Crude Awakening 2 – Oil trade to face growing risks as rapid ice sheet losses drive faster sea level rise

26 of 30 key oil ports of the Top 5 oil producing, consuming, exporting & importing nations are vulnerable to 1m of SLR, possible by 2070

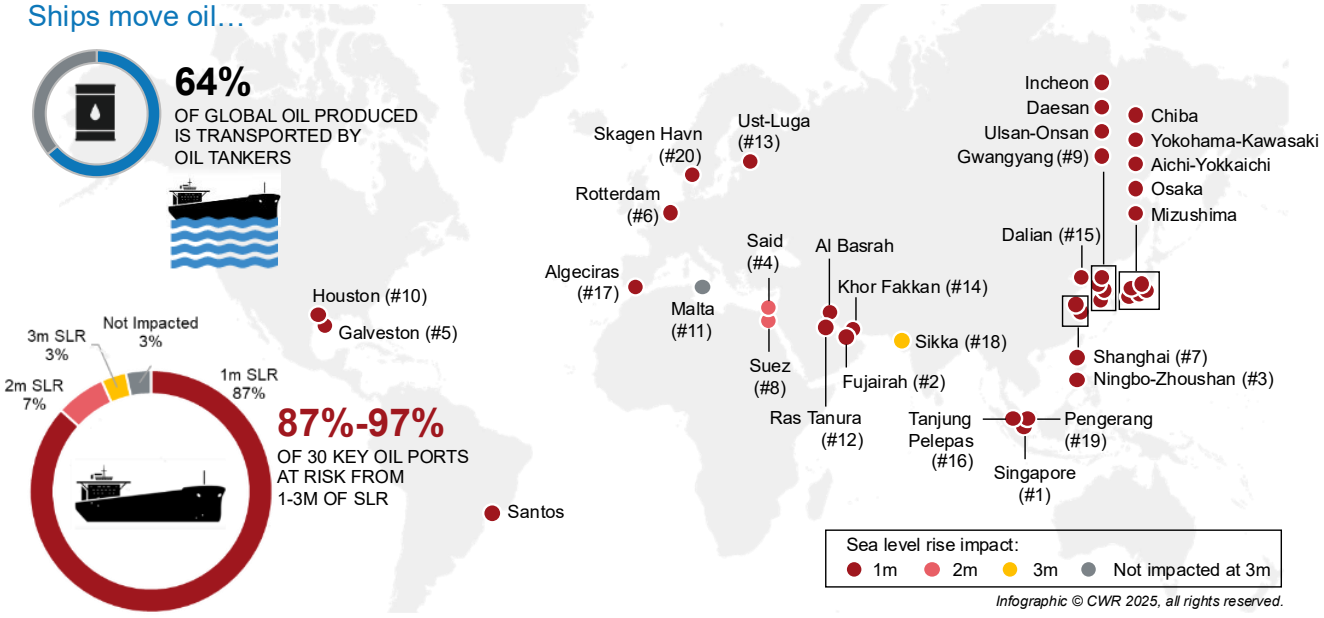
17th September 2025 – Hong Kong. Our 2024 report warned of a Crude Awakening across the entire oil supply chain from fast rising seas. Since then, we have become increasingly concerned over rising energy insecurity as more research showing rapid sea level rise (SLR) from accelerated ice sheet losses have surfaced. Now, leading studies warn that 1.5°C+ is too hot for ice sheets causing them to melt at unprecedented rates – ice sheet losses are now the #1 driver of SLR.[1] Scientists have in 2025, said the new safe threshold for ice sheets is closer to 1°C,[1] yet global warming is still increasing throughout 2025 to 1.55°C for the 12 months to mid-2025,[2] with no signs of abating given the projected rise in fossil fuel demand.

