



Capital District 2010 Regional GHG Inventory

With community GHG inventories
for all 160 municipalities in the
Capital District.

Prepared for

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Preface

Creating a greenhouse gas (GHG) emissions inventory baseline is an important component of long term sustainability planning.

This GHG inventory was commissioned by the Capital District Regional Planning Commission (CDRPC), and covers all major GHG sources in the eight-county Capital District Regional Economic Development Council (REDC) region. It was developed to support communities participating in the Climate Smart Communities (CSC) program. It also serves as the baseline for the Capital District Regional Sustainability Plan developed under the Cleaner Greener Communities (CGC) Program.

The inventory was developed for the year 2010 and is based upon methods, data sources, and protocol established by the CSC and CGC programs. This work includes separate inventories for the REDC as a whole, for each county, and for each of the region's 160 municipalities. Counties and municipalities can use the inventories in this report as a baseline to develop a community Climate Action Plan as part of the Climate Smart Communities pledge. They can track progress by periodically updating the inventories in future years following the methods described in this report.

This report is primarily a GHG baseline and is not intended to cover the options available to reduce GHG emissions in the region. However, it does include policy scenarios to show how alternative fuels and vehicles may reduce emissions from the transportation sector. It also includes a detailed study of how household energy use varies across the region to help planners identify strategies to engage households in local sustainability efforts.

Regional and county GHG inventories are presented in Appendix A in the format required by the Capital District Regional Sustainability Plan. Community inventories suitable for the Climate Smart Communities program are presented in Appendix B along with supporting data on energy use and transportation demand. The report also includes tips for how municipalities can, in some cases, improve the community-scale inventories provided in this report. Emission factors are in Appendix C.

All data in the Appendices are available in spreadsheets maintained by CDRPC.



Notable Findings

In 2010 Capital District greenhouse gas (GHG) emissions were 15.8 million MTCDE (Metric Tons Carbon Dioxide Equivalent), or 14.7 MTCDE/person. Fossil fuels created 84% of the emissions. Smaller sources included chemical bi-products of the region's cement industry, fugitive refrigerant leakage from buildings and vehicles, and emissions from agriculture and waste management practices.

Energy is expensive and investing in energy efficiency will reduce emissions, save money, and help improve the economy. The Capital District spent \$4.5 billion for energy (\$4100 / person), paying 60% more than it did 10 years ago after adjusting for inflation. Much of the increase was driven by rising petroleum fuel prices.

The Capital District is diverse and one set of GHG strategies will not necessarily work for all counties. Albany and Saratoga counties have an even balance of residential, commercial, and industrial emissions, whereas Schenectady and Rensselaer counties have a higher proportion of emissions in the residential sector. Albany, Greene and Warren counties have most of the region's cement and paper industry. Washington and Columbia counties, on the other hand, have the largest share agriculture. Each county and community pursuing sustainability will need to engage stakeholders based on its own unique emissions profiles as presented in this report.

Individual industries and large commercial entities can sometimes dominate community and county inventories. Identifying and engaging these large stakeholders directly will be an important part of meeting long term regional or county-scale GHG mitigation targets.

Transportation fuels dominate in all counties and account for 40% of the Capital District's GHG emissions. Significant reductions and cost savings may be possible by introducing electric vehicles, alternative fuels, more efficient vehicles, transit, and more walkable, compact development patterns.

Upstate New York's electricity is the least-carbon intensive in the nation and offers a unique opportunity to reduce emissions and save residents money by electrifying on-road transportation. Shifting 20% of on-road gasoline vehicles to electricity would reduce Capital District emissions by 4.5% and save drivers \$174 million in fuel costs.

Development patterns in the Capital District influence emissions. Households in compact, employment-accessible areas generate 31% less greenhouse gas emissions and have 39% lower energy costs. Households in some rural towns consume three times more energy than households in some cities. Rising energy prices hit rural areas harder because they have longer commute distances (using gasoline) and rely on fuel oil and propane for heating. Households in some rural communities now spend 15-18% of total income on energy compared to those in urban communities that spend as little as 5-7%.

The Capital District is a major electric power generating region in New York. Emissions from Athens Generating, the PSEG Bethlehem Energy Center, and Selkirk Cogeneration Partners are equivalent to the emissions from all vehicles, operating on all roads, in all eight counties combined.

GHG Accounting Overview

At the start of the Climate Smart Communities coordinators program, NYSERDA convened the **New York GHG Working Group**- an informal body of all CGC Planning Teams, CSC consultants, state agencies, regional and municipal officials, and others to:

- Review existing national GHG protocol available for regional inventories, and,
- Establish consensus methods and data sources relevant for all of New York.

This body created the *New York Community and Regional GHG Inventory Guidance* report which outlines group consensus recommended and alternate methods for New York inventories (NYSERDA, 2013). The methods applied in this work are compliant with all *recommended* methods in that guidance report and the reader should refer to it for detailed step-by-step method details. In this report the reader will find an overview of group consensus methods and in some cases additional new methodology needed in the Capital District that went beyond the scope of the regional guidance.

This inventory accounts for all major GHGs including carbon dioxide (CO₂), methane (CH₄), nitrous oxide (N₂O), hydrofluorocarbons (HFCs), perfluorocarbons (PFCs), and sulfur hexafluoride (SF₆). In the Capital District emissions come from three basic activities:

- Burning fossil fuels creates CO₂ and a small amount of CH₄ and N₂O. Fossil fuels are the dominant source of GHG emissions in the region.
- Solid and sewage waste management, agriculture practices, and chemical processes in Capital District cement and paper industries release fugitive emissions of CH₄, N₂O, and some PFCs.
- Common refrigerants (HFCs and SF₆) used by homes, businesses, vehicles, and the utility industry are GHGs themselves, and they create a net footprint when they leak to the air as fugitive emissions. HFCs are also called Ozone Depleting Substitutes (ODS) because they were created to replace chlorofluorocarbons (CFCs) that had been found to be degrading the ozone layer.

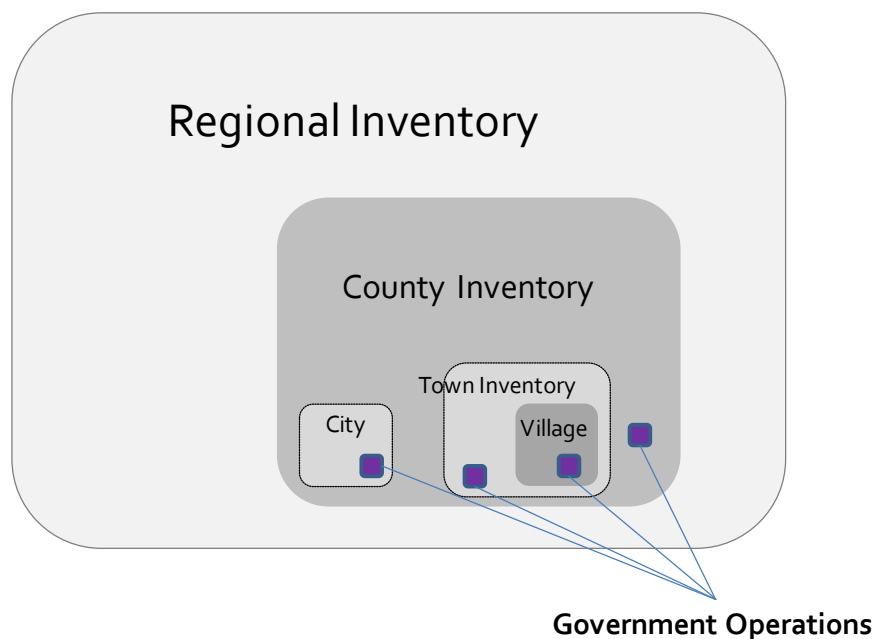
Regional GHG Accounting Framework

Geographic Boundaries: Regional and Community GHG Inventories

Regional GHG Inventories count all emissions attributed to residences, businesses, farms, county and municipal operations, and industries within a multi-county region. For this study, the region is the eight-county Capital District Regional Economic Development Council (REDC) Region.

As shown in Figure 1, a regional GHG inventory can be further broken into inventories for counties, towns, cities, and villages. County inventories include composite town and city inventories and similarly, town inventories include composite village inventories. At a county-level and below, the GHG inventories reported here are called **community-wide GHG inventories** specific to each county or municipality.

Figure 1. Regional GHG Inventory Boundaries



Also as shown in Figure 1, each county or municipality can also prepare its own distinct **government operations GHG inventory**, which includes only emissions associated with its own services and facilities. This report does not separately break out government operations inventories although they are inherently included in the community inventories. The reason is because regional and community inventories are prepared with estimated or aggregated public data, whereas local governments can make more accurate inventories using proprietary energy and fleet fuel data. Typically government operations make up 2-4% of a community inventory.

Climate Smart Communities are encouraged to use the inventories reported in Appendix B (Table B 1) to support community climate action planning, and to develop government operations GHG inventories to track performance of their own facilities and operations. Finally, the community inventories reported here use methods that, in some cases, may be improved upon by communities. See the section "*Improving Your Community's GHG Inventory*" for more information.

Scopes Based GHG Accounting

Within the regional or any community inventory, GHG sources are organized by what is known as "Scopes" based accounting that assign sources as either:

- Scope 1 (direct) emissions that physically occur within the regional or community boundary such as those emitted by burning natural gas or fuel oil in homes and businesses; or
- Scope 3 (indirect) emissions *attributed* to region or community activities that cause emissions whether the emissions physically occur in-boundary or not. Scope 2 is a special category of emissions to attribute a share of regional power plant emissions to individual communities based on how much electricity they use.

Scopes based accounting allows a community to have *both* Scope 1 and 3 emissions for what is essentially the same source. For example, communities with electric power stations have very large Scope 1 sources from fuel burned by the power plants inside the community. Power plants, however, do not supply electricity to communities directly. They supply the electricity grid. Therefore, communities will also have separate Scope 2 emissions based on (1) the amount of electricity they consume and (2) on the average carbon intensity of all the plants supplying the regional grid. In solid waste the City of Albany and the Town of Colonie each have scope 1 GHG emissions from landfills. However *all* communities including Albany and the Town of Colonie are assigned separate Scope 3 emissions based on how much waste they produce and send for disposal to landfills and waste-to-energy plants.

Scopes accounting can inherently double count, so they are never added together. The point of organizing inventories by scopes is to empower stakeholders to reduce emissions they influence. Therefore power plant and landfill operators can record GHG reductions against community Scope 1 footprints, whereas municipalities can tie community-wide energy and waste reduction efforts against their Scope 2 and 3 footprints.

The GHG Working Group identified scope 1 methods for all sources, and Scope 2 or 3 methods for electricity consumption, solid waste generation, and air transportation demand. With the exception of air travel, the Working Group adopted only Scope 1 methods to count physical emissions from all vehicles, locomotives, and boats that happen to operate in the community boundary. The group recognized that Scope 3 approaches should be developed in the future to attribute to emissions to traffic created by communities and not to only traffic that happens to occur inside their boundaries. While Scope 1 accounting works well to describe transportation demand at a regional level, at a community level those with interstate highways have pass-through traffic emissions that they cannot influence. Currently ICLEI is piloting several Scope 3 approaches as part of the Community GHG Protocol Initiative (ICLEI, 2013).

Reporting GHG Emissions

The GHG Working Group developed two formats to report emissions:

- The **Detailed GHG Inventory Report** is like a chart of accounts listing emissions by sector and scope in a table modeled after the GHG Accounting Framework presented in Table 1.
- The **Rollup GHG Inventory Report** lists certain emissions from the detailed report that can be added to form what is accepted to be the “total” GHG footprint for the region or community. It is designed to prevent double counting across scopes. The GHG Accounting Framework identifies which sources are “rolled up” and which are not. In general the GHG Working Group decided to roll up Scopes 2 and 3 in favor of Scope 1 when both exist for the same source.

All GHG emissions in this report are reported in units of **Metric Tons Carbon Dioxide Equivalent (MTCDE)** which is the convention for reporting regional GHG inventories. One MTCDE is equal to 1000 kgs of CO₂. Non-CO₂ GHGs are first converted to an equivalent amount CO₂ using a global warming potential (GWP) unique to each gas as defined in the Intergovernmental Panel on Climate Change

(IPCC) Second Assessment Report. Table 1 shows the GHG Accounting Framework created by the GHG Working Group and identifies the complete listing of all sources included in the study.

Table 1. Regional GHG Inventory Framework

Sector / Source	Description of the Source	Scope	Rolled Up?
Built Environment			
Residential Energy	Direct emissions from natural gas, fuel oils, wood, and propane consumed in boundary.	1	Yes
	Indirect emissions attributed to electricity consumption.	2	Yes
Commercial Energy	Direct emissions from natural gas, fuel oils, wood, and propane consumed in boundary.	1	Yes
	Indirect emissions attributed to electricity consumption.	2	Yes
Industrial Energy	Direct emissions from natural gas, fuel oils, wood, propane, coal, residual fuel oils, petroleum coke, and others consumed in boundary.	1	Yes
	Indirect emissions attributed to electricity consumption.	2	Yes
Power Generation	Direct emissions from grid-connected power generating facilities of capacity 1 MW or greater in boundary.	1	No
Transmission Losses (T/D)	Direct fugitive emissions of natural gas that leaks from the gas transmission and distribution system in boundary.	1	Yes
	Indirect emissions associated with transmission and distribution (line losses) when communities consume electricity in boundary.	2	Yes
	Direct fugitive emissions from gas, oil, and coal production sites.	1	Yes
Industrial Processes and Product Use	Direct chemical process emissions (non energy related) from the cement, paper, metals, and other industries.	1	Yes
	Direct emissions of PFCs and HFCs (refrigerants) used in vehicles, buildings, and industry.	1	Yes
	Direct fugitive emissions of SF ₆ , a specialized coolant used in the utility industry.	1	Yes
Transportation			
On road	Direct emissions from on-road vehicles in boundary.	1	Yes
Off-road	Direct emission from off-road equipment (e.g., construction, agricultural, lawn care, etc.) in boundary.	1	Yes
Rail	Direct emissions from rail locomotives in boundary.	1	Yes
Marine	Direct emissions from boats including private craft on lakes and rivers, and commercial shipping operating on rivers and around ports.	1	Yes
Air	Indirect emissions attributed to regional domestic and international air travel demand.	1	Yes
Waste			
Solid Waste	Direct emissions from regional landfills and waste incinerators. Grid-connected waste-to-energy (WTE) facilities are reported under Scope 1 in Power Generation.	1	No
	Indirect emissions attributed to communities based on the amount of solid waste they create in boundary.	3	Yes
Sewage Waste	Direct emissions from waste water treatment plants and septic systems in boundary.	1	Yes
Agriculture			
Livestock / Manure	Direct emissions from livestock operations (enteric fermentation and manure management) in boundary.	1	Yes
Fertilizer and Soils	Direct emissions from cropland management and fertilizer application in boundary.	1	Yes

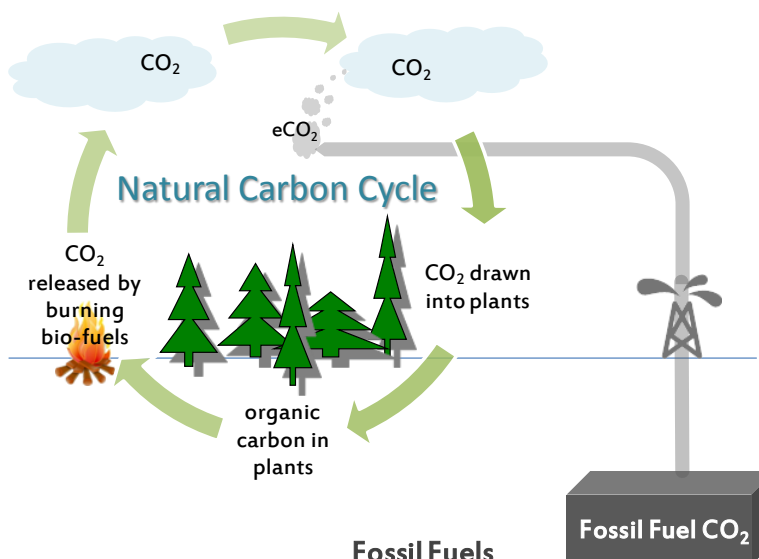
GHG Emissions and Bio-fuels

Burning biodiesel, wood, and ethanol releases CO₂ just like burning fossil fuels but as shown in Figure 2 biogenic CO₂ does not cause a build-up of carbon in the air, land, and water.

Figure 2. Simplified Carbon Cycle of Bio-fuels

Bio-Fuels

do not cause climate change. The natural carbon cycle is relatively closed. CO₂ from the air is drawn in plants and trees, and is released when plants die and decay, or are burned in forest fires. Burning bio-fuels is the same. It releases carbon, but that carbon was drawn from the air when the fuel was cultivated creating a zero sum overall.



Fossil Fuels

do cause climate change. Burning fossil fuels injects CO₂ into the closed natural cycle. Without a way to remove it, it builds up in the air, in plants, and in the water causing climate change and other impacts.

The human act of obtaining and burning fossil fuels releases fossil carbon that had been sequestered stably in the ground and out of the active biosphere. Once released the extra carbon increases CO₂ concentrations in the air and oceans causing climate change and related environmental impacts. For example, widespread coral bleaching seen today is thought to be caused by acidification due to increased carbon loading (NOAA, 2012).

For the Capital District this study adopted decisions by the GHG Working Group in that:

- Bio-fuel CO₂ emissions will be reported separately as “biogenic” on the detailed GHG inventory reports but will not be added to the roll-up GHG inventories. Including them on the detailed report will help the Capital District target and track increasing use of bio-fuels as a GHG mitigation measure.
- All conventional gasoline consumption in New York is considered to be a 10% blend of ethanol, and that portion is counted as biogenic.

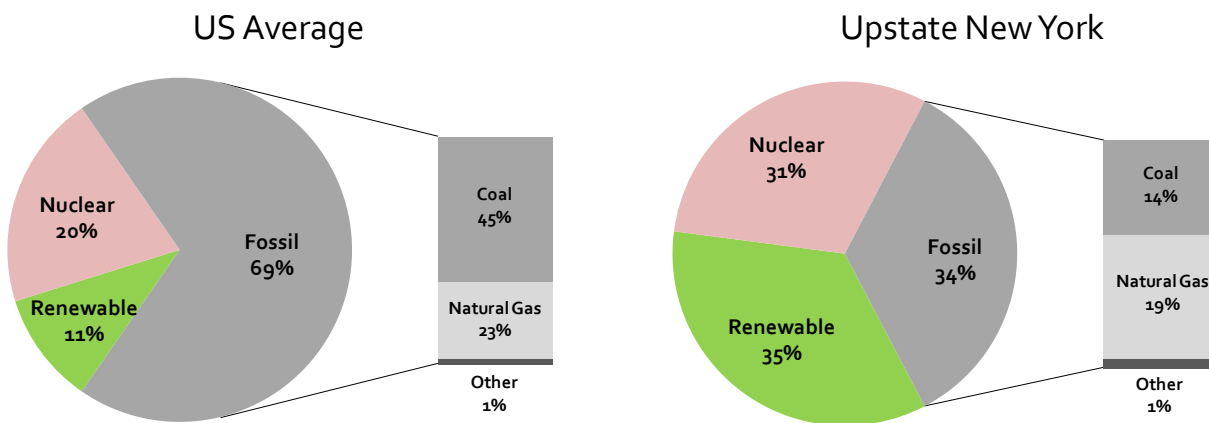
- Municipal solid waste (MSW) used as a fuel will be considered 56% biogenic and 44% fossil-based (US EIA, 2007) in the form of plastics and other oil-derivatives. CO₂ emissions from MSW will be split into fossil (Scope 1) CO₂ and biogenic CO₂ categories.

At first glance it appears that switching to bio-fuels from fossil fuels is an excellent GHG mitigation measure. While true not all bio-fuels are created equal and they each have a lifecycle CO₂e emissions footprint associated with producing and distributing them. For example, conventional corn ethanol is thought to have only a 25% lifecycle GHG benefit over gasoline, where as advanced ethanol from cellulose reduces emissions between 50-90% (Schnepf, 2013). It is important to use bio-fuel types that reduce GHG emissions on the life-cycle and do not cause other environmental problems locally or upstream. The most beneficial bio-fuels are those produced and sourced sustainably such as biodiesel from waste oil, firewood and wood waste, agricultural residue and municipal waste converted to solid fuels, and bio-methane from landfills, waste water plants, farm operations, and digested municipal waste.

GHG Emissions and Electricity Use

When communities use grid electricity they create Scope 2 emissions at regional power plants based on fossil carbon-intensity of the electricity. This study uses grid carbon intensities developed by the US EPA called the Emissions & Generation Resource Integrated Database- EGRID (US EPA, 2012). According to EGRID upstate New York’s electricity mix is the least fossil-carbon intensive in the nation, featuring significant hydro, nuclear, and renewable fuels. It produces only 500 lbs CO₂e/MWh consumed compared to the national average of 1222 lbs CO₂e/MWh. The Capital District is home to several major natural gas-fired power stations in Bethlehem, Rensselaer, and Athens, but these form part of the regional grid mix and do not feed consumers directly.

Figure 3. New York vs. US Grid Electricity Generation Mix



It should be noted NYSERDA is currently updating the carbon intensity estimates of the New York grid to better reflect imports, and so emissions estimates for Scope 2 may change.

Regional and County GHG Emissions

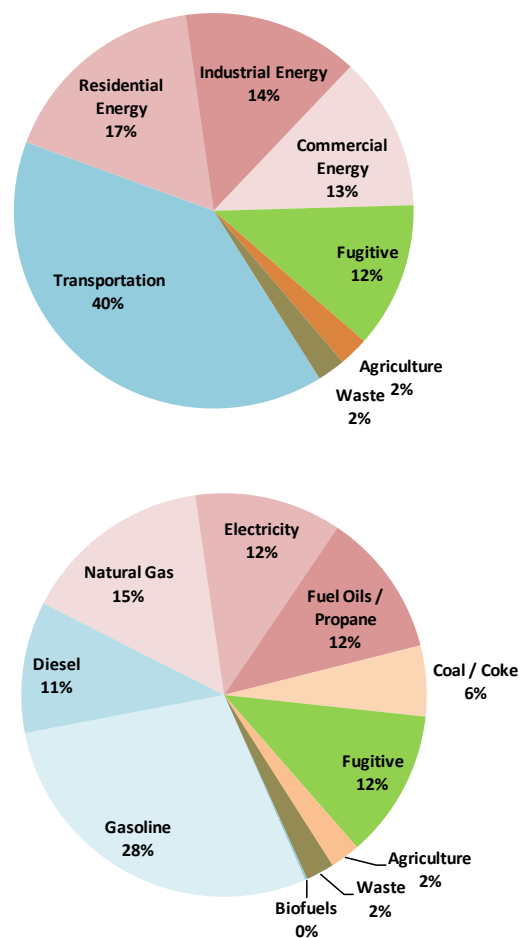
In 2010, the Capital District emitted 15,831,238 Metric Tons Carbon Dioxide Equivalent (MTCDE) greenhouse gas (GHG) emissions. Transportation fuels accounts for 40%, followed by energy consumption in the residential (17%), commercial (14%), and industrial (15%) sectors. Fugitive emissions contribute 12%, defined in the figures as the sum of industrial process, product use, and transmission/distribution loss emissions. Agriculture and waste sectors are the smallest contributing 2% each.

Table 2. Regional GHG Emissions By Sector and Source.

Sector	Energy (MMBTU*)	GHG (MTCDE)	Cost (\$)
Transportation	92,132,492	6,258,855	2,034,241,256
Residential Energy	50,545,185	2,707,593	1,253,684,694
Industrial Energy	36,851,803	2,258,018	426,936,148
Commercial Energy	32,956,047	1,984,986	839,997,242
Process and Fugitive		1,883,042	
Agriculture		379,096	
Waste		359,648	
Totals	212,485,527	15,831,238	4,554,859,339

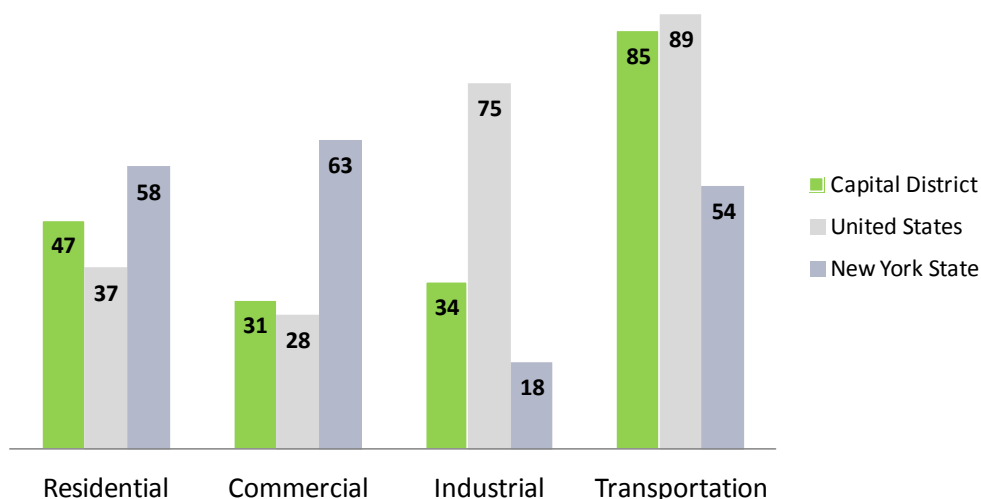
Source	Energy (MMBTU)	GHG (MTCDE)	Cost (\$)
Natural Gas	45,417,113	2,410,377	499,434,373
Electricity	27,576,233	1,855,273	1,369,241,326
Fuel Oils / Propane	25,402,850	1,836,073	534,756,704
Coal / Coke	9,481,109	898,503	48,430,800
Biofuels	18,441,223	27,075	196,904,506
Gasoline	64,068,955	4,514,875	1,429,764,082
Diesel	22,098,044	1,667,275	476,327,547
Process and Fugitive		1,883,042	
Agriculture		379,096	
Waste		359,648	
Totals	212,485,527	15,831,238	4,554,859,339

*MMBTU is an energy unit equal to 1 million British thermal units



On a per capita basis, GHG emissions are 14.7 MTCDE / person compared to the 2010 US average of 21.7 MTCDE / person. Part of the difference is because New York’s electricity is cleaner on average. Part of the difference is somewhat artificial because the region is less industrial than the US as a whole as shown in Figure 4.

