Documentation of 2022 base year emissions development by emission modeling platform sector

afdust (area fugitive dust):

- Paved roads: projections from 2020 to 2022 applied to 2020NEI using factors based on county total VMT trends, 2022 versus 2020. Posted numbers are fully adjusted with both meteorological and transport fractions.
- Animal dust, a.k.a. "dust kicked up by hooves": project from 2020->2022 using factors based on county and animal type based on animal count census data. Emissions held at 2020 levels for counties/animal types with zero or missing data in either 2020 or 2022. Projection factors limited to range of +/- 20%.
- Unpaved roads and all other sources in afdust (i.e., construction, agricultural tilling, mining): Held flat from 2020NEI.
- Data provided for review not adjusted for meteorology or transport fraction.

airports:

- Emissions for Top 50 commercial airports other than ATL computed by running the Aviation Environmental Design Tool (AEDT) using a method similar to the 2020 NEI process.
- Emissions for ATL airport were provided by Georgia EPD.
- All other airport emissions were projected from 2020 to 2022 using factors derived from the 2023 Terminal Area Forecast (TAF) with airport-specific values derived where available.

biogenic:

- Ran Biogenic Emissions Inventory System (BEIS) version 4, with the Biogenic Emissions Landuse Database (BELD) version 6 and year 2022 meteorology.

cmv_c1c2 (Category 1 and 2 Commercial Marine Vessels):

- Computed using 2020 NEI methods but with 2022 Automatic Identification System (AIS) data.

cmv_c3 (Category 3 Commercial Marine Vessels):

- Computed using 2020 NEI methods but with 2022 Automatic Identification System (AIS) data.

fertilizer

- Will be computed in summer 2024 using a bi-directional air quality model run with 2022 emissions.

livestock:

- Emissions for beef and dairy cattle, broilers, layers, and swine derived from the Farm Emissions Model (FEM). Includes 2022 census animal counts and input from Idaho and other animal counts from the 2022 Census of Agriculture.
- Emissions for turkeys, horses, sheep, and goats projected from 2020NEI based on factors derived from 2020 and 2022 census animal counts. Emissions were held at 2020 levels for counties/animal types with zero or missing data in either 2020 or 2022. Projection factors limited to range of +/- 20%.

nonpt (nonpoint sources not included in other sectors):

- Most emissions from 2020 NEI unless otherwise noted.

- Bulk terminals/plants and pipeline gasoline: Projected from 2020 to 2022 using nationally-based factors derived from the State Energy Data System (SEDS) from the U.S. Energy Information Administration (EIA).
- All other fuel types: Projected from 2020 to 2022 using statewide factors based on the SEDS consumption dataset (see Table 1 and *2022_nonpt_projection_SCC_xref_MSN_codes.xlsx* for more details).
- Human cremation: Projected from 2020 to 2022 using factors based on county-level death counts and statewide cremation rates.
- Projection factors limited to a range of +/- 30%

nonroad:

- MOVES4 was run for 2022.
- In California, 2020 and 2023 emissions provided by California Air Resources Board (CARB) were interpolated to 2022.

np_oilgas:

- Most emissions from a run of the 2020 NEI oil and gas tool updated with 2022 activity data.
- Abandoned wells and blowdown and pigging emissions derived separately for 2022.
- Includes some state-provided factors and emissions data.
- Activity data feedback was received from NY, UT and WY
- Colorado submitted their own nonpoint Oil and Gas inventory
    - Several edits have occurred in the last week; those edits are not included in Data Retrieval Tool at this time
    - Colorado included exploration-related sources
- Oklahoma used 2020NEI emissions for production-related sources and applied state projection factors for oil, natural gas and condensate to get to year 2022 estimated emissions
- Wyoming used 2020NEI emissions for production-related sources and applied county projection factors to get to year 2022 estimated emissions
- Pennsylvania submitted nonpoint emission for unconventional wells
    - These emissions were subtracted out of the Oil and Gas Tool emissions to generate conventional well emissions
- All states are using the Oil and Gas Tool emissions for EXPLORATION-related sources except Colorado
- Point source subtraction process was used for New Mexico and Kansas within the 2022 Oil and Gas Tool emissions

np_solvents:

- All emissions, except asphalt paving, are projected from the 2020NEI, including state-submitted emissions. Using 2021 data, a SCC-specific ratio derived and applied to 2020NEI emissions. This ensures state-submitted emissions magnitudes are preserved. For asphalt paving, 2020NEI emissions are carried forward.

onroad:

- MOVES4 was run for 2022 in rates mode to derive emission factors and SMOKE-MOVES was run for each type of activity data and emission rates to compute emissions.
- Vehicle Miles Traveled (VMT) were based on Federal Highway Administration (FHWA) VMT data for 2022, with state-submitted data incorporated where provided. (VMT state submissions: AK

CO CT DE GA KS ME MD MA MI NH NJ NY NC OR PA SC TN TX UT VA WA WV WI, and Jefferson County, KY.)

