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Central Asia Regional Economic Cooperation Program

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Global Logistics Challenges, their impacts and coordinated responses by the CAREC Community

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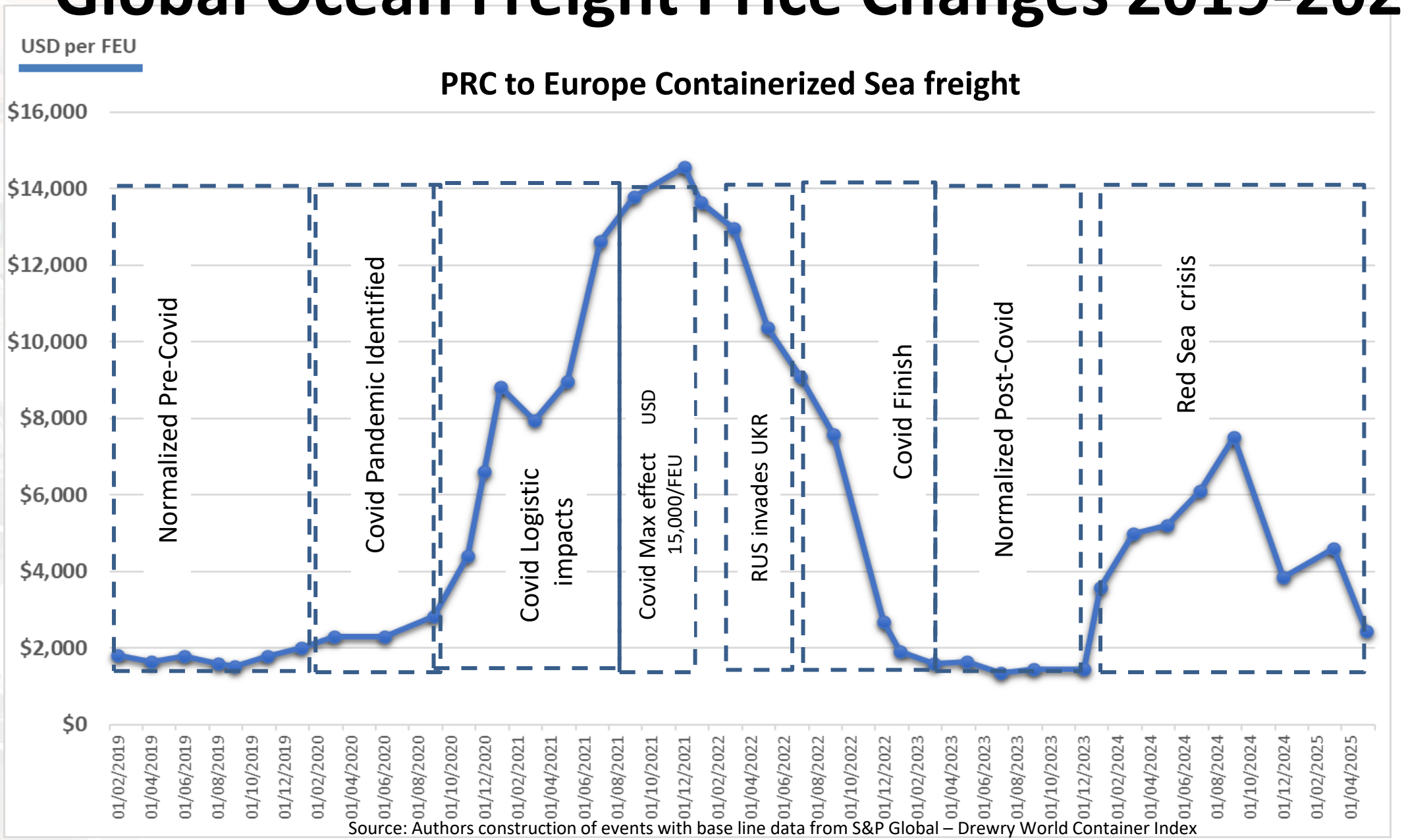
Outline

- Timeline of modern era global logistics events & challenges
- Ocean freight prices
- Climate change
  - UN Paris accord
  - Caspian Sea level
  - Northen sea route
- Decarbonization of shipping
- Decarbonization at ports
- Exhaustion of economic accessible fossil fuels

Global Logistics Challenges

- Covid-19 pandemic: 1 March 2020 – 5 May 2023
- Russia-Ukraine war: 24 Feb 2022 / hope for resolution
- Red Sea crisis/Suez Canal: 19 Nov 2023 / hope for resolution
- Panama Canal: 1 Jan 2020 – Jan 2025 / uncertain future!
- Climate Change: UN IPCC measure changes: 1990 - ongoing
- Decarbonization of shipping: 13 April 2018* - ongoing
- Decarbonization of ports (green-ports): 2010 – ongoing
- Economic supply of fossil fuels: circa 2072 / uncertain future!

