences, the sea-level rise in the North Indian Ocean was recorded between 1.06 to 1.75 mm per year during the 1874-2004 period; the rate, however, has increased to 3.3mm per year since 1993. Under the RCP4.5 scenario, the Northern Indian Ocean sea level is expected to be 300mm higher relative to average over 1986-2005 against the global mean sea level (GSML) rise of 180mm by 2050. The acceleration in sea level rise together with the increase in intensity, frequency and uncertainty of the tropical storm expected with climate change, will lead to higher frequency and uncertainty of abnormally high tides, floods and storm surges in the coastal regions and cause severe impact to the port infrastructure in future.

Operational loss higher than damage cost: The port operations are normally halted

as precautionary measures to save life and property before any anticipated weather events, like torrential rain and storm surge. As a result, the business loss to ports has a lower threshold to climate stressors. A part of the infrastructure damage risk could also be mitigated through proper adaptation measure, but loss due to precautionary work closure would persist. There are cascading impacts of closure, like backlogs, congestion and further cancelation of port calls. For example, the port of Hong Kong suffered disproportionately high loss in 2018, when Typhoon Mangkhut led to closure of its nine terminals for two days. Several container lines skipped the port call due to significant backlogs and estimated delays.

Risks were identified for all the ports and terminals during the detailed climate risk assessment study which included – inundation due to increase in precipitation and sea level rise, timetabling delays due to high winds, increase in precipitation and sea level rise, operational delays due to increase in precipitation, high wind and increase in temperature.

Estimated Financial Implication of the Risk

The financial implications of the risks identified can be in terms of:

- Operational delays and stoppages
- Damage to infrastructure and components
- After event maintenance

Stress-testing the business risk: We face the maximum loss at a time when all the ports on the east or west coast get impacted in one go. However, because of the long stretch of the two coastlines, it is very unlikely that one storm/ cyclone system or even a series of systems could impact the entire coastline on the east or west coast at one time. We conducted a scenario analysis to assess the financial impacts due to increased incidences of low-pressure systems such as cyclones. Long-term historical data for tropical cyclones is analysed for all the ports and terminals to understand the likely trends and average frequency and probability of incidence. Based on our climate risk assessment, we could face revenue loss of ₹ 3.98 lakhs to 22.57 crores per day from the extreme weather events caused by climate change. Additional loss could be due to damage to the equipment and roads and drainage systems due flooding and inundation of the premises. We have capability and vendor base to quickly repair and bring back to work the operations at the ports after any extreme level of damage to the equipment, flooding, dredging requirement and inundation of premise. As a result, we are able to quickly bounce back to keep the disruption to minimum.

In the worst case, a major tropical cyclone on the West Coast could simultaneously affect our operations in Gujarat, Maharashtra and Goa. For example, extremely severe cyclone Biparjoy, which made a land fall in Kutch, Gujarat in June 2023, had impacted all our operations in the Gujarat State, including our business at Mundra, Hazira, Dahej ports and Tuna terminal. Our operations in Dighi Port in Maharashtra and Mormugao terminal in Goa are also at risk of simultaneously getting impacted by severe cyclones if the trail of it is along the coasts of the three states. These 6 ports and terminals on the West Coast together accounted for an operating revenue of ₹ 8,241 crore in FY23 while Dighi port had operating revenue of ₹ 14.55 crore In FY23.

Minimum impact:

Business loss at the Dighi port = ₹ 14.55 crore/ 365 days in a year = ₹ 3.98 lakhs per day

Maximum impact:

Business loss at Mundra, Hazira, Dahej, Tuna, Dighi and Mormugao = ₹ 8,241 crore/ 365 days in a year = ₹ 22.57 crore per day

At present, a one-day of complete shutdown of APSEZ operations could lead to \gtrless 47 croreof revenue loss which is also same as the total revenue loss incurred if each facility of APSEZ face one day of disruption during the entire year. In 2050 under RCP4.5 scenario, we expect the frequency and intensity of extreme weather events to increase which coupled with the higher sea level, can result in stronger storm surge, high tides and floods. To date, the maximum loss we have faced in a year is of \gtrless 29 crore at Dhamra in Orissa, a key port for APSEZ, which suffered three major cyclones in 2019 leading to added cost of re-dredging and maintenance.