Figure 4. Energy Use by Sector per Capita (MMBTU/person)



National average per-capita industrial energy consumption is 75 MMBTU / person, whereas in the Capital District it is only 34 MMBTU / person. In other words the regional inventory does not include “embodied” emissions connected to products and food consumed in the Capital District but manufactured by industry elsewhere. There is work underway by groups like ICLEI to develop Scope 3 methods to attribute GHG emissions to materials and food consumption but these were not finalized when the GHG Working Group convened.

Regional Energy Mix and GHG Emissions

Considering all forms of energy consumption in Table 2, the region’s energy mix is about 86% non-renewable and 14% renewable. Non-renewable energy includes fossil fuels and the portion of grid electricity consumed attributed to fossil fuels. It does not include fossil fuel energy used at grid-connected power stations. Renewable energy includes wood used in homes and industries, organic waste used to generate power, biogas used at landfills and wastewater treatment plants, ethanol in gasoline, and the renewable portion of electricity consumed in the region. It does not include energy produced by onsite solar, wind, and small-scale hydro projects.

Only non-renewable fuels create Scope 1 or 2 GHG emissions. On-road motor gasoline and diesel creates the most at 39% of total GHG emissions, followed by stationary fuel oils, natural gas, and electricity consumption at 10-15% each (Table 2). New York’s clean electricity contributes only 12% to the total emissions whereas nationally electricity contributes 32%. Considering that gasoline is an expensive petroleum fuel and is the single largest source of GHG emissions, New York’s clean electricity opens up a unique opportunity for the Capital District to significantly reduce emissions and save money by switching vehicles from gasoline to electricity (UCS, 2012).

Energy Cost

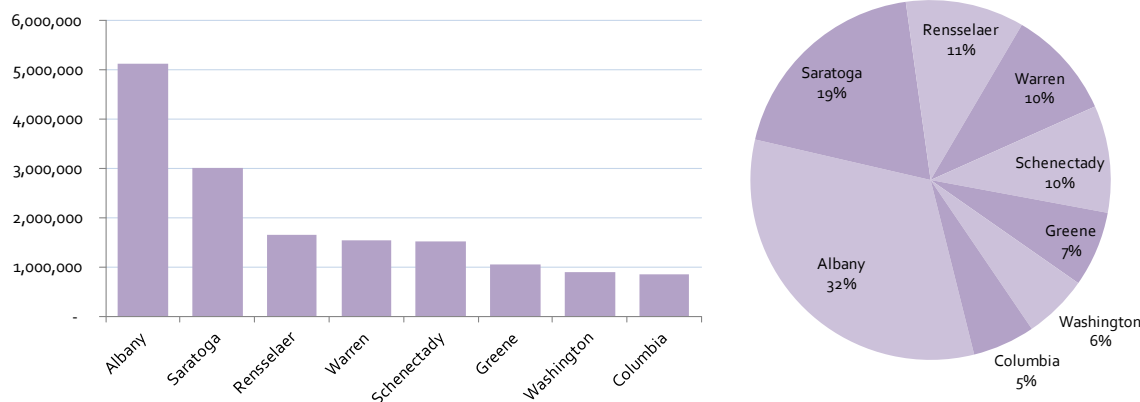
Energy is expensive. Across all forms, Capital District residents and business in 2010 spent \$4.5 billion on energy of which two thirds (\$2.9 billion) was on petroleum-based gasoline, diesel, and fuel oils. The cost of these fuels rose more than others and today the region pays \$1.75 billion *more* per year for petroleum fuels than it did 10 years ago- that’s a rise of \$1600 per person (adjusted for inflation). Rural areas with lower incomes and those dependent upon fuel oil have been hit the hardest.

Half of all energy used in the Capital District is petroleum-based gasoline, diesel, and fuel oil. Today, the region pays \$1.75 billion *more* per year for these fuels than it did 10 years ago- that’s a rise of \$1600 per person.

County GHG Emissions

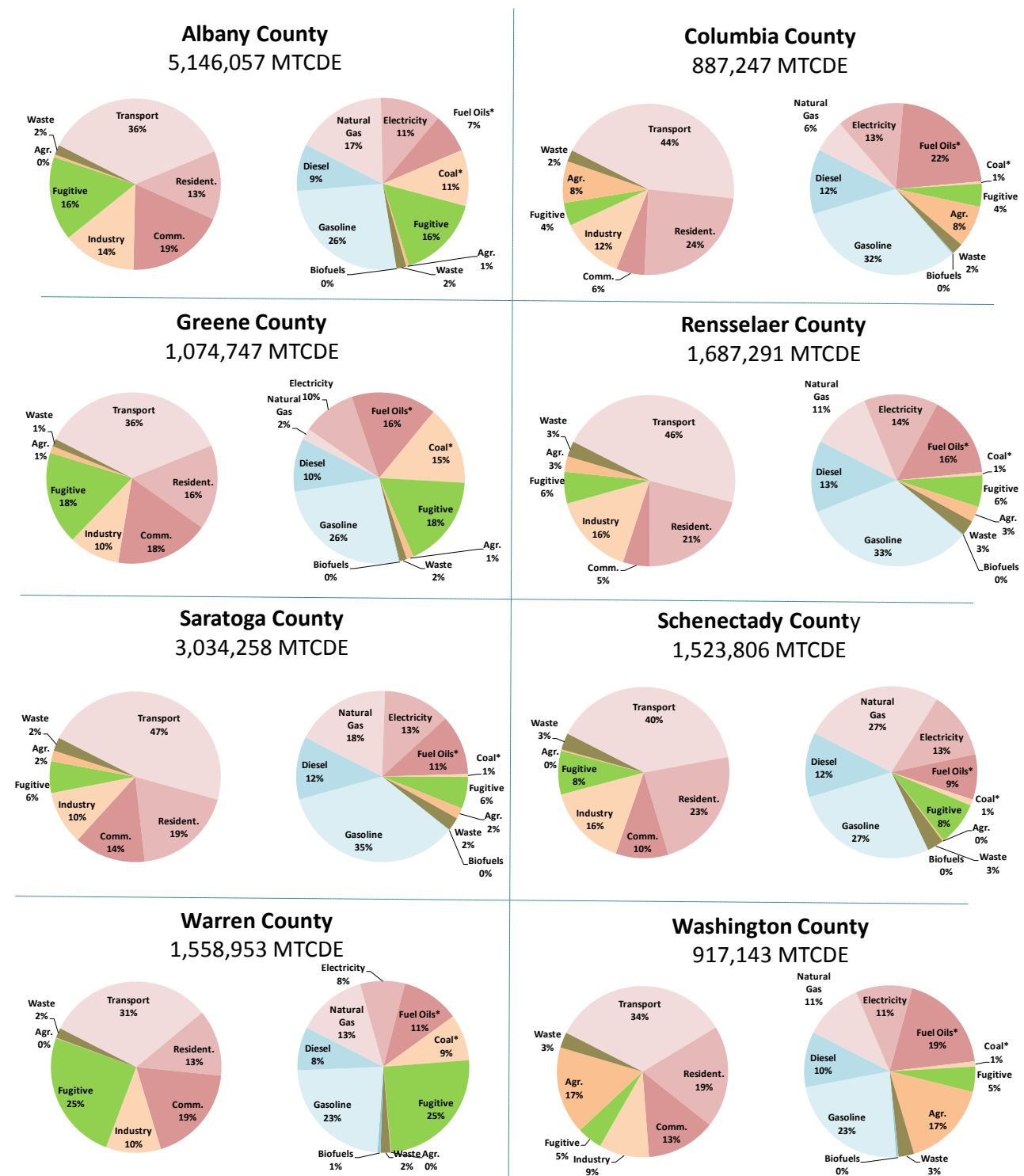
The Capital District counties are diverse and strategies to reduce GHG emissions must be tailored for each county and municipality based on their unique emissions profile. Across the counties as shown in Figure 5, Albany and Saratoga County have 5.1 and 3 million MTCDE GHG emissions respectively and account for half of the region’s emissions. This is primarily because they have the region’s highest populations and larger concentrations of commercial and industrial activities. On the other hand, Columbia County has a low population and less commerce and industry, and is therefore the smallest emitter at 887,247 MTCDE.

Figure 5. GHG Emissions by County (MTCDE)



Columbia, Rensselaer, and Schenectady Counties are more residential with households producing 20-25% of all emissions. Washington and Columbia Counties have significant agriculture that accounts for 17% and 8% of county emissions respectively. In some Washington County dairy towns this share rises to close to 40% rivaling on-road vehicles. Transportation emissions dominate in all counties, though the share differs, ranging from 32% in Warren County to 47% in Saratoga County.

Figure 6. GHG Emissions by County, by Source and Sector (MTCDE)



County-by-county energy mix as shown in

Figure 6 is similar across all counties, although it varies based upon how much grid-supplied natural gas is available in the county. In Columbia and Washington counties where there is less natural gas availability, fuel oil counts for 20% of all emissions whereas in Albany and Schenectady Counties fuel oil makes up only 8% of emissions. Given the rise in petroleum energy costs, counties and towns with a higher reliance on fuel oil have been hit harder by rising fuel prices and will benefit most from energy conservation.

Regionally as show in Table 3, per-capita emissions are 14.7 MTCDE / person. Between counties it varies significantly from 9.8 MTCDE/person in Schenectady County to 23.7 MTCDE/person in Warren County.

Table 3. Per Capita GHG Emissions by County (MTCDE/person)

County	Emissions (MTCDE)	Emissions per Capita (MTCDE/person)			
		Total	res / com	Industrial*	Transport
Albany	5,146,057	16.9	4.8	5.5	6.1
Saratoga	3,035,995	13.8	4.3	2.4	6.5
Rensselaer	1,687,291	10.6	4.1	1.0	4.9
Warren	1,558,953	23.7	5.8	10.0	7.5
Schenectady	1,523,806	9.8	4.2	1.5	3.9
Greene	1,074,747	21.8	5.7	7.6	7.9
Washington	917,143	14.5	4.4	2.4	4.9
Columbia	887,247	14.1	5.3	1.2	6.2
REDC	15,831,238	14.7	4.6	3.6	5.8

* Industrial includes process emissions

The differences are driven in part by lower transportation and residential energy use in more densely populated areas, but are driven more so simply by whether or not a county has large industry relative to population. Warren and Green Counties have higher transportation and domestic energy use per capita, but they also low populations and large cement industries (e.g., Holcim US Inc. and Lehigh Northeast Cement). Conversely Schenectady and Rensselaer counties have less industrial activity and residents and businesses are located in cities such as Troy and Schenectady, which use less energy because of their compact form.

Industrial facility emissions can be large and dominate emission inventories, and therefore it is important to engage these stakeholders as part of sustainability planning. Communities can find detailed data on all Capital District GHG point sources in Table 4. For example the Lafarge, Inc. cement plant in the Village of Ravena counts for 20% of Albany County's entire GHG inventory, emitting roughly the same as all emissions sources from the City of Albany combined. Within the City of Albany, the Office of General Services (OGS) Sheridan Steam Plant facility that heats the Empire State Plaza accounts for 50% of the cities industrial sector GHG inventory.

Table 4. Capital District Industrial GHG Point Sources

Facility Name	Industry	Municipality	County	GHG Emissions (MTCDE)			
				Scope1	Bio	Process	Total
Lafarge Building Materials, Inc.	Cement	Ravena	Albany	524,461	0	544,401	1,068,862
Lehigh Northeast Cement Company	Cement	Glens Falls	Warren	125,070	0	321,965	447,035
Holcim US Inc	Cement	Catskill	Greene	158,231	0	160,108	318,339
Momentive Per. Materials	Chemical	Waterford	Saratoga	133,893	0	0	133,893
Finch Paper LLC	Paper	Glens Falls	Warren	113,442	318,416	3,407	116,849
Albany Rapp Rd. Landfill	Landfill	Albany	Albany	78	9,748	67,190	67,268
Colonie Town Landfill	Landfill	Cohoes	Albany	95	19,598	55,209	55,304
Sabic Innovative Plastics US LLC	Paper	Selkirk	Albany	53,332	0	0	53,332
SCA Tissue	Paper	South Glens Falls	Saratoga	38,433	0	0	38,433
SI Group, Inc.	Chemical	Rotterdam Junction	Schenectady	26,790	0	0	26,790
Iroquois Gas Transmission, L.P.	Gas Distrib	Delanson	Schenectady	23,856	0	0	23,856
Owens-Corning Insulating Systems	Chemical	Feura Bush	Albany	23,655	0	0	23,655
GE Global Research Center	General	Niskayuna	Schenectady	22,427	0	0	22,427
Compressor Station 254	Gas Distrib.	Riders Mills	Columbia	20,428	0	0	20,428
Hollingsworth & Vose-Easton Mill	Paper	Greenwich	Washington	20,419	0	0	20,419
NYS Washington Correctional Facility	General Industry	Comstock	Washington	16,167	0	0	16,167
Norlite Corp	Cement	Cohoes	Albany	10,724	0	0	10,724
Ball Metal Beverage Container Corp	Metals	Saratoga Springs	Saratoga	10,393	0	0	10,393
Buckeye Albany Terminal LLC	General Industry	Albany	Albany	8,950	0	0	8,950
Quadgraphics	Printing	Saratoga Springs	Saratoga	8,757	0	0	8,757
Amri Rensselaer	Chemical	Rensselaer	Rensselaer	6,945	0	0	6,945
Hollingsworth & Vose Greenwich Mill	Paper	Center Falls	Washington	6,265	0	0	6,265
Commonwealth Plywood Inc.	Paper	Whitehall	Washington	4,923	31,667	0	4,923
Von Roll Usa Inc	Industry	Schenectady	Schenectady	3,873	0	0	3,873
Hess Rensselaer Terminal	Energy Distrib.	Rensselaer	Rensselaer	3,472	0	0	3,472
Saint Gobain Per. Plastics	Chemical	Hoosick Falls	Rensselaer	2,696	0	0	2,696
Lehigh Northeast Cement – Greene	Cement	Catskill	Greene	933	0	0	933
Manchester Wood Inc	Paper	Granville	Washington	143	7	0	143
Petroleum Fuel & Terminal Co	Energy Distr.	Rensselaer	Rensselaer	91	0	0	91
Global Companies Llc	General Industry	Albany	Albany	58	0	0	58
Citgo Petroleum Glenmont Terminal	Energy Distr.	Glenmont	Albany	18	0	0	18

Household Energy, Land Use, and GHG Emissions

Capital District GHG emissions are driven by a nexus between the residential and transportation sectors. The residential sector is the largest of the “RCI” sectors (residential, commercial, industrial) and transportation is the single largest sector overall. They are linked because while households create energy demand for domestic heating and cooling, household residents create transportation demand that forms the majority of on-road transportation GHG emissions. Together how much an individual household and its residents contribute to GHG emissions depends upon household size and efficiency, choice of heating fuels, community land use patterns, proximity to work, and accessibility of transit.

For regional and community planners to find drivers to engage community residents in GHG reduction programs, it’s important they understand how and why their households use energy, how much it costs them, and how consumption patterns vary across the region. The study evaluated the following per-household metrics for each municipality:

Domestic energy use: The sum total of all electricity, gas, fuel oil, and wood used in a household reported in MMBTU. This energy data comes directly from the GHG inventory and utility-supplied data.

Attributed transportation energy use: This is an estimate of fuel use attributed to households to meet transportation needs (i.e., directly through fueling of personal vehicles or indirectly through use of transit.) To estimate it, it was assumed that Capital District households consume at the national average rate of 132 MMBTU/household. Half of that rate was assigned to municipalities by default and the balance was apportioned weighted to average community commute time reported in the American Community Survey. This method ensures that the average household rate remains 132 over the whole region, but allows communities with longer commutes to receive more energy than those with shorter commute times.

Attributed GHG footprint: Total GHG emissions attributed to a household for meeting both its domestic energy and transportation energy needs. The calculation assumes for simplicity that all transportation energy is conventional motor gasoline.

Energy Cost of Living (ECOL): The total cost for all energy paid by households to meet domestic and transportation needs. ECOL is compared with household incomes to determine how the energy cost burden varies across the counties and municipalities.

Maps depicting each of these four municipal household metrics are shown on the following pages on Figures 7 - 10, and summarized by county in Figure 11 and Table 5. Results for all municipalities are presented in Appendix B, Table B 4.

Figure 7. GHG Emissions per Household Attributed to Domestic Energy Use.

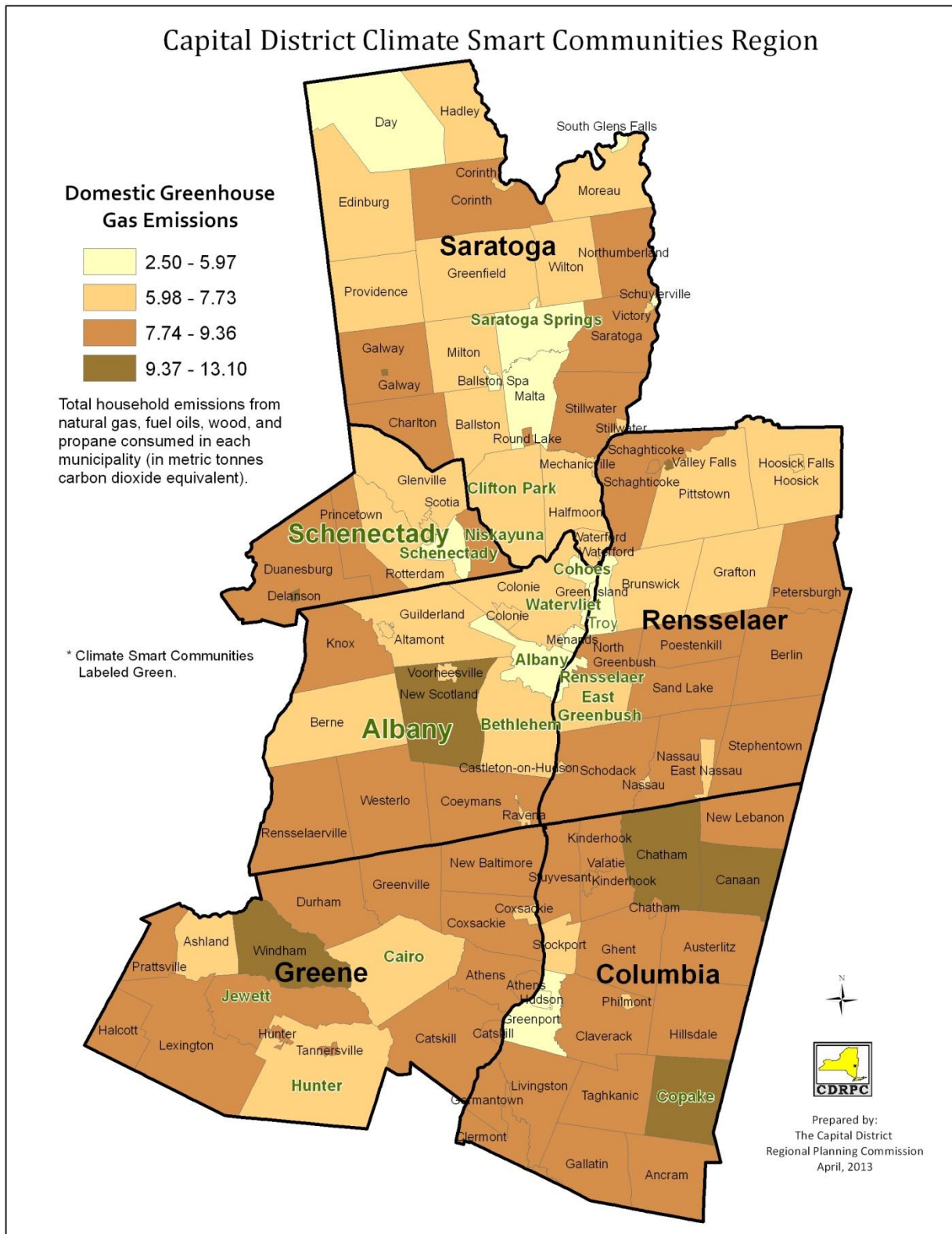


Figure 8. GHG Emissions per Household Attributed to Transportation Demand

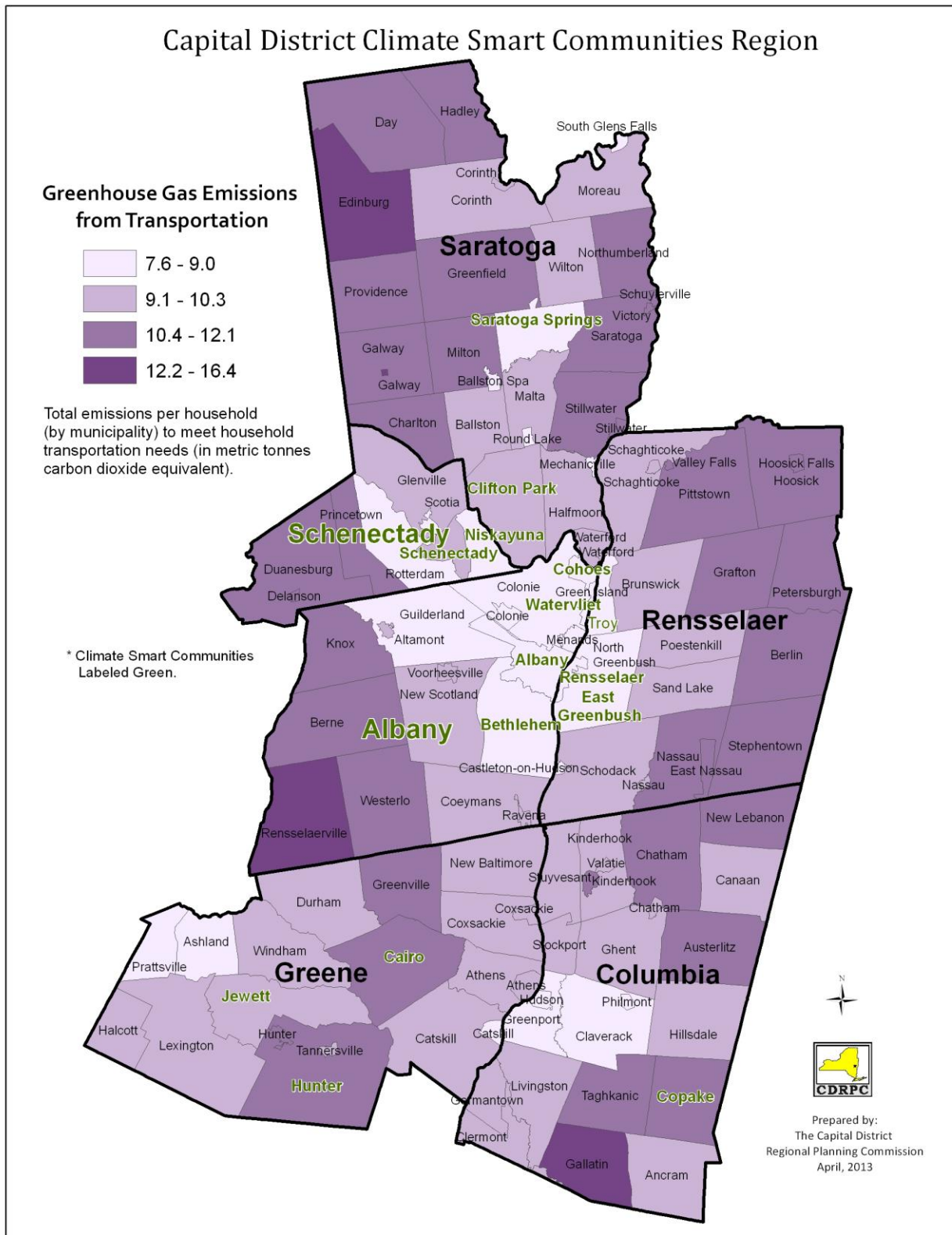


Figure 9. GHG Emissions per Household.