With all eyes on conflicts in the Gulf, remote polar ice sheet melt that could unleash catastrophic SLR and devastate global seaborne oil trade has no doubt flown under the radar. **So, in this brief, we provide key updates on ice sheet losses and expand our SLR stress tests to 30 key oil ports including the world's Top 20 tanker terminals…**

SLR = existential threat to global oil trade: ~2/3rds of oil produced globally is shipped, yet 26 or 87% of the 30 key oil ports are vulnerable to 1m of SLR. The graphic below shows the stress tests to 1m, 2m, & 3m of SLR. Now, given accelerated ice sheet losses, **scientists say that 1m of SLR is possible by 2070 on our current emissions path.** But regional disparities mean this could occur earlier with some regions facing close to 1m of SLR by 2050. In short, **26 oil ports could be impacted between 25 to 45 years' time** – these are shown in dark red below. Indeed, rapid ice losses indicate we are now likely tracking the IPCC's "cannot be ruled out" scenario of 2-3m by 2100. A further 3 terminals are hit at 2m; and another 1 at 3m. Only the terminal in Malta is "safe".

Fast rising seas threatens global seaborne oil & energy security

Global oil flows are highly vulnerable to 1m of sea level rise



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Note: The 30 key oil ports comprise the Top 20 Tanker Terminals denoted by their rankings from (#1) to (#20); the rest serve the Top 5 crude oil producing/exporting (ex-Canada) & consuming/importing countries.

Source: CWR; Clarksons Research 2023 – Top 20 Tanker Terminals by port callings; OPEC Annual Statistical Bulletin 2023; NASA SRTM 30m; Verschuur et al. (2023) "Multi-hazard risk to global port infrastructure and resulting trade and logistics losses", Communications Earth & Environment.

There's no negotiating with the melting point of ice – know the real risks ahead. Physical climate risks are evolving quickly, and science is playing catch up. When we published our Stop the Melt factsheets in March 2025, the scientific consensus was that 2°C was too hot for ice; now, 1.5°C is too hot for ice.[1] So don't get caught out! Some key points to note regarding ice losses & SLR are:

- Global mean sea levels have **already increased ~0.2m between 1901 & 2018.**
- **We didn't expect ice sheets to melt so fast, so soon. Ice sheet melt from Greenland & Antarctica are now the #1 driver of accelerating SLR.** At the time of the IPCC AR6 WG1 (2021), thermal expansion was the largest contributor to SLR (~50%) but now, this is overtaken by accelerated melt from ice sheets & glaciers. Greenland Ice Sheet losses today already track IPCC AR6 worst-case projections.
- Rapid ice sheet losses are occurring now! **Mass loss from ice sheets in Greenland & Antarctica have quadrupled since the 1990's driving faster SLR.[1] Already, the rate of SLR has doubled in the last 30 years**. If warming persists, ice sheet losses will only accelerate, speeding up SLR further. Published papers in 2025 on observed ocean warming, subglacial meltwater as well as surface melt all indicate faster ice sheet melt, pointing to faster SLR.[3,4,5]
- In East Antarctica, glaciers are retreating some 25 years sooner, contributing ~30% more to SLR by 2100 due to ocean freshening under the ice sheet. In short, **we've underestimated SLR.**
- **Antarctic sea ice losses have caught up to the Arctic's – what took the Arctic 40 years to lose was lost in just 6 years in Antarctica**. Sea ice helps to stabilise the ice sheet, so a paradigm shift in sea ice losses will further destabilise the ice sheet causing accelerated ice melt and higher SLR.
- We now know that ice sheets are much more sensitive to warming than previously thought and are melting at lower temperatures. **1.5°C of warming is now too hot for ice – scientists now believe the new safe threshold for ice sheets to be closer to 1°C.** Annual warming has already breached 1.5°C in 2024; **the WMO warned in May 2025 that warming could be as high as 1.9°C by 2029.**

