

- In the Northern European & Baltic green maritime corridor, four liner shipping routes are under consideration, including Route 1: Port of Rotterdam → Port of Hamburg → Port of Rønne → Port of Rotterdam, Route 2: Port of Rotterdam → Port of Hamburg → Port of Rønne → Port of Gdynia → Port of Tallinn → Port of Rotterdam, Route 3: Port of Hamburg → Port of Tallinn → Port of Gdynia → Port of Hamburg, and Route 4: Port of Rotterdam → Port of Rønne → Port of Tallinn → Port of Gdynia → Port of Rotterdam. While currently serviced by conventional vessels, there are plans to introduce alternative-fueled vessels in the coming years to establish environmentally sustainable corridors. We obtain the distance between ports from the website <https://www.routescanner.com/> and calculate the days it takes by vessel speed of 18 knots.
- Port investment costs of bunkering structure are generated randomly from 300 10³\$/Ton to 700 10³\$/Ton, with the capacity of bunkering station in 10000, 12000, 15000, 18000 tons, respectively. The OD demands are generated according to history data published by Maersk shipping line. The total amount of CO₂ emissions by the traditional fuel vessels by multiplying a factor of converting fuel cost to CO₂ defined by [231]:
 $E_{CO_2f} = 3.17$, representing the amount of tons of CO₂ emissions by burning per ton of traditional fuel.
- One emission allowance in EU ETS, referred to as EEA in our paper, represents one ton of CO₂ equivalent. For example, EEA = 66 means one ton of CO₂ emissions need to pay for 66\$ for operators. There is a planned stage to count all CO₂ emissions into EU ETS gradually, thus, in **Figure 6.6**, we compare the CO₂ emission costs under different EEA first and under different cases on 25%, 35%, 50%, 70%, 100% percentage of CO₂ emissions phased-in EU ETS.
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