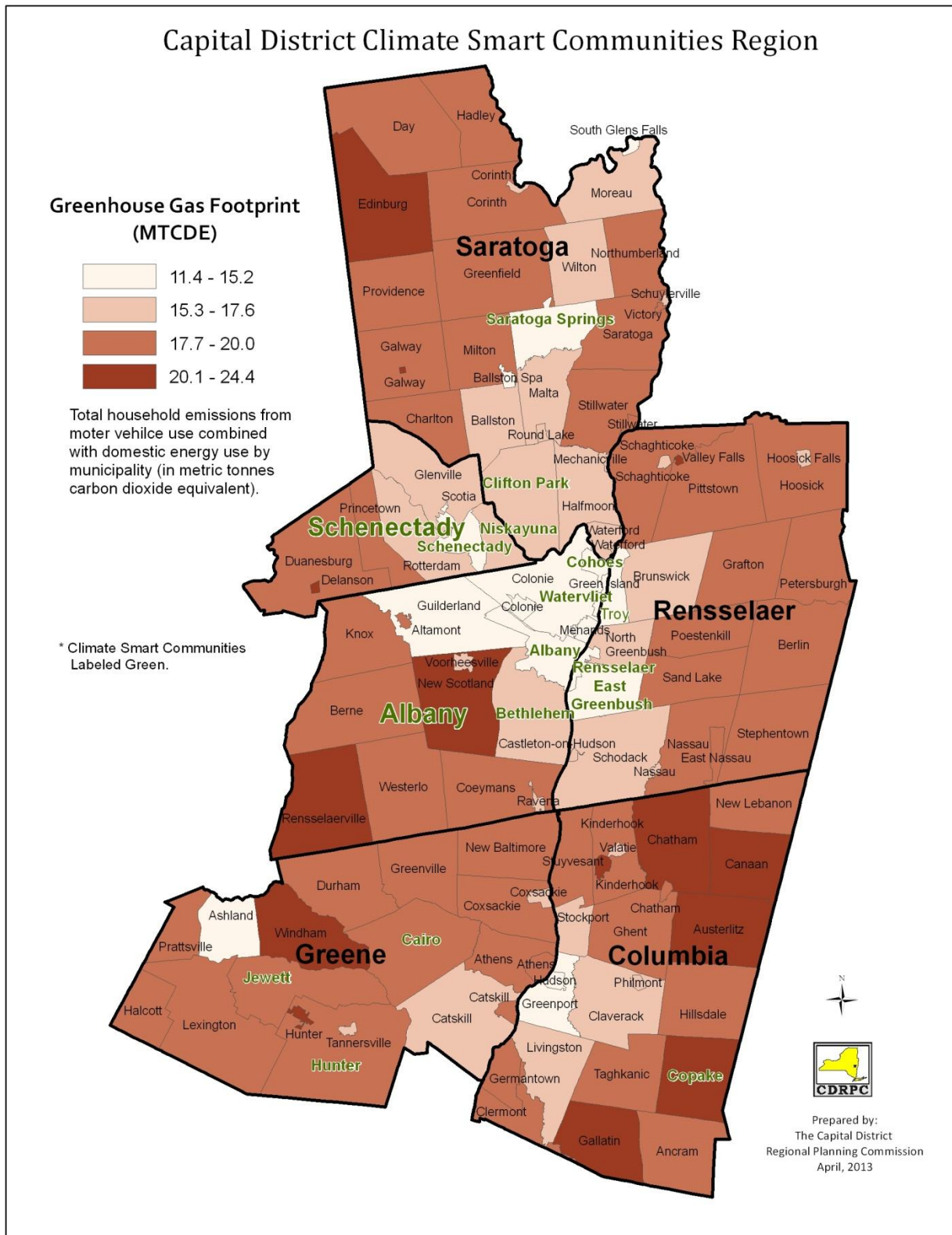
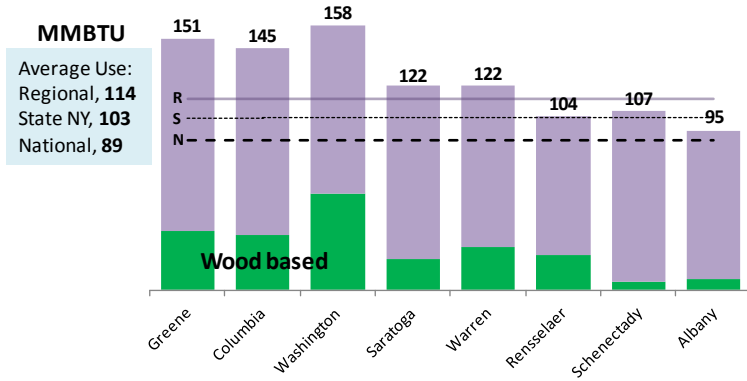
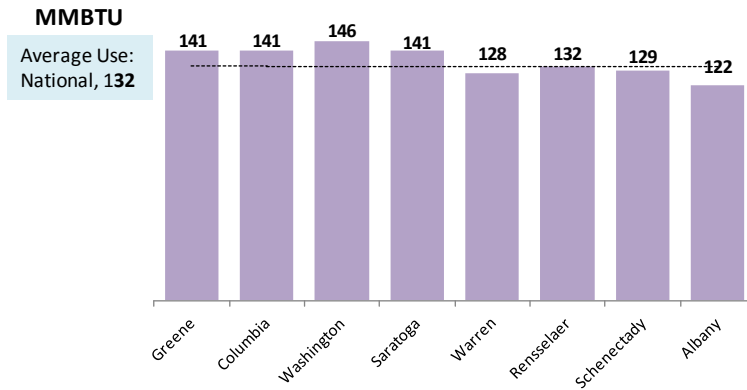


Figure 11. Energy Use and GHG Emissions per Household



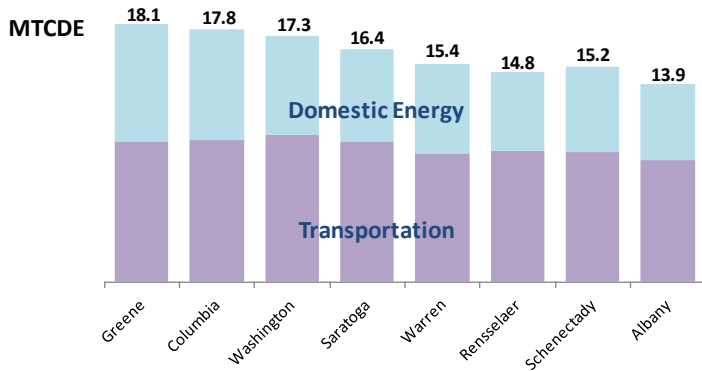
Domestic Energy

Per-household use of electricity, natural gas, fuel oil, and wood. Wood based energy is shown separately in green.



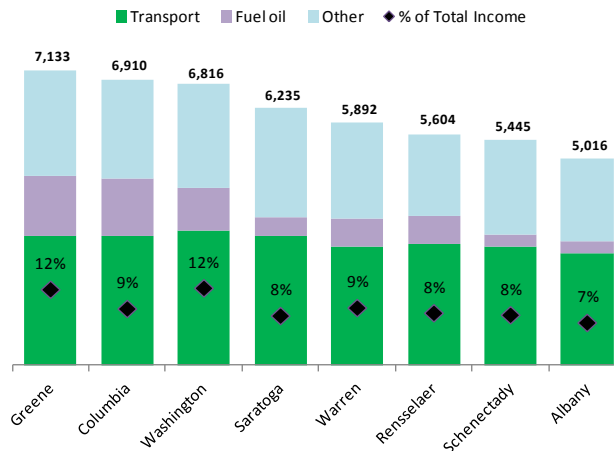
Transportation Energy

Per-household use of gasoline and diesel attributed to household members using private vehicles, transit, and trains.



GHG Emissions

Per-household GHG emissions (MTCDE) caused by a household's domestic and transportation energy demand.



Energy Cost of Living

Total cost for domestic and transportation energy. Domestic energy costs are broken out by fuel oil (purple) and others (light blue). Black diamonds indicate the fraction of average household income that is spent on energy.

As shown in Figure 11 households in the Capital District consumed 114 MMBTU/year in 2010 for domestic energy, higher than both state (103) and national (89) averages. This is reasonable because New York is a cold state, and because upstate has lower development density than downstate.

Looking across the counties, households in Greene, Columbia, and Washington counties consume the most domestic and transportation energy, create the most GHG emissions, and spend the most on energy. They have more single family households, residents have longer commute times, and households are more dependent on fuel oil for heating. Greene and Washington County households combine high energy bills with the lowest average incomes and consequently spend 12% of household income on energy (Table 5). In some towns that percentage rises to 20% or more.

Table 5. Energy Cost of Living (ECOL) and GHG Emissions per Household

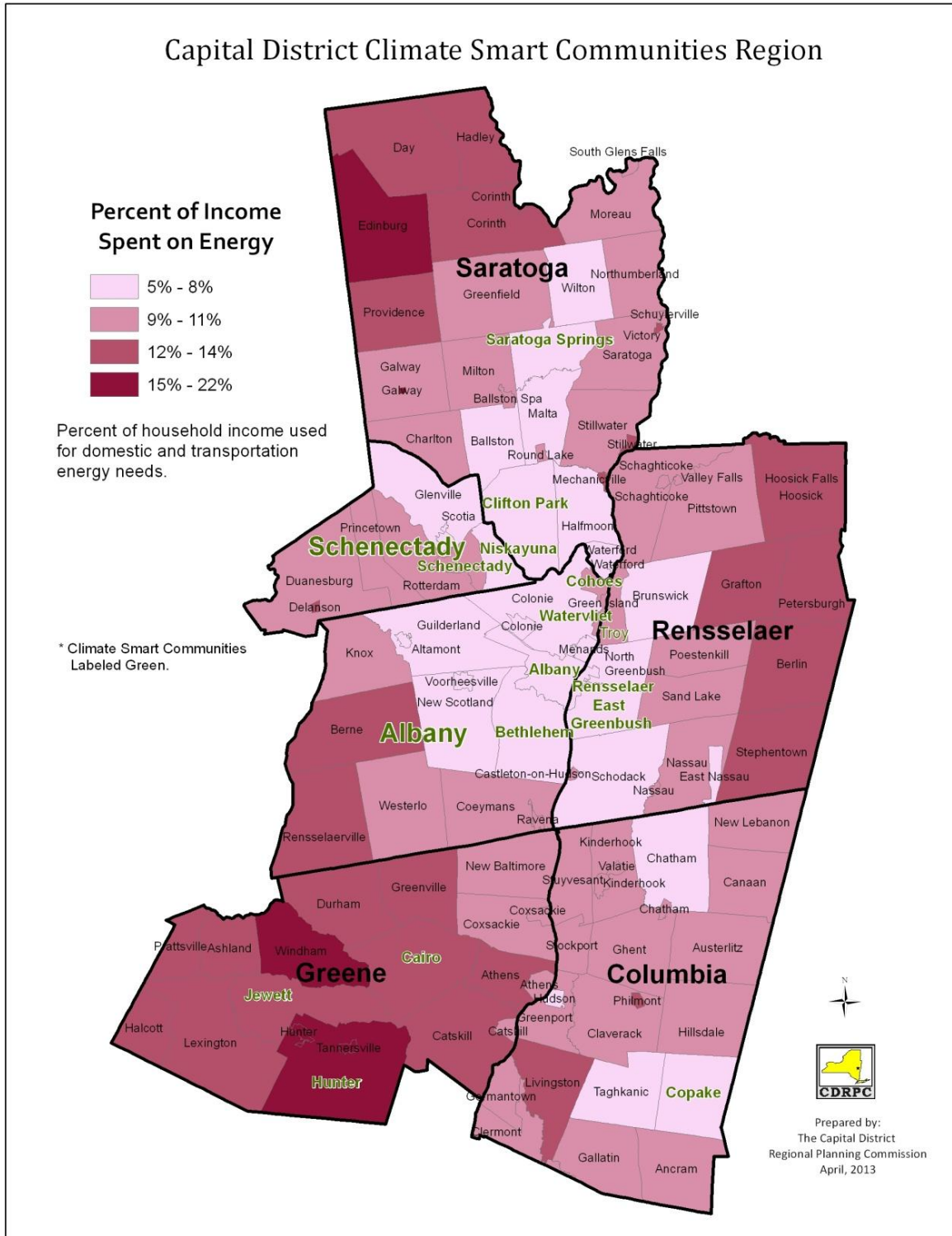
County	Energy Use (MMBTU)			Energy Cost (\$\$)			GHG Emissions (MTCDE)		
	Domestic	Transport	Total	ECOL	Income	% of income	Transport	Domestic	Total
Greene	151	141	291	7,133	58,833	12%	9.9	8.4	18.3
Columbia	145	141	286	6,910	76,237	9%	9.9	8.1	18.0
Washington	158	146	304	6,816	55,160	12%	10.3	7.2	17.5
Saratoga	122	141	263	6,235	78,371	8%	9.9	6.9	16.8
Rensselaer	107	129	237	5,445	67,473	8%	9.1	6.6	15.7
Schenectady	122	128	250	5,892	63,990	9%	9.0	6.6	15.6
Warren	104	132	235	5,608	66,854	8%	9.3	5.8	15.0
Albany	95	122	217	5,016	73,367	7%	8.6	5.8	14.3
Class									
Rural	159.86	145.89	306	6,177	58,799	11%	10.3	6.8	17.1
Suburban	116.66	131.84	249	5,476	75,565	7%	9.3	6.5	15.8
Urban	79.07	121.61	201	4,449	58,697	8%	8.6	4.7	13.3
Average	114.62	131.92	247	5,787	70,409	8%	9.3	6.5	15.8

Conversely, households in Albany, Rensselaer, and Schenectady counties consume the least domestic and transportation energy, create 40% less GHG emissions, and spend the least on energy. These counties are more urban and compact, have lower commute times, and have more households in multi-family buildings. Households in Warren and Saratoga Counties fall in the middle, though Saratoga has higher transportation emissions.

As shown in the top panel of Figure 11, counties with households that use firewood as a heating fuel reduce GHG emissions per household. For example, while Washington County households have the highest domestic and transportation energy consumption needs, its households rank only 3rd in GHG emissions because 38% of domestic energy needs are met with renewable wood that doesn't create GHG emissions.

Energy performance and cost varies even more across individual municipalities. For example, Figure 12 shows that rural and more outlying communities spend a greater percentage of income on energy compared to urban communities.

Figure 12. Energy Cost of Living as a Percent of Income

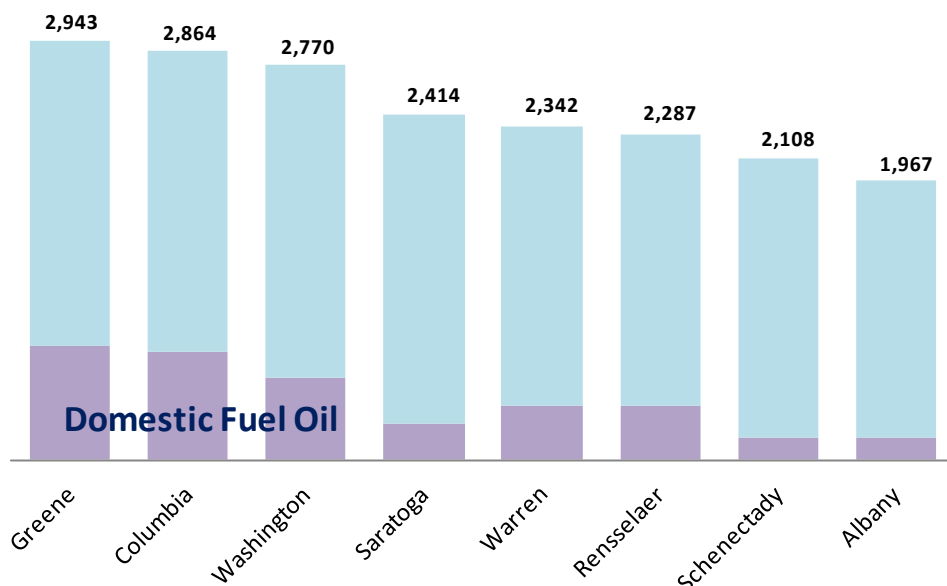


Appendix B, Table B 4, provides the Energy Cost of Living and GHG emissions / household data for all 160 municipalities. Households in some rural towns consume three to four times more energy than their urban counterparts. For example, households the city of Troy, which is compact and has a high proportion of multi-family housing, are by far the least energy demanding in the Capital District, consuming only 38 MMBTU/year to meet domestic energy needs.

Energy prices- a driver for energy and GHG reduction efforts

As shown in Figure 13, households today pay on average \$2300/year *more* to power homes and vehicles than they did ten years ago (adjusted for inflation). Energy bills in Greene and Columbia county households have risen about a thousand dollars more than those in Albany County. Across individual municipalities the difference is even greater. Some rural Towns have seen average household and vehicle fuel bills increase in excess of \$3500/year.

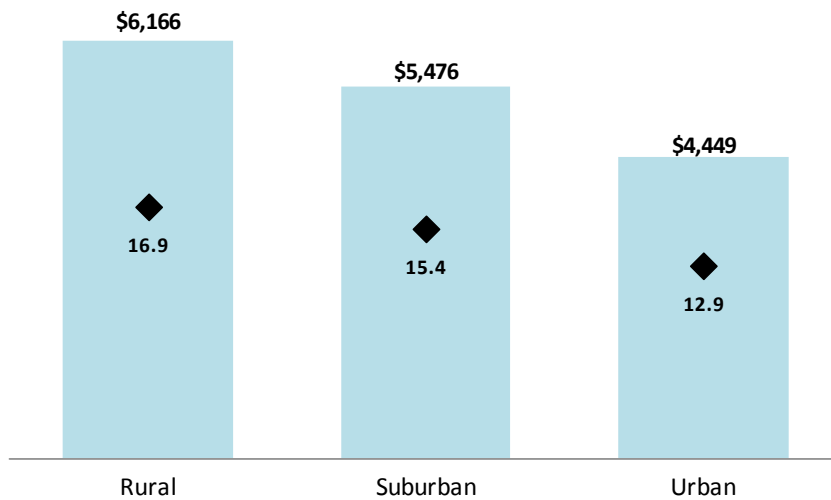
Figure 13. 10-Year Cost Increase for Energy (\$\$/household)



Petroleum fuel prices have increased far more than natural gas and electricity, and so rising prices have hit rural areas harder because they rely on gasoline for transport *and* fuel oil for heating. The purple shading in Figure 13 shows the portion of the 10-year energy price increase that is due to domestic fuel oil, which accounts for much of the cost increase difference between counties. Overall, with energy bills now consuming 8-20% of a household income prices likely have already had, and will continue to have, a depressive effect on local economies if energy efficiency measures are not pursued.

Most counties are a mix of urban, suburban, and rural communities. To investigate consumption differences between types, the study averaged household consumption data from all communities by type instead of by county. As shown in Figure 14 rural households create 31% more GHG emissions and pay 37% more for energy than urban counterparts to meet transportation and domestic energy needs.

Figure 14. Annual Energy Costs (\$) and GHG Emissions (MTDCE) per Household



Suburban and rural households consume similar amounts of transportation fuels, but rural households consume more energy for domestic use at home. Urban households consume considerably less energy for both transportation and domestic needs. It is clear that as a long term GHG mitigation strategy, emphasizing compact and employment accessible land use development would reduce GHG emissions and save residents money.

Reducing GHG Emissions from On-Road Transportation

With transportation accounting for 40% of all emissions in the Capital District, this is a priority area for regional GHG mitigation efforts. Reducing emissions typically involves around (1) introducing alternative fuels and more efficient vehicles to reduce the impact of current on-road travel demand, and (2) implementing land use policy and transit measured to reduce both existing and future travel demand. This study developed and compared several scenarios around electric vehicles, bio-fuels, and land use policy. The results are presented in Table 6.

Electric Vehicles

New York has a unique opportunity to power on-road and off-road vehicles with clean electricity, which lowers both costs and GHG emissions. According to a recent study by the Union of Concerned Scientists (UCS, 2012), New York's power grid is the cleanest in the nation and switching passenger cars from gasoline to electric will reduce emissions by 75% per mile. Electrifying transportation requires developing a market (most likely starting in urban areas) and implementing charging infrastructure. As shown in Table 6, this is switching 20% of on-road vehicle miles to electricity would reduce the Capital District emissions by 5% and save residents and estimated \$175 million in fuel costs per year.

Bio-Fuels

Bio-fuels can also reduce GHG emissions, though as discussed previously the lifecycle benefit varies from 25% for corn ethanol to GHG to 60% or more from cellulosic ethanol from switch grass and other feedstock (Schnepf, 2013). Using locally recycled oils and bio-methane from waste to create fuel can increase that savings even further.

The American Renewable Fuels standard was created under the Energy Policy Act (EPAct) of 2005, and established the first renewable fuel volume mandate in the United States. Under the Energy Independence and Security Act (EISA) of 2007, the RFS program set lifecycle greenhouse gas performance standards to ensure that each category of renewable fuel emits fewer greenhouse gases than the petroleum fuel it replaces. The act created a category of "advanced" bio-fuels, requiring that they save 50% on the lifecycle. These fuels, like cellulosic ethanol from switch grass, are in limited production today but the Act is seeking to make them widely available by 2020.

As shown in Table 6, if the Capital District shifts 20% of on-road gasoline and diesel consumption to advanced bio-fuels as defined by the RFS, this will reduce the Capital District GHG emissions by 3.3%.

Land use planning and compact, mixed-used development

While electric vehicles and alternative fuels provide immediate gains to reduce the impact of current transportation demand, the best option to reduce GHG emissions and fuel costs is to simply reduce automobile use. Compact, transit accessible, pedestrian friendly development requires 20-50% less vehicle use and creates less GHG emissions per household (US EPA, 2011). For many communities it is challenging to change existing land use patterns, but it is possible to introduce mixed use development, complete streets, and urban infill to bring people closer to employment and transit.

As shown in Table 6, reducing VMT demand in the Capital District by 10% would reduce GHG emissions by 3.2% and save residents \$200 million in fuel costs- savings on par with those gained by introducing alternative fuels and vehicles.

Natural Gas

Natural gas is becoming a more cost effective fossil fuel. In addition, studies show that on the lifecycle, natural gas can reduce GHG emissions over petroleum by 6-10% (US DOE).

Vehicle Efficiency

All vehicles, whether alternative or conventional, can always be chosen to be more efficient over the ones they are replacing. This is perhaps the easiest way to reduce emissions and to save money. For example, hybrid-electric gasoline vehicles can cut fuel use in half by themselves.

Table 6. Reducing Transportation Emissions in the Capital District

Shift light duty gasoline cars and trucks to electricity¹

% Shift of VMT	GHG Savings			Fuel Cost Savings ²
	Emissions (MTCDE)	% transport	% of total baseline	
10	340,176	6.9%	2.2%	\$87,470,126
20	680,351	13.7%	4.4%	\$174,940,253
50	1,700,878	34.3%	10.9%	\$437,350,632
100	3,401,756	68.6%	21.8%	\$874,701,263

Reduce overall travel demand (VMT)

% Reduction of VMT	GHG Savings			Fuel Cost Savings
	Emissions (MTCDE)	% transport	% of total baseline	
2	99,217	2.0%	0.6%	\$38,939,276
5	248,042	5.0%	1.6%	\$97,348,191
10	496,085	10.0%	3.2%	\$194,696,381
20	992,170	20.0%	6.3%	\$389,392,762

Shift from gasoline to E-85 (cellulosic or advanced cornstarch)

% Shift	GHG Savings			Fuel Cost Savings
	Emissions (MTCDE)	% transport	% of total baseline	
2	51,281	1.0%	0.3%	--
5	128,202	2.6%	0.8%	--
10	256,404	5.2%	1.6%	--
20	512,809	10.3%	3.3%	--

¹ Electric vehicle efficiency set to 0.34 Kwh / mile (UCS, 2012), total cost of electricity \$0.17/KWh
² Presumed \$4.00/gallon for gasoline
³ Assumes sustainable ethanol has 60% lifecycle emissions reduction per gallon over gasoline

Sector-by-Sector GHG Methods, Results, and Data Sources

Emissions in the Built Environment

Residential, Commercial, and Industrial Energy Consumption

Fuels and energy used in homes, businesses, and industry are combined the largest source of GHG emissions in the Capital District. They include:

- Scope 1 direct emissions from burning natural gas, coal, fuel oils (#1, #2, #4, #5, #6), kerosene, propane, used oils, petroleum coke, motor gasoline, other petroleum products.
- Scope 2 emissions attributed to electricity consumption.
- Biogenic CO₂ emissions from wood and bio-methane combustion.

Table 7 shows a breakdown of GHG emission by sector and county.

Table 7. GHG Emissions by Sector, Scope, and County (MCTDE)

County	Residential			Commercial			Industrial		
	Scope 1	Scope 2	Biogenic	Scope 1	Scope 2	Biogenic	Scope 1	Scope 2	Biogenic
Albany	484,926	181,769	73,093	405,759	310,454	24,410	859,067	98,676	12,763
Columbia	154,399	58,821	83,462	68,448	38,467	11,315	32,304	15,073	2,108
Greene	123,375	48,772	69,029	65,453	38,135	11,092	168,762	22,130	1,775
Rensselaer	247,175	105,426	124,918	157,264	106,655	18,876	61,612	23,891	5,484
Saratoga	399,738	174,351	151,399	174,927	133,367	26,235	336,434	76,397	9,148
Schenectady	262,536	92,594	27,899	139,485	97,570	5,226	147,598	3,827	10,086
Warren	141,581	55,074	74,991	95,503	66,721	16,960	282,159	9,733	325,573
Washington	128,066	48,989	137,804	56,807	29,971	13,227	101,942	18,412	36,471
REDC	1,941,798	765,795	742,594	1,163,647	821,339	127,339	1,989,879	268,139	403,406

For each municipality, electricity and fuel consumption data was collected or estimated in units of MMBTU (Million British Thermal Units) and converted into GHG emissions using methods recommended by GHG Working Group (NYSERDA, 2013). The methods and data sources are summarized below and for reference the emission factors can be found in Appendix C, Table C 1.

