Emissions Modeling: Tools and Procedures for Air Quality Practitioners

Northern Transportation & Air Quality Summit

Baltimore, MD

August 31, 2016

Outline

- MOVES Models
- Trend Analysis
- MOVES QA Tool
- Sketch Planning Tool

MOVES Models

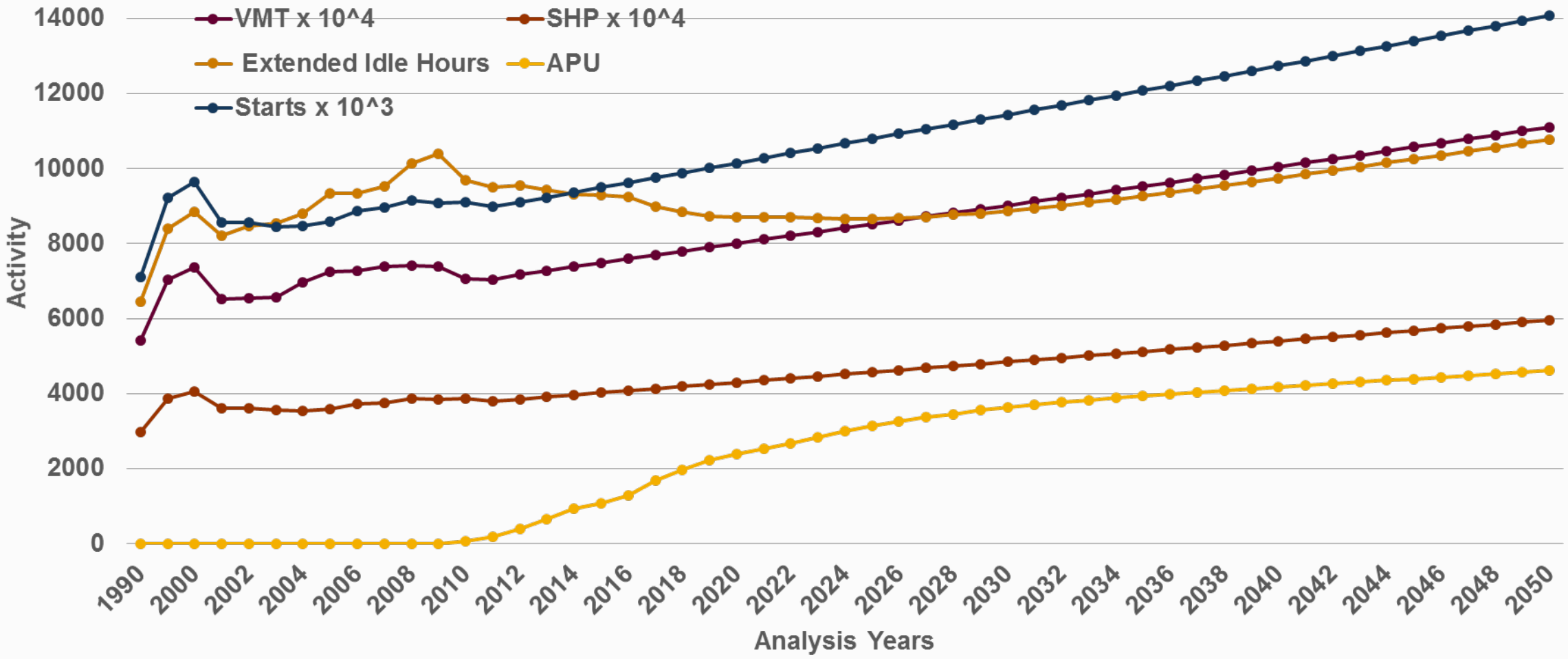
Models	Milestones	Observations
MOBILE62	Sep 2003 – Dec 2012	Fast
MOVES2010*	Mar 2010 – Dec 2012	Increase in NOx, PM2.5, CO, and Slight Decrease in VOC Emissions,
MOVES2010a	Sep 2010 – Jan 2013	Increase in Methane, and Slight Decrease in VOC and PM10 Emissions
MOVES2010b	Jan 2013 – Oct 2016	Added all Mobile Source Air Toxic (MSAT) Pollutants
MOVES2014*	May 2014 – Dec 2015	Tier-3 Rule Activity and Emission Rate Update
MOVES2014a	Dec 2015– Current	Minor Change in VOC, PM2.5 and CO2

