

# Virginia Beach City Public Schools Greenhouse Gas Emissions Inventory

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PREPARED BY:

**MOSELEY** ARCHITECTS  
3200 Norfolk Street  
Richmond, VA 23230

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# Executive Summary

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Virginia Beach City Public Schools, the largest school district in the Hampton Roads region, has long had a strong commitment to sustainability. The district's hard work was recognized by the Virginia School Boards Association with the designation as a "*Certified Green School Division*" in the 2009 Green Schools Challenge. In 2010, VBCPS earned a Platinum level designation in year 2 of VSBA's Green Schools Challenge.

In Fall 2010, as part of its overarching commitment to being a green school division, Virginia Beach City Public Schools committed to conducting a greenhouse gas emissions inventory of all of their holdings under their operational control, in accordance with the spirit of: President Obama's Executive Order *Federal Leadership in Environmental, Energy, and Economic Performance*; Governor McDonnell's Executive Order 19 (2010), *Conservation and Efficiency in the Operation of State Government* and the Virginia Energy Plan (2007); and the *US Mayor's Climate Protection Agreement* (signed by City of Virginia Beach Mayors Oberndorf and Sessoms).

Spanning calendar years 2006-2010, this inventory calculated the school district's emissions using the Clean Air – Cool Planet v6.6 Campus Carbon Calculator, and followed the ACUPCC Implementation Guide. Because this inventory may be of future use to the City of Virginia Beach, the Local Government Operations Protocol (*for the quantification and reporting of greenhouse gas emissions inventories*)[Version 1.1, May 2010] was also used for general guidance in reporting of those emissions.

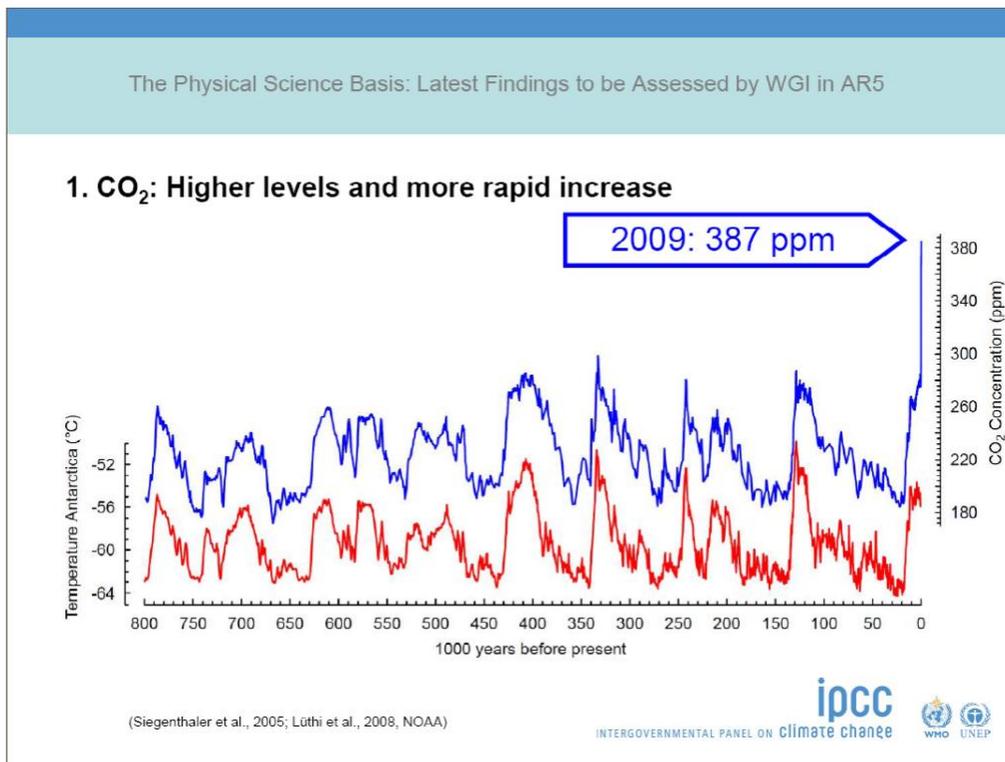
The results of this inventory indicate that the largest emission source associated with the school district is purchased electricity, followed by both student transportation to and from school and faculty/staff commuting. In total, 65% of the emissions coming from VBCPS are building related and 35% are transportation related. All other emissions sources amount to less than 1% of the total carbon emissions of VBCPS.

This report summarizes the process used to develop the green house gas inventory, reports on the findings of the inventory, and outlines the next steps for VBCPS to take on their path to carbon neutrality.

# Study Background

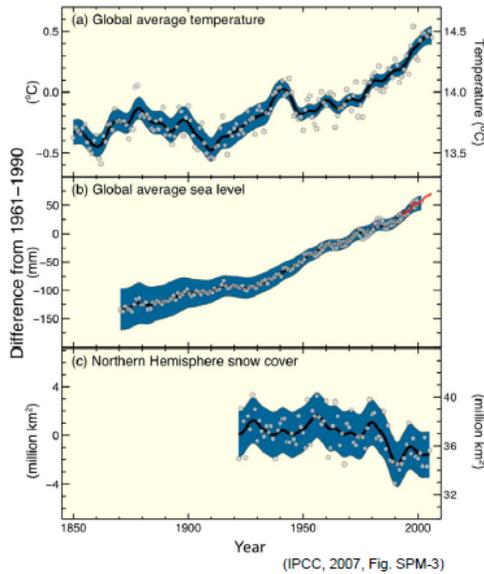
Like most school districts across the country, Virginia Beach City Public Schools (VBCPS) leaves a large environmental footprint in the local community. One way this footprint is now being measured is via carbon emissions into our collective atmosphere. The International Panel on Climate Change has been studying the phenomenon of carbon emissions and the associated effect on our global climate since its founding in 1988, by the World Meteorological Organization (WMO) and the United Nations Environment Program (UNEP). The First Assessment Report in 1990 set the stage for an international treaty to address climate change. The Fifth Assessment Report (AR5) is due to be released in 2014. Over the years since the IPCC was formed, much data has been collected and much thought has gone into the physical science basis, impacts/adaptations/vulnerabilities, and mitigation opportunities.

The image below depicts both atmospheric CO<sub>2</sub> trends and temperature trends in Antarctica (°C) over the last 800,000 years. From this image, it is clear that current CO<sub>2</sub> levels in 2009 are already far outside the range of normal variation that has been seen over time and that the temperature trends seem to follow CO<sub>2</sub> trends.



Furthermore, global average temperature and global average sea level have been steadily rising over the last 150 years, while northern hemisphere snow cover has been decreasing.

