



Clean Air

Support climate policy with sound science and technical expertise

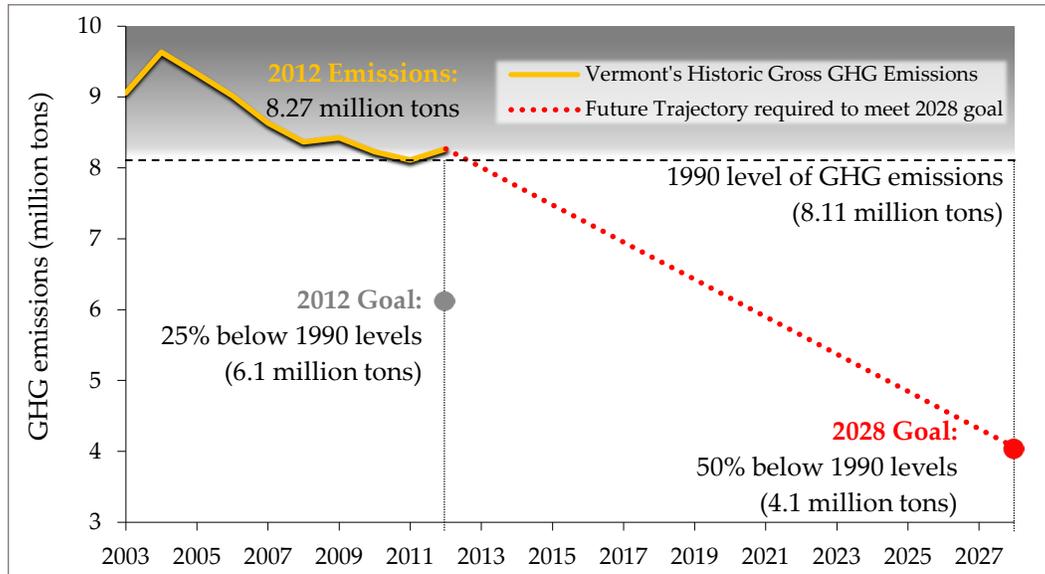
Quantifying tons of greenhouse gases emitted in Vermont

PERFORMANCE TREND

50%

reduction in GHG emissions statewide required to meet the statutory target by 2028

Vermont greenhouse gas emissions inventory, 2003-2012



NEXT STEPS

To meet Vermont's GHG reduction goals, Vermont state government, businesses, communities and individuals must continue to develop and implement effective policies and actions to reduce annual GHG emissions by increasing energy efficiency, conservation, and renewable energy sources.

The Air Quality and Climate Division will continue to publish GHG emissions inventory updates on an annual basis to track progress and inform climate policy.

ANR provides Vermonters with science and technical information on climate change through a number of channels:

- Climate Dashboard (expected spring 2016)
- Climate Connections newsletter
- @vtclimatechange on Twitter

DATA ANALYSIS

This performance measure tracks Vermont's progress in meeting the state's greenhouse gas reduction goals. Emissions from most sectors declined slightly or remained nearly constant between 2010 and 2012, however emissions from the electricity sector have been rising in the past few years despite effective energy efficiency programs and an increase in in-state renewable energy generation. This has been caused by a marked decrease in reliance on nuclear generation, an increased reliance on higher GHG-emitting regional market power in Vermont's contracted electricity mix, and ongoing sales of Renewable Energy Certificates (RECs) to entities outside of Vermont.

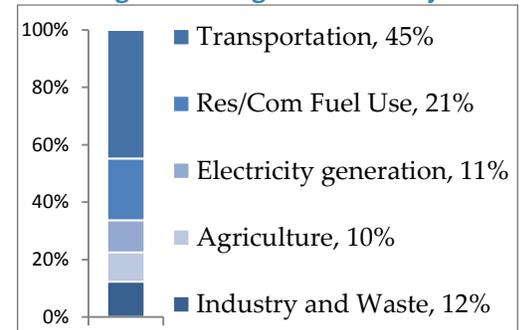
Vermont did not achieve its 2012 goal of reducing greenhouse gas emissions to 25% below 1990 levels. Vermont now must focus its attention on the

next goal on the horizon of reducing GHG emissions 50% below 1990 levels by 2028 as set forth by state statute.

This will require a substantial, but not impossible, effort by Vermont State Government and all Vermonters. As illustrated above, the average rate of decline from 2004 through 2008 was somewhat steeper than what will be required in the future to meet the 2028 goal.

