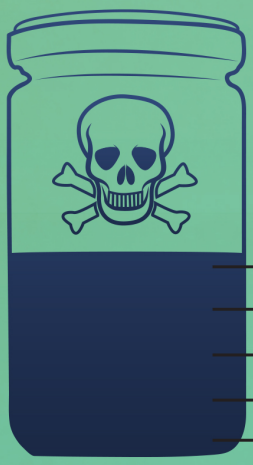
RISKS & CHALLENGES of HEAVY FUEL OIL use in the ARCTIC

- OIL SPILL RISK -

Growing Arctic shipping traffic and dangerous Arctic shipping conditions bring an increased risk of oil spill occurring. Given the sensitive and pristine Arctic environment and impossibility of clean up there is a greater likelihood that when an HFO spill occurs it is a catastrophic one with a long lasting impact on the marine ecosystem's flora and fauna.

Greater potential damage from an HFO spill in the Arctic

1) HFO EXTREMELY TOXIC & WORSE THAN OTHER FUELS WHEN SPILLED



-HFO = **thick tar-like "waste"** fuel oil.
-Emulsifies with water resulting in larger spill volumes to remove.
-Persists for months or years if not removed.

By contrast lighter diesel fuel disappears from the surface after three days.

- **Toxic heavy metals**
- **Up to 55 chemical substances**
- **Sulphur**
- **Ash**
- **Other harmful pollutants**

2) LARGE AMOUNTS OF HFO FUEL CARRIED WHEN IN REMOTE ARCTIC

Full tanks carried due to limited opportunities for refuelling in the Arctic region → increases potential damage of an oil spill.

3) INABILITY TO RESPOND QUICKLY TO A SPILL

-Currently "zero" spill response capability in the Arctic (says a top officer with the US Coast Guard)
-Extremely remote.
-Temperature and light extremes.

"There is really no solution or method today that we're aware of that can actually recover [spilled] oil from the Arctic."
– Senior Official with a firm that specializes in oil-spill response

4) NEARLY IMPOSSIBLE TO EFFECTIVELY CLEAN UP SPILL IN ICY ARCTIC WATERS

-Oil takes longer to break down in cold waters.
-Presence of ice and snow mean that any clean up operation becomes far more challenging.
-Oil trapped under the ice makes the pollution longer lasting and transportable over greater distances.

Devastating impacts if an Arctic spill occurs

Spill* Case Example in Remote/Cold Waters: 25 years on

-Oil still lingers on beaches where it seeped between boulders and cobbles.
-Remaining oil has most of the same chemical compounds as oil sampled 11 days after the accident.
-Populations of otters, orca whales & pink salmon → remain damaged.
-Species including crab & herring → still not back.

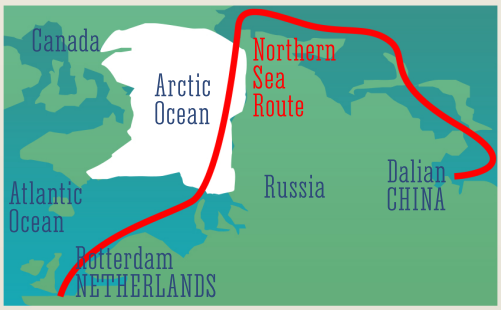
*(N.B. mainly crude oil)

5) LONG LASTING IMPACT ON ARCTIC FLORA & FAUNA

-HFO = poisonous to many organisms.
-HFO = thick & tar-like → smothers species, coats feathers & fur, reduces ability to maintain body temperature.

6) IMPACT ON ARCTIC PEOPLE WHO RELY ON A HEALTHY MARINE ECOSYSTEM FOR THEIR SUBSISTENCE & LIVELIHOOD

-Ice containing trapped oil could melt in the Spring releasing oil during this particularly precarious time for Arctic ecosystems.
-Culturally and economically important Arctic species at risk.



Greater likelihood of a spill occurring in the Arctic

7) GROWING ARCTIC SHIPPING TRAFFIC INCREASES PROBABILITY OF A SPILL

-Global shipping emissions projected to grow up to **250%** by 2050.

-Melting Arctic ice will open new shipping lanes across the Arctic.

8) HARSH ARCTIC CONDITIONS MEAN HIGH LIKELIHOOD OF AN ACCIDENT RESULTING IN A SPILL

"Heavy Fuel Oil (HFO) sludges are the greatest source of illegal oil discharges from ships."

-Report from the Organisation for Economic Co-operation and Development

ILLEGAL DISCHARGE OF HFO WASTE SLUDGE RISK

With increasing Arctic shipping traffic there is a rising risk that the illegal dumping of HFO waste sludge (produced when HFO is burned) will take place in the pristine Arctic ocean posing considerable damage to the marine environment.

High risk of illegal waste sludge dumping in Arctic Ocean

9) ILLEGAL DUMPING OF HFO SLUDGE IN THE ARCTIC OCEAN TO SAVE COSTS

-Burning HFO → lots of waste sludge produced (up to **5%** of the fuel consumed).
-Sludge needs to be disposed of safely onshore, however c. **5-15%** of all large vessels illegally discharge waste oil into the oceans.
-Increasing Arctic shipping + current lack of Arctic port reception facilities to deal with HFO sludge + cost + time → high risk that illegal waste sludge dumping in the Arctic Ocean → environmental damage.

BLACK CARBON (BC) EMISSIONS CAUSE CLIMATE & HEALTH IMPACTS

10) BC EMISSIONS ON ICE & SNOW INCREASE MELTING AND CLIMATE WARMING

-International shipping emits **71,000-160,000** metric tons of BC annually.
-BC accounts for up to **half of all Arctic warming.**

Surface darkening deposition

Absorbs heat and accelerates melting

BLACK CARBON RISK

Growth in Arctic shipping operations could result in a twentyfold increase of Arctic black carbon emissions. This will inevitably further accelerate both Arctic warming and snow and ice melt.

11) CLIMATE CHANGE IMPACTS

-**Irreversible changes to ecosystems and animals.**
-**Dramatic global sea-level rise.** Greenland ice sheet alone could still lead to 7m global sea-level rise. Between 2003-2008 the melting of the Arctic land ice contributed to 40% of global sea level rise.

12) HEALTH IMPACTS

-Burning HFO releases **health damaging air pollutants** (including Sulphur Oxides (SOx), Nitrogen Oxides (NOx), Particulate Matter (PM) and Black Carbon (BC).
-BC emissions → **respiratory problems, heart attacks, lung cancer** and **low birth weights.**
-International shipping → **50,000 premature deaths per year** in Europe alone.