The Physical Science Basis: Latest Findings to be Assessed by WGI in AR5



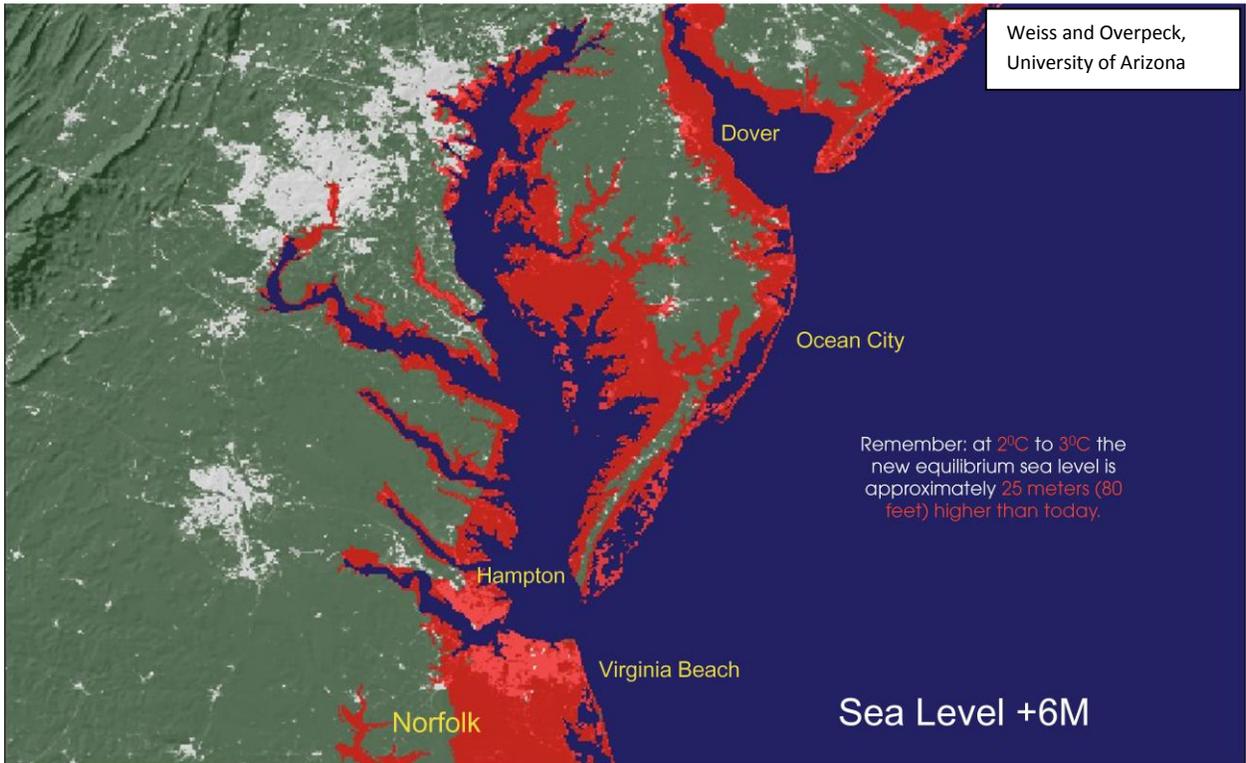
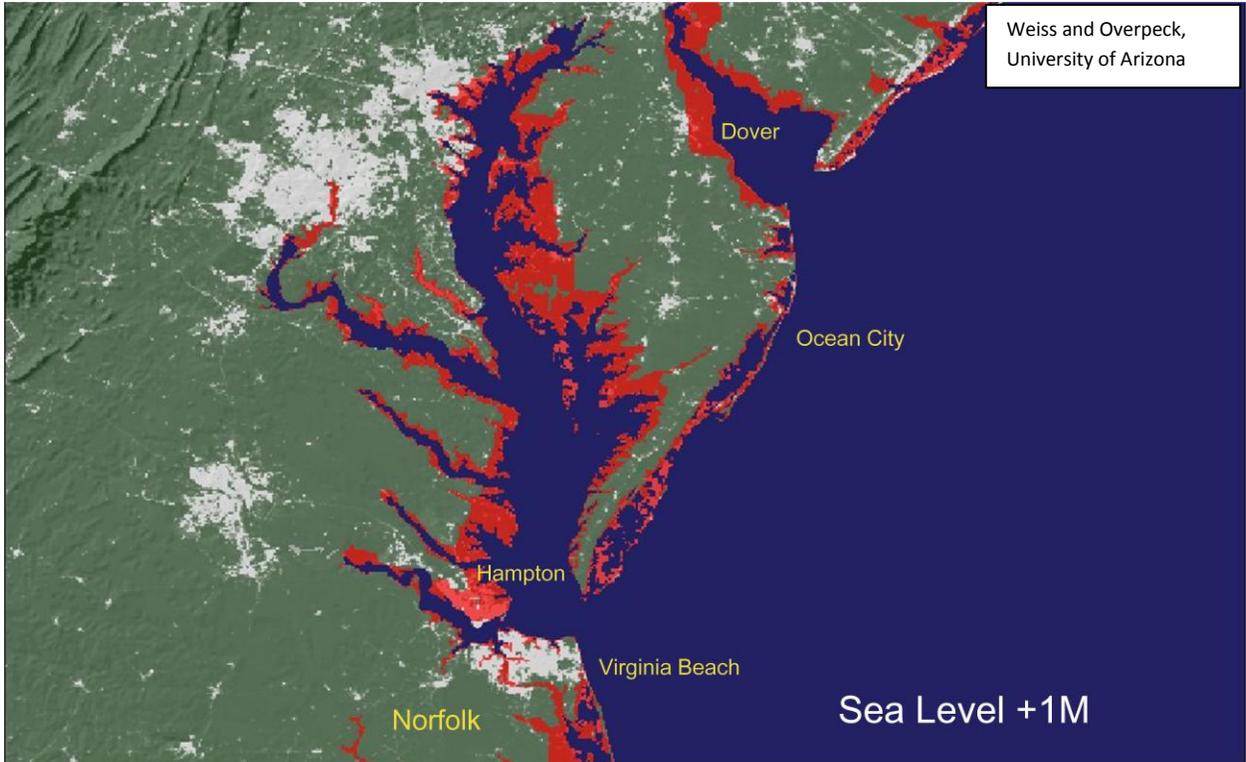
IPCC (2007):

*Warming in the climate system is unequivocal...*

ipcc  
INTERGOVERNMENTAL PANEL ON climate change

WHO  
UNEP

There are a multitude of reasons to be concerned about the consequences of the combustion of fossil fuels and the associated emissions from that combustion. In addition to concerns similar to those of inland peers, individuals living in coastal communities must also be prepared for the possibility of sea-level rise over time. The images below show (in red) the areas that would be inundated if the sea rose 1 meter and 6 meters, respectively:



Approximately eight years ago, due to growing concerns about the school district's environmental footprint, VBCPS began to look at how to transition the district to a more sustainable model. The objective was simple: Be part of the solution, not of the problem. Three goals are moving VBCPS towards that objective.

Since buildings, and the building process, have the greatest environmental impact on greenhouse gas emissions, natural resources, and energy consumption, VBCPS's first goal is to build sustainable buildings. Hermitage Elementary School became the first LEED certified Elementary School in VA in 2005. Since that time, VBCPS has continued to raise the bar in school design and construction, requiring each new building to be a low-energy, high performance building.

Integrating environmentally sustainable practices throughout the division is the second critical goal. A sustainable schools committee, comprised of individuals from departments within the school division, oversees the implementation of this goal. Members of this committee participated in this study.

The first two goals act as a conduit to the third goal of educating the public about the importance of environmental sustainability. Understanding the school division's impact on the environment is a key component to sustainability education.

The following study is one component in developing a clear plan to increase the public's awareness about this important issue.

# Methodology: GHG Emissions Inventory

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Virginia Beach City Public School's GHG Emissions Inventory was conducted in 2010-2011 by Moseley Architects, working with representatives from the VBCPS's Sustainable Schools Committee (see Appendix B). In order to develop useful historical trends against which to measure future progress in emissions reductions, the Inventory was completed for calendar years 2006-2010.

This inventory was conducted using the Clean Air – Cool Planet v6.6 Campus Carbon Calculator, with additional reporting guidance taken from the Local Government Operations Protocol (version 1.1, May 2010).

A summary of the findings, in general terms, is presented within the body of his report. A summary of the findings following the "Local Government Operations Standard Inventory Report" guidelines is provided in Appendix A.

The geographic boundary for the Inventory includes all the buildings under the operational control of VBCPS between the study years at the following locations:

1. All K12 schools within the district
2. Administration Building
3. Building #16

VBCPS also occupies certain facilities not under their operational control; these facilities are not accounted for in this inventory:

1. Office of Consolidated Services/ Organizational Development (Princess Anne Building, 2387 Court Plaza Drive 23456)
2. Office of Guidance Services and Student Records (Commonwealth Building; 520 South Independence Blvd 23452)
3. Department of Technology Annex-Pungo Building (Pungo Building; 2380 Court Plaza Drive 23456)

Using the Clean Air-Cool Planet (CA-CP) v6.6 Campus Carbon Calculator, the study team was able to determine the district-wide emissions for each of the study years. Data sources and calculations used as the basis for entries into the CA-CP v6.6 calculator are described, as follows:

## **Institutional Data – Budget**

**Operating budget** was provided by Facilities Planning & Construction. This data is routinely reported in fiscal year (FY) format, and so the following process was used for conversion to calendar year (CY) format:

Step 1: divide FY budget amount by 2, to provide an approximate July-December budget amount and an approximate January-June budget amount.

Step 2: assign each 6-month budget amount to its appropriate calendar year.

Step 3: add the two 6-month budget amounts from the same calendar year together, to get a full approximate budget amount for that calendar year.

**Energy budget data** was provided by School Plant Services, Environmental & Energy Management. This data is routinely reported in fiscal year (FY) format, and so the following process was used for conversion to calendar year (CY) format:

Step 1: divide FY budget amount by 2, to provide an approximate July-December budget amount and a January-June budget amount.

Step 2: assign each 6-month budget amount to its appropriate calendar year.

Step 3: add the two 6-month budget amounts from the same calendar year together, to get a full approximate budget amount for that calendar year.

Virginia Beach City Public Schools does not have a **research budget**.

*Please note that the CA-CP v6.6 calculator adjusts these calculated budget numbers to take them all back to 2005 equivalents.*

## **Institutional Data – Population**

**Student population data** was provided by the Office of Demographics and Planning. This data is routinely reported in school year (SY) format, and so the following process was used for conversion to calendar year (CY) format:

Step 1: divide SY population number by 2, to provide an approximate July-December population and an approximate January-June population.

