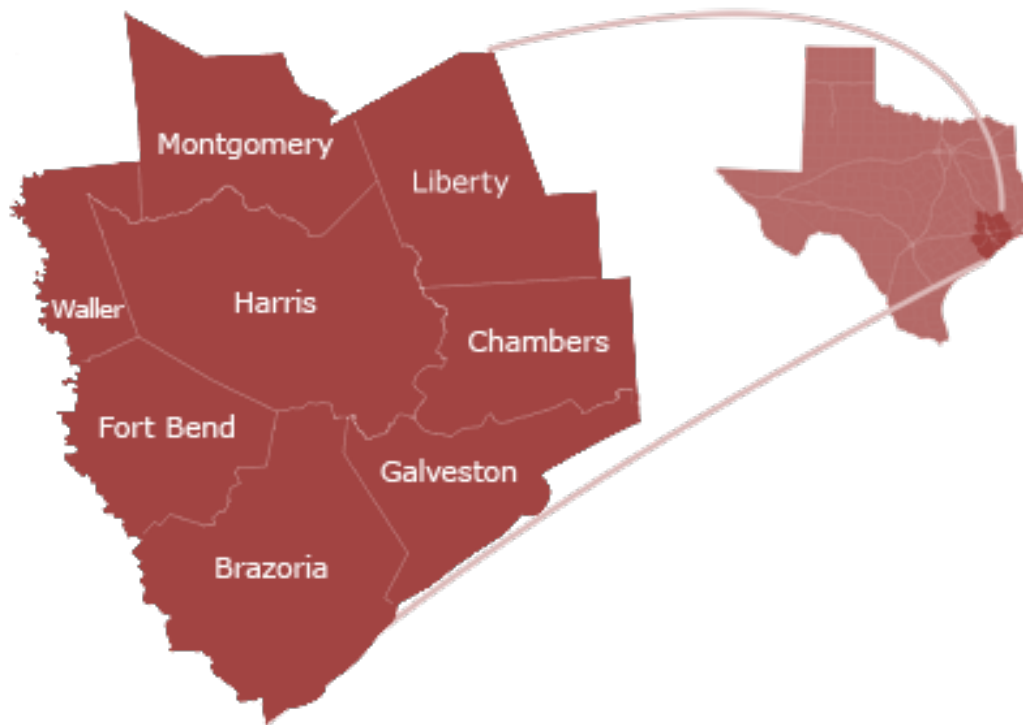

Houston-Galveston-Brazoria (HGB)

PM_{2.5} Advance

Path Forward



PREPARED IN PARTNERSHIP BY MEMBERS OF THE
H-GAC REGIONAL AIR QUALITY PLANNING ADVISORY COMMITTEE

2014



HOUSTON-GALVESTON-BRAZORIA (HGB) PM_{2.5} ADVANCE PATH FORWARD

CONTENTS

| | | |
|--|-------------------------|----|
| Acknowledgements | (in alphabetical order) | 4 |
| Executive Summary | | 5 |
| Introduction | | 6 |
| Overall Program Objective | | 6 |
| Mission of the Local Program | | 6 |
| Voluntary Program Scope | | 6 |
| Program Development Process | | 6 |
| Area Stakeholders/ Consultation Process | | 6 |
| The Region | | 8 |
| Houston-Galveston Area Council | | 8 |
| Population & Employment | | 8 |
| Transportation System | | 8 |
| Air Quality Background: Air Pollution | | 9 |
| Particulate Matter (PM) | | 9 |
| Past and Present Status of PM _{2.5} in HGB | | 9 |
| HGB Monitoring Network | | 11 |
| HGB PM _{2.5} Inventory | | 12 |
| PM _{2.5} Composition in HGB | | 13 |
| Harris County PM _{2.5} Inventory Summary | | 15 |
| Past and Present Initiatives | | 16 |
| Air Quality Programs at H-GAC | | 16 |
| Clean Vehicles & Clean School Bus Programs | | 16 |
| Clean Vessels for Texas Waters | | 17 |
| Commute Solutions: Clean Air Champions | | 17 |
| Commute Solutions: Ride Match (NuRide) | | 17 |
| Commute Solutions: Telework | | 17 |
| Commute Solutions: METRO STAR Vanpool Program | | 17 |
| Commute Solutions: Transit Pilot Projects | | 18 |
| Drayage Loan Program | | 18 |
| Pedestrian & Bicyclist Program | | 18 |
| Voluntary Idling Reduction Program | | 19 |
| Regional TECQ Texas Emission Reduction Plan (TERP) | | 19 |
| Regional Texas Emission Reduction Plan (TERP) | | 20 |
| Clean Air Education | | 20 |
| Air Quality Forecast and PM Action Day E-Mail Alert system | | 20 |
| Drive Clean Across Texas | | 20 |
| MySolutionIs.com | | 20 |
| Ozone Viewer Mobile App | | 20 |
| Air Quality Reference Guide | | 20 |
| Dust Suppression Projects in the Clinton drive Area | | 21 |
| City of Houston | | 21 |
| Additional Charging Stations | | 21 |
| Anti-Idling Policy | | 21 |
| Houston Airport System Emissions Reductions | | 22 |
| Houston Bike Share Program | | 22 |
| Metal Recyclers Task Force | | 22 |
| Safe Passage Ordinance and Complete Streets Policy | | 22 |

| | |
|---|-------|
| SPACE Units..... | 23 |
| Voluntary Environmental Compliance Agreements..... | 23 |
| Harris County Enhanced Enforcement Program - Smoking Vehicles..... | 23 |
| Metropolitan Transit Authority of Harris County..... | 23 |
| Hybrid Bus Fleet..... | 23 |
| METRO Bikes on Buses..... | 23 |
| Port of Houston Authority (PHA)..... | 24 |
| Bayport Expansion and Increased Efficiency..... | 24 |
| Cleaner Operating efficient Cranes..... | 24 |
| Container Tracking Mobile App..... | 24 |
| Gate Automation..... | 24 |
| Idling Program..... | 24 |
| Partnerships..... | 24 |
| Truck Registry and Drayage Exchange (TRADE)..... | 25 |
| Railroad Projects..... | 25 |
| Anti-Idling Engine Controls..... | 25 |
| Refurbished Switcher and Low Emission Engines..... | 25 |
| Regulatory Projects..... | 25 |
| EPA’s Control of Emissions from Ships..... | 25 |
| Federal Motor Vehicle Control Program..... | 25 |
| Industry Projects..... | 26 |
| Energy Efficiency in HGB..... | 26 |
| Potential and Future Projects..... | 27 |
| Air Quality programs & Partner Projects..... | 27 |
| Clean Vehicles Program..... | 27 |
| DOE Hydrogen Fuel-Cell Electric Hybrid Truck Demonstration Project..... | 27 |
| DOE Zero-Emission Delivery Vehicle Demonstration Project..... | 27 |
| PM Filter Outreach Campaign..... | 27 |
| Second Regional TERP..... | 28 |
| Houston Independent School District (HISD)..... | 28 |
| HISD Electric Vehicle School Bus Demonstration Project..... | 28 |
| City of Houston One Bin for All..... | 28 |
| Port of Houston Authority (PHA)..... | 28 |
| Expanded Drayage Truck Replacement..... | 28 |
| Future Dust Suppression Projects..... | 29 |
| Implementation of Intelligent Transportation Systems (ITS)..... | 29 |
| Other Regional Port Projects..... | 29 |
| Overweight container route between HGB Region Ports..... | 29 |
| Railroad Projects..... | 30 |
| Replacement of railroad switcher engines..... | 30 |
| Regulatory Projects..... | 30 |
| Tier 3 Motor Vehicle Fuel and Emission Standards..... | 30 |
| Metropolitan Transit Authority of Harris County..... | 30 |
| Alternative Fuel Buses..... | 30 |
| METRO Rail..... | 30 |
| Conclusion..... | 31 |
| Letters of Support..... | 32-43 |

RAQPAC Members & Alternate Members

Adrian Shelley, Air Alliance Houston / Brian Butler (Citizen/Environmental)
-PM2.5 Advance Subcommittee Chair

Andy Mao, TxDOT / Charles Airiohuodion (Government)

Arturo Blanco, City of Houston / Laura Spanjian (Local Government)

Bob Allen, Harris County Pollution Control Services / Stuart Mueller (Local Government)

Ceil Price, City of Houston / Tanwir Badar (Local Government)

Dale Kornegay, Associated General Contractors / Bob Lanham (Business/Industry)

Edmund Petry, METRO (Local Government)

Elena Craft, Environmental Defense Fund / Marcello Norsworthy (Citizen/Environmental)

Gabriel Reaume, City of Sugar Land (Local Government)

Jacque Darbonne, Harris County Precinct 2 / Matt Van Vleck (Local Government)

Jarod Davis, Dow Chemical Company / Robert Elam (Business/Industry)

Jeff Suggs, City of La Porte / Kristen Gauthier (Local Government)

Jim Lester, Houston Advanced Research Center / Alex Cuclis (Citizen/Environmental)

Joe Ripple, Brazoria Region (Citizen/Environmental)

Laura Blackburn, League of Women Voters of the Houston Area / Nancy Parra (Citizen/Environmental)

Lily Wells, Port of Houston Authority / Ken Gathright (Business/Industry)

Lisa Chisholm, ExxonMobil Baytown / Judy Bigon (Business/Industry)

Marise Textor (former member)/ Craig Beskid, EHCMA (Business/Industry)

Melissa Hagan, Union Pacific / Tomanicka Morris (Business/Industry)

Mike Lindsey, Montgomery County / Ruben Martinez (Local Government)

Paresh Lad, City of Houston / Don Richner (Local Government)

Paula Warren, Harris County / Carole Lamonte (Local Government)

Rachel Harris, American Lung Association / Paulette Wolfson (Citizen/Environmental)

Richard Brown, Liberty County / Sandra Pickett (Local Government)

Ronnie Schultz, Galveston County / Lori FitzSimmons-Evans (Local Government)

Shankar Chellam, Regional (Citizen/Environmental)

Steven Hansen, Greater Houston Partnership / Beth Whitehead Everage (Business/Industry)

EPA Staff

Carl Young
Carrie Paige
Laura Bunte

H-GAC Staff

Alan Clark
Charles Wemple
Melissa Bain
Nicholas Williams
Shelley Whitworth

TCEQ Staff

Donna Huff
Jim Price
Kristen Jacobsen
Lola Brown
Matthew Southard
Melanie Rousseau
Stephen Davis
Walker Williamson

EXECUTIVE SUMMARY

H-GAC has developed the following Path Forward in partnership with the Regional Air Quality Planning Advisory Committee (RAQPAC), as part of our involvement in the voluntary EPA Particulate Matter (PM) Advance Program. Participation in this program is a result of significant collaboration between local governments, key citizen/environmental groups, industry representatives and other regional stakeholders to assist our region in meeting the PM_{2.5} air quality standard.

This Path Forward document is a compilation of a variety of voluntary regional air quality improvement efforts. These projects range from the replacement of older heavy-duty truck and marine engines with newer, cleaner models, to funding electric vehicle charging equipment, to voluntary industry and local government air quality initiatives. In 2013, the H-GAC programs alone have resulted in an estimated 84 to 300 tons of PM_{2.5} reductions in our region. Over 50 current H-GAC and partner programs/projects - and nearly 20 additional potential future initiatives presented in this document will achieve additional reductions, which will be documented and expanded upon as this effort continues.

Though our region is currently very close to the National Ambient Air Quality Standard limits on fine particle pollution, by maintaining and expanding regional collaboration on voluntary projects, our region will position itself to avoid a nonattainment designation and be prepared for future, more stringent standards.

The Path Forward document will be presented to the H-GAC Transportation Policy Council and Board of Directors for approval prior to submission to the EPA. Upon successful submittal of this document to the EPA, RAQPAC will present the document to the general public. The committee will also continue to track individual projects included in the document, calculate reductions and adjust the document as necessary.

INTRODUCTION

OVERALL PROGRAM OBJECTIVE

The Particulate Matter (PM) Advance Program (Program) is a voluntary, collaborative effort between local government and key stakeholders to continue to meet the PM_{2.5} National Ambient Air Quality Standard (NAAQS) which became effective December 14, 2012 (12.0 µg/m³ annual average). The NAAQS are health-based air quality standards per the Clean Air Act. Another program goal is to foster an understanding of local air quality issues and promote implementation of near-term initiatives that maintain and/or improve ambient PM_{2.5} levels.

MISSION OF THE LOCAL PROGRAM

The mission of the Program is to promote, identify, expand and improve voluntary PM reduction efforts (both existing and potential future opportunities) within the areas where compliance with the 2012 PM_{2.5} NAAQS may be at risk. The Program can also serve as a catalyst to encourage voluntary accelerated implementation of current clean air strategies and encourage additional voluntary participation in PM reduction efforts such as H-GAC's Clean Vehicles program. Voluntary participation in PM Advance will provide an opportunity for stakeholders to voluntarily promote PM reduction efforts and take advantage of funding opportunities.

VOLUNTARY PROGRAM SCOPE

Participation in PM Advance allows the region to create a collaborative platform to identify and launch potential PM reductions efforts. Program participants have worked together voluntarily to develop this Path Forward to meet the stated mission. Program participation does not create or remove any statutory or regulatory requirements but can serve as an early action framework to maintain compliance with air quality standards. Please note: this Path Forward is a living document; periodic evaluation and updates are anticipated.

PROGRAM DEVELOPMENT PROCESS

The H-GAC Regional Air Quality Planning Advisory Committee (RAQPAC) (representing local governments, citizen/environmental groups and business/industry) examined potential voluntary actions to quickly reduce levels of fine particulate matter. In 2013, RAQPAC proposed the development of a voluntary action plan to the H-GAC Board of Directors to reduce PM_{2.5} emissions in our region (participation in PM Advance). At its June 2013 meeting, the H-GAC Board of Directors authorized H-GAC staff to develop voluntary strategies to reduce fine particulate matter as recommended by RAQPAC and the PM_{2.5} Task Force.