Beware! Ice responds to temperatures today not the average temperatures over 20 years! Even though annual warming breached 1.5°C in 2024, this does not constitute a breach of the Paris Agreement target of 1.5°C as the IPCC defines the 1.5°C threshold based on a 20-year average above pre-industrial levels. The year of exceedance is the mid-point in the 20-year period with an average global temperature above 1.5°C. As ice is responding to rising temperatures today and not the average temperatures over 20 years, prominent ice scientists have pointed out the pitfalls of the decade long lag. **There is too much to lose if you are not on top of hidden ice risks & their impact on SLR – we strongly urge you to check out the factsheets below, produced in collaboration with top cryosphere scientists & institutes.**

In collaboration with:

International Cryosphere Climate Initiative
The International Cryosphere Climate Initiative

Chinese National Committee International Association of Cryospheric Sciences
The Chinese National Committee for International Association of Cryospheric Sciences

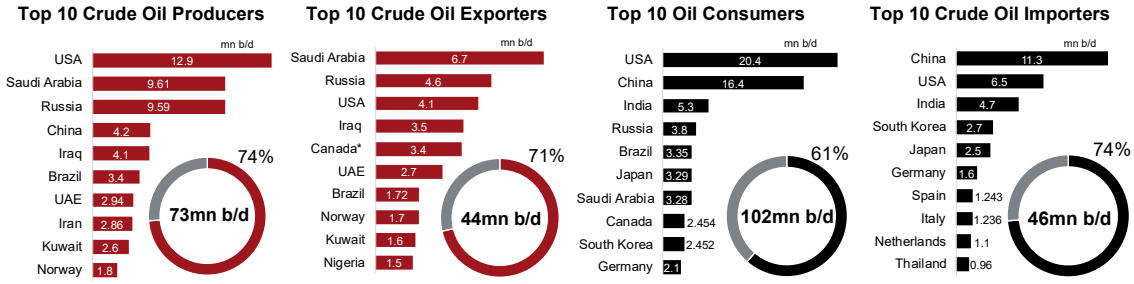
Institute of Geographic Sciences & Natural Resources Research, Chinese Academy of Sciences

ICIMOD
The International Centre for Integrated Mountain Development

Global warming of 1.3°C today means that our cryosphere is in dire straits. Mountain glaciers are vanishing fast and ice sheets, permafrost & sea ice in the Arctic & Antarctica are also seeing rapid losses. Over 14 trillion tonnes of ice have been lost in the last 30 years – this means we've on average lost over 50 million tonnes of ice every hour for the last 30 years from our mountains & polar regions!

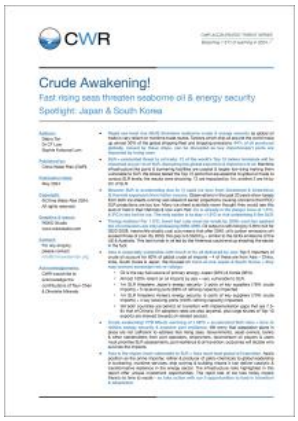
*So, get on top of hidden ice risks with **CWR's 13-Factsheet Guide** and help us stop the melt!*
Together, we can slow down fast rising seas & preserve our freshwater ice banks.