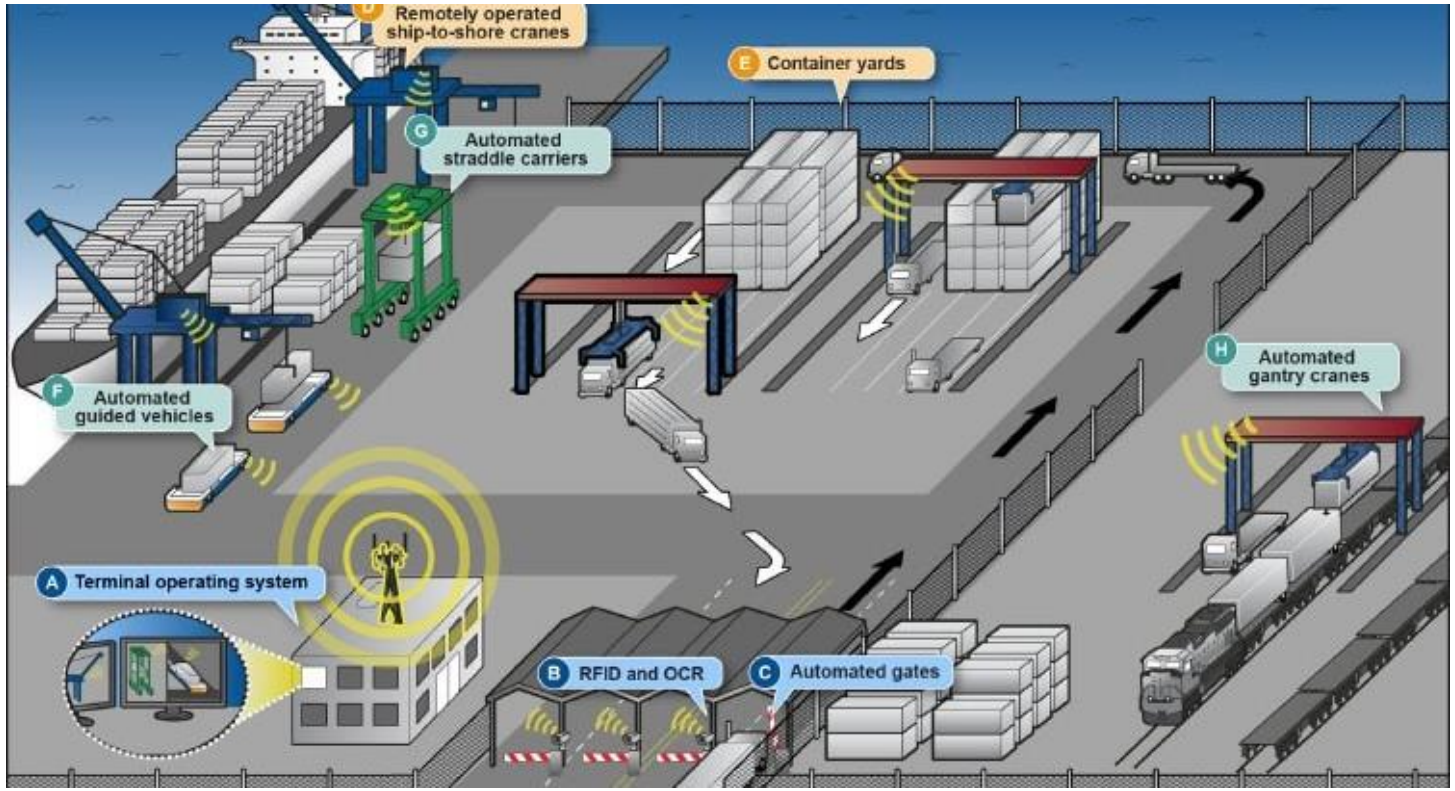
Global Ocean Freight Price Changes 2019-2025



Source: Authors construction of events with base line data from S&P Global – Drewry World Container Index