Table shows the summary of climate-related risk and strategies adopted to mitigate the financial impacts posed by physical hazards (Acute and Chronic hazards).

Summary of Physical Risk Assessment Analysis

					STRATEGY TO MITIGATE/RESPONSE TO		
RISK	DRIVERS	Short- term	Medium- term	Long- term	RISK		
Acute Risk: Extreme weather events: Storm surge, cyclone)	Increased indirect (operating) cost	Medium	Medium- High	Medium- High	APSEZ has prepared a comprehensive port- wise adaptation plan with a compendium of proposed adaptation measures that primarily focus on operational and engineering-based solutions. Most of these measures can be incorporated into our regular activity timelines, with around 50% of them achievable in the short to medium term. APSEZ have invested. ₹ 127.2 crores in various adaptation measures, including ₹ 26.3 crores for engineering, building adaptive capacity, and ecosystem-based measures, and a significant investment of around ₹ 100.7 crores was made in operational measures. In addition, around ₹ 10 crore has been spent on insurance coverage.		
Acute Risk: Tropical cyclone	Increase insurance coverage related cost	Medium	Medium- High	Medium- High	Climate change adaptation plan include adaptation measures enhancing infrastructure resilience, development of the emergency plan and establishment of early warning system. In response to the increasing occurrence of tropical cyclones impacting port assets, APSEZ has decided to enhance its insurance coverage to safeguard financial stability and ensure minimal disruptions to operations and infrastructure.		

PHYSICAL RISK	FINANCIAL DRIVERS		EVEL		STRATEGY TO MITIGATE/DESDONSE TO
		Short-	Medium-	Long-	RISK
Chronic Risk: Sea level rise	Increased indirect operating cost	Low	Medium	Medium	APSEZ has proposed mitigation measure specific to sea level rise which includes of constructing seawalls and breakwaters, raising the elevations of critical port infrastructure including berths, terminals etc.

At present, we are in the process of estimating financial impacts for more physical risk drivers identified under both the climate change scenarios (<2 °C and >2 °C warming). We are also planning to include the supply chain (upstream and downstream) in physical risk assessment along with our direct operations to encompass the impacts of physical hazards on our entire value chain. It will involve the addition of more physical hazards specific to the geographical locations covered under the supply chain.

Financial Opportunities Arising from Low-Carbon Transition

APSEZ has made efforts to mitigate and adapt to climate change which also produce opportunities for its port operations- through resource efficiency and cost savings, the adoption of renewable energy, access to new markets, and building resilience in its port operations.

In addition to this, the company has also developed a framework to identify, assess, and mitigate their risks including, geographic focus risk, land availability risks, locational risks, environmental risks, and safety risks. This provides opportunity to APSEZ to maximize their financial output and achieve reductions in the overall costs. We will leverage our economy of scale and integration to competitively price our services, positioning ourselves to provide the best price and value proposition.

Renewable power: Investment in renewable power gives us competitive advantage over mid- to long-term. This will help us meet our own target of net zero and enable us to perform as clean energy hub in future. We can leverage the experience and strength of our Group Company, Adani Green which is one of the largest renewable energy companies in India, to reduce the cost of installing solar plant and produce electricity at one of the lowest unit costs. Adani Green has already implemented mega scale solar projects in India with tariff among the lowest in the

world.

Over the years, we invested more than Rs.100 crores in our renewable portfolio of 34MW which has resulted in emissions reduction of 42.7 ktCO2 last year. We expect to make parallel investments in renewable energy sources and electrification with a potential positive impact in a declining use of fossil fuels over the medium to long term. Though the development is capital-intensive, diversification towards clean energy, including hydrogen, is our strategy to achieve our climate change commitment. We continue our efforts to increase the proportion of renewable power in total electricity to 100% by 2025 through third-party open access route (solar/wind), Independent Power Producers (IPPs) and captive generations.