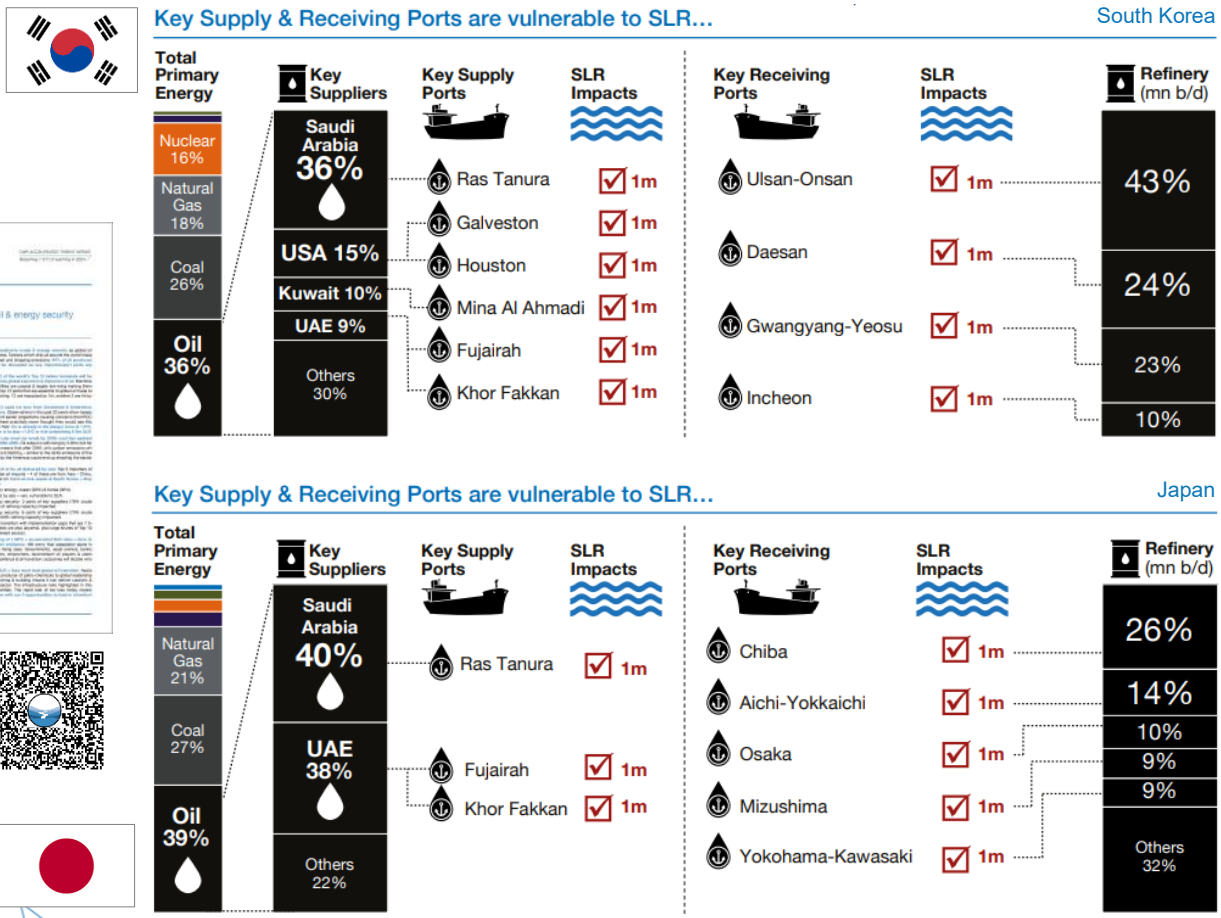
Up to 49% of global crude oil exports + up to 50% of crude oil imports could be disrupted; this is just from the Top 5 global exporters & importers of crude. We stress tested the key ports of the Top 5 crude oil exporters & the Top 5 crude oil importers and found them to be very vulnerable to fast rising seas. All 7 key ports serving the Top 5 exporters (ex-Canada) will be affected by just 1m of SLR. Note here that we included the UAE instead as Canada's crude oil exports are predominantly piped to the USA.[6] For the Top 5 importers, 14 key ports serving four of them will be affected at 1m of SLR; only India is spared as Sikka is only impacted by 3m of SLR. **This means that just 1m of SLR could disrupt up to 49% of total global crude oil exports of 44mn b/d from Saudi Arabia, Russia, USA, Iraq & the UAE as well as up to 50% of crude of imports of 46mn b/d to China, USA, South Korea & Japan.**



**Canada's crude oil exports are predominately piped to USA.*
Source: CWR, 2024 OPEC Annual Statistical Bulletin 59th edition – data is for the year 2023

Fast rising seas threaten energy security – S. Korea & Japan are particularly vulnerable. Whilst impacts are highly material for all Top 5 oil importers, if we look at it from an energy security standpoint, the USA & China won't be as impacted as much as they are also major crude oil producers and have significant coal reserves. India will only be impacted at 3m of SLR. However, this is not the same for South Korea & Japan – see the graphic below. We covered this in detail in our earlier report Crude Awakening 1: Spotlight Japan & South Korea.





