

TSD-4

**Future Year Emissions Inventory for
Regional and Urban Modeling over the OTR**

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Following the designation of an area as non-attainment for the criteria pollutant Ozone, the Clean Air Act requires submission of an implementation plan, commonly referred to as State Implementation Plan (SIP), demonstrating as to how that area will be meeting the NAAQS in the time period established by the Act. Several areas of the OTR were designated as being in nonattainment for 8-hr ozone (see <http://www.epa.gov/ozonedesignations/>) with a maximum attainment date of June 2009 and June 2010. However, given that ozone precursors also contribute to PM_{2.5} and other logistics, it was recommended and agreed by the member states that the future year for demonstrating attainment would be 2009. Therefore the OTR states initiated the development of emissions inventories reflecting growth and control from 2002 to 2009 as well as for 2012 and 2018. The 2018 inventory was in response to the need for submission of regional haze SIP, and the 2012 as a next step in the event that attainment for ozone was not feasible in 2009.

Future year emissions inventories within the OTR

The OTR states through MANE-VU contracted MACTEC Federal Programs (called Contractor) develop the 2009, 2012 and 2018 inventories based upon 2002 inventories that the states had previously developed for use in the base year model work. The Contractor in consultation with the states developed the necessary growth and control factors and applied to the 2002 inventory. It should be noted that emissions for mobile sources and the electric energy generating units (EGUs) was not part of the Contractor's effort. The states provided VADEQ and NESCAUM appropriate MOBILE 6 input files along with the projected VMTs, which coupled with the hourly gridded temperature information was used to generate mobile source emissions. As for the emissions from the EGU sector, the inter-RPO work group utilized the Integrated Planning Model (IPM) to develop the state and unit-level emissions. Details on these topics can be found in MACTEC (2007) for non-EGU sectors and in ICF (2005a, 2005b) for the EGU sector. These inventories are identified as 2009 on the way (2009OTW), since they reflect all emission control measures that were promulgated or would become effective on or before 2009.

In addition to these OTW inventories, states have also requested the development of what is termed as beyond on the way (BOTW) inventories for 2009, 2012, and 2018. These inventories are to be based on additional OTC model rules, which would result in reduction in emissions from specific source categories. Details on the development of these controls and the corresponding inventories can be found in MACTEC (2007).

Future year emission inventories outside the OTR

MANE-VU obtained inventories for 2009OTW and 2018OTW as part of the inter-RPO workgroup. However, only MRPO provided emissions for 2012OTW. For the VISTAS region, 2012 emissions were obtained by interpolating area, nonroad, and non-EGU emissions between 2009 and 2018. For mobile sources, VMT were interpolated between

2009 and 2018 and the 2012 emissions were calculated with MOBILE6 using these interpolated VMT and 2012 emission factors. For the CENRAP region, no 2012 emissions were generated, and therefore the 2009 emissions were used in the 2012 CMAQ simulation.

Canadian Emissions

In the case of Canadian emissions, 2010 and 2020 area, non-road, and mobile source emissions were obtained from USEPA

(ftp://ftp.epa.gov/EmisInventory/canada_2000inventory/).

Primary PM_{2.5} and PM₁₀ emissions for the SCCs listed in http://www.epa.gov/ttn/chief/emch/invent/tf_scc_list2002nei_v2.xls were divided by a factor of 4 to account for the fugitive dust transport fraction correction. EGU point source emissions for 2010 and 2020 were obtained from Environment Canada (Bloomer, 2006), while non-EGU point source emissions were assumed to be the same as those developed for 2002 and described elsewhere (see TSD-1c). The 2010 inventories were used in preparing CMAQ input files for the 2009OTW, 2009BOTW, and 2012BOTW scenarios.

Emissions processing – Application of SMOKE

The 2009OTW, 2009BOTW, and 2012 BOTW inventories were processed by VADEQ and NYSDEC using a template similar to that was used for processing 2002 base year emissions (see TSD-1d, TSD-1j) for the 12 km domain. In particular, all gridding and speciation profiles and cross-reference files as well as all temporal allocation profiles and cross-reference files used in the 2002 processing were also used for future year processing. For each day, the following files were prepared:

2009OTW:

- MANE-VU
 - o 2009 OTW V3 area source (VADEQ)
 - o 2009 V3 nonroad source (VADEQ)
 - o 2009 mobile source (NYSDEC)
 - o 2009 OTW V3 non-EGU point source (VADEQ)
 - o 2009 IPM2.1.9. EGU point source (VADEQ)
 - o 2009 EGU point source, IPM2.1.9. non-fossil fuel units (VADEQ)
- VISTAS
 - o 2009 BaseG area source (VADEQ)
 - o 2009 BaseG nonroad source (VADEQ)
 - o 2009 BaseG non-EGU point source (VADEQ)
 - o 2009 IPM2.1.9. EGU point source (incl. post-IPM adjustments) (VADEQ)
 - o 2009 BaseG low-level fires (VADEQ)
 - o 2009 BaseG elevated source fires (VADEQ)
- MRPO
 - o 2009 BaseK area source (NYSDEC)
 - o 2009 BaseK area source NH3/dust (NYSDEC)

