Taskforce on Climate-Related Financial Disclosures (TCFD) Report 2022

ADANI PORTS AND SPECIAL ECONOMIC ZONE LIMITED

adani
Ports and
Logistics

Executive summary

Adani Ports & SEZ (PASEZ) is at the forefront in the ports and logistics sector to adopt a sustainable pathway to growth and profitability. In the last financial year, APSEZ reported 26-27% growth in its cargo volumes and revenue. Alongside, the Company achieved 38% increase in renewable capacity, 16% reduction in its emission intensity, 56% share of non-competing water sources, 87% waste recycling and 3,239 Ha of afforested mangroves area. In the last five years, renewable share in the electricity mix has increased from zero to 20%. While we made material progress in a short period, but what we have committed to achieve in significantly bigger.

With a target of **Carbon Neutrality in 2025,** APSEZ is working to source 350MW of electricity supply from renewable sources, procure 500 counts of battery-based ITVs (e-ITVs), replace equipment such as Reach Stackers, Empty Container Handlers, Excavators, Forklifts and Dozers, with low carbon alternatives. We have already refurbished Rubber Tyre Gantry Carnes (RTGS) from diesel to electricity and are now electrifying Quay cranes. APSEZ is also targeting 5,000Ha of mangrove afforestation and 1,200Ha of terrestrial plantation. These projects are capital intensive and would require investment in excess of ₹ 5,000 crore.

Given the nature of APSEZ's business, and its **exposure to climate stressors**, building resilience in our infrastructure, processes and systems is necessary to provide a seamless service to our customers. A climate resilient infrastructure will provide APSEZ a competitive advantage, as the frequency and intensity of extreme weather events intensify. We are therefore investing in adapting our ports to the physical risks of climate change, with implementation of identified measures in the within **10 years**.

In the medium to long term, we see material opportunities for APSEZ from the low carbon transition of world's economy. We are also working on our **net zero target** plan which will be submitted to SBTi this year for a validation. We would likely be targeting net zero in the next decade, well before 2050, the target year for the world to limit the temperature rise to 1.5-degree Celsius. 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.

On resource utilization, we have set ourselves to achieve industry leading targets. We have made commitment to reduce the freshwater use across our operations to below 20% by **2025** and source at least **80%** of our entire requirement from **non-competing sources**.

We are evaluating construction of a desalination (500 MLD) plant and some STP projects. These will easily take our share of total water supply from non-competing sources to over 90% in the next few years. For waste management, we follow 5 R - reduce, reuse, recycle, recover and reprocess- approach across all out facilities. We have commitment for **zero waste to landfill** across all our sites.

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 three 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 centricity and sustainability with an ambition to become the largest port operator globally, and India's largest transport utility by 2030.

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 India's largest commercial port operator and integrated logistics player. The Company intends to emerge as the world's largest private port company and India's largest integrated transport utility by 2030. It has 12 ports and terminals and 538 MMT of operating capacity. The Company also possesses the largest container handling facility in India. Nearly 62% of the Company's capacity is on the west coast of India and 38% on the east coast. APSEZ ventured to create and maintain India's national waterways. The Company took up three distinct projects in the National Waterway 1 (NW1). The projects comprise the deployment of six small CSDs across a 300 Km stretch of NW1. APSEZ (through subsidiary Adani Logistics Ltd.) operates six logistics parks at Patli in Haryana, Kilaraipur and Kanech in Punjab, Kishangarh in Rajasthan, Nagpur in Maharashtra and Malur in Karnataka. We have a grain silo capacity of 0.87 MMT under operation, while 0.25 MMT of additional capacity is under commissioning. Adani's logistics park – the largest in India– is being constructed on the outskirts of Ahmedabad. APSEZ's subsidiary Adani Logistics Ltd. (ALL) possesses an annual capacity to manage 600,000 twenty-foot equivalent units (TEUs) across 580 acres of its six logistics parks. (For more details, please visit our website https://www.adaniports.com).

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 front line of climate impact. Continuity of this trade sector in the 'business as usual scenario' is threatened 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.

Energy hub –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 location for waste recycling & reuse and circular economy. In fact, ports could be the real catalyst for 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:

(a) 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;

(b) 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;

(c) 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.

(d) 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

(e) 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 the time to come.
The transportation and logistics sector are among the top global greenhouse gas contributing sector. De-carbonization of the sector is taking place at various levels. **Being a part of the sector, we recognize our responsibility to reduce GHG emissions and are committed to the same.**

Our Position and Commitment

- We are committed to contributing to a climate scenario aligned to Paris Protocol and one which does not lead to temperature rise beyond 1.5degree Celsius
- As a member of the Climate Ambition Alliance, committed to net zero emissions before 2050
- **Our goal is to be carbon neutral by 2025**
- Committed to setting net zero target and action plan in FY 2023 and get the target validated by the Science-Based Target Initiative (SBTi)
- We endorse and commit to United Nations CEO Water Mandate
- Committed to reduce dependence on shared sources of water
- Our target to get **80%** of our water requirement from **non-competing** sources by **2025**

Climate Change Governance

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

The Board, supported by Corporate Responsibility Committee (CRC), Corporate Social Responsibility Committee (CSRC), Stakeholder Responsibility Committee (SRC) and Risk Management Committee (RMC), monitors performance, adherence to the standards and risks in the organisation. The Corporate Responsibility Committee (CRC) oversees the implementation of the ESG Strategy and policies, including the management of transition risks and delivery against ESG targets. Management of ESG priorities is embedded across business areas, corporate and business unit level, flowing from the Board. At the corporate level, CRC reviews performance against environmental and social metrics and develops a strategy while the ESG team develop the Company's ESG agenda and support business functions in driving implementation.

We have sustainability committees at different levels – Board, corporate and site. Our cross-functional Sustainability Leadership Committee (SLC), chaired by the CEO, is responsible for ensuring the operationalisation of sustainability as a part of our strategy. The Sustainability Leadership Committee (SLC) shape the business strategy by:

a. Overseeing strategies, policies and practices on sustainability matters to attain Company's Sustainability frameworks, risks, standards, priorities, community-led initiatives and partnerships

b. Reviewing and reporting to the Board on Company's performance, international sustainability trends, benchmarking against peers and public disclosures.

At the site-level, the Site Heads support the implementation of our sustainability strategy in their respective functions through a Sustainability Steering Committee (SSC).

Risk Management

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 an 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 and site-level Environment, Health and Safety (EHS) Team** are responsible to identify and respond to climate change risk at the site level along with cross-functional teams.

Climate Change 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 external factors and our resilience to the risks. **The magnitude of impact these climate change risks have on our business is assessed through an array of indicators embedded into our risk management tool (depicted in the diagram).** We have identified water sources, the quantity of water consumed, energy mix and its quantity, our emission profile, cost of procuring energy and complexity, legal, and regulatory dimension of risk, 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 water and energy security** and undertake systematic investment in our existing operations to reduce the stress of climatic changes on the current assets. While doing so, **the Company sincerely considers the opinions of its investors and all stakeholders**. We take into account communities' exposure to climatic risk in all our operations and future investments.

Risk Intensity and Anticipated Movement

Timeframe of Risk Occurrence	Transition Risk					Physical Risk	
	Regulatory	Legal	Technology	Market	Reputation	Acute	Chronic
Short Term	Low	Low	Medium	Low	Medium	Low	Low
Long Term	Medium	Low	Low	High	High	High	High
Movement of Risk	↑	↔	↓		↑	↑	↑

Opportunities arise through resource efficiency, new products and services, and our ability to serve diverse markets better. Addressing the risk to our assets provides us with the opportunity to build resilient infrastructure that continues to operate under more significant climate stressors. Thus, climate change poses risks to the business, but responding to transitional and physical risks also provides new opportunities.

Climate Change Strategy

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

1. **Reducing the impact of our business emissions** to meet the global carbon budget requirement **in alignment with the 1.5-degree world.** Therefore, our GHG impact reduction pathway is set on a 1.5degree scenario

2. We are **building the physical resilience** of our infrastructure based on an **RCP 4.5 scenario** i.e. preparing ourselves against physical risks posed by a greater than 2-degree global warming
3. **Building business resilience to transition risks** arising from the global commitment to meet a **1.5-degree scenario.**

We currently use a qualitative and quantitative scenario analysis for physical and transition risk assessment. Our physical risk assessment and resilience plan is based on a detailed plan developed by an external agency for APSEZ.

The below diagram describes the three pillars of our climate strategy

Timeframe for strategy, Risk and Opportunity Assessment Implementation

We follow short, medium and long-term time frames for categorizing risk and opportunity. The short term is an immediate impact on the company but **within 3 years** timeframe, the medium term is **3-10 years**, and **greater than 10 years** is the long term.

Transition Risks

Transition risks arise from **changing regulatory and legal landscape, technology and market scenarios** posed by de-carbonization and carbon neutral pathway and **reputation** loss based on the perception by the stakeholders. For the assessment of climate-related transition risks arising for our business, we have considered global transition to a **1.5-degree Celsius** consistent pathway in **2040**. There is a wide range of 1.5°C-consistent pathways (IPCC SR15, Chapter 4), but all of them require rapid reduction in GHG emissions to net zero by 2050. The pathways with consideration for 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 system, 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**).

Risks and opportunities from the shipping sector transition: Shipping is one of the major sectors where emissions abatement is difficult for the want of feasible low carbon technologies and cost-effective solutions. Since the transition pathway to be followed by

the shipping sector will affect our business, any ambiguity in the long-term policy for the sector poses risk to us.

As the zero 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.

Changing demand

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 outlook of achieving a net-zero emission world by 2050. It brings around two kinds of shift for us; one- customers looking for more climate-friendly ports, and the second is the need to ensure that our ports are equipped to handle a more diverse portfolio of products. 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 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 that will need policy support from the government.

We recorded negative growth of 33.9% in thermal coal traffic in FY22 and it currently accounts for 26% of our total volume. 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.