Source: The graphic has been extracted from "Crude Awakening! Fast rising seas threaten seaborne oil & energy security – Spotlight: Japan & South Korea", CWR 2024

Other chokepoints to note are…

- **The Strait of Malacca is especially vulnerable to 1m of SLR.** Three of the Top 20 Tanker Terminals as per Clarkson's Research in 2023 are located here – Singapore (#1), Tanjung Pelepas (#16) & Pengerang (#19). This has energy as well as economic implications for both Malaysia & Singapore and other countries which rely on these oil transit hubs.
- **Suez Canal ports of Said & Suez will be hit at 2m of SLR.** These rank #4 & #8 among the Top 20 Tanker Terminals, and their vulnerability will impact the flow of oil from the Middle East to Europe via the Mediterranean Sea, forcing tankers to take the longer route around Africa's Cape of Good Hope.
- **Key European ports are also vulnerable to 1m of SLR.** Rotterdam & Algeciras rank #6 & #17 among the Top 20 Tanker Terminals and serve the Netherlands & Spain respectively. These two countries are among the Top 10 importers ranking #9 & #7 respectively. Together, they accounted for 5% of global crude imports in 2023. Important bunkering hub, Skagen Havn (#20), Denmark, is also vulnerable to 1m of SLR.
- **Brazil's oil terminals in Santos are also vulnerable to 1m of SLR.** We included Santos in this brief as Brazil is amongst the Top 5, ranked #5 by oil demand. Brazil is also the 6th largest producer of oil as well as the 7th largest oil exporter.

Fast melting sea ice opens Arctic route = existing trade routes & ports could lose strategic importance. We've seen alarming losses in sea ice so much so that sea ice extents have crossed thresholds, entering "new states" in both the Arctic & Antarctica. At 2°C, the Arctic Ocean will be sea ice-free almost every year for up to 4 months by 2050. This will open Arctic trade routes that could cut shipping times between Europe & Asia by over a week and key maritime routes like the Strait of Malacca may become less important. This could happen a lot sooner than we think as the WMO has warned that annual warming may be as high as 1.9°C as soon as 2029 – that's 4 years away.

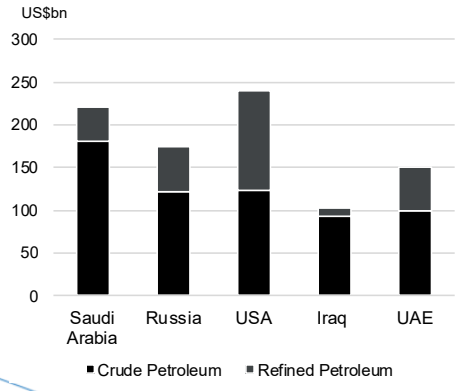
However, there are significant downsides as sea ice play multiple important roles – it's the planet's "refrigerator", keeping us cool by reflecting solar energy back into the space; plus, sea ice helps regulate our climate and drives ocean currents & thermohaline circulation aka the Great Ocean Conveyor Belt. While sea ice melt does not directly contribute to SLR, it protects ice sheets from oceans warming & swells. So, losing sea ice leaves ice sheets exposed, accelerating their melt and contribution to SLR. Extensive sea ice losses today means that these multiple functions are on the brink of collapse, bring us choppier & faster rising seas. For more on sea ice check out our "Sea Ice Factsheet".

Oil exporters are not immune: loss of exports to rising seas threatens economic security.