Natural gas and electricity: National Grid, Central Hudson, New York State Electric and Gas (NYSEG), and the Green Island Power Authority (GIPA) provided aggregate electricity and natural gas consumption by sector for all 160 municipalities in the Capital District. The data are available in Appendix B, Table B 2. It was provided in aggregate and includes no private data for any specific utility customers.

Residential non-utility fuels (coal, fuel oils/kerosene, wood, and propane): Consumption by each municipality was estimated by allocating a portion of total US Energy Information Administration (EIA) reported statewide consumption of each fuel weighted to American Community Survey (ACS)

demographic information on household counts, home-heating fuel preference, and housing unit size. The method also incorporates weighting for heating-degree-day (HDD) differences across New York.

- The ACS data is available online via the Census Bureau’s American Fact Finder. The study used ACS five-year moving average demographics for home heating and housing counts, and 2010 census data for population.
- Statewide consumption of residential fuels reported by the US Energy Information Administration (EIA) and is available online at the State Energy Data System (SEDS) at <http://www.eia.gov/state/seds/>. For residential fuels, the study used five year moving average (2006-2010) consumption rates to match the timescale of the ACS data.

Commercial fuels (coal, fuel oils/kerosene, wood, and propane): Consumption by each municipality was estimated by allocating a portion of total statewide consumption to each municipality weighted to local employment totals, commercial floor square footage, home-heating fuel preference, and heating-degree-day (HDD) differences across New York. Home heating fuel choice in a community is used as a proxy to determine which fuels are most likely to be used by businesses in the same community.

Industrial fuels (coal, petroleum coke, fuel oils/residual fuel oil/kerosene, natural gas, and others): Large industry and power generators in the Capital District report fuel use and emissions directly to one or more of the following three mandatory programs from which data is made public:

- EPA’s Facility Level GHG Reporting Program (GHGRP) available using EPA’s FLIGHT Tool at <http://ghgdata.epa.gov/ghgp/main.do>. (US EPA, 2012)
- NYSDEC’s Title 5 permits issued under the Air Permitting and Registration Program with data available at <http://www.dec.ny.gov/chemical/32249.html>
- Energy Information Administration (EIA)’s Schedule 923 Annual electric utility reporting program with data available at <http://www.eia.gov/electricity/data/eia923/>

All relevant sources were pulled from these databases for 2010 and placed directly in the inventories of the communities in which they are located. Where the same facility was listed in multiple reporting sources, NYSDEC data was preferred as it is most quality controlled.

Because smaller industry does not report to the above mandatory reporting programs, the GHG Working Group created a “pie slice” method to estimate the emission contribution of unaccounted-for-industry. The method compares total statewide emissions from actual reporting facilities to industry-wide sector totals derived using EIA/SEDS energy data. The difference between the two at the state level was assumed to be a “pie slice” representing smaller unaccounted for industry, and that portion was then allocated from the state level to counties based manufacturing employment data from the New York State Department of Labor (NYS DOL). County totals were then further allocated to communities using the community-to-county ratio of industrial electricity consumption reported by the utilities.

Transmission and Distribution (T/D) Losses

When utilities supply natural gas and electricity to consumers, some of it is lost during transmission and distribution (T/D). The study adopted the GHG Working Group recommendation to use a regional T/D loss rate of 1.9% for natural gas and 5.28% for electricity. T/D loss emissions are assigned to municipalities by applying the above percentages to actual natural gas and electricity consumption levels provided by the utilities. Natural gas T/D is counted as direct unburned fugitive emissions of methane, whereas electricity T/D is treated as consumption and emissions are calculated using the electricity scope 2 emissions factors.

As show in Table 9, T/D emissions from natural gas loss are higher than those from electricity because raw unburned methane is a potent GHG with a global warming potential (GWP) of 21.

Another potential source of T/D GHG emissions is direct fugitive methane (CH₄) emissions that can leak from coal, oil, and natural gas mining and drilling operations. There are no active energy wells in the region and so this source is not reported.

Industrial Process and Product Use

Industrial Process Emissions

Industrial process GHG emissions are chemical bi-products of certain manufacturing processes. In the Capital District in 2010 they come from cement and paper production at four facilities that report emissions to EPA's GHGRP program (Table 8). Because these industries also use fuels for energy, Table 8 shows total facility GHG emissions broken into industrial process emissions, Scope 1 emissions from fossil fuel combustion, and biogenic CO₂ emissions from wood combustion.

Table 8. Facilities that Create Industrial Process GHG Emissions

Facility	Industry	Municipality	County	GHG Emissions (MTCDE)				% of Inventory	
				Scope 1	Biogenic	Process	Total	County	Muni
Lafarge, Inc.	Cement	Ravena	Albany	524,461	0	544,401	1,068,862	21%	95%
Lehigh Northeast	Cement	Glens Falls	Warren	125,070	0	321,965	447,035	49%	58%
Holcim US Inc	Cement	Catskill	Greene	158,231	0	160,108	318,339	19%	62%
Finch Paper LLC	Paper	Glens Falls	Warren	113,442	318,416	3,407	116,849	13%	15%
Totals				921,203	318,416	1,029,881	1,951,084		

Facility emissions are large and, as discussed earlier, can represent a major portion of county and local emissions. The Lehigh Northeast cement facility in Warren County burns coal and represents half of the entire county's GHG inventory. As major energy consumers these large facilities are not limited to using fossil fuels. Finch Paper LLC is the region's single largest consumer of bio-fuel (as wood) which significantly reduces GHG emissions from that facility.

This study, for 2010, does not include possible emissions related to semi conductor manufacturing at Global Foundries in Malta, a source that may need to be included in the future.

Product Use Emissions

Many refrigerants are GHGs by themselves and create a GHG footprint when they leak to the atmosphere. Product use emissions are broken into two categories:

HFCs, also called Ozone Depleting Substitutes, include common refrigerants and fire retardants used ubiquitously in homes, buildings, and vehicles, and in commercial facilities like ice rinks and supermarkets.

Sulfur Hexafluoride (SF₆) is a specialized coolant used by the utility industry and is very potent GHG. It is reported separately because unlike HFCs, SF₆ is highly specific utilities and each one can manage losses and report progress as a sustainability strategy.

Community level Scope1 HFC emissions were computed by applying a national average emissions rate of 0.37 MTCDE/person to local population. Scope 1 SF₆ emissions were calculated using a national average emissions rate of 0.000921 MTCDE/MMBTU of electricity consumed. Both emission rates were developed by the GHG Working Group (NYSERDA, 2013).

Table 9. Product Use and T/D Loss Emissions by County (MTCDE)

County	Product Use (MTCDE)			T/D Losses (MTCDE)	
	SF ₆ Utility	ODS/Refrigerants	Total	Natural gas	Electricity
Albany	8,090	112,914	121,005	121,248	30,692
Saratoga	5,259	81,514	86,773	75,376	19,952
Rensselaer	3,231	59,177	62,408	26,217	12,257
Warren	1,801	24,389	26,190	28,068	6,832
Schenectady	2,656	57,431	60,088	55,222	10,076
Greene	1,493	18,270	19,763	3,173	5,664
Washington	1,333	23,464	24,798	13,950	5,058
Columbia	1,538	23,420	24,958	7,560	5,836
REDC	25,401	400,579	425,981	330,814	96,366

Power Generation- Scope 1

There are 14 grid-connected power generators in the region with nameplate capacity of 1 MWh or greater that use fuel and create GHG emissions (Table 11). Smaller facilities that generate power for onsite consumption (i.e., non-grid connected) are counted as Scope 1 emissions in the industrial or commercial sectors. For example, the Office of General Services (OGS) Sheridan Steam plant that serves the Empire State Plaza in Albany is considered an industrial source. Also excluded in this list are renewable facilities regardless of size like hydro, wind, and on-site solar because they do not create GHG emissions.

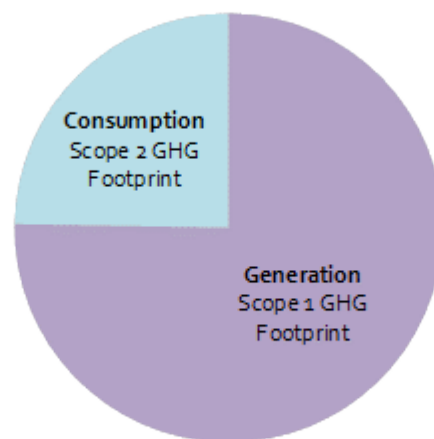
Regional power stations are fired with a variety of fuels and create significant GHG emissions. The largest power stations are fired with natural gas. Athens Generating, Selkirk Cogeneration Partners, and the PSEG Bethlehem Energy Center create more emissions than the sum total of all vehicles, operating on all roads, in all eight counties combined. Smaller renewable facilities like the landfills in the City of Albany and Town of Colonie generate power with landfill gas that contributes no GHG emissions and reduces direct fugitive emissions from the landfills. The Wheelabrator Hudson Falls waste-to-energy (WTE) plant uses municipal solid waste (MSW) that is 56% organic (US EIA, 2007) and can be considered the second largest consumer of bio-fuel in the region second only to Finch Paper LLC in Warren County.

Power Stations are large GHG emission sources. Athens Generating, Selkirk Cogeneration Partners, and PSEG Bethlehem Energy Center create more emissions than the sum total of all vehicles, operating on all roads, in all eight counties combined.

The Capital District is an energy and GHG emissions exporter—meaning that its power plants creates more direct GHG emissions than can be attributed indirectly to its regional electricity consumption. Table 10 shows that direct Scope 1 emissions are 5,646,929 MTCDE compared to only 1,855,273 MTCDE in Scope 2. The majority of generation is in Albany and Greene Counties.

Table 10. Electricity Generation vs. Consumption (MTCDE)

County	Generation / Scope 1	Consumption / Scope 2
Albany	2,479,133	590,899
Saratoga	263,921	384,115
Rensselaer	498,712	235,972
Warren	0	131,528
Schenectady	0	193,991
Greene	2,319,605	109,037
Washington	85,557	97,372
Columbia	0	112,360
REDC	5,646,929	1,855,273



Fuel consumption data were taken from either from the EPA GHG Reporting Program (GHGRP), NYSDEC’s Title 5 Air Permitting and Registration Program, or from the US Energy Information Administration’s (EIA) Schedule 923 reporting program that collects data annually from that nation’s power producers. Where facilities were represented in more than one reporting program, NYSDEC data was preferred because it is quality controlled by the Agency. Scope 1 emissions are reported in the Detailed GHG Inventory Reports for the region and counties in Appendix A, but as per reporting convention they are not counted in the “roll up” emission inventories.

Table 11. Capital District Electric Power Generation Facilities

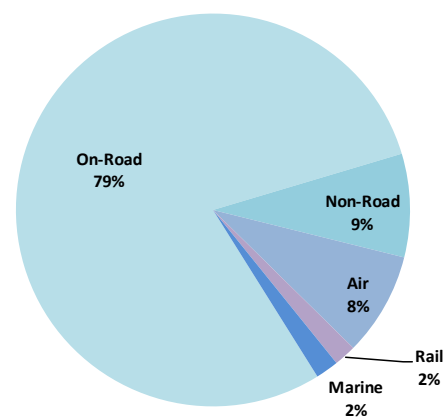
Power Facility	Municipality	County	GHG Emissions (MTCDE)		Energy Use (MMBTU)
			Scope 1	Bio-Fuel	
Athens Generating Company	Athens	Greene	2,319,226	0	43,699,616
PSEG Bethlehem Energy Center	Glenmont	Albany	1,641,254	0	30,917,824
Selkirk Cogeneration Partners	Selkirk	Albany	837,720	0	15,784,849
Empire Generating LLC	Rensselaer	Rensselaer	415,212	0	7,822,846
Indeck-Corinth Energy Center	Corinth	Saratoga	263,921	0	4,972,886
NYSOGS Sheridan Steam Plant	Albany	Albany	72,962	0	1,374,760
Castleton Power, LLC	Castleton-on-Hudson	Rensselaer	70,193	0	1,322,076
Wheelabrator Hudson Falls LLC	Hudson Falls	Washington	68,010	80,893	1,621,279
Gen. Electric Steam Turbine Global	Schenectady	Schenectady	20,933	0	394,162
Rensselaer Cogeneration	Rensselaer	Rensselaer	13,307	0	250,539
Central Hudson, South Cairo	Cairo	Greene	235	0	3,160
Central Hudson, West Coxsackie	Coxsackie	Greene	145	0	2,688
Town of Colonie Town Landfill	Cohoes	Albany	95	19,598	370,570
Albany Rapp Rd. Landfill	Albany	Albany	78	9,748	184,672

Transportation

Transportation GHG emissions are broken into five categories: On-road, off-road, rail, marine, and aircraft emissions. Off-road transportation includes agricultural machinery, construction and maintenance vehicles, lawn and garden equipment, and other vehicles that use transportation fuels but don't operate on roads.

Table 12. Transportation Emissions By Mode and County (MTCDE)

County	On-Road	Non-Road	Air	Rail	Marine	Total
Albany	1,496,750	125,791	150,131	28,092	65,297	1,866,061
Saratoga	1,177,072	110,503	108,381	13,181	11,019	1,420,156
Rensselaer	619,296	58,214	78,682	24,656	5,056	785,903
Warren	360,093	76,612	32,428	351	21,373	490,858
Schenectady	459,058	43,553	76,361	22,814	1,196	602,982
Greene	313,107	39,856	24,292	8,100	4,827	390,181
Washington	227,888	39,041	31,199	8,870	3,584	310,583
Columbia	307,583	39,250	31,139	8,211	5,947	392,131
REDC	4,960,848	532,820	532,613	114,276	118,299	6,258,855



On-road vehicles dominate as expected and account for 79% of transportation sector emissions. Off-road equipment contributes a surprisingly high 9%, followed by marine vessels and rail locomotives at roughly 2% each. Albany County has the largest marine sector emissions attributed to commercial vessels operating in and around the Port of Albany. Scope 3 emissions attributed to regional demand for commercial and passenger air travel is equivalent to roughly 8% of the transportation sector.

Transportation sector GHG accounting methods and data sources are summarized as follows:

On-road: The Capital District Transportation Committee (CDTC) provided detailed vehicle-miles-traveled (VMT) data for Albany, Rensselaer, Schenectady, and Saratoga Counties at a municipal level. The New York Department of Transportation (NYSDOT) provided county-level data for Columbia, Greene, Warren, and Washington Counties which was then allocated to communities by the ratio of municipal to county road length as reported in the NYSDOT state inventory of highways. Community VMT was converted into fuel consumption and GHG emissions following the recommended methods created by the GHG Working Group (NYSGHG, 2013). Municipal level VMT data and estimated fuel consumption for all 160 Capital District municipalities is available in Appendix B, Table B 3.

Off-road: NYSDEC provided detailed county-level GHG emissions for 214 types of off-road equipment for the year 2007. NYSDEC prepares the data every three years to support air quality modeling and was in the process of updating the data at the time of this study. The GHG Working Group decided that the 2007 data, in absence of updated data, can be presumed valid for 2010. The county data was further allocated to individual municipalities based on population.

Rail: Rail is categorized into four main groups: Class I freight, Class II/III freight, passenger/commuter, and switchyard rail. Within the Capital District all eight counties contain Class I railways, while only two counties (Rensselaer and Washington) contain Class II/III freight. Passenger lines include Amtrak and Adirondack Scenic Railroad. There is no electric rail in the region. As per decisions of the GHG Working Group, diesel consumption by county was pulled directly from the *2002 Locomotive Survey for New York State (NYSERDA, 2007)* and that data was used as a proxy for year 2010. The GHG Working Group looked at updating this source but found it impractical to do so. The NYSERDA county level data was allocated to communities by relative length of rail track passing through each community.

Air: Unlike the other transportation sectors that count Scope 1 (direct) emissions, this mode follows a Scope 3 method that attributes emissions to flight miles arriving and departing from regional airports. The GHG Working Group created an emissions factor of 0.02381497 MTCDE/flight-mile (NYSGHG 2012.) In 2010, Albany Airport (ALB), Glens Falls Airport (GLF), Schenectady County Airport (SCH), and Saratoga Springs (VWK) reported to the Federal Aviation Administration (FAA) a total of 22,364,620 arrival and departure flight miles, translating into a regional footprint of 532,613 MTCDE. Regional emissions were then allocated to counties based on population and reported in Table 12. Scope 3 air emissions were not allocated to communities and are not included in the roll up GHG inventory transportation sector totals in Appendix B, Table B 1.

Marine: Marine emissions come from private and commercial vessels. County-level emissions from private craft were included in the non-road data set provided to the GHG Working Group by NYSDEC. Those emissions were allocated to communities based on the ratio of municipal to county surface water area as reported in the 2010 census. Commercial emissions were not included in the NYSDEC non-road dataset, and so county-level CO (carbon monoxide) emissions from commercial marine vessels were taken from the 2008 US National Emissions Inventory¹ and converted into CO₂ on a mass basis using a ratio of 1:150. This ratio was derived from the CO and CO₂ emission factors for non-ocean going vessels contained in the Intergovernmental Panel on Climate Change (IPCC) 1996 Guidelines for GHG inventories (IPCC, 1996).

Waste (Solid and Sewage)

Solid Waste

Solid waste management accounts for 1.6% of regional GHG emissions. Landfills slowly create methane because the organic component of municipal solid waste (MSW) buried in one year decays and releases methane over many years. Modern landfills collect methane and use it to generate power, and so actual GHG emissions are the fugitive portion that escapes capture. MSW that is incinerated creates CO₂e emissions that are reported as 56% biogenic and 44% fossil-based Scope 1 emissions (US EIA, 2007). Grid connected waste-to-energy (WTE) plant emissions are reported in the Power Generation sector.

¹ Currently searchable by county at <http://www.epa.gov/ttn/chief/net/2008inventory.html>

The GHG Working Group developed Scope 1 and Scope 3 methods to estimate this source. The group concluded that both should be listed on the Detailed GHG Inventory Reports in Appendix A, but that only Scope 3 will be included in “roll up” GHG inventories. The methods are summarized as follows:

Scope 1 (direct) emissions come from landfills within a community boundary and in the Capital District there are only two sources, the City of Albany’s Rapp Rd. landfill and the Town of Colonie’s landfill. Closed landfills can also create emissions but they were excluded because they all have been closed for more than 20 years and emissions should be low. The Wheelabrator Hudson Falls LLC WTE plant in Hudson Falls in Washington County is counted in the power generation sector and not in the waste sector. All three facilities report to US EPA’s GHGRP and to NYS DEC’s Title 5 air permitting rule and so emissions data were pulled directly from these sources for 2010.

Scope 3 (attributed) emissions are based on how much solid waste communities send to landfills and WTE plants each year. Therefore all communities have Scope 3 emissions.

For Scope 3 the GHG Working Group decided to adopt a “forward commitment” method that links emissions directly to base-year waste generation- regardless of whether the waste is incinerated immediately or is deposited in a landfill where it’s actual emissions will be created slowly over the next 100 years. Although WTE plants were not counted in the Scope 1 waste footprint they are included in the Scope 3 waste footprint calculation.

The GHG Working Group compiled data from annual reports submitted to NYSDEC by landfill and WTE plant operators. These reports show much MSW each facility receives by county of origin. The GHG Working Group collated data from all reports statewide and developed a waste flow matrix showing how much waste originated from each county, where it went, and how much went to landfills vs. WTE plants. Results are shown in Table 13.

Scope 3 waste GHG emissions were computed from the waste tonnages sent by counties to landfills and WTE plants. For the land-filled portion, emissions were calculated using the “First Order Decay” (FOD) model developed by the California Air Resources Board and recommended by ICLEI Local Governments for Sustainability as part of the Local Government Operations Protocol (ICLEI, 2011). The model was set up using waste stream composition data for New York (NYSDEC, 2012) and then forward integrated 100 years presuming an average landfill methane capture rate of 75%. For the MSW portion sent to WTE plants, CO₂ emissions were calculated using the emissions factors in Appendix C-Table C 1. Together, landfill and WTE plant emissions form the Scope 3 total.

As shown in Table 13, the Capital District is a net waste and GHG exporter. It produced and sent 967,130 tons of MSW to facilities regionally and around the state, but physically processed only 538,040 tons at facilities in the region. Most of the exported waste went to the Seneca Meadows landfill near Syracuse and to a separate Wheelabrator LLC WTE facility in Dutchess County.

Comparing Scope 1 and 3 emissions across counties shows how solid waste management is a regional issue. Albany County produces 122,399 MTCDE of emissions in Scope 1 from its two landfills but the

county's own waste generation is only responsible for only about half of that, or 65,900 MTCDE, in Scope 3.

Table 13. Solid Waste Origin and Destination, and GHG Emissions by County

County	MSW Sent By County to... (tons)			MSW Processed in County at... (tons)			GHG Emissions (MTCDE)	
	Total	Landfills	WTE plants	Total	Landfills	WTE plants	Scope 1	Scope 3
Albany	272,626	260,145	12,481	369,373	369,373	0	122,399	65,900
Columbia	56,546	56,546	0	0	0	0	0	13,224
Greene	44,112	44,112	0	0	0	0	0	10,316
Rensselaer	142,879	142,411	469	0	0	0	0	33,494
Saratoga	196,811	140,164	56,647	0	0	0	0	55,761
Schenectady	138,666	138,666	0	0	0	0	0	32,428
Warren	58,886	5,407	53,479	99	99	0	0	22,962
Washington	56,654	13,205	43,449	168,569	0	168,569	68,010*	20,716
REDC	967,180	800,655	166,525	538,040	369,471	168,569	190,409	254,801

*Scope 1 emissions are from the county WTE plant and are shown for illustration only since they are counted in the power generation sector.

Sewage Treatment

Waste water treatment plants (WWTPs) create methane (CH₄) and small amounts of N₂O during and after water treatment. Private and commercial septic systems create methane that is vented to the atmosphere. Regionally waste water treatment creates 104,847 MTCDE GHG emissions, or about 0.6% of the total regional inventory making this the smallest subsector of emissions. Emission levels scale to population and are included in the County and Community level GHG inventories presented in Appendices A and B, Table B 1.

This study used EPA's State Inventory Tool (SIT) modified for use in individual counties (US EPA, 2012). This tool collapses a number of complex emissions pathways into a simple per-capita estimate based on state profiles of climate, WWTP operations, and fraction of population served by WWTPs vs. septic systems. Because this source is small and because there are so many WWTPs in any region, the GHG Working Group adopted this method as acceptable for regional inventories recognizing that individual communities may wish to use the process-specific methods defined in the Local Government Operations Protocol (ICLEI, 2011) to improve the results.

In the Capital District there are 69 WWTP facilities. Some are major facilities serving cities and others are very small sewer districts servicing just a few hundred households. The study authors validated the SIT estimates for Schenectady County against a detailed evaluation of county WWTPs using the LGOP methods and found that the SIT estimate was within 5% validating its use region-wide.

Agriculture

Capital District agriculture creates 379,096 MTCDE GHG emissions, or 2.4% of the total inventory. While small overall the source is important in Washington, Columbia, and Saratoga counties. In

Washington County, in particular, it is a major source at 17% of total county emissions. GHG sources include:

Enteric fermentation: methane (CH₄) emissions from livestock as a byproduct of digestion.

Manure management: methane (CH₄) emissions from processing livestock manure, as well as fugitive emissions from field manure. This methane can be harnessed to generate power and reduce GHG emissions using technologies to capture methane.

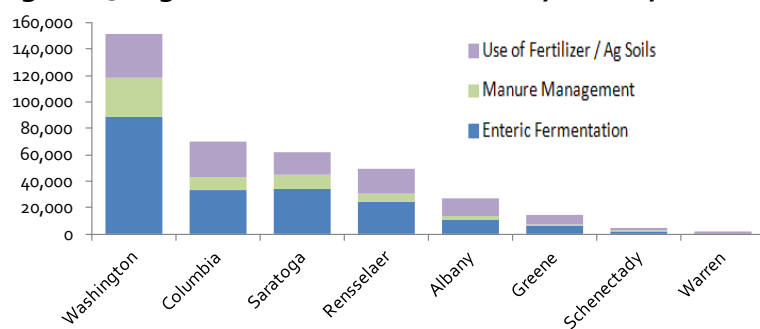
Soils and Field Management: fugitive N₂O emissions from nitrogen-based fertilizer, as well as small amounts of CH₄ from burning crop residues.

Like the waste water sector, the GHG Working Group recommended using the US EPA State Inventory Tool to estimate emissions (US EPA, 2012). Emissions are driven primarily by livestock population and crop acreage, and so the SIT was modified and applied to each Capital District county with data from the National Agricultural Statistics Service (NASS.) NASS provides data on the number of farms, amount of crop area, and livestock counts for each New York County. County emissions were allocated to towns by the ratio of town land area to total town land area in the county. No emissions were assigned to cities and villages.