Step 2: assign each 6-month population to its appropriate calendar year.

Step 3: add the two 6-month population numbers from the same calendar year together, to get a full approximate population for that calendar year

Summer school students are reported for the calendar year during which the summer session was held. Summer school students were only counted once in a year, regardless of how many sessions or schools were attended. Students enrolled in summer school for only a day were excluded. Students flagged as invalid enrollments were excluded.

**Faculty and staff population data** was provided by the Department of Human Resources. Faculty and staff population is reported in school year format, and so was converted to calendar year format using the same steps as described above in “student population data.” Faculty and staff data was reported in one lump sum, and was entered into the CA-CP v6.6 calculator in the “staff” column.

**Total building space data** was prepared by the Office of Demographics and Planning. Total square footage is reported by school year (e.g., 2006-2007). Entries into the CA-CP v6.6 calculator took the school year value and reported it in the calendar year associated with the first half of the school year (e.g., for the 2006-2007 school year, the square footage is reported in the calculator as the 2006 calendar year total square footage).

**Total research building space** was not reported, as this category is not applicable to K12 school districts.

## Scope 1 Emission Sources

### *On-campus cogeneration*

Not applicable

### *On campus stationary sources*

**Natural gas** data was provided by School Plant Services, Environmental & Energy Management. This data was reported in fiscal year format, and so was converted to calendar year format using the same three step method as described in the “budget” and “population” sections above. The data was then further converted from CCF (reported units) to MMBTU (calculator input units) by multiplying the CCF value by 0.1.

**Propane** is used in science laboratories, for educational purposes only. The amount of propane combusted is small enough to be considered a *de minimus* emissions source for the purposes of this inventory.

**Fuel oil** (#2 distillate) is not used by Virginia Beach City Public Schools.

### *Direct transportation sources*

**VBCPS fleet** fuel data was reported by Transportation Services. Vehicle fuels consumed by the VBCPS fleet during the study period included gasoline, diesel, compressed natural gas, and B20. For compressed natural gas, data was only available from July 2006 forward, so the first ½ of 2006 is estimated to be the same as the second ½ of that same year.

Gasoline, diesel, and B20 were all reported in gallons, which is the same unit of measurement reported in the calculator. Compressed natural gas, however, was reported in “gas gallon equivalent” (GGE), while the CA-CP v6.5 calculator requires reporting in million BTU (MMBTU). The conversion from GGE to MMBTU used the following assumptions:

$$1 \text{ GGE} = 126.67 \text{ ft}^3$$

$$1 \text{ ft}^3 = 900 \text{ BTU}$$

The conversion from GGE to MMBTU is as follows:

$$\frac{[(\text{GGE consumed} * 126.67 \text{ ft}^3/\text{GGE}) * 900 \text{ BTU}/\text{ft}^3]}{1,000,000 \text{ BTU/MMBTU}}$$

### ***Refrigerants and chemical sources***

**Refrigerant** release data is not currently tracked by Virginia Beach City Public Schools, and is therefore not reported in this inventory.

### ***Agriculture sources***

**Fertilizer** application data was provided by Virginia Beach Parks and Recreation, Landscape Services Division.

## **Scope 2 Emission Sources**

### ***Purchased Electricity, Steam, and Chilled Water sources***

**Electricity data** was provided by School Plant Services, Environmental & Energy Management. The eGRID subregion symbol was set to SRVC (correlating region name is SERC Virginia/Carolina) and the CA-CP v6.6 default fuel mix was used.

**Steam** is not used by Virginia Beach City Public Schools.

**Chilled water data** is not tracked by Virginia Beach City Public Schools. The only VBCPS building served by chilled water generated by the City of Virginia Beach is the Admin Building. For the purposes of this inventory, emissions related to this small volume of chilled water will be considered *de minimus* and are not reported.

## **Scope 3 Emission Sources**

### ***Commuting***

**Faculty commuting data** was provided by the school division's Demographics/Facilities GIS Analyst. Faculty data is reported in the same column as staff commuting in the calculator, because staffing numbers kept by VBCPS did not differentiate between "faculty" and "other staff".

**Staff commuting data** was developed based on the "best assumptions" of the Sustainable Schools Committee members participating in this study:

- a. 99.5% of staff arrive in personal vehicle
- b. 0.5% of staff carpool

- c. 0% of staff arrive by bus
- d. 0% of staff arrive by light rail
- e. 0% of staff arrive by commuter rail
- f. Staff make an average of 10 one-way trips per week to school
- g. Staff commute 40 weeks out of the year (accounting for vacation time, sick time, and 4-day work-week in summer months)
- h. Average commute distance is 15 miles, one way

**Student commuting data** was generally developed based on the “best assumptions” of the Sustainable Schools Committee members participating in this study. However, certain pieces of data were available regarding bus commute, and were provided by Transportation Services. All data provided was based on school year, so the same method as described many times above was used to convert school year data to calendar year data.

The percentage of “arriving in personal vehicle” students was able to be determined because VBCPS knows how many students are enrolled as of Sept 30 of each school year, and track how many students ride a bus to school. Students who do not ride the bus are considered, for the purposes of this study, to arrive at school in a single occupancy vehicle:

- a. 2006: 15% of students arrived in personal vehicle (including parental drop-off)
- b. 2007: 15% of students arrived in personal vehicle (including parental drop-off)
- c. 2008: 15% of students arrived in personal vehicle (including parental drop-off)
- d. 2009: 20% of students arrived in personal vehicle (including parental drop-off)
- e. 2010: 25% of students arrived in personal vehicle (including parental drop-off)

The following are the assumptions made about the commuting patterns of non-bus-riding students:

- a. 0% of students arrive in a carpool
- b. Students make an average of 10 one-way trips per week to school
- c. Students commute 38 weeks out of the year
- d. Average commute distances in 5 miles one way

Please note that the emissions coming from the VBCPS school bus fleet are considered to be scope 1 emissions, while the emissions coming from faculty/staff personal commutes and the emissions coming from students arriving in single-occupancy vehicle commutes (or being dropped by parents) are considered scope 3 emissions.

### ***Directly Financed Outsourced Travel***

**Air travel data** was not reported. The emissions by VBCPS sponsored air travel are not currently tracked, and are considered to be *de minimus* for the purposes of this inventory.

**Train, taxi, ferry, rental car, and bus data** was not reported. The emissions by VBCPS sponsored train/taxi/ferry/rental car/bus travel are not currently tracked, and are considered to be *de minimus* for the purposes of this inventory.

**Personal Mileage Reimbursement data** was provided by not reported. The emissions by VBCPS sponsored air travel are not currently tracked, and are considered to be *de minimus* for the purposes of this inventory.

***Study abroad travel***

**Study abroad travel data** was not reported. While there are study abroad opportunities at VBCPS, the emissions by VBCPS sponsored study abroad travel are not currently tracked, and are considered to be *de minimus* for the purposes of this inventory.

**Solid waste data** was provided, in part, by the Waste Management Administrator for the City of Virginia Beach. Some assumptions were made in terms of total quantity of waste generated, because accurate weights are not currently tracked.

In general terms, the solid waste is picked up by a contractor on a prescribed schedule (all schools are picked up three times a week, except Princess Anne HS (5), First Colonial HS (4), and Linkhorn and Creeds ES (2)). The trucks also pick up waste from other customers along the same route, so non-school waste is commingled with others' waste. These trucks dump their loads at the Landstown Transfer station, where it is screened and separated by staff members. Waste that is determined to be combustible is loaded onto SPSA transfer vehicles and hauled to the "Refuse Derived Fuel" (RDF) plant and incinerated. Waste that is not combustible is taken to a landfill where it is buried under six inches of soil. The Bethel landfill has a methane recovery system with electric generation. For the purposes of this inventory, it is assumed that 95% of the waste generated by Virginia Beach City Public Schools is sent to the RDF facility, and the 5% balance is sent to the Bethel landfill.

Solid waste is provided to schools under contract. The level of service is measured in number and frequency of service for (typically) 8 cubic yard front load containers. These are not weighed individually.

In April 2010, the Lynnhaven Middle School's Environmental Club and the Virginia Beach Project Green Teens conducted an Earth Day "Dumpster Dive" to quantify the amount and the type of waste leaving the school. The "dumpster dive" study was used as the basis of the assumption in this Greenhouse Gas Inventory that the average school dumpster is  $\frac{3}{4}$  full when picked up by the waste hauler, and weighs 464 pounds.

Virginia Beach City Public Schools does keep track of how many dumpsters are at each facility, and how many times each dumpster is emptied by the waste contractor. A total tons-per-year of waste generated estimate was calculated using the following formulas:

Pounds of waste per pickup = [number of containers] \* 464 pounds

Pounds of waste per week = [pounds of waste per pickup] \* [pickup frequency]

Pounds of waste per year = [pounds of waste per week] \* 38 weeks

Tons of waste per year = [pounds of waste per year] / 2000

This calculation was conducted for each facility in this inventory, and then summed for the entire school district.

