



**“Gheorghe Asachi” Technical University of Iasi, Romania**



---

## **ASSESSMENT OF ENVIRONMENTAL COSTS OF SHIP EMISSIONS: CASE STUDY ON THE SAMSUN PORT**

**Aydin Tokuslu**

*Multinational Maritime Security Center of Excellence, 34330, Besiktas, Istanbul, Turkey  
E-mail: aydintokuslu78@gmail.com; Phone: +90 5066905844*

---

### **Abstract**

The Samsun port is one of the biggest in the Black Sea and serves as an international sea trade gateway with neighbour countries. In this study, exhaust gas emissions from ships during cruising, manoeuvring, and hoteling in the Samsun port were calculated based on ship activity-based methods including ship call information. Total exhaust gas emissions from ships in the port were calculated as 51.129 t y<sup>-1</sup> for CO<sub>2</sub>, 903 t y<sup>-1</sup> for NO<sub>x</sub>, 411 t y<sup>-1</sup> for SO<sub>2</sub>, 37 t y<sup>-1</sup> for VOC, 52 t y<sup>-1</sup> for PM for the year of 2018. General cargo, ro-ro cargo, and tanker ships are the main polluters at the port, and these ships produce almost 91% of all emissions in the port. Exhaust gas emissions during cruising mode were 86% of total emissions, and 3% for manoeuvring, and 11% for the hotelling. Ship emissions have negative effects on human health and it has been anticipated that the emissions (SO<sub>2</sub>, NO<sub>x</sub>, PM) generated from the ships calling to the Samsun port will endanger around 64.000-150.000 people living within 1-2 km range from the harbour area annually. All forms of emissions close to the port and district should be examined regularly and measures to reduce exhaust gas emissions in the port area should be considered. The environmental cost of the port is estimated to be over \$31 million and \$10.095 per ship call in 2018. This study has concretely demonstrated for the first time that maritime emissions affect how many people in the port city. This study will help to create ship emission inventory for the Black Sea region.

*Key words:* emission, harbour, pollution effects, Samsun, ships

*Received: April, 2020; Revised final: July, 2020; Accepted: October, 2020; Published in final edited form: May, 2021*

---