AREA STAKEHOLDERS/ CONSULTATION PROCESS

The PM_{2.5} Task Force is made up of RAQPAC members from the business/industry sector, citizen/environmental sector and local government, other agency staff (TCEQ and EPA), interested public and H-GAC staff. The PM_{2.5} Task Force has also been open to public participation since formation of the committee in January 2013. The Task Force met several times since Board authorization to participate in the program. Meetings included a discussion and review of past, present and potential future PM

reduction projects within the eight-county HGB ozone nonattainment area amongst RAQPAC members, stakeholders and interested public. Task Force meetings have also included presentations on PM_{2.5} composition in Houston by TCEQ and others.

The Task Force has developed the following program development process for the Path Forward. This timeline includes an anticipated presentation of the Path Forward to the H-GAC Board, and anticipated submission to EPA in 2014. Status updates of Path Forward efforts will be ongoing following submission to EPA, with an informal status update annually or as requested by the H-GAC Board of Directors.

- Formation of RAQPAC PM Advance Task Force, January 2013
- First PM Advance Task Force meeting, February 25, 2013
- Ongoing PM Advance Task Force meetings – open to public participation
- Task Force meetings were held on Feb. 25, 2013, Mar. 11, 2013, Mar. 19, 2013, Apr. 15, 2013, May 9, 2013, May 21, 2013, Aug. 8, 2013, Sept. 12, 2013, Sept. 24, 2013, Nov. 12, 2013, Jan. 9, 2014, Feb. 25, 2014, Mar. 13, 2014, Apr. 10, 2014. Additional meetings, ongoing from April 2014 onward
- RAQPAC Recommendation to H-GAC Board re Participation in PM Advance Program, May 30, 2013
- PM Advance Task Force call for projects, ongoing from January 2013 – March 2014
- HGAC Board approved submission of intent to participate in PM Advance to EPA, June 18, 2013
- PM_{2.5} Advance Sign Up Letter submitted to EPA, July 16, 2013
- PM Advance Program Welcome Letter received from EPA, August 9, 2013
- Ongoing PM Advance Task Force call for projects for inclusion in program – and engage sectors to provide input to the plan, January 2013 – March 2014
- Briefed Area Emission Reduction Credit Organization (AERCO) on program, November 2013
- Informed Transportation Air Quality (TAQ) Subcommittee to H-GAC Technical Advisory Committee (TAC), October 3, 2013 & February 11, 2014
- Negotiated contract with consultant for technical assistance, August – Nov. 2013
- Texas made its recommendations on 2012 PM_{2.5} NAAQS designations, December 2013
- PM Advance Task Force Developed Draft Path Forward November 2013 - March 2014
- Path Forward Review by Task Force, December 2013 – April 2014
- Post Draft Path Forward on RAQPAC website for public review (September – May 2014)
- Share Path Forward with RAQPAC as information item, March & April 2014
- Present Path Forward to TAQ, April 2014
- Present Path Forward to RAQPAC as Action Item, May 2014

NEXT STEPS

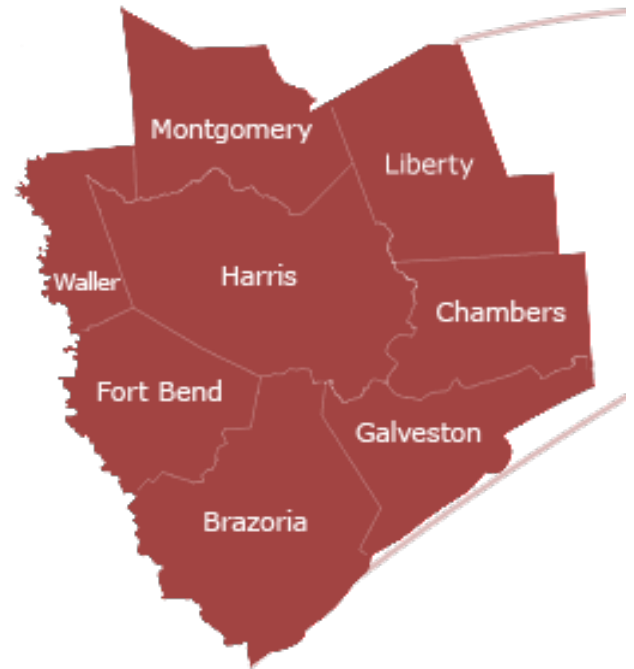
Next steps in the program development and/or consultation process include the following:

- Present Path Forward to H-GAC Technical Advisory Committee (TAC) and Transportation Policy Council (TPC), June 2014
- Present Path Forward to H-GAC Board of Directors, July 2014
- Submit Path Forward to EPA, July-August 2014
- Post Final Path Forward on RAQPAC website, July-August 2014
- Distribute and explain Path Forward to general public, following receipt by EPA
- Track Path Forward Efforts/Reductions & Revisit/Adjust Path Forward, ongoing
- Final Designations for PM_{2.5} NAAQS, Dec. 2014 (EPA/TCEQ)
- Informal Status Update to EPA, annually

THE REGION

HOUSTON-GALVESTON AREA COUNCIL

The Houston-Galveston Area Council (H-GAC) is the region-wide voluntary association of local governments for the 13-county Gulf Coast Planning region of Texas. H-GAC is also the Metropolitan Planning Organization (MPO) for the eight-county Houston-Galveston-Brazoria (HGB) area. This area includes Brazoria, Chambers, Fort Bend, Galveston, Harris, Liberty, Montgomery and Waller Counties. The scope of this report focuses on the eight-county HGB area.



POPULATION & EMPLOYMENT¹

The HGB region has experienced dramatic changes in its population size and composition over the last few decades, and these trends are expected to continue. The region is projecting a significant increase in population and employment over the next 25 years. There are currently 5.8 million residents and 2.7 million jobs within the region. By 2040, the regional population is expected to reach 9.6 million residents (an increase of over 3.8 million people). Similarly, the region is expected to create an additional 1.4 million jobs for a total of 4.1 million. Projected population growth will also result in economic changes stemming from increased purchasing power and tax revenue.

TRANSPORTATION SYSTEM

Every day, more than 169 million miles are traveled on the system's roadways². Within our region, there are approximately 26,000 centerline miles of locally-owned roads and almost 4,000 centerline miles of state-owned facilities³. In addition, the region currently has over 190 miles of High Occupancy Vehicle (HOV)/ High Occupancy Toll (HOT) lanes in operation⁴. Regional transit includes bus routes, the METRORail light rail system, commuter transit routes, smaller vehicle routes, and ferries. The HGB region's transportation system also includes bikeways, freight rail, ports, airports, and pipelines.

Congestion remains a major challenge facing the HGB region. The number of morning and evening peak hours continues to increase as the number of commuters travelling to and from work increase. Congestion in our region will continue to grow given the projected population, employment and economic growth facing our region.

¹ H-GAC 2040 RTP

² H-GAC TDM, 2014 (typical fall weekday VMT - all HGB roadways)

³ TxDOT Standard Reports 2012

⁴ H-GAC 2012 Regional Mobility Report

AIR QUALITY BACKGROUND: AIR POLLUTION

Air pollution occurs when the air contains gases, particles, fumes or odors that could be harmful to the health and/or comfort of humans and animals or which could cause damage to plants and materials.

The substances that cause air pollution are called pollutants. The U.S. Environmental Protection Agency (EPA) has set both primary and secondary standards (National Ambient Air Quality Standards or NAAQS) for six “criteria” pollutants including particulate matter.

H-GAC and its partners continue to work to reduce air pollution and help the region meet these federal air quality standards. The region has made considerable progress in reducing ground-level ozone and particle matter emissions over the last few years.

PARTICULATE MATTER (PM)

Particle pollution is a complex mixture of extremely small particles (particulate matter or PM). Components of PM include particles and/or liquids such as dust, fly ash, soot, smoke, aerosols, fumes, mists and condensing vapors that can be suspended in the air. EPA groups particle pollution into two categories: Inhalable coarse particles (PM₁₀) and fine particles (PM_{2.5}). The size of particles is directly linked to their potential for causing health problems. Particles that are smaller than 10 micrometers in diameter (PM₁₀ and PM_{2.5}) are able to pass through the throat and deep into the lungs where they can cause serious health effects. Fine particulates (PM_{2.5}) are generally emitted in vehicle exhaust and from activities such as industrial and residential combustion.

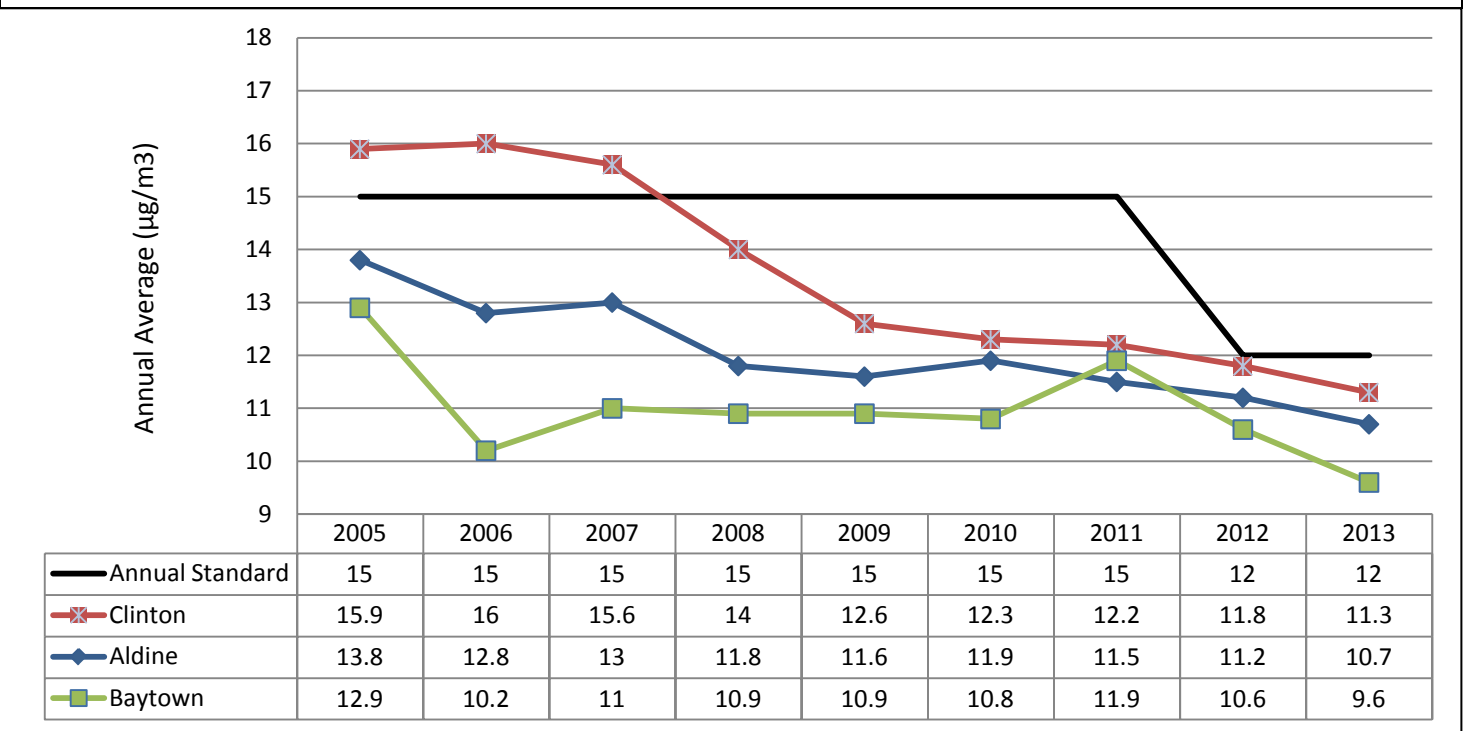
PAST AND PRESENT STATUS OF PM_{2.5} IN HGB

The HGB area has experienced significant improvements in PM_{2.5} levels over the past ten years. Historically, the HGB area has been designated as “unclassified/attainment” for particulate matter standards for both the PM_{2.5} and PM₁₀ standards. Details of the particulate matter NAAQS are found in the table below. Note that in 2012, EPA lowered the primary annual NAAQS for fine particles (PM_{2.5}) to 12.0µg/m³ to be more protective of public health.

| Pollutant | Primary NAAQS | Averaging Period | Designation |
|---|--|--------------------------|-------------------------------|
| Particulate Matter (PM ₁₀) | 150 µg/m ³ | 24-hour | Attainment/ Unclassifiable |
| Particulate Matter (PM _{2.5}) | 12.0 µg/m ³ (2012 standard) | Annual (Arithmetic Mean) | Pending |
| | 15.0 µg/m ³ (1997 standard) | Annual (Arithmetic Mean) | Attainment/ Unclassifiable |
| | 35 µg/m ³ | 24-hour | Attainment/ Unclassifiable |
| | 35 µg/m ³ | 24-hour | Attainment/ Unclassifiable |

Air monitoring data collected, compiled, and validated by the Texas Commission of Environmental Quality (TCEQ) identifies the certified PM_{2.5} annual design value⁵ for 2010-2012 for the HGB region as 12.1 micrograms per cubic meter (µg/m³). Exceptional events⁶ have been removed from the 2010 through 2012 annual averages⁷. Preliminary TCEQ-certified 2013 PM_{2.5} data (submitted to EPA on March 7, 2014) indicates a continuing decline in annual PM_{2.5} averages in the HGB area (see table above). If EPA concurs with that submittal the HGB area's annual PM_{2.5} design value (2011-2013) will be 11.8µg/m³, which is very close to the current standard for fine particles (12.0µg/m³).