*Conformity Grace Period

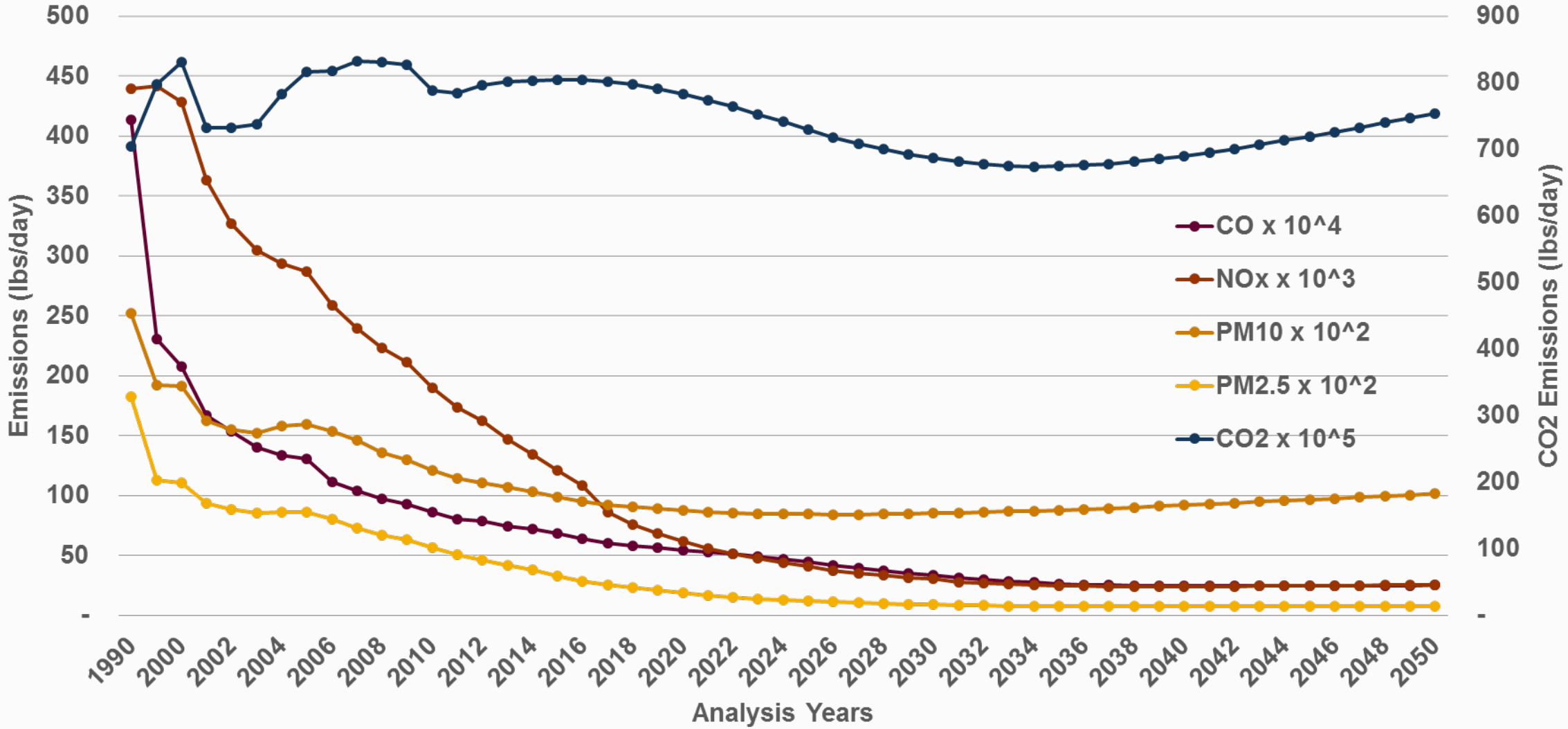
Trend Analysis: Overview

- Analysis Years 1990, 1999 through 2050
- MOVES2014-20141021 Version
- 254 Counties in Texas
- Summer Weekday and Annual Inventories