- o 2009 BaseK nonroad source (NYSDEC)
 - o 2009 non-EGU point source (VADEQ)
 - o 2009 IPM2.1.9. EGU point source (incl. post-IPM adjustments) (VADEQ)
- CENRAP
 - o 2009 BaseB area source (VADEQ)
 - o 2009 BaseB nonroad source (VADEQ)
 - o 2009 non-EGU point source (VADEQ)
 - o 2009 IPM2.1.9. EGU point source (VADEQ)
- VISTAS/MRPO/CENRAP (“non-MANE-VU RPOs”)
 - o 2009 mobile sources for all non-MANE-VU RPOs as implemented in VISTAS 2009 BaseG processing (VADEQ)
- Canada
 - o 2010 area sources (NYSDEC)
 - o 2010 nonroad sources (NYSDEC)
 - o 2010 mobile sources (NYSDEC)
 - o point sources (2002 non-EGU point sources; 2010 EGU point sources from IPM) (NYSDEC)
- Biogenics
 - o Same as for 2002 base case, calculated with hourly MM5 meteorological fields for 2002 (NYSDEC)

2009 BOTW:

As above for 2009 OTW, with the following two exceptions:

- MANE-VU
 - o 2009 BOTW V3 area source (NYSDEC)
 - o 2009 BOTW V3 non-EGU point source (NYSDEC)

2012 BOTW:

- MANE-VU
 - o 2012 OTW V3 area source (NYSDEC)
 - o 2012 V3 nonroad source (NYSDEC)
 - o 2012 mobile source (NYSDEC)
 - o 2012 OTW V3 non-EGU point source (NYSDEC)
 - o 2012 IPM2.1.9. EGU point source (NYSDEC)
 - o 2009 EGU point source, IPM2.1.9. non-fossil fuel units (VADEQ)
- VISTAS
 - o 2012 BaseG area source (interpolated between 2009 BaseG and 2018 BaseG) (NYSDEC)
 - o 2012 BaseG nonroad source (interpolated between 2009 BaseG and 2018 BaseG) (NYSDEC)
 - o 2012 BaseG mobile source (interpolated VMT between 2009 BaseG and 2018 BaseG) (NYSDEC)

- o 2012 BaseG non-EGU point source (interpolated between 2009 BaseG and 2018 BaseG) (NYSDEC)
 - o 2012 IPM2.1.9. EGU point source (incl. post-IPM adjustments) (NYSDEC)
 - o 2009 BaseG low-level fires (VADEQ)
 - o 2009 BaseG elevated source fires (VADEQ)
- MRPO
 - o 2012 BaseK area source (NYSDEC)
 - o 2012 BaseK area source NH3/dust (NYSDEC)
 - o 2012 BaseK nonroad source (NYSDEC)
 - o 2012 BaseK nonroad source (NYSDEC)
 - o 2012 non-EGU point source (NYSDEC)
 - o 2012 IPM2.1.9. EGU point source (incl. post-IPM adjustments) (NYSDEC)
- CENRAP
 - o 2009 BaseB area source (VADEQ)
 - o 2009 BaseB nonroad source (VADEQ)
 - o 2009 mobile source (based on VISTAS 2009 BaseG processing) (NYSDEC)
 - o 2009 non-EGU point source (VADEQ)
 - o 2009 IPM2.1.9. EGU point source (VADEQ)
- Canada
 - o 2010 area sources (NYSDEC)
 - o 2010 nonroad sources (NYSDEC)
 - o 2010 mobile sources (NYSDEC)
 - o point sources (2002 non-EGU point sources; 2010 EGU point sources from IPM) (NYSDEC)
- Biogenics
 - o Same as for 2002 base case, calculated with hourly MM5 meteorological fields for 2002

References

ICF (2005a) IPM documentation for VISTAS IPM run –e-mail and other communications. Gopal Sistla (gsistla@dec.state.ny.us)

ICF (2005b) Future Year Electricity Generating Sector Emission Inventory Development Using the Integrated Planning Model (IPM[®]) in Support of Fine Particulate Mass and Visibility Modeling in the VISTAS and Midwest RPO Regions (Final Report) Prepared by ICF Resources, L.L.C., 9300 Lee Highway, Fairfax, VA.

MACTEC (2007) Development of Emission Projection for 2009, 2012, and 2018 for nonEGU point, area, and nonroad sources in the MANE-VU region.
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TSD-1c (2006) Emissions Processing for 2002 OTC Regional and Urban 12km Base year simulation

TSD-1d (2006) 8-h Ozone Modeling using the SMOKE/CMAQ system

TSD-1j (2007) Emission processing for OTC 2009 OTW/OB 12km CMAQ Simulations