- Vehicle Population (VPOP) data were carried forward from 2020NEI, with state-submitted data used where provided. (VPOP state submissions: DE, GA, NY, WI.) Vehicles were added in some areas to resolve discrepancies between VMT and VPOP.
- STARTS data were carried forward from 2020NEI, except where the VPOP changed (either via state submissions or VMT/VPOP discrepancy resolution), in which case STARTS activity was changed in proportion to the VPOP. (e.g. where VPOP increased, STARTS was increased proportionally, and vice versa.)
- HOTELING hours were calculated from 2022 VMT using the standard hours/mile factor applied to restricted road VMT for combination long-haul trucks.
- Off-network idling (ONI) hours were computed based on the year 2022 county databases and VMT.
- In California, 2020 and 2023 emissions were interpolated to 2022 based on data provided by CARB in 2021. (California provided brand new 2022 emissions to be included in 2022v1 platform, but they were not provided in time to be included in this data review.)

ptagfire (agricultural fires):

- Use HMS detects that intersect with the USDA Crop Data Layer shapefile
- Used activity from GA, FL, ID, and WA
- Received some activity data from a few other states but determined that it would not improve the quality of the emissions dataset
- Generated emissions using a prototype Crop burn Module for Bluesky Pipeline authored by EPA-ORD

ptfire-rx (prescribed fires):

- Used python SmartFire2 software maintained at USEPA to take activity data from various federal and state agencies to generate daily acres burned at specific latitude and longitude
    - Federal activity sources included US Forest Service, Dept of Interior, National Interagency Fire Center, and ICS209
- Used US Forest Service's BlueSky Pipeline tool to generate emissions
- Flint Hills prescribed grassland burns are processed outside of Bluesky Pipeline using activity received from Kansas
    - About 2M acres burned from mid-February through April
    - Counties in eastern Kansas and Includes 4 counties in Oklahoma
- Pile burn methodology was implemented for this inventory.
- See technical memo here for more information: https://gaftp.epa.gov/Air/emismod/2022/v1/draft/fires/2022EMP_beta_version_fires_tech_memo.2024Apr12.pdf

ptfire-wild (wild fires):

- Used python SmartFire2 software maintained at USEPA to take activity data from various federal and state agencies to generate daily acres burned at specific latitude and longitude
    - Federal activity sources included US Forest Service, National Interagency Fire Center, and ICS209
- Used US Forest Service's BlueSky Pipeline tool to generate emissions

- See technical memo here for more information: https://gaftp.epa.gov/Air/emismod/2022/v1/draft/fires/2022EMP_beta_version_fires_tech_memo.2024Apr12.pdf

ptegu (Electric Generating Units):

- Based on 2022 NEI point source dataset from March 2024, with NO_x and SO_2 from Continuous Emissions Monitoring System (CEMS) data downloaded in January, 2024 inserted using the CEMConvert program for units matched to the NEI.

ptnonipm (Point sources not in other point source sectors):

- All sources except rail yards are based on the 2022 NEI point source dataset from March 2024.
- Rail yards are not yet available.

pt_oilgas (oil and gas-related point sources):

- Based on the 2022 NEI point dataset from March 2024.
- Sources in the 2022 point dataset in which emissions are from 2020 or 2021 were projected to 2022 using EIA-based state projection factors.
    - These state projection factors were applied to production-related NAICS codes in the inventory

rail:

- Line haul locomotive emissions updated from 2020 NEI based on 2023 fleet mix and 2022 fuel use data.

rwc (Residential Wood Combustion):

- 2020 NEI RWC emissions projected to 2021 using state-wide factors based on SEDS. Note that the 2022 SEDS factors for RWC were not available in time for the data review.

Table 1. Methods to Prepare 2022 Nonpoint Sector Emissions

Sector	Source Category	Task Force Identified 2020-2022 Projection Method
Solvents	Solvents	EPA to develop growth factors representing the projected change in emissions from 2020 (to 2021 for v1 and to 2022 for v2) based on implementing the 2020 NEI emissions estimation methodology. The factors are to be applied to 2020 NEI emissions to address situations where 2020 NEI emissions were supplied by state/local agencies
Fugitive Dust (note that meteorological and transport fraction adjustments are separately	Paved Roads	Apply VMT-based growth rates to 2020 NEI emissions (i.e., 2022 VMT/2020 VMT); EPA will use state-supplied 2022 state-supplied VMT data where provided
	Agricultural Production - Livestock	Apply 2022/2020 livestock counts used to estimate 2022 ammonia emissions for the Ag. Livestock category (see row 26 below)
	Unpaved Roads	Hold constant

applied in modeling process)	Construction	Hold constant
	Agricultural Production - Crops	Hold constant
	Mining and Quarrying	Hold constant
Livestock	Agricultural Livestock	2021 livestock emission estimates available now; EPA excepts to be able to develop 2022 estimates before April
Fertilizer	Agricultural Fertilizer	EPA will be newly running CMAQ/EPIC to estimate these emissions this summer (EPA needs to wait to get updated data output from an early CMAQ run)
Residential Wood	All subcategories	Apply EIA State Energy Data System residential wood consumption ratios (2021 SEDS currently available; 2022 available in May-perhaps update to 2022 SEDS for v2?)
All Other Nonpoint	All Other Nonpoint Source Fuel Combustion	Apply EIA State Energy Data System energy consumption ratios (2021 SEDS available for all fuels; 2022 data available for some fuels; perhaps update to 2022 SEDS for v2?)
	Stage 1 Gasoline Unloading at Service Stations	Apply EIA State Energy Data System Transportation Sector/Motor Gasoline consumption ratios
	Stage 1 Gasoline Unloading at Bulk Terminals/Plants	Apply EIA State Energy Data System Total Motor Gasoline consumption ratios
	Aviation Gasoline Stage I and II	Apply EIA State Energy Data System Aviation Gasoline consumption ratios
	Pipeline Gasoline	Apply EIA State Energy Data System Total Motor Gasoline consumption ratios
	Human Cremation	Estimate 2022 county-level number of cremations from 2022 actual county-level deaths from CDC's Wonder Database and 2022 state-level (projected) cremation rates from National Funeral Directors Association's "Cremation and Burial Report" and apply 2022/2020 county-level cremation ratios to 2020 NEI cremation emissions
	Commercial Cooking	Hold constant
	Portable Fuel Containers	Hold constant
	Asphalt Paving	Hold constant
	Open Burning	Hold constant
	Landfills/POTWs	Hold constant
	Charcoal Grilling	Hold constant