Table 14. Agricultural Emissions by County and Sector (MTCDE)

County	Totals	Enteric Fermentation	Manure Management	Use of Fertilizer / Ag Soils
Washington	151,710	88,848	29,735	33,128
Columbia	69,896	33,381	9,568	26,946
Saratoga	61,428	33,730	10,993	16,704
Rensselaer	49,502	23,995	6,574	18,934
Albany	26,544	11,174	2,363	13,008
Greene	14,133	6,210	1,216	6,707
Schenectady	4,368	2,083	300	1,984
Warren	1,515	342	15	1,159
REDC	379,096	199,762	60,764	118,570

Figure 15: Agricultural GHG Emissions by County and Sector (MTCDE)



Improving Your Community's GHG Inventory

Appendix B, Table B 1 provides community-wide roll up GHG inventories along with supporting data on utility energy use, transportation demand, and household fuel consumption in subsequent tables. With the exception of per-household energy cost of living and utility energy tables (Table B 4 and Table B 2), data sets for towns include villages.

Communities may use the data in Appendix B for their 2010 community inventory "as is", or may improve the data. Prior to using the inventories, communities should review them and perform a simple "common sense" check. Do the sector breakdowns make sense and are large point sources in Table 4 and Table 11 accurately placed in the community inventory? Regional inventories are large and complex data studies and, on occasion, data sets may accidentally have emission sources in the wrong municipality because of address errors and other mistakes.

In some cases communities can improve the inventory in Appendix B although, in most cases, estimates are already based on methods typically used by communities when they develop GHG inventories independently. In general:

- Natural gas and electricity consumption is provided by National Grid, Central Hudson, New York State Electric and Gas (NYSEG), and the Green Island Power Authority (GIPA) at a community level. It is the best data available and cannot be improved.
- Non-utility fuel consumption (e.g., fuel oils, propane, and wood, etc.) is estimated with demographic methods created by the GHG Working Group that are the kind most often used by communities when they develop inventories on their own. They usually cannot be improved unless communities have specific local fuel survey or sales data from fuel suppliers.
- Large industry and power plant emissions come directly from state and federal reporting sources and are placed directly in the community inventory. The estimates cannot be improved although correct placement should be checked.
- Detailed community level transportation (VMT) data was provided by the Capital District Transportation Committee (CDTC) for Albany, Rensselaer, Saratoga, and Schenectady counties, and is the best available data. For Columbia, Greene, Washington, and Warren Counties, NYS Department of Transportation (NYSDOT) county data was allocated to communities by road length as discussed in the transportation sector. Communities in Warren and Washington counties may be able to obtain better local VTM estimates by contacting the Glens Falls / Adirondack Transportation Council, the MPO serving those two counties.
- Scope 1 estimates from landfills are reported directly by the landfills to the US EPA's mandatory GHG reporting program (GHGRP). They cannot be improved. Municipal solid waste (MSW) generation in tons for the Scope 3 calculation is estimated by allocating county data to communities based on population. Communities that haul waste can improve the calculation with actual hauled waste totals.
- Wastewater emissions are estimated with the EPA's State Inventory Tool which combines per-capita emission averages with community population. Communities can improve the estimates

by applying process-specific methods to waste water treatment plants in the community following the Local Government Operations Protocol (ICLEI, 2011).

- Agricultural emissions are first created at a county level with EPA's State Inventory Tool and then allocated to towns based on land area. Agricultural methods are driven with county data from the National Agricultural Statistics Service (NASS) on crop acreage and livestock population. Local estimates could be improved if actual community-level livestock populations and crop acreage is available.

CDRPC will be able to assist Climate Smart Communities in making use of this product. For those planning to update or create a new GHG inventory for years beyond 2010, they should check with CDRPC on the status of updated utility and transportation data that may be available to them.

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Appendix A. Regional and County Detailed GHG Emission Inventories

REDC GHG Emissions 2010

15,831,238 MTCDE

Sector / Source	GHG Emissions (MTCDE)					Energy
	Scope 1	Scope 2	Scope 3	Biogenic	Rolled up?	(MMBT)
Residential Energy Consumption						
Electricity / Steam		765,795			Yes	11,382,553
Natural Gas	894,450				Yes	16,853,529
Propane / LPG	184,517				Yes	2,990,112
Distillate Fuel Oil (#1, #2, #4, Kerosene)	842,211				Yes	11,349,179
Coal	4,991				Yes	53,028
Wood	15,628			742,594	Yes	7,916,785
Commercial Energy Consumption						
Electricity / Steam		821,339			Yes	12,208,145
Natural Gas	683,605				Yes	12,880,719
Propane / LPG	44,651				Yes	723,578
Distillate Fuel Oil (#1, #2, #4, Kerosene)	218,078				Yes	2,938,703
Residual Fuel Oil (#5 and #6)	214,192				Yes	2,842,667
Coal	440				Yes	4,675
Wood	2,680			127,339	Yes	1,357,561
Industrial Energy Consumption						
Electricity / Steam		268,139			Yes	3,985,535
Natural Gas	829,354				Yes	15,626,964
Propane / LPG	7,357				Yes	116,535
Distillate Fuel Oil (#1, #2, #4, Kerosene)	94,391				Yes	1,271,966
Residual Fuel Oil (#5 and #6)	51,876				Yes	688,473
Coal	819,981				Yes	8,711,435
Petroleum Coke	73,090				Yes	711,971
Motor Gasoline (E-10)	26,970				Yes	382,722
Other Oils	78,369				Yes	1,055,495
Wood	8,490			403,406	Yes	4,300,707
Energy Generation and Supply						
Natural Gas	5,560,890				No	104,780,116
Distillate Fuel Oil (#1, #2, #4, Kerosene)	1,855				No	25,004
MSW	84,036			63,558	No	1,592,624
Landfill Gas	145			28,820	No	553,480
Electricity T/D Losses	96,366				Yes	1,456,025
Natural Gas T/D Losses	330,814				Yes	816,502
Industrial Processes						
Cement Production	1,026,474				Yes	
Pulp and Paper Manufacturing	3,407				Yes	
Product Use (HFC, ODS)						
Use of SF6 in the Utility Industry	25,401				Yes	
All Refrigerants- except SF6	400,579				Yes	
Transport: On-Road						
Motor Gasoline (E-10)	4,273,665			309,894	Yes	65,170,313
Diesel	687,183				Yes	9,107,915
Ethanol (E-85)	N/A				No	
Biodiesel	N/A				No	
Transport: Rail, Marine, Off-Road, Air						
Motor Gasoline (E-10)	214,519			23,147	Yes	3,382,092
Diesel	447,480				Yes	5,930,887
Residual Fuel Oil (#5 and #6)	63,762				Yes	846,220
Natural Gas	2,967				Yes	55,901
Propane / LPG	36,668				Yes	579,921
Jet Kerosene (Air)			532,613		Yes	7,059,242
Waste Management						
Landfill Methane	122,399		187,237		Yes (S3)	
MSW incineration			67,564		Yes (S3)	
Sewage treatment	104,847				Yes	
Agriculture						
Enteric Fermentation / Manure	260,526				Yes	
Soils / Fertilizer	118,570				Yes	
Totals by Scope	18,957,877	1,855,273	787,414	1,698,759		321,709,278

Albany County GHG Emissions 2010

5,146,057 MTCDE

Sector / Source	GHG Emissions (MTCDE)					Energy
	Scope 1	Scope 2	Scope 3	Biogenic	Rolled up?	(MMBT)
Residential Energy Consumption						
Electricity / Steam		181,769			Yes	2,701,766
Natural Gas	346,111				Yes	6,521,529
Propane / LPG	16,575				Yes	268,603
Distillate Fuel Oil (#1, #2, #4, Kerosene)	120,077				Yes	1,618,099
Coal	625				Yes	6,638
Wood	1,538			73,093	Yes	779,240
Commercial Energy Consumption						
Electricity / Steam		310,454			Yes	4,614,493
Natural Gas	281,503				Yes	5,304,172
Propane / LPG	7,879				Yes	127,679
Distillate Fuel Oil (#1, #2, #4, Kerosene)	58,403				Yes	787,002
Residual Fuel Oil (#5 and #6)	57,362				Yes	761,283
Coal	99				Yes	1,050
Wood	514			24,410	Yes	260,235
Industrial Energy Consumption						
Electricity / Steam		98,676			Yes	1,466,684
Natural Gas	254,734				Yes	4,799,783
Propane / LPG	1,073				Yes	17,001
Distillate Fuel Oil (#1, #2, #4, Kerosene)	12,769				Yes	172,070
Residual Fuel Oil (#5 and #6)	3,936				Yes	52,235
Coal	496,057				Yes	5,270,079
Petroleum Coke	48,468				Yes	472,122
Motor Gasoline (E-10)	6,456				Yes	91,617
Other Oils	35,307				Yes	475,518
Wood	269			12,763	Yes	136,065
Energy Generation and Supply						
Natural Gas	2,477,641				No	104,780,116
Distillate Fuel Oil (#1, #2, #4, Kerosene)	1,346				No	25,004
MSW	0			0	No	1,592,624
Landfill Gas	145			28,820	No	553,480
Electricity T/D Losses	30,692				Yes	463,739
Natural Gas T/D Losses	121,248				Yes	299,259
Industrial Processes						
Cement Production	544,401				Yes	
Pulp and Paper Manufacturing	0				Yes	
Product Use (HFC, ODS)						
Use of SF6 in the Utility Industry	8,090				Yes	
All Refrigerants- except SF6	112,914				Yes	
Transport: On-Road						
Motor Gasoline (E-10)	1,309,225			94,935	Yes	19,964,739
Diesel	187,525				Yes	2,485,457
Ethanol (E-85)	N/A				No	
Biodiesel	N/A				No	
Transport: Rail, Marine, Off-Road, Air						
Motor Gasoline (E-10)	32,317			3,487	Yes	509,507
Diesel	116,649				Yes	1,546,064
Residual Fuel Oil (#5 and #6)	59,882				Yes	794,725
Natural Gas	917				Yes	17,277
Propane / LPG	9,415				Yes	148,903
Jet Kerosene (Air)			150,131		Yes	1,989,840
Waste Management						
Landfill Methane	122,399		60,836		Yes (S3)	
MSW incineration			5,064		Yes (S3)	
Sewage treatment	29,554				Yes	
Agriculture						
Enteric Fermentation / Manure	13,536				Yes	
Soils / Fertilizer	13,008				Yes	
Totals by Scope	6,940,658	590,899	216,032	237,507		171,875,698

Columbia County GHG Emissions 2010

887,247 MTCDE

Sector / Source	GHG Emissions (MTCDE)					Energy
	Scope 1	Scope 2	Scope 3	Biogenic	Rolled up?	(MMBT)
Residential Energy Consumption						
Electricity / Steam		58,821			Yes	874,296
Natural Gas	12,435				Yes	234,299
Propane / LPG	16,230				Yes	263,007
Distillate Fuel Oil (#1, #2, #4, Kerosene)	123,688				Yes	1,666,749
Coal	290				Yes	3,078
Wood	1,756			83,462	Yes	889,785
Commercial Energy Consumption						
Electricity / Steam		38,467			Yes	571,757
Natural Gas	19,459				Yes	366,652
Propane / LPG	2,884				Yes	46,734
Distillate Fuel Oil (#1, #2, #4, Kerosene)	23,131				Yes	311,696
Residual Fuel Oil (#5 and #6)	22,718				Yes	301,510
Coal	18				Yes	193
Wood	238			11,315	Yes	120,629
Industrial Energy Consumption						
Electricity / Steam		15,073			Yes	224,036
Natural Gas	23,126				Yes	435,744
Propane / LPG	161				Yes	2,547
Distillate Fuel Oil (#1, #2, #4, Kerosene)	1,634				Yes	22,024
Residual Fuel Oil (#5 and #6)	440				Yes	5,843
Coal	3,596				Yes	38,205
Petroleum Coke	0				Yes	0
Motor Gasoline (E-10)	1,066				Yes	15,132
Other Oils	2,236				Yes	30,117
Wood	44			2,108	Yes	22,473
Energy Generation and Supply						
Natural Gas	0				No	104,780,116
Distillate Fuel Oil (#1, #2, #4, Kerosene)	0				No	25,004
MSW	0			0	No	1,592,624
Landfill Gas	0			0	No	553,480
Electricity T/D Losses	5,836				Yes	88,181
Natural Gas T/D Losses	7,560				Yes	18,660
Industrial Processes						
Cement Production	0				Yes	
Pulp and Paper Manufacturing	0				Yes	
Product Use (HFC, ODS)						
Use of SF6 in the Utility Industry	1,538				Yes	
All Refrigerants- except SF6	23,420				Yes	
Transport: On-Road						
Motor Gasoline (E-10)	259,043			18,784	Yes	3,950,225
Diesel	48,540				Yes	643,347
Ethanol (E-85)	N/A				No	
Biodiesel	N/A				No	
Transport: Rail, Marine, Off-Road, Air						
Motor Gasoline (E-10)	21,151			2,282	Yes	333,463
Diesel	28,445				Yes	377,010
Residual Fuel Oil (#5 and #6)	1,642				Yes	21,787
Natural Gas	166				Yes	3,127
Propane / LPG	2,005				Yes	31,715
Jet Kerosene (Air)			31,139		Yes	412,720
Waste Management						
Landfill Methane	0		13,224		Yes (S3)	
MSW incineration			0		Yes (S3)	
Sewage treatment	6,130				Yes	
Agriculture						
Enteric Fermentation / Manure	42,949				Yes	
Soils / Fertilizer	26,946				Yes	
Totals by Scope	730,524	112,360	44,363	117,951		119,277,966

Greene County GHG Emissions 2010

1,074,747 MTCDE

Sector / Source	GHG Emissions (MTCDE)					Energy
	Scope 1	Scope 2	Scope 3	Biogenic	Rolled up?	(MMBT)
Residential Energy Consumption						
Electricity / Steam		48,772			Yes	724,933
Natural Gas	4,494				Yes	84,675
Propane / LPG	14,917				Yes	241,724
Distillate Fuel Oil (#1, #2, #4, Kerosene)	101,984				Yes	1,374,280
Coal	528				Yes	5,608
Wood	1,453			69,029	Yes	735,916
Commercial Energy Consumption						
Electricity / Steam		38,135			Yes	566,829
Natural Gas	16,609				Yes	312,947
Propane / LPG	3,167				Yes	51,323
Distillate Fuel Oil (#1, #2, #4, Kerosene)	22,904				Yes	308,640
Residual Fuel Oil (#5 and #6)	22,496				Yes	298,553
Coal	44				Yes	469
Wood	233			11,092	Yes	118,247
Industrial Energy Consumption						
Electricity / Steam		22,130			Yes	328,933
Natural Gas	1,987				Yes	37,435
Propane / LPG	136				Yes	2,144
Distillate Fuel Oil (#1, #2, #4, Kerosene)	3,677				Yes	49,556
Residual Fuel Oil (#5 and #6)	371				Yes	4,919
Coal	135,152				Yes	1,435,845
Petroleum Coke	24,623				Yes	239,850
Motor Gasoline (E-10)	898				Yes	12,738
Other Oils	1,882				Yes	25,353
Wood	37			1,775	Yes	18,919
Energy Generation and Supply						
Natural Gas	2,319,364				No	104,780,116
Distillate Fuel Oil (#1, #2, #4, Kerosene)	242				No	25,004
MSW	0			0	No	1,592,624
Landfill Gas	0			0	No	553,480
Electricity T/D Losses	5,664				Yes	85,573
Natural Gas T/D Losses	3,173				Yes	7,831
Industrial Processes						
Cement Production	160,108				Yes	
Pulp and Paper Manufacturing	0				Yes	
Product Use (HFC, ODS)						
Use of SF6 in the Utility Industry	1,493				Yes	
All Refrigerants- except SF6	18,270				Yes	
Transport: On-Road						
Motor Gasoline (E-10)	259,480			18,816	Yes	3,956,886
Diesel	53,627				Yes	710,769
Ethanol (E-85)	N/A				No	
Biodiesel	N/A				No	
Transport: Rail, Marine, Off-Road, Air						
Motor Gasoline (E-10)	20,170			2,176	Yes	318,002
Diesel	30,404				Yes	402,975
Residual Fuel Oil (#5 and #6)	1,200				Yes	15,931
Natural Gas	78				Yes	1,466
Propane / LPG	930				Yes	14,715
Jet Kerosene (Air)			24,292		Yes	321,961
Waste Management						
Landfill Methane	0		10,316		Yes (S3)	
MSW incineration			0		Yes (S3)	
Sewage treatment	4,782				Yes	
Agriculture						
Enteric Fermentation / Manure	7,426				Yes	
Soils / Fertilizer	6,707				Yes	
Totals by Scope	3,250,707	109,037	34,607	102,887		119,767,167

Rensselaer County GHG Emissions 2010

1,687,291 MTCDE

Sector / Source	GHG Emissions (MTCDE)					Energy
	Scope 1	Scope 2	Scope 3	Biogenic	Rolled up?	(MMBT)
Residential Energy Consumption						
Electricity / Steam		105,426			Yes	1,567,014
Natural Gas	68,914				Yes	1,298,503
Propane / LPG	29,463				Yes	477,457
Distillate Fuel Oil (#1, #2, #4, Kerosene)	145,367				Yes	1,958,880
Coal	802				Yes	8,524
Wood	2,629			124,918	Yes	1,331,747
Commercial Energy Consumption						
Electricity / Steam		106,655			Yes	1,585,284
Natural Gas	90,409				Yes	1,703,513
Propane / LPG	5,864				Yes	95,019
Distillate Fuel Oil (#1, #2, #4, Kerosene)	30,540				Yes	411,545
Residual Fuel Oil (#5 and #6)	29,996				Yes	398,095
Coal	58				Yes	615
Wood	397			18,876	Yes	201,234
Industrial Energy Consumption						
Electricity / Steam		23,891			Yes	355,113
Natural Gas	31,464				Yes	592,851
Propane / LPG	3,197				Yes	50,568
Distillate Fuel Oil (#1, #2, #4, Kerosene)	4,272				Yes	57,561
Residual Fuel Oil (#5 and #6)	4,618				Yes	61,284
Coal	9,355				Yes	99,387
Petroleum Coke	0				Yes	0
Motor Gasoline (E-10)	2,774				Yes	39,365
Other Oils	5,817				Yes	78,348
Wood	115			5,484	Yes	58,463
Energy Generation and Supply						
Natural Gas	498,444				No	104,780,116
Distillate Fuel Oil (#1, #2, #4, Kerosene)	268				No	25,004
MSW	0			0	No	1,592,624
Landfill Gas	0			0	No	553,480
Electricity T/D Losses	12,257				Yes	185,191
Natural Gas T/D Losses	26,217				Yes	64,708
Industrial Processes						
Cement Production	0				Yes	
Pulp and Paper Manufacturing	0				Yes	
Product Use (HFC, ODS)						
Use of SF6 in the Utility Industry	3,231				Yes	
All Refrigerants- except SF6	59,477				Yes	
Transport: On-Road						
Motor Gasoline (E-10)	533,503			38,686	Yes	8,135,533
Diesel	85,793				Yes	1,137,099
Ethanol (E-85)	N/A				No	
Biodiesel	N/A				No	
Transport: Rail, Marine, Off-Road, Air						
Motor Gasoline (E-10)	19,144			2,066	Yes	301,829
Diesel	63,811				Yes	845,744
Residual Fuel Oil (#5 and #6)	1,037				Yes	13,758
Natural Gas	298				Yes	5,608
Propane / LPG	3,636				Yes	57,511
Jet Kerosene (Air)			78,682		Yes	1,042,847
Waste Management						
Landfill Methane	0		33,303		Yes (S3)	
MSW incineration			190		Yes (S3)	
Sewage treatment	15,489				Yes	
Agriculture						
Enteric Fermentation / Manure	30,568				Yes	
Soils / Fertilizer	18,934				Yes	
Totals by Scope	1,837,857	235,972	112,175	190,029		131,171,421

Saratoga County GHG Emissions 2010 **3,035,995 MTCDE**

Sector / Source	GHG Emissions (MTCDE)					Energy
	Scope 1	Scope 2	Scope 3	Biogenic	Rolled up?	(MMBT)
Residential Energy Consumption						
Electricity / Steam		174,351			Yes	2,591,495
Natural Gas	204,538				Yes	3,853,973
Propane / LPG	55,482				Yes	899,094
Distillate Fuel Oil (#1, #2, #4, Kerosene)	135,577				Yes	1,826,957
Coal	955				Yes	10,150
Wood	3,186			151,399	Yes	1,614,057
Commercial Energy Consumption						
Electricity / Steam		133,367			Yes	1,982,335
Natural Gas	94,042				Yes	1,771,968
Propane / LPG	13,262				Yes	214,907
Distillate Fuel Oil (#1, #2, #4, Kerosene)	33,798				Yes	455,442
Residual Fuel Oil (#5 and #6)	33,196				Yes	440,558
Coal	78				Yes	827
Wood	552			26,235	Yes	279,687
Industrial Energy Consumption						
Electricity / Steam		76,397			Yes	1,135,539
Natural Gas	249,950				Yes	4,709,642
Propane / LPG	699				Yes	11,053
Distillate Fuel Oil (#1, #2, #4, Kerosene)	53,745				Yes	724,234
Residual Fuel Oil (#5 and #6)	1,911				Yes	25,356
Coal	15,606				Yes	165,792
Petroleum Coke	0				Yes	0
Motor Gasoline (E-10)	4,627				Yes	65,667
Other Oils	9,704				Yes	130,696
Wood	193			9,148	Yes	97,525
Energy Generation and Supply						
Natural Gas	263,920				No	104,780,116
Distillate Fuel Oil (#1, #2, #4, Kerosene)	0				No	25,004
MSW	0			0	No	1,592,624
Landfill Gas	0			0	No	553,480
Electricity T/D Losses	19,952				Yes	301,455
Natural Gas T/D Losses	75,376				Yes	186,040
Industrial Processes						
Cement Production	0				Yes	
Pulp and Paper Manufacturing	0				Yes	
Product Use (HFC, ODS)						
Use of SF6 in the Utility Industry	5,259				Yes	
All Refrigerants- except SF6	81,514				Yes	
Transport: On-Road						
Motor Gasoline (E-10)	1,016,142			73,683	Yes	15,495,434
Diesel	160,930				Yes	2,132,967
Ethanol (E-85)	N/A				No	
Biodiesel	N/A				No	
Transport: Rail, Marine, Off-Road, Air						
Motor Gasoline (E-10)	38,157			4,117	Yes	601,577
Diesel	89,298				Yes	1,183,554
Residual Fuel Oil (#5 and #6)	1				Yes	10
Natural Gas	550				Yes	10,371
Propane / LPG	6,697				Yes	105,919
Jet Kerosene (Air)			108,381		Yes	1,436,480
Waste Management						
Landfill Methane	0		32,778		Yes (S3)	
MSW incineration			22,983		Yes (S3)	
Sewage treatment	21,335				Yes	
Agriculture						
Enteric Fermentation / Manure	44,723				Yes	
Soils / Fertilizer	16,704				Yes	
Totals by Scope	2,751,658	384,115	164,142	264,581		151,411,984

Schenectady County GHG Emissions 2010

1,523,806 MTCDE

Sector / Source	GHG Emissions (MTCDE)					Energy
	Scope 1	Scope 2	Scope 3	Biogenic	Rolled up?	(MMBT)
Residential Energy Consumption						
Electricity / Steam		92,594			Yes	1,376,289
Natural Gas	196,551				Yes	3,703,470
Propane / LPG	10,940				Yes	177,280
Distillate Fuel Oil (#1, #2, #4, Kerosene)	54,271				Yes	731,325
Coal	188				Yes	1,998
Wood	587			27,899	Yes	297,433
Commercial Energy Consumption						
Electricity / Steam		97,570			Yes	1,450,255
Natural Gas	107,925				Yes	2,033,554
Propane / LPG	2,741				Yes	44,418
Distillate Fuel Oil (#1, #2, #4, Kerosene)	14,475				Yes	195,052
Residual Fuel Oil (#5 and #6)	14,217				Yes	188,678
Coal	18				Yes	196
Wood	110			5,226	Yes	55,710
Industrial Energy Consumption						
Electricity / Steam		3,827			Yes	56,886
Natural Gas	97,388				Yes	1,835,014
Propane / LPG	779				Yes	12,319
Distillate Fuel Oil (#1, #2, #4, Kerosene)	8,492				Yes	114,428
Residual Fuel Oil (#5 and #6)	7,676				Yes	101,874
Coal	17,206				Yes	182,795
Petroleum Coke	0				Yes	0
Motor Gasoline (E-10)	5,102				Yes	72,401
Other Oils	10,743				Yes	144,690
Wood	212			10,086	Yes	107,526
Energy Generation and Supply						
Natural Gas	0				No	104,780,116
Distillate Fuel Oil (#1, #2, #4, Kerosene)	0				No	25,004
MSW	0			0	No	1,592,624
Landfill Gas	0			0	No	553,480
Electricity T/D Losses	10,076				Yes	152,245
Natural Gas T/D Losses	55,222				Yes	136,297
Industrial Processes						
Cement Production	0				Yes	
Pulp and Paper Manufacturing	0				Yes	
Product Use (HFC, ODS)						
Use of SF6 in the Utility Industry	2,656				Yes	
All Refrigerants- except SF6	57,431				Yes	
Transport: On-Road						
Motor Gasoline (E-10)	398,331			28,884	Yes	6,074,267
Diesel	60,727				Yes	804,874
Ethanol (E-85)	N/A				No	
Biodiesel	N/A				No	
Transport: Rail, Marine, Off-Road, Air						
Motor Gasoline (E-10)	12,172			1,313	Yes	191,896
Diesel	49,096				Yes	650,722
Residual Fuel Oil (#5 and #6)	1				Yes	10
Natural Gas	413				Yes	7,789
Propane / LPG	5,880				Yes	93,001
Jet Kerosene (Air)			76,361		Yes	1,012,091
Waste Management						
Landfill Methane	0		32,428		Yes (S3)	
MSW incineration			0		Yes (S3)	
Sewage treatment	15,032				Yes	
Agriculture						
Enteric Fermentation / Manure	2,384				Yes	
Soils / Fertilizer	1,984				Yes	
Totals by Scope	1,221,026	193,991	108,789	73,408		128,958,008

