

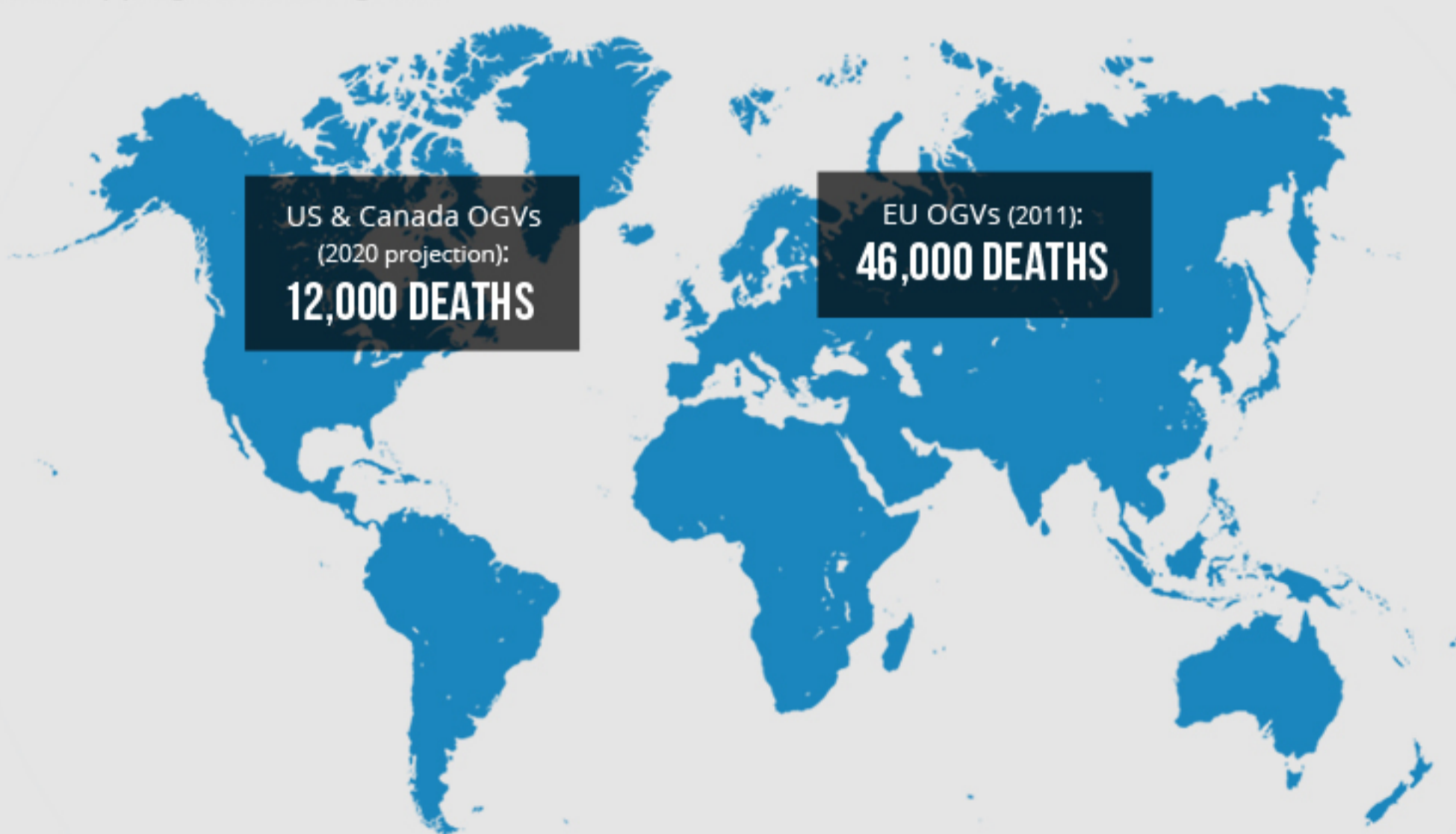
REDUCING SHIPPING EMISSIONS IN CHINA

The most harmful pollutants from marine emissions, namely SO_x, NO_x, and PM, can cause various adverse health effects:



EVERY YEAR IN CHINA, OUTDOOR AIR POLLUTION INCLUDING SHIPPING EMISSIONS LEADS TO 1.2 MILLION PREMATURE DEATHS.