Tech-led changes: Adoption of new technology is essential for the ports in the low-carbon scenario. We see new technologies shaping the day-to-day activities of the ports. Automation and control of operations from remote location, including operating equipment from faraway place, monitoring processes remotely, etc. will be necessary to reduce exposure of 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 shipping, port and logistics sector must also transform to adjust to changing customer preference for greener product and sustainable supply chain. Further, 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.

Estimating the onshore power opportunity: We see higher opportunity with deeper decarbonisation of the shipping sector. In onshore power supply itself there is an opportunity of ₹ 400 crore per annum. As per our calculation, if we meet onshore power demand of the ships that berth at our port in 2030, we would be able to generate additional revenue of at least ₹ 400 crore per year. The total installed capacity required to meet the onshore power demand with solar & wind will be 240MW which will require ₹ 200 crore capex every year from now until 2030.

Assumptions for onshore power opportunity

1. *Berth power demand per call of ships = 50MWh.*
2. *No. of ship calls with onshore power requirement = 10,000 per year*
3. *Average Industrial power tariff of Rs.8 / unit; not accounting for inflation*

Regulations to contain sectoral emissions are emerging worldwide, and as we expand operations to other geographies, we may face regulations with emission caps. So far, we are not impacted legally or financially by any such laws and regulations. For us to achieve our climate goal, having a climate regulation and policy conducive to generating and purchasing renewable power is vital. As the Indian government further formalises policies to achieve its NDCs, APSEZ may face direct or indirect prices on its carbon emissions. Anticipating future requirements, we have started to internally price our carbon emissions at the rate of USD20/ ton of all the scope 1 & 2 CO2 emissions from our operations. The equivalent cumulative amount is set aside for investment into renewable projects and energy efficiency measures. This helps us partly account for the negative externalities of the use of fossil fuel in exacerbating climate change. It also enables us to evaluate our new low carbon projects from the standpoint of benefits they bring towards climate mitigation. In FY 2021-22, a USD 6.4 million fund was generated through the carbon pricing measure. In the voluntary carbon market in India, the carbon price averages USD10-15/ ton. We decided to keep our internal carbon price at least 25% higher than that. We'll review the carbon price every year with an objective to gradually align it with the global carbon prices.

Attempting and addressing technology risks is now leading us to opportunities. In FY 2021-22, we used internal accruals to invest ₹ 209.69 crore, in projects related to energy efficiency, emission reduction, environment protection, water & waste treatment and adaptation all of which will help us transition to less GHG-intensive business. Over ₹ 180

crore was spent on different rail projects like electrification and up-gradation of existing lines and equipment, which helped reduce energy use through a modal shift and efficiency improvements. We made investments of ₹ 2.6 crore on solar power projects.

Technology Pathway	Transition to Cleaner Fuel	Conversion of diesel locomotive to electric and doubling of rail line	Opportunity through technology upgradation
Financial Cost	Capex of approximately ₹500 crore for 500 E- ITV's and a payback of 4-5 years.	₹ 180 crore	Electrification of 11 mobile harbour cranes at a CAPEX of about ₹ 58 Crore and a payback period of 3 years
Outcome	Overall emission reduction of 7,000tCO2 p.a. As the electricity grid gets cleaner, the emission reduction will be much higher.	Emissions are estimated to reduce by 6000tCO2 p.a. from electrification alone.	The expected reduction of 8,600tCO2 p.a. is due to the electrification of cranes.

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 scenario of RCP4.5 with the likelihood of more than 2 degrees of global warming was considered. Two timeframes of 2021-2050 and 2041-2070 have been studied as means of testing strategic resilience against different plausible and science-based climate scenarios.

Implementation timeframe and expected cost implication of adaptive measures have been drawn out for the four most vulnerable ports — Mundra and Hazira ports in Gujarat, Dhamra port in Odisha, and Krishnapatnam port in Andhra Pradesh. Development of adaptation plans for other ports are in progress.

Financial Risks of Climate Change

Significant risks that were identified for the four ports (Mundra, Dhamra, Hazira and Krishnapatnam) during the detailed climate risk assessment study 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.

A broad Adaptation Plan was developed to address the significant climate risks (Very High Risks and High Risks) through adaptation measures for each of the 4 ports. The adaptation measures proposed were classified into:

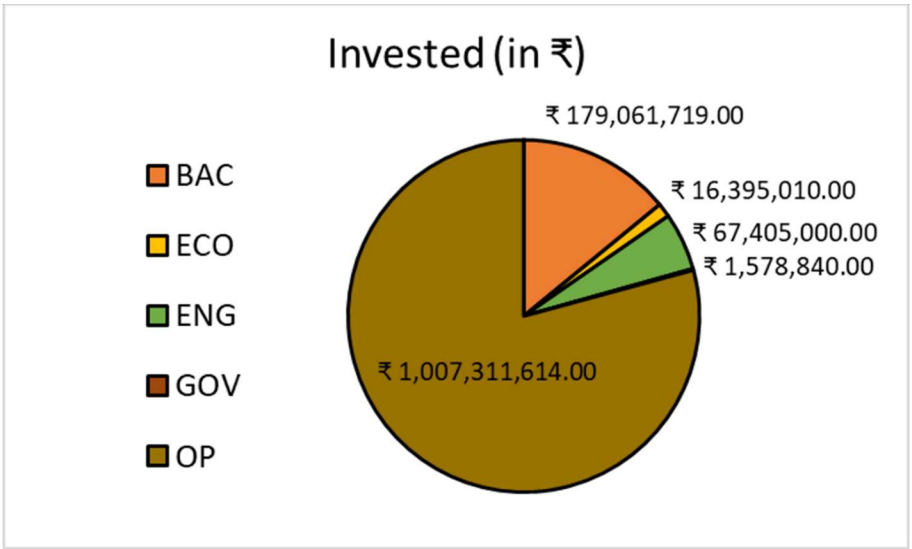
a) **Building Adaptive Capacity (BAC)** measures such as conduct of detailed assessment studies, raising awareness, early warning systems, monitoring response, etc.
b) **Operational Measures (OP)** such as strengthen standard operating measures, periodic maintenance schedules, pre-post events monitoring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

The Adaptation Plan for the ports included the following components:

a) Type of Adaptation Measure
b) Implementation Timeline (Short term, Medium Term, Long Term, Regular)
c) Cost (Low, Moderate and High)
d) Responsible department for implementing the measure

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 **relevant adaptation 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 well i.e., **Krishnapatnam, Dighi, and Colombo**.

Investment in different categories of adaptation measures



Estimated Financial Implication of the Risk before Taking Action

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

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

APSEZ claimed **₹19.25-2.13 crores** as an insurance claim for the damaged asset/infrastructure due to climatic event. Certain amount of money is spent on the after-event maintenance activities. Over the last years **₹ 12 crores per port** (east coast port) was spent on the re-dredging activity as a maintenance activity after a cyclone.

In year 2021, **₹127.2 crores** were invested in different adaptation measures out of which ₹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.

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 the near-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, like other logistics segments. 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 calls due to significant backlogs and estimated delays.

At present, a one-day of complete shutdown of APSEZ operations could lead to ₹ 50 crore of 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 flood.

Assuming that the business volume of APSEZ rises 4 times in 2050, the daily loss of closure of operation will be ₹ 200 crore (at constant price) with additional cost incurred due to congestion, port call avoidance, higher insurance premium, repair, re-dredging, etc. To date, the maximum loss we have faced in a year is of ₹ 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.

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. A more plausible case to estimate maximum business loss would when the ports of Mundra, Hazira and Dahej in Gujarat and Dighi port in Maharashtra get impacted in one go. These ports handle close to 65% of the current cargo volume and account for 43% of the operating revenue. Based on our assessment, we face maximum 10 days of closure due to any extreme level of damage or inundation to any port. We have capability and vendor base to quickly repair and bring back to work the operations at the ports post any extreme level of damage to the equipment, flooding, dredging requirement and inundation of premise.

The closure of operations could result in subsequent ship berthing backlog, congestion and cancellation of port calls which can further result in business loss. We estimate, all these together would result in 14 days equivalent of maximum business loss, including the number of days the extreme weather event lasts. The business loss altogether over the 14-days period will be ₹ 300 crore at present value (₹ 50 crore x 43% x 14days). The damage cost will be the next significant loss to the Company followed by increase in insurance premium, payment of loss & damage to customers, treatment of employees in case of any injury during the extreme weather event.

Regulatory risk: APSEZ is targeting to increase the share of renewable electricity from current 20% to 100% for all its operations by 2025. Generally, the regulations do not prohibit or regulate renewable power installations. However, our largest port operation at Mundra faces restrictions on renewable power plant installations due to the Gujarat State laws. As per the current regulations of the state, wind-based renewable energy capacities of the Company at a site cannot be more than 50% of the total power requirement contract through the grid. Earlier, these restrictions applied to solar power plants installed capacity as well. While the regulatory change concerning solar power has reduced the regulatory risk, the regulation for wind power continues to hinder our renewables target for the Mundra port. We can achieve a maximum of 62% of energy generation from renewable sources with the current regulations. We plan to purchase the equivalent emission reduction certificates to fulfil our target, which will cost the organization about ₹ 2.67 crore every year from FY25 onwards.

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 economic of scale and integration to competitively price our services, positioning ourselves as a cost leader offering the best price 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 company in India, to reduce the cost of installing solar plant and produce electricity at one of the lowest unit cost. 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, which includes 14.88 MW of solar at different locations and 6 MW of wind energy at the Krishnapatnam port. With this, we achieved an emissions reduction of 46,741 tCO2e in FY 2021-22 and 111, 283 tCO2e over the years. We expect to make parallel investments in renewable energy sources 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. In FY 2021-22, the total consumption of electricity was 301,774 MWh, out of which solar and wind was 59,166 MWh.

Investment for 2025 Carbon Neutrality target: Looking forward, to meet the carbon neutrality target for 2025, there is a substantial value of low-carbon transition capex that is required. The capex identified for few key projects are:
(1) An additional 350MW of renewable capacity installation by 2025 which will need another ₹ 2,100 crore of investments
(2) Around ₹ 500 crores for replacing diesel based Internal Transfer Vehicles (ITVs) with battery-based ITVs (e-ITVs)
(3) 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 investment of more than ₹ 2,500 crore, as per our estimate. The payback period of our investment in **e-ITVs** is **4-5 years**, **cranes 3-years** and **conveyors** again **3-years**.