Preliminary Annual PM_{2.5} Averages for Clinton, Aldine and Baytown Regulatory Monitors⁸



EPA will promulgate final area designations for the 2012 PM_{2.5} NAAQS by no later than December 12, 2014. Air monitoring data can be retrieved from the TCEQ Texas Air Monitoring Information System (TAMIS) web: <http://www5.tceq.state.tx.us/tamis/index.cfm?fuseaction=home.welcome>.

⁵ A “design value” for an area is a statistic that is compared to the National Ambient Air Quality Standards (NAAQS) to determine the attainment status of the area. An area’s value is calculated using an arithmetic mean of the annual PM_{2.5} averages for three consecutive years at each regulatory monitor. If an area has more than one regulatory monitor, the monitor with the highest value sets the design value for the area (EPA, 2014).

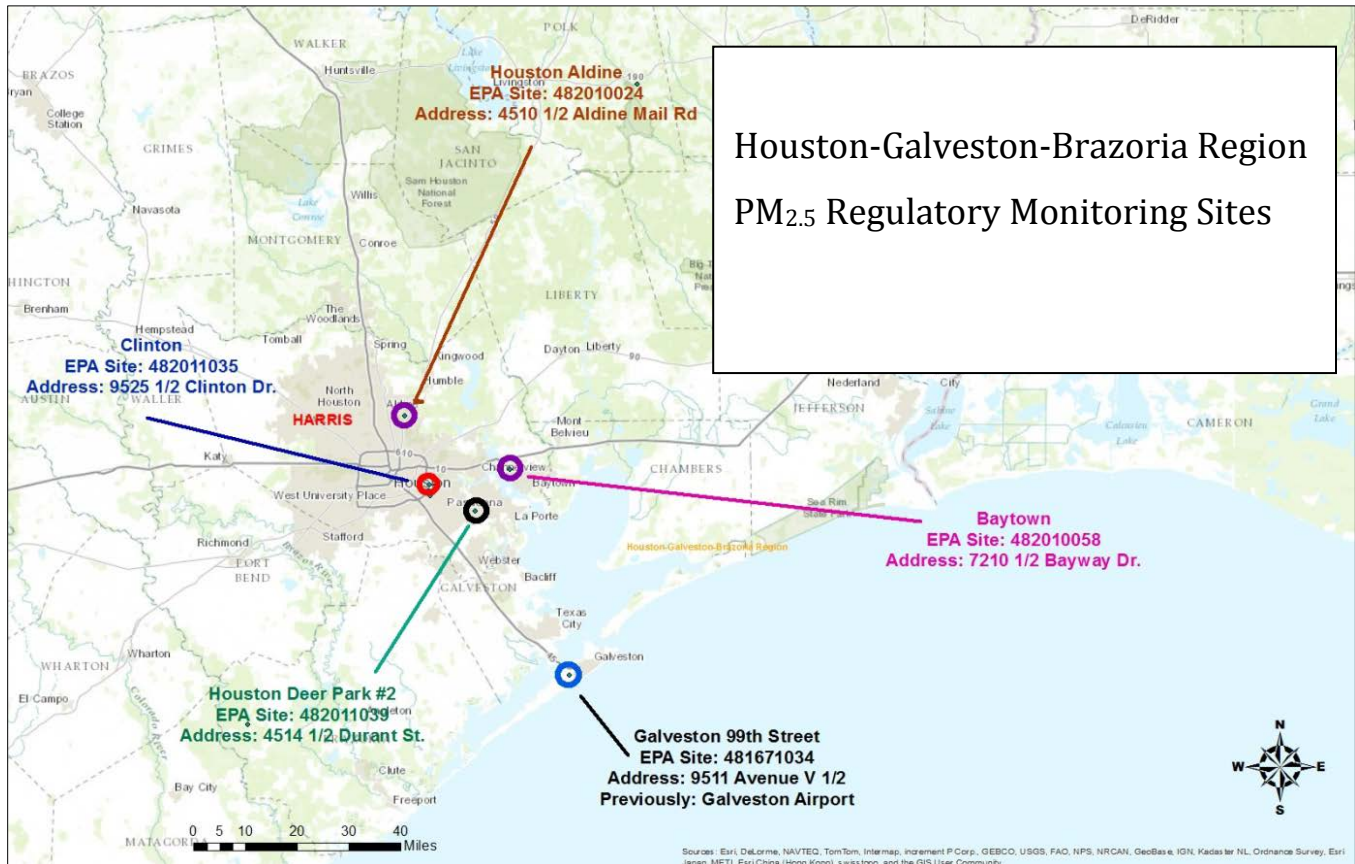
⁶ In accordance with the language in section 319, EPA is defining the term “exceptional event” to mean an event that: (i) Affects air quality; (ii) Is not reasonably controllable or preventable; (iii) Is an event caused by human activity that is unlikely to recur at a particular location or a natural event; and (iv) Is determined by EPA through the process established in these regulations to be an exceptional event.

⁷ TCEQ has proposed seven such exceptional event⁷ days during the 2010 through 2012 period: three in 2010, one in 2011, and three in 2012. TCEQ has submitted demonstration documents to EPA for each of those years. EPA has until December 12, 2014 to make a decision on whether or not to concur with these proposed exceptional events. However, there is no set deadline for a decision or action by EPA. EPA’s approval of TCEQ’s exceptional events submittal is required before EPA could remove those days from the basis for proposing the area’s attainment designation status.

⁸ 2013 values in this chart are preliminary, other years are certified. Only the data from these regulatory monitors will be used by EPA for attainment demonstration purposes. Source: TCEQ 2013

HGB MONITORING NETWORK

Over time, the monitoring system in the HGB region has expanded significantly. There are 5 sites with regulatory PM_{2.5} monitors, 11 local conditions (acceptable) monitors and many more non-regulatory monitors in our region. The City of Houston, Harris County, University of Houston, Texas Commission on Environmental Quality (TCEQ), and Houston Regional Monitoring Corporation (HRM) and others operate these monitors. Most of these monitoring stations measure the concentrations of the criteria pollutants in the air, as well as air temperature, wind velocity, and other meteorological parameters. Some of the monitoring stations also measure the levels of an additional set of selected chemicals, and some measure pollen and mold spores.



The following table of monitoring sites lists the 5 HGB PM_{2.5} monitor sites which are also classified as Federal Reference Method (FRM) monitor sites by the EPA. PM_{2.5} data from the Houston Aldine, Baytown and Clinton monitors determine HGB attainment with the PM_{2.5} NAAQS. The Galveston and Deer Park PM_{2.5} monitors are shaded in gray below because they were added in 2013 and have not yet collected a full set of PM_{2.5} data. TCEQ has plans to add another PM monitor in the HGB region near an HGB roadway (to be co-located with a current or future NO₂ monitor).

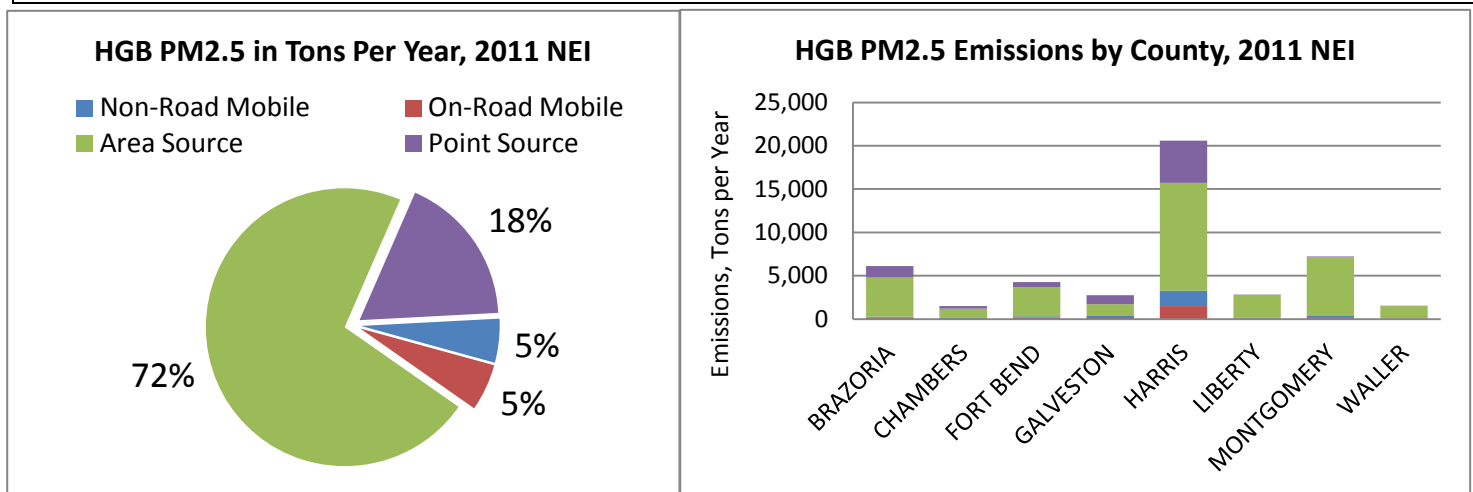
These federal monitors utilize the appropriate sampling and analysis methods and quality assurance/quality control (QA/QC) protocols for use in determining attainment demonstration status with the fine particulate matter standard. Monitoring sites with FRM monitors are considered regulatory monitors. There are numerous additional PM_{2.5} monitors within our region that are not considered FRM monitors by EPA. The monitoring data from these other sites are used by TCEQ to help understand air quality data and trends and help predict possible alerts.

| HGB Region PM2.5 Regulatory Monitoring Sites ⁹ | | | | | | |
|---|-----------------------|---------|--|------------|--------------------------|---------------------|
| Region | Name | CAMS ID | Address | AQS Number | Sampler Type | Operational Date |
| 12 | Houston Aldine | C0008 | 4510½ Aldine Mail Road, Houston | 482010024 | PM2.5 (FRM) | 8/14/2000 |
| 12 | Baytown | C0148 | 7210½ Bayway Drive, Baytown | 482010058 | PM2.5 (FRM) | 1/6/1999 |
| 12 | Clinton | C0403 | 9525 Clinton Drive, Houston | 482011035 | PM2.5 (FRM & co-located) | 1/1/1999 & 4/6/1999 |
| 12 | Galveston 99th Street | C1034 | 9511 Avenue V½, Galveston Airport, Galveston | 481671034 | PM2.5 (FRM) | 5/1/2013 |
| 12 | Houston Deer Park2 | C0035 | 4514½ Durant Street, Deer Park | 482011039 | PM2.5 (FRM & FEM) | 8/10/2013 |

HGB PM_{2.5} INVENTORY

The following PM_{2.5} inventory is based on TCEQ's adjusted 2011 National Emissions Inventory (NEI) data. The NEI is a comprehensive, detailed estimate of criteria and hazardous air emissions sources. The NEI is prepared every three years by the EPA based primarily upon emission estimates and emission model inputs provided by State, Local, and Tribal air agencies for sources in their jurisdictions, and supplemented by data developed by EPA. The 2011 NEI was built from emissions data in the Emissions Inventory System (EIS).

TCEQ PM_{2.5} Inventory for HGB¹⁰



⁹ The Galveston and Deer Park PM_{2.5} monitors were added in 2013 and have not yet collected a full data set.

¹⁰ TCEQ's adjusted 2011 NEI data follows the same quality assurance and quality control process as data in the Reasonable Further Progress (RFP) and Attainment Demonstration (AD) State Implementation Plan (SIP).

These data are split into four emission categories: point, on-road mobile, non-road mobile, and area (non-point) sources. Point sources are individually inventoried and usually located at a fixed, stationary location (heaters, boiler and cooling water towers at large industrial facilities), although portable sources are also included (some rock crushing operations). On-road mobile sources include emissions from vehicles found on roads and highways (cars, trucks, buses); while non-road mobile sources include mobile sources not found on roads and highways (lawn mowers, construction vehicles, farm machinery, rail, airplanes and commercial marine vessels). Area (non-point) sources include those sources that are inventoried collectively because they are too small in magnitude or too numerous to inventory as individual point sources, and which can often be estimated more accurately as a single aggregate source (residential heating, leaf blowers and unpaved roads). The estimated emission values for TCEQ non-point sources in the chart below are taken from the Texas Air Emissions Repository (TexAER).

TCEQ PM_{2.5} Inventory for HGB (tons per year)¹¹

| | Point Source | On-Road Mobile | Non-Road Mobile | Area Source |
|--------------|---------------------|-----------------------|------------------------|--------------------|
| Brazoria | 1,316.99 | 105.59 | 192.32 | 4,485.76 |
| Chambers | 291.43 | 89.22 | 33.73 | 1,098.25 |
| Fort Bend | 605.83 | 161.94 | 168.96 | 3,334.43 |
| Galveston | 1,045.86 | 95.70 | 247.64 | 1,363.36 |
| Harris | 4,871.06 | 1,794.99 | 1,490.56 | 12,445.15 |
| Liberty | 4.81 | 60.53 | 65.99 | 2,658.58 |
| Montgomery | 101.56 | 199.81 | 151.08 | 6,788.87 |
| Waller | 7.34 | 42.01 | 33.92 | 1,418.63 |
| Total | 8,244.88 | 2,549.79 | 2,384.20 | 33,593.03 |

PM_{2.5} COMPOSITION IN HGB

Components of PM_{2.5} include fine particles or liquids such as dust, fly ash, soot, smoke, aerosols, fumes, mists and condensing vapors that can be suspended in the air. Particles originate from a variety of stationary and mobile sources and may be directly emitted (primary sources) or formed in the atmosphere (secondary emissions) by transformation of gaseous emissions.

