



Airport Emissions Inventory Development for Air Quality Modeling

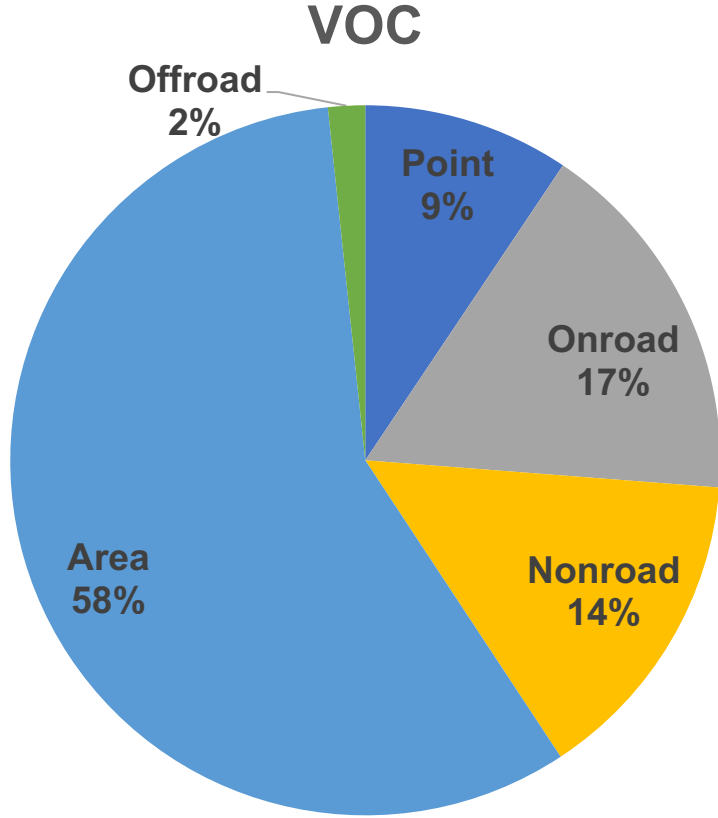
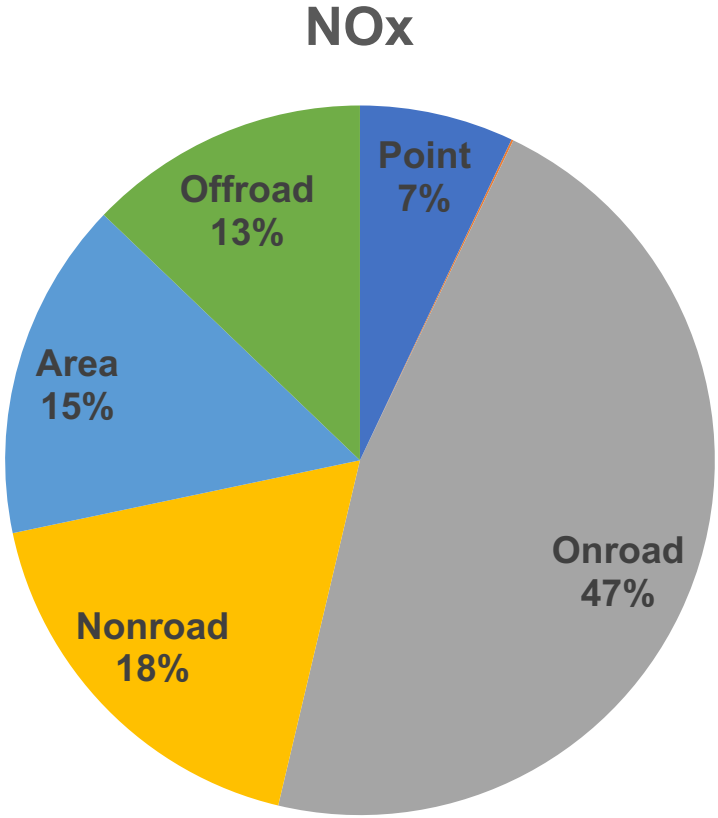
Peter Hoholick

Presented at the DFW Air Quality Technical Information Meeting on August 22, 2022

Overview

- OFFROAD Sector
- Data Sources
- Activities Measured
- Updating the 2019 Modeling Platform
 - Emission Inventory
 - Pre-processing & Post-processing