CAREC Opportunities - Global Ocean Freight Price Changes

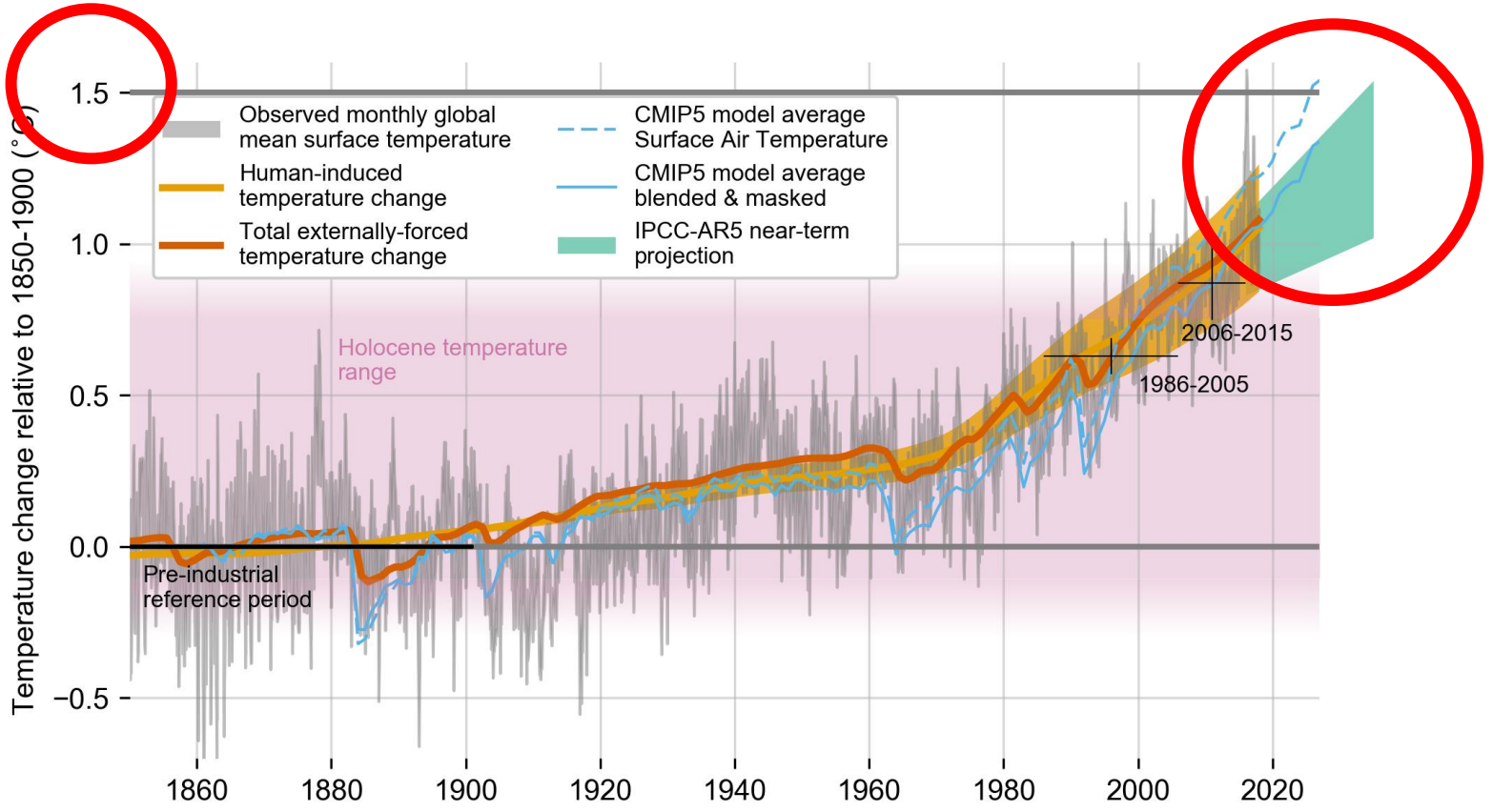
- Investments in Middle Corridor rail network capacity, block-trains, rolling stock, shunting yards and signaling
- Investments in seaports and trans-Caspian shipping to increase network capacity
- Investments in logistics digitalization systems and efficiency of cross-border freight transits



Source: Inbound logistics strengthening-the-port-rail-connections

Global Logistics Challenges - Climate Change

- UN Intergovernmental Panel on Climate Change (IPCC) is the recognized leader on climatic modelling.
- IPCC states human-induced warming reached approx 1°C above pre-industrial levels in 2017, increasing at 0.2°C (likely between 0.1°C and 0.3°C) per decade