Health impacts caused by shipping in China are not known, but here are estimates of premature deaths attributed to international shipping in other regions:

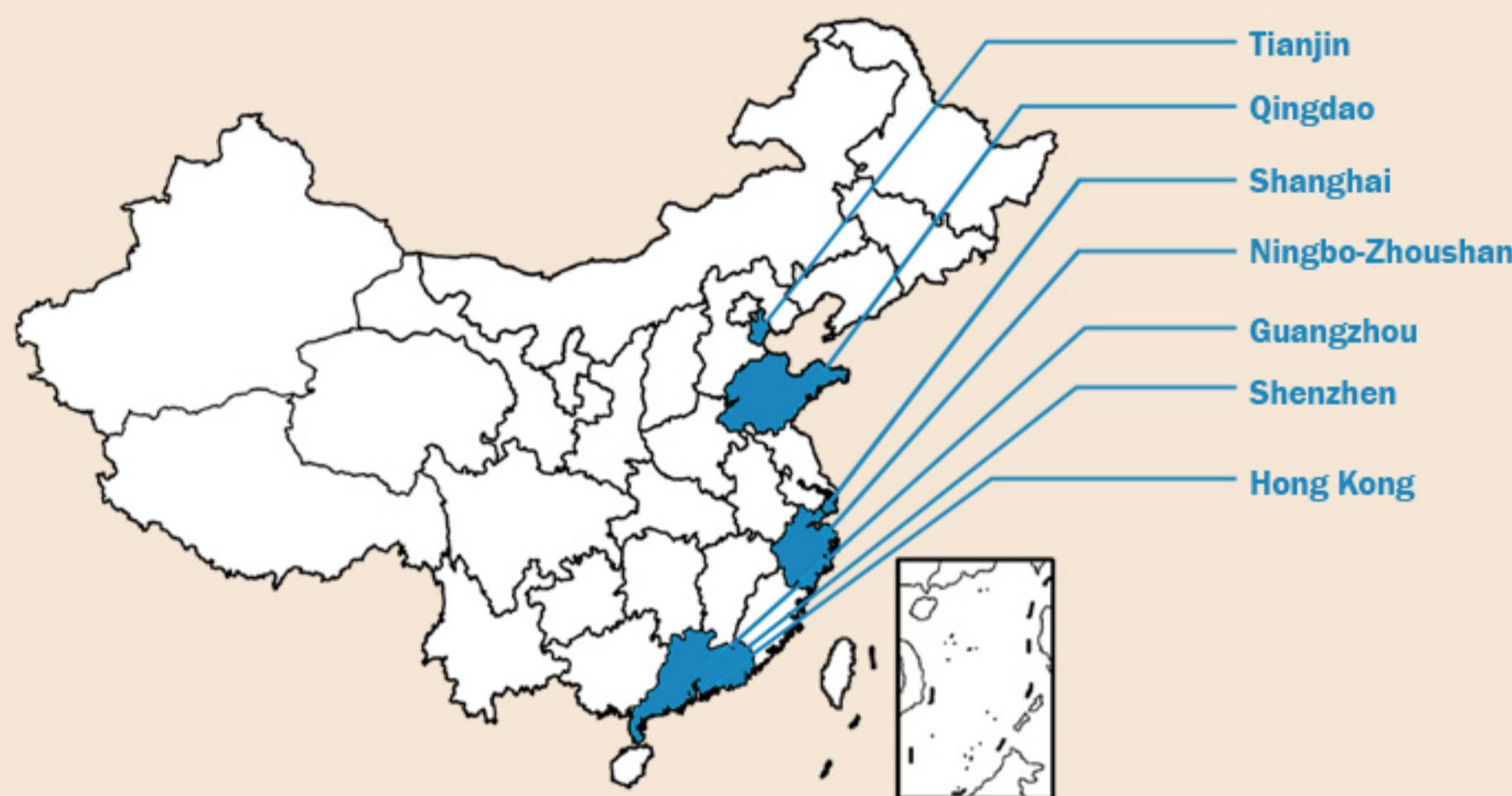


WHY IS IT IMPORTANT TO REDUCE SHIPPING EMISSIONS IN CHINA?

7 OF THE WORLD'S 10 BUSIEST CONTAINER PORTS ARE IN CHINA

The high concentration of shipping movements and maritime activities, combined with high population density at these cities, suggest that shipping emissions are causing significant health impacts to residents in these areas.

IN ONE DAY, 1 CONTAINER SHIP IN CHINA EMITS AS MUCH PM_{2.5} AS 500,000 EURO IV TRUCKS



IN THE NEAR TERM, KEY PORT REGIONS CAN CONSIDER:

Develop a marine emissions inventory



Use inventory as the basis for devising a port clear air action plan that prioritizes control measures

INCLUDING THESE POTENTIAL CONTROL MEASURES:



LOW SULFUR FUEL SWITCH

Both California and EU have imposed the strictest at berth fuel switching requirements, mandating OGVs to use fuel with a maximum 1,000-ppm sulfur content while at dock.



SHORE POWER

The use of shore power allows ships to turn off engines on board and instead use shore side electricity to power refrigeration, lights, pumps and other equipment while at berth.



LIQUEFIED NATURAL GAS

The use of LNG can cut NO_x and PM emissions by 80% or more, it can also lower greenhouse gas emissions across its lifecycle, depending on the source.