### ***Wastewater***

**Wastewater data** was provided by School Plant Services, Environmental & Energy Management

All wastewater from the City of Virginia Beach (including VBCPS) is treated at either the Atlantic Plant or the Chesapeake-Elizabeth Plant. Both plants use anaerobic digestion water treatment technology.

### ***Paper***

**Paper usage data** was not reported, as pounds of paper with various recycled content values is not currently tracked within the VBCPS accounting systems. It is, therefore, not included in this inventory.

### ***Offsets***

**Carbon offset data** was provided by the Sustainable Schools Project Manager. The Renewable Energy Certificates (RECs) reported for Renaissance Academy were for a 2 year offset, so only ½ of the quantity purchased (1,346,362 kWh) was input into the calculator for the 2010 calendar year.

**Composting** data was provided by the Sustainable Schools Project Manager:

VBCPS has 50 schools that have outdoor gardens and estimate that half of those are participating in composting. A conservative estimate would be 100-200 lbs of material each school year per school.

However, because this data is not formally tracked, it is not reported in the calculator.

### ***Other***

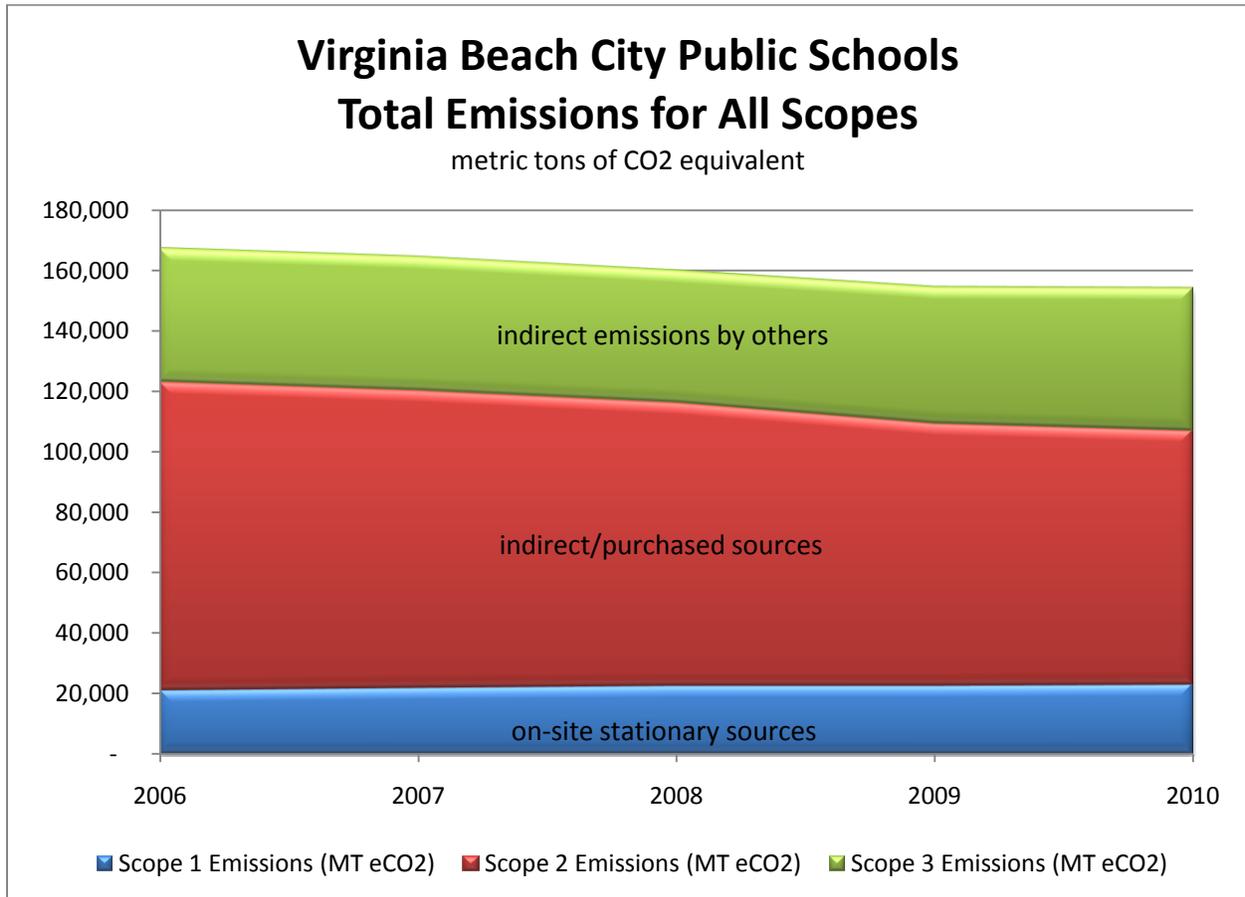
**Electricity (scope 2) Transmission & Distribution losses** were generated by the CA-CP v6.6 calculator.

# Findings: GHG Emissions Inventory

The 11 main emission sources contributing to Virginia Beach City Public Schools' "carbon footprint" were analyzed at several different levels of detail.

As shown below, in Figure 1, emissions were grouped by scope and trended over time, to determine which scope was the largest contributor to VBCPS's overall emissions and in which direction the trend was headed. When the data is aggregated and viewed in this graphical format, it is clear that Scope 2 (purchased electricity) emissions are the biggest contributors to VBCPS's carbon footprint, but that they are showing a decreasing trend line over time.

Figure 1



The major contributors within each scope were also analyzed for the most current year data was available (2010):

