# ESTIMATING THE EMISSION FROM TERMINAL TRACTOR IN WESTPORTS MALAYSIA: A REVIEW

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## ABSTRACT

Emissions are the term used to depict the gases and particles, which are put into the air or transmitted by different sources. Decreasing the effects of products relationship on human wellbeing and the earth is a top need for the Westport Malaysia Sdn Bhd. Most of the research agreed that the emission from vehicles and machinery in the port area could cause emissions. Terminal Tractor was the largest number of vehicles in Westports Malaysia Sdn Bhd. At the same time, it can produce higher amounts of emissions in the port area. For this reason, the current study aims to investigate the amount of emission release and type of gases of emission release from the Terminal Tractor based on the activity rate in Westports Malaysia Sdn Bhd, Pulau Indah. The study used data collected from the Terminal Tractor in port area that include the distance traveled, fuel consumption and operation hour. Further, the data was analyzed using various types of formulas and generated into Microsoft Excel and formulae to confirm the results based on the distance traveled operation hour and fuel consumption. The emission factor produced by each Terminal Tractor is based on the activity rate, which is the operation hour and distance travel every week for three months in 2018. Each type of emission will produce by Terminal Tractor according to the operation hour and distance travel for every Terminal Tractor in the port area. Every emission factor may result in different values every day. Moreover, the higher activity rate in port operation will result in a higher number of emissions produced. The study provided recommendations based on these results for the future implications for academicians and practitioners.

***Keywords**: Estimate emission, NOx, CO2, SOx, Green Port*

## 1.0 INTRODUCTION

Port is where the operation of the water transports to handle goods or people from one place to another place using the specialist equipment and facilities that have been provided by the port authority. Nowadays, seaports provide various services which are mostly related to passenger and cargo transport. Around 20% of worldwide releases of squanders and deposits into the ocean are originated from the transportation industry. When the number of sufferings from pollution in that port is higher, it's meant the port was the busiest port. To support marine environment protection and development of waste

management systems and facilities in seaport which is one of the strategies for setting up Green Port improvement [1]-[2].

The sources that cause emissions of environmental pollutants can generally be divided into stationary and mobile sources. Examples of stationary sources are systems for generating heat and energy, such as central heating systems and electrical power plants, and systems where industrial processes take place. Mobile sources include numerous means of transport such as passenger cars, heavy-duty trucks, inland waterway vessels, and aircraft. Shipping discharges in ports are considerable, representing 18 million tons of CO2 emanations, 0.4 million tons of NOx, and
0.03 million tons of PM10 in 2011. Around 85% of discharges originate from containerships [3]-[5].

Emissions are the term used to depict the gases and particles, which are put into the air or transmitted, by different sources. Decreasing the effects of products relationship on human wellbeing and the earth is a top need for the Westport Malaysia. Sources of port-related emanations incorporate maritime vessels, substantial trucks, and harbor make, payload taking care of gear and railroad trains. (Majewski, 2012) Expressed that from most of this transportation, it will cause the diesel particulate issue (DPM), nitrogen oxides (NOx), carbon dioxide (CO2) and sulfur oxides (SOx), all of which have been known to influence human wellbeing and add to the arrangement of contamination. From the terminal tractor operation in port, it will cause all these gases and produce air emissions in the port areas. Transportation will produce higher Greenhouse Gas emissions in the economic sector. From figure 2, the transportation part creates the biggest offer of ozone-harming substance outflows [6]-[8].

## 2. METHODOLOGY

The study is conduct at Westports Malaysia Sdn Bhd. Westports Malaysia Sdn Bhd (formerly known as Kelang Multi Terminal Sdn Bhd) is a multi-cargo port placed on Pulau Indah, Port Klang, Malaysia. Westports is a multi-cargo port, which handles all modes of cargoes in containers; break bulk, dry bulk, liquid bulk, vehicles (roll-on roll-off) and other conventional cargoes. The data that needed to estimate the emission from the Terminal Tractor is the manufacturing supplier of terminal tractor. Next are, type of fuel used such as diesel. For estimating CO2 emissions from transportable combustion, the most accurate technique is to estimate by the operation hour of daily activity, the measured carbon content of the fuel per unit of energy (or per unit of volume or mass), and the measured heat content (or density) of the fuel used. Lastly, the data that needed to estimate the emission are average distance travelled. The average distance travelled from Terminal Tractor will be collected based on the distance travelled movement in port area. Emission can be estimate using various type of formula, another equation that can been used are the Equation 1, [9]- [10].