The Vermont Greenhouse Gas Emissions Inventory is released on an annual basis, with a delay of three years from the year that emissions are being calculated. This is due to the staggered availability of multiple data sources at state and federal levels, from which this report is compiled. The emissions inventory for 2013 will be available in late winter of 2016.

Vermont greenhouse gas emissions by sector



DATA SOURCE: Air Quality and Climate Division Greenhouse Gas Emissions Inventory Update 1990-2012

PREPARED BY: Air Quality and Climate Division; (802)-828-1288



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Reduce mobile source air pollution

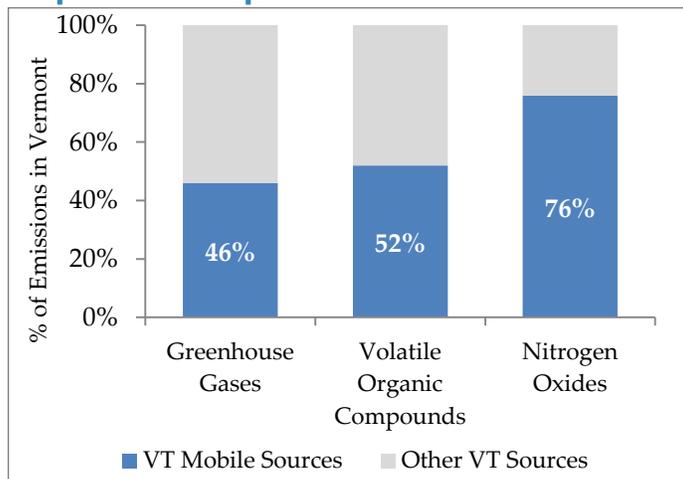
Increasing electric vehicles in Vermont will reduce air pollution emissions

76%

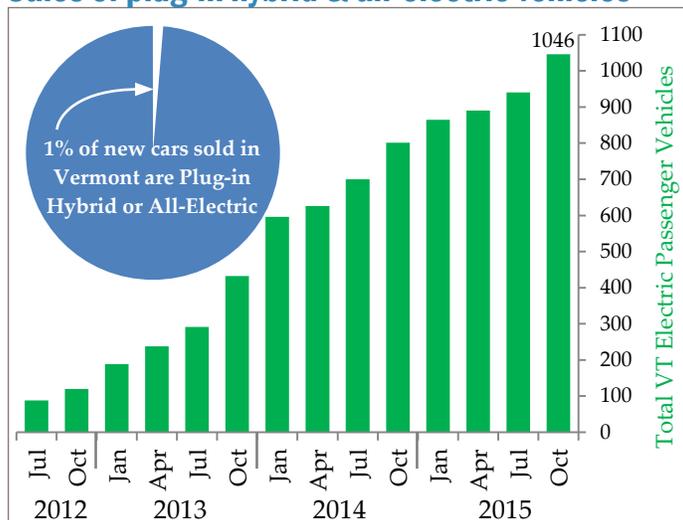
of NO_x emissions in Vermont are from mobile sources

PERFORMANCE TREND

Proportion of air pollutants from mobile sources



Sales of plug-in hybrid & all-electric vehicles



DATA ANALYSIS

In Vermont, mobile sources (i.e. vehicles, engines, and equipment) are the largest source of many air pollutants, including greenhouse gases and the ozone-forming volatile organic compounds (VOCs) and nitrogen oxides (NO_x).

Over the last thirty years, the number of cars and trucks registered in Vermont has increased by nearly 60%, while the number of vehicle miles traveled (VMT) each year in Vermont has nearly doubled.

Cleaner conventional

vehicles and alternatively fueled vehicles such as plug-in hybrid and all-electric vehicles are necessary to help offset increases in vehicle population and VMT.

While the continuous growth rate of new electric vehicles registered in Vermont is encouraging, these vehicles are still only a very small fraction of the total new vehicles registered. In order to improve air quality and meet our greenhouse gas emission reduction goals, plug-in hybrid and all-electric vehicles will need to be a much larger fraction of total new vehicles registered in Vermont.

At the same time, efforts to reduce air pollution from conventional vehicles must continue. These include continued adoption of California vehicle emissions standards, inspection and maintenance of vehicle emission control systems, and enhancement of emissions control technology upgrade programs for diesel engines.