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 all the operations. The SBTi validated *net zero* target which will be finalized in FY23, will also cover the Scope 3 emissions. Our **Scope1, Scope 2 and Scope 3 GHG accounting** is aligned with the GHG protocol and best international practices and provides us with a mechanism to track our carbon footprint and progress towards the goal. We keep aligning our emission reduction actions to this goal. **Our total emission (Scope 1 and 2) in FY 22 was 322,499 tCO2e**.

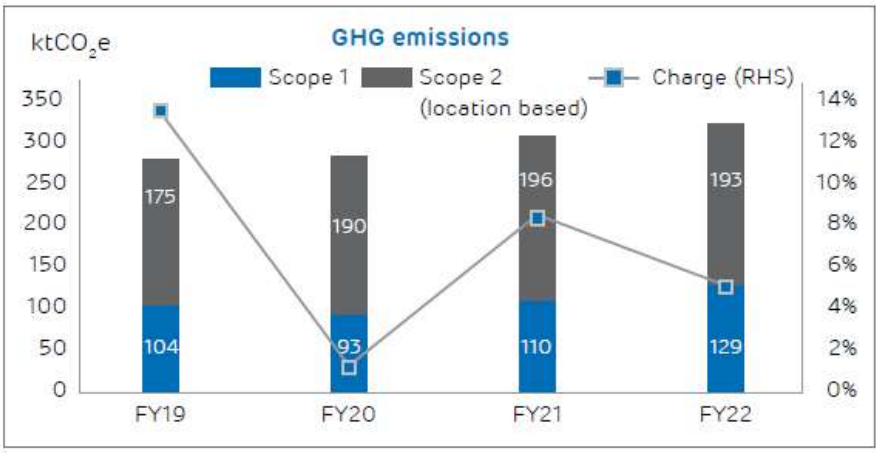
In view of our emissions targets, **we have scaled up the ambition for renewable to additional 350MW capacity from the earlier announced 100-megawatt generation capacity**. The company is now discussing the tie-up of electricity supply from renewable developers. **Ports have the largest emission footprint at APSEZ** contributing about 75% of emission, followed by dredging and harbor services which contribute 15% and 8% of the total emission respectively.

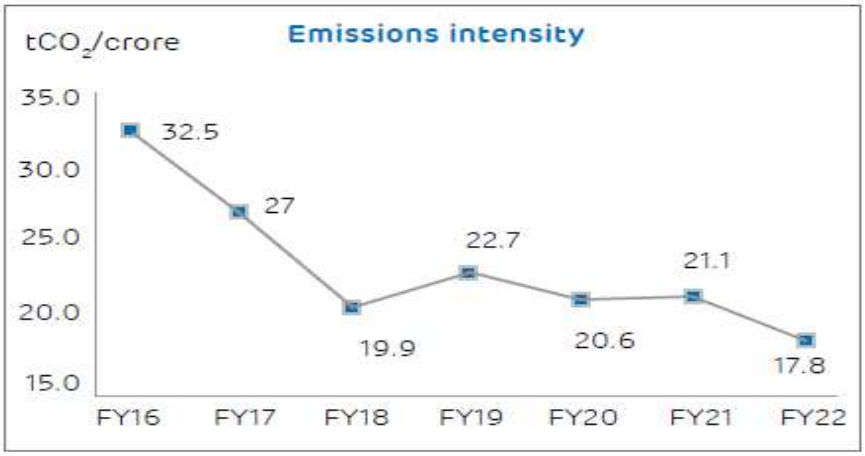
Scope 3 includes emissions arising from fuel consumed by contract vehicles, contract equipment, administrative vehicles (outsourced), business travel (air, train, bus, and four-wheeler), employee transit (daily commute), waste disposal (outsourced), horticulture equipment and vehicles (outsourced), canteens 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 FY2021-22 were **471,649 tCO2e.**

ESG targets & performance

Environmental			
Indicator	**FY 2021-22 target**	**Achievement against FY 2021-22 target**	**2025 target**
Renewable energy share	15%	131%	100%
Energy intensity reduction*	30%	127%	50%
Water consumption intensity reduction*	55%	106%	60%
Water withdrawal from non-shared resources	76%	71%	80%
Waste intensity reduction#	20%	110%	30%
Zero waste to landfill certification	6 ports	100%	12 ports
Single use plastic free sites	11 ports + 4 ICD	9 Ports (Completed) + 4 ICD (In Progress)	12 ports + 4 ICDs + 14 Agri-logistics sites
Mangrove afforestation	3200 Ha	3239 Ha	5000 Ha**
Terrestrial plantation	1000 Ha	1000 Ha	1200 Ha

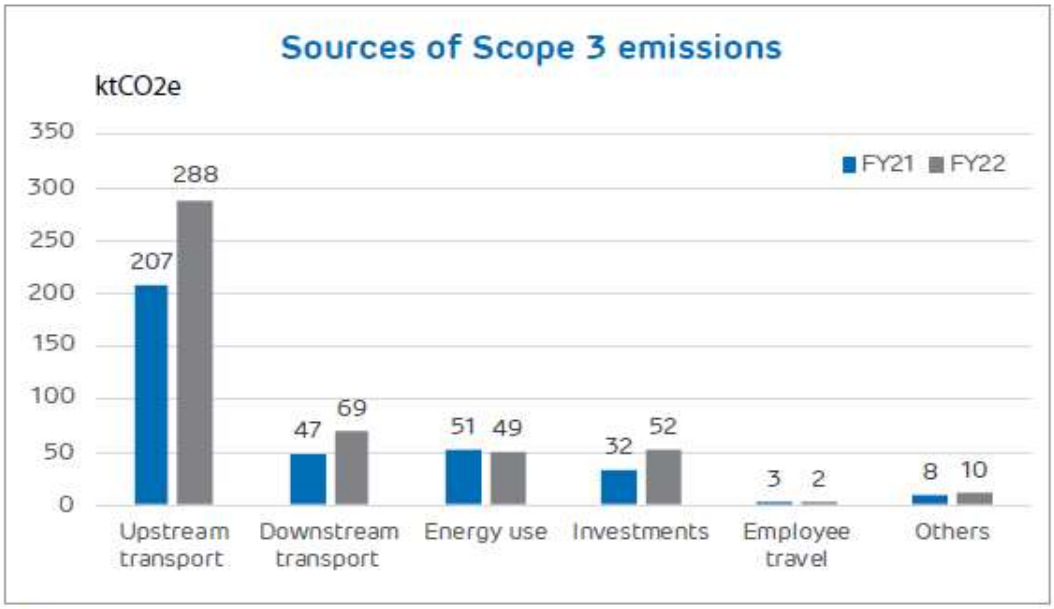
*Base year is FY 2015-16; # Base year is FY 2017-18





Ozone Depleting Substances (ODS)

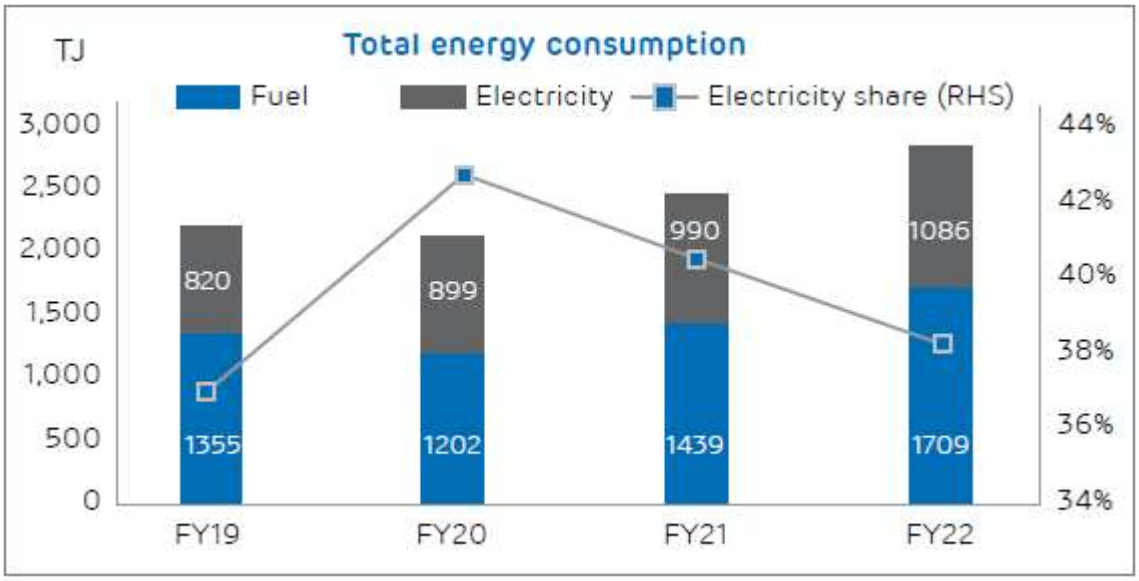
Ozone-depleting substances (ODS)	Quantity Kg
R-22	335
R-407C	0
R-410	164
R-32	1.8