E = ACTIVITY (A) x EMISSION FACTOR (EF).....eqn 1

Activity (A) is an amount of how active a piece of equipment is, and there are various ways to calculate this component. Depending on the piece of equipment, the activity might be presented as a measurement of volume per time. For example, when calculating the annual emissions of a boiler, that boiler needs the total amount of fuel consumed in a one-year period. The emission factor (EF), which relays the process

activity to the amount and type of pollutants emitted, is the part of the equation that can take the most time to change. The units of an emission factor are always mass per activity unit [11] – [12].

The activity rate for Terminal Tractor in Westport's Malaysia will be collected based on the distance travelled from one point to another point, and the operation hours that the Terminal Tractor been operate. The activity rate collected based on the two types of Terminal Tractor that been used in Westports Malaysia which is Kalmar Terminal Tractor and Terberg Terminal Tractor. Terminal Tractor using diesel for the engine, operation hour, volume of transportation and distance travelled will affect the number of emission that produce by each type of Terminal Tractor [13] – [15].

## 3. RESULTS AND DISCUSSION

The emission factor NOx and CO2 has been producing by each type of Terminal Tractor in Westports Malaysia Sdn Bhd area. NOx reacts to form ground-level ozone and smog and can contribute to respiratory problems. CO2 are colorless, odorless, naturally exists in Earth's atmosphere. CO2 is called a greenhouse gas (GHG) because CO2 traps the energy from the sun and keeps the world at a suitable temperature. But rises in atmospheric CO2 connected with human actives can stand problem. Each type of emission will produce by Terminal Tractor according to the operation hour and distance travel for every Terminal Tractor in port area. Every emission factor may result in different value every day. All the activity in port that occurs with vehicle or machineries movement can cause the emission or pollution to the environment.

Table 1 shows the value of every emission factor in three months in 2018. CO2 emission was the largest and the highest number of emissions in three months. Terminal Tractor in Westports Malaysia Sdn Bhd produces more CO2 than NOx gases during the operation activity daily. The highest the number of activity rate, the highest number of emissions been producing by the Terminal Tractor. When there is less activity rate, number of emissions also will be decrease from week to week.

Table .1: Emission Factor From Terminal Tractor 2018

| EMISSION FACTOR FROM TERMINAL TRACTOR 2018 | | | |
|---|---|---|---|
| Month | Week | CO2 | NOx |
| OCTOBER | 1 | 0.087 | 0.010 |
| | 2 | 0.086 | 0.012 |
| | 3 | 0.086 | 0.011 |
| | 4 | 0.087 | 0.012 |
| NOVEMBER | 1 | 0.086 | 0.011 |
| | 2 | 0.085 | 0.011 |
| | 3 | 0.087 | 0.010 |
| | 4 | 0.083 | 0.009 |
| DECEMBER | 1 | 0.086 | 0.010 |
| | 2 | 0.087 | 0.010 |
| | 3 | 0.086 | 0.009 |
| | 4 | 0.086 | 0.009 |
| **TOTAL** | **16** | **1.032** | **0.124** |

## 4. CONCLUSION

This research is conducted to study the amount of emission that produce by Terminal Tractor in Westports Malaysia Sdn Bhd at Pualau Indah, Selangor. This research is an attempt of the activity rate in port area towards the emission has been produce by the Terminal Tractor. Moreover, the higher number of activity rate in port operation will result in higher number of emission produce. The higher number of emission produce can give harm to the environment in port area and effect the ecosystem.

In Malaysia, several ports have implemented The Green Port Policy. Green Port Policy has been implied in Westports Malaysia Sdn Bhd. Westports Malaysia is convinced that going green is an important part of moving towards a more sustainable and eco-friendly business practice. Westports Malaysia has accepted several energy reducing initiatives. Green Port Policy can reduce environment pollution, at the same time can reduce number of emission pollution that produce by the vehicle and machineries in port area. The data was collected through the research methodology. The instrument used to collect data is from the observation and existing data from port authorities. According to the observation, the researcher collects all data from them and makes final analysis result. The researcher used a data collection as a research design for this research. This hypothesis must be provable by scientific and statistical means and is the basis around which the entire analysis is planned. Besides that, for the research the researcher had chosen Terminal Tractor as the main component. This is because all these research issues are related to the emission that release by the Terminal Tractor in port area.