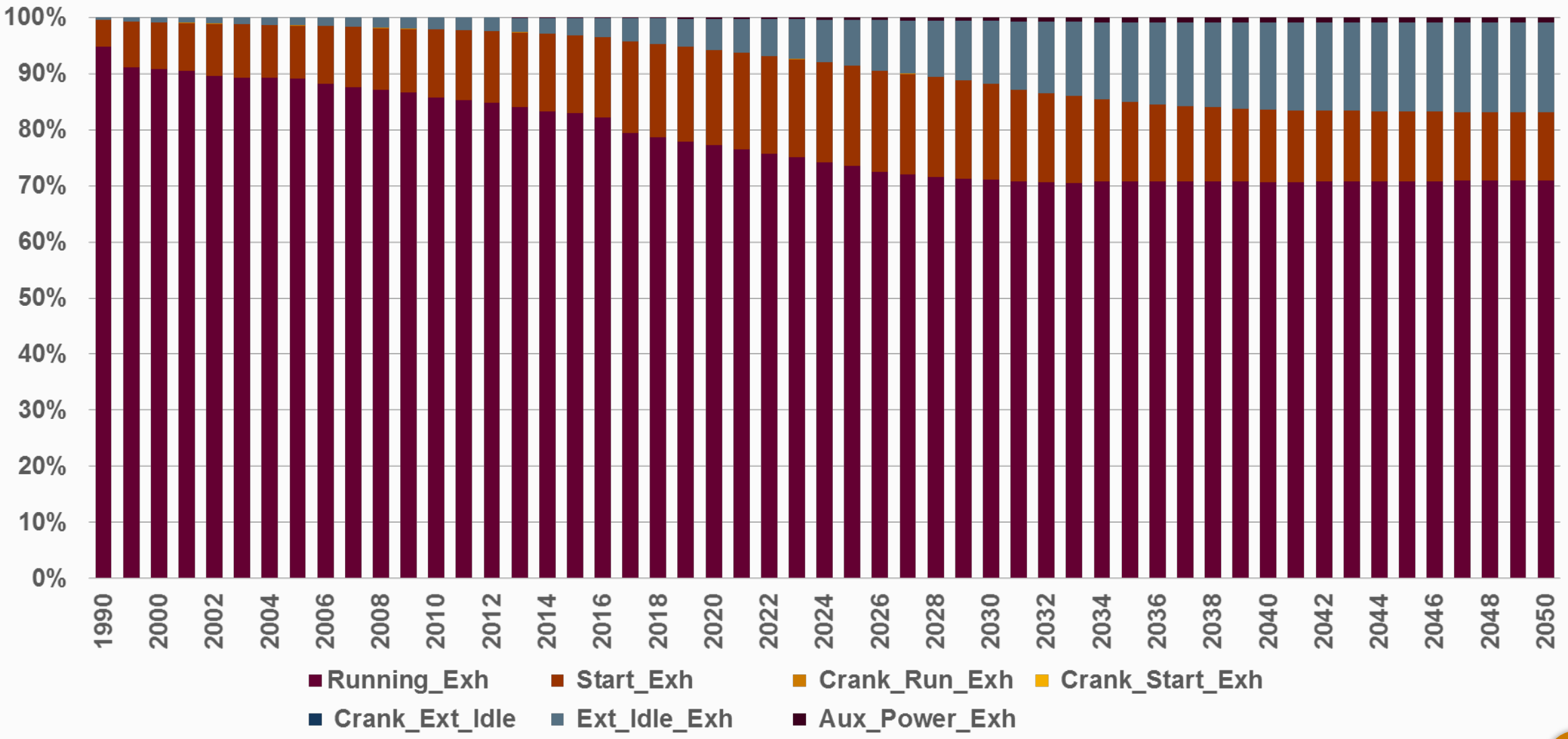
Trend Analysis : Activity



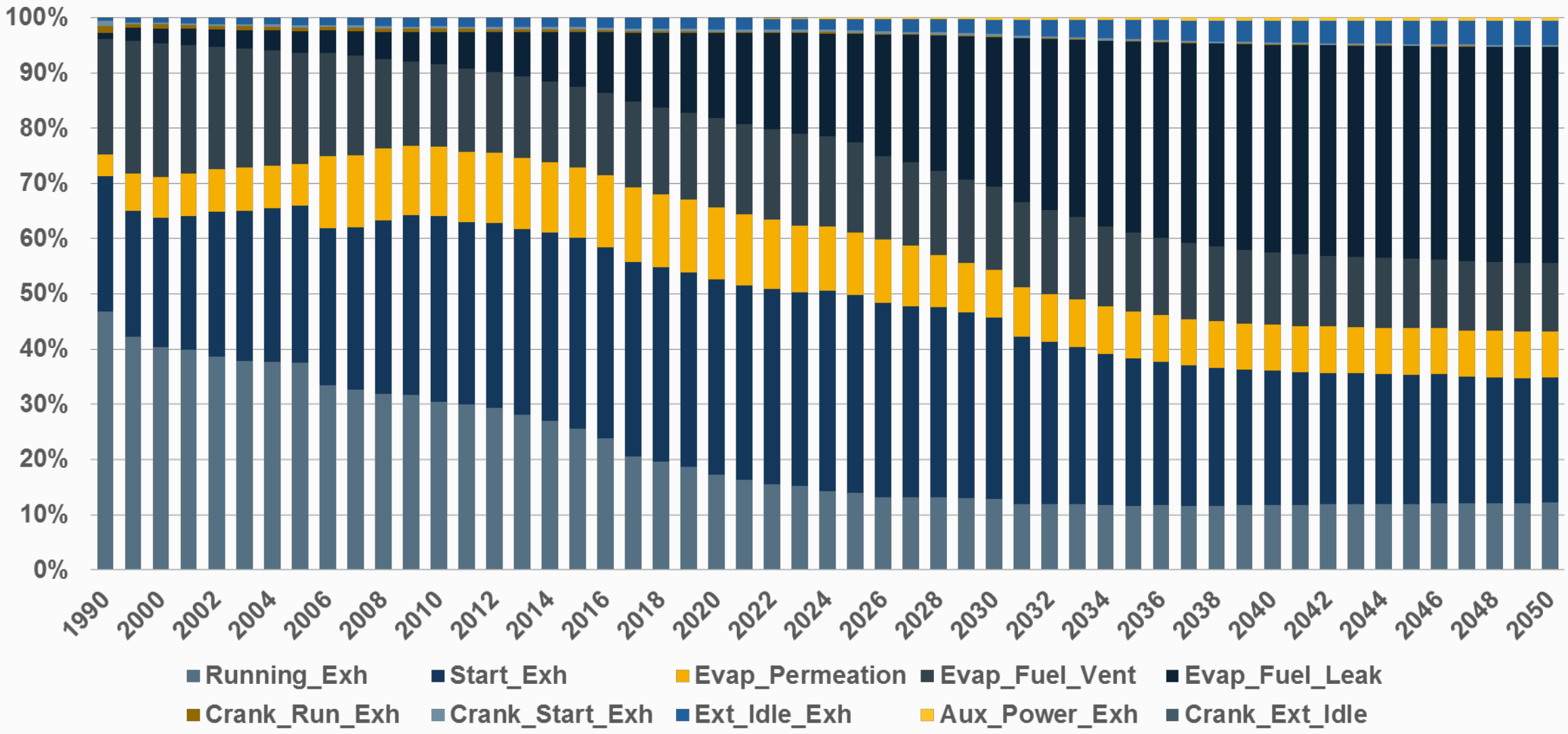
Trend Analysis : Emissions



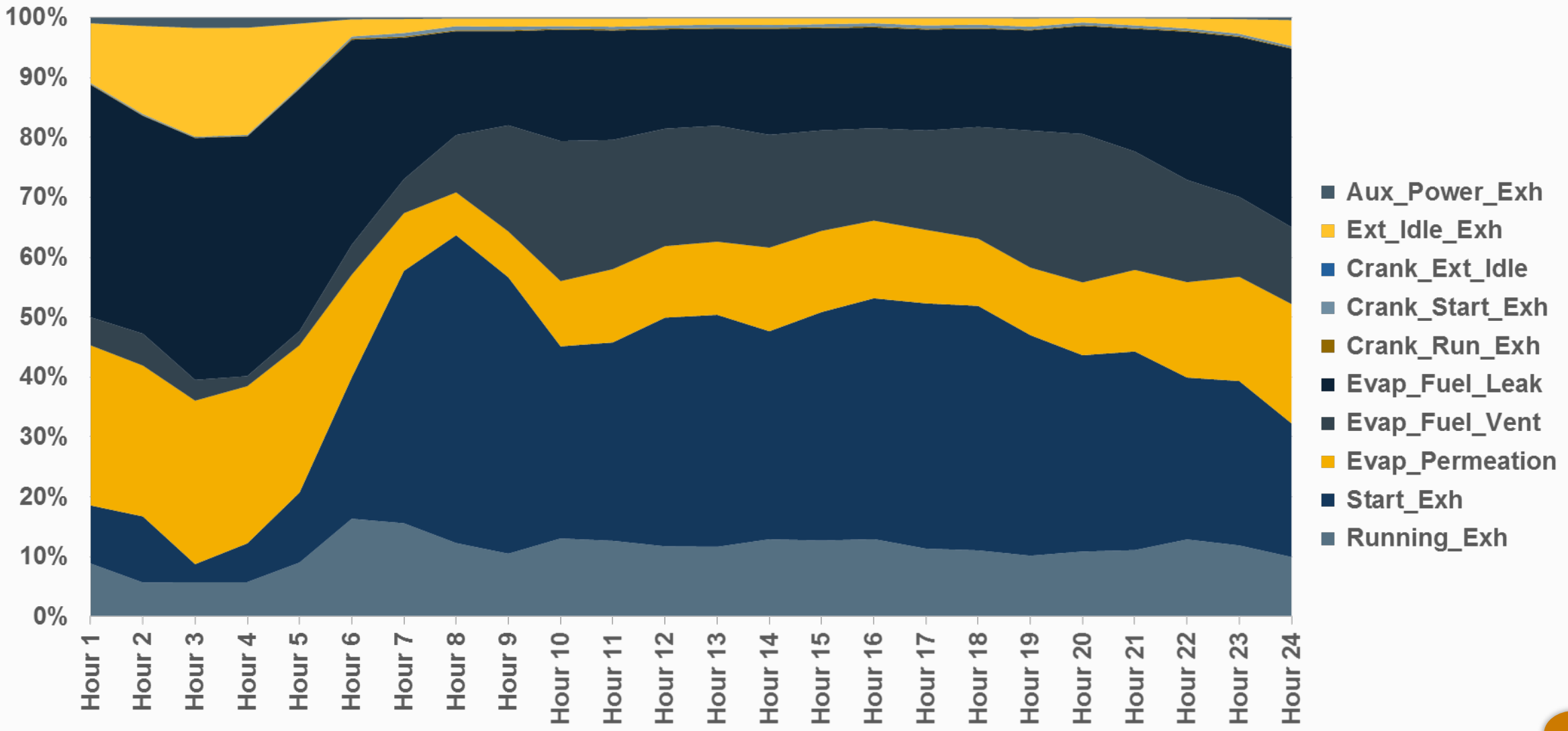
Trend Analysis: NOx Emission by Processes