2019 DFW Summer Emissions by Sector



Offroad



Airports



Locomotive

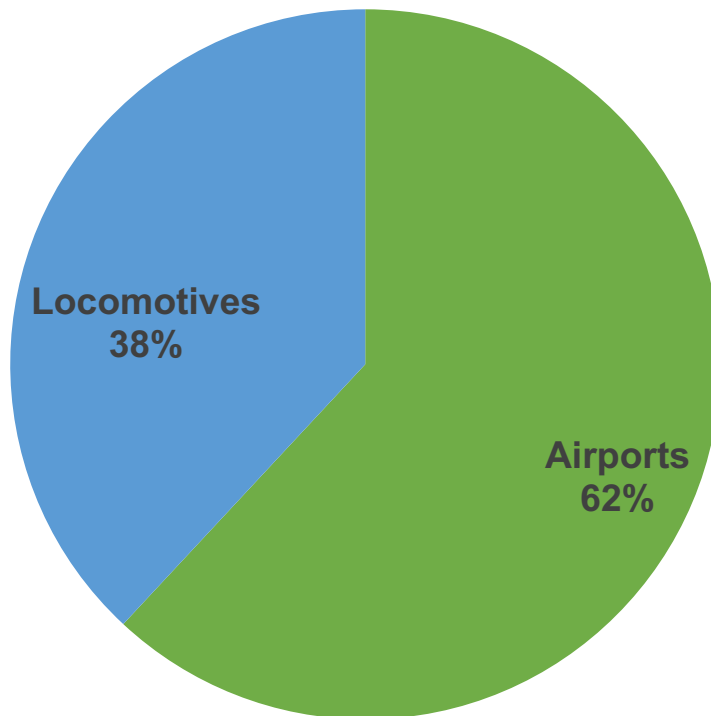


Commercial
Marine

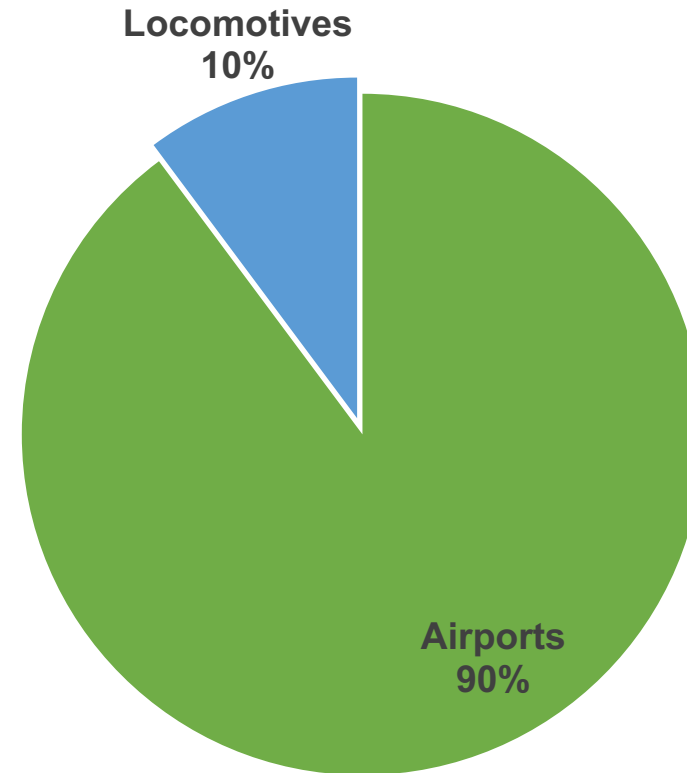
Figure Courtesy: Ramboll

2019 DFW Offroad Emissions

NOx



VOC



Data Sources for Airport Emissions in 2019 Modeling Platform

- Inside Texas
 - TTI 2020 data (FAA's Aviation Environmental Design Tool [AEDT])
 - Used for Texas
- Outside Texas
 - EPA2016v1 data
 - Used for MX, CAN, non-Texas US

Activities Measured

Aircraft Emissions

- Aviation Environmental Design Tool (AEDT) model from (Federal Aviation Agency) FAA used to develop Airport emissions
- Emit mostly NO_x, VOC, CO, and PM from combustion
- Most come from landing to takeoff (LTO) and cruising
- Amount depends on 3 main factors – fuel composition, operation time, and aircraft material and technological sophistication
- AEDT treats each aircraft as a combo of specific aircraft type and engine type when collecting emission data