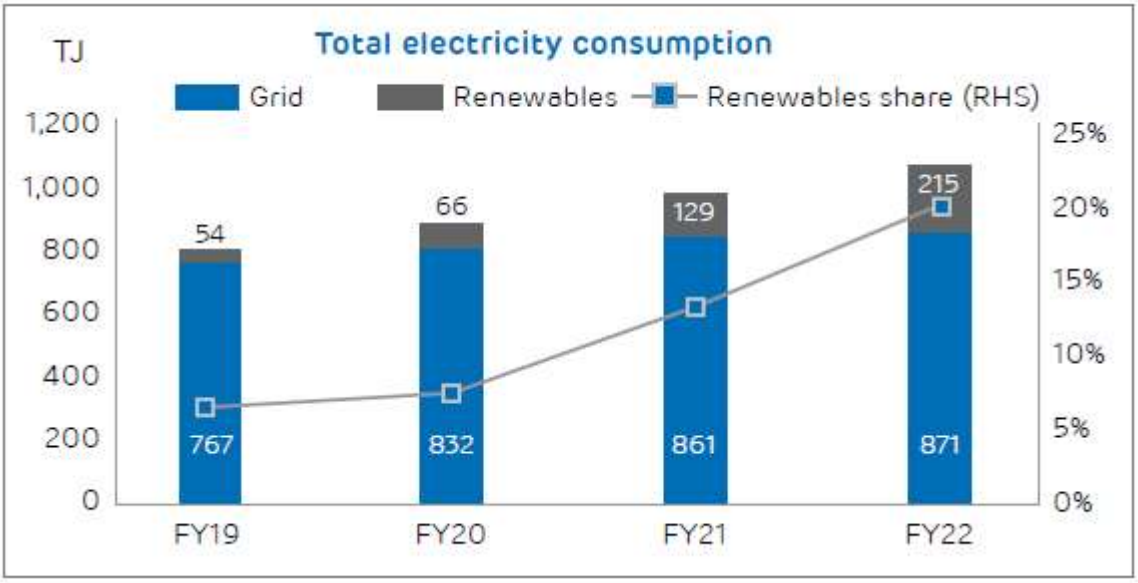


Note: Others include downstream emissions, employee commutation, business travel and waste disposal

Energy Consumption

The share of electricity in our total energy consumption stands at 39%, which has remained largely the same over the last four years. However, the proportion of renewables in total electricity consumption doubled over this period. We are discussing tie-ups for additional 350MW capacity with IPPs to increase our renewables share significantly. The target is to have 100% renewable in electricity mix by 2025.




Total electricity consumption
TJ
Grid
Renewables
Renewables share (RHS)
1,200
1,000
800
600
400
200
0
25%
20%
15%
10%
5%
0%
54
66
129
215
767
832
861
871
FY19
FY20
FY21
FY22

Waste

Goal: Zero waste to landfill for all sites

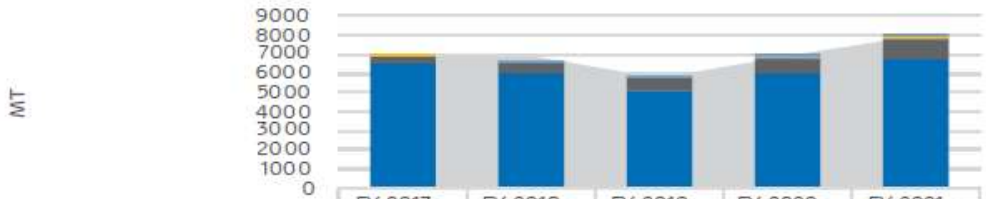
Management Strategies

- Across facilities, the **5R approach** was implemented: Reduce, reuse, recycle, recover and reprocess
- Reduce **single-use plastics**: straws, wrappers, disposables and crockery items were banned across 9 ports as of FY 2021-22
- Installation of **organic waste converter**: biogas, vermicomposting, etc.
    - Biodegradable waste was recycled and used as manure
    - Non-biodegradable waste was sent to recyclers and cement plants for coprocessing
    - STP sludge was used as soil conditioner/ manures
- Reducing **paper use**: digitization of communications and promotion of recycling

Performance

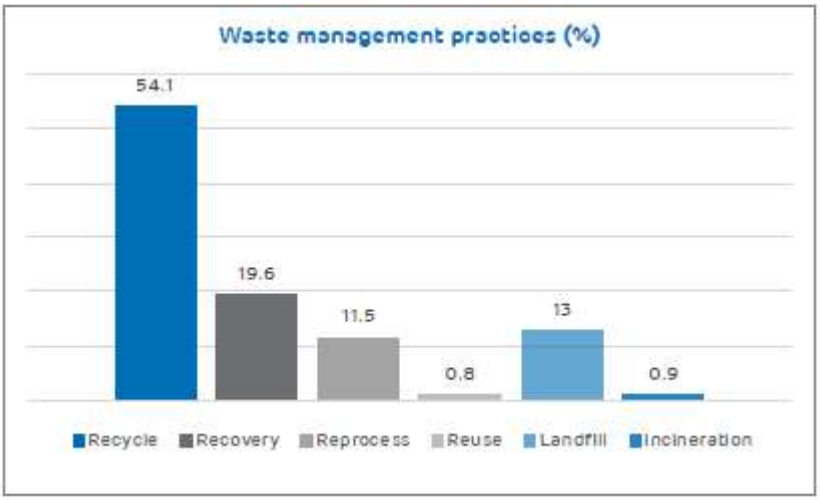
- As of FY 2021-22, 6 ports have completed the target of being "zero waste to landfill" sites
- In FY 2021-22, total waste disposal increased 14.93 % over FY 2020-21. Some 86% waste was handled using the 5R principles; 1%, 12%, 54% and 20% waste being reused, reprocessed, recycled and recovered respectively. Some 1% waste was incinerated; 13% waste was landfilling.
- In FY 2021-22, the Company disposed 1052 MT of hazardous waste, 6768 MT of non-hazardous waste, 35.1 MT lead acid battery waste, 6.9 MT biomedical waste and 50.9 MT e-waste. Additionally, 5,640 MT of metal scrap was sold for onward recycling. APSEZ targets to reduce waste intensity 30% (from the 2017-18 level) by 2025 across our ports.

Waste disposal



	FY 2017-18	FY 2018-19	FY 2019-20	FY 2020-21	FY 2021-22
Total	6919	6960	5718	6885	7913
Bio-medical waste (MT)	0	1	5	5	7
Battery (MT)	11	34	19	29	35
E-waste (MT)	3	4	5	19	51
Hazardous waste (MT)	412	491	621	769	1052
Non-hazardous waste (MT)	6492	6030	5069	6063	6768

Waste Intensity (MT/Revenue in crore)



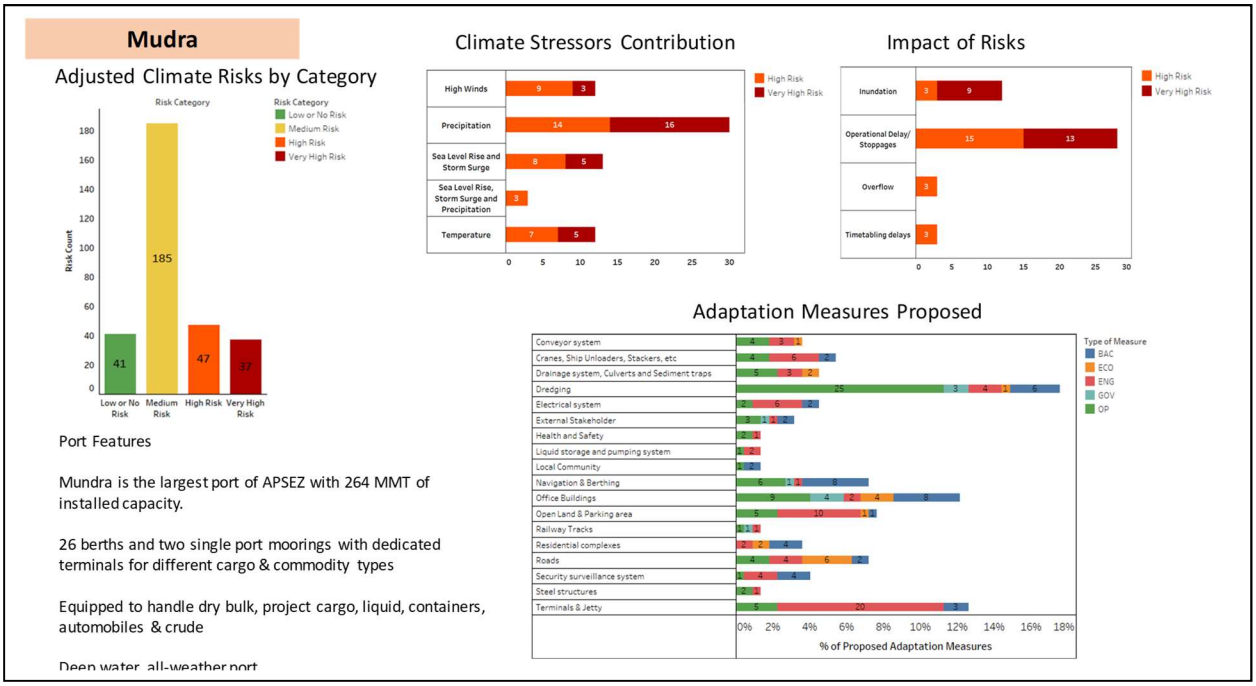
Adaptation at Ports with Higher Climate Vulnerability

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. Environmetn 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