Source: IPCC Chapter 1 — Global Warming of 1.5 ºC

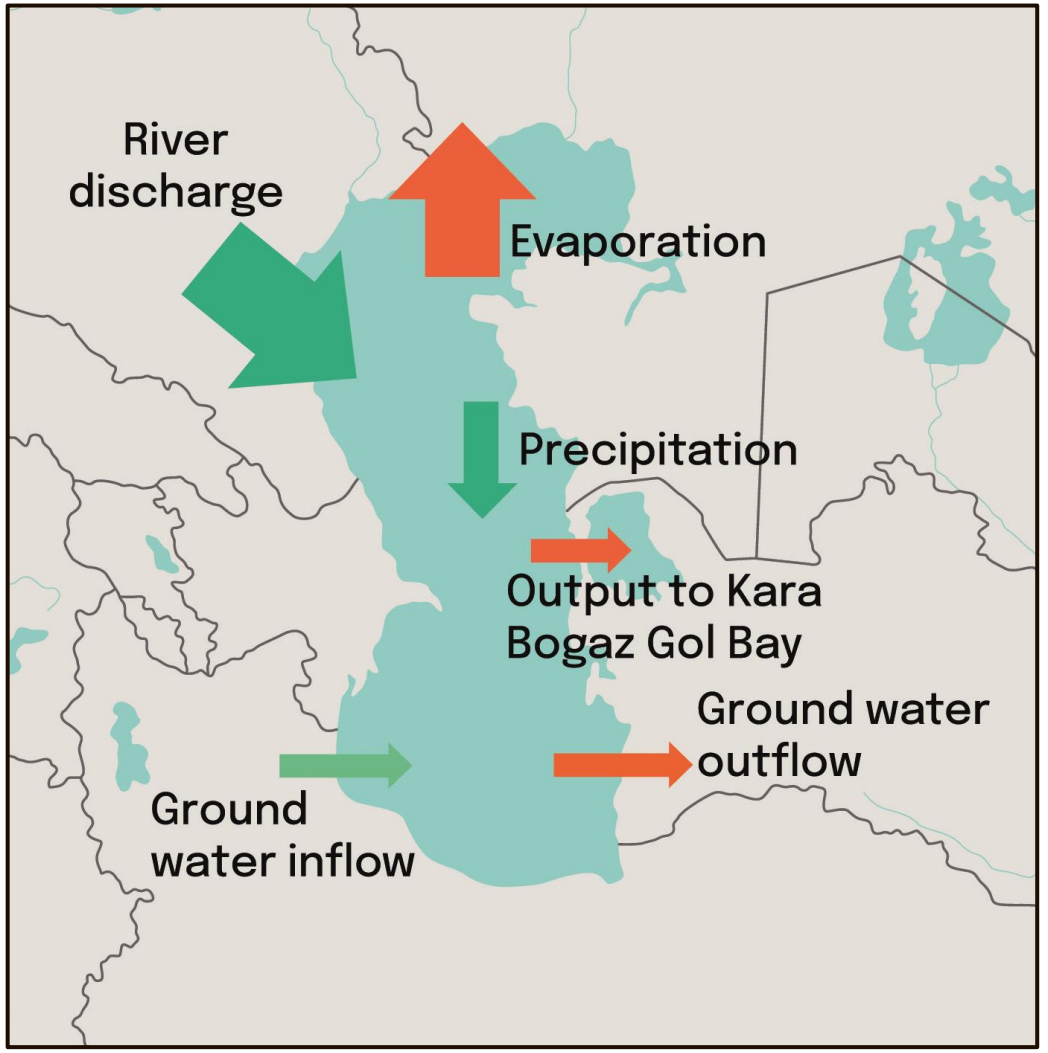
Climate Change – Caspian Sea

Drivers affecting Caspian Sea water balance:

- Evaporation (350 to 400 km³/year)
- River inflow, Volga River (~240 km³/year)
- Exacerbated by climate change, leads to a projected net water deficit