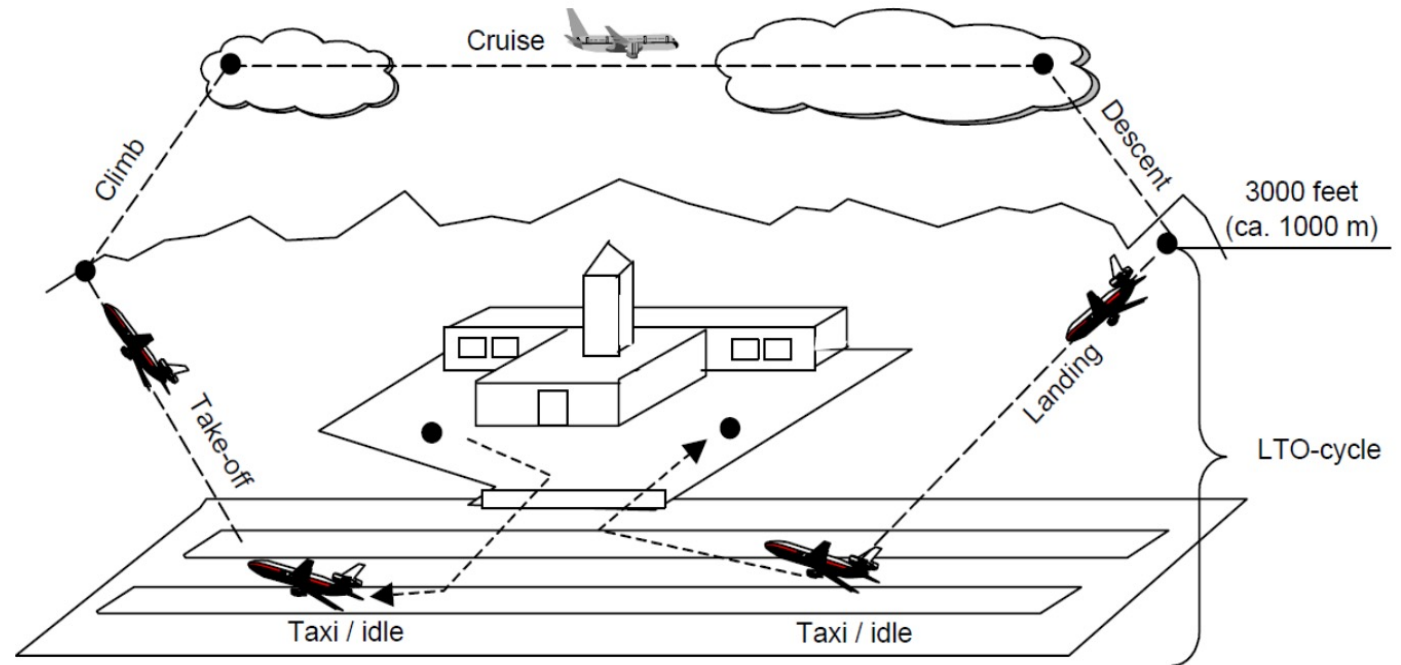


Figure Courtesy: TTI

Auxiliary Power Units



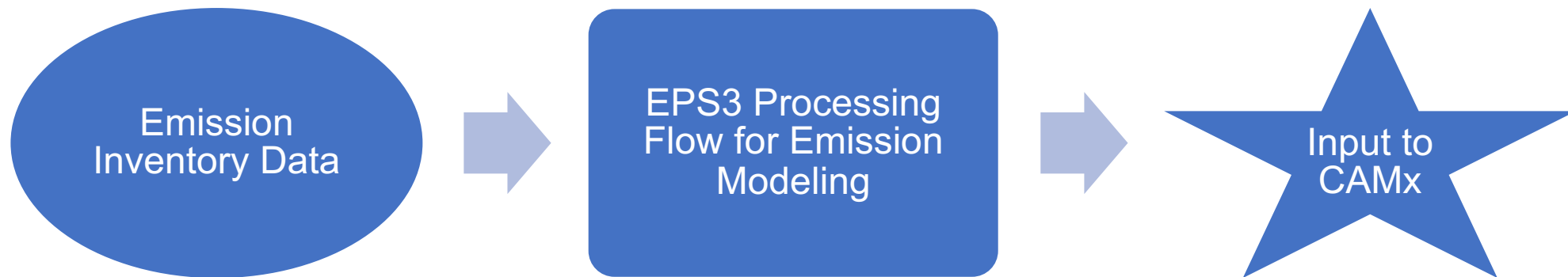
- APU (auxiliary power units): used to generate electricity and compress air by burning jet fuel and generating exhaust like other engines
 - Only in use when aircraft powered down
 - Burn jet fuel to keep air pre-conditioned and maintain power/operability

Ground Support Equipment

- GSE (ground support equipment) includes: air conditioners, compressors, aircrafts tractors/tugs, baggage tractors, belt loaders, cabin service trucks, lavatory trucks, catering trucks, water supply trucks, external generators, hydrant fueling trucks