Figure 2

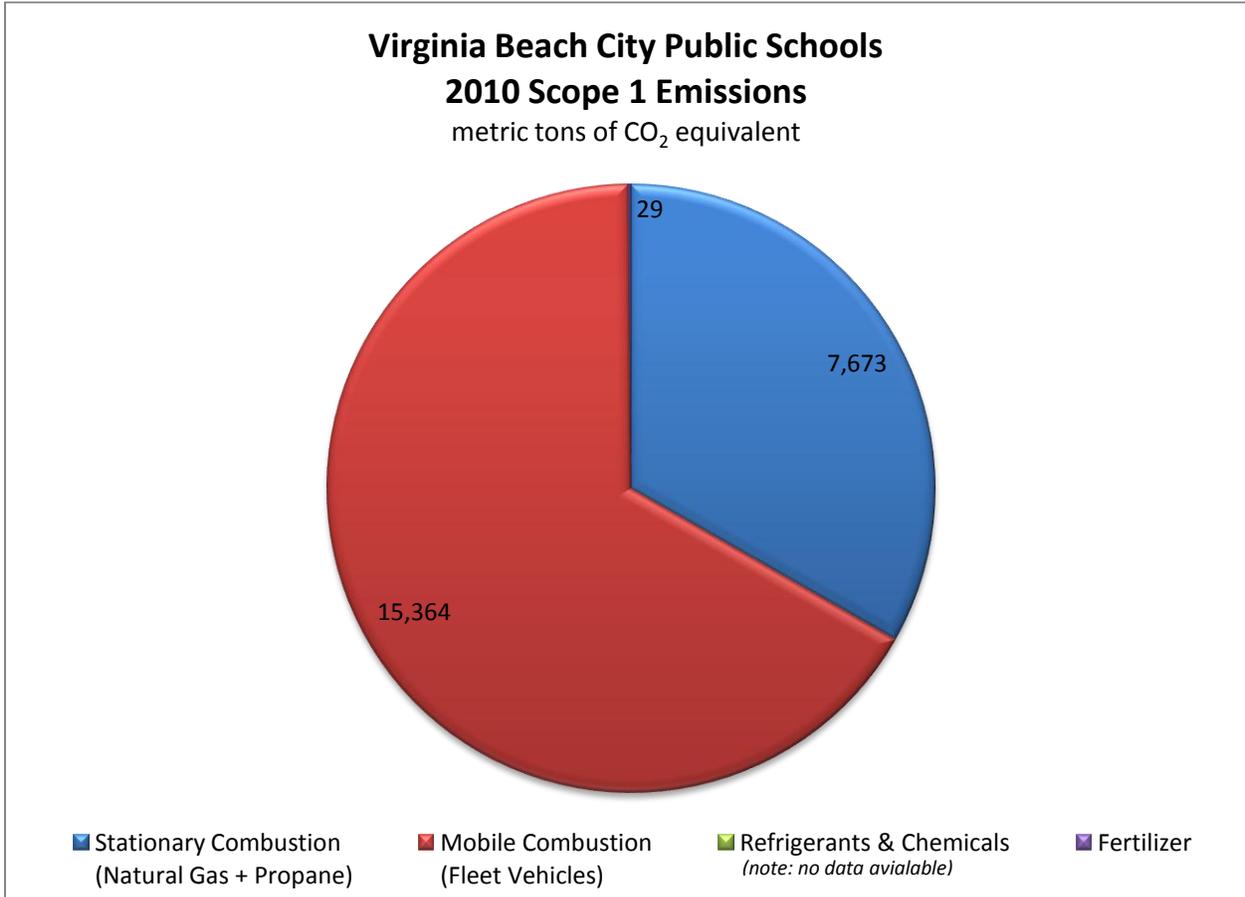


Figure 3

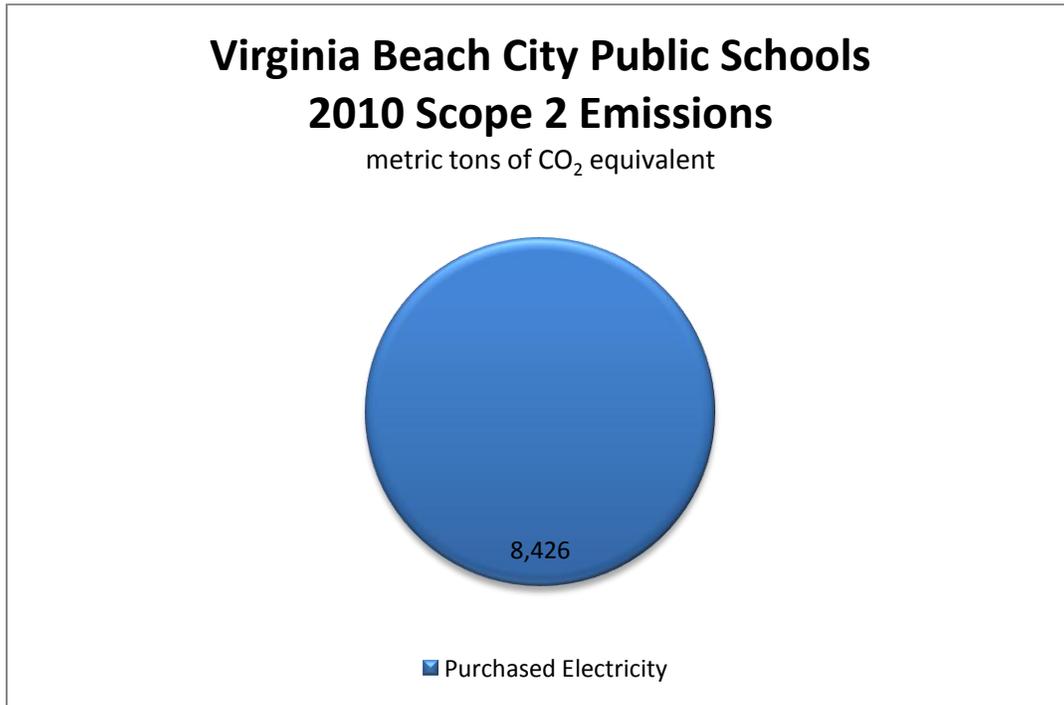
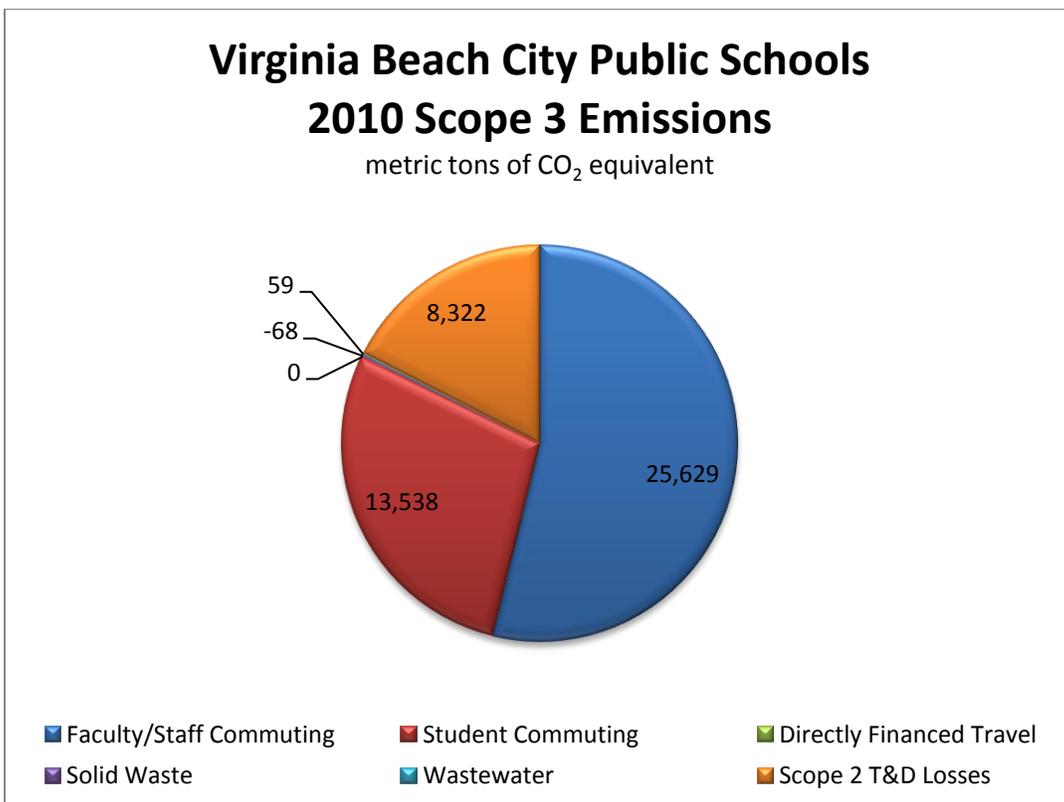


Figure 4

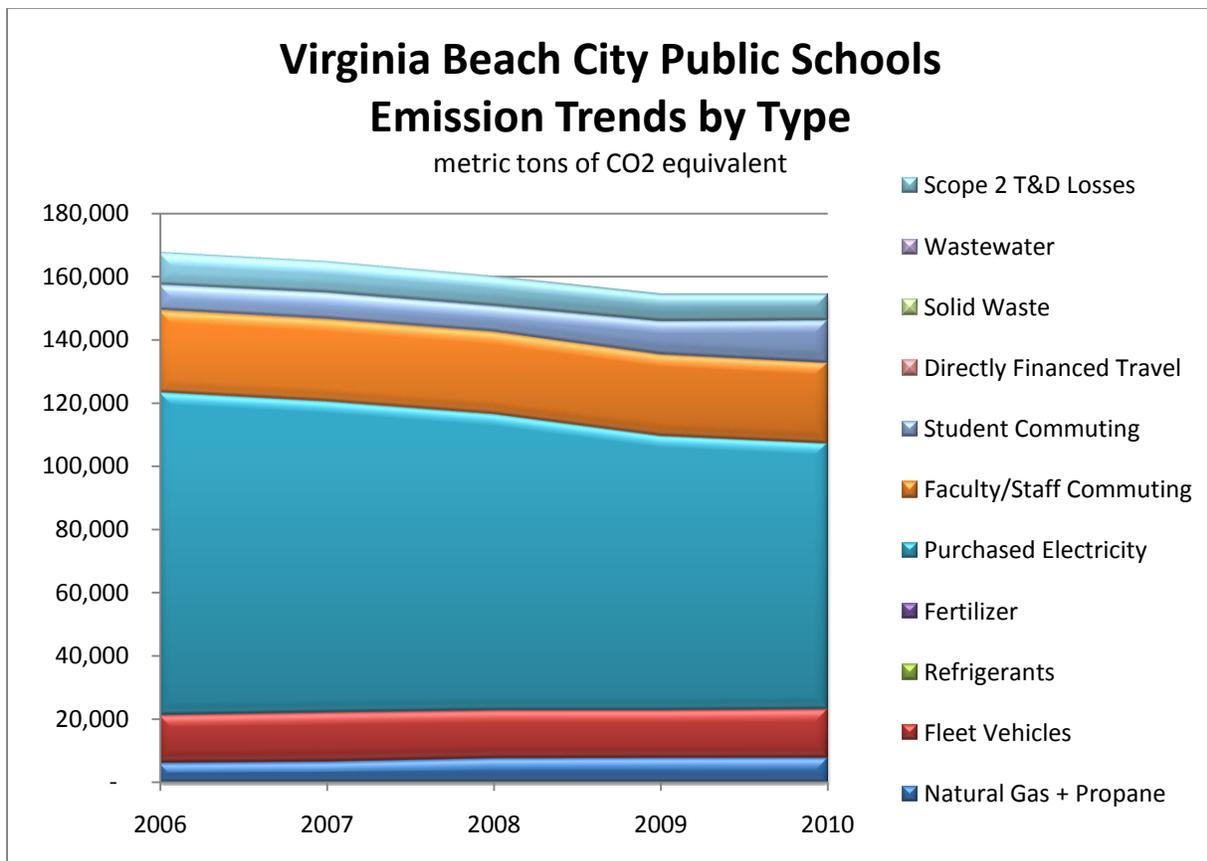


When looking at the data from this perspective, it is clear that the major Scope 1 contributor is fleet vehicles (primarily the school bus fleet), the major Scope 2 contributor is the purchase of electricity, and the major Scope 3 contributor is emissions from faculty and staff commuting (followed by emissions from vehicles dropping students off at school).