Primary PM sources include both human and natural activities. A large amount of year-round PM_{2.5} emissions are generated by human activity. These types of activities include agricultural operations, industrial processes, combustion of wood and fossil fuels, construction and demolition activities and road dust in the air. Additional naturally derived sources of PM emissions (i.e. windblown dust and wildfires) also contribute to the overall PM emissions.

Secondary PM sources directly emit air contaminants into the atmosphere that help form PM. These pollutants are considered precursors to PM formation. Secondary pollutants include nitrogen dioxide

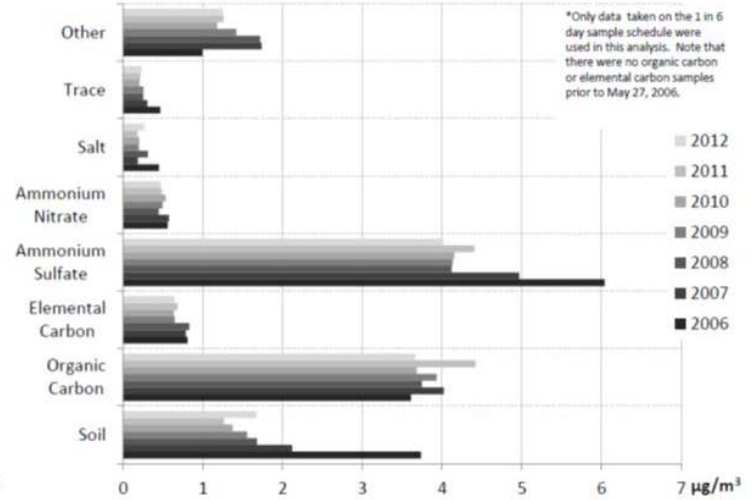
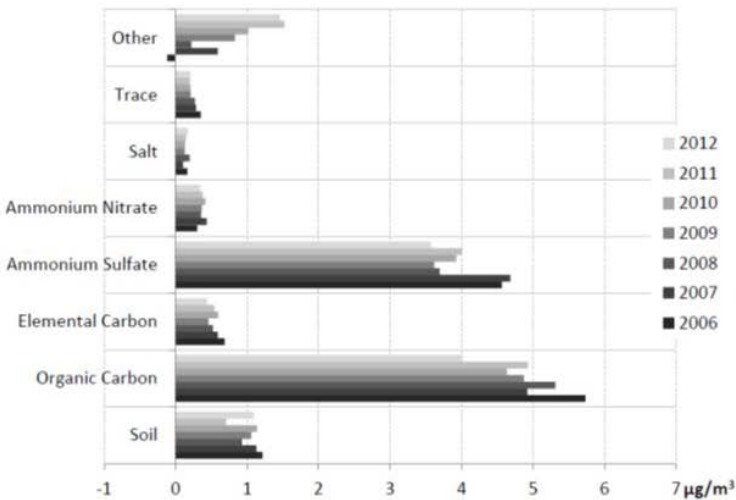
¹¹ TCEQ Data Sources: 2011 rail and locomotive – 2011, 2011 area source v2, 2011 commercial marine vessels, 2011 AERR on road annual criteria, 2011 non-road annual criteria pollutants, 2011 At 2011 Drilling Rigs Controlled, 2011 aviation - if non-road, point source data obtained from the state of Texas air reporting system (STARS) on January 22, 2014. Emissions data reported by sites that met TCEQ reporting requirements as stated in 30 Texas Administrative Code, S101.10 for the given year. The data is subject to revisions or updates.

(NOx), sulfur oxide (SOx), volatile organic compounds (VOCs), and ammonia. Programs or measures that reduce PM precursor emissions tend to have a beneficial impact on ambient PM levels.

The following two tables show the annual average reconstructed mass speciation¹² data from 2006 through 2012 at the Aldine and Clinton Drive FRM monitors¹³. Data from these two monitors indicate that the predominant components of PM_{2.5} at these locations include ammonium sulfate and organic carbon.

Aldine Annual Average Reconstructed Mass

Clinton Drive Annual Average Reconstructed Mass



AMMONIUM SULFATE & SULFUR DIOXIDE

According to TCEQ, the 2012 levels of ammonium sulfate concentrations in the two graphs above suggest that motor vehicles and other forms of regional transport are dominant sources of ammonium sulfate. Ammonium sulfate atmospheric particulate forms from a chemical reaction in the atmosphere between sulfur dioxide (SO₂) emissions from vehicles, combustion, and other sources and ammonia present in the atmosphere. Reducing SO₂ may reduce ambient PM_{2.5} as sulfur compounds may be the limiting reactant.

ORGANIC CARBON

Sources of organic carbon as PM_{2.5} particulate matter are less understood. A substantial part of the organic carbon is secondary PM, formed from reactions in the air that transform VOC and semi-volatile organic compounds (SVOCs) into less volatile materials.

¹² Chemical speciation refers to the distribution of an element amongst chemical species in a system.

¹³ TCEQ presentation to PM Advance Task Force of the Regional Air Quality Planning Committee, Houston Galveston Area Council, September 24, 2013, located at <http://www.h-gac.com/agendas/raqpc/default.aspx>

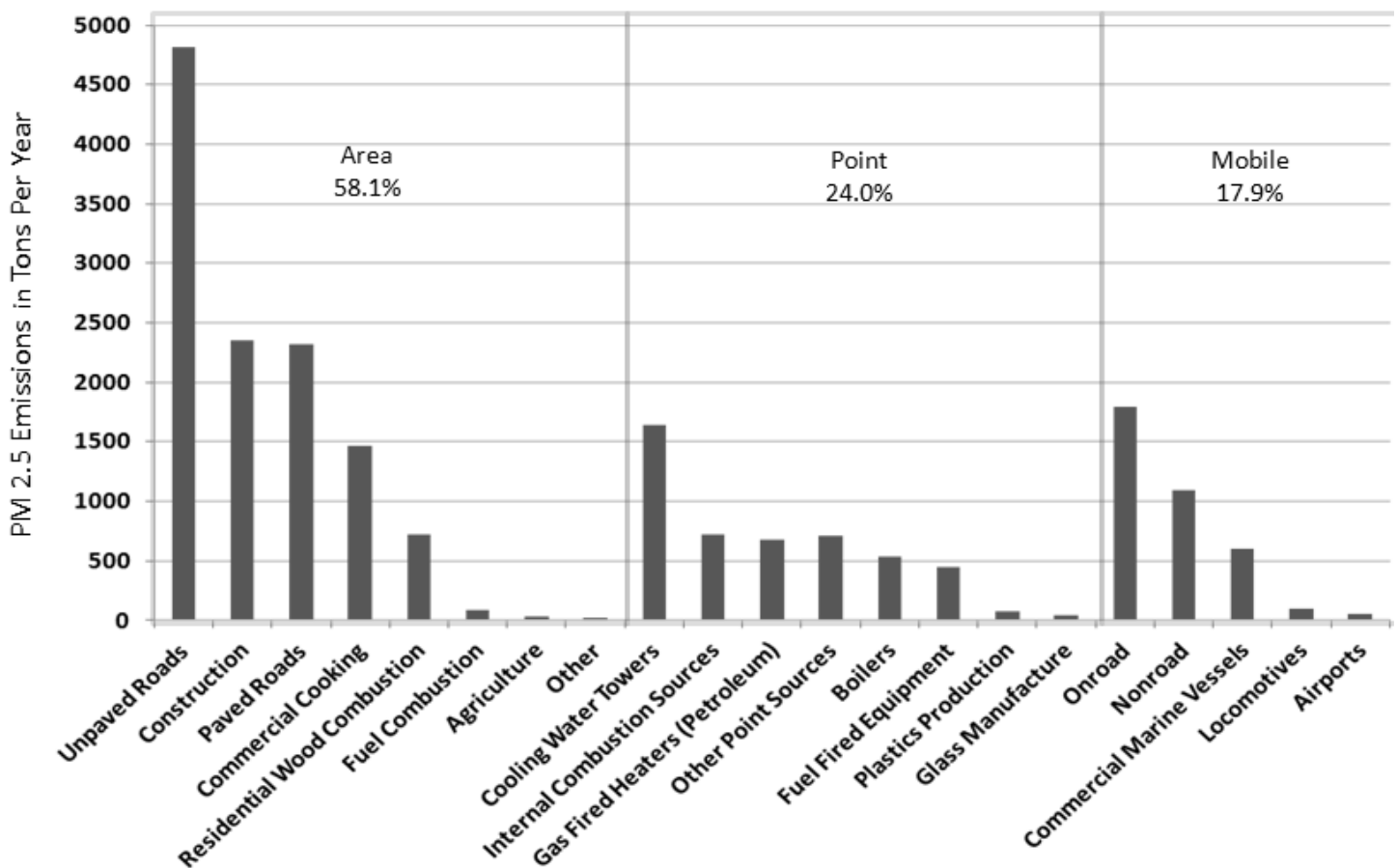
HARRIS COUNTY PM_{2.5} INVENTORY SUMMARY

Preliminary 2013 ambient air quality monitoring data indicates that the Clinton Drive PM_{2.5} monitor (located within Harris County) is marginally in attainment with the 2008 annual PM_{2.5} NAAQS. The preliminary 2013 PM_{2.5} design value is 11.3 at Clinton Drive, which is close to the current 12.0 µg/m³ standard for fine particles. Houston Advanced Research Center (HARC), in partnership with Harris County, spearheaded an effort to further investigate sources of PM_{2.5} within Harris County: the Harris County PM_{2.5} Emissions Inventory project.

This project was funded by a Coastal Improvement Assistance Program (CIAP) grant, administered by the U.S. Fish and Wildlife Service through Harris County. The aim of this portion of the grant was to review the PM_{2.5} inventories developed by TCEQ and EPA for Harris County, make adjustments when technically justified, and provide a list of potential controls, including their efficiencies and costs that might be used to reduce PM_{2.5} emissions based on the revised inventory.

This inventory summary is broken down into three categories of emissions: point, mobile and area sources, using NEI inventory definitions. This Inventory Summary identifies unpaved roads as the predominant source of PM_{2.5} within Harris County.

Harris County PM_{2.5} Inventory Summary for 2011¹⁴



¹⁴ Data has not been finalized

PAST AND PRESENT INITIATIVES

AIR QUALITY PROGRAMS AT H-GAC

H-GAC has partnered with local and regional government agencies, citizen and environmental groups, business and industry-based organizations and other stakeholders to proactively pursue air quality improvements within our region. Currently, over 12 major emission reduction programs are underway at H-GAC due to the region's ozone non attainment status. These programs have multi-pollutant benefits; despite their main focus on reducing ground-level ozone, these programs have produced in significant PM_{2.5} reductions in the past. In 2013 alone, these programs resulted in between 84 and 300 tons of PM_{2.5} reductions in our region.

| 2013 Current Control Programs Reductions (tpy) ¹⁵ | | | | |
|--|-----------------------------|---------------|---------------|------------------------|
| Measure | PM _{2.5} (tons) | NOx (tons) | VOC (tons) | VMT/Starts or Vehicles |
| Clean Vehicles Program | 12 | 180 | 11 | 389 |
| Clean School Bus Program | 0.7 | 11 | 1 | 68 |
| Clean Vessels for Texas Waters | 1 | 80 | 3 | 10 engines |
| Commute Solutions (Clean Air Champions, Ridematch and Telework) | 1.9 | 38.7 | 16.1 | 174,763,308/6,808,442 |
| Commute Solutions: METRO Star Vanpool | 0.5 | 7 | 3 | 60,753,529/0 |
| Commute Solutions: Commuter and Transit Pilot Projects | 0.1 | 1.4 | 0.6 | 8,807,980/0 |
| Drayage Loan Program | 0 | 0 | 0 | 217 |
| Pedestrian & Bicyclist Program | 0.33 | 12.6 | 11.6 | 21,182,775/14,121,485 |
| Voluntary Idling Reduction Program | <0.5 | <2 | <0.5 | 20,000 |
| Regional H-GAC TERP | 2 – 8 | 83 | 4 | 100 |
| State TERP in HGB | 65 – 275 | 2,754 | 150 | 3,243 |
| Totals | 84-300 | 3,170 | 201 | |

CLEAN VEHICLES & CLEAN SCHOOL BUS PROGRAMS

Since 1995, the Clean Vehicles Program has provided grant assistance to replace older diesel engines in both public and private fleets within the HGB region. This fuel neutral program is designed to reduce on-road vehicle emissions by rapid turnover to newer lower emitting engines, retrofit of existing engines with approved devices, or introduce new lower emission technologies. Since its start, the program has provided over \$78 million in financial aid, replaced over 2,700 engines and developed several alternative fueling stations. In 2013 alone, the Clean Vehicles Program reduced 12 tons of PM_{2.5} emissions.

The Clean School Bus program serves the following counties: Angelina, Austin, Brazoria, Chambers, Colorado, Fort Bend, Galveston, Hardin, Harris, Houston, Jasper, Jefferson, Liberty, Matagorda, Montgomery,

¹⁵ ENVIRON, Multi-Pollutant Analysis and Cost Effectiveness Evaluation of Voluntary Mobile Source Measures, 2014. (MOVES emission factors).

Nacogdoches, Newton, Orange, Polk, Sabine, San Augustine, San Jacinto, Trinity, Tyler, Walker, Waller, and Wharton. The goal of the program is to reduce children's exposure to diesel exhaust and reduce the amount of air pollution created by diesel school buses. To date, the H-GAC Clean School Bus Program has provided over \$8 million towards clean school bus projects. In 2013, the Clean School Bus program reduced almost 1 ton of PM_{2.5} emissions.

CLEAN VESSELS FOR TEXAS WATERS

In 2011, EPA awarded H-GAC almost \$1 million to repower 3 high-emitting tug vessels with 8 new, cleaner engines. Vessels being repowered mainly operate in the HGB non-attainment area—docking ships and fueling marine vessels. The project has already completed the replacement of 6 engines, with the last 2 scheduled for re-fit in 2014. This project has reduced over 1 ton of PM_{2.5} emissions.