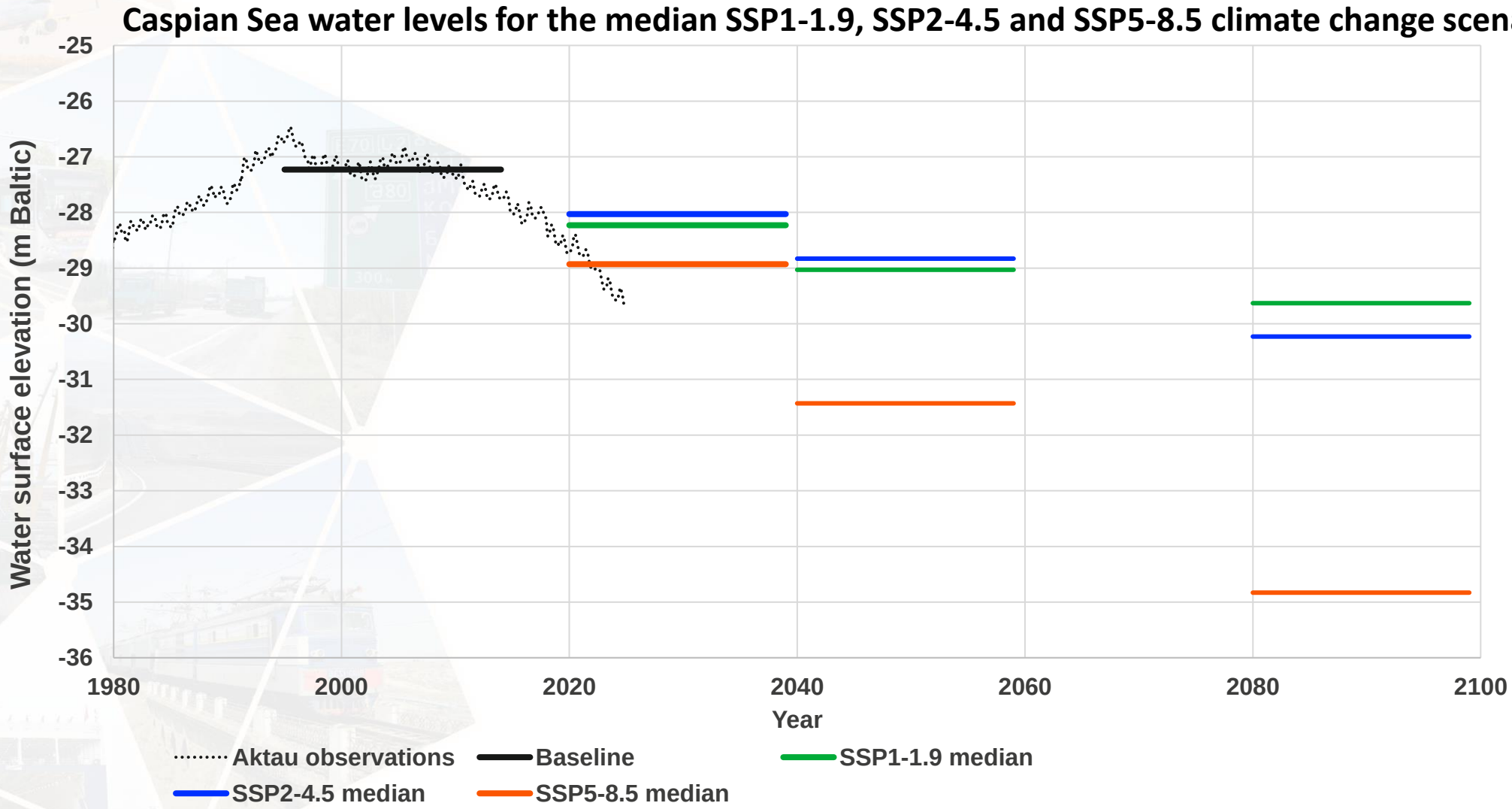
Future water level projections:

- Moderate -1.0 m by 2030 and -2.4 m by 2090
- Median -0.8 m in 2030 to -2.9 m by 2090
- Severe -1.7 m in 2030s and -7.4 m by 2090
- Urgent need for adaptive management strategies to mitigate the environmental and socio-economic impacts of sea-level decline



Source: World Bank Group / HR Wallingford 2025

Climate Change – Caspian Sea



Source: World Bank / HR Wallingford 2025.