It is important to note that, while being aggressive with reducing emissions from the major contributors within each scope, minor contributors should not be overlooked. For instance, within the Scope 1 emissions total, refrigerants are not currently being tracked and reported; it will be important for future inventories to put additional emphasis on finding, correcting, tracking, and reporting refrigerant leaks.

The study team next looked at the data through a more detailed lens of how much each of the individual emission sources has been contributing to the overall carbon footprint over the five year study period (see Figure 5). This particular view of the data emphasizes the major contribution of purchased electricity (through direct use and through transmission and distribution losses) to VBCPS’s carbon footprint. The movement of people (students on school buses, students being dropped off, and faculty/staff commuting to work) appear to be secondary contributors, while the use of natural gas, propane, refrigerants & fertilizers, and fugitive emissions from wastewater appear to be relatively minor contributors. The diversion of solid waste to a “refuse derived fuel” facility actually reduces VBCPS’s eCO<sub>2</sub> emissions by approximately 68 metric tons a year.

Figure 5



Looking at the data from this perspective also illustrates that the relative magnitude of on-site stationary (natural gas & propane) and on-site mobile sources (fleet vehicles) have remained fairly stable over the last five years, while purchased electricity has shown a clear downward trend.

Two additional common trends analyzed in greenhouse gas inventories are emissions per enrollment and emissions per 1,000 square feet of campus buildings:

Figure 6

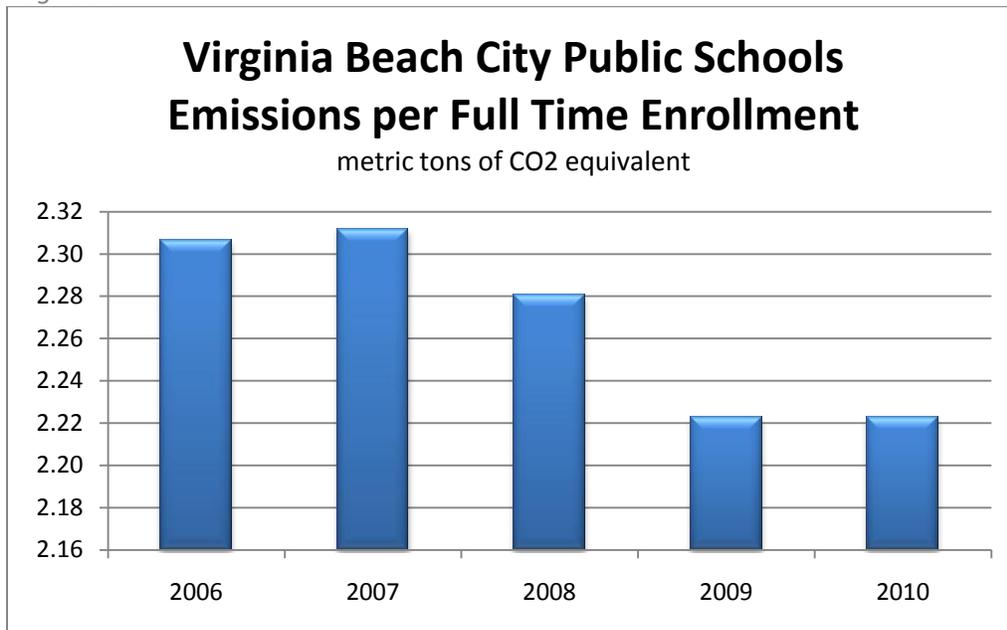
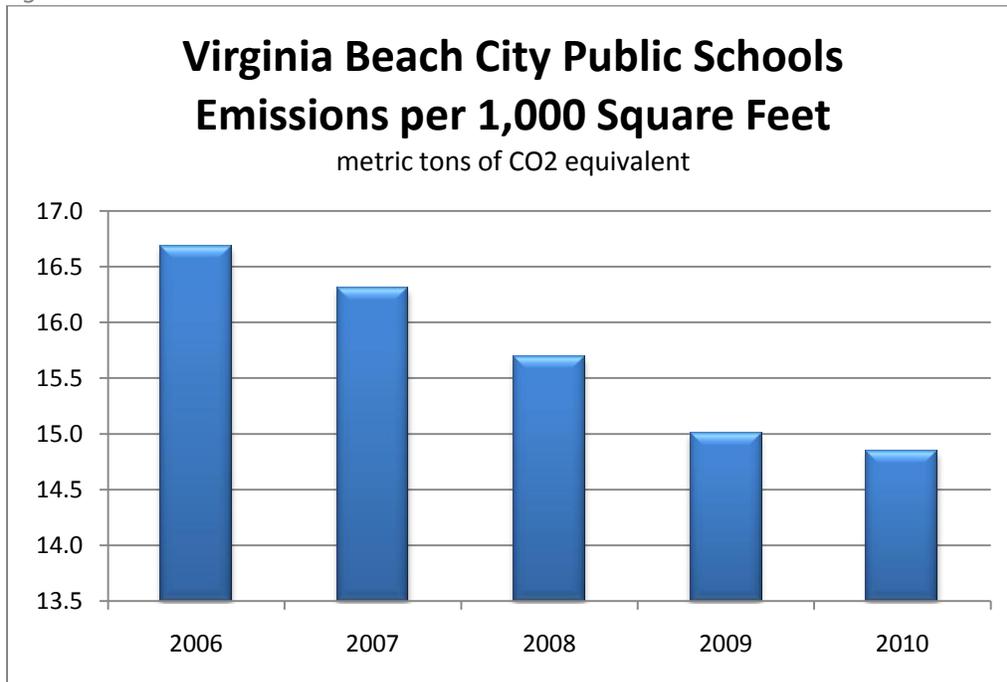


Figure 7



It is interesting to note that both the CO<sub>2</sub> emissions per full time enrollment trends and the CO<sub>2</sub> emissions per 1,000 square feet have a strong downward trend over the study period.

The final view of the data takes a look at the relative magnitude of emissions trends over time, grouped into three major categories:

- 1) Building Related
  - a) Oil Distillate #2 + Natural Gas + Propane
  - b) Electricity used
  - c) Electricity T&D losses
- 2) Transportation Related
  - a) Fleet Vehicles (school bus fleet)
  - b) Commuting by faculty and staff
  - c) Commuting by students
- 3) Other
  - a) Refrigerants + Fertilizers
  - b) Directly Financed Travel
  - c) Solid Waste
  - d) Wastewater