The result is a great tool in achieving the objectives stated. The expected results could be achieved through analysis and finding. Moreover, by analysis the findings and result from this research, it has significantly helped the researcher to achieve the objectives that already being stated earlier. Data analysis is another tool in helping the researcher to find out the results based on the data collected. The data mainly gathered from Westports Malaysia Sdn Bhd.

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Figure 1: Westports Malaysia Container Terminal Facilities

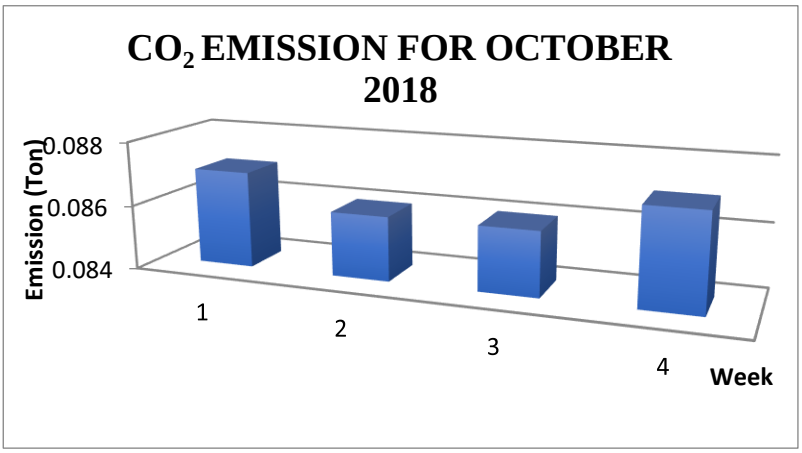


Figure 2: $CO^2$ Emission for October 2018

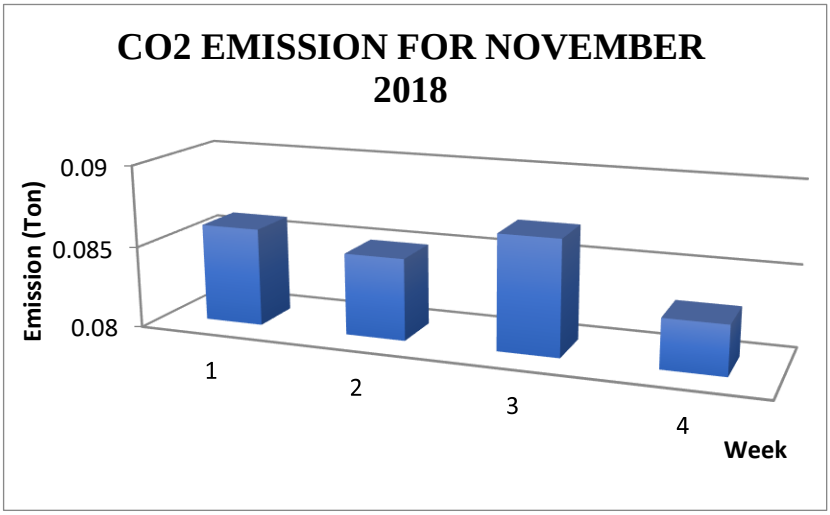


Figure 3: $CO_2$ Emission For November 2018

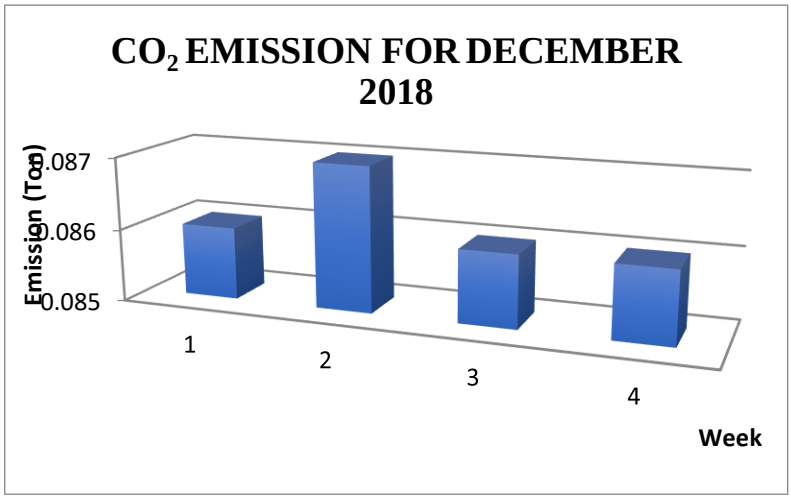


Figure 4: $CO_2$ Emission For December 2018