2019 Modeling Platform Data Processing



EPS3 Processing

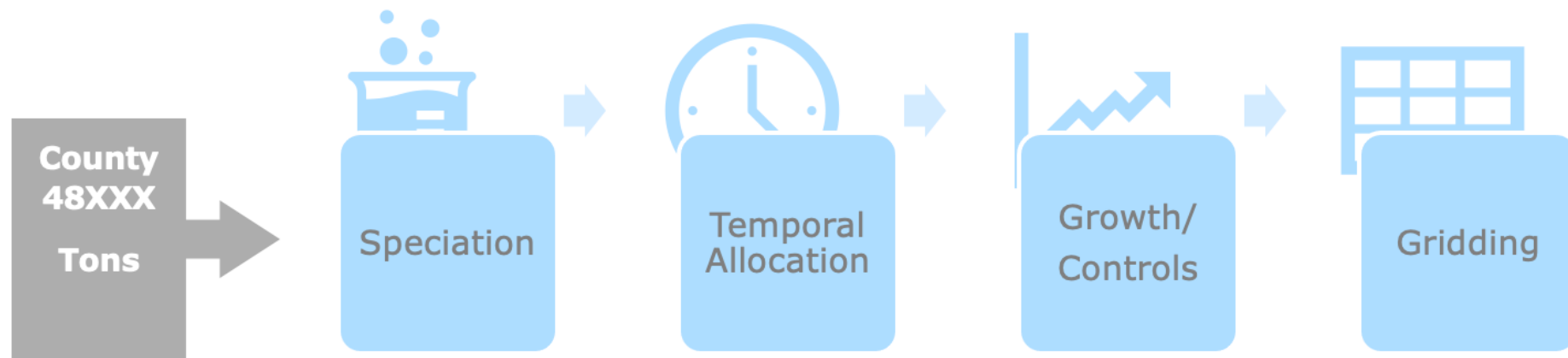


Figure Courtesy: Ramboll;

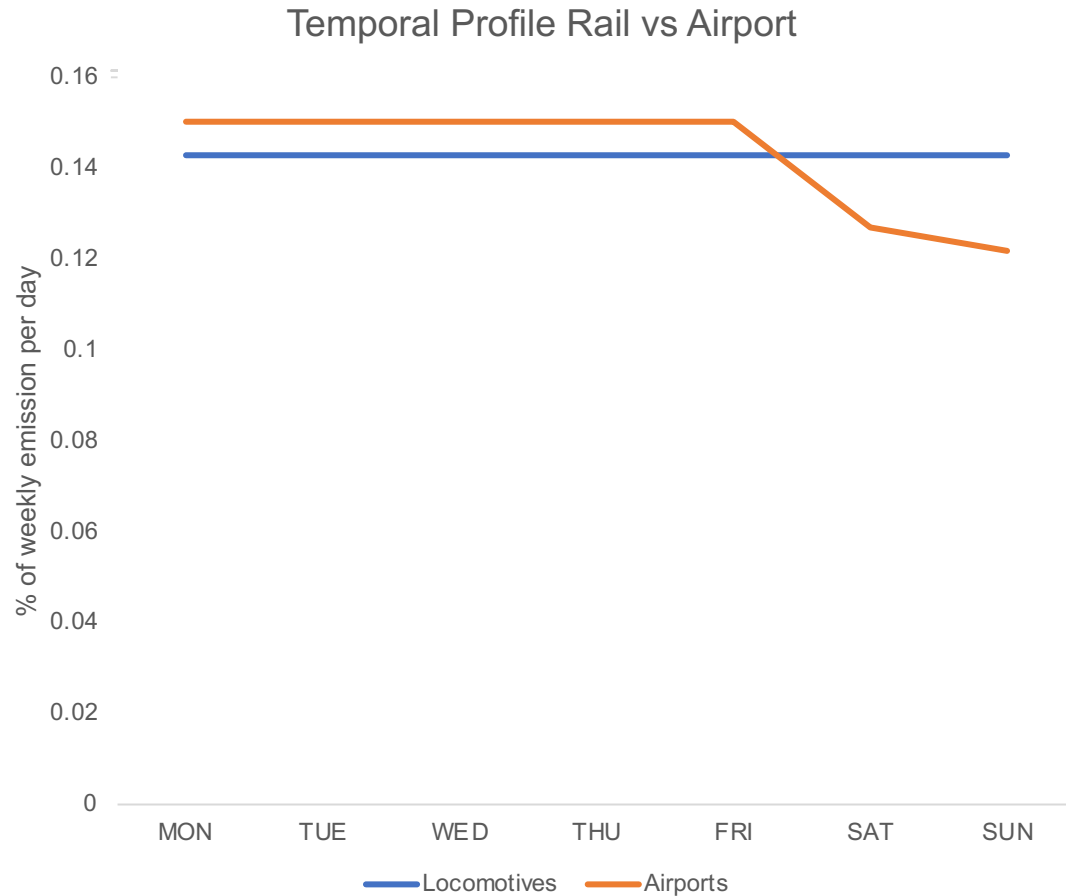
Speciation



Photo Courtesy: Ramboll

- Disaggregates criteria pollutants into photochemical modeling compounds based on speciation profiles of the air quality model chemical mechanism
 - Ex. NO_x \rightarrow NO, NO_2 , HONO
 - Ex. VOC \rightarrow Benzene, Ethanol, Ethylene, Formaldehyde, and other species