COMMUTE SOLUTIONS: CLEAN AIR CHAMPIONS

The Clean Air Champions program is an outreach program designed to partner with local employers to implement alternative commuting and clean fleet policies. Organizations that meet the requirements of the Clean Air Champion program earn the distinction of being recognized as a regional leader of employee benefits offerings - a designation that gives them a competitive advantage in recruiting the best and brightest employees. The Clean Air Champions companies represent 174,886 employees, or 5.5 percent of regional employment.

COMMUTE SOLUTIONS: RIDE MATCH (NURIDE)

NuRide is one of the largest and most successful incentive-based online rideshare programs in the nation. NuRide rewards people for trips in which they choose to walk, bike, telecommute, carpool, vanpool, take transit, or work a compressed week. To date the NuRide program has almost 20,000 users from more than 1,530 organizations resulting in close to 1 ton of PM_{2.5} emission reductions.

COMMUTE SOLUTIONS: TELEWORK

The Telework Program helps regional employers and employees by educating about the benefits of teleworking and offering financial incentives to develop and implement Telework and alternative work schedule programs. Almost 1,800 teleworkers participated in the program in 2013, resulting in over 8 million VMT reduced.

COMMUTE SOLUTIONS: METRO STAR VANPOOL PROGRAM

STAR, the regional vanpool and rideshare program provided by METRO is one of the largest programs of its kind in the nation. The program provides a 15-, 12-, or 7-passenger van along with insurance, maintenance, roadside assistance and administrative coordination. Average fares are about \$135 per month, and the average round-trip traveled is 66 miles. Additionally, program participants receive a \$35 per month subsidy to help offset vanpool costs. Volunteers within the vanpool groups do the driving. There are currently over 700 vanpools in operation with over 7,000 riders in the region. This program has reduced over 60 million VMT and 0.53 tpy of PM_{2.5}.

Active Vanpool Participants

- METRO STAR Vanpool
- METRO Transit
- NuRide
- Enterprise Vanpool
- VRide
- Fort Bend County Transit
- Harris County Transit
- BAYTRAN
- TREK Express
- Energy Corridor District
- TxDOT
- Port of Houston Authority
- Rice University
- Central Houston
- South Main Alliance
- Cousins
- Gulf Coast Center

COMMUTE SOLUTIONS: TRANSIT PILOT PROJECTS

More than 13 pilot projects have been implemented in the HGB region using a combination of federal funds and local matching funds. Over \$520,000 of federal CMAQ funds were invested in 2011 - resulting in over 8,000,000 VMT reduced. The net PM2.5 emission reductions from pilot transit projects are 0.1 ton per year.

ENERGY CORRIDOR DISTRICT'S CARSHARE PROGRAM

The Energy Corridor in partnership with Enterprise Holdings provides commuters access to vehicles on days they use a commute alternative. CarShare vehicles are available for hourly rental at two different sites for personal or work errands throughout the day, with fuel, physical damage/liability protection, vehicle maintenance, and 24/7 roadside and member assistance included. This program assists in making alternative mode use more attractive to users and is not assumed here to result in additional emission reductions.

DRAYAGE LOAN PROGRAM

Since 2010, the H-GAC Drayage Loan Program has offered independent owner operator and/or trucking companies servicing HGB ports the opportunity to apply for financing to support the purchase of cleaner, safer and more fuel efficient drayage trucks. Almost 900 tons of NOx reductions and 14 tons of PM emission reductions are anticipated over the life of the program. This program has been a collaborative effort between H-GAC, Environmental Defense Fund and the Port of Houston Authority.

PEDESTRIAN & BICYCLIST PROGRAM

In Houston, 1-3 percent of trips are made via bike/walk modes - equal to 38,689 -116,068 trips per day for an approximate daily VMT reduction of 58,035 - 174,101. According to a frequency distribution analysis of trips by trip length (prepared by the Texas Transportation Institute¹⁶), there are 3,868,922 trips per day that are 2 miles or less in length for home-based work, home based non-work, and non-home based non work trips.

Regionally, there is a vibrant move toward more bicycle use. The City of Houston offers over 300 miles of an interconnected bikeway network spanning across 500 square miles. The network includes bike lanes, bike routes, signed-shared lanes and shared-use paths, commonly referred to as 'hike and bike' trails,

¹⁶ TTI analysis of the 2009 Houston Household Travel Survey File TTFD.Hou.Reg.3WayWith.Proxy.Adj transmitted by H-GAC on 1/24/12

which includes rails to trails, and other urban multi-use paths. In addition to these bicyclist transportation facilities, there are over 80 miles of hike and bike and nature trails found in City of Houston parks. In addition, Harris County and many municipal utility districts have constructed over 160 miles of bikeways within the City limits.

The annual reduction is 21,182,775 miles and 14,121,485 trips, reducing 11.6 tons of VOC; 12.6 tons of NOx; 0.33 tons of PM2.5; and 9,550 tons of CO₂ annually.

VOLUNTARY IDLING REDUCTION PROGRAM

In 2012, in partnership with local governments, citizen and environmental groups, business and industry-based organizations and other stakeholders H-GAC developed a voluntary idling reduction program and adopted a voluntary diesel idling reduction policy. This anti-idling policy aims to lower nitrogen oxide (NOx) and other emissions by placing a five-minute idle limit on motor vehicles. Along with promoting this voluntary policy region-wide, H-GAC provides idling reduction bumper stickers and signs within our region free of charge. The Port of Houston Authority has been a major partner in developing and supporting this program, posting over 100 idling reduction signs at the Turning Basin terminal within the Port.

The following organizations within the 8-county nonattainment region have anti-idling policies in place:

| | | |
|--------------------------|------------------------------|----------------------------|
| Alief ISD | Dickinson ISD | Museum Park Super |
| Alvin ISD | Fast Trac Transportation | Neighborhood |
| Angelton ISD | Fort Bend ISD | Our Lady Queen of Peace |
| Alain Garcia Independent | Friendswood ISD | Catholic School |
| Trucking | Galena Park ISD | Pasadena ISD |
| AT&T | Galveston ISD | Pearland ISD |
| Barbers Hill ISD | Goose Creek Consolidated ISD | Port of Houston |
| Brazosport ISD | Harris County | Santa Fe ISD |
| City of Houston | High Island ISD | Sheldon ISD |
| City of Sugar Land | Houston Astros | Spring ISD |
| Clear Creek ISD | Houston ISD | Sweeny ISD |
| Columbia-Brazoria ISD | Houston Biodiesel | Texas City ISD |
| Conroe ISD | Huffman ISD | Tomball ISD |
| Crosby ISD | Humble ISD | TXDOT |
| Cy-Fair ISD | Jose Alfaro Independent | UPS |
| Damon ISD | Trucking | Waller ISD |
| Danbury ISD | Klein ISD | Westside High School, HISD |
| Davenport Transportation | Magnolia ISD | |

REGIONAL TECQ TEXAS EMISSION REDUCTION PLAN (TERP)

The Texas Commission on Environmental Quality's (TCEQ) regional Texas Emission Reduction Plan (TERP) program - established by the 77th Texas Legislature in 2001, through enactment of Senate Bill (SB) 5 - has been an important voluntary project in Texas. TCEQ provides TERP funding for emission reduction projects to participants in Texas. These projects include a number of voluntary financial incentive programs (including Emission Reduction And Incentive Grants, Rebate Grants, Third-Party and American Recovery and Reinvestment Act Rebate Grants, as well as other assistance programs), to help

improve the air quality in Texas. Between 2008 - 2013 TCEQ regional TERP has funded over 3,200 vehicle replacements, totaling over \$160 million dollars. TERP grants are estimated to reduce between 65 and 275 tons of PM emissions per year¹⁷.

REGIONAL TEXAS EMISSION REDUCTION PLAN (TERP)

The first H-GAC Regional TERP program provided over \$3 million in grant funds, resulting in over 405 tons of NOx emission reductions from on-road vehicles and off road equipment (Local Government and Drayage Loan Trucks). PM reductions were not enumerated, but estimated to be in the range of 10 – 40 tons.

The second H-GAC Regional TERP program, which is currently open to Local Governments, has currently provided \$78,015 grant funds contracting for a NOx emission reduction of 7.8 tons from off road equipment. Again, PM reductions were not enumerated, but estimated to be at least 0.2 – 0.7 tons.

CLEAN AIR EDUCATION

AIR QUALITY FORECAST AND PM ACTION DAY E-MAIL ALERT SYSTEM. TCEQ provides free e-mail alerts for the Today's Texas Air Quality Forecast and PM Action Days for several metropolitan areas throughout Texas, including the Houston area. The TCEQ informs the public typically a day in advance when conditions are forecast to be favorable for high PM levels in any of the participating areas

DRIVE CLEAN ACROSS TEXAS is the nation's first statewide public outreach and education campaign designed to raise awareness and change attitudes about air pollution.

MYSOLUTIONIS.COM. H-GAC has developed a single website address for all air quality initiatives and commute solutions programs. This one website provides air quality information to promote awareness amongst area residents, HR Management, Fleet management, partners and stakeholders. This site also includes upcoming event information and links to recent air quality publications and educational resources.

OZONE VIEWER MOBILE APP. The Houston Clean Air Network (Houston CAN) is a coalition of clean air advocates and health, science and environmental professionals representing businesses, government agencies, schools, community groups and the general public. The Houston CAN in partnership with Air Alliance Houston, American Lung Association and others - has developed an Ozone Viewer Mobile App to help increase education and awareness surrounding air quality in our area. This app can be viewed online at: <http://houstoncleanairnetwork.com/>

AIR QUALITY REFERENCE GUIDE. The Air Quality Reference Guide provides up to date information about air pollution in the Houston-Galveston region.

¹⁷ ENVIRON 2014

DUST SUPPRESSION PROJECTS IN THE CLINTON DRIVE AREA

TCEQ, EPA Region 6, the City of Houston, Harris County Precinct 2, Port of Houston Authority, Port Terminal Rail Authority and local industry have partnered to address PM_{2.5} sources and implement dust suppression strategies to reduce PM_{2.5} emissions near the Clinton Drive area.

TCEQ approved a supplemental environmental project (SEP) to pave the parking lot directly adjacent to the Clinton Drive monitoring station. The paving was completed in summer 2009.

The City of Houston has installed barriers to keep trucks from driving onto the unpaved shoulder. Additionally, a traffic light was installed at Clinton Drive and Industrial Park East to control traffic. A landscaping project was completed along Clinton Drive. Since implementation, these dust suppression projects have proven PM_{2.5} reduction benefits (not solely PM₁₀ benefits). Speciation data from the Clinton Drive monitor show decreases in dust and soil following the implementation of dust suppression measures.

The Port of Houston Authority (PHA) has established a program to regularly apply emulsified asphalt to reduce dust emissions at steel yards within the Terminal at Turning Basin (since 2009). PHA has applied emulsified asphalt at Industrial Park East (IPE). PHA has also paved 18 acres of land at IPE. Since 2008, PHA has sprayed approximately 48 acres with emulsified asphalt. PHA has also paved the Upper Level Road at Turning Basin, and added capacity from two lanes to four lanes from the main entry gate off of I-610 to the Port Coordination Center.

In addition, industry has undertaken dust suppression efforts near the Port. The Port Terminal Railroad Association (PTRA) has stopped steel loading activities on a dirt area to the south of the Clinton Drive monitor to reduce dust. DuPont, a PHA tenant, implemented new dust control best management practices at its fluorspar unloading and storage facility. Valero Asphalt paved its large land leases located across Clinton Drive to the southeast of the Clinton monitor.

CITY OF HOUSTON

ADDITIONAL CHARGING STATIONS

Participation in Department of Energy's (DOE) Electric Vehicle (EV) Project, with partner Ecotality, added 77 additional Blink charging stations in Houston, including 24 at the airports and 29 in downtown Houston. Through this program, participants, including the City of Houston and other businesses, received charging stations at no cost and an additional credit to install the charging station.

ANTI-IDLING POLICY

In 2011, the City adopted an anti-idling policy for municipal vehicles. Section 7.2.29 of the Administrative Procedure for Motor Vehicle Assignment and Use states:

“No employee shall cause or allow an engine of a City vehicle that is within his or her custody or control to idle for more than five consecutive minutes in a one-hour period when the City vehicle is not in motion or when the other engine is not being used for its primary function.”

HOUSTON AIRPORT SYSTEM EMISSIONS REDUCTIONS

To reduce emissions from flights, winglets are being utilized to reduce fuel consumption by 6%. Improvements to airfield runways, taxiways, and gates/ramp reduced aircraft taxi and idle times which resulted in both fuel consumption and associated emissions reductions and improved air quality.

The Houston Airports have reduced the use of auxiliary power units (APUs). APUs are small on-board turbines that are operated to provide electrical power and air conditioning to an aircraft when it is parked at a gate and the main engines are shut down. Installation of gate electrification equipment enables parked aircraft to forego the use of APUs which results in a reduction in both jet-fuel consumption and associated emissions.

Rental car companies formerly operated out of separate facilities located both on airport and off-airport. Houston Airport System constructed a Consolidated Rental Car Facility on airport property south of the terminal area, significantly reducing the mix of numbers, types, and ages of the existing buses operated by the various rental car companies. This resulted in a reduction in both diesel fuel consumption and associated emissions.

HOUSTON BIKE SHARE PROGRAM

In April, 2013, the City expanded Houston Bike Share (www.houston.bicycle.com) to encourage biking in Houston. Houston now has over 200 bikes and 28 kiosks throughout downtown and adjacent neighborhoods (Montrose, Midtown, East End, Heights, and the Museum District). The Houston Bike Share program Phase III expansion plans include bike share kiosks at the city's universities, the Texas Medical Center, and additional neighborhoods.