	FINANCIAL DRIVERS	IMPACT LEVEL			
OPPORTUNITY		Short-	Medium-	Long-	STRATEGY TO IDENTIFY OPPORTUNITIES
		term	term	term	
Energy source: Use of lower- emission sources of energy	Returns on investment in low emission technology given lower cost of renewable power vs. grid	Medium	Medium	High	APSEZ finds an immense potential for positive returns from investments in low- emission technology, positioning itself as a leader in a more environmentally conscious shipping sector in the scenario of evolving policy landscape and customers demands for low carbon services. To maintain a competitive edge and embrace sustainability, the company is investing in infrastructure for green fuel refuelling, onshore renewable power supply, carbon capture & storage (CCS), and waste recycling & disposal at its ports. APSEZ has devised a comprehensive plan to meet the onshore power demand with solar and wind energy, requiring an installed capacity of 250MW, entailing an annual

Summary of Climate-related Opportunities

					capital expenditure of around ₹1,500 crore. Presently, the company has already invested ₹100 crore in our renewable portfolio of 34MW which has resulted in emissions reduction of 42.7 ktCO2 last year and annual saving in grid electricity cost. For example, solar panel of 15KWp capacity set up along the North breakwater rocks as a trial is estimated to generate 20,000 units and save ₹ 1,43,000 annually.
Low carbon services: Development and/or expansion of sustainable operations, low carbon services	Increased revenues through onshore renewable power supply, position as sustainable & climate friendly port	Medium	Medium	High	APSEZ has made a significant investment in renewable energy, such as solar and wind installations, and energy efficiency optimizations helped solidify the company's position as a sustainable company. Through an internal carbon pricing mechanism, APSEZ generated ₹ 62.3 crore in FY 2022- 23, directing funds towards renewable projects and energy-efficient measures. Investments were made in electrifying equipment (e.g., electric ITVs, charging infrastructure) and rail projects for reduced energy use. Additional sustainability initiatives, like crane electrification, berth mechanization, and the adoption of electric vehicles, resulted in emissions reduction. APSEZ aims to develop green hydrogen infrastructure and facilities for onshore supply of renewable electricity to the ships calling the port.

Adaptation to climate risks

A broad Adaptation Plan was developed to address the significant climate risks (Very HighRisks and High Risks) through adaptation measures for each of the ports and terminals. The adaptation measures proposed were classified into:

- Building Adaptive Capacity (BAC) measures such as conduct of detailed assessment studies, raising awareness, early warning systems, monitoring response, etc.
- Operational Measures (OP) such as strengthen standard operating measures, periodic maintenance schedules, pre-post events monitoring check, etc.
- Engineering Measures (ENG) such as civil work, establishment of physical interventions, etc.
- Eco-system Measures (ECO) such as re-vegetation, afforestation, mangrove conservation, etc.
- Governance and Capacity Building (GOV) port wide measures such as policy on Green Buildings

Some of the adaptation measures proposed in the Adaption Plan were implemented at ports. And remaining are in progress to be implemented. We target to implement relevantadaptation measures within a timeline of 5-10 years for existing operations. The risk assessment and plan to adapt to physical climate risks cover our new operations as welli.e., Krishnapatnam, Dighi, and Colombo.



Investment (₹ crore) in different categories of adaptation measures

After all extreme weather events, costs are incurred for maintenance and repair activities. On an average \gtrless 12 crores (east coast port) was spent on the re-dredging activity as a maintenance requirement after major cyclones. Over the years, \gtrless 127.2 crores were invested in different adaptation measures out of which \gtrless 26.3 crores were invested in engineering measures, BAC and ecosystem-based adaptation measures. However, the major investment was made in operational measures which

accounts for approximately ₹ 100.7 crores.

Adaptation at Ports with Higher Climate Vulnerability

Sustainable ports are the future, marked by relatively low environment and social impacts and a commitment to mitigate them wherever possible. Ports are central nodes connecting ships worldwide and have important impact on the environment, ecology, resources and the rest of the sector. It is, without question, a socio-economic crisis that impacts millions of lives and livelihoods on a daily basis. Environment impacts, including climate change, availability of and accessibility to clean water, occurrence of live threatening nature disasters and weather events, loss of livelihood and ecosystems, are becoming increasingly common. Without decisive action on a global scale, environmental impacts could be the biggest risk to our existence.

To reduce carbon footprint, berthed vessels can use shore power to meet their energy demands for lighting, heating, ventilation and air conditioning (HVAC). We are gradually moving towards providing zero carbon electricity to berthed vessels. Last year, we also implemented a 50% waiver of marine dues for LNG-powered vessels. Further, all customers can opt for our waste reception facilities to help them in proper waste management and disposal.