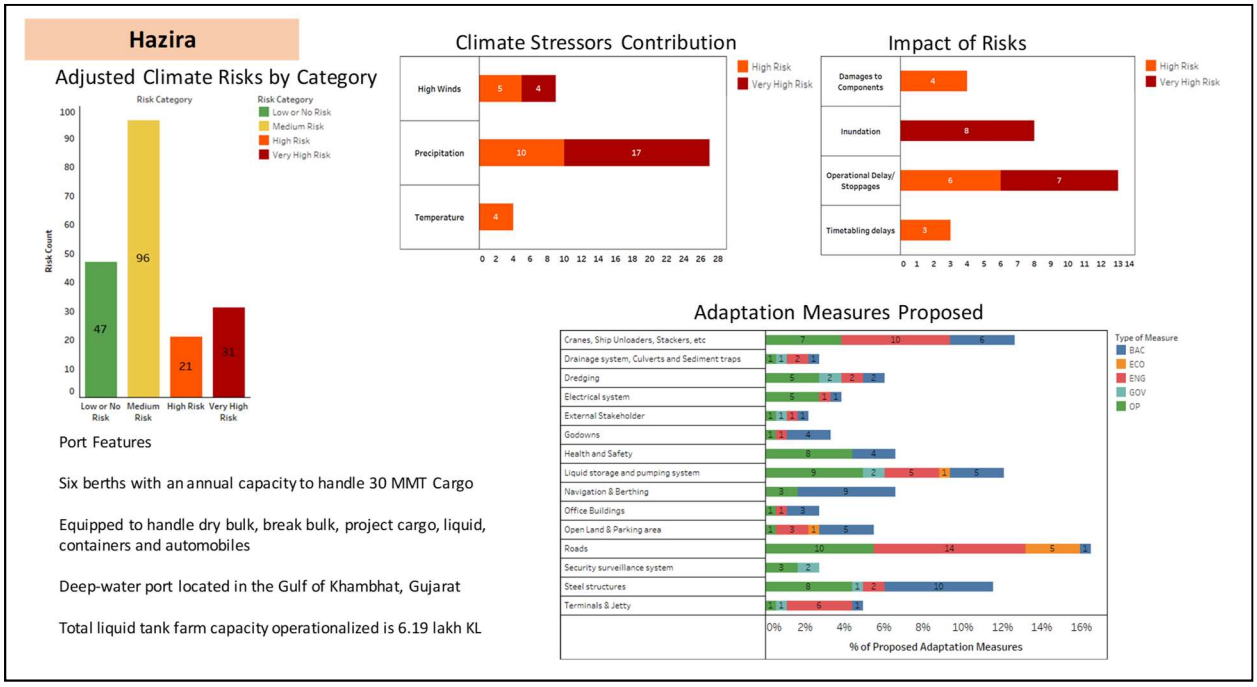
Precipitation changes due to climate change will be the primary climate scenario to be addressed as it is expected to cause the highest number of climate adjusted risks. It will impact operations, causing delays and temporary stoppages. Some of the impacts faced by the port will be muddy conditions, 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.

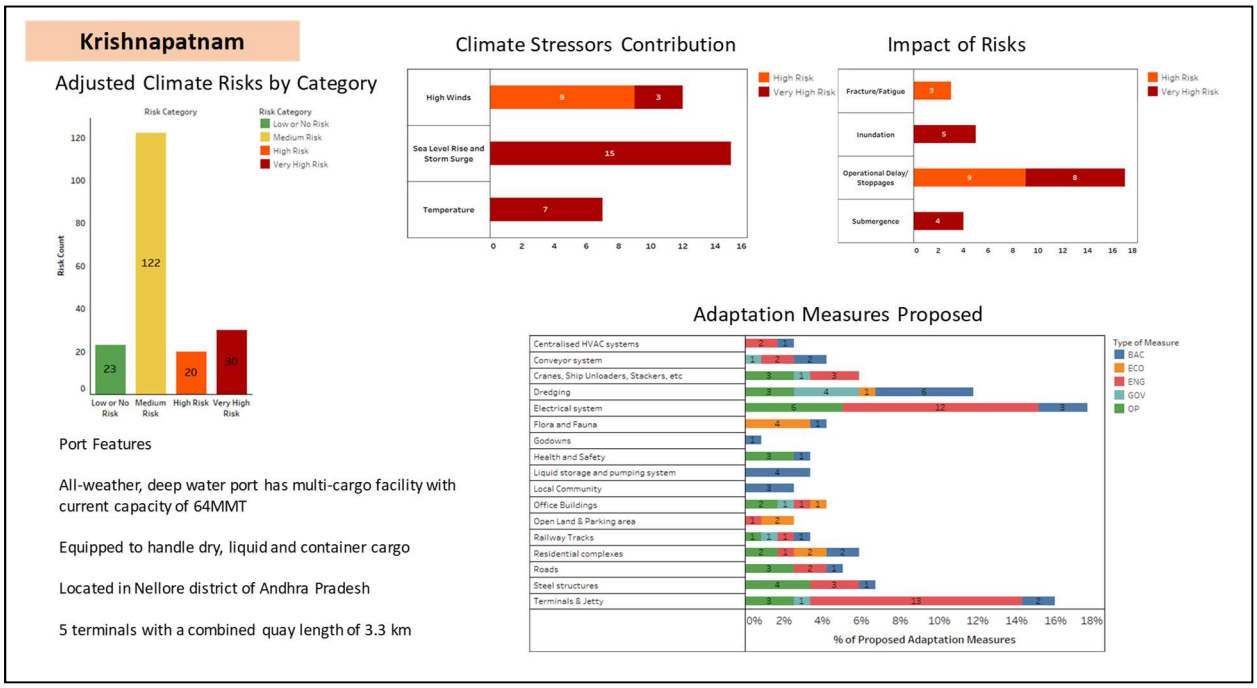
Hazira Port

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.

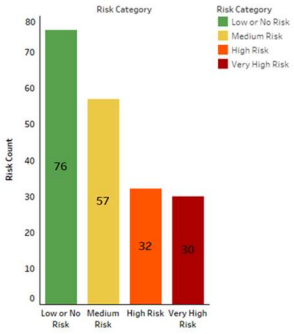


Dhamra Port

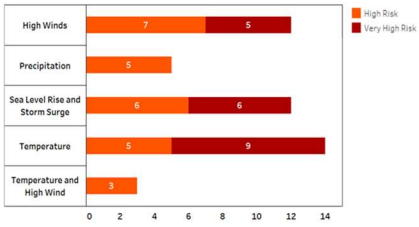
Dhamra is a deep water, all weather port of India in Odhisa, which can accommodate super cape-size vessels. About 30% of the risk at this port is associated with roads, railways and terminals. More than half the measures planned to increase the resilience of this port would entail operational and BAC 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 1-3 year timeframe. At Dhamra, some adaptation measures will need implementation immediately, while others can happen in the short term.

Dhamra

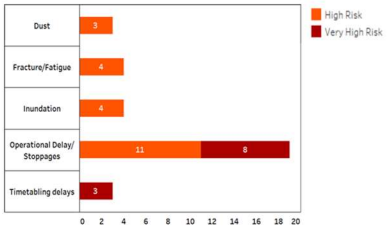
Adjusted Climate Risks by Category



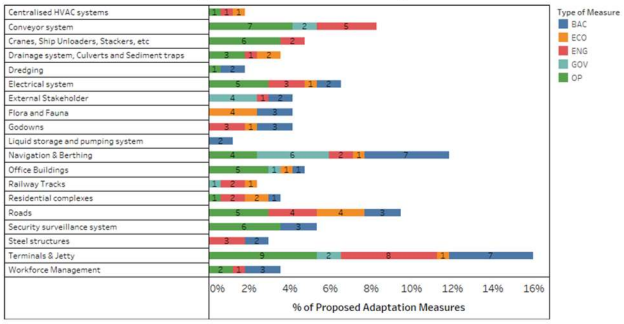
Climate Stressors Contribution



Impact of Risks



Adaptation Measures Proposed



Port Features

Deep-water, all-weather, multi-user, multi cargo port situated on the east coast of India between the Haldia and Paradeep Ports

4 berths with an annual capacity to handle 45MMT cargo

Equipped to handle dry bulk, break bulk, project cargo and containers

Water

Goals: at least 80% from non-competing sources

Changing water landscape

Water security will define business continuity in future. Knowing that water is limited, shared and generally stressed resource due to competing uses, we want to build a water-secure future for APSEZ. This understanding is the underlying basis of our water stewardship journey. With 99% of our water consumption being at the port operations, the ports are the centre of all our water-related activities and initiatives. Community and catchment are essential to the water dynamics which we engage in through our Adani Foundation work. Our approach is to understand the water landscape and prepare an appropriate response and action plan for operational and beyond-the-operational boundary.

Water stress and risk

Our port operations are spread across seven maritime states of Gujarat, Maharashtra, Goa, Kerala, Tamil Nadu, Andhra Pradesh and Odisha. To determine the relative water stress experienced at ports, we draw information from internationally recognized publicly available sources in the baseline and future water stress scenarios. For long term water stress assessment, future scenarios until 2030-2040 are included in our assessment. We envisage that climate action worldwide will generate a positive impact on containing GHG emissions. Hence, an "optimistic" scenario with stable world economic development and carbon emissions peaking and declining by 2040, with emissions constrained to stabilize at approximately 650 ppm CO2 and temperatures to 1.1–2.6°C by 2100, is considered appropriate for future water stress assessment. Ports in Gujarat, Maharashtra, Tamil Nadu and Andhra Pradesh experience extremely high-water stress in the catchment. Water stress at Mundra, Tuna and Dahej region will multiply by 1.4 times from the baseline as predicted by The Aqueduct Water Tool (refer graph on Future water stress). At the same time, moderate seasonal variability will increase at ports in Tamil Nadu and Krishnapatnam. By and large, the seasonal variability and water stress at all other ports will continue to be nearly the same.

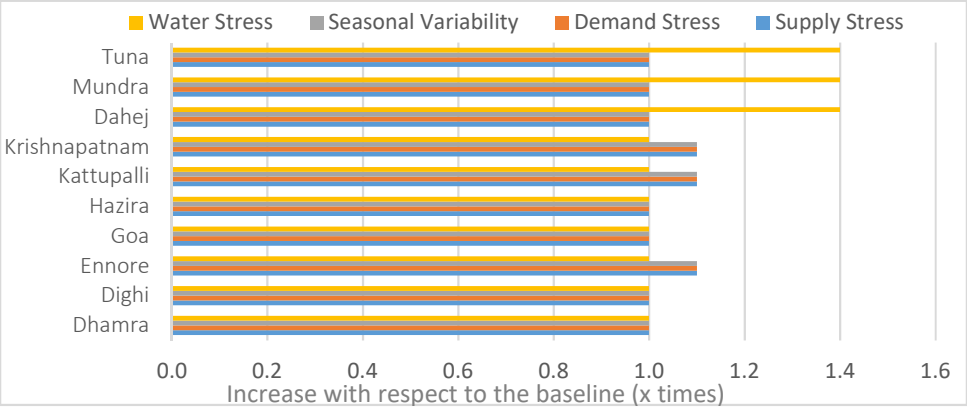
Baseline Water Stress[1]

