

Shipping Industry: The Cost of BAU in the Age of Climate Change.

Sea level rise and tropical cyclones are the two most directly impactful natural hazards as results of climate change.

Based on the modelled greenhouse gas concentration trajectories RCP 4.5 and RCP 8.5, global sea level will rise 0.2-0.4m before 2050, and 0.5-1m before 2100¹.

1) Costs of storm damages to port infrastructure

High intensity cyclones are most common in the APAC regions and tropical areas of North America, incurring high cost of reparation to seaports.

From 2005 to 2019, the port damages from five major hurricanes totaled over US\$5 billion globally. In the current decade, hurricane damages to U.S. ports have averaged to around US\$430 million per year, while estimated annual damage for ports globally is US\$3 billion per year².

STORM (YEAR)	STORM CATEGORY AT LANDFALL*	COUNTRY (AFFECTED REGION OR PORT)	DAMAGE ESTIMATE (2020 US\$) OR DESCRIPTION
Hurricane Katrina (2005)	5	U.S. (Louisiana, Mississippi, Alabama)	US\$2.2 billion damages to ports in Louisiana, \$133 million to three ports in Mississippi (Biliverie, Gulfport, and Pascagoula), and \$40 million to the Port of Mobile in Alabama
Hurricane Ike (2008)	2	U.S. (Texas)	US\$2.9 billion in damages to ports, waterways, and coastlines in Texas ²⁴
Hurricane Sandy (2012)	1	U.S. (Port of New York/ New Jersey)	US\$147 million in damage ²⁵
Hurricane Florence (2018)	1	U.S. (North Carolina)	US\$46 million in damage to the ports of Wilmington and Morehead City ²⁶
Hurricane Maria (2019)	4	U.S. (Puerto Rico)	US\$911 million in damages to the Port of San Juan and other ports in Puerto Rico ²⁷
Typhoon Maemi (2003)	2	South Korea (Port of Busan)	Damage to 11 quay cranes and flooded the port's container yards
Gujarat Cyclone (1998)	3	India (Kandla Port)	Damage to port infrastructure and facilities, including 14 jetties, as well as to ships and cargo in the port

The damage is shocking compared to the annual net earnings of US\$25 billion for the container port industry globally³.

2) Costs of disruptions to shipping operation

The annual costs of disrupted BAU operation and delivery schedule are estimated to be US\$1.3-2.4 billion, representing a large portion of the average annual operating profit for the container shipping industry, which was US\$20 billion during 2018-2020⁴.

With the interconnectivity of global ports, disruption to BAU in one port will spillover to other ports in the global supply chain. From 2011 to 2019, for extreme weather conditions, the median duration of disruption to port operation was 6 days. In

¹ RTI International, <https://www.edf.org/media/shipping-industry-and-ports-susceptible-billions-dollars-damage-disruption-climate-change>

² Ibid.

³ Drewry. (2019). What does 2019 hold for the container port industry? <https://www.drewry.co.uk/maritime-research-opinion-browser/maritime-research-opinions/what-does-2019-hold-for-the-container-port-industry?>

⁴ Bryant, C. (2021). Container shipping earnings now rival Apple. it's not a good look. Bloomberg. <https://www.bloomberg.com/opinion/articles/2021-08-19/container-shipping-is-making-a-killing-this-year-but-will-we-have-christmas>.

2018, Typhoon Lekima resulted in a 5-day closure of the Port of Dalian in China, leading to a US\$65 million loss in port income.

3) Cost of shipping losses at sea and wreck cleanup

Most shipping losses due to extreme weather conditions happened in the APAC region, as a result of high level of ship traffic and vulnerability to tropical storms. For example, in 2017 Typhoon Damrey caused a loss of 6 ships in total.

The loss of vessels brings costly liability obligations. In 2019, the containership MSC Zoe experienced a salvage operation of US\$40 million due to a loss of roughly 350 containers in extreme weather conditions off the North coast of Germany⁵.

4) Costs of adapting to sea level rise

To prevent repair cost due to extreme weather conditions, enterprises usually engage in either soft adaptation or hard adaptation, both incur high cost of BAU.

1) Cost of changing shipping schedule and routes in response to extreme weather:

For a standard containership that consumes an average of 150 tons of fuel per day, each additional day of shipping due to re-routing can cost an extra US\$75k in fuel costs alone⁶.

2) Cost of elevating port surface by 1.6-2.3m to prevent flooding: For 50 largest ports in the APAC region, the average unit cost of surface elevation ranges from US\$1-49 million per square kilometer⁷.

Table 1: Potential adaptation costs of top ten Asian ports by capacity

Port Area	Market	Capacity (mt)*	Cost to adapt - Low case (US\$ million)	Cost to adapt - High case (US\$ million)
Shanghai	CH	647	378	613
Singapore	SG	576	1,081	1,293
Qingdao	CH	476	509	1,006
Guangzhou	CH	475	430	739
Port Hedland	AU	453	132	151
Ningbo	CH	449	323	467
Tianjin	CH	440	680	1,525
Busan	SK	348	940	1,488
Dalian	CH	321	322	447
Guangyang	SK	272	1,614	3,564
TOTAL		4,457	6,409	11,293

* Note that different measures are used to assess port capacities (metric tons, revenue tons, and freight tons)
Source: ARE cost estimates, capacity from American Association of Port Authorities

Why does the shipping industry need to start implement green technology and green investment goals now?

Shipping industry growth and its consistent reliance on heavily polluting fuels have made it a major emitter of greenhouse gases, currently accounting for 20% of global emissions from transportation. If no action is taken, the cost of BAU in the shipping industry will start to grow exponentially.

⁵ Buitendijk, M. (2020). Minister: MSC likely to pay large part of MSC Zoe disaster costs. SWZ Maritime. <https://swzmaritime.nl/news/2020/05/12/minister-msc-likely-to-pay-large-part-of-msc-zoe-disaster-costs/>

⁶ Cropley, E. (2021). Suez blockage comes a year too late. Reuters. <https://www.reuters.com/article/us-egypt-suezcanal-ship-break-ingviews/breakingviews-suez-blockage-comes-a-year-too-late-idUSKBN2BH1JW>

⁷ McCarron, B., Giunti, A. and Tan, S. (2018). Climate Costs for Asia Pacific Ports. HBC.

Solution: begin to add ESG initiatives and goals into your BAU operation, and invest in zero-emission fuels and green technologies for sustainability purpose.