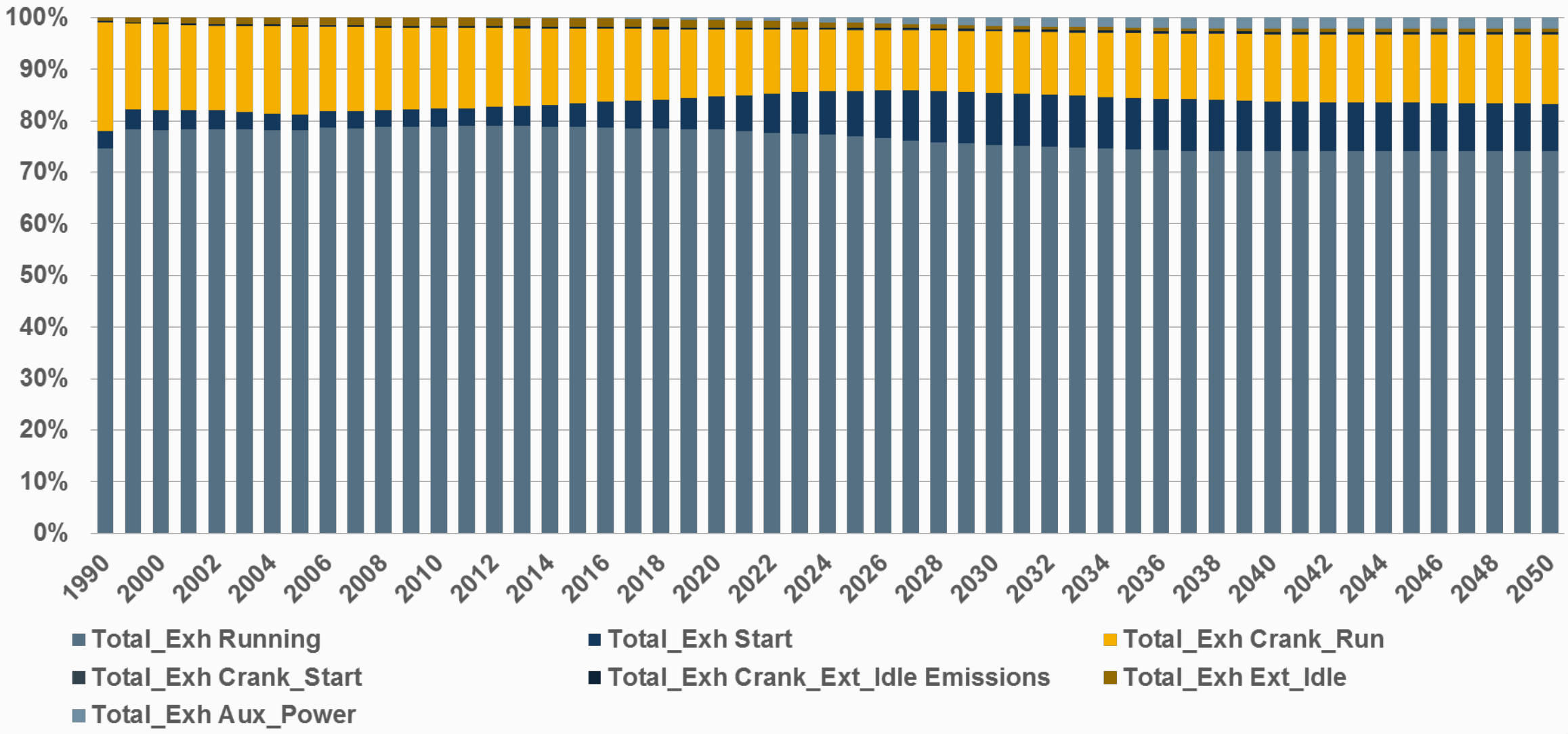
Trend Analysis: VOC Emission by Processes



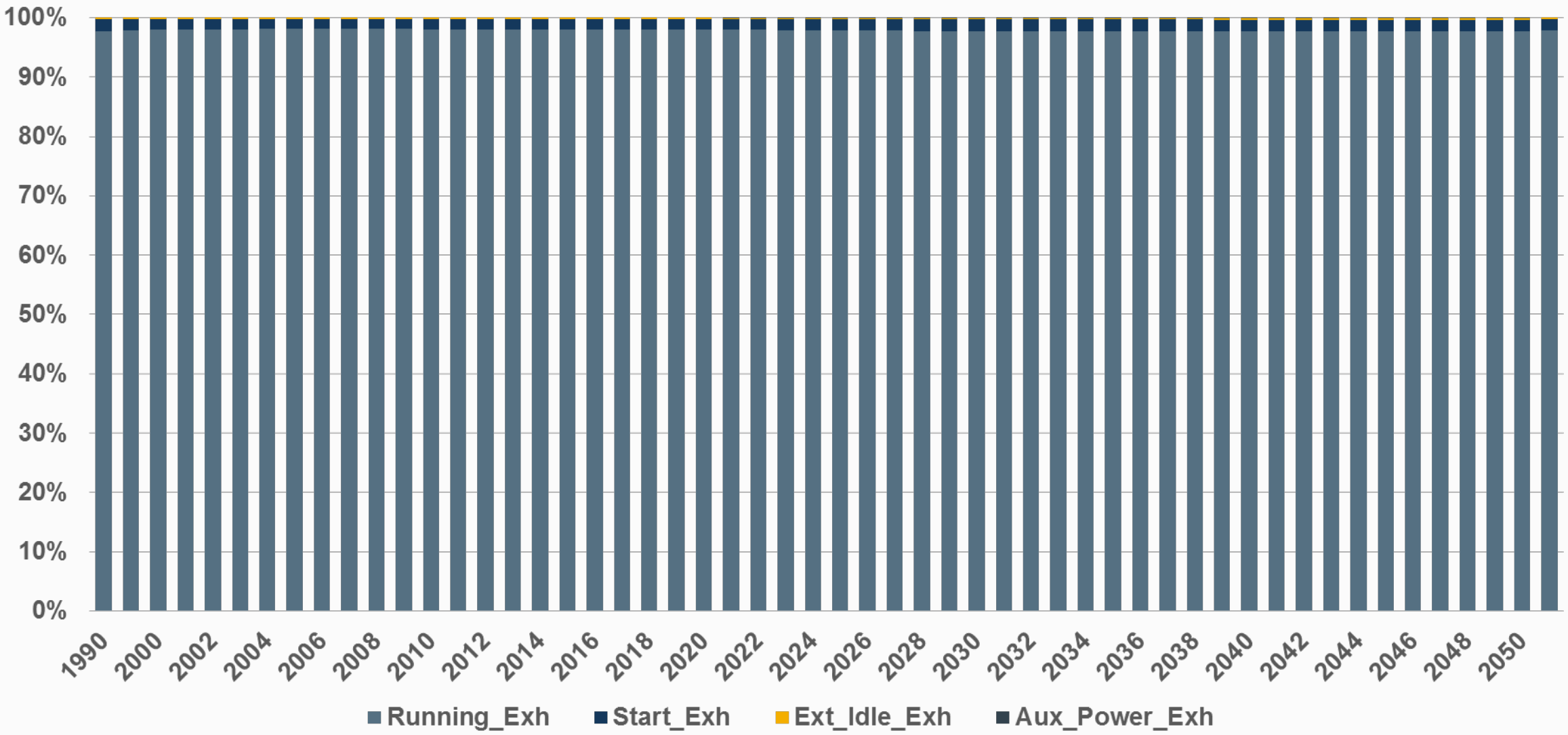
Hourly Pattern: VOC Emission by Processes