Port Location	Water Stress	Water Depletion	Seasonal Variability	Coastal Flood Risk	Draught Risk
Mundra, Gujarat	Extremely High	Medium - High	High	High	–
Tuna, Gujarat	Extremely High	Medium - High	High	High	–
Dahej, Gujarat	Extremely High	High	High	Low	High
Hazira, Gujarat	Extremely High	High	High	Medium - High	High
Goa, Goa	Low - Medium	Low - Medium	High	High	Medium - High
Ennore, Tamil Nadu	Extremely High	Medium - High	Medium - High	Low - Medium	High
Kattupalli, Tamil Nadu	Extremely High	Medium - High	Medium - High	Low - Medium	High
Krishnapatnam, Andhra Pradesh	Extremely High	Medium - High	Medium - High	Low - Medium	High
Dhamra, Odisha	Low - Medium	Low - Medium	Medium - High	High	Medium - High

Risks definitions:

Water Stress	Water Depletion	Seasonal Variability	Coastal Flood Risk	Draught Risk
Ratio of total water withdrawals to available renewable surface and ground water supply	Ratio of total water consumed to available renewable water supply	Average within-a-year variability of available water supply including renewable surface and ground water supply	Percentage of population expected to be affected by coastal flooding in an average year	Likely occurrence of droughts, exposure and vulnerability of the population and assets

Future Water Stress Changes Relative to the Baseline (2030-2040)[2]



While the water stress assessment provides good insight into the future, we need to know the water risk to our operation for associated action. To determine the water risk at each port, we have adopted a severity and likelihood matrix based on various parameters supported by information drawn from publicly available sources and our business-specific criteria. Exposure to water resources with competing use, local stakeholders' interaction

[1] *Derived from The Aqueduct Water Risk Atlas*

[2] All changes provided in the graph are relative to baseline

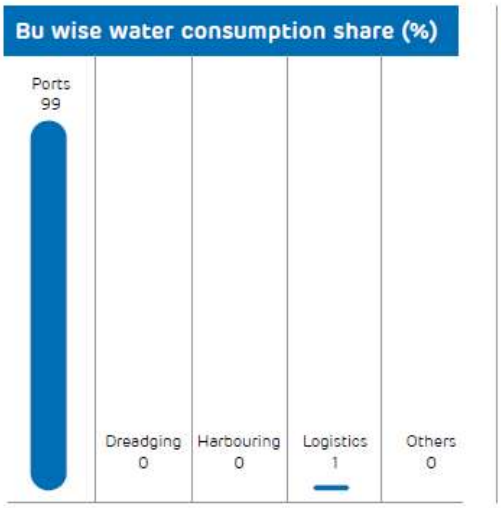
and concerns regarding existing and upcoming water regulations, sudden regulatory changes and sensitivity of local ecosystem and habitats are the issues contributing to our water risk assessment. The adopted model has indicated that the six ports of Dahej, Hazira, Mundra, Dhamra, Krishnapatnam and Tuna are at the highest water risk. These six ports also contributed to ninety-five percent of APSEZ's water withdrawal in FY22. Based on the business growth prospect until 2030, we foresee these ports to continue contributing significantly to the business and water demand.

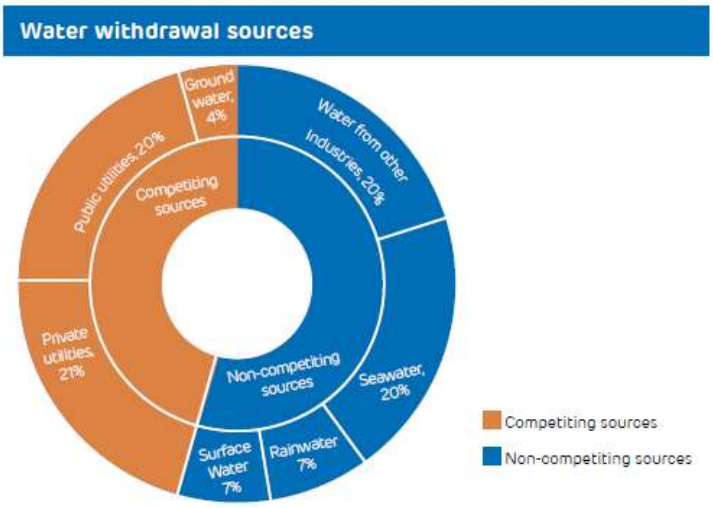
Risks and Issues Contributing to APSEZ's Water Risk Assessment Matrix

Ports	Baseline Catchment/ Basin Level Risk	Exposure	Local Stakeholders	Regulations	Local Ecosystem and Habitats
		← *Contributing Issues* →			
Dahej	Extremely High (4-5)	The amount of water sourced from the shared resources like groundwater Quality of water required by respective cargo handled at site	The local community is one of the most important stakeholders who require water for carrying out their daily activities and undertake agriculture. Some of the industries in our area of operation also sometimes pose as competing users for water. Local authorities are an important stakeholder, as they decide or can decide the quantity of water to be supplied to different industries.	Regulatory changes at the local, state and national level, which lead to prioritization and diversion of water for other competing uses, can be a constraint. There is a possibility of regulatory changes prohibiting the use of freshwater or water from a defined source.	Fragile coastal ecosystems need to thrive for the local community's livelihood. Local ecosystems rejuvenate the water sources as well. Disturbance to the same will create water and ecosystem imbalance and create reputational issues
Dhamra	Extremely High (4-5)				
Ennore	Extremely High (4-5)				
Goa	High (3-4)				
Hazira	Extremely High (4-5)				
Kattupalli	Extremely High (4-5)				
Krishnapatnam	Extremely High (4-5)				
Mundra	Extremely High (4-5)				
Tuna	Extremely High (4-5)				
Vizag	High (3-4)				
MUPL, Mundra	Extremely High (4-5)				

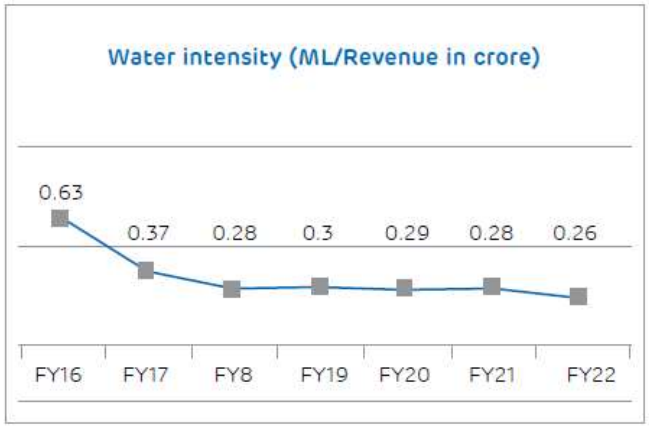
Water Consumption Statistics

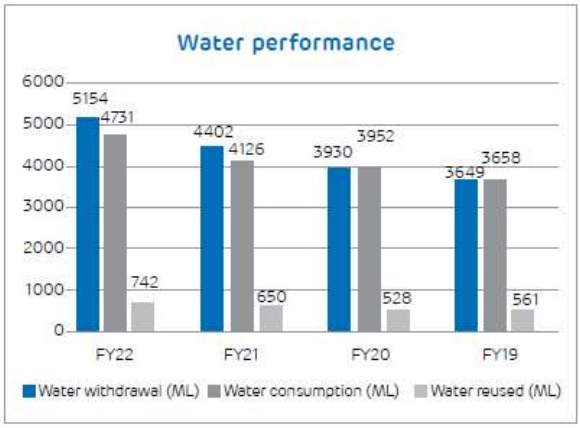
- About 3 of the APSEZ's ports operate in water-stressed areas and more than 68% of its water is used for cargo handling (only industrial consumption).
- Although total water withdrawal increased by 27% as compared to the previous year, the Company was able to bring down its water intensity by 7%.
- Absolute water consumption increased by 14.76 % in FY 2021-22 to 4,731 ML from 4,123 ML in FY 2020-21.
- In FY 2021-22, APSEZ cumulatively withdrew 5,154 ML of water, 26% more than compared to the previous year.
- Sea water accounted for 20% and freshwater for 45% of the total water withdrawn by APSEZ in FY 2021-22.
- The fresh water accounted for 2,319 ML, comprising water from public and private utility and groundwater sources.
- The water consumption per revenue (in crore) reduced by 58% overall and 14% annually from the base year of 2016.





Note: Surface water is taken from source, which is at the confluence of the river and sea, marked by high salinity and not being potable, hence considered here as non-competing





Strategy for Conservation

Targets for 2025

- Reduce water footprint: 80% of water from non-competing sources
- 60% water consumption intensity reduction
- 80% water withdrawal from noncompeting sources
- Alliance for water stewardship certification for 12 ports
- WASH assessment for 12 ports
- 10 MLD of wastewater to be recycled and reused
- <20% fresh water withdrawal share
- Conduct risk assessment and make context-specific, local scenario plans that focus on internal action to optimize water use, improve efficiency and reduce water related pollution
- Water awareness among employees, suppliers, customers
- Enhance transparency by working with stakeholders such as local municipalities and communities to create a share resource with minimal issues

Approach to water security

APSEZ considers water as a crucial shared natural resource. Its responsible consumption is one of the key drivers of innovative and sustainable economic prosperity. We focus on implementing the best water management practices at the ground level and being vigilant of the external developments that can impact our water security. Firstly, we have developed a Water Stewardship policy for APSEZ (available on https://www.adaniports.com/-/media/Project/Ports/Investor/corporate-governance/Policies/Water-Stewardship-Policy.pdf) to guide action. We are signatory to the United Nations CEO water mandate. The water risk shapes our approach to water stewardship, our commitments to water conservation and the zeal to be a leader in creating water security for our business and communities around us.

Our approach to implementing water security at the ground has four tiles, replacing freshwater with alternate water sources, implementing water conservation, harvesting rainwater for groundwater recharge and use, and undertaking watershed management activities. Replacing freshwater consumption and implementation of water conservation activities occurs at the port sites, whereas the other two tiles are implemented outside the port boundary. Successful implementation of water management initiatives requires a sound supporting system of high-quality data, accurate understanding of the legal compliance requirements by individual states, applicable regulations, emerging regulations and approval from all relevant regulatory authorities. This management practice pillar is an equally essential part of our approach towards water security.