CAREC Opportunities – Caspian Sea Climate Change

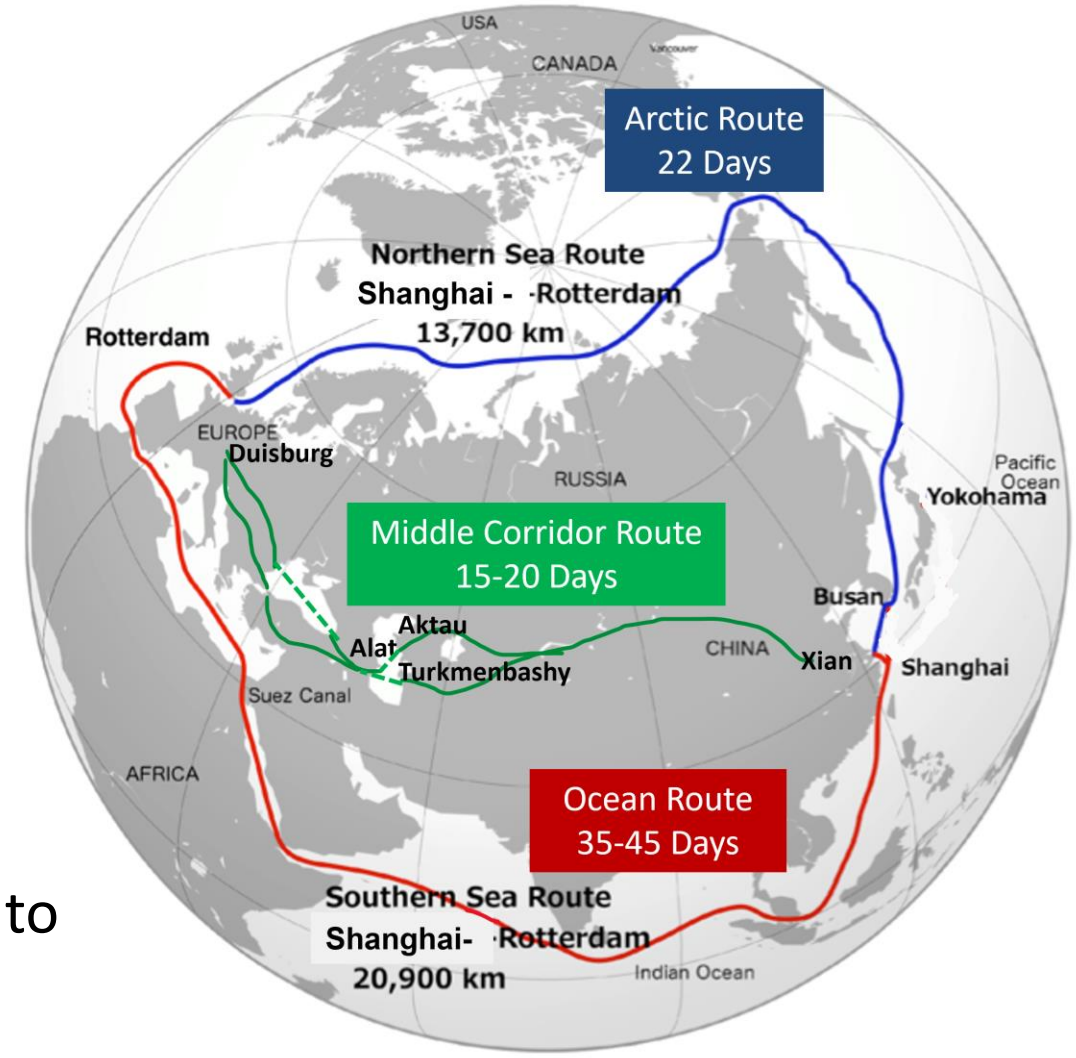
- Adaptive infrastructure investment for ports and logistics to mitigate risks associated with fluctuating water levels
- Dredging and disposal strategies costs of dredging
- Port business continuity plans and alternatives
- Adaptative shipping strategy and investment in shoal draft vessel design

Source: Inbound logistics strengthening-the-port-rail-connections

Climate Change – Arctic Ocean Route

Arctic Sea / Transpolar Sea Route

- Commercial shipping via middle Arctic, projected to be safe all year navigation in late 2020's (Wishnick, 2017).
- Arctic Corridor, connects Scandinavia and west Europe deep-water ports via Arctic Ocean & Baltic Sea.
- Will be the shortest, most direct route between Asia & Europe
- Fuel saving US$1 million per voyage
- Russia has stated they will restrict access to the Northern Sea Route



Source: Arctic Sea Route PRC-EU Authors interpretation

CAREC Opportunities – Arctic Sea Route Competition

- Middle Corridor has potential to secure first mover advantage
- Invest in higher efficient port systems aligned with block train service arrivals
- Invest in Caspian sea water loss mitigation and transformative infrastructure
- Invest in vessels with greater efficiency

Source: Authors Photo – Turkmenbashy port

Global Logistics Challenges – Shipping Decarbonization

- Shipping is a transformative target under climate agenda, approx. 3% of global greenhouse gas emissions.
- In April 2025, IMO approved a framework introducing global carbon pricing for vessels > 5000GRT
- Two-tier fee CO_2 emissions:
  - $100 per ton base fee
  - $380 per ton for ships exceeding emission thresholds