Mundra Port

Precipitation changes due to climate change will be the primary climate scenario to be addressed as it is expected to cause the highest number of climate adjusted risks. It will impact operations, causing delays and temporary stoppages. Some of the impacts faced by the port will be muddy conditions, operational delays and difficultly of handling the operations, congestion & difficulty in access, increased loss of water quality and benthic habitat due to increased runoff, maintenance dredging and disposal of dredge material. While, the sea-level rise and storm surge will cause similar impacts, it may create additional challenges like inundation, navigation & berthing, increased maintenance dredging, higher operational downtime, excessive sedimentation, and submergence. Proposed adaptation measures are predominantly operational and engineering-based. The majority of the adaptation measures can be carried out as a part of regular activity timelines. Nearly 50% of these measures can be carried out in the short to medium term. As the interventions essentially need operational actions involving human resources and time involvement, they can be implemented with low investment. Few engineering measures like increasing drainage capacity and raising the elevation of assets to prevent inundation will be finance intensive.

Hazira Port

The primary climate stressor at Hazira is increased precipitation which is expected to cause inundation, Overflow from existing storm drainages, operational delays and difficultly of handling the operations, contamination of cargo, damage to

infrastructure & components, timetabling delays, difficulty in access to the port. Operational delays and inundation are the two highest impact areas where crane ship unloaders and water resource systems are at the highest susceptibility level. More than one-third of the adaptation measures at Hazira will be operational measures, which would be taken up as a part of the regular activities and would have low-cost implications. The next significant action needed is the BAC and engineering measures like climate proofing of roads, strengthening cranes, ship unloaders, and Stackers. These would require financing at a moderate level and will be implemented in a 1-3 years timeframe.

Krishnapatnam Port

We have completed the acquisition of the Krishnapatnam port. Unlike Mundra and Hazira, sea-level rise and storm surge are the main climate stressor for the port creating the risk of operational delay, stoppage, inundation and submergence. Jetty and terminal are the most vulnerable asset. At this port, engineering and operational measures will be implemented, followed by building adaptive measures for protection and adaptation of vulnerable assets. Commonly proposed engineering measures are to raise quay heights to prevent flooding, install automated or remote-controlled machinery, install flood barrier gates, and procure mobile DG sets for power backup. About 65% of the measures would require low to medium cost for implementation as a regular course of business and in the medium term, i.e. 1-3 years duration.

Dhamra Port

Dhamra is a deep water, all-weather port of India in Odhisa, which can accommodate super cape-size vessels. About 30% of the risk at this port is associated with roads, railways and terminals. More than half the measures planned to increase the resilience of this port would entail operational and BAC activities. Nearly one-third of the resilience enhancing activities would be implemented as a part of the regular business operations, whereas another one- third would take place in a 1-3years timeframe. At Dhamra, some adaptation measures will need implementation immediately, while others can happen in the short term.

Risk Management

Risk governance: Over the years, the Company has instituted a systematic risk management approach. The Board has constituted a Risk Management Committee to frame, implement and monitor the risk management plan for the Company. The Committee meets at least once in every quarter to review the risk exposure and risk management plan on behalf of the Board. The Audit Committee has additional oversight in financial risks and controls. The major risks identified by the business are systematically addressed through mitigation actions on a continual basis. At the executive level, business risk management is the responsibility of the Head of ESG (Chief Risk Officer) while the responsibility of monitoring and auditing risk management performance on an operational level lies with the Management Audit & Assurance Services (MA&AS) team which has experienced and professionally qualified accountants, engineers and SAP executives to carry out audits across all functional areas. The MA&AS function directly reports to the Chairman of the Board. The scope of internal audits includes the review of various ESG control processes, performance metrics and data. Along with that we also conduct audits with the help of an external agency.

Risk management processes: The ESG Head managing the business risk is answerable to the Risk Committee and reports directly to the CEO to ensure independence from other functions. The Risk Management Committee has three members, all of whom are nonexecutive directors with two of them being independent directors. All three members of the Risk Management Committee have diverse business experience and vast business risk management exposure.

The Executive Management and/ or Risk Management Committee perform the following functions:

- Periodic review and approval of various business proposals for their corresponding risks and opportunities,
- Guidance over risk supervision, risk assessment and risk management, including systems for risk assessment and measurement.
- Establish policies, practices and other control mechanisms to contain risks.
- Review and monitor the effectiveness and application of risk management policies, related standards and procedures.
- Review and identify risks in cybersecurity and management.