METAL RECYCLERS TASK FORCE

The City and a metal recyclers' task force are working together in characterizing emissions from metal recyclers, assessing the potential risks that may be posed by the emissions, recommending and implementing best emissions-mitigating-practices, such as altering metal cutting methods to reduce fine particulate emissions.

SAFE PASSAGE ORDINANCE AND COMPLETE STREETS POLICY

The City approved a Safe Passage ordinance in May 2013 to keep bicyclists and pedestrians safer on city streets and encourage more outdoor activity. In October 2013, Mayor Parker unveiled a transformative new approach for Houston streets that will accommodate the needs of all users, not just those behind the wheel. The Mayor's Complete Streets and Transportation Plan is meant to provide safe, accessible and convenient use by motorists, public transit riders, pedestrians, bicyclists, and people of all abilities. The new policy, detailed in a draft executive order from the Mayor, will be achieved over time as improvements to existing roadways and redevelopment occur.

SPACE UNITS

In 2011, 17 mobile solar-powered generators (SPACE units) were acquired through a partnership with the University of Houston School of Architecture's Green Building Components Program and placed at fire stations, parks, neighborhood centers and schools; these units reduce the use of diesel generators in an emergency.

VOLUNTARY ENVIRONMENTAL COMPLIANCE AGREEMENTS

The City and industrial businesses have voluntarily implemented environmental compliance agreements that help reduce emissions. By these agreements businesses have modified operational controls minimizing particulate and visible emissions, such as from painting and abrasive blasting operations in the ship channel area.

HARRIS COUNTY ENHANCED ENFORCEMENT PROGRAM - SMOKING VEHICLES

The Harris County Sheriff's Department, the Precinct 4 Constable's Office, and the Precinct 5 Constable's Office have implemented an emissions enforcement program to ensure that all vehicles on our roads are in compliance with air quality standards. This enforcement program is conducted in collaboration with the Harris County District Attorney's office, the Harris County Judge's office, the Harris County Attorney's office, the Texas Department of Public Safety, and the Houston-Galveston Area Council. Law enforcement personnel target high emitting vehicles, smoking vehicles, and suspicious vehicles to verify that the state inspection certificates attached to these vehicles are legitimate.

METROPOLITAN TRANSIT AUTHORITY OF HARRIS COUNTY

HYBRID BUS FLEET

The Metropolitan Transit Authority of Harris County (METRO) currently operates a fleet of more than 1,230 buses that carry more than 105 million passengers annually¹⁸. Over one-third of the METRO bus fleet – over 440 buses - has been converted to clean-running, diesel-electric hybrid technology – resulting in significant PM reductions for the HGB region.

METRO BIKES ON BUSES

There are a growing number of bicycle and pedestrian paths and walkways and a concentrated effort to connect these walkways with activity centers and transit centers. All METRO buses are equipped with bike racks, with the exception of park and ride buses (which have cargo areas for bike storage). METRO's annual bike boardings continue to increase from 2011 through 2013. In 2013, 167,421 bike boardings on buses were recorded¹⁹.

¹⁸ <https://www.ridemetro.org/Community/GoingGreen.aspx>

¹⁹ Metro Bike Boarding Running Count FY 2011 – FY 2014 by month

PORT OF HOUSTON AUTHORITY (PHA)

BAYPORT EXPANSION AND INCREASED EFFICIENCY

The Port of Houston Authority was awarded a \$10 million Transportation Investment Generating Economic Recovery (TIGER) grant to be used toward the expansion of the berth at its Bayport Container Terminal. The grant helped fund the extension of Bayport's wharf and purchase three new electric, rail-mounted gantry cranes to handle the increase in container throughput. The project will allow Bayport to handle more than 2 million 20-foot-equivalent units (TEUs), doubling its present capacity, and will help support international trade with more than 1,000 ports in more than 200 countries. Increased productivity as a result of the expansion is projected to reduce truck waiting and idling times by an estimated 7.6 minutes on average.

CLEANER OPERATING EFFICIENT CRANES

The Port of Houston recently replaced 10 rubber tired gantry cranes (RTGs) at Barbours Cut with 8 newer Tier 3 665hp RTGs (replaced 10 Tier 2 755 hp RTGs). These RTGs will operate about 2,500 hours a year. This is possible because the older cranes average about 4 moves an hour while the new cranes average about 12 to 15 moves per hour. The increased efficiency associated with these cleaner, faster cranes reduces the truck idling and associated emissions at the Port.

CONTAINER TRACKING MOBILE APP

The Port has developed a mobile app that allows drivers to check on the status of a container and its pick up availability. This app reduces the amount of waiting and idling at the Port. It is available for download at: <http://www.portofhouston.com/container-terminals/bayport/container-tracking-mobile-app/>

GATE AUTOMATION

PHA implemented an automated gate system with optical character recognition (OCR) portal to automate equipment identification, traffic processing and damage inspection imaging at the entry gate of the Barbours Cut and Bayport container terminals. The system automatically identifies containers, chassis, and license plates associated with the equipment. Since implementation, gate OCR installation enabled PHA to process trucks twice as fast and reduced idling time by 48%, dramatically reducing emissions.

IDLING PROGRAM

The Port of Houston has an idling program in place for all landside engines at the port, including heavy-duty diesel trucks and cargo handling equipment.

PARTNERSHIPS

PHA was awarded \$1.4 million to replace Port of Houston Authority cargo handling equipment and to repower the 'Sam Houston' tour boat.

In addition, PHA received a \$1.5 million grant as pass-thru to ocean-going shipping lines to demonstrate air quality benefits of switching to lower sulfur fuel in advance of the North American Emission Control Area (ECA) timetable.

TRUCK REGISTRY AND DRAYAGE EXCHANGE (TRADE)

As part of PHA's efforts to exchange older engines with cleaner burning technologies, PHA created public/private partnerships with tenants and stakeholders to implement emission reduction strategies and policies. PHA also provided \$2.2 million in grant funds (pass-thru) to tenants and stakeholders for the replacement, repower, and retrofitting engines and equipment. PHA provided matching dollars as leverage for a \$9 million EPA SmartWay grant to fund the revolving Drayage Loan Program.

RAILROAD PROJECTS

ANTI-IDLING ENGINE CONTROLS

Approximately 60% of UP switcher engines operating in the HGB area have anti-idling controls, which reduce PM emissions.

REFURBISHED SWITCHER AND LOW EMISSION ENGINES

The Port Terminal Railroad Association (PTRA) and Union Pacific (UP) are operating newly refurbished switcher engines on the Clinton line. UP currently has 52 new low-emission genset²⁰ engines in the Houston area. In addition, UP has 13 Tier 2 locomotives funded by Texas Emissions Reduction Plan (TERP).

REGULATORY PROJECTS

A number of regulatory projects have reduced fine particulate matter emissions in the HGB region. Some of these initiatives are outlined below.

EPA'S CONTROL OF EMISSIONS FROM SHIPS

In March 2010, the International Marine Organization (IMO) officially designated waters off North American coasts as an Emission Control Area (ECA) with stringent international emission standards for ships. The first-phase fuel sulfur standard began in 2012. All marine diesel fuels used by ships in the North American ECA are now limited to a maximum fuel sulfur content of 10,000 ppm (1 %).

FEDERAL MOTOR VEHICLE CONTROL PROGRAM

The Federal Motor Vehicle Control Program has significantly reduced exhaust emissions from both light duty and heavy duty vehicles in the HGB area.

²⁰ Genset locomotives are powered by ultra-low-emission diesel engines that are connected to electric generators, thus the name "Generator-Set," or "Genset" switcher. http://www.tceq.texas.gov/assets/public/implementation/air/sip/hgb/hgb_mveb_2012/12002SIP_ado_complete.pdf

INDUSTRY PROJECTS

As of January 2011, approximately 90% of the nation's refinery capacity is under lodged or entered 'global' settlements to reduce SO₂ emissions at both refineries and sulfuric acid plants²¹.

An East Harris County company reduced particulate emissions by an estimated 24 tons per year during 2005 to 2007 with several projects including boiler shutdown, process changes, and cooling tower equipment upgrade. Another company upgraded cooling tower equipment and decreased particulate emissions (quantity not estimated).

Shell Deer Park made several equipment upgrades that reduced particulate and/or sulfur dioxide emissions, including the 2003 installation of a wet gas scrubber on refinery's cat cracker, resulting in the reduction of 61 tpy of PM and 4674 tpy of SO₂ ²². Shell also installed a Flare Gas recovery compressor system on the Deer Park Refinery's East Property Flare at end of 2012 – resulting in the reduction of 2475 tpy of SO₂²³.

Valero Refining has implemented control measures to reduce SO₂ emissions by 3,500 tpy. The Rhodia sulfuric acid plant was projected to decrease its SO₂ emissions by 8,984 tpy from 2005 to 2012.

The Dow Chemical Company completed several shutdowns and upgrades to facilities at Freeport and Deer Park that reduced PM emissions by 192.97 tpy. These projects include: an Acetylene plant shutdown (Deer Park), 2008; Latex plant shutdown (Freeport), 2009; Upgrades to the Dow Pyridine derivatives facility and cooling tower (Freeport), 2009; Power 3, Power 6 and Poly 2 facilities shutdown (Freeport), 2010; EDC VCM facility shutdown (Freeport), 2011; Styrene 1, 2, EBA and distribution facilities shutdown (Freeport), 2012; and improvements to HT cooling Tower in Deer Park, including drift eliminators, 2013.

ENERGY EFFICIENCY IN HGB

In 1999, the Public Utility Commission of Texas (PUCT) adopted rules for the state's Renewable Energy Mandate, establishing a renewable portfolio standard (RPS), a renewable-energy credit (REC) trading program, and renewable-energy purchase requirements for competitive retailers in Texas²⁴.

The State has established the Texas Energy Efficiency resource goal of 20% incremental load growth in 2011, which is equivalent to approximately 0.10% annual savings, with 25% in 2012, 30% in 2013 and onward²⁵.

On January 8, 2014, the City of Houston adopted a Residential Buildings Energy Efficiency Code that is 15% in excess of the state standard. PHA has also adopted an electrical contract which requires 25% renewable energy.

In Fort Bend County, NRG Energy added a 75-megawatt natural gas generating unit to its W.A. Parish power plant. This natural gas unit has higher energy efficiency and less PM_{2.5} emissions than a conventional power plant.

²¹ <http://www2.epa.gov/sites/production/files/documents/refineryinitiative-powerpoint021111.pdf>

²² Based on comparison of 2002/2003 emissions to 2004/2005 emissions

²³ Based on comparison of 2011 emissions versus 2013 preliminary-AEI emissions

²⁴ www.dsireusa.org/incentives/incentive.cfm?Incentive_Code=TX03R&re=1&ee=1

²⁵ www.aceee.org/sector/state-policy/texas

POTENTIAL AND FUTURE PROJECTS

These ideas are NOT commitments of future action. They are merely ideas, and their implementation would be contingent on funding availability, and an affirmative commitment from the proposing agency. All ideas are voluntary and would result in PM benefits.

AIR QUALITY PROGRAMS & PARTNER PROJECTS

CLEAN VEHICLES PROGRAM

The Clean Vehicles Program will continue to provide significant emission reductions within our region. This program has funded replacements of school buses, private fleets, drayage trucks, transit vehicles and more. Since its start, the program has provided over \$78 million in financial aid, replaced over 2,700 engines and developed several alternative fueling stations. In the future, the Clean Vehicles Program will target heavy-duty fleet replacements and will continue to result in both PM and NOx emission reductions for our region.

DOE HYDROGEN FUEL-CELL ELECTRIC HYBRID TRUCK DEMONSTRATION PROJECT

The U.S. Department of Energy (DOE) provided a grant of \$3.4 million for a three-year demonstration project supporting the deployment of 20-zero emission Class-8 Hydrogen fuel cell-electric hybrid trucks at the Port of Houston Authority (PHA). The purpose of the project is to deploy heavy-duty trucks fueled by hydrogen and to demonstrate cost-effectiveness, emissions reduction and commercial viability.

DOE ZERO-EMISSION DELIVERY VEHICLE DEMONSTRATION PROJECT

The goal of H-GAC's Zero Emission Truck project is to demonstrate the effectiveness of all-electric delivery vehicles in the Houston region. H-GAC received more than \$2 million from the U.S. Department of Energy for this project. Project partners will assemble and deploy all-electric delivery vehicles and provide vehicles to partner fleets operating in HGB. Each truck will be delivered with an electric vehicle charging station (EVSE). The vehicles will be deployed and tested over two years to measure emission reductions and evaluate vehicle performance. By deploying zero emission trucks, the project will reduce petroleum consumption and emissions of harmful air pollutants, including PM.

PM FILTER OUTREACH CAMPAIGN

H-GAC is considering the potential application and impact of a PM filter outreach and education campaign for truck drivers. Diesel particulate filters are ceramic devices that collect PM in exhaust steam. The high temperature of the exhaust heats the ceramic structure and allows the particles inside to break down (or oxidize) into less harmful components. When maintained correctly, PM filters reduce emissions of PM, hydrocarbons and carbon monoxide by 60 to 90 percent²⁶. To function appropriately, manufacturers recommend that filters be cleaned every 100,000 miles to prevent clogged filters. The educational component of this campaign would focus on appropriate use and maintenance of PM filters and associated emission reduction technology.

²⁶ EPA http://www.epa.gov/region1/eco/diesel/pdfs/particulate_matter_filter_fact%20sheet.pdf

SECOND REGIONAL TERP

H-GAC has received \$3 million from TCEQ to establish the second Regional Texas Emission Reduction Program (TERP). The Regional TERP provides grants to local governments for the replacement of non-road equipment and on-road vehicles powered by heavy duty diesel engines, and aids in the replacement of drayage trucks associated with the Drayage Loan Program. Regional TERP grant amounts are based upon the NOx reduction created by the equipment and vehicle replacement. These replacements will also result in PM_{2.5} reductions in the HGB area.