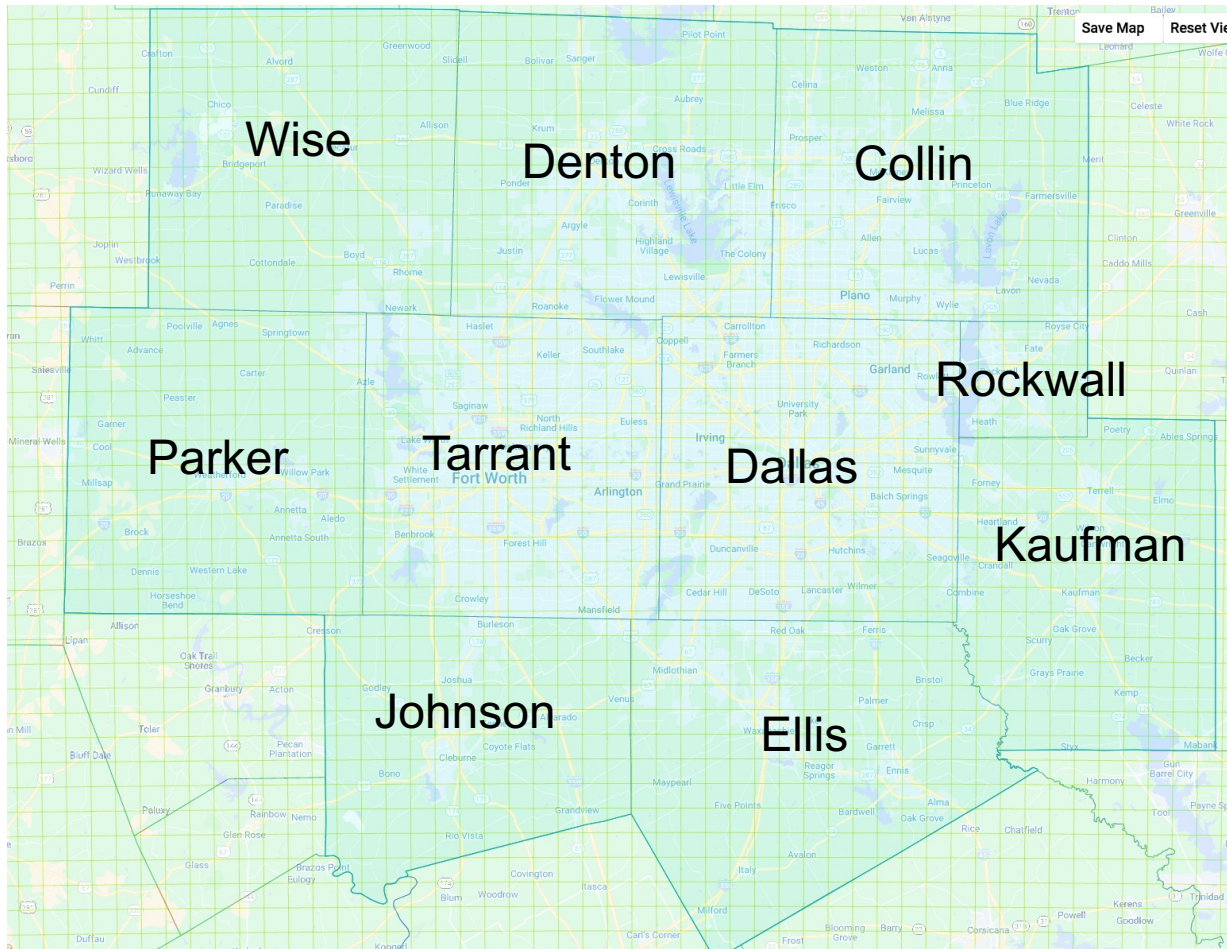
Temporal Allocation



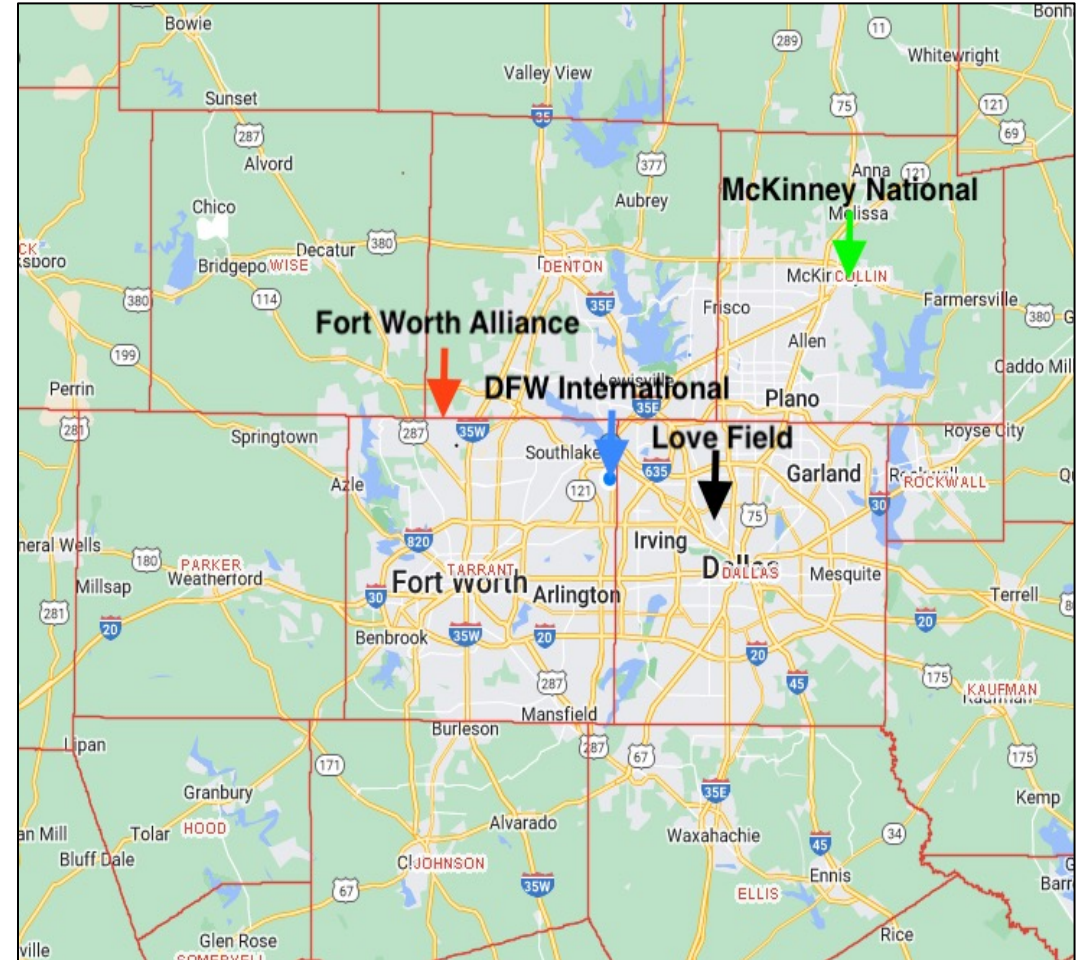
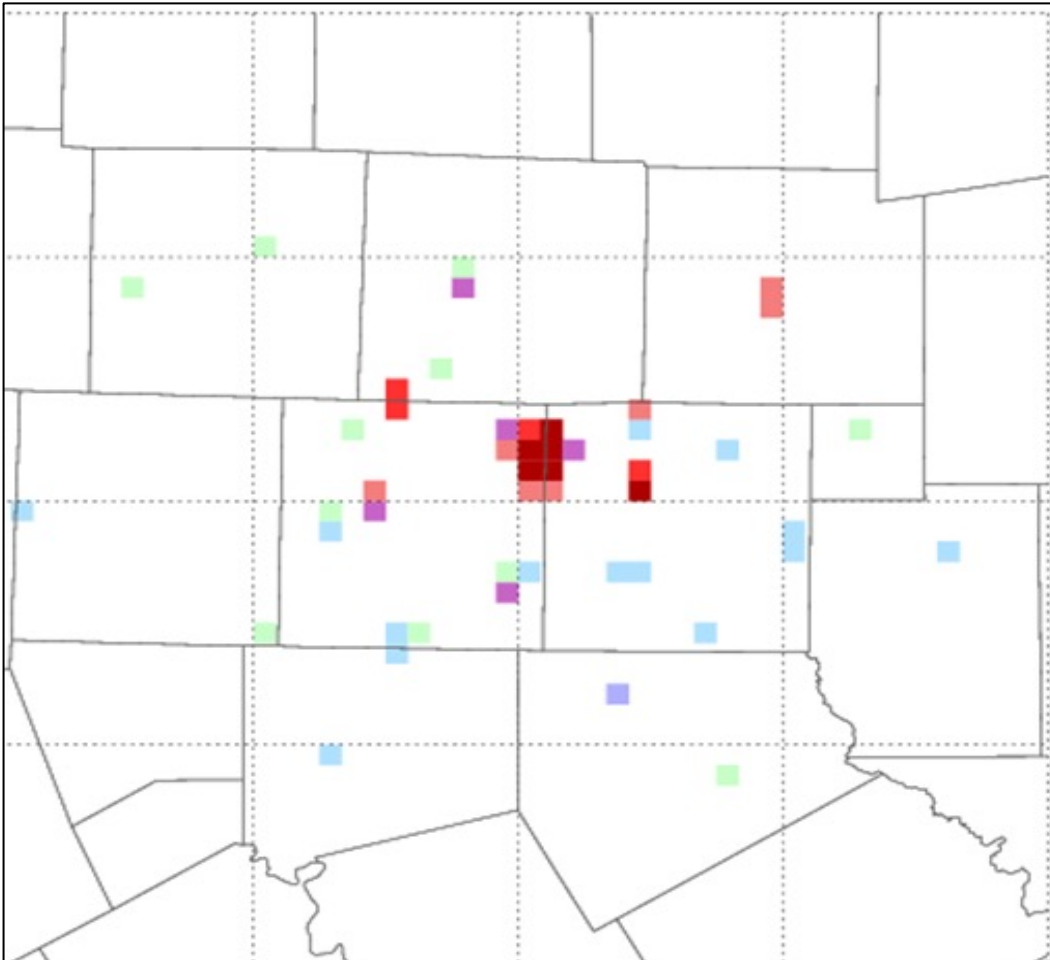
- Temporally adjusts emissions from annual, seasonal, or typical season day to episodic levels; allocates emissions to the hours of the modeling episode
- Temporal profiles were generated from EPA SMOKE profiles based on ancillary data provided from 2017gb (second set of 2017 NEI platform) data set of the 2017 modeling platform
- For airports, most emissions on the weekday, with slightly less on Sundays than Saturdays, seasons do not matter
- For railways everything is average day, also no seasons or weekends