Trend Analysis: PM2.5 Emission by Processes



Trend Analysis: CO2 Emission by Processes



Trend Analysis: Summary

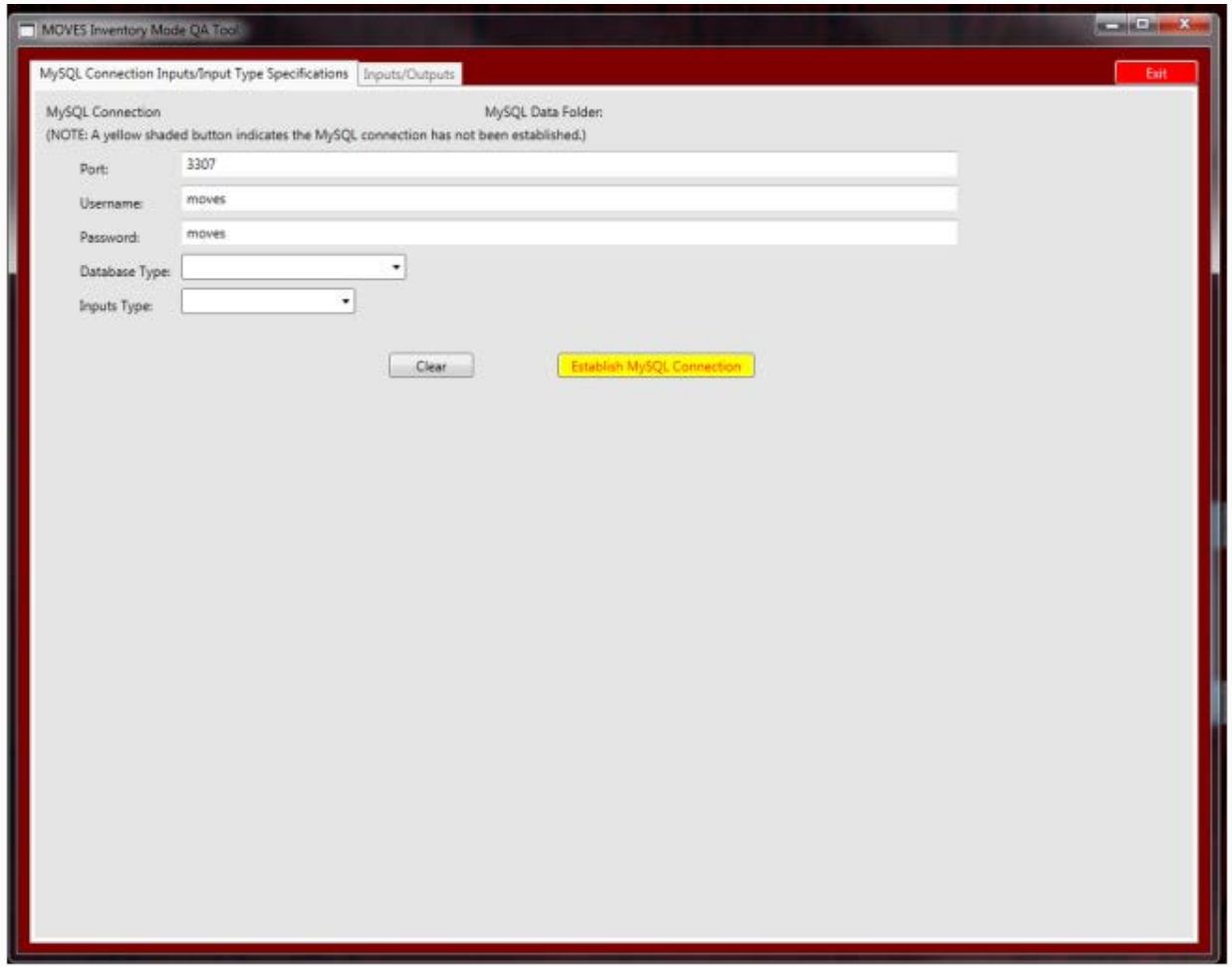
- Provides Outlook on Future Emissions
- Plan for Conformities and State Implementation Plans
- Targeted Control Strategies
- Explore Model Performance
- Contribute for Model Improvements

MOVES QA Tool: Overview

- Compatible with MOVES2014(a)
- Tool Links with MYSQL Using DOS
- Check Activity and Emissions Summary
- Review MOVES CDB and Inventory Mode Outputs
- MYSQL Script Created Based on Database Type
- Option for Creating Activity and Emissions Summary

MOVES QA Tool: Features

- QA Checks Designed for Texas Data
- 36 Tables Reviewed
- Reviewed for Incorrect
  - Input Table Format,
  - Invalid Data & Data parameters
  - Aggregation Errors