HOUSTON INDEPENDENT SCHOOL DISTRICT (HISD)

HISD ELECTRIC VEHICLE SCHOOL BUS DEMONSTRATION PROJECT

This potential future project is being led by National Strategies LLC. as part of a commitment made under the Clinton Global Initiative (CGI), with the support of Houston Independent School District (HISD), TransPower and NRG and others. The demonstration project being considered includes the repower of 4 conventional type-C HISD school buses to all-electric, battery powered vehicles (EV) with vehicle-to-grid (V2G) technology and vehicle-to-building (V2B) capability. The project duration is anticipated to be 2.5 to 3 years, including a 9-month bus operation cycle in summer and winter seasons with a total cost of approximately \$2 million. The overall objectives of the project are to demonstrate the economic viability and air quality benefits of EV V2G school buses in order to speed the adoption of zero-emission school buses and associated emission reductions across the U.S.

CITY OF HOUSTON ONE BIN FOR ALL

The City of Houston recently won a Bloomberg Philanthropies Mayors Challenge grant award to implement One Bin for All, a program which allows residents to discard all materials in one bin, treating trash as valuable assets where up to 75% of the total Municipal Solid Waste may be separated and recycled. It is estimated that the 75% waste stream generates approximately 7 TPY of PM_{2.5} and 13 TPY of PM₁₀ emissions. Diverting 75% of the city's waste stream would substantially reduce the city's current PM emissions footprint and benefit Houston in its ongoing efforts to improve air quality. The City has completed the Request for Qualifications (RFQ) process, is reviewing the information received, and expects to issue a Request for Proposals (RFP) by early 2014. Project selection will be made based on the One Bin objectives, including PM_{2.5} and other emissions reductions.

PORT OF HOUSTON AUTHORITY (PHA)²⁷

EXPANDED DRAYAGE TRUCK REPLACEMENT

In partnership with H-GAC, the Port of Houston Authority submit a proposal to the EPA for 2013 DERA funding for an Expanded Houston-Galveston Drayage Truck Program. This proposal was unsuccessful, but the Port will continue to seek alternative funding. This vehicle replacement program could achieve

²⁷ These ideas are NOT commitments of future action. They are merely ideas, and their implementation would be contingent on funding availability, and an affirmative commitment from the proposing agency. These ideas can be considered as factors in the PM Advance discussion, but they themselves are not open for discussion before RAQPAC. All ideas are voluntary and would result in PM benefits. Contingent on funding, and in conjunction with TxDOT, railroads, the City of Houston, H-GAC, and Harris County

significant PM emission reductions by replacing 25-30 old Class 8 drayage trucks with new 2010-compliant trucks. This program could reduce over 116 tons of NO_x, 5 tons of PM_{2.5} and achieve other diesel emission pollutant reductions at the regional port industrial complex in the Houston-Galveston-Brazoria non-attainment area.

FUTURE DUST SUPPRESSION PROJECTS

Fugitive road dust entrainment rates, whether from parking lots or on the transit network, depend upon the dust loading, vehicle speed and number of vehicles. Dust loading has been controlled by paving unpaved surfaces and regular pavement cleaning or watering or other treatment of unpaved surfaces. The benefits of these programs are proportional to the activity on those surfaces. Analysis of these projects is relatively straightforward given the level of activity and understanding of the dust loading of those areas.

The Port of Houston Authority is planning dust suppression projects in future years. Starting in 2015, emulsified asphalt will be applied to about 12 acres at Industrial Park East (IPE); Approximately 36 acres will continue to have emulsified asphalt sprayed following this initial effort. In addition, the Port will be reconstructing High Level Road from the Main Gate the Port Coordination Center; this roadway and existing lanes will be widened and expanded to allow for increased throughput while suppressing dust. Lastly, the Port will be repaving the entrance to Industrial Park East from Clinton Drive to further reduce PM emissions associated with fugitive road dust.

IMPLEMENTATION OF INTELLIGENT TRANSPORTATION SYSTEMS (ITS)

A potential future project at PHA includes the synchronization of lights, electronic/optic gates and freight messaging for the operational improvement and flow of freight traffic within the region and the Port of Houston/Ship Channel area. Some of these projects are currently listed as capital projects resulting in improved efficiencies at PHA, also resulting in PM reductions.

OTHER REGIONAL PORT PROJECTS

OVERWEIGHT CONTAINER ROUTE BETWEEN HGB REGION PORTS

An overweight or dedicated truck route can improve emissions by reducing stop and go emissions and reducing the number of truck trips. This potential future measure could create dedicated routes able to allow overweight trucks. Dedicated routes could provide a benefit without an overweight allowance by smoothing the traffic flow. In other transportation measures, such as traffic signal improvements, traffic flow improvements have been shown to reduce emissions rates by 5 – 10% for regional fleets. The relative benefit may be higher with heavy-duty trucks than for light-duty vehicles because braking, idling, and acceleration are high emissions modes for trucks.

Overall emission reductions will also depend on the dedicated truck routes and the expected usage of routes. Other considerations include whether infrastructure costs are incurred to allow overweight trucks, create grade separation, or overcome obstacles to allow such trucks routes to be constructed.

RAILROAD PROJECTS

REPLACEMENT OF RAILROAD SWITCHER ENGINES

In the Houston area, there has been discussion regarding a potential future railroad demonstration project involving the replacement of traditional switcher engines with natural gas powered engines. Powering long haul locomotives with LNG would result in PM reduction benefits for the HGB region.

REGULATORY PROJECTS

TIER 3 MOTOR VEHICLE FUEL AND EMISSION STANDARDS

The Tier 3 emission standards include a lower PM emission standard for light-duty gasoline vehicles beginning in 2017 and phasing in through 2025. This means that in addition to the 2007 PM standards for heavy-duty diesel that is reducing PM emissions in the near term, as the fleet turns over, on-road vehicle PM emissions will continue to decrease in the future. The below table shows the effect of Tier 3 emission standards in years 2018 and 2030.

| Pollutant | 2018 | | 2030 | |
|-------------------|------------------------------|---------------------------------|------------------------------|---------------------------------|
| | National Inventory Reduction | Air Quality Inventory Reduction | National Inventory Reduction | Air Quality Inventory Reduction |
| PM _{2.5} | -0.1% | -0.4% | -10.0% | -10.4% |
| NO _x | -9.6% | -9.9% | -24.6% | -25.5% |
| VOC | -2.8% | -2.4% | -15.5% | -14.4% |
| CO | -1.6% | -1.6% | -23.4% | -25.3% |
| SO ₂ | -56.3% | -55.9% | -55.7% | -55.0% |

METROPOLITAN TRANSIT AUTHORITY OF HARRIS COUNTY

ALTERNATIVE FUEL BUSES

METRO is currently investigating the possibility of transitioning their bus fleet to compressed natural gas (CNG), using a phased-in approach. Alternative fueled buses would reduce PM and other emissions.

METRO RAIL

METRO has plans to expand the current light rail network, including the Southeast corridor, North corridor extension and East End corridor LRT extension. These network expansions are included in the Regional Transportation Plan (RTP) and these potential extensions have been modeled accordingly for transportation conformity purposes. METRO has also proposed the University LRT and 90A LRT Commuter Rail projects. These routes would result in reduced congestion and PM emissions in the HGB region.

²⁸ <http://www.epa.gov/otaq/tier3.htm>

CONCLUSION

H-GAC's participation in PM Advance is a successful example of voluntary collaboration between local government, business, industry, citizens and environmental groups in our region. In the past, the HGB region has faced potential nonattainment designations for PM. Since that time, our region has made significant improvements; preliminary 2013 data now show attainment of the 2012 standard for PM_{2.5}.

This Path Forward document establishes a framework to help us continue to meet air quality standards and achieve the Program mission to encourage voluntary accelerated implementation of current clean air strategies and programs. This document compiles information on past and present projects to form a PM baseline that quantifies and justifies project impacts. It also outlines potential future initiatives which will help us continue to prioritize future efforts and particulate matter reductions in our region.

The development of this Path Forward has been a successful starting point for ongoing collaboration. Our region needs to continue to collectively work together to better understand PM. Future growth will inevitably impact particulate matter emissions in our region – whether due to population, industry or economic growth. Through this program, we will continue to work together to understand regional PM emissions and meet our air quality and attainment goals.



Texas Department of Transportation[®]

P.O. BOX 1386 • HOUSTON, TEXAS 77251-1386 • (713) 802-5000

June 19, 2014

Jack Steele
Houston-Galveston Area Council
3555 Timmons Lane
Houston, Texas 77027

RE: Letter of Support for H-GAC Voluntary PM2.5 Advance Path Forward Plan

Dear Mr. Steele:

On behalf of the Texas Department of Transportation (TxDOT) Houston District, I am pleased to present this letter of support for the PM Advance Path Forward Plan developed by the H-GAC Regional Air Quality Planning Advisory Committee (RAQPAC).

TxDOT has been an active participant in the development of this voluntary PM2.5 Advanced Path Forward Plan with RAQPAC and is committed to showing leadership in the effort to reduce vehicle emissions and improve air quality for all Texas citizens. The development of this voluntary Path Forward constitutes a successful collaborative effort amongst area businesses/industry, citizens/environmental groups, local governments, other agencies, interested public and H-GAC. This voluntary action plan will serve as a catalyst for the voluntary accelerated implementation of current clean air strategies and will encourage additional voluntary participation in future PM reduction efforts.

We appreciate the initiative taken by RAQPAC members and H-GAC in developing the PM Advance Path Forward and look forward to future efforts in this area.

If you have any questions regarding TxDOT's support of this proposal, please feel free to contact Andrew C. Mao, P.E., at (713) 802-5301. Thank you for your consideration of this project.

Sincerely,

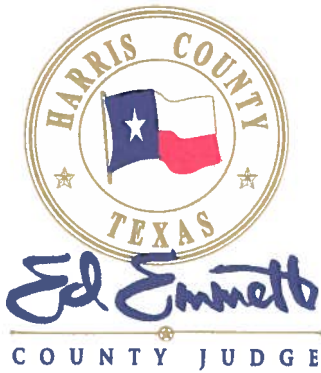
Michael W. Alford, P.E.
District Engineer
Houston District

cc: Andrew C. Mao, P.E.

OUR GOALS

MAINTAIN A SAFE SYSTEM • ADDRESS CONGESTION • CONNECT TEXAS COMMUNITIES • BEST IN CLASS STATE AGENCY

An Equal Opportunity Employer



June 3, 2014

Re: Letter of Support for Houston-Galveston Area Council Voluntary PM 2.5 Advance Path Forward Plan

As Harris County Judge, it is my pleasure to offer support for the PM 2.5 Advance Path Forward plan developed by the H-GAC Regional Air Quality Planning Advisory Committee (RAQPAC).

The development of this voluntary Path Forward constitutes a successful collaborative effort amongst area business/industry, citizen/environmental groups, local government, other agency staff, interested public and H-GAC staff. This voluntary action plan serves as a catalyst for the voluntary accelerated implementation of current clean air strategies and encourages additional voluntary participation in future PM reduction efforts.

We appreciate the initiative taken by RAQPAC members and H-GAC in developing the PM 2.5 Advance Path Forward and look forward to future efforts in this area. If you have any questions regarding my support of this proposal, please feel free to contact Paula Warren at 713-755-4025.

Thank you for your consideration of this project.

Sincerely,

A handwritten signature in blue ink, appearing to read "Ed Emmett", is written over a blue diagonal line that extends from the top right towards the signature.

Ed Emmett

County Judge



CITY OF HOUSTON

Annise D. Parker

Mayor

P.O. Box 1562
Houston, Texas 77251-1562

Telephone – Dial 311
www.houstontx.gov

June 17, 2014

Mr. Jack Steele
Executive Director
Houston-Galveston Area Council
P.O. Box 22777
Houston, Texas 77227-2777

RE: Letter of Support for H-GAC Voluntary PM2.5 Advance Path Forward Plan

Dear Mr. Steele:

On behalf of the City of Houston, I am pleased to present this letter of support for the PM Advance Path Forward plan developed by the H-GAC Regional Air Quality Planning Advisory Committee (RAQPAC).

The City is committed to identifying air quality issues and targeting solutions for the improvement of Houston's health and environment. The development of this voluntary Path Forward constitutes a successful collaborative effort amongst area businesses, industry, environmental groups, local government, other agency staff, interested citizens and H-GAC staff. This voluntary action plan serves as a catalyst for the voluntary accelerated implementation of current clean air strategies and encourages additional voluntary participation in future PM reduction efforts.

We appreciate the initiative taken by RAQPAC members and H-GAC in developing the PM Advance Path Forward and look forward to future efforts in this area. If you have any questions regarding the City of Houston's support of this proposal, please contact Ceil Price, Senior Assistant City Attorney, at (832) 393-6291. Thank you for your consideration of this project.

Sincerely,

CITY OF HOUSTON, TEXAS

A handwritten signature in cursive script that reads "Annise D. Parker".

Annise D. Parker
Mayor



PORT OF HOUSTON AUTHORITY

June 12, 2014

Jack Steele
Houston-Galveston Area Council
3555 Timmons Lane
Houston, Texas 77027

RE: Letter of Support for H-GAC Voluntary PM2.5 Advance Path Forward Plan

Dear Mr. Steele:

On behalf of the Port of Houston Authority (PHA), I am very pleased to present this letter of support for the Voluntary PM2.5 Advance Path Forward Plan developed by the H-GAC Regional Air Quality Planning Advisory Committee (RAQPAC).