NEXT STEPS

- Implement VT's Zero Emission Vehicle (ZEV) Action Plan which identifies actions to expand the ZEV market in VT, and continue to participate in Multi-State ZEV Action Plan.
- Continue adoption of California vehicle emissions standards, including ZEV requirements.
- Continue and enhance VT's vehicle emissions inspection and maintenance program to maximize benefits from investments in emissions control technology.
- Continue to reduce diesel emissions through technical support and funding for vehicle and equipment replacement, and installation of idling reduction technologies.
- Continue providing information and training to VT automotive technicians to ensure effective maintenance and repair of vehicle emission control systems.

DATA SOURCE: VT submission to US EPA 2011 National Emissions Inventory
VT Department of Motor Vehicles Motor Vehicle Registrations

PREPARED BY: Air Quality and Climate Division, (802) 828-1288



Clean Air

Reduce Public Exposure to Industrial Air Pollution

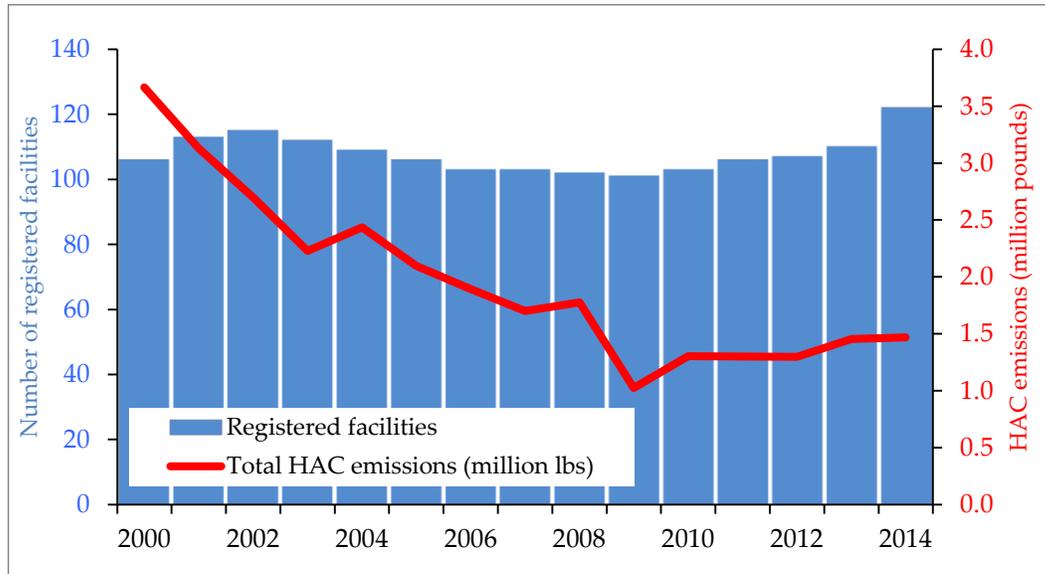
Regulating toxic air pollution emissions from stationary sources

60%

reduction in Hazardous
Air Contaminant
emissions since 2000

PERFORMANCE TREND

Hazardous Air Contaminant emissions and number of stationary sources



DATA ANALYSIS

The Air Quality and Climate Division (AQCD) regulates industrial stationary sources of air pollution through permits, inspections, regulations, and registration of actual emissions. These programs have effectively helped reduce toxic Hazardous Air Contaminant (HAC) emissions (e.g. benzene, mercury, formaldehyde, and others) from these sources over time. These emissions have been reduced by 60 percent since the year 2000, even while the number of stationary sources has remained relatively constant. As emissions decrease, further reductions become more difficult and require expanded efforts with smaller and smaller sources.

In 2015, the Air Program issued 23 permits for new or modifying stationary sources, issued 16 operating permits for existing sources, issued 20 permits for open burning, conducted 64 inspections, reviewed 20 excess emission reports, oversaw 25 stack emission compliance tests, responded to 38 public complaints, and referred 5 cases for formal prosecution.

The number of HAC-emitting facilities is notably up from 2013. This is due to the fact that 'CowPower' digesters were added to our registration roster. While often considered a renewable source of energy, they still have notable combustion emissions of sulfur dioxide and formaldehyde that are required to be registered.