Warren County GHG Emissions 2010 **1,558,953 MTCDE**

Sector / Source	GHG Emissions (MTCDE)					Energy
	Scope 1	Scope 2	Scope 3	Biogenic	Rolled up?	(MMBT)
Residential Energy Consumption						
Electricity / Steam		55,074			Yes	818,603
Natural Gas	45,385				Yes	855,162
Propane / LPG	20,905				Yes	338,774
Distillate Fuel Oil (#1, #2, #4, Kerosene)	72,862				Yes	981,846
Coal	851				Yes	9,040
Wood	1,578			74,991	Yes	799,477
Commercial Energy Consumption						
Electricity / Steam		66,721			Yes	991,714
Natural Gas	42,760				Yes	805,692
Propane / LPG	6,360				Yes	103,064
Distillate Fuel Oil (#1, #2, #4, Kerosene)	23,174				Yes	312,274
Residual Fuel Oil (#5 and #6)	22,761				Yes	302,069
Coal	93				Yes	985
Wood	357			16,960	Yes	180,808
Industrial Energy Consumption						
Electricity / Steam		9,733			Yes	144,674
Natural Gas	116,114				Yes	2,187,858
Propane / LPG	547				Yes	8,647
Distillate Fuel Oil (#1, #2, #4, Kerosene)	5,643				Yes	76,047
Residual Fuel Oil (#5 and #6)	6,963				Yes	92,411
Coal	134,828				Yes	1,432,408
Petroleum Coke	0				Yes	0
Motor Gasoline (E-10)	3,620				Yes	51,373
Other Oils	7,592				Yes	102,248
Wood	6,852			325,573	Yes	3,470,925
Energy Generation and Supply						
Natural Gas	0				No	104,780,116
Distillate Fuel Oil (#1, #2, #4, Kerosene)	0				No	25,004
MSW	0			0	No	1,592,624
Landfill Gas	0			0	No	553,480
Electricity T/D Losses	6,832				Yes	103,224
Natural Gas T/D Losses	28,068				Yes	69,277
Industrial Processes						
Cement Production	321,965				Yes	
Pulp and Paper Manufacturing	3,407				Yes	
Product Use (HFC, ODS)						
Use of SF6 in the Utility Industry	1,801				Yes	
All Refrigerants- except SF6	24,389				Yes	
Transport: On-Road						
Motor Gasoline (E-10)	302,369			21,926	Yes	4,610,909
Diesel	57,724				Yes	765,078
Ethanol (E-85)	N/A				No	
Biodiesel	N/A				No	
Transport: Rail, Marine, Off-Road, Air						
Motor Gasoline (E-10)	56,385			6,084	Yes	888,961
Diesel	37,067				Yes	491,288
Residual Fuel Oil (#5 and #6)	0				Yes	0
Natural Gas	315				Yes	5,936
Propane / LPG	4,570				Yes	72,270
Jet Kerosene (Air)			32,428		Yes	429,799
Waste Management						
Landfill Methane	0		1,264		Yes (S3)	
MSW incineration			21,698		Yes (S3)	
Sewage treatment	6,384				Yes	
Agriculture						
Enteric Fermentation / Manure	356				Yes	
Soils / Fertilizer	1,159				Yes	
Totals by Scope	1,372,034	131,528	55,390	445,533		128,454,062

Washington County GHG Emissions 2010 **917,143 MTCDE**

Sector / Source	GHG Emissions (MTCDE)					Energy
	Scope 1	Scope 2	Scope 3	Biogenic	Rolled up?	(MMBT)
Residential Energy Consumption						
Electricity / Steam		48,989			Yes	728,156
Natural Gas	16,023				Yes	301,919
Propane / LPG	20,004				Yes	324,172
Distillate Fuel Oil (#1, #2, #4, Kerosene)	88,386				Yes	1,191,044
Coal	752				Yes	7,992
Wood	2,900			137,804	Yes	1,469,130
Commercial Energy Consumption						
Electricity / Steam		29,971			Yes	445,480
Natural Gas	30,900				Yes	582,221
Propane / LPG	2,495				Yes	40,434
Distillate Fuel Oil (#1, #2, #4, Kerosene)	11,655				Yes	157,053
Residual Fuel Oil (#5 and #6)	11,447				Yes	151,921
Coal	32				Yes	339
Wood	278			13,227	Yes	141,010
Industrial Energy Consumption						
Electricity / Steam		18,412			Yes	273,669
Natural Gas	54,592				Yes	1,028,636
Propane / LPG	766				Yes	12,257
Distillate Fuel Oil (#1, #2, #4, Kerosene)	4,159				Yes	56,045
Residual Fuel Oil (#5 and #6)	25,961				Yes	344,550
Coal	8,182				Yes	86,925
Petroleum Coke	0				Yes	0
Motor Gasoline (E-10)	2,426				Yes	34,429
Other Oils	5,088				Yes	68,524
Wood	768			36,471	Yes	388,812
Energy Generation and Supply						
Natural Gas	1,521				No	104,780,116
Distillate Fuel Oil (#1, #2, #4, Kerosene)	0				No	25,004
MSW	84,036			63,558	No	1,592,624
Landfill Gas	0			0	No	553,480
Electricity T/D Losses	5,058				Yes	76,418
Natural Gas T/D Losses	13,950				Yes	34,430
Industrial Processes						
Cement Production	0				Yes	
Pulp and Paper Manufacturing	0				Yes	
Product Use (HFC, ODS)						
Use of SF6 in the Utility Industry	1,333				Yes	
All Refrigerants- except SF6	23,464				Yes	
Transport: On-Road						
Motor Gasoline (E-10)	195,571			14,181	Yes	2,982,320
Diesel	32,317				Yes	428,324
Ethanol (E-85)	N/A				No	
Biodiesel	N/A				No	
Transport: Rail, Marine, Off-Road, Air						
Motor Gasoline (E-10)	15,023			1,621	Yes	236,856
Diesel	32,710				Yes	433,531
Residual Fuel Oil (#5 and #6)	0				Yes	0
Natural Gas	230				Yes	4,329
Propane / LPG	3,534				Yes	55,887
Jet Kerosene (Air)			31,199		Yes	413,505
Waste Management						
Landfill Methane	0		3,088		Yes (S3)	
MSW incineration			17,628		Yes (S3)	
Sewage treatment	6,142				Yes	
Agriculture						
Enteric Fermentation / Manure	118,583				Yes	
Soils / Fertilizer	33,128				Yes	
Totals by Scope	853,413	97,372	51,915	266,863		119,451,541

Appendix B. Community GHG Inventories and Related Data

Table B 1. Municipal Roll-Up GHG Inventories (MTCDE)

Community	Type	County	Roll Up GHG Emissions By Sector (MTCDE)							
			Res	Com	Industry	Process	Transport	Waste	Ag	Totals
Coeymans	Town	Albany	22,213	13,040	554,492	547,297	84,755	2,328	2,685	1,226,809
Albany	City	Albany	177,473	307,650	178,464	38,796	484,002	30,706	0	1,217,091
Ravena	Village	Albany	8,963	5,654	551,922	545,672	17,709	1,025	0	1,130,946
Colonie	Town	Albany	216,847	270,913	14,404	32,714	573,016	25,602	2,997	1,136,493
Bethlehem	Town	Albany	92,935	50,595	138,831	13,881	172,624	10,561	2,626	482,053
Guiderland	Town	Albany	91,299	69,965	219	13,904	202,311	11,077	3,102	391,878
New Scotland	Town	Albany	30,424	16,413	31,847	3,365	54,459	2,714	3,080	142,302
Cohoes	City	Albany	30,149	15,843	41,022	6,184	33,003	5,073	0	131,275
Colonie	Village	Albany	21,818	21,028	0	3,097	58,995	2,445	0	107,384
Watervliet	City	Albany	17,824	9,905	21,256	4,025	49,672	3,218	0	105,899
Menands	Village	Albany	10,208	25,958	4,209	1,691	54,997	1,252	0	98,315
Westerlo	Town	Albany	11,111	5,147	573	1,300	17,535	1,055	3,096	39,817
Green Island	Village	Albany	5,840	8,160	12,882	1,115	8,114	822	0	36,933
Green Island	Town	Albany	5,840	8,160	12,882	1,115	8,114	822	0	36,933
Berne	Town	Albany	8,511	3,969	0	1,077	13,962	877	3,430	31,825
Knox	Town	Albany	8,291	3,645	0	1,031	11,512	845	2,237	27,561
Rensselaerville	Town	Albany	7,076	3,317	47	715	10,966	578	3,292	25,991
Voorheesville	Village	Albany	7,699	3,417	0	1,070	9,040	875	0	22,101
Altamont	Village	Albany	4,993	1,947	0	661	4,830	540	0	12,972
Chatham	Town	Columbia	20,896	8,385	27,657	1,692	50,576	1,266	5,881	116,354
Claverack	Town	Columbia	21,042	7,368	3,278	2,372	31,821	1,847	5,255	72,983
Greenport	Town	Columbia	12,777	19,364	9,245	1,784	23,203	1,278	2,056	69,705
Kinderhook	Town	Columbia	27,942	10,358	0	3,300	18,236	2,607	3,515	65,957
Canaan	Town	Columbia	7,443	4,793	73	686	42,840	525	4,053	60,411
Hudson	City	Columbia	14,343	21,916	26	2,633	16,800	2,059	0	57,778
Ghent	Town	Columbia	19,094	6,865	171	2,086	23,790	1,657	4,987	58,651
Copake	Town	Columbia	16,859	5,025	6	1,431	20,135	1,109	4,504	49,069
Hillsdale	Town	Columbia	8,163	3,548	0	775	23,394	591	5,273	41,744
Livingston	Town	Columbia	10,342	3,923	0	1,415	13,957	1,118	4,217	34,972
Ancram	Town	Columbia	6,106	1,876	5,650	663	14,041	482	4,694	33,512
Austerlitz	Town	Columbia	5,772	1,545	0	644	16,926	507	5,384	30,777
New Lebanon	Town	Columbia	8,779	3,294	237	906	13,109	707	3,962	30,995
Stockport	Town	Columbia	9,067	2,586	0	1,078	12,058	863	1,287	26,939
Stuyvesant	Town	Columbia	7,339	2,122	0	780	9,863	622	2,763	23,489
Taghkanic	Town	Columbia	4,180	2,255	0	519	10,741	402	4,417	22,514

Table B 1. Municipal Roll-Up GHG Inventories (MTCDE)

Community	Type	County	Roll Up GHG Emissions By Sector (MTCDE)							
			Res	Com	Industry	Process	Transport	Waste	Ag	Totals
Germantown	Town	Columbia	6,654	2,549	3,636	794	6,941	599	1,337	22,510
Gallatin	Town	Columbia	6,502	1,844	5	648	7,530	512	4,322	21,362
Chatham	Village	Columbia	7,401	4,275	2,517	739	4,307	543	0	19,782
Clermont	Town	Columbia	6,143	1,867	0	753	5,031	603	1,989	16,386
Kinderhook	Village	Columbia	5,078	1,622	0	468	3,615	371	0	11,155
Valatie	Village	Columbia	4,347	2,070	0	706	2,337	558	0	10,017
Philmont	Village	Columbia	3,773	1,356	2	535	1,621	423	0	7,711
Catskill	Town	Greene	38,044	26,981	185,821	164,983	89,698	3,612	1,320	510,457
Coxsackie	Town	Greene	20,729	24,768	1,608	3,504	51,724	2,735	805	105,873
Cairo	Town	Greene	22,989	9,878	41	2,605	34,144	2,046	1,307	73,008
New Baltimore	Town	Greene	11,365	4,657	22	1,307	45,458	1,034	905	64,747
Athens	Town	Greene	15,801	6,055	2,534	1,593	36,182	1,254	573	63,991
Durham	Town	Greene	10,065	3,669	3,377	1,099	25,263	836	1,077	45,387
Catskill	Village	Greene	12,374	13,785	1,456	1,643	12,646	1,252	0	43,156
Hunter	Town	Greene	13,599	9,159	10	1,157	13,629	838	1,975	40,367
Greenville	Town	Greene	13,373	6,388	102	1,470	16,123	1,147	847	39,450
Windham	Town	Greene	12,330	8,394	0	784	13,993	522	987	37,010
Coxsackie	Village	Greene	8,619	4,183	303	1,093	7,955	863	0	23,016
Jewett	Town	Greene	5,023	1,593	0	383	10,171	292	1,099	18,561
Lexington	Town	Greene	4,764	1,601	1	315	9,180	247	1,740	17,848
Athens	Village	Greene	5,626	2,168	226	647	5,829	512	0	15,008
Ashland	Town	Greene	2,844	1,090	0	291	9,385	240	567	14,417
Prattsville	Town	Greene	3,358	1,457	0	279	7,714	215	429	13,451
Hunter	Village	Greene	3,686	3,634	2	245	1,900	154	0	9,620
Tannersville	Village	Greene	2,479	2,131	3	232	1,352	165	0	6,362
Halcott	Town	Greene	1,487	491	0	101	3,227	79	503	5,888
Troy	City	Rensselaer	50,980	94,405	35,985	19,560	93,038	15,401	0	309,369
East Greenbush	Town	Rensselaer	44,021	62,906	0	6,628	84,844	5,061	1,861	205,321
Schodack	Town	Rensselaer	41,089	19,211	0	4,986	111,557	3,931	4,798	185,571
North Greenbush	Town	Rensselaer	36,251	30,102	9,605	4,902	65,166	3,710	1,437	151,172
Rensselaer	City	Rensselaer	17,765	16,254	40,187	3,675	31,665	2,886	0	112,431
Brunswick	Town	Rensselaer	31,764	13,341	0	4,621	54,671	3,669	3,436	111,502
Schaghticoke	Town	Rensselaer	23,273	6,011	0	2,956	51,601	2,359	3,854	90,054
Sand Lake	Town	Rensselaer	29,766	8,396	742	3,320	33,103	2,621	2,716	80,664
Hoosick	Town	Rensselaer	19,416	9,931	3,163	2,707	35,750	2,127	4,884	77,978
Pittstown	Town	Rensselaer	16,382	3,960	0	2,185	41,968	1,762	4,775	71,031
Nassau	Town	Rensselaer	15,951	4,366	0	1,840	26,514	1,471	3,443	53,585

Table B 1. Municipal Roll-Up GHG Inventories (MTCDE)

Community	Type	County	Roll Up GHG Emissions By Sector (MTCDE)							
			Res	Com	Industry	Process	Transport	Waste	Ag	Totals
Poestenkill	Town	Rensselaer	12,900	3,529	0	1,738	23,649	1,392	2,507	45,715
Stephentown	Town	Rensselaer	9,122	2,307	268	1,130	19,347	892	4,485	37,551
Hoosick Falls	Village	Rensselaer	9,289	5,709	3,162	1,376	7,826	1,076	0	28,437
Berlin	Town	Rensselaer	6,826	2,043	300	734	12,150	578	4,618	27,249
Grafton	Town	Rensselaer	7,181	2,181	0	822	11,276	654	3,465	25,579
Petersburgh	Town	Rensselaer	5,457	1,405	1,759	604	10,921	469	3,224	23,837
Castleton-on-Hudson	Village	Rensselaer	4,107	2,465	0	574	4,204	453	0	11,802
Nassau	Village	Rensselaer	3,700	1,182	0	436	4,964	348	0	10,630
Schaghticoke	Village	Rensselaer	1,856	876	0	232	5,455	182	0	8,601
East Nassau	Village	Rensselaer	1,955	535	0	226	4,598	180	0	7,494
Valley Falls	Village	Rensselaer	1,620	400	0	180	3,353	143	0	5,697
Clifton Park	Town	Saratoga	99,042	52,279	92	14,375	262,581	12,886	3,791	445,045
Saratoga Springs	City	Saratoga	68,673	76,661	61,223	10,849	129,676	9,333	0	356,416
Waterford	Town	Saratoga	20,742	10,074	270,643	3,876	25,317	2,957	516	334,125
Halfmoon	Town	Saratoga	57,636	32,438	26,301	8,588	135,040	7,560	2,562	270,125
Malta	Town	Saratoga	37,252	21,017	812	5,782	185,464	5,183	2,196	257,706
Moreau	Town	Saratoga	39,633	17,481	87,983	5,685	82,221	5,170	3,297	241,470
Wilton	Town	Saratoga	42,617	30,805	0	6,408	127,210	5,678	2,818	215,537
Ballston	Town	Saratoga	23,967	13,120	1,655	3,765	60,935	3,432	2,326	109,200
Milton	Town	Saratoga	50,041	20,705	1,622	7,177	65,455	6,521	2,807	154,328
South Glens Falls	Village	Saratoga	7,842	4,929	88,382	1,364	7,942	1,235	0	111,693
Stillwater	Town	Saratoga	25,509	8,133	232	3,240	42,421	2,909	3,239	85,685
Greenfield	Town	Saratoga	25,192	10,382	0	3,019	35,010	2,730	5,300	81,632
Corinth	Town	Saratoga	19,986	6,743	0	2,518	27,868	2,293	4,464	63,871
Saratoga	Town	Saratoga	17,100	6,210	0	2,194	23,597	1,992	3,190	54,282
Galway	Town	Saratoga	12,726	3,676	0	1,375	30,052	1,245	3,447	52,521
Charlton	Town	Saratoga	15,035	3,942	0	1,593	25,167	1,451	2,577	49,766
Northumberland	Town	Saratoga	14,225	3,399	0	1,951	18,803	1,786	2,540	42,704
Mechanicville	City	Saratoga	16,131	6,353	25	2,020	12,792	1,824	0	39,145
Ballston Spa	Village	Saratoga	11,186	7,742	1,672	2,087	13,023	1,899	0	37,608
Hadley	Town	Saratoga	6,292	1,627	0	784	10,098	719	3,123	22,643
Round Lake	Village	Saratoga	1,569	488	0	242	17,081	219	0	19,599
Providence	Town	Saratoga	6,419	1,601	0	764	5,927	700	3,460	18,871
Edinburg	Town	Saratoga	7,405	2,038	0	475	3,866	426	4,732	18,943
Waterford	Village	Saratoga	5,585	1,922	0	760	7,233	699	0	16,198
Corinth	Village	Saratoga	7,681	3,270	0	991	3,641	898	0	16,482
Stillwater	Village	Saratoga	5,233	1,875	30	682	5,714	610	0	14,144

Table B 1. Municipal Roll-Up GHG Inventories (MTCDE)

Community	Type	County	Roll Up GHG Emissions By Sector (MTCDE)							
			Res	Com	Industry	Process	Transport	Waste	Ag	Totals
Day	Town	Saratoga	4,469	1,180	0	333	2,274	301	5,042	13,599
Schuylerville	Village	Saratoga	3,276	2,740	0	542	3,383	487	0	10,428
Victory	Village	Saratoga	1,560	341	0	231	1,267	212	0	3,610
Galway	Village	Saratoga	516	204	0	77	1,864	70	0	2,731
Schenectady	City	Schenectady	131,239	98,774	66,283	25,492	103,742	20,286	0	445,816
Rotterdam	Town	Schenectady	82,610	58,602	39,815	11,402	157,432	8,924	805	359,589
Glenville	Town	Schenectady	80,632	53,892	0	11,515	121,384	9,042	1,109	277,575
Niskayuna	Town	Schenectady	64,000	38,754	29,468	8,500	69,284	6,681	319	217,006
Duanesburg	Town	Schenectady	20,694	6,026	29,276	2,362	48,338	1,878	1,596	110,170
Scotia	Village	Schenectady	19,715	5,876	0	2,962	15,883	2,371	0	46,806
Princetown	Town	Schenectady	6,925	1,920	0	817	26,440	649	539	37,289
Delanson	Village	Schenectady	1,206	689	30,693	149	992	116	0	33,845
Glens Falls	City	Warren	33,122	47,171	306,449	331,331	42,525	6,565	0	767,162
Queensbury	Town	Warren	75,680	71,238	3,764	11,091	153,436	12,461	110	327,779
Lake George	Town	Warren	15,083	14,379	0	1,445	61,854	1,570	53	94,384
Chester	Town	Warren	12,029	5,474	0	1,310	57,992	1,498	148	78,453
Bolton	Town	Warren	13,970	6,034	0	932	36,573	1,039	111	58,660
Warrensburg	Town	Warren	14,258	7,661	0	1,603	24,178	1,828	111	49,639
Johnsburg	Town	Warren	7,931	5,542	0	961	30,004	1,070	358	45,866
Lake Luzerne	Town	Warren	11,936	4,941	0	1,298	15,038	1,495	92	34,799
Horicon	Town	Warren	8,560	3,310	0	548	9,960	620	115	23,114
Hague	Town	Warren	5,082	1,971	0	280	10,467	312	112	18,225
Lake George	Village	Warren	3,552	6,159	0	386	6,078	405	0	16,579
Thurman	Town	Warren	3,866	1,395	0	467	9,819	544	160	16,251
Stony Creek	Town	Warren	3,446	1,380	0	296	6,584	343	144	12,193
Fort Edward	Town	Washington	15,443	27,725	38,673	2,622	25,682	2,707	4,861	117,712
Kingsbury	Town	Washington	29,259	19,996	1	4,897	33,838	5,383	7,242	100,616
Greenwich	Town	Washington	15,914	8,667	35,343	1,970	19,370	2,100	7,970	91,334
Fort Edward	Village	Washington	7,521	18,429	38,766	1,450	8,380	1,434	0	75,980
Fort Ann	Town	Washington	11,872	2,699	19,794	2,360	17,271	2,630	19,895	76,522
Granville	Town	Washington	21,646	6,304	5,877	2,643	23,267	2,833	10,152	72,722
Easton	Town	Washington	8,092	4,451	26,387	976	17,727	992	11,372	69,998
Hudson Falls	Village	Washington	15,772	8,886	1	2,784	14,195	3,093	0	44,730
Whitehall	Town	Washington	13,179	5,370	1,138	1,580	13,048	1,717	10,436	46,469
Argyle	Town	Washington	12,769	3,907	0	1,472	15,453	1,607	10,319	45,527
Salem	Town	Washington	11,110	2,848	37	1,065	16,683	1,153	9,557	42,452
White Creek	Town	Washington	9,413	1,970	0	1,269	14,022	1,426	8,747	36,847

Table B 1. Municipal Roll-Up GHG Inventories (MTCDE)

Community	Type	County	Roll Up GHG Emissions By Sector (MTCDE)							
			Res	Com	Industry	Process	Transport	Waste	Ag	Totals
Hebron	Town	Washington	5,982	1,039	7	717	16,554	787	10,241	35,327
Jackson	Town	Washington	6,800	1,293	623	700	16,509	765	6,783	33,472
Cambridge	Town	Washington	7,001	2,511	0	806	13,594	859	6,636	31,407
Hartford	Town	Washington	6,321	1,300	0	872	9,282	964	7,919	26,658
Dresden	Town	Washington	3,062	604	0	252	12,110	277	9,537	25,843
Putnam	Town	Washington	3,109	558	0	236	10,692	259	5,985	20,840
Granville	Village	Washington	8,242	2,675	3,850	1,025	3,053	1,080	0	19,926
Whitehall	Village	Washington	8,230	2,269	0	1,003	4,809	1,111	0	17,422
Cambridge	Village	Washington	5,123	2,033	0	726	4,221	794	0	12,897
Hampton	Town	Washington	2,612	487	0	360	4,283	399	4,060	12,200
Greenwich	Village	Washington	5,417	1,643	0	691	3,671	755	0	12,176
Salem	Village	Washington	3,806	1,099	11	371	2,860	402	0	8,549
Fort Ann	Village	Washington	1,391	610	0	189	552	206	0	2,948
Argyle	Village	Washington	1,151	448	0	121	392	130	0	2,242