Our approach to secure water supply for future is quite straight forward:

1. We have a target to increase the share of non-competing sources of water to 80% by 2025. For this we have three pronged approach- a) enter long term contract with nearby industry/ municipals to source their STP water for our operation, b) set-up or tie-up with desalination plants at various sites to meet our requirements, and c) carry rainwater harvesting wherever feasible

2. We are investing to improve efficiency of water use through regular maintenance of infrastructure, installation of water meters at all the nodes to monitor and reduce water wastage and water audit to optimise demand & supply. We are also working to increase the recycle & reuse of water within the operation.

Action plan to move to non-competing sources

Our action plan currently includes:

- setting up our own desalination plant in Krishnapatnam and getting into tie-up with third party desalination plants in Mundra and Dahej,
- sourcing STP water from nearby municipals in Hazira and Goa, and
- using condensate water from LNG terminal at Dhamra to replace competing sources

In Mundra, water from the desalination plant will meet the entire demand and turn the port water neutral. Mundra alone accounted for 53% of the total cargo handled by the APSEZ. The port of Hazira and Goa terminal are discussing supply of STP water which will meet all the entire industrial (non-freshwater) demand at the sites. Once all the plans are implemented, 90 % of the water requirement of all the APSEZ ports will be met through non-competing sources. This will reduce the impact of APSEZ operations on the water sources and it will be available to other competing users.

Port	Action Plan
Mundra Port	Discussion initiated for tie-up with desalination plant to meet all the water demand
Dahej Port	GIDC is constructing a 100 MLD desalination plant for providing water to industries in Dahej GIDC, plant is expected to start supply of water from mid of 2022. Dahej port is exploring tie up with desalination plant for supply of water.
Hazira Port	Hazira port is in discussion with Surat Municipal Corporation (SMC) for supply of water from the nearby Sewage Treatment Plant (STP) of SMC. This will meet all the water demand being met at present from competing sources.
Dhamra Port	A 5 MMTPA LNG import and regasification terminal is being constructed inside the Dhamra port. The condensate water generated from regasification terminal is proposed to be used for meeting the water demand presently sourced from competing sources. Approximately 2000KLD water will be available once the LNG facility is commissioned in October – November 2022.
Goa terminal	Goa port is in final stages of getting approvals to set up a 1.6 KM pipeline from Bayana STP to Goa terminal and use the treated water from STP to meet the industrial water requirements of the port and shift to non-competing sources.
Krishnapatnam port	KP is in process of setting up a desalination plant to meet its water requirement and move from competing to non-competing sources.

Six key water-related projects of ₹ 3.5 crore were carried out in FY22 of which five were completed while the Baina STP pipeline work is expected to be completed in FY23.

Initiative	Capital expenses (₹)	Status	Benefits
Marmugao (Goa) Port Terminal			

Drip irrigation system	4,87,000	Completed	Savings of 1500 KL p.a. eq. to ₹ 1.30 lakhs
Pipeline from Kattum Baina STP to transport STP water for use in plantation and sprinkling	c2.6 crore	FY 23	Savings of 250 - 400 KLD eq. to ₹ 25.92 lakhs p.a.
Krishnapatnam Port			
Installation of 240 KLD STP unit	50 lakhs	Completed	55.34 ML of water reused with total savings of ₹ 66 lakhs. in FY22
Mundra Port & SEZ			
Sensor based on/off pump to control water level (2 nos.)	44,000	Completed	Elimination of manual intervention, less chances of water overflow
Re-routing of 1 km water supply line to bypass water leakages inside utility drain	30 lakhs	Completed	200 KLD of water saved eq. to ₹ 43.8 lakhs p.a.
Raw water pump house automation	50,000	Completed	Avoided manual intervention, less chances of overflow

We have set the goal to lead the water revolution in the Indian port sector. Our international commitments are supported by goals of certifications with global water standards backed by an array of targets to be fulfilled by 2025. We frequently review our plan to ascertain achievement of our goals and explore opportunities to ratchet the target towards becoming water neutral and even producing/ harnessing more water than our requirement from the desalination plant and rainwater harvesting.

We have, in all, 550MLD capacity of desalination plants planned for different sites, with the largest being for Mundra Port (400 MLD) followed by Hazira Port (100 MLD). Overall. this will require more than ₹ 5,000 crore of investment. However, it will help us cut down on the cost of purchase of water from third party and also generate opportunity of supplying the surplus water to the nearby industry or the municipals. In Chennai, we have plans to get into contract with the local municipal corp. to purchase water from it's 100 MLD desalination plant. All these would help us become water positive.

Water Conservation Initiatives

- Development of Infrastructure (18 Km of dedicated pipeline) for managing recycled water from Krishak Bharati Cooperative Limited at Adani Hazari Port Pvt. Ltd., to reduce freshwater footprint and make good quality water available in a cost effective and environment-friendly manner.
- Utilization of desalinated water from the sea water reverse osmosis plant instead of freshwater for port operations with the aim of reusing treated water of STPs, ETP and harvested rainwater for greenbelt development and maintenance, which results in sustainably managing and protecting natural resources of fresh water
- Installation of a drip irrigation system at Adani Marmugao Port Terminal Pvt. Ltd.

- Automatic Water Sensors for water level of pumps and prevention of water overflow in toilets at Mundra Port.

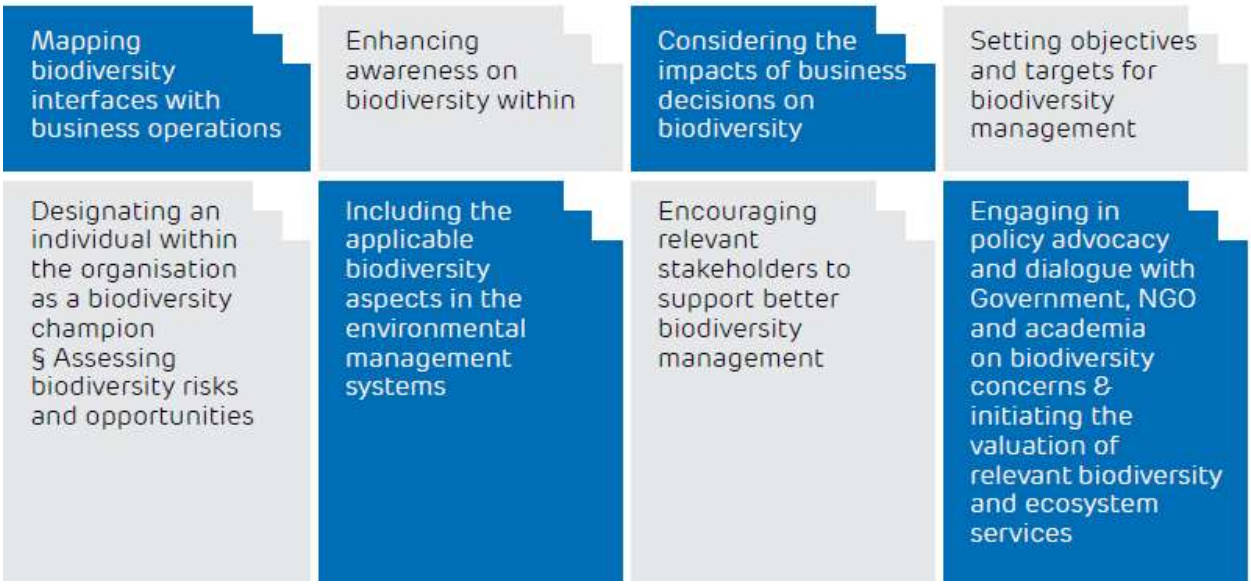
Biodiversity and Land Use

Goal: To become biodiversity-neutral

Biodiversity and land use have been identified as critical material topics by the Company. APSEZ has a commitment for no net deforestation and a target to become at least biodiversity neutral.

The port sector can impact biodiversity and land-use. Impacts could vary from degradation, fragmentation to loss of ecosystems, contamination and disturbance to species. Coastal urbanisation leads to the destruction and fragmentation of inter tidal and shallow habitats with the loss of associated ecological functions. APSEZ is positioned at the leading edge of environmental stewardship. The Company is cognizant of the fact that disturbance from construction activities, dredging and berthing could displace fishery resources and other mobile bottom biota. Hence, our initiatives related to biodiversity and land use are driven by the following objectives:

- To minimize the severity and magnitude of the highest net biodiversity value
- To promote the sustainable management of land and natural resources that integrate conservation needs and development priorities throughout APSEZ construction, operation and decommissioning activities
- To undertake reasonable measures to avoid and minimize the direct and indirect impacts of a project/site development, operation and decommissioning activities on land use, terrestrial and aquatic habitat and biodiversity (including, but not limited to, shoreline vegetation, wetlands, coral reefs, fisheries, bird life, and other sensitive aquatic and near-shore habitats, etc.)
- To protect and conserve biodiversity and ecosystem services (including alteration and/or fragmentation of areas of high biodiversity value) within and in the surroundings of APSEZ project/site influence areas.
- To improve environment conservation through knowledge building and sharing through multi-stakeholder partnerships. As our commitment towards No Net Loss, we are trying to mitigate potential risks and footprint.
- Development of Indigenous and Community Conserved Area (ICCA) for the first time in Kutch.
- Conservation of endemic species and development of a gene bank
- Conservation of inland mangroves, catalyzing grasslands development
- Prevention of spills to prevent soil and water pollution