ShipUniverse: Estimated Daily Carbon Fee by Vessel Type – 2027 Outlook

Vessel Type	Fuel Use/Day (tons)	CO_2/Day (tons)	Fee @ $100/Ton	Fee @ $380/Ton
Panamax Container Ship	60	189	$18,900	$71,820
Mid-Size Bulk Carrier	35	110	$11,000	$41,800
Large RoRo	45	142	$14,200	$53,960
Coastal Feeder	12	38	$3,800	$14,440

Note: CO_2 emissions are estimated using an emission factor of approximately 3.15 tons of CO_2 per ton of fuel burned. Actual emissions and fees may vary based on engine type, fuel quality, and operational conditions.

Source: https://www.shipuniverse.com/imo-carbon-tax-where-were-headed-and-what-it-will-cost/

CAREC Opportunities –Shipping Decarbonization

- Transformation from Caspian vessels using petroleum fuels
- ASCO Ship's Energy Efficiency Management Plan – reduce CO2
- ASCO is exploring the possibility of retrofitting several of its ships to transition to methanol fuel between 2027 and 2030
- Methanol fuel density

Source: H2 Energy and DFDS Ferries

Global Logistics Challenges –Green Ports / Decarbonization

Ports are a transformative target under climate agenda as a facilitator of shipping

- No global set of standardized regulations for impact to the environment for port operations - its left to each countries own environmental laws and regulations
- ADB will introduce a Green Ports Toolkit in 2026 aimed at providing a;
  - Strategy, toolkit and guidance for planning and preparing future port project investments in ADB DMCs and a knowledge series on green ports
  - Workship planned for Oct 2025 in Singapore – seeking interest to attend

CAREC Opportunities –Green Ports / Decarbonization

- Stock-take/Evaluation of current operational and practices against
  - Air quality
  - Emissions CO^2 NOx SOx
  - Particulate matter
  - Noise pollution
  - Light spill pollution
  - Water quality
  - Energy efficiency
  - Land / soil quality
  - Run off
  - Waste disposal

Priority	2016	2017	2018	2019	2020
1	Air quality	Air quality	Air quality	Air quality	Air quality
2	Energy consumption	Energy consumption	Energy consumption	Energy consumption	Climate change
3	Noise	Noise	Noise	Climate Change	Energy efficiency
4	Relationship with the local community	Water quality	Relationship with the local community	Noise	Noise
5	Garbage /Port waste	Dredging operations	Ship waste	Relationship with the local community	Relationship with the local community
6	Ship waste	Garbage /Port waste	Port development (land related)	Ship waste	Ship waste
7	Port development (land related)	Port development (land related)	Climate Change	Garbage /Port waste	Water quality
8	Water quality	Relationship with the local community	Water quality	Port development (land related)	Garbage /Port waste
9	Dust	Ship waste	Dredging operations	Dredging operations	Dredging operations
10	Dredging operations	Climate change	Garbage /Port waste	Water quality	Port development (land related)