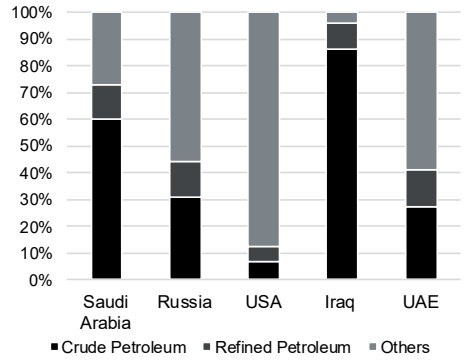
US$887bn worth of trade in crude (US$619bn) & refined petroleum (US$269bn) could be impacted, as fast rising seas could sink the 7 key ports serving the Top 5 crude oil exporters (ex-Canada) – see chart below left. While the USA may be able to sustain such losses as crude petroleum exports only accounts for 7% of total export value, the hit will be significant for Saudi Arabia where crude oil exports are 60% of total exports, and existential for Iraq – see chart below right. Impacts will also be material for Russia & the UAE. **For major oil exporting countries like Saudi Arabia & Iraq, rising seas pose a serious threat to economic security unless ports are future-proofed against increasing risks.**

Even when adapted, exporters will still be at risk if importing nations fail to adapt their vulnerable ports. Moreover, as pumping more oil will inevitably further accelerate SLR, these countries will end up shooting themselves in the foot if they do not transition away from oil.

Top 5 Crude Oil Exporters (ex-Canada)
2023 Crude & Refined Petroleum Exports



Top 5 Crude Oil Exporters (ex-Canada)
2023 Total Exports Value Mix



Source: CWR, OEC World.

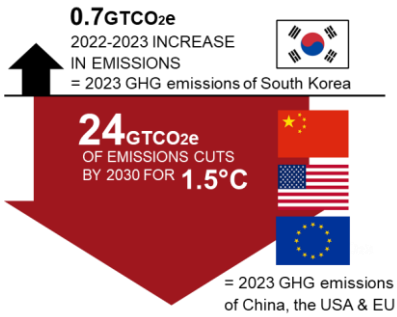
Global emissions are still on the rise; oil emissions are rising too = increasing SLR risk. According to the 2024 UNEP Emissions Gap Report, global GHG emissions set a new record in 2023 of 57.1GtCO2e, up 1.3% from 2022 levels. This is alarming as emissions are now growing at a far greater rate than before – emissions growth preceding COVID-19 only averaged 0.8% p.a. between 2010-2019. The increase of 0.7GtCO2e in 2023 may not sound like much but it is equivalent to the emissions of South Korea – see left chart below. **Clearly adding the emissions of a South Korea each year will only accelerate warming & ice sheet melt resulting in faster & sooner SLR.**

To stay below 1.5°C with little or no overshoot, we need a 43% cut in GHG emissions by 2030 from 2019 levels (~24GTCO2e) but projected cuts in line with the latest NDCs are a mere 2.6%. **Significant cuts, enough to slow down SLR, are not possible without cutting fossil fuels, which account for 68% of emissions today.** For perspective, if coal was a country, it would be the 2nd largest emitter after China, followed by oil in 3rd and natural gas in 4th places – both ahead of the USA – see centre chart below.

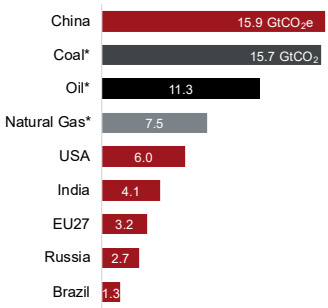
Yet, fossil fuel demand and therefore emissions are still projected to rise. As per the chart on the right below, oil demand is forecast to rise by 2.5mn b/d from 2024 to 2030, plateauing around 105.5mn b/d by the end of the decade. However, coal demand previously forecasted by the IEA to fall from 2023 to 2026, is now expected to rise y-o-y through to 2027 as per the IEA's latest report in December 2024.[7] **So, oil can no longer piggyback on coal for cuts now that coal demand is forecasted to rise.**

Indeed, fossil fuel expansion only increases emissions & thus ice melt, which will accelerate SLR threats to oil ports.