Risk Identification & Assurance



Key features of the risk assessment dashboard

- Overall location and Company level dashboard
- Category-wise risk dashboards with impact
- Generation of heat maps for each user and function
- Risk trends report and risk severity charts with overall risk severity mapping (H-M-L)
- Location-wise severity
- Bubble charts used to examine impacts and the likelihood of risks on a quarter-toquarter basis
- Risk severity in risk registers based on a colour coding system
- Access to management users for viewing dashboard for locations and central functions
- Audit trail kept at each level of design
- Auto alerts of risk cards at defined frequency to risk owners and Chief Risk Officer

Features of the Enterprise Risk Management tool: During FY 2022-23, the Risk Management Committee conducted 4 meetings. APSEZ's Board-approved Risk Management Policy comprised of material risks identified and assessed by the Company. The Company set up a policy framework for ensuring better management of risk profile and provided importance to prudent project (conceptualisation, implementation and sustenance) practices, putting in place suitable risk mitigation measures. The risk management framework of APSEZ sought to minimise the adverse impact of risks on key business objectives and enabled the Company to leverage opportunities. The Company designed and operated its risk assessment model that took quantitative and qualitative data into account.

Risk review: During FY 2022-23, APSEZ proactively worked on preventive measures and mitigation plans for the risks identified to have impacts on the Company. APSEZ has identified risk appetites to facilitate risk review and reporting. This outlines the level of acceptable risk we have defined for the achievement of our goals. It is decided by the risk management team and is approved by the risk management committee with majority

independent Board members. The risk management team conducts a quarterly assessment of the actual risk exposure and compares it with the acceptable level for various business goals. The gaps identified, if any, are highlighted accordingly to the management and reported to the risk management committee.

Management of Climate Risks

In FY 2021-22, APSEZ conducted a climate change scenario planning study, recognizing the financial implications and business risks associated with climate change. The study focused on the infrastructure related to its port operations, aligning with IPCC guidelines and best practices. Using climate change risk assessment framework and consulting sectoral climate experts, APSEZ carried out a climate change vulnerability risk assessment and adaptation planning study in phases, considering different plausible climate change scenarios within the timeframes of 2021-2050 and 2041-2070.

With advancements in climate modelling and incorporating the latest IPCC assessment report (IPCC AR6), APSEZ updated its physical climate risk assessment study, introducing new climate models and scenarios. The revised study expanded the identification of climate-related risks (both physical and transition) and opportunities. The company assesses the magnitude of impact that climate-related risks have on its business using a range of indicators embedded within its risk management tool. APSEZ considers factors such as physical climatic hazards, water sources and consumption, energy mix and consumption, emission profile, and cost and regulatory dimensions of risk. This assessment aids in prioritizing risk mitigation efforts and anticipating future changes in climate risks.

APSEZ effectively monitors climate-related risks through its comprehensive environmental management system at the site level. The Corporate Responsibility Committee (CRC), which convenes quarterly with the Board, reviews climate risks presented by the Head of ESG (Chief Risk Officer) in the Risk Management Committee. Sustainability Leadership Committee also discusses all matters related to climate. The responsibility for site-specific and business-specific responses to climate risks lies with the business entity CEO and the local EHS team. Due to the interdisciplinary nature of climate risks, cross-functional coordination with legal, operations, and supply chain teams is often necessary for effective risk mitigation. APSEZ's approach revolves around transforming risks into opportunities as it develops and expands its business, integrating its decarbonization strategy into its core operations.

At APSEZ, we are committed to leading the way in climate resilience within the ports and logistics industry. Our dedication to sustainable practices and responsible risk management is exemplified through various key initiatives:

1. Regular Disclosures and Reporting:

We ensure transparent and consistent reporting, aligning with the recommendations of the Task Force on Climate-related Financial Disclosures (TCFD). Our financial reports and relevant documents comprehensively disclose climate-related risks, opportunities, and strategies. By doing so, we empower our stakeholders with crucial information to make informed decisions.

2. Regular Stakeholder Updates:

Communication is at the heart of our climate risk management strategy. We prioritize keeping our stakeholders informed about our progress and improvements in managing climate-related risks. Through regular updates, we strive to build trust and reinforce our commitment to sustainable business practices.