Table B 2. Utility-Supplied Energy Consumption Data for 2010 by Municipality

Municipality	Type	County	Electricity (MWh)				Natural Gas (Therms)			
			Total	Res.	Com.	Indust.	Total	Res.	Com.	Indust.
Albany	City	Albany	787,013	163,747	525,549	97,717	69,719,817	19,441,640	25,053,627	25,224,550
Colonie	Town	Albany	640,730	211,051	429,679	0	36,329,295	18,903,368	15,657,504	1,768,423
Bethlehem	Town	Albany	441,651	106,494	78,626	256,531	17,432,493	8,129,000	2,473,122	6,830,371
Guiderland	Town	Albany	247,534	106,430	141,104	0	10,741,736	7,569,255	3,134,014	38,467
Watervliet	City	Albany	69,686	18,611	12,225	38,850	4,629,623	2,043,683	736,932	1,849,008
Menands	Village	Albany	66,902	11,657	42,887	12,359	3,631,556	1,088,386	2,394,300	148,870
Colonie	Village	Albany	65,173	24,273	40,899	0	3,313,277	2,079,231	1,234,046	0
Cohoes	City	Albany	58,060	34,339	23,721	0	8,812,594	3,513,436	1,043,180	4,255,978
Green Island	Village	Albany	45,366	10,699	18,978	15,689	2,442,244	483,298	473,173	1,485,773
New Scotland	Town	Albany	38,286	23,765	14,521	0	595,948	413,659	182,289	0
Coeymans	Town	Albany	26,764	15,489	5,196	6,080	265,737	18,145	133,256	114,336
Ravena	Village	Albany	18,598	10,986	7,575	37	617,017	395,068	221,949	0
Westerlo	Town	Albany	16,842	12,466	2,091	2,286	0	0	0	0
Berne	Town	Albany	12,645	10,737	1,908	0	0	0	0	0
Voorheesville	Village	Albany	11,022	8,097	2,925	0	970,673	739,091	231,582	0
Knox	Town	Albany	10,138	9,333	805	0	5,414	5,414	0	0
Rensselaerville	Town	Albany	9,860	8,168	1,505	187	0	0	0	0
Altamont	Village	Albany	7,107	5,268	1,839	0	465,355	392,611	72,744	0
Green Island	Town	Albany	0	0	0	0	0	0	0	0
Greenport	Town	Columbia	75,598	13,531	38,521	23,547	1,884,330	616,833	1,260,473	7,024
Hudson	City	Columbia	44,949	11,885	33,064	0	3,447,936	1,532,832	1,910,585	4,519
Claverack	Town	Columbia	35,978	19,418	7,843	8,718	21,932	4,180	17,752	0
Kinderhook	Town	Columbia	30,710	21,393	9,317	0	0	0	0	0
Copake	Town	Columbia	28,335	22,896	5,422	17	0	0	0	0
Chatham	Village	Columbia	26,124	8,604	10,855	6,664	0	0	0	0
Ghent	Town	Columbia	25,812	18,668	6,687	456	126,423	3,711	122,712	0
Ancram	Town	Columbia	25,207	8,231	2,019	14,956	0	0	0	0
Chatham	Town	Columbia	24,743	18,861	5,081	801	0	0	0	0
Germantown	Town	Columbia	21,780	8,072	4,065	9,643	0	0	0	0
Livingston	Town	Columbia	19,603	13,077	6,526	0	0	0	0	0
Hillsdale	Town	Columbia	18,844	11,585	7,259	0	0	0	0	0
Canaan	Town	Columbia	16,409	10,579	5,640	189	341,081	0	341,081	0
New Lebanon	Town	Columbia	16,030	10,319	5,078	633	0	0	0	0
Stockport	Town	Columbia	10,500	9,010	1,490	0	199,341	185,429	13,912	0
Taghkanic	Town	Columbia	10,449	5,253	5,196	0	0	0	0	0
Valatie	Village	Columbia	9,689	5,185	4,504	0	0	0	0	0

Table B 2. Utility-Supplied Energy Consumption Data for 2010 by Municipality

Municipality	Type	County	Electricity (MWh)				Natural Gas (Therms)			
			Total	Res.	Com.	Indust.	Total	Res.	Com.	Indust.
Austerlitz	Town	Columbia	9,434	8,323	1,112	0	0	0	0	0
Gallatin	Town	Columbia	9,116	7,964	1,139	13	0	0	0	0
Stuyvesant	Town	Columbia	8,915	7,468	1,447	0	0	0	0	0
Clermont	Town	Columbia	7,670	6,155	1,515	0	0	0	0	0
Philmont	Village	Columbia	7,515	5,290	2,220	5	0	0	0	0
Kinderhook	Village	Columbia	5,921	4,399	1,523	0	0	0	0	0
Catskill	Town	Greene	119,438	28,250	20,848	70,341	367,092	125,240	241,852	0
Windham	Town	Greene	48,197	24,383	23,815	0	0	0	0	0
Coxsackie	Town	Greene	46,079	12,462	28,527	5,090	1,839,100	17,359	1,811,261	10,480
Cairo	Town	Greene	41,113	27,870	13,091	153	0	0	0	0
Catskill	Village	Greene	40,881	12,351	23,487	5,043	1,487,738	547,509	932,515	7,714
Durham	Town	Greene	27,983	11,867	3,578	12,538	0	0	0	0
Greenville	Town	Greene	26,185	15,205	10,601	379	0	0	0	0
Hunter	Village	Greene	18,640	7,015	11,619	6	0	0	0	0
New Baltimore	Town	Greene	17,990	12,383	5,525	82	10,318	9,233	1,086	0
Hunter	Town	Greene	16,865	11,688	5,159	18	0	0	0	0
Coxsackie	Village	Greene	15,556	10,392	4,460	704	310,455	147,410	142,751	20,294
Athens	Town	Greene	15,028	10,324	3,542	1,163	366,639	0	0	366,639
Tannersville	Village	Greene	10,044	3,929	6,103	12	0	0	0	0
Jewett	Town	Greene	9,270	8,432	838	0	0	0	0	0
Athens	Village	Greene	8,910	6,028	2,037	845	0	0	0	0
Prattsville	Town	Greene	5,980	3,818	2,162	0	0	0	0	0
Lexington	Town	Greene	5,085	4,558	525	3	0	0	0	0
Halcott	Town	Greene	1,615	1,450	164	1	0	0	0	0
Ashland	Town	Greene	0	0	0	0	0	0	0	0
Troy	City	Rensselaer	303,119	87,686	161,560	53,873	14,710,072	3,258,070	7,682,301	3,769,701
East Greenbush	Town	Rensselaer	163,363	53,161	110,201	0	7,820,826	2,766,545	5,053,602	679
North Greenbush	Town	Rensselaer	133,572	45,672	65,571	22,329	4,338,953	2,671,675	1,667,278	0
Schodack	Town	Rensselaer	66,739	39,031	27,708	0	1,234,880	718,416	516,464	0
Brunswick	Town	Rensselaer	60,095	41,573	18,522	0	1,361,192	873,978	487,214	0
Rensselaer	City	Rensselaer	60,027	17,733	21,938	20,356	7,085,328	1,898,709	1,452,350	3,734,269
Sand Lake	Town	Rensselaer	49,053	37,630	9,611	1,812	0	0	0	0
Schaghticoke	Town	Rensselaer	31,262	25,891	5,371	0	543,103	505,631	37,472	0
Hoosick Falls	Village	Rensselaer	24,281	8,936	15,346	0	0	0	0	0
Hoosick	Town	Rensselaer	19,339	10,992	8,348	0	0	0	0	0
Pittstown	Town	Rensselaer	17,993	16,775	1,218	0	8,479	8,479	0	0
Poestenkill	Town	Rensselaer	17,845	14,838	3,007	0	21,424	16,157	5,267	0

Table B 2. Utility-Supplied Energy Consumption Data for 2010 by Municipality

Municipality	Type	County	Electricity (MWh)				Natural Gas (Therms)			
			Total	Res.	Com.	Indust.	Total	Res.	Com.	Indust.
Stephentown	Town	Rensselaer	16,775	13,949	2,171	654	0	0	0	0
Nassau	Town	Rensselaer	15,030	13,105	1,925	0	0	0	0	0
Petersburgh	Town	Rensselaer	12,006	6,749	968	4,290	0	0	0	0
Berlin	Town	Rensselaer	11,540	8,336	2,471	734	0	0	0	0
Grafton	Town	Rensselaer	9,913	7,534	2,379	0	0	0	0	0
Castleton-on-Hudson	Village	Rensselaer	8,558	4,122	4,437	0	400,558	267,373	133,185	0
Nassau	Village	Rensselaer	4,813	3,401	1,412	0	0	0	0	0
Schaghticoke	Village	Rensselaer	3,941	1,920	2,022	0	0	0	0	0
Valley Falls	Village	Rensselaer	2,338	2,018	320	0	0	0	0	0
East Nassau	Village	Rensselaer	0	0	0	0	0	0	0	0
Saratoga Springs	City	Saratoga	312,120	78,603	133,519	99,997	18,202,053	7,387,668	6,408,282	4,406,103
Clifton Park	Town	Saratoga	238,802	124,831	113,972	0	12,790,201	10,088,003	2,686,253	15,945
Waterford	Town	Saratoga	231,639	20,687	14,824	196,129	34,357,673	1,526,807	544,940	32,285,926
Halfmoon	Town	Saratoga	189,274	82,386	73,167	33,722	7,126,379	3,388,252	1,184,124	2,554,003
Wilton	Town	Saratoga	128,931	55,471	73,460	0	4,108,028	2,825,284	1,282,744	0
Malta	Town	Saratoga	92,691	55,008	35,370	2,313	3,705,866	2,391,993	1,313,873	0
Milton	Town	Saratoga	64,646	45,616	19,030	0	2,316,385	1,910,399	405,986	0
Moreau	Town	Saratoga	51,192	35,653	15,539	0	2,112,235	1,499,950	612,285	0
Ballston	Town	Saratoga	43,312	26,940	16,371	0	2,474,237	1,503,562	966,987	3,688
Greenfield	Town	Saratoga	42,238	28,360	13,878	0	380,577	107,210	273,367	0
Stillwater	Town	Saratoga	40,547	31,329	8,775	442	510,945	383,131	118,264	9,550
Mechanicville	City	Saratoga	29,035	18,985	10,033	17	2,218,923	1,734,074	481,599	3,250
Ballston Spa	Village	Saratoga	25,120	11,848	13,272	0	2,029,928	1,179,251	562,885	287,792
Northumberland	Town	Saratoga	19,922	17,323	2,599	0	451,874	428,908	22,966	0
Charlton	Town	Saratoga	18,861	17,030	1,831	0	346,124	276,602	69,522	0
South Glens Falls	Village	Saratoga	18,353	9,909	8,444	0	8,430,980	823,556	365,057	7,242,367
Galway	Town	Saratoga	17,966	14,978	2,988	0	0	0	0	0
Saratoga	Town	Saratoga	17,306	15,037	2,269	0	47,079	45,819	1,260	0
Corinth	Town	Saratoga	16,545	13,831	2,714	0	1,650	0	1,650	0
Corinth	Village	Saratoga	13,162	7,839	5,323	0	50,327,533	0	32,297	50,295,236
Stillwater	Village	Saratoga	11,647	8,156	3,401	90	0	0	0	0
Schuylerville	Village	Saratoga	8,681	3,879	4,802	0	545,311	337,651	207,660	0
Edinburg	Town	Saratoga	7,846	6,909	938	0	0	0	0	0
Hadley	Town	Saratoga	7,554	7,004	549	0	0	0	0	0
Providence	Town	Saratoga	7,370	6,936	434	0	0	0	0	0
Waterford	Village	Saratoga	6,813	4,953	1,860	0	838,329	660,658	177,671	0

Table B 2. Utility-Supplied Energy Consumption Data for 2010 by Municipality

Municipality	Type	County	Electricity (MWh)				Natural Gas (Therms)			
			Total	Res.	Com.	Indust.	Total	Res.	Com.	Indust.
Day	Town	Saratoga	4,993	4,774	220	0	0	0	0	0
Round Lake	Village	Saratoga	3,315	2,616	699	0	1,263	1,263	0	0
Victory	Village	Saratoga	1,940	1,791	149	0	39,695	39,685	10	0
Galway	Village	Saratoga	1,009	619	389	0	0	0	0	0
Schenectady	City	Schenectady	300,295	115,980	167,648	16,668	27,761,506	15,102,272	8,213,228	4,446,006
Rotterdam	Town	Schenectady	191,623	93,356	98,266	0	17,754,470	7,915,343	4,664,989	5,174,138
Glenville	Town	Schenectady	152,604	70,977	81,627	0	8,685,637	4,962,095	3,723,542	0
Niskayuna	Town	Schenectady	131,997	70,253	61,744	0	13,860,758	6,948,945	3,319,916	3,591,897
Scotia	Village	Schenectady	29,639	21,402	8,236	0	2,514,682	2,103,073	411,609	0
Duanesburg	Town	Schenectady	25,672	21,577	4,095	0	507	507	0	0
Princetown	Town	Schenectady	10,106	8,435	1,672	0	4,722	2,465	2,257	0
Delanson	Village	Schenectady	2,903	1,270	1,633	0	0	0	0	0
Queensbury	Town	Warren	233,588	97,436	136,152	0	8,761,575	4,479,106	3,616,518	665,951
Glens Falls	City	Warren	159,913	34,866	82,659	42,389	26,612,831	3,739,141	3,738,335	19,135,355
Lake George	Town	Warren	28,896	14,833	14,063	0	378,703	99,911	278,792	0
Warrensburg	Town	Warren	26,498	14,170	12,328	0	0	0	0	0
Johnsburg	Town	Warren	23,051	10,519	12,532	0	0	0	0	0
Bolton	Town	Warren	21,812	15,346	6,466	0	0	0	0	0
Chester	Town	Warren	20,648	14,202	6,447	0	0	0	0	0
Lake Luzerne	Town	Warren	17,679	13,149	4,530	0	14,633	14,633	0	0
Lake George	Village	Warren	15,776	3,953	11,823	0	642,098	218,824	423,274	0
Horicon	Town	Warren	10,470	8,748	1,722	0	0	0	0	0
Hague	Town	Warren	6,516	5,533	984	0	0	0	0	0
Thurman	Town	Warren	4,468	4,192	276	0	0	0	0	0
Stony Creek	Town	Warren	3,492	2,904	588	0	0	0	0	0
Fort Edward	Village	Washington	62,869	7,082	9,665	46,122	6,323,010	705,392	2,615,046	3,002,572
Kingsbury	Town	Washington	35,728	16,470	19,258	0	1,127,708	335,626	792,082	0
Easton	Town	Washington	34,735	8,570	4,070	22,095	3,233,393	3,663	382,739	2,846,991
Greenwich	Town	Washington	33,209	12,208	21,001	0	100,823	52,773	48,050	0
Granville	Town	Washington	27,635	18,639	7,439	1,557	0	0	0	0
Hudson Falls	Village	Washington	25,818	18,374	7,444	0	2,516,906	1,599,782	916,950	174
Granville	Village	Washington	25,792	10,617	6,312	8,863	0	0	0	0
Argyle	Town	Washington	19,189	12,282	6,907	0	1,311	1,311	0	0
Fort Edward	Town	Washington	19,039	10,394	8,645	0	1,387,989	320,643	1,067,346	0
Fort Ann	Town	Washington	16,901	14,451	2,450	0	0	0	0	0
Whitehall	Town	Washington	14,902	4,966	9,936	0	0	0	0	0
Salem	Town	Washington	11,894	9,099	2,735	60	0	0	0	0

Table B 2. Utility-Supplied Energy Consumption Data for 2010 by Municipality

Municipality	Type	County	Electricity (MWh)				Natural Gas (Therms)			
			Total	Res.	Com.	Indust.	Total	Res.	Com.	Indust.
Whitehall	Village	Washington	10,518	6,581	3,938	0	0	0	0	0
Cambridge	Village	Washington	10,258	5,056	5,203	0	0	0	0	0
Jackson	Town	Washington	10,080	7,613	1,022	1,445	0	0	0	0
Greenwich	Village	Washington	9,916	6,420	3,497	0	0	0	0	0
Hartford	Town	Washington	9,482	8,085	1,398	0	0	0	0	0
Hebron	Town	Washington	9,308	8,603	689	16	0	0	0	0
Cambridge	Town	Washington	7,372	5,947	1,426	0	0	0	0	0
White Creek	Town	Washington	7,325	6,054	1,271	0	0	0	0	0
Salem	Village	Washington	6,167	3,872	2,269	26	0	0	0	0
Hampton	Town	Washington	3,752	3,318	434	0	0	0	0	0
Putnam	Town	Washington	3,309	3,049	260	0	0	0	0	0
Dresden	Town	Washington	3,284	2,893	390	0	0	0	0	0
Fort Ann	Village	Washington	3,066	1,378	1,688	0	0	0	0	0
Argyle	Village	Washington	2,507	1,329	1,178	0	0	0	0	0

Table B 3. Vehicle-miles-traveled and Fuel Consumption (gallons) by Municipality

Community Name	Type	County	Vehicle Miles Traveled and Fuel Consumption (gallons)			
			VMT	Gasoline	Ethanol	Diesel
Menands	Village	Albany	131,076,906	5,105,949	567,328	672,121
Colonie	Village	Albany	142,982,262	5,559,689	617,743	658,896
Voorheesville	Village	Albany	20,464,079	794,177	88,242	84,410
Bethlehem	Town	Albany	359,198,482	13,952,741	1,550,305	1,638,551
Colonie	Town	Albany	1,372,496,943	53,340,359	5,926,707	6,435,232
Altamont	Village	Albany	6,605,201	256,775	28,531	35,328
Cohoes	City	Albany	60,520,335	2,345,765	260,641	247,388
Guilderland	Town	Albany	472,166,930	18,346,988	2,038,554	2,088,286
Watervliet	City	Albany	111,067,234	4,324,953	480,550	563,806
Albany	City	Albany	1,041,725,983	40,542,803	4,504,756	5,132,858
Green Island	Village	Albany	17,866,323	695,426	77,270	85,947
Ravena	Village	Albany	25,278,922	983,622	109,291	138,578
New Scotland	Town	Albany	122,784,111	4,767,469	529,719	572,753
Coeymans	Town	Albany	141,222,286	5,468,897	607,655	974,333
Knox	Town	Albany	26,123,677	1,015,549	112,839	139,722
Rensselaerville	Town	Albany	25,469,880	990,067	110,007	143,517
Berne	Town	Albany	32,213,436	1,252,181	139,131	171,339
Westerlo	Town	Albany	40,583,926	1,577,686	175,298	217,062
Green Island	Town	Albany	17,866,323	695,426	77,270	85,947
Hudson	City	Columbia	29,666,690	1,149,913	127,768	114,067
Greenport	Town	Columbia	49,732,416	1,927,806	214,201	199,050
Stockport	Town	Columbia	23,379,816	906,566	100,730	101,106
Claverack	Town	Columbia	69,775,758	2,707,430	300,826	353,451
Ghent	Town	Columbia	49,867,292	1,935,922	215,102	274,136
Copake	Town	Columbia	43,566,618	1,691,708	187,968	269,002
Canaan	Town	Columbia	95,128,023	3,660,888	406,765	837,551
Hillsdale	Town	Columbia	54,384,901	2,111,553	234,617	340,132
Ancram	Town	Columbia	32,194,143	1,250,557	138,951	190,461
Austerlitz	Town	Columbia	39,018,597	1,515,191	168,355	239,341
Chatham	Village	Columbia	6,510,663	252,756	28,084	41,234
Gallatin	Town	Columbia	16,072,730	624,822	69,425	85,965
Chatham	Town	Columbia	109,201,924	4,206,449	467,383	918,325
New Lebanon	Town	Columbia	28,556,163	1,109,088	123,232	171,819
Germantown	Town	Columbia	10,763,627	418,432	46,492	57,569
Taghkanic	Town	Columbia	24,559,282	954,241	106,027	140,546
Philmont	Village	Columbia	1,688,364	65,635	7,293	9,030
Stuyvesant	Town	Columbia	17,782,070	690,797	76,755	103,965

Table B 3. Vehicle-miles-traveled and Fuel Consumption (gallons) by Municipality

Community Name	Type	County	Vehicle Miles Traveled and Fuel Consumption (gallons)			
			VMT	Gasoline	Ethanol	Diesel
Kinderhook	Village	Columbia	6,831,765	265,203	29,467	43,618
Livingston	Town	Columbia	26,360,816	1,024,221	113,802	151,182
Clermont	Town	Columbia	9,262,586	360,080	40,009	49,541
Valatie	Village	Columbia	2,715,058	105,519	11,724	15,040
Kinderhook	Town	Columbia	29,863,670	1,160,479	128,942	168,324
Catskill	Village	Greene	22,012,941	853,219	94,802	78,710
Coxsackie	Village	Greene	12,688,532	491,784	54,643	40,582
Catskill	Town	Greene	185,335,012	7,146,952	794,106	1,329,715
New Baltimore	Town	Greene	94,529,042	3,635,723	403,969	812,550
Coxsackie	Town	Greene	100,090,581	3,853,655	428,184	758,493
Windham	Town	Greene	31,012,164	1,204,593	133,844	184,419
Hunter	Village	Greene	3,671,399	142,724	15,858	19,636
Jewett	Town	Greene	23,504,024	913,711	101,523	125,711
Tannersville	Village	Greene	2,208,626	85,860	9,540	11,813
Lexington	Town	Greene	21,337,192	829,476	92,164	114,122
Halcott	Town	Greene	7,554,980	293,697	32,633	40,408
Prattsville	Town	Greene	17,628,376	684,748	76,083	104,523
Durham	Town	Greene	56,787,612	2,205,845	245,094	336,439
Hunter	Town	Greene	28,262,054	1,098,677	122,075	151,159
Cairo	Town	Greene	70,486,903	2,737,499	304,167	406,640
Greenville	Town	Greene	32,306,379	1,255,899	139,544	172,790
Athens	Village	Greene	11,286,371	437,604	48,623	39,153
Athens	Town	Greene	71,756,332	2,759,331	306,592	597,498
Ashland	Town	Greene	21,524,104	835,918	92,880	130,490
North Greenbush	Town	Rensselaer	148,483,374	5,766,690	640,743	657,513
Rensselaer	City	Rensselaer	63,716,996	2,477,187	275,243	302,976
Castleton-on-Hudson	Village	Rensselaer	6,658,956	258,865	28,763	35,615
East Greenbush	Town	Rensselaer	191,343,209	7,436,300	826,256	950,651
Brunswick	Town	Rensselaer	128,312,180	4,976,175	552,908	606,383
Schaghticoke	Town	Rensselaer	113,449,606	4,403,630	489,292	646,612
Troy	City	Rensselaer	183,491,144	7,113,436	790,382	758,439
Schodack	Town	Rensselaer	247,177,562	9,577,137	1,064,126	1,669,037
Poestenkill	Town	Rensselaer	55,801,122	2,167,412	240,824	273,832
Pittstown	Town	Rensselaer	92,924,302	3,607,578	400,842	586,940
Stephentown	Town	Rensselaer	45,636,357	1,773,544	197,060	254,413
Berlin	Town	Rensselaer	28,508,735	1,107,712	123,079	162,830
Petersburgh	Town	Rensselaer	23,020,640	893,804	99,312	143,930

Table B 3. Vehicle-miles-traveled and Fuel Consumption (gallons) by Municipality

Community Name	Type	County	Vehicle Miles Traveled and Fuel Consumption (gallons)			
			VMT	Gasoline	Ethanol	Diesel
Sand Lake	Town	Rensselaer	75,284,141	2,925,671	325,075	392,982
Valley Falls	Village	Rensselaer	5,372,086	208,547	23,172	34,169
Grafton	Town	Rensselaer	25,743,803	999,529	111,059	161,056
Schaghticoke	Village	Rensselaer	12,948,026	502,885	55,876	77,930
Nassau	Village	Rensselaer	11,162,279	433,425	48,158	69,114
Nassau	Town	Rensselaer	61,037,595	2,370,508	263,390	369,498
Hoosick Falls	Village	Rensselaer	16,124,312	626,499	69,611	92,366
Hoosick	Town	Rensselaer	76,402,206	2,965,969	329,552	485,864
East Nassau	Village	Rensselaer	10,845,082	421,244	46,805	64,617
Mechanicville	City	Saratoga	24,321,087	942,444	104,716	108,763
Waterford	Village	Saratoga	14,698,740	569,753	63,306	59,484
Saratoga Springs	City	Saratoga	291,683,676	11,338,523	1,259,836	1,381,076
Clifton Park	Town	Saratoga	619,794,846	24,098,814	2,677,646	2,843,771
Schuylerville	Village	Saratoga	6,409,069	248,754	27,639	41,667
South Glens Falls	Village	Saratoga	14,886,969	577,962	64,218	88,763
Ballston Spa	Village	Saratoga	26,280,680	1,018,920	113,213	103,465
Waterford	Town	Saratoga	49,986,881	1,937,595	215,288	202,912
Wilton	Town	Saratoga	288,071,847	11,183,063	1,242,563	1,789,432
Malta	Town	Saratoga	438,791,944	17,052,847	1,894,761	2,657,904
Halfmoon	Town	Saratoga	311,953,409	12,123,534	1,347,059	1,503,197
Ballston	Town	Saratoga	137,711,937	5,345,971	593,997	728,303
Milton	Town	Saratoga	139,930,109	5,432,724	603,636	718,496
Moreau	Town	Saratoga	181,630,402	7,066,318	785,146	1,061,192
Northumberland	Town	Saratoga	37,619,288	1,462,204	162,467	205,549
Charlton	Town	Saratoga	57,482,683	2,232,629	248,070	315,404
Victory	Village	Saratoga	2,308,381	89,650	9,961	13,981
Stillwater	Town	Saratoga	93,051,957	3,613,943	401,549	539,279
Greenfield	Town	Saratoga	72,344,925	2,809,785	312,198	435,402
Saratoga	Town	Saratoga	50,607,255	1,964,902	218,322	309,058
Edinburg	Town	Saratoga	8,047,993	312,863	34,763	43,045
Day	Town	Saratoga	4,536,590	176,358	19,595	24,264
Stillwater	Village	Saratoga	11,742,693	455,696	50,633	72,472
Galway	Town	Saratoga	69,940,099	2,716,711	301,857	408,260
Round Lake	Village	Saratoga	42,168,162	1,643,788	182,643	221,473
Providence	Town	Saratoga	12,150,299	472,339	52,482	64,986
Hadley	Town	Saratoga	21,130,735	821,059	91,229	120,308
Galway	Village	Saratoga	4,416,233	171,679	19,075	23,620