NEXT STEPS

- Continue permitting of new and modifying sources to ensure they are as clean as possible.
- Continue permitting of existing sources to ensure emission reductions are achieved when reasonable and necessary.
- Continue inspections and compliance testing and outreach to ensure facilities operate properly and in compliance.
- Continue registration of facility actual emissions to identify emission sources and reduction opportunities.
- Revise the emission registration fee structure to reflect current science of relative toxicity and provide incentive to further reduce emissions.
- Expand outreach to source categories that cumulatively contribute significant emissions.



Clean Air

Achieve and Maintain Healthy Air Quality

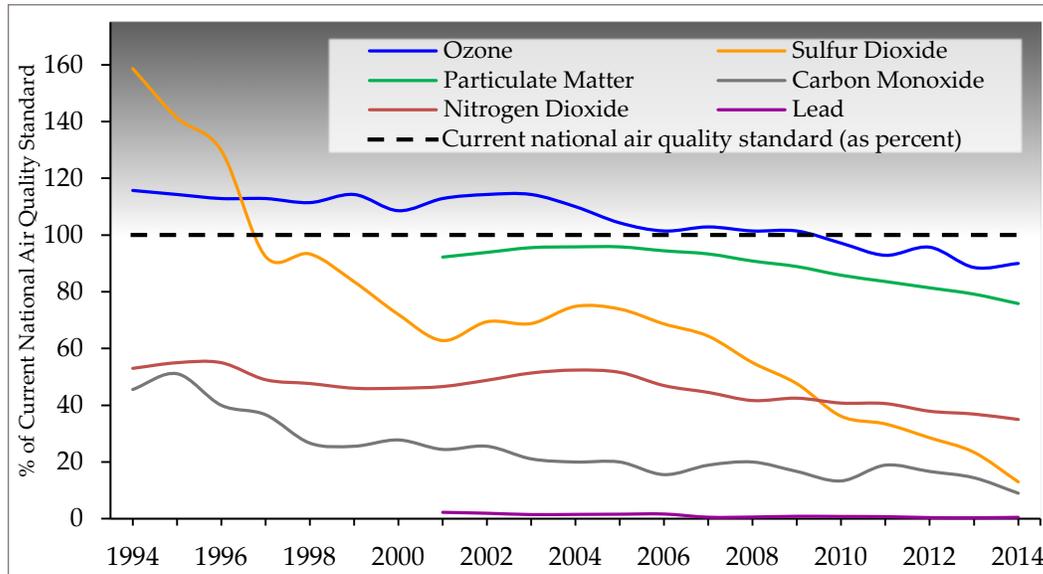
Monitoring Vermont's air pollutant concentrations

53%

of particulate matter emissions (PM_{2.5}) in Vermont come from residential wood burning

PERFORMANCE TREND

Ambient air quality trends for Criteria Air Pollutants in Vermont



DATA ANALYSIS

Vermonters' health, welfare and environment are affected by exposures to many different pollutants present in our air that result from a combination of local and out-of-state sources. The US EPA sets and periodically revises National Ambient Air Quality Standards (NAAQS) for six of the most common air pollutants: ozone, particulate matter, sulfur dioxide, carbon monoxide, nitrogen dioxide, and lead.

Monitored concentrations of these common air pollutants in Vermont's ambient air provide direct performance measures of the effectiveness of the integrated efforts of the entire Air Quality and Climate Division (AQCD) program to reduce air pollution emissions, in

combination with parallel efforts from upwind states and national programs in the US and Canada.

Concentrations of the pollutants plotted above are based on the highest concentrations measured in Vermont, and are expressed as percentages of the current health standards for each pollutant (National Ambient Air Quality Standards). All six pollutants have been declining over time, and are currently achieving the levels of current health standards (the dashed line). Ozone and particulate matter are the pollutants that come closest to exceeding standards. Continued reductions of these pollutants will be needed to meet future, more stringent, standards.

NEXT STEPS

- Vermont's ground level ozone concentrations are heavily influenced by transport from upwind states, and active participation in regional organizations like the multi-state Ozone Transport Commission is essential to achieve future progress.
- Vermont's in-state contributions to ozone come primarily from mobile sources. These emissions will also need to be reduced to assure the health of future generations.
- Vermont's particulate matter pollution is heavily influenced by interstate transport in the summer, and will benefit from regional programs like EPA's Cross State Air Pollution Rule.
- Vermont's winter particulate levels are often dominated by local emissions, especially in mountain valley towns where reductions from local sources like wood stoves will be needed to meet more protective future standards.