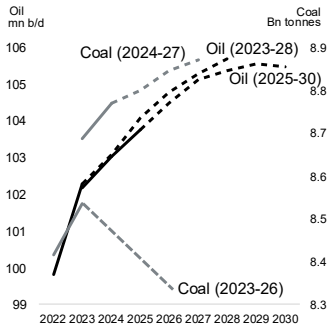
Emissions are Rising But Urgent Cuts Needed for 1.5°C…



If Fossil Fuels Were a Country…



Oil & Coal Demand by 2030…



*Note: *carbon emissions only, the rest are GHG emissions.*
Source: CWR, IPCC AR6 WG1, UNEP Emissions Gap Report, JRC & IEA GHG Emissions of all world countries 2024, IEA World Energy Outlook 2024, IEA Oil 2023 Analysis and forecast to 2028, IEA Coal 2023 Analysis and forecast to 2026, IEA Oil 2025 Analysis & forecast to 2030 and IEA Coal 2024 Analysis and forecast to 2027.

3 Recommendations. Our quick analysis shows a critical number of the 30 oil ports, which are essential to the global oil trade serving the top exporting & importing countries, face significant risks from rising seas. Therefore, given fast rising seas we recommend countries/investors/lenders that are reliant on/supply oil to:

1. **Get on top of what's happening in the cryosphere** as faster ice sheet melt will drive higher & sooner SLR. Start with the **Stop the Melt factsheets** we produced in collaboration with top cryosphere scientists & institutes.

2. **Conduct more in-depth analyses on the exposure of critical energy infrastructure**. This will provide greater detail and granularity **to inform transition/divestment actions or future adaptation spend:**

   - **Nations especially reliant on seaborne crude imports,** like Japan & South Korea, should rethink energy security, fast track transition as well as shore up adaptation; while **nations especially reliant on seaborne crude exports**, like Saudi Arabia & Iraq, should also do the same; pumping more oil in the short term could lead to shooting themselves in the foot in the long term.
   - **Coastal capitals & cities are also exposed.** Countries should also assess their exposure as fast rising seas will redraw coastlines with devastating impacts on populations; Asia is the most vulnerable continent.
   - **Bankers should also assess exposure as lending to the fossil fuel sectors continues to rise.** Fossil fuel financing commitments from 65 of the world's biggest banks increased significantly by 23% or US$162bn to US$869bn according to the Banking on Chaos' Fossil Fuel Finance Report 2025.

- **New projects could face disruptions from 1m SLR within project financing timeframes.** The 65 banks should get on top of SLR risks as almost half of the financing from the 65 banks or US$429bn is going to companies expanding fossil fuel production & infrastructure (upstream oil & gas, downstream gas-fired power expansion, coal expansion).[8] In 2024, the top 9 oil & gas companies with the most bank funding for expansion received US$101.2bn in investments.[8] Investment in upstream oil and gas is expected to remain high in 2025 – the IEA's World Energy Investment 2025 report projects this to be under US$570bn in 2025.[9]
- **Sovereign risk re-rating could be on the cards for countries like Japan & South Korea** as rising seas could impact energy security. Oil is Japan & South Korea's largest energy source at 39% & 36% respectively yet almost 100% is imported by sea. 1m of SLR will impact nine ports which serve almost 70-100% of their national refining capacity.
- **Beware! Asset revaluations due to SLR could happen sooner than the SLR impact date.** Once set in motion, we cannot reverse SLR; and as science improves, we can better project the timing and levels of SLR. So, there will come a point when stakeholders – be they private equity/bankers – will price in SLR tail risks driving a revaluation of energy assets ahead of the SLR impact date.