Performance

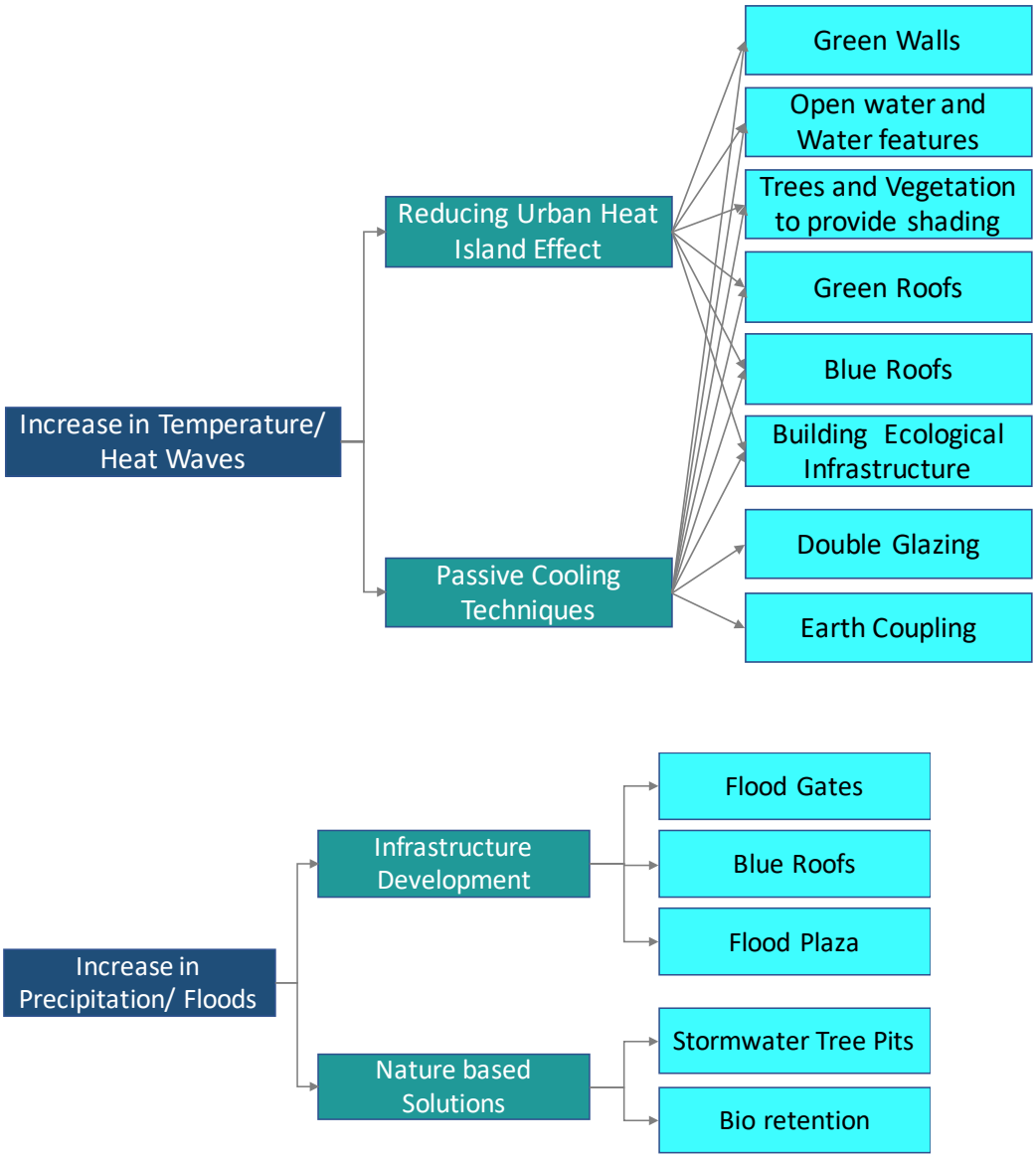
- APSEZ conducts **regular biodiversity assessments** of its ports through authorized institutes having expertise in ecology and biodiversity such as GUIDE - Gujarat, CAMB - Chennai, SDMRI- Chennai and NIO- Goa
- For every expansion/new project, the Company carried out detailed biodiversity assessment studies covering terrestrial and marine ecosystems.
- APSEZ developed ESMS as per **IFC Performance Standards and the Equator Principles**. As part of the ESMS, framework on Biodiversity & Land use was developed. In line with ESMS site specific Biodiversity Management Plans for Mundra, Dhamra, Hazira, Kattupalli and Vizhinjam were developed and were under implementation. These sites covered~75% of our cargo handling.
- **Mangrove conservation and afforestation areas** increased to 2,850 Ha and 3,390 Ha respectively, covering Mundra, Tuna, Hazira, Dahej Krishnapatnam and Dhamra Ports
- During FY 2021-22, Dharma Port Company Ltd planted around 70,000 trees with species like Casuarina Equisetifolia and Terminalia Arjuna covering 29 hectares and spending around H43 lakhs with a 90% survival rate.
- Initiatives for biodiversity conservation of Kanika island by Dhamra Port Company Limited
- **Restoration project** initiated on 10 Ha grassland ecosystem at Kutch in Gujarat. Mangroves cover in Kutch also increased from 794.77 km2 to 798.44 km2. Some 12 hectares were developed with mangrove multi-species with a good survival rate. Another 3-hectare coastal stretch was planted with select mangrove species.
- **Miyawaki technique** was pioneered by Japanese botanist Akira Miyawaki to build forests 10 times faster and 30 times denser. It involved planting dozens of native

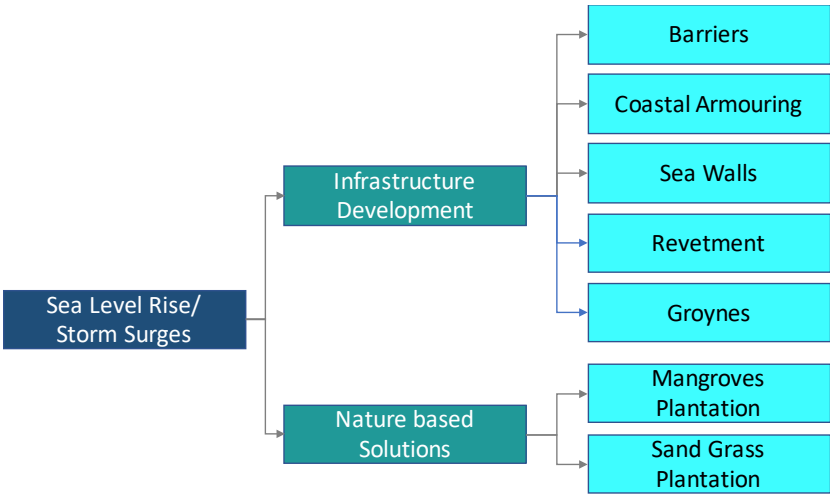
species to become maintenance free after three years in and around the Mundra landscape. Some 4,965 saplings of 42 different species were planted.

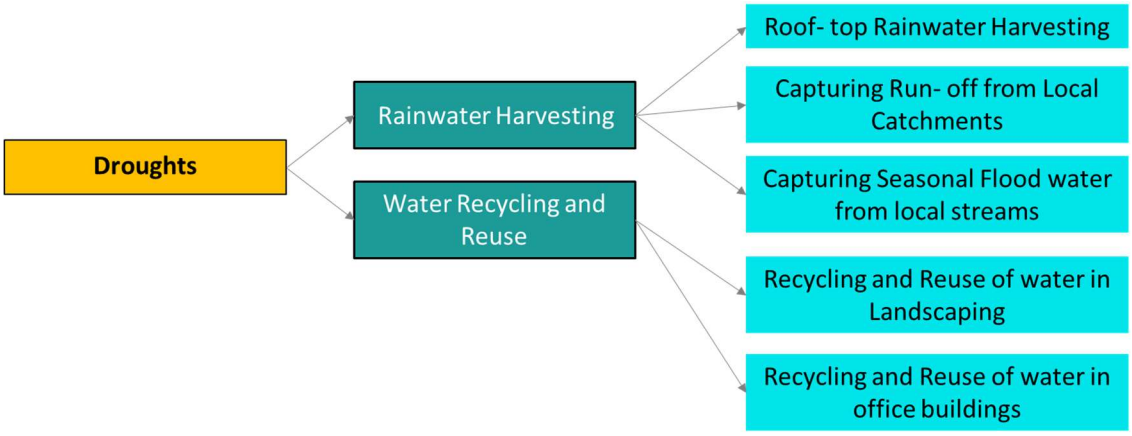
- A butterfly park inside our Dahej port comprises a species evenness of 0.98
- Reported a significant dolphin count around the Dhamra port with a significant jump
- Average turtle nesting near the Dhamra port more than doubled since APSEZ ownership
- All ports have oil spill contingency plans in place, in accordance with the National Oil Spill Disaster Contingency Plan. The plans also includes potential spills of fuels, lubricants or other oily liquids. Spills that start on land and may reach the shore areas are also taken into account with immediate clean up and control actions.

Appendix

Adoption Measures identified for Impact-wise Risk Management




Sea Level Rise/ Storm Surges
Infrastructure Development
Nature based Solutions
Barriers
Coastal Armouring
Sea Walls
Revetment
Groynes
Mangroves Plantation
Sand Grass Plantation


Droughts
Rainwater Harvesting
Water Recycling and Reuse
Roof- top Rainwater Harvesting
Capturing Run- off from Local Catchments
Capturing Seasonal Flood water from local streams
Recycling and Reuse of water in Landscaping
Recycling and Reuse of water in office buildings

General Adaption Measures for Environmental Performance

Adaptation Options	
Information Related	• Monitor and assess the current state of water and air quality, and the health of the local marine ecosystem. Assess how climate change and port operations may create negative impacts. • Assess how climate change may interact with freight transportation and affect air and water quality. • Assess the port and its surroundings for potential areas at risk of uncontrolled pollution – critical for hazardous material storage areas.
Operational measures	• Ensure on-site management and action plans include mitigation, clean up and restoration methods for uncontrolled releases.
Technical / physical measures	• Restore land through beneficial use of dredge spoil. • Pollution control equipment in key locations - critical for hazardous material storage areas. • Bunding for liquid storage tanks with safety margins that consider simultaneous extreme rainfall events. • Alarm systems on tanks for uncontrolled releases and pump shutdown.
Governance and capacity building measures	• Collaborate in city initiatives to increase resilience to a changing climate, and gain knowledge from other international projects. • Work with local environmental health and habitat experts to formulate management and action plans that include extreme events and gradual, longer term changes impacts. • Work with government ministries responsible for environmental protection to ensure international best practice is adopted. • Increase awareness of site personnel as to how climate change may result in uncontrolled environmental incidents.