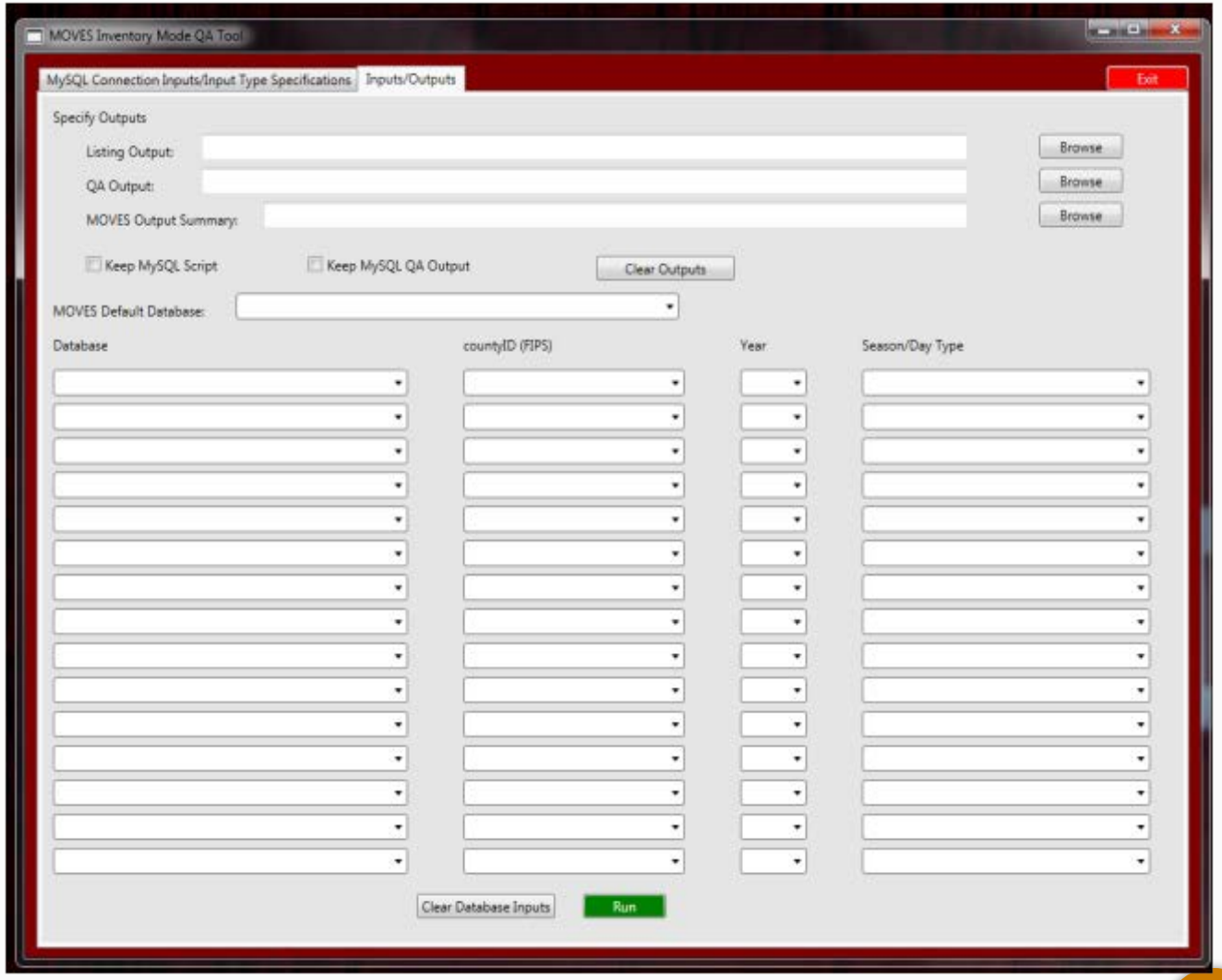
MOVES QA Tool: Operation

Checks Tables

- Moveserror
- Movesrun
- Movesactivityoutput
- Movesoutput

Flags Activity not within 5% of Movesactivityoutput

Main QA Output is Tab-Delimited Format

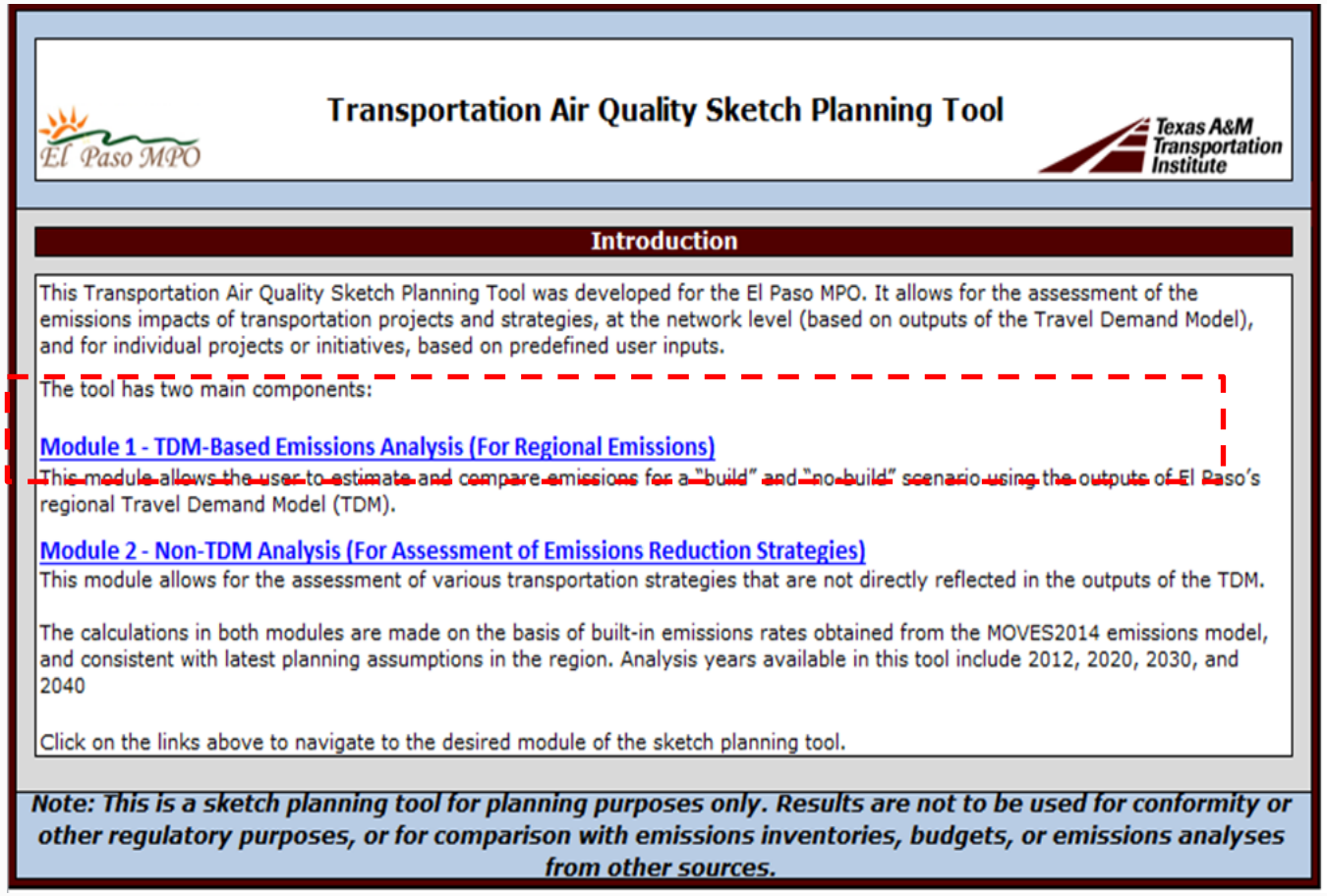


MOVES QA Tool: Summary & Next Steps

- Early Error Detection
- Saves Resources
- Next Steps
  - Inclusion of MOVES Rate Mode Output Database
  - Refinement of MOVES CDB QA Procedures
  - Can Adapted to other Regions/Counties

Sketch Planning Tool: Overview

- Emissions impacts
- Easy to Use
- Quick Results
- Visual Display
- Comparative Analysis



El Paso MPO

Transportation Air Quality Sketch Planning Tool

Texas A&M Transportation Institute

Introduction

This Transportation Air Quality Sketch Planning Tool was developed for the El Paso MPO. It allows for the assessment of the emissions impacts of transportation projects and strategies, at the network level (based on outputs of the Travel Demand Model), and for individual projects or initiatives, based on predefined user inputs.

The tool has two main components:

Module 1 - TDM-Based Emissions Analysis (For Regional Emissions)
This module allows the user to estimate and compare emissions for a "build" and "no-build" scenario using the outputs of El Paso's regional Travel Demand Model (TDM).

Module 2 - Non-TDM Analysis (For Assessment of Emissions Reduction Strategies)
This module allows for the assessment of various transportation strategies that are not directly reflected in the outputs of the TDM.

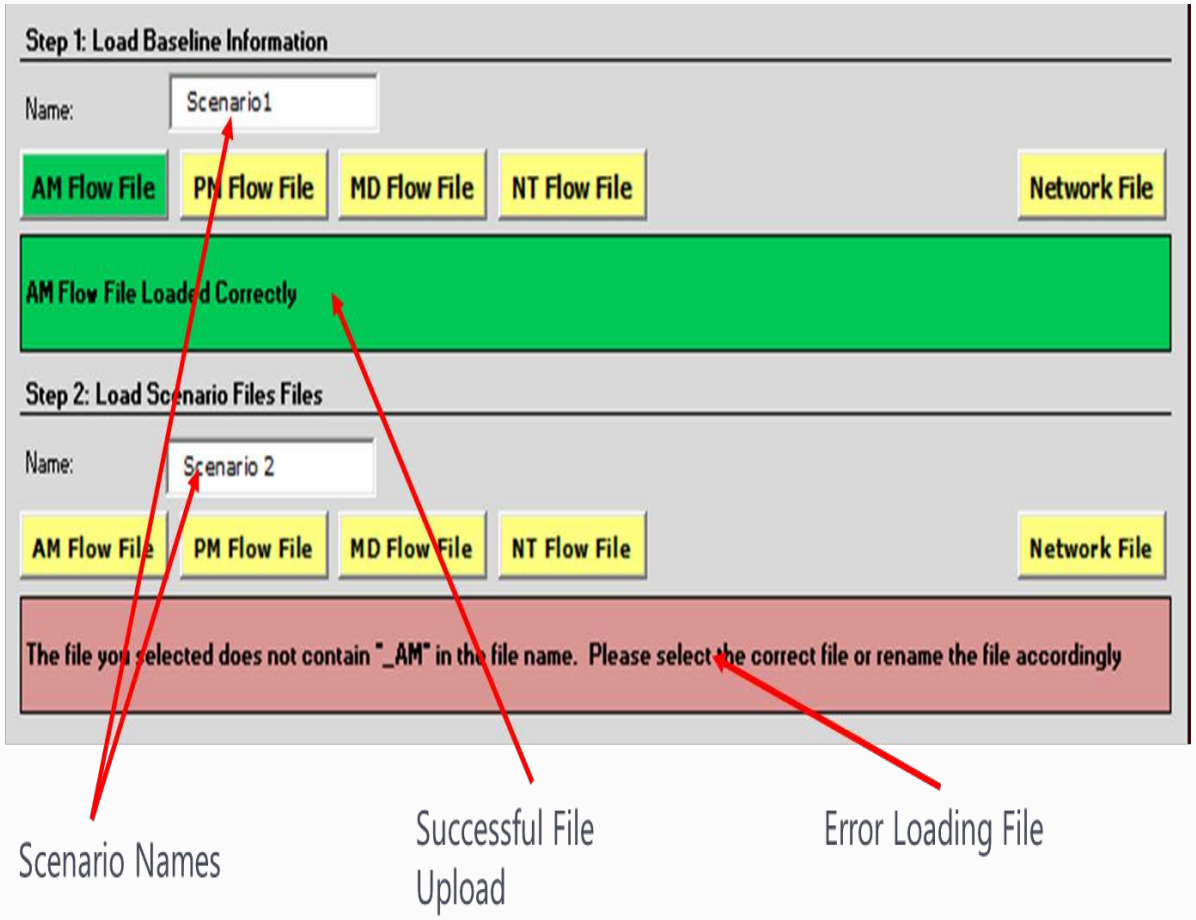
The calculations in both modules are made on the basis of built-in emissions rates obtained from the MOVES2014 emissions model, and consistent with latest planning assumptions in the region. Analysis years available in this tool include 2012, 2020, 2030, and 2040

Click on the links above to navigate to the desired module of the sketch planning tool.

Note: This is a sketch planning tool for planning purposes only. Results are not to be used for conformity or other regulatory purposes, or for comparison with emissions inventories, budgets, or emissions analyses from other sources.