3. Employee Training and Awareness:

We recognize the significance of our employees' role in driving positive change. We ensure that all employees, regardless of their level, receive comprehensive training about climate change, its potential impact on our business, and the importance of climate risk management. Moreover, we foster a culture of climate consciousness, encouraging employees to contribute their ideas for climate risk mitigation and adaptation.

4. Continuous Monitoring and Review:

Our commitment to climate resilience extends beyond initial efforts. We have implemented a robust system for ongoing monitoring of climate-related risks and the effectiveness of our risk management strategies. Regular reviews and updates ensure that we remain agile and responsive to emerging risks and new information.

In summary, APSEZ employs a comprehensive approach to risk management, encompassing risk identification, assessment, and management. By implementing an ERM framework, engaging key stakeholders, conducting climate change scenario planning studies, and integrating risk mitigation efforts across functions, APSEZ demonstrates its commitment to addressing climate-related risks while embracing opportunities for sustainable growth.

Metrics and Targets

GHG emissions

We have a target to become carbon neutral by 2025 which will cover our entire Scope 1 and Scope 2 emissions from the port operations. We also have a target to achieve net zero by 2040 which is a science-based target. We have committed to seek validation of this target by the Science Based Targets initiative in the next two years which will also cover the Scope 3 emission reduction. Our Scope1, Scope 2 and Scope 3 GHG accounting is aligned with the GHG protocol and follows the best international practices and provides us with a mechanism to track our carbon footprint and progress towards our goals. We keep aligning our emission reduction actions to our short- and medium- term goals. Our total emission (Scope 1 and 2) in FY 23 was 382 ktCO2e.

In view of our emissions targets, we have scaled up the ambition for renewable capacity to additional 250MW from the earlier planed 100MW capacity. The company is now discussing the tie-up of electricity supply from renewable developers. Ports have the largest emission footprint at APSEZ contributing about 83% of emission, followed by dredging and harbor services which contribute 7% and 6% of the total emission respectively.

Scope 3 includes emissions arising from fuel consumed by contract vehicles, contract equipment, administrative vehicles (outsourced), business travel (air, train, bus, and four- wheeler), employee transit (daily commute), waste disposal (outsourced), horticulture equipment and vehicles (outsourced), canteens and its vehicles (outsourced), and other indirect emissions. Emissions from investments include our joint ventures' Scope 1 & 2 emissions. Total Scope 3 GHG emissions for FY2022-23 were 2,023 ktCO₂e.

Indicator	FY 23 target	Actual achievement by FY 23	2025 target
Energy intensity reduction*	45%	46%	50%
Emissions intensity reduction*	45%	47%	60%
Renewable share in total			
electricity	14%	14%	100%
Scope 3 emissions (ktCO2e) [#]	2,050	2,023	

Energy and Emissions: targets & performance

* Base year is FY2016

Target of 50% reduction by FY2033 from FY2023 base year





Scope 3 emissions

Scope 3 Category	FY 22 (tCO ₂ e)	FY 23 (tCO ₂ e)
Purchased goods and services	Not calculated	4,75,391
Capital goods	Not calculated	8,48, 219
Fuel - and energy- related - activities (not included in Scope 1 or 2)	49,492	1,32,022
Upstream transportation and distribution	2,88,191	4,22,719
Waste generated in operations	58	329
Business travel	531	169
Employee commuting	1,801	1,367
Upstream leased assets	Not applicable	Not applicable
Downstream transportation and distribution	69,097	97,653
Processing of sold products	Not applicable	Not applicable
Use of sold products	Not applicable	Not applicable
End of life treatment of sold products	Not applicable	Not applicable
Downstream leased assets	10,236	11,589
Franchises	Not applicable	Not applicable
Investments	52,242	33,614
Other downstream	Not applicable	Not applicable
Other upstream	Not applicable Not applicable	
Total	4,71,648	20,23,072

Energy Consumption

The share of electricity in our total energy consumption increased to 46% from 39% last year which is in line with our strategy to switch from fossil fuel to electricity use. As we source more renewable electricity in future, we will be able to reduce this scope 2 emissions from our operation. However, the proportion of renewables in total electricity consumption stood at 14% in FY23. We currently have 34MW of captive and PPA based renewable capacity and have already given contract for additional 250MW capacity with



IPPs to increase our renewables share significantly. The target is to have 100% renewable in electricity mix by 2025.