Figure 8

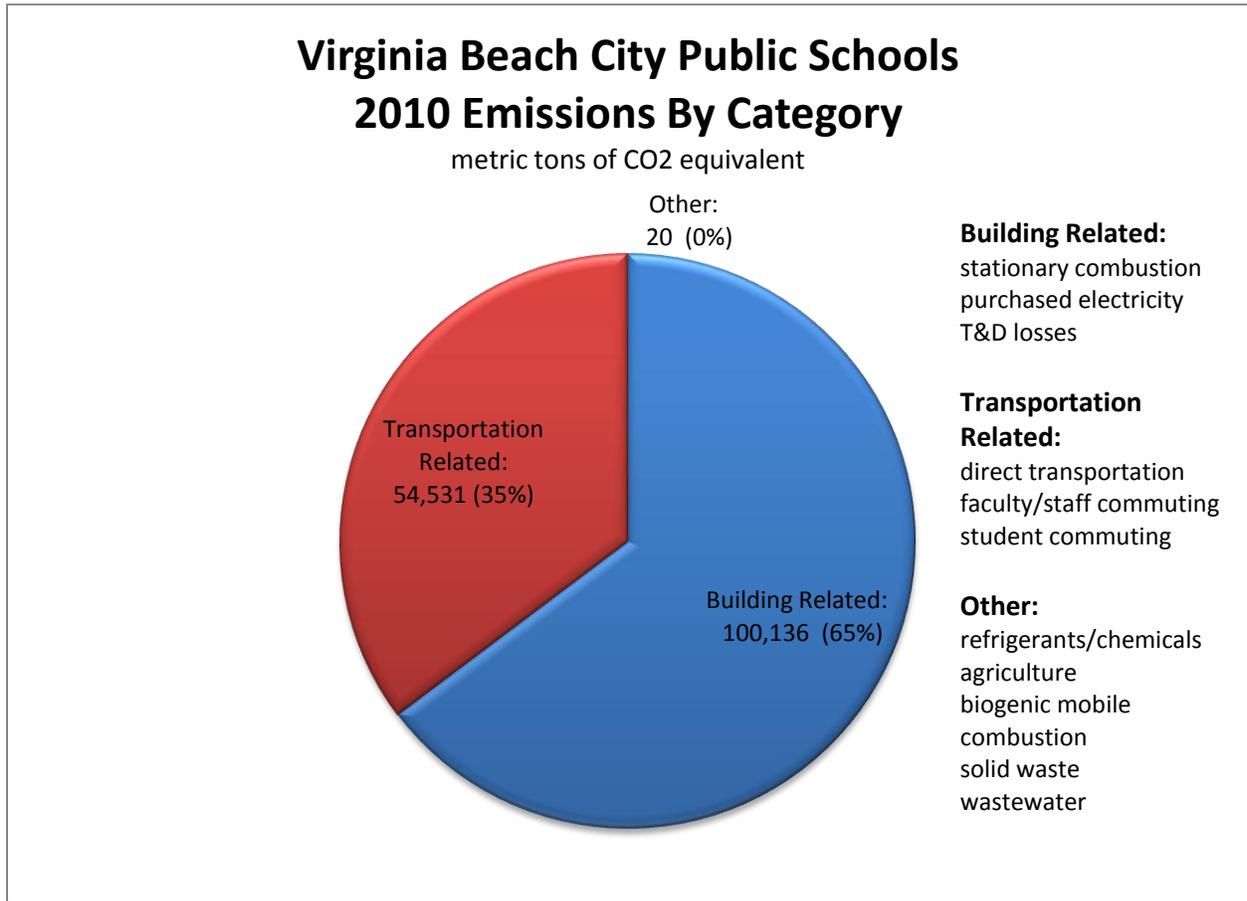
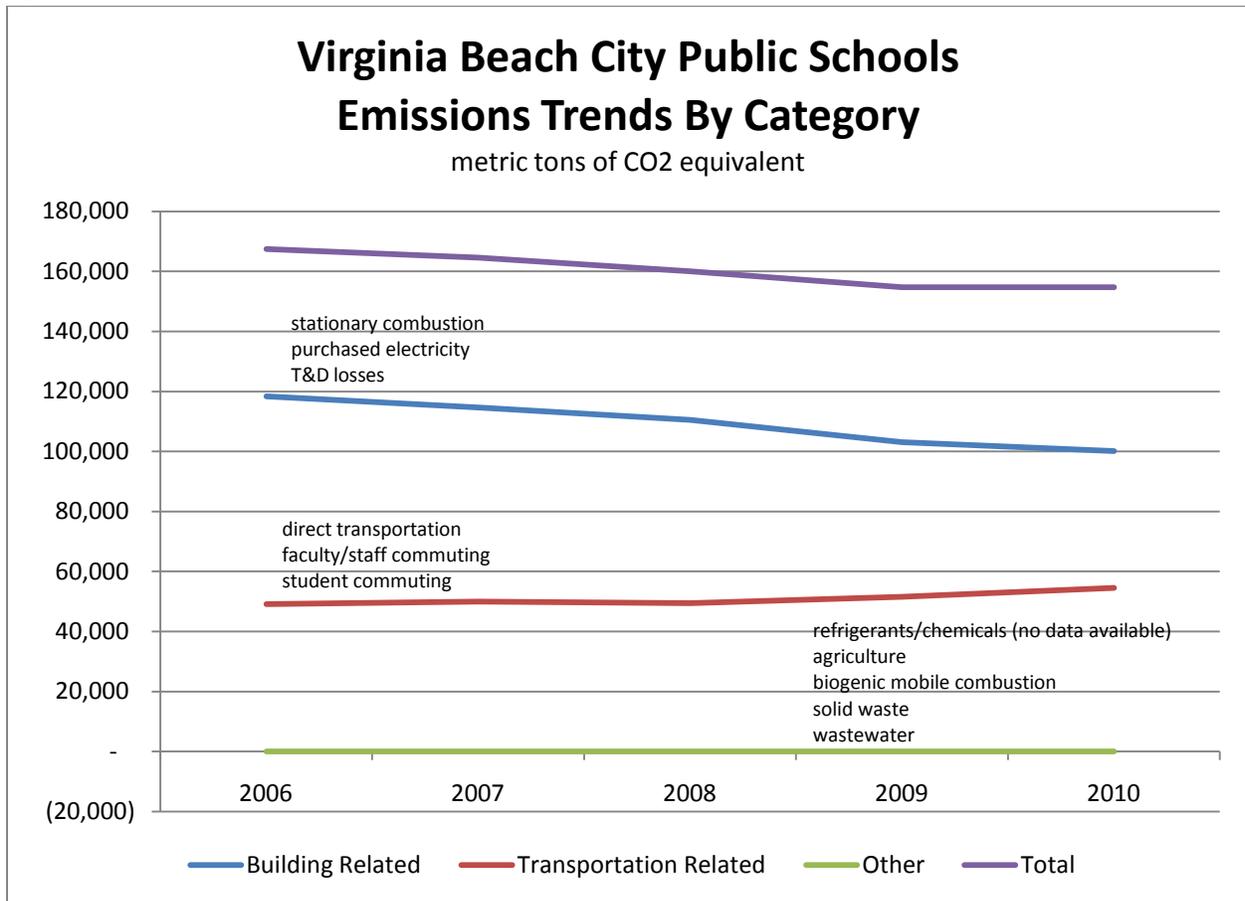


Figure 9



As illustrated in Figures 8 and 9 above, the building-related category is clearly the largest contributor to VBCPS’s carbon footprint, but the emissions are trending in a clear downward direction over the course of the study period. Transportation related emissions are also significant and trending slightly upwards. Other contributions are relatively minor, in comparison to the two main categories, and are fairly stable over the study period.

# Next Steps

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## Immediate Action Items (2011)

### Develop mechanisms to track remaining metrics called for in Greenhouse Gas Inventory Progress Reports:

Data	Responsible Party	Reporting Units
Refrigerant	Mechanical Systems Coordinator	Pounds
Faculty/staff commuting	Demographics/Facilities GIS	Miles
Student drop-off commuting	Demographics/Facilities GIS	Miles
Solid waste	School Plant Services	Short tons
Paper usage		Pounds

### Create an annual Sustainability Metrics Report

By developing a standard set of metrics (including, but not limited to those reported in this inventory), Virginia Beach City Public Schools can determine areas where consistent progress is being made and areas where additional attention may be warranted.

### Evaluate the Energy Star status (or potential status) of all VBCPS schools

Because energy efficiency will continue to be an important component of reducing VBCPS's carbon footprint, using the free EnergyStar tool can provide a preliminary benchmark regarding which schools will need additional attention in the energy performance arena and which are already performing better than average.

### Draft VBCPS's first Climate Action Plan

Upon acceptance of this inventory, identify a team to embark on the creation of a Climate Action Plan for Virginia Beach City Public Schools.

The types of topics that may be addressed in this Climate Action Plan may include (for example):

- Transportation – preferred methods to reduce emissions from school bus deployment, development of programs to promote Safe Routes to School, development of a timeline for greenway, bicycle, and pedestrian master plans between school and city infrastructure, and distance learning
- Energy – priority list for building envelope upgrades, priority list for building equipment upgrades, priority list for daylight retrofits, development of policy guiding daylight requirements in new school construction
- Water – opportunities for water use reductions, opportunities for wastewater generation reductions, opportunities for rain water harvesting, opportunities for gray water recycling

- Carbon Sinks – opportunities to create carbon sinks through land conservation easements, re-forestation, and storm water management facilities (note: credit for carbon sinks must be measured, documented, and verified before being claimed in an inventory)
- Renewable Energy – opportunities for additional renewable energy production both in the short term and long term.

## **Mid-Range Action Items (2012-2016)**

### **Conduct energy audits of all VBCPS buildings**

Because building related energy use, and electricity consumption, is the largest contributor to VBCPS's emissions profile, it will be important to continue the good work of the last 5 years relative to energy use reductions. Upon identification of specific buildings that are consuming a disproportionate amount of energy, it will be possible to prioritize additional energy conservation projects targeted at the worst performing buildings.

