



Preliminary 2023 Emissions Inventory Estimate for Warehouse Distribution Centers

Background

The objective of this document is to provide a rough estimate of the baseline emissions of nitrogen oxides (NO_x) in 2023 that could be affected by potential facility-based measures that would apply to warehouse distribution centers. The estimated emissions values described in this document are not intended to be final values used for the State Implementation Plan or for regulatory purposes. Instead, they are intended only as a point of reference to guide future strategies, policies and/or rules aimed at reducing emissions from warehouse distribution centers in the Basin. More detailed emissions inventories for this source category will be developed in future public processes for any specific measure that will be used to obtain SIP credit (such as a regulation, MOU, etc.) and for future Air Quality Management Plans.

NO_x Emissions Inventory for Warehouse Distribution Centers

The estimate presented here relies on the substantial work that has previously been conducted to estimate vehicular-related NO_x emissions, including work performed by California Air Resources Board (CARB) staff for the 2016 Air Quality Management Plan (AQMP) emissions inventoryⁱ and the Southern California Regional Association of Governments (SCAG) and SCAQMD staff during development of the Final 2016 AQMP. SCAQMD also sponsored a study to evaluate warehouse activities that affect air qualityⁱⁱ, and co-sponsored (along with NAIOP, a commercial development trade association) a study conducted by ITE to update warehouse trip generation estimates for warehousesⁱⁱⁱ. The table below provides a summary of the overall NO_x emissions inventory for off-road equipment and on-road vehicles potentially associated with warehouse distribution centers in 2023.

Methodology for Estimating 2023 NO_x Emissions from Warehouse Distribution Centers

Trucks

Composite truck emission factors were calculated from EMFAC2014 for heavy-heavy duty trucks and light-heavy duty trucks. Vehicle miles travelled (VMT) per truck trip were derived from the 2016 Regional Transportation Plan modelling analysis. These values were multiplied by the trip generation rates from ITE's Transload and Short-Term storage warehouse classification referenced above to derive emissions from truck travel. Total idling emissions in the basin for these truck classes were proportioned by the VMT estimate associated with warehouse trucking to calculate potential idling emissions associated with warehouses.

Passenger Vehicles

Similar to the methodology described for trucks, composite emission factors for light duty cars and trucks from EMFAC2014 and ITE trip generation rates were used to estimate emissions from passenger car travel.

Transportation Refrigeration Units (TRUs)

All of the emissions from TRUs in the air basin were conservatively assumed to be associated with warehouses as refrigerated goods must travel to or from a warehouse for local delivery.

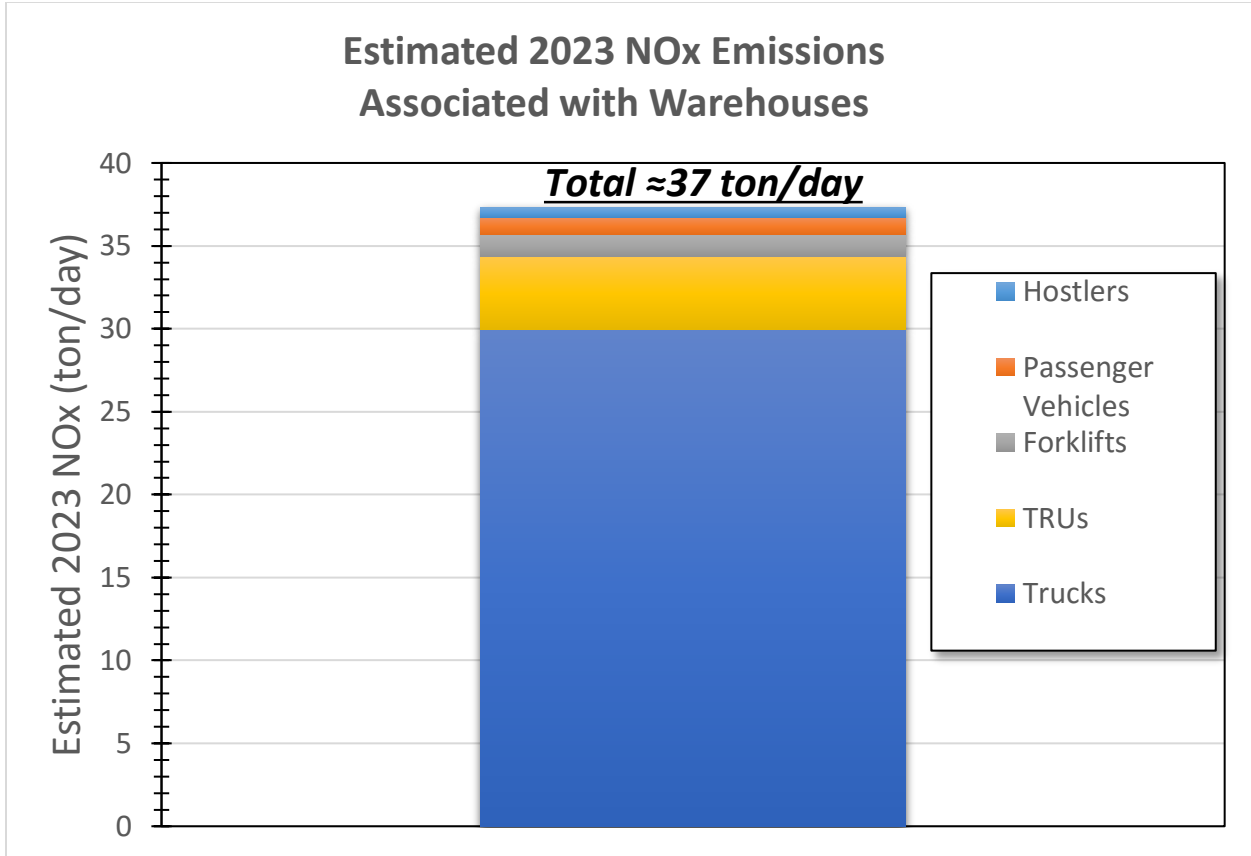
Off-Road Cargo Handling Equipment

Large spark ignition (LSI) forklift (typically propane) emissions were calculated using information from CARB's inventory for LSI equipment and the SCAQMD business survey of warehouse activity. This data was applied to the SIP inventory for industrial category LSI forklifts to derive a rough estimate of forklift emissions associated with warehouses. A rough estimate of the total number of hostlers operating at



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warehouses was calculated using information from the SCAQMD business survey of warehouse activity. As this total approximately equaled the number of pieces of equipment in the ‘Other’ category for ‘Industrial Equipment’ from the off-road SIP inventory, all of the emissions from this category were conservatively included in the estimate.



Vehicle Type	2023 NOx (tons/day)
Trucks	30.0
Passenger Vehicles	1.0
Forklifts	1.3
TRUs	4.4
Hostlers	0.6
Total	~37

ⁱ <https://www.arb.ca.gov/app/emsinv/fcemssumcat/fcemssumcat2016.php>

ⁱⁱ <http://www.aqmd.gov/home/rules-compliance/ceqa/air-quality-analysis-handbook/high-cube-warehouse>

ⁱⁱⁱ <http://library.ite.org/pub/a3e6679a-e3a8-bf38-7f29-2961becdd498>