Gridded Allocation

- Spatially allocates emissions based on source location, or gridded spatial surrogate indicators

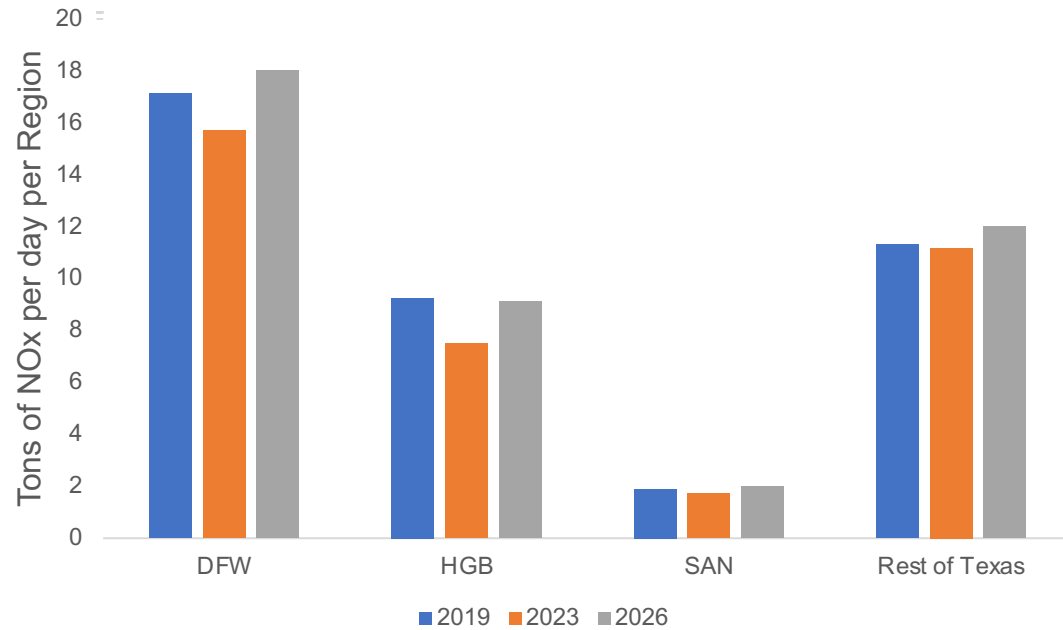


2019 DFW Mapping

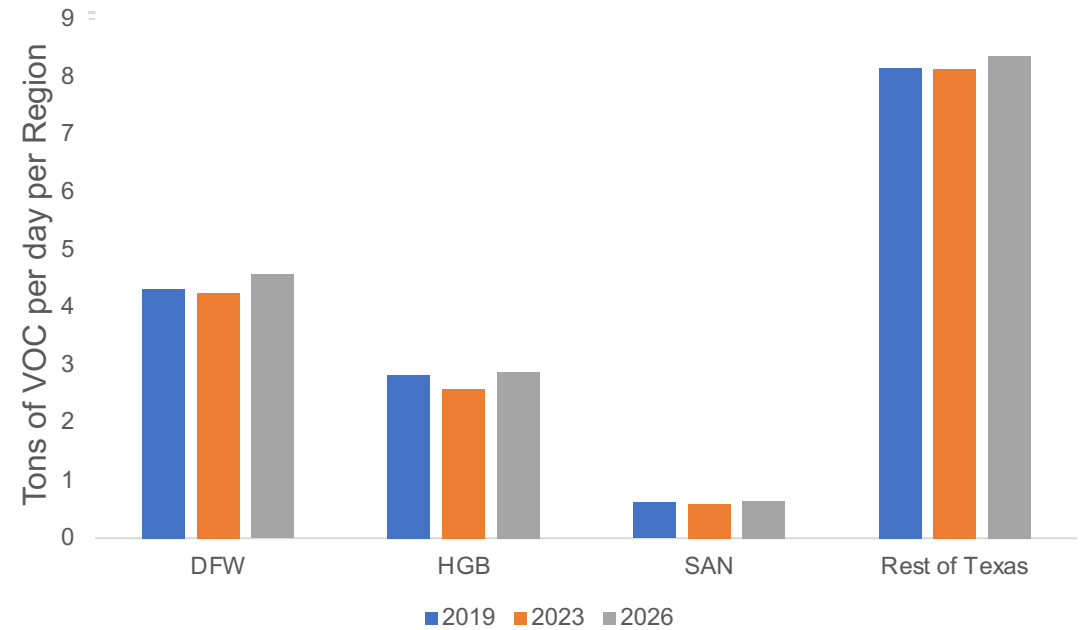


Airport Emissions by Year

2019, 2023 and 2026 Tons of NOx by Region



2019, 2023, and 2026 Tons of VOC by Region



Airport Emissions by Year

2019 Weekday Emission

Airport	NO _x (TPD)	VOC (TPD)
DALLAS-FORT WORTH INTL	11.31	1.31
DALLAS LOVE FLD	2.01	0.43
FORT WORTH ALLIANCE	1.40	0.36
MCKINNEY NTL	0.70	0.22
FORT WORTH MEACHAM INTL	0.63	0.46
ADDISON	0.28	0.24
DENTON ENTERPRISE	0.18	0.22
ARLINGTON MUNI	0.14	0.14
MID-WAY RGNL	0.07	0.08
FORT WORTH SPINKS	0.07	0.13
Remaining 320 DFW Area Airports	0.34	0.73
Ten-County DFW Airport Total	17.13	4.32

2023 Weekday Emissions

Airport	NO _x (TPD)	VOC (TPD)
DALLAS-FORT WORTH INTL	9.97	1.16