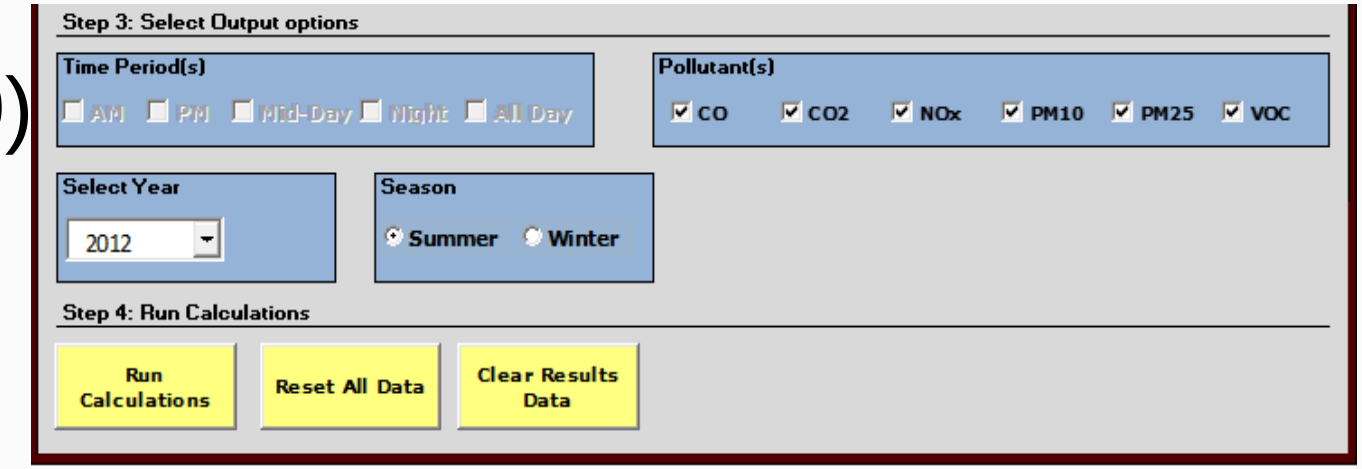
Sketch Planning Tool: Features

- Preloaded Emission Rates
- Name Scenarios
- Upload Network Files for Time Periods
- Automatically Check Files For Necessary Data And Correct Time Period



Sketch Planning Tool: Features Cont'd

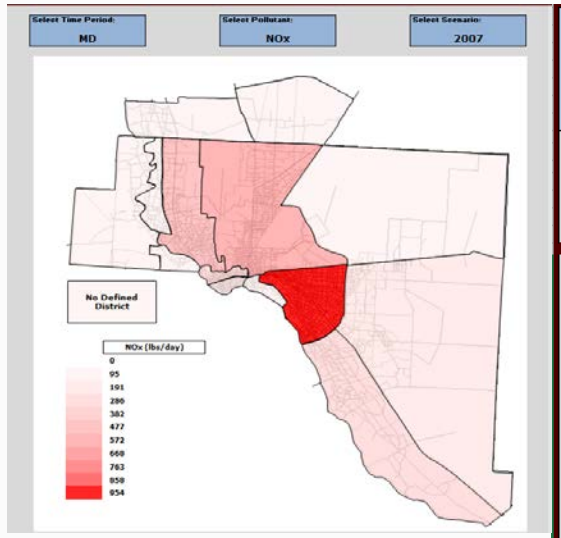
- Analysis Years (2012,2020,2030,2040)
- Pollutant(s)
- Time period(s)
- Season (Winter/Summer)

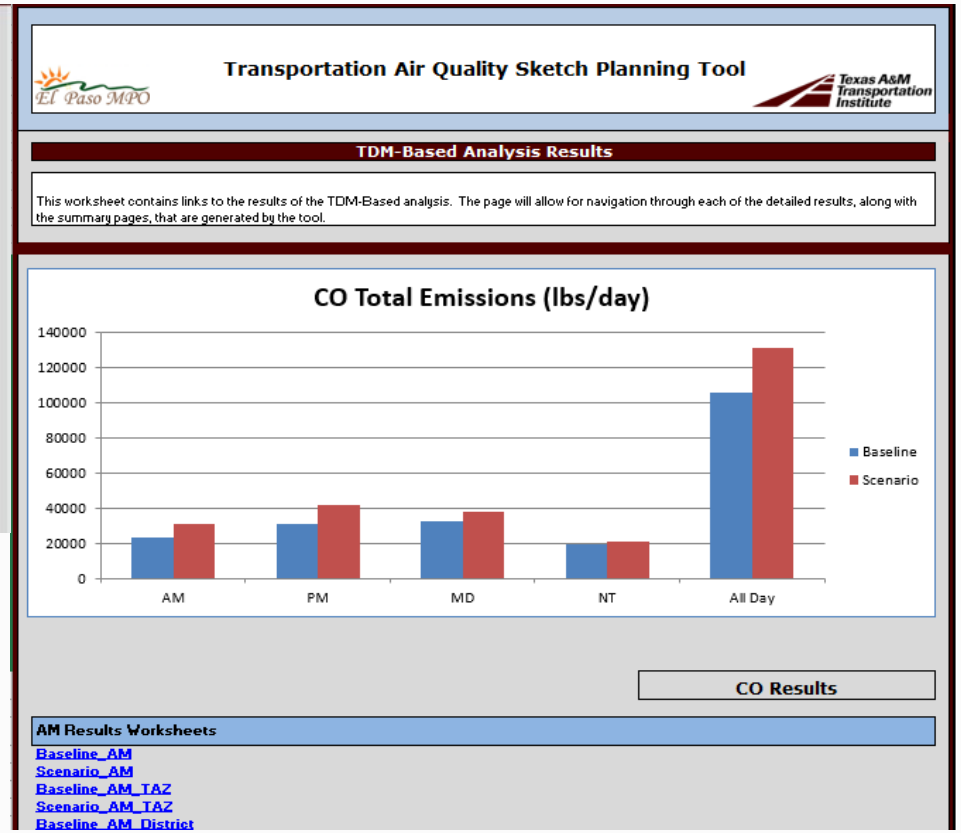


Note: Calculations may take up to 10-20 minutes

TDM-Based Module - Output

- Total Emissions Graphs by Time Period
- Interactive Map
  - Districts
  - Pollutants
  - Time Period
- Summary Results
  - District
  - TAZ
  - Time Period
  - Pollutant





Navigation menu linked to detailed results sheets, including link level results.

TTI Contacts

Madhu Venugopal

M-venugopal@tti.tamu.edu 817-462-0523

Dennis Perkinson

d-perkinson@tti.tamu.edu 979-862-4926

Reza Farzaneh

R-Farzaneh@tti.tamu.edu 512-407-1118