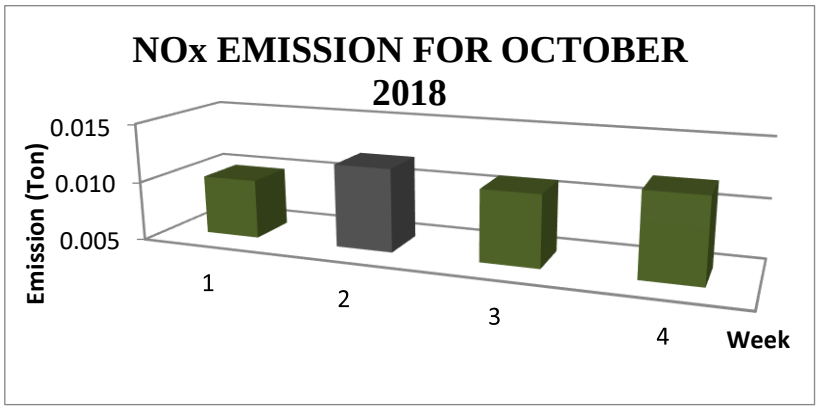


Figure 5: $NO_X$ Emission For October 2018

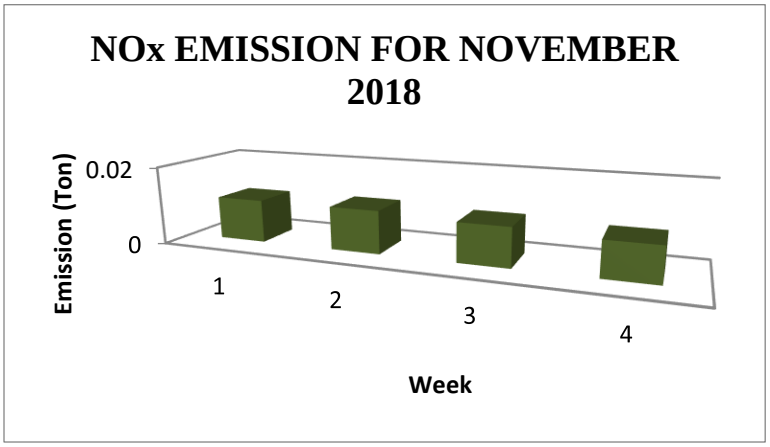


Figure 6: $NO_X$ Emission For November 2018

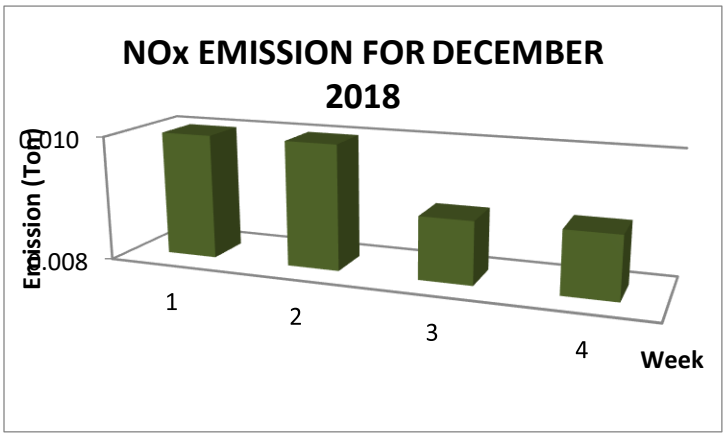


Figure 7: $NO_X$ Emission For December 2018

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Table 1: Westports Malaysia Container Terminal Facilities

| **WESTPORTS MALAYSIA CONTAINER TERMINAL FACILITIES** | |
|---|---|
| Berth Length | 20 Berths<br>5800 meters |
| Terminal Capacity | 14 million TEU capacity per year<br>187 Hectares consisting of CT 1- CT 9. |
| Quay Cranes | 67 units |
| RTG's | 185 units |
| Terminal Tractors | 524 units |
| Stackers | 26 units |
| Total Ground Slots | 46922 |

Table 2: Emission Factor from Terminal Tractor 2018

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