PHA has been an active participant in the development of this Voluntary PM2.5 Advance Path Forward Plan and the RAQPAC. This voluntary action plan constitutes a successful collaborative effort amongst area business/industry, citizen/environmental groups, local government, agency staff, interested citizens, and H-GAC staff. We are proud that this effort has been built upon the successes PHA and other stakeholders have had in the reduction of PM2.5 emissions as recorded by the Clinton Drive air monitor. We trust this action plan will serve as a catalyst for the voluntary accelerated implementation of current clean air strategies and encourage additional voluntary participation in future PM reduction efforts.

We appreciate the initiative taken by RAQPAC members and H-GAC in developing the Voluntary PM2.5 Advance Path Forward Plan and look forward to future efforts in this area. If you have any questions regarding the Port of Houston Authority's support of this proposal, please feel free to contact Lily Wells at 713-670-2601. Thank you for your consideration of this project.

Sincerely,

A handwritten signature in blue ink, appearing to read "Charlie Jenkins", is written over the word "Sincerely,".

Charlie Jenkins
Managing Director
Channel Development and Environmental Affairs

**Board of
Directors**

Gilbert Andrew
Garcia, CFA
Chairman

Allen D. Watson
Vice Chairman

Lisa Castañeda
Secretary

Burt Ballanfant
Honorable
Dwight Jefferson

Diann L. Lewter
Jim Robinson

Cindy Siegel
Christof Spieler

**President &
Chief Executive
Officer**

Thomas C. Lambert

June 19, 2014

Mr. Jack Steele, Executive Director
Houston-Galveston Area Council
P.O. Box 22777
Houston, TX 77227-2777

RE: Letter of Support for H-GAC Voluntary PM2.5 Advance Path Forward Plan

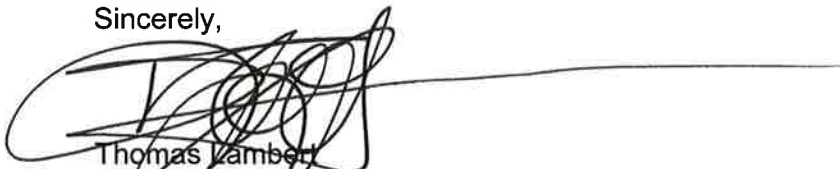
Dear Mr. Steele:

On behalf of the Metropolitan Transit Authority of Harris County, Texas (METRO), I am pleased to present this letter of support for the PM Advance Path Forward plan developed by the H-GAC Regional Air Quality Planning Advisory Committee (RAQPAC).

METRO is the regional transit provider of bus, light rail, transit center/park and ride, HOV/HOT, and paratransit services in order to enhance mobility and ease of traffic congestion throughout the Houston region. In fact, METRO's bus service is the most used bus system in the Texas and the Southwest. The development of this voluntary Path Forward constitutes a successful collaborative effort amongst area business/industry, citizen/environmental groups, local government, other agency staff, interested public and H-GAC staff. This voluntary action plan serves as a catalyst for the voluntary accelerated implementation of current clean air strategies and encourages additional voluntary participation in future PM reduction efforts.

As a committed partner in the mission of improving the region's air quality, we appreciate the initiative taken by RAQPAC members and H-GAC in developing the PM Advance Path Forward and look forward to future efforts in this area. In addition, we continue to support changes in procedures to streamline and expedite regulatory review and approval for project development. If you have any questions regarding METRO's support of this proposal, please feel free to contact Edmund Petry, Manager, Capital & Environmental Planning, at 713.739.4613. Thank you for your consideration of this project.

Sincerely,



Thomas Lambert
President & CEO

cc: Kurt Luhrsen, V.P., METRO - Planning Department
Thomas Jasien, V.P., METRO - Government & Public Affairs
Clint Harbert, Sr. Director, METRO - System Planning & Development
Edmund J. Petry, Manager, METRO - Capital & Environmental Planning

June 18, 2014

Dr. Shankar Chellam
2506 Lansing Circle
Pearland, TX 77584


RE: Letter of Support for H-GAC Voluntary PM_{2.5} Advance Path Forward Plan

I am pleased to write this letter of support for the PM Advance Path Forward plan developed by the H-GAC Regional Air Quality Planning Advisory Committee (RAQPAC). As a Professor of Environmental Engineering at the University of Houston, I am intimately familiar with the health effects of fine PM, their myriad sources, their spatial and temporal variability as well as potential differences in their toxicity based on chemical composition. I strongly believe that the RAQPAC's efforts will improve the respiratory health of Houston's citizens.

The development of this voluntary Path Forward constitutes a successful collaborative effort amongst area business/industry, citizen/environmental groups, local government, other agency staff, interested public and H-GAC staff. This voluntary action plan serves as a catalyst for the voluntary accelerated implementation of current clean air strategies and encourages additional voluntary participation in future PM reduction efforts.

I appreciate the initiative taken by RAQPAC members and H-GAC in developing the PM Advance Path Forward and look forward to future efforts in this area. I would be happy to answer any questions you may have at Chellam@uh.edu. I appreciate your consideration of this project.

Sincerely,

A handwritten signature in black ink that reads "Shankar Chellam". The signature is written in a cursive style with a horizontal line underneath the name.

Shankar Chellam



June 12, 2014

Slack & Co. Contracting, Inc.
2990 Holmes Road
Houston, TX 77051

RE: Letter of Support for H-GAC Voluntary PM2.5 Advance Path Forward Plan

On behalf of Slack & Co. Contracting, Inc., I am pleased to present this letter of support for the PM Advance Path Forward plan developed by the H-GAC Regional Air Quality Planning Advisory Committee (RAQPAC).

The development of this voluntary Path Forward constitutes a successful collaborative effort amongst area business/industry, citizen/ environmental groups, local government, other agency staff, interested public and H-GAC staff. This voluntary action plan serves as a catalyst for the voluntary accelerated implementation of current clean air strategies and encourages additional voluntary participation in future PM reduction efforts.

We appreciate the initiative taken by RAQPAC members and H-GAC in developing the PM Advance Path Forward and look forward to future efforts in this area. If you have any questions regarding Slack & Co. Contracting, Inc.'s support of this proposal, please feel free to contact Dale Kornegay at 713-731-3605. Thank you for your consideration of this project.

Sincerely,

A handwritten signature in blue ink, appearing to read 'Dale Kornegay', is written over a white background.

Dale Kornegay
Director of Business Development
Slack & Co. Contracting, Inc.

Board of Directors

Larry Soward
President

Gavin Dillingham
Vice-President

Greg Broyles, MPH
Treasurer

Jonathan Ross, JD
Secretary

Laura Blackburn
Terri Burton

Rep. Jessica Farrar
Leo Gold, MBA
Charles Irvine, JD
Robert E. Levy, PhD
Brett Perkison, MD,
MPH

Ron Parry, PhD
Lucy Randel
Tom Stock, PhD
Terry Thorn
Terri Thomas
Brian Tison, MD

Staff

Adrian Shelley
Executive Director

Tifani Pust
Artistic/Educational
Programs Director

Belinda Vasquez
Community Outreach
Director

Sara DeMers
Development Director

Brian Butler
Community Outreach
Coordinator

Matthias Jung
Communications
Director

Paige Powell
Administrative
Assistant

May 20, 2014

Houston-Galveston Area Council
P.O. Box 22777
Houston, TX 77227-2777

RE: Letter of Support for H-GAC Voluntary PM2.5 Advance Path Forward Plan

On behalf of Air Alliance Houston, I am pleased to present this letter of support for the PM Advance Path Forward plan developed by the H-GAC Regional Air Quality Planning Advisory Committee (RAQPAC).

The mission of Air Alliance Houston is to reduce air pollution in the Houston region and protect public health and environmental integrity through research, education, and advocacy. The development of this voluntary Path Forward constitutes a successful collaborative effort amongst area business/industry, citizen/environmental groups, local government, other agency staff, interested public and H-GAC staff. Although we would have liked to see the plan become an opportunity for Path Forward participants to offer proposals for new projects to achieve further reduction of PM in the future, we do appreciate that the plan will encourage additional voluntary participation in PM reduction efforts.

We appreciate the initiative taken by RAQPAC members and H-GAC in developing the PM Advance Path Forward and look forward to future efforts in this area. If you have any questions regarding Air Alliance Houston's support of this proposal, please feel free to contact Adrian Shelley. Thank you for your consideration of this project.

Sincerely,



Adrian Shelley
Executive Director
Air Alliance Houston



June 16, 2014

American Lung Association in Texas
2030 North Loop W # 250
Houston, TX 77018

RE: Letter of Support for H-GAC Voluntary PM2.5 Advance Path Forward Plan

On behalf of the American Lung Association in Texas, I am pleased to present this letter of support for the PM Advance Path Forward plan developed by the H-GAC Regional Air Quality Planning Advisory Committee (RAQPAC).

The American Lung Association is the oldest voluntary health organization in the United States. Founded in 1904 to fight tuberculosis, the American Lung Association today fights lung disease in all its forms, with special emphasis on asthma, tobacco control and environmental health. The development of this voluntary Path Forward constitutes a successful collaborative effort amongst area business/industry, citizen/ environmental groups, local government, other agency staff, interested public and H-GAC staff. This voluntary action plan serves as a catalyst for the voluntary accelerated implementation of current clean air strategies and encourages additional voluntary participation in future PM reduction efforts.

We appreciate the initiative taken by RAQPAC members and H-GAC in developing the PM Advance Path Forward and look forward to future efforts in this area. If you have any questions regarding the American Lung Association in Texas support of this proposal, please feel free to contact Christian Stumpf at (602) 363-2696. Thank you for your consideration of this project.

Sincerely,

Paulette Wolfson

Paulette Wolfson
American Lung Association
RACPAC Representative



June 2, 2014

Environmental Defense Fund
301 Congress Avenue, Suite 1300
Austin, TX 78701

RE: Letter of Support for H-GAC Voluntary PM2.5 Advance Path Forward Plan

On behalf of Environmental Defense Fund (EDF), I am pleased to present this letter of support for the PM Advance Path Forward plan developed by the H-GAC Regional Air Quality Planning Advisory Committee (RAQPAC).

EDF, a leading national nonprofit organization, links science, economics, law, and innovative partnerships to create transformational solutions to the most serious environmental problems. Our mission is to preserve the natural systems on which all life depends. The development of this voluntary Path Forward constitutes a successful collaborative effort amongst area business/industry, citizen/ environmental groups, local government, other agency staff, interested public and H-GAC staff. This voluntary action plan serves as a catalyst for the voluntary accelerated implementation of current clean air strategies and encourages additional voluntary participation in future PM reduction efforts.

We appreciate the initiative taken by RAQPAC members and H-GAC in developing the PM Advance Path Forward and look forward to future efforts in this area. If you have any questions regarding Environmental Defense Fund's support of this proposal, please feel free to contact Marcelo Norsworthy at mnorsworthy@edf.org. Thank you for your consideration of this project.

Sincerely,

A handwritten signature in black ink, appearing to read 'E Craft', is positioned above the typed name.

Elena Craft, PhD
Senior Health Scientist
Environmental Defense Fund



June 26, 2014

Mr. Jack Steele
Executive Director
Houston-Galveston Area Council
P.O. Box 22777
Houston, Texas 77227-2777

RE: Letter of Support for H-GAC Voluntary Fine Particulate (PM 2.5) Advance Path Forward Plan

Dear Mr. Steele:

On behalf of the Board of Directors of the Bay Area Houston Transportation Partnership (BayTran), we are pleased to offer this letter of support for the Fine Particulate (PM 2.5) Advance Path Forward Plan developed by the Houston-Galveston Area Council (H-GAC) Regional Air Quality Planning Advisory Committee (RAQPAC). BayTran fully endorses this voluntary action plan and promotes the efforts to introduce innovative clean air strategies.

BayTran is the regional Transportation Management Organization (TMO) for the Houston Bay Area, and was established to address transportation, mobility, and air quality issues in the region. As the Bay Area's TMO, BayTran supports the development of this voluntary Path Forward which constitutes a successful collaborative effort amongst area business/industry, citizen/environmental groups, local government, interested public, and other agency and H-GAC staff. This action plan serves as a catalyst for the voluntary accelerated implementation of current clean air strategies and encourages additional voluntary participation in future PM reduction efforts.

BayTran appreciates the initiative taken by RAQPAC members and H-GAC in developing the PM Advance Path Forward Plan and looks forward to future efforts in addressing air quality issues. If you have any questions regarding BayTran's support of this proposal, please do not hesitate to contact Barbara Koslov, BayTran President. Thank you for your consideration of this project.

Sincerely,

A handwritten signature in black ink that reads "Jon Branson".

Jon Branson
Chair, BayTran

A handwritten signature in black ink that reads "Barbara Koslov".

Barbara Koslov
President, BayTran



June 16, 2014

RE: Letter of Support for H-GAC Voluntary PM2.5 Advance Path Forward Plan

On behalf of the League of Women Voters of the Houston Area, I am pleased to present this letter of support for the PM Advance Path Forward plan developed by the H-GAC Regional Air Quality Planning Advisory Committee (RAQPAC).

The League of Women Voters of the Houston Area has been involved in air quality work for many years, educating the public and advocating for clean air. The development of this voluntary Path Forward constitutes a successful collaborative effort amongst area business/industry, citizen/ environmental groups, local government, other agency staff, interested public and H-GAC staff. This voluntary action plan serves as a catalyst for the voluntary accelerated implementation of current clean air strategies and encourages additional voluntary participation in future PM reduction efforts.

We appreciate the initiative taken by RAQPAC members and H-GAC in developing the PM Advance Path Forward and look forward to future efforts in this area. If you have any questions regarding League of Women Voters of the Houston Area's support of this proposal, please feel free to contact me. Thank you for your consideration of this project.

Sincerely,

Carolyn Mata

A handwritten signature in cursive script that reads 'Carolyn Mata'.

President, League of Women Voters
of the Houston Area