3. **Oil majors should aim for sensible climate strategies.** Many oil majors are also likely reliant on these vulnerable maritime trade routes, yet they have dialed back their net zero pledges which increases the risk of SLR & trade disruptions. Investments in low emissions energy technology by oil & gas companies were also lower in 2024, amounting to US$22bn, which is 25% lower than in 2023.[9] Continuing to pump plus ignoring their likely significant & increasing exposure to coastal threats are not going to slow down fast rising seas. They should evolve strategies for the rapidly evolving climate landscape.

   Note that while adapting for SLR could help keep insurance costs down, **insurance premiums for critical infrastructure will rise as climate threats rise. As the date of SLR impact gets nearer, insurers may opt to stop insuring before the actual impact.**

As SLR poses the greatest threat to Asia, more detailed recommendations can be found in our Crude Awakening report. We urge you to read the section on "Asia to drive change – 5 opportunities to lead in transition & adaptation".

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About CWR

In an era marked by unprecedented accelerating water & climate threats, CWR aims to unpack and value complex climate & water risks; rethink transition to "slow down" these risks; and build resilience so that finance, corporates and governments can all make better decisions today for water tomorrow. Since 2011, the think tank has worked from its Hong Kong base to engage with global finance and business in understanding and managing various types of water & climate risks in China and across Asia. CWR's collaborative reports with financial institutions, IGOs, scientists as well as government related bodies are widely cited by the media to banks and the IPCC – they have been instrumental in understanding Asia's water challenges and informing disclosure frameworks; they compel us to rethink climate & water risks for resilience.

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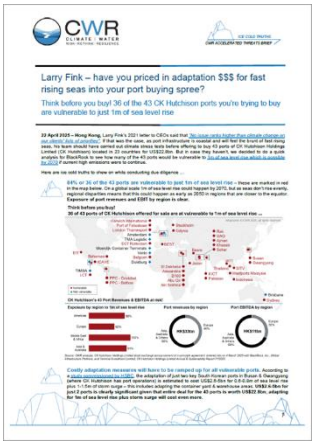
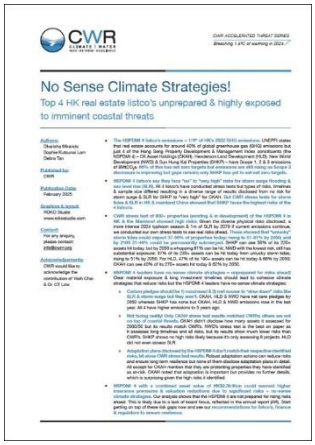


Larry Fink – have you priced in adaptation $$$ for fast rising seas into your port buying spree?

April 2025

Accelerated ice melt is causing rapid sea level rise and since there's no negotiating with the melting point of ice, we thought Larry Fink should know the real risks before he buys CK Hutchison's 43 global ports

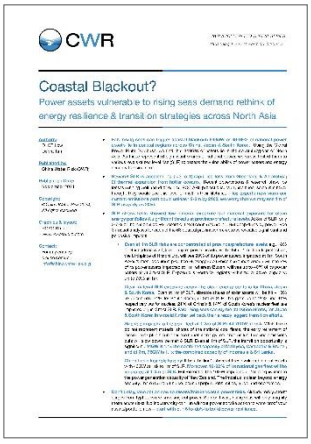


No Sense Climate Strategies

Top 4 HK real estate listco's unprepared & highly exposed to imminent coastal threats

February 2025

Material write downs are in store for tycoons with stakes in listco's with assets worth over HK$2.3trn as resilience measures disclosed aren't commensurate to escalating risks.



Coastal Blackout?

Power assets vulnerable to rising seas demand rethink of energy resilience & transition strategies across North Asia

Sept 2024

Fast rising seas could swamp the coastal power plants of China, Japan & South Korea sooner than we think, causing coastal blackouts.
849GW of coastal power assets were stress tested for various SLR levels.

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