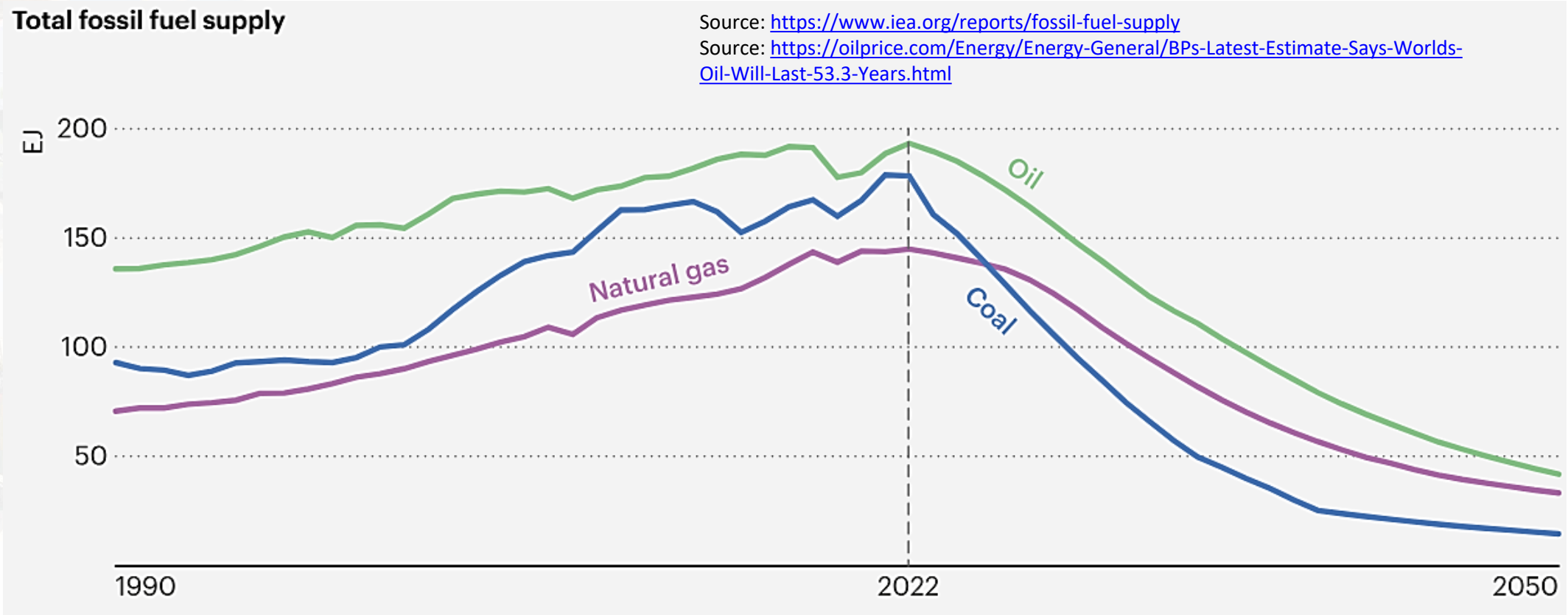
Source:RCI Innovations Seminar Green Ports, Shipping, & Maritime Decarbonization

CAREC Opportunities –Green Ports / Decarbonization

Opportunity exists to establish assistance to provide guidance to CAREC ports on how they fulfill environmental objectives and commitments defined in their national legislation.

- Added advantage of a regional approach to environmental management through establishment of systematic environmental management frameworks and systems – Environment Management and Monitoring Plans (EMP)
- Specific and overarching recommend actions include:
  - Development of Port environmental management systems and associated management strategies – including preparation and implementation of EMP
  - Pursue technology opportunities to reduce carbon footprint through investment in clean energy solutions, applying electrification and de-dieselization
  - Investment in infrastructure upgrades with enhanced environmental controls and greater efficiencies and environmental monitoring infrastructure and software.

Global Logistics Challenges –Exhaustion of Fossil Fuels



According to BP Annual Report earth has 53 years of oil reserves left at current rate of consumption with known reserves

EJ in Energy commonly refers to Exajoule, a unit of energy equivalent to 10^18 joules, often used in discussing large-scale energy consumption and production.

Global Logistics Challenges
Exhaustion of Fossil Fuels – Shipping

- AH36 steel plate is hot rolled high tensile steel used for shipbuilding and marine platforms – raw material inputs;
  - Iron ore, coking coal, manganese, silicon, phosphorus, sulfur, nickel, chromium, molybdenum, copper, and vanadium
- Lead time for shipbuilding varies around the world
  - Shipyard average delivery times reported for new ships are;
    - 3 years for Tanker vessels
    - 3.2 years for Container Ships
    - 4.8 years for LNG carriers
- Decarbonization of global iron and steel industry by 2050 will cost $1.4 trillion and limit affordable access to AH36

Source: https://public.axsmarine.com/

CAREC Opportunities – Fossil Fuel Depletion

Opportunity exists for CAREC countries to plan a transformative strategy to fund and develop alternative vessel designs, propulsion systems and fuel types, in addition to shipbuilding also investing in recycling of iron and steel using new smelting processes

The carbon tax announced by IMO April 2025 will generate $30–40 billion by 2030, $10 billion yearly – IMO member countries could lobby this value to be distributed to help transition in ship design, ship construction materials, alternative fuel production and steel recycling

Source: https://climatechangedispatch.com/u-n-maritime-agency-slaps-first-ever-emissions-tax-on-shipping-in-latest-money-grab/

Concluding observations

- CAREC related Waterborne / Maritime transport and Ports Sector face significant challenges in the next 5-50 years
- Prefeasibility / knowledge support will assist planning to confront and implement mitigation / transformative actions
- At the 9th RWG and Ports / Shipping, options for new TA support activities in 2025 and 2026 were discussed
  - Knowledge support accounting standards, railway marketing
  - Technical support for ports, shipping, railway developments
  - Dialogue and proposed recommendations with Govt's.

Thank you!

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