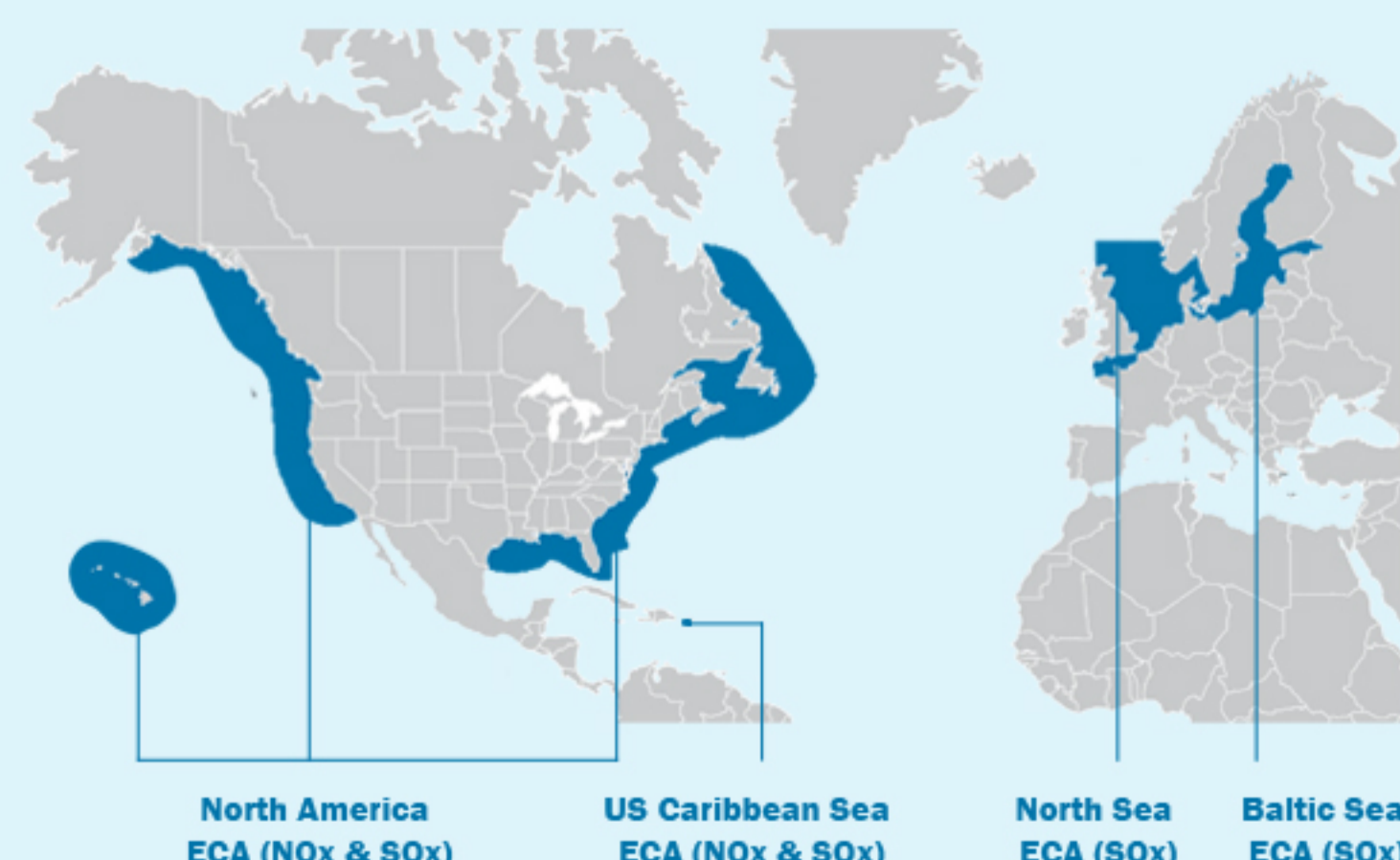


VESSEL SPEED REDUCTION

VSR refers to the practice of OGVs operating at a speed significantly less than their maximum speed. This helps to save fuel and reduce emissions.

IN THE LONG TERM, AN EMISSION CONTROL AREA WILL GREATLY REDUCE EMISSIONS

Emission Control Areas (ECAs) are internationally regulated treaties with strict limits for ship emissions, ranging from SO_x, PM to NO_x, depending on the type of ECA applied. Current ECAs cover the Baltic Sea, North Sea, North America, and U.S. Caribbean Sea.



The North America ECA is estimated to achieve the following reductions and benefits by 2020:

Compared to predicted levels without an ECA, SO_x, PM_{2.5}, and NO_x from vessels operating within an ECA are expected to reduce by **86%, 74%, and 23%**, respectively.

Avoiding 5,500-14,000 premature deaths, 3,800 emergency room visits, and 4.9 million cases of acute respiratory symptoms.



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