### **Research and expand on-site renewable energy sources**

As each building is optimized for energy performance, the addition of on-site renewable energy sources becomes more affordable and will continue to reduce VBCPS's carbon footprint.

### **Research and evaluate Safe Routes to School program opportunities**

Moving students between home and school, whether on a VBCPS bus or in a parent's private vehicle, is also a large part of VBCPS's overall carbon footprint. Consideration may be given to the addition of walkable neighborhood schools in appropriate communities. But certainly, identifying ways to move students without the use of fossil-fuel powered vehicles, primarily through safe walking or biking routes, will also help reduce VBCPS's carbon footprint.

### **Research and evaluate clean-fuel technology for school bus fleet**

Because not all students live close enough to school to safely walk or bike, the school bus fleet will remain a necessary part of school operations. As bus technology improves over time, VBCPS should monitor which upgrades are appropriate for their fleet, and make those upgrades when feasible.

### **Keep the GHG Inventory current through bi-annual progress reports**

In order to ensure that VBCPS is heading in the proper, downward, direction with respect to carbon emissions, it will be important to update this Inventory and any future Plans every two years until carbon neutrality is reached.

# Conclusions

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Virginia Beach City Public Schools has completed many significant steps towards eventual climate neutrality, including the completion of a 5-year emissions inventory, and the passage of School Board Policy 3-67 which addresses division wide sustainability practices.

In researching emission patterns throughout the school district, it became clear that the predominant emission source is due to the purchase of electricity. The next most significant emission source is related to commuting – both for faculty and staff, and also to get students to and from school. It also became clear to the study team that VBCPS does not currently have in place data collection practices for all of the metrics required by a green house gas inventory.

In the near term (by the end of 2011), VBCPS should focus on:

- Developing mechanisms to track remaining metrics called for in Greenhouse Gas Inventory Progress Reports
- Creating an annual Sustainability Metrics Report
- Evaluating the Energy Star status (or potential status) of all VBCPS schools
- Drafting VBCPS's first Climate Action Plan

In the mid-term (2012-2016), VBCPS should focus on:

- Conducting energy audits of all VBCPS buildings
- Researching and expanding on-site renewable energy sources
- Researching and evaluating Safe Routes to School program opportunities
- Researching and evaluating clean-fuel technology for school bus fleet
- Keeping the GHG Inventory current through bi-annual progress reports

By conducting this study and then developing a clear plan for energy efficiency and greenhouse gas emissions reductions, VBCPS will continue to maintain its leadership position in the Commonwealth of Virginia, and nationwide, with respect to “walking the talk” and educating the next generation of leaders in a truly high performance academic environment.

# Appendix A

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## Local Government Operations Standard Inventory Report

### Section 1 – Local Government Profile Information (2010)

Virginia Beach City Public Schools  
2512 George Mason Drive  
P.O. Box 6038  
Virginia Beach, Virginia 23456-0038  
757.263.1000 (tel)

Size	10,400,865 square feet of building space
Population	69,432 students
Annual Budget	\$820,256,147
Employees	10,599 faculty/staff
Climate Zone	4A
Heating/Cooling Degree Days	4,329 HDD/1,082 CDD

#### Primary Contact:

J. Tim Cole  
[J.Tim.Cole@VBSchools.com](mailto:J.Tim.Cole@VBSchools.com)  
(757) 263-1090 (tel)

#### Services Provided:

Schools (primary/secondary)

#### School District Description:

Virginia Beach City Public Schools is the largest school division in Hampton Roads – southeastern Virginia – serving approximately \*69,365 students in grades [K-12](#). Currently, the school system includes [56 elementary schools](#), [14 middle schools](#), [11 high schools](#), and a number of secondary/post-secondary specialty centers, including the [Renaissance Academy](#), [Advanced Technology Center](#), [Technical and Career Education Center](#), and [Adult Learning Center](#).

\* Student Enrollment September 30, 2010

**Section 2 – Greenhouse Gas Inventory Details**

Reporting year: 2010

Protocol used: Local Government Operations Protocol, v1.1 (May 2010)

Control approach: Operational

*Note: The CA-CP v6.6 calculator does not report all data requested in the LGOP v1.1 tables; only data reported by the CA-CP v6.6 calculator is recorded below. All values are reported in metric tons.*

**BUILDINGS & OTHER FACILITIES**

SCOPE 1	CO <sub>2</sub> e	CO <sub>2</sub>	CH <sub>4</sub>	N <sub>2</sub> O	HFCs	PFCs	SF <sub>6</sub>
Stationary Combustion	7,673	7649.5	.7649	.0153			
Fugitive Emissions	29			.097			
<b>Total Direct Emissions from Buildings &amp; Facilities</b>	<b>7,673</b>	<b>7649.5</b>	<b>.7649</b>	<b>.1123</b>			

SCOPE 2	CO <sub>2</sub> e	CO <sub>2</sub>	CH <sub>4</sub>	N <sub>2</sub> O
Purchased Electricity	84,141	83,693.8	1.0103	1.4159
Purchased Steam				
District Heating & Cooling				
<b>Total Indirect Emissions from Buildings &amp; Facilities</b>	<b>84,141</b>	<b>83,693.8</b>	<b>1.0103</b>	<b>1.4159</b>

SCOPE 3	CO <sub>2</sub> e
Faculty/Staff Commuting	
Student Commuting	
Solid Waste	
Waste Water	
Scope 2 T&D losses	
Non-additional offsets	

**VEHICLE FLEET**

SCOPE 1	CO <sub>2</sub> e	CO <sub>2</sub>	CH <sub>4</sub>	N <sub>2</sub> O	HFCs	PFCs
Mobile Combustion		1,310.34	.26	.09		
Fugitive Emissions						
<b>Total Direct Emissions from Vehicle Fleet</b>		<b>1,310.34</b>	<b>.26</b>	<b>.09</b>		

SCOPE 2	CO <sub>2</sub> e	CO <sub>2</sub>	CH <sub>4</sub>	N <sub>2</sub> O
Purchased Electricity for Electric Vehicles				
<b>Total Indirect Emissions from Vehicle Fleet</b>				

SCOPE 3	CO <sub>2</sub> e
Not applicable	

**INDICATORS**

Number of Vehicles	
Vehicle Miles Traveled	

Number of Pieces of Equipment   
 Equipment Operating Hours

**TRANSIT FLEET**

**SCOPE 1**

	CO <sub>2</sub> e	CO <sub>2</sub>	CH <sub>4</sub>	N <sub>2</sub> O	HFCs	PFCs
Mobile Combustion		13,894.14	.79	.36		
Fugitive Emissions						
Total Direct Emissions from Vehicle Fleet		13,894.14	.79	.36		

**SCOPE 2**

	CO <sub>2</sub> e	CO <sub>2</sub>	CH <sub>4</sub>	N <sub>2</sub> O
Purchased Electricity for Electric Vehicles				
Total Indirect Emissions from Vehicle Fleet				

**SCOPE 3**

Not applicable  CO<sub>2</sub>e

**INDICATORS**

Number of Vehicles   
 Vehicle Miles Traveled

**TOTAL EMISSIONS**

	CO <sub>2</sub> e	CO <sub>2</sub>	CH <sub>4</sub>	N <sub>2</sub> O	HFCs	PFCs	SF <sub>6</sub>
SCOPE 1	23,066						
SCOPE 2	84,141						
SCOPE 3	47,476						

**INFORMATION ITEMS**

CO<sub>2</sub> from Biomass Combustion  CO<sub>2</sub>e

Carbon Offsets Retired  CO<sub>2</sub>e  
 Carbon Offset Generated and Sold  CO<sub>2</sub>e

Renewable Energy Credits (Green Power) Retired  MWH:  CO<sub>2</sub>e   
 % of Total electricity offset by Green Power   
 RECs (Green Power) Generated & Sold  MWH:  CO<sub>2</sub>e

**Section 3 – Activity Data Disclosure**

Described in Greenhouse Gas Inventory chapter titled, “Methodology: GHG Emissions Inventory”

**Section 4 – Methodology/Emission Factors Disclosure**

Described in Greenhouse Gas Inventory chapter titled, “Methodology: GHG Emissions Inventory”

# Appendix B

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## Participating Sustainable Schools Committee Members

**John Kalocay**

Assistant Superintendent  
Department of Administrative Support Services

**Tony Arnold**

Director of Facilities Planning and Construction

**J. Tim Cole**

Sustainable Schools Project Manager  
Chairman, Sustainable Schools Committee

Larry Ames – Director of Custodial Services

Jay Cotthaus – Transportation Services, Pupil Transportation

John Hasher – Mechanical Systems Coordinator

Melisa Ingram – Demographics/Facilities GIS Analyst

Jim Morris – Assistant Director, School Plant Services, Environmental & Energy Management