DALLAS LOVE FLD	1.86	0.39
FORT WORTH ALLIANCE	1.40	0.36
MCKINNEY NTL	0.70	0.22
FORT WORTH MEACHAM INTL	0.61	0.45
ADDISON	0.31	0.26
DENTON ENTERPRISE	0.18	0.22
ARLINGTON MUNI	0.16	0.15
MID-WAY RGNL	0.07	0.08
FORT WORTH SPINKS	0.07	0.13
Remaining 320 DFW Area Airports	0.37	0.81
Ten-County DFW Airport Total	15.70	4.25

2026 Weekday Emissions

Airport	NO _x (TPD)	VOC (TPD)
DALLAS-FORT WORTH INTL	12.00	1.39
DALLAS LOVE FLD	2.07	0.44
FORT WORTH ALLIANCE	1.44	0.37
MCKINNEY NTL	0.71	0.23
FORT WORTH MEACHAM INTL	0.63	0.46
ADDISON	0.31	0.27
DENTON ENTERPRISE	0.19	0.23
ARLINGTON MUNI	0.16	0.15
MID-WAY RGNL	0.07	0.08
FORT WORTH SPINKS	0.07	0.13
Remaining 320 DFW Area Airports	0.38	0.82
Ten-County DFW Airport Total	18.02	4.57

Contact

- Peter Hoholick
 - Peter.Hoholick@tceq.texas.gov
- Barry Exum
 - Barry.Exum@tceq.Texas.gov

Questions?