Table B 3. Vehicle-miles-traveled and Fuel Consumption (gallons) by Municipality

Community Name	Type	County	Vehicle Miles Traveled and Fuel Consumption (gallons)			
			VMT	Gasoline	Ethanol	Diesel
Corinth	Village	Saratoga	5,529,327	214,781	23,865	32,732
Corinth	Town	Saratoga	57,816,612	2,245,996	249,555	339,157
Niskayuna	Town	Schenectady	164,540,861	6,377,943	708,660	667,651
Scotia	Village	Schenectady	31,505,021	1,221,181	135,687	123,762
Rotterdam	Town	Schenectady	364,438,349	14,173,596	1,574,844	1,892,049
Schenectady	City	Schenectady	205,927,380	7,994,084	888,232	913,632
Glenville	Town	Schenectady	276,672,614	10,725,803	1,191,756	1,163,847
Princetown	Town	Schenectady	53,016,737	2,041,812	226,868	449,879
Duanesburg	Town	Schenectady	101,431,220	3,904,630	433,848	874,968
Delanson	Village	Schenectady	2,224,899	86,492	9,610	11,900
Glens Falls	City	Warren	53,645,121	2,079,387	231,043	215,812
Lake George	Village	Warren	12,206,519	474,063	52,674	54,039
Queensbury	Town	Warren	286,891,001	11,150,359	1,238,929	1,318,273
Lake George	Town	Warren	137,641,277	5,328,241	592,027	949,909
Lake Luzerne	Town	Warren	24,785,669	962,869	106,985	144,982
Hague	Town	Warren	23,213,038	901,236	100,137	145,844
Bolton	Town	Warren	76,612,986	2,943,449	327,050	704,458
Horicon	Town	Warren	19,871,835	772,508	85,834	106,332
Johnsburg	Town	Warren	65,207,394	2,531,882	281,320	405,338
Chester	Town	Warren	122,171,972	4,690,424	521,158	1,145,774
Stony Creek	Town	Warren	13,706,244	532,825	59,203	73,308
Warrensburg	Town	Warren	42,821,585	1,651,068	183,452	346,408
Thurman	Town	Warren	20,072,753	780,136	86,682	110,806
Hudson Falls	Village	Washington	24,304,242	942,074	104,675	96,818
Fort Edward	Village	Washington	14,538,017	563,517	62,613	57,520
Fort Edward	Town	Washington	50,672,890	1,965,276	218,364	236,623
Kingsbury	Town	Washington	62,813,809	2,436,270	270,697	267,423
Greenwich	Town	Washington	37,267,141	1,447,994	160,888	213,366
Easton	Town	Washington	38,955,738	1,513,647	168,183	222,217
Argyle	Town	Washington	32,507,212	1,263,706	140,412	173,864
Putnam	Town	Washington	25,364,624	984,865	109,429	157,601
Hebron	Town	Washington	37,990,734	1,475,637	163,960	226,315
Dresden	Town	Washington	28,743,351	1,115,944	123,994	180,662
Argyle	Village	Washington	467,695	18,181	2,020	2,501
Jackson	Town	Washington	36,475,864	1,416,540	157,393	222,071
Granville	Village	Washington	3,370,048	131,004	14,556	18,128
Salem	Village	Washington	4,791,077	186,016	20,668	30,023

Table B 3. Vehicle-miles-traveled and Fuel Consumption (gallons) by Municipality

Community Name	Type	County	Vehicle Miles Traveled and Fuel Consumption (gallons)			
			VMТ	Gasoline	Ethanol	Diesel
Greenwich	Village	Washington	4,741,402	184,119	20,458	29,114
Hartford	Town	Washington	19,529,882	759,217	84,357	104,455
Hampton	Town	Washington	7,798,934	303,181	33,687	41,712
Salem	Town	Washington	35,567,558	1,381,684	153,520	208,751
Cambridge	Town	Washington	30,539,953	1,186,627	131,847	174,582
Fort Ann	Village	Washington	568,949	22,118	2,458	3,043
Granville	Town	Washington	46,619,760	1,810,864	201,207	276,634
Cambridge	Village	Washington	7,297,908	283,352	31,484	45,591
Whitehall	Village	Washington	7,523,647	292,148	32,461	46,413
Fort Ann	Town	Washington	29,956,324	1,164,001	129,333	170,303
White Creek	Town	Washington	27,799,251	1,079,744	119,972	166,250
Whitehall	Town	Washington	23,049,819	895,697	99,522	129,943

Table B 4. Household GHG emissions and Energy Cost of Living

Community	Type	County	Per-Household GHG Footprint (MTCDE)			Energy Cost of Living (ECOL)		
			Energy	Transport	HH Total	ECOL (\$)	income	% income
Coeymans	Town	Albany	8.0	8.0	15.9	6,560	68,730	10%
Albany	City	Albany	4.3	3.9	8.2	4,154	53,425	8%
Ravena	Village	Albany	6.6	6.6	13.2	6,069	62,653	10%
Colonie	Town	Albany	6.9	6.3	13.1	5,243	86,844	6%
Bethlehem	Town	Albany	7.2	6.7	13.8	5,717	101,025	6%
Guilderland	Town	Albany	6.4	5.9	12.3	5,422	92,769	6%
New Scotland	Town	Albany	9.9	9.2	19.1	6,851	101,545	7%
Cohoes	City	Albany	4.0	3.6	7.6	4,268	51,075	8%
Colonie	Village	Albany	6.8	6.3	13.0	5,290	88,704	6%
Watervliet	City	Albany	3.7	3.4	7.1	4,085	47,905	9%
Menands	Village	Albany	5.6	5.1	10.7	4,780	94,569	5%
Westerlo	Town	Albany	8.1	8.0	16.1	7,571	71,046	11%
Green Island	Village	Albany	5.0	4.5	9.5	5,187	57,344	9%
Green Island	Town	Albany		0.0	0.0	5,187	57,344	9%
Berne	Town	Albany	6.9	6.9	13.8	7,756	69,778	11%
Knox	Town	Albany	8.5	8.4	16.8	7,805	82,246	9%
Rensselaerville	Town	Albany	8.4	8.3	16.7	8,355	67,899	12%
Voorheesville	Village	Albany	6.9	6.4	13.2	5,607	86,868	6%
Altamont	Village	Albany	7.6	7.1	14.7	6,187	80,634	8%
Chatham	Town	Columbia	13.1	11.9	25.0	8,361	113,442	7%
Claverack	Town	Columbia	8.7	8.5	17.2	6,712	78,372	9%
Greenport	Town	Columbia	5.8	5.5	11.3	5,049	54,639	9%
Kinderhook	Town	Columbia	8.5	8.4	16.8	7,188	83,655	9%
Canaan	Town	Columbia	10.8	10.4	21.2	8,805	98,704	9%
Hudson	City	Columbia	5.0	4.5	9.5	4,566	57,162	8%
Ghent	Town	Columbia	8.3	8.2	16.5	6,684	73,712	9%
Copake	Town	Columbia	9.6	9.5	19.1	8,488	105,086	8%
Hillsdale	Town	Columbia	8.9	8.7	17.6	8,045	90,041	9%
Livingston	Town	Columbia	8.1	8.0	16.0	7,079	61,815	11%
Ancram	Town	Columbia	8.5	8.3	16.8	7,607	85,130	9%
Austerlitz	Town	Columbia	9.1	9.0	18.1	8,394	96,306	9%
New Lebanon	Town	Columbia	7.9	7.8	15.7	7,290	74,235	10%
Stockport	Town	Columbia	7.5	7.3	14.8	6,263	61,285	10%
Stuyvesant	Town	Columbia	8.4	8.3	16.7	6,872	70,809	10%
Taghkanic	Town	Columbia	7.9	7.8	15.7	7,608	95,595	8%
Germantown	Town	Columbia	8.2	8.0	16.1	7,088	77,054	9%
Gallatin	Town	Columbia	8.3	8.2	16.4	8,453	81,954	10%

Table B 4. Household GHG emissions and Energy Cost of Living

Community	Type	County	Per-Household GHG Footprint (MTCDE)			Energy Cost of Living (ECOL)		
			Energy	Transport	HH Total	ECOL (\$)	income	% income
Chatham	Village	Columbia	8.0	7.8	15.8	6,776	63,206	11%
Clermont	Town	Columbia	8.2	8.1	16.4	6,936	81,906	8%
Kinderhook	Village	Columbia	9.2	9.1	18.3	7,465	84,974	9%
Valatie	Village	Columbia	8.0	7.9	16.0	6,665	72,175	9%
Philmont	Village	Columbia	7.3	7.1	14.4	6,322	47,513	13%
Catskill	Town	Greene	7.8	7.8	15.6	6,641	61,225	11%
Coxsackie	Town	Greene	8.8	8.2	17.0	6,716	64,558	10%
Cairo	Town	Greene	7.7	7.6	15.2	7,017	58,747	12%
New Baltimore	Town	Greene	8.5	8.4	16.9	7,224	69,468	10%
Athens	Town	Greene	9.1	8.8	17.9	7,048	64,257	11%
Durham	Town	Greene	9.3	9.2	18.5	7,577	56,117	14%
Catskill	Village	Greene	8.9	8.4	17.3	6,324	63,949	10%
Hunter	Town	Greene	7.0	6.8	13.8	7,528	43,167	17%
Greenville	Town	Greene	8.6	8.5	17.1	7,670	53,295	14%
Windham	Town	Greene	10.8	10.5	21.3	9,007	58,086	16%
Coxsackie	Village	Greene	7.7	7.4	15.1	6,313	63,966	10%
Jewett	Town	Greene	7.8	7.7	15.5	7,676	57,528	13%
Lexington	Town	Greene	8.5	8.4	16.8	7,147	58,927	12%
Athens	Village	Greene	8.3	8.2	16.4	6,751	64,492	10%
Ashland	Town	Greene	6.9	6.9	13.8	5,025	43,912	11%
Prattsville	Town	Greene	9.4	9.2	18.6	7,233	53,646	13%
Hunter	Village	Greene	9.0	8.8	17.8	8,337	38,545	22%
Tannersville	Village	Greene	8.0	7.8	15.8	6,928	39,207	18%
Halcott	Town	Greene	8.8	8.8	17.6	7,477	56,598	13%
Troy	City	Rensselaer	2.5	2.3	4.8	4,017	48,936	8%
East Greenbush	Town	Rensselaer	6.7	6.2	12.9	5,320	84,059	6%
Schodack	Town	Rensselaer	8.2	8.0	16.2	6,509	82,141	8%
North Greenbush	Town	Rensselaer	7.9	7.5	15.4	6,042	81,881	7%
Rensselaer	City	Rensselaer	4.2	3.8	8.0	4,081	57,435	7%
Brunswick	Town	Rensselaer	6.5	6.2	12.7	5,957	80,672	7%
Schaghticoke	Town	Rensselaer	8.2	8.0	16.2	7,127	76,268	9%
Sand Lake	Town	Rensselaer	8.7	8.5	17.2	7,303	82,519	9%
Hoosick	Town	Rensselaer	7.4	7.3	14.8	6,961	59,992	12%
Pittstown	Town	Rensselaer	7.7	7.6	15.3	7,323	70,356	10%
Nassau	Town	Rensselaer	8.4	8.3	16.7	7,369	70,762	10%
Poestenkill	Town	Rensselaer	8.0	7.9	15.8	7,164	78,198	9%
Stephentown	Town	Rensselaer	7.9	7.7	15.6	8,315	71,919	12%

Table B 4. Household GHG emissions and Energy Cost of Living

Community	Type	County	Per-Household GHG Footprint (MTCDE)			Energy Cost of Living (ECOL)		
			Energy	Transport	HH Total	ECOL (\$)	income	% income
Hoosick Falls	Village	Rensselaer	7.0	6.9	13.9	6,475	57,991	11%
Berlin	Town	Rensselaer	7.8	7.7	15.6	7,812	62,944	12%
Grafton	Town	Rensselaer	7.7	7.6	15.3	7,904	69,189	11%
Petersburgh	Town	Rensselaer	7.9	7.8	15.6	8,022	59,387	14%
Castleton-on-Hudson	Village	Rensselaer	7.3	6.9	14.2	5,667	66,177	9%
Nassau	Village	Rensselaer	7.2	7.2	14.4	6,160	58,341	11%
Schaghticoke	Village	Rensselaer	8.0	7.8	15.8	6,575	67,290	10%
East Nassau	Village	Rensselaer	7.1	7.1	14.2	3,581	71,942	5%
Valley Falls	Village	Rensselaer	9.6	9.5	19.0	7,832	80,484	10%
Clifton Park	Town	Saratoga	7.3	6.7	14.0	6,063	103,105	6%
Saratoga Springs	City	Saratoga	5.8	5.3	11.1	5,137	79,979	6%
Waterford	Town	Saratoga	6.1	5.5	11.6	5,458	71,099	8%
Halfmoon	Town	Saratoga	6.4	6.0	12.3	5,929	78,409	8%
Malta	Town	Saratoga	6.0	5.6	11.5	6,055	80,506	8%
Moreau	Town	Saratoga	7.6	7.2	14.8	5,989	61,820	10%
Wilton	Town	Saratoga	7.1	6.7	13.9	6,383	87,544	7%
Ballston	Town	Saratoga	7.2	6.7	13.9	6,248	79,285	8%
Milton	Town	Saratoga	7.6	7.2	14.9	6,239	70,945	9%
South Glens Falls	Village	Saratoga	5.0	4.6	9.6	4,893	55,821	9%
Stillwater	Town	Saratoga	8.4	8.1	16.5	7,610	77,614	10%
Greenfield	Town	Saratoga	7.7	7.6	15.3	7,241	86,344	8%
Corinth	Town	Saratoga	8.0	7.9	15.9	6,843	56,403	12%
Saratoga	Town	Saratoga	8.4	8.3	16.7	7,010	73,883	9%
Galway	Town	Saratoga	8.2	8.1	16.4	7,792	88,709	9%
Charlton	Town	Saratoga	8.7	8.4	17.1	7,568	87,364	9%
Northumberland	Town	Saratoga	8.1	7.8	15.9	7,408	76,333	10%
Mechanicville	City	Saratoga	7.0	6.4	13.4	5,577	46,946	12%
Ballston Spa	Village	Saratoga	5.1	4.7	9.8	4,781	55,228	9%
Hadley	Town	Saratoga	7.3	7.2	14.5	7,163	58,604	12%
Round Lake	Village	Saratoga	8.0	7.8	15.8	6,723	75,391	9%
Providence	Town	Saratoga	7.7	7.6	15.2	7,942	60,906	13%
Edinburg	Town	Saratoga	7.5	7.4	14.9	9,148	55,749	16%
Waterford	Village	Saratoga	6.2	5.6	11.8	5,216	65,778	8%
Corinth	Village	Saratoga	7.2	7.0	14.2	6,055	54,367	11%
Stillwater	Village	Saratoga	7.6	7.5	15.1	7,394	67,959	11%
Day	Town	Saratoga	5.8	5.7	11.5	7,691	56,885	14%
Schuylerville	Village	Saratoga	5.3	4.8	10.1	5,508	56,381	10%

Table B 4. Household GHG emissions and Energy Cost of Living

Community	Type	County	Per-Household GHG Footprint (MTCDE)			Energy Cost of Living (ECOL)		
			Energy	Transport	HH Total	ECOL (\$)	income	% income
Victory	Village	Saratoga	7.6	7.4	15.0	6,856	55,414	12%
Galway	Village	Saratoga	10.2	10.0	20.2	8,692	45,926	19%
Schenectady	City	Schenectady	5.3	4.9	10.2	4,816	48,630	10%
Rotterdam	Town	Schenectady	7.1	6.5	13.6	5,590	67,415	8%
Glenville	Town	Schenectady	7.3	6.8	14.2	5,755	77,759	7%
Niskayuna	Town	Schenectady	8.0	7.3	15.3	5,864	110,546	5%
Duanesburg	Town	Schenectady	9.0	8.4	17.3	7,718	80,973	10%
Scotia	Village	Schenectady	6.3	5.8	12.1	5,225	64,968	8%
Princetown	Town	Schenectady	8.5	8.4	17.0	7,591	84,981	9%
Delanson	Village	Schenectady	10.5	9.3	19.9	8,043	73,354	11%
Glens Falls	City	Warren	4.8	4.5	9.4	4,412	52,955	8%
Queensbury	Town	Warren	6.4	6.0	12.5	5,601	73,641	8%
Lake George	Town	Warren	8.0	7.7	15.7	6,526	70,950	9%
Chester	Town	Warren	7.6	7.5	15.2	6,991	55,250	13%
Bolton	Town	Warren	9.0	8.9	17.9	7,241	66,466	11%
Warrensburg	Town	Warren	7.4	7.3	14.6	6,287	53,242	12%
Johnsburg	Town	Warren	6.7	6.6	13.3	7,127	47,583	15%
Lake Luzerne	Town	Warren	8.1	8.0	16.1	7,310	64,903	11%
Horicon	Town	Warren	7.8	7.7	15.5	7,286	63,426	11%
Hague	Town	Warren	7.6	7.5	15.1	7,084	74,273	10%
Lake George	Village	Warren	6.2	5.8	12.0	5,286	58,917	9%
Thurman	Town	Warren	6.9	6.8	13.7	7,519	69,188	11%
Stony Creek	Town	Warren	7.3	7.2	14.4	7,867	53,271	15%
Fort Edward	Town	Washington	6.9	6.4	13.3	5,979	48,138	12%
Kingsbury	Town	Washington	6.2	5.9	12.1	5,203	53,320	10%
Greenwich	Town	Washington	8.3	7.6	15.9	7,563	69,333	11%
Fort Edward	Village	Washington	5.2	4.8	9.9	5,440	47,311	11%
Fort Ann	Town	Washington	8.2	8.1	16.3	8,089	60,346	13%
Granville	Town	Washington	9.1	8.9	18.0	7,461	52,388	14%
Easton	Town	Washington	8.7	8.1	16.7	7,750	72,803	11%
Hudson Falls	Village	Washington	4.9	4.5	9.3	4,776	47,354	10%
Whitehall	Town	Washington	8.7	8.5	17.2	6,292	48,813	13%
Argyle	Town	Washington	7.5	7.4	15.0	7,252	65,625	11%
Salem	Town	Washington	8.4	8.3	16.7	7,959	60,189	13%
White Creek	Town	Washington	6.6	6.6	13.2	6,196	50,891	12%
Hebron	Town	Washington	7.8	7.7	15.6	8,615	62,392	14%
Jackson	Town	Washington	8.0	7.9	15.9	7,945	67,643	12%

Table B 4. Household GHG emissions and Energy Cost of Living

Community	Type	County	Per-Household GHG Footprint (MTCDE)			Energy Cost of Living (ECOL)		
			Energy	Transport	HH Total	ECOL (\$)	income	% income
Cambridge	Town	Washington	26.8	25.8	52.6	8,381	68,170	12%
Hartford	Town	Washington	7.4	7.3	14.7	7,434	67,959	11%
Dresden	Town	Washington	7.1	7.0	14.1	7,395	48,676	15%
Putnam	Town	Washington	8.5	8.4	16.9	7,092	59,345	12%
Granville	Village	Washington	7.9	7.8	15.7	6,557	45,932	14%
Whitehall	Village	Washington	7.2	7.1	14.4	6,042	39,965	15%
Cambridge	Village	Washington	7.2	7.1	14.2	6,158	44,815	14%
Hampton	Town	Washington	8.0	7.9	15.8	7,243	57,146	13%
Greenwich	Village	Washington	7.1	7.0	14.1	6,861	66,274	10%
Salem	Village	Washington	8.5	8.4	17.0	7,267	54,914	13%
Fort Ann	Village	Washington	8.3	8.1	16.4	6,325	56,466	11%
Argyle	Village	Washington	7.5	7.4	14.9	7,660	51,019	15%

Appendix C. Emission Factors

Table C 1. Fuel (Scope 1) and Electricity (Scope 2) Emission Factors

Fuel Type	Heating Value	CO ₂ Factor	CH ₄ Factor	N ₂ O Factor	CO ₂ e
Solid Fuels	mmBtu / ton	kg / mmBtu	g / mmBtu	g / mmBtu	Kg/MMBTU
Anthracite Coal	25.09	103.54	11	1.60	104.27
Bituminous Coal	24.93	93.40	11	1.60	94.13
Sub-bituminous Coal	17.25	97.02	11	1.60	97.75
Lignite Coal	14.21	96.36	11	1.60	97.09
Mixed (Commercial Sector)	21.39	95.26	11	1.60	95.99
Mixed (Electric Power Sector)	19.73	94.38	11	1.60	95.11
Mixed (Industrial Coking)	26.28	93.65	11	1.60	94.38
Mixed (Industrial Sector)	22.35	93.91	11	1.60	94.64
Coke	24.80	102.04	11	1.60	102.77
Municipal Solid Waste	9.95	90.70	32	4.20	92.67
Petroleum Coke (Solid)	30.00	102.41	32	4.20	104.38
Plastics	38.00	75.00	32	4.20	76.97
Tires	26.87	85.97	32	4.20	87.94
Agricultural Byproducts	8.25	118.17	32	4.20	120.14
Peat	8.00	111.84	32	4.20	113.81
Solid Byproducts	25.83	105.51	32	4.20	107.48
Wood and Wood Residuals	15.38	93.80	32	4.20	95.77
Gaseous Fuels	mmBtu / scf	kg CO ₂ / mmBtu	g CH ₄ / mmBtu	g N ₂ O / mmBtu	Kg/MMBTU
Natural Gas (per scf)	0.001028	53.02	1.000	0.100	53.072
Blast Furnace Gas	0.000092	274.32	0.022	0.100	274.351
Coke Oven Gas	0.000599	46.85	0.480	0.100	46.891
Fuel Gas	0.001388	59.00	0.022	0.100	59.031
Propane Gas	0.002516	61.46	0.022	0.100	61.491
Biogas (Captured Methane)	0.000841	52.07	3.200	0.630	52.333
Liquid Fuels	mmBtu / gallon	kg CO ₂ / mmBtu	g CH ₄ / mmBtu	g N ₂ O / mmBtu	Kg/MMBTU
Asphalt and Road Oil	0.158	75.36	3.0	0.60	75.609
Aviation Gasoline	0.120	69.25	3.0	0.60	69.499
Butane	0.101	65.15	3.0	0.60	65.399
Butylene	0.103	67.73	3.0	0.60	67.979
Crude Oil	0.138	74.49	3.0	0.60	74.739
Distillate Fuel Oil No. 1	0.139	73.25	3.0	0.60	73.499
Distillate Fuel Oil No. 2	0.138	73.96	3.0	0.60	74.209
Distillate Fuel Oil No. 4	0.146	75.04	3.0	0.60	75.289
Ethane	0.069	62.64	3.0	0.60	62.889
Ethylene	0.100	67.43	3.0	0.60	67.679
Heavy Gas Oils	0.148	74.92	3.0	0.60	75.169
Isobutane	0.097	64.91	3.0	0.60	65.159

Table C 1. Fuel (Scope 1) and Electricity (Scope 2) Emission Factors

Fuel Type	Heating Value	CO ₂ Factor	CH ₄ Factor	N ₂ O Factor	CO _{2e}
Isobutylene	0.103	67.74	3.0	0.60	67.989
Kerosene	0.135	75.20	3.0	0.60	75.449
Kerosene-type Jet Fuel	0.135	72.22	3.0	0.60	72.469
Liquefied Petroleum Gases (LPG)	0.092	62.98	3.0	0.60	63.229
Lubricants	0.144	74.27	3.0	0.60	74.519
Motor Gasoline	0.125	70.22	3.0	0.60	70.469
Naphtha (<401 deg F)	0.125	68.02	3.0	0.60	68.269
Natural Gasoline	0.110	66.83	3.0	0.60	67.079
Other Oil (>401 deg F)	0.139	76.22	3.0	0.60	76.469
Pentanes Plus	0.110	70.02	3.0	0.60	70.269
Petrochemical Feedstocks	0.129	70.97	3.0	0.60	71.219
Petroleum Coke	0.143	102.41	3.0	0.60	102.659
Propane	0.091	61.46	3.0	0.60	61.709
Propylene	0.091	65.95	3.0	0.60	66.199
Residual Fuel Oil No. 5	0.140	72.93	3.0	0.60	73.179
Residual Fuel Oil No. 6	0.150	75.10	3.0	0.60	75.349
Special Naphtha	0.125	72.34	3.0	0.60	72.589
Still Gas	0.143	66.72	3.0	0.60	66.969
Unfinished Oils	0.139	74.49	3.0	0.60	74.739
Used Oil	0.135	74.00	3.0	0.60	74.249
Biodiesel (100%)	0.128	73.84	1.1	0.11	73.897
Ethanol (100%)	0.084	68.44	1.1	0.11	.057
Rendered Animal Fat	0.125	71.06	1.1	0.11	71.117
Vegetable Oil	0.120	81.55	1.1	0.11	81.607
Electricity Consumption (Scope 2)		lb/MWh	lb/GWh	lb/GWh	Kg/MMBTU
Upstate New York Grid (EGRID- NYUP)		497.92	15.94	6.77	66.18

Sources:

Solid, gaseous, liquid and biomass fuels: Federal Register (2009) EPA; 40 CFR Parts 86, 87, 89 et al; *Mandatory Reporting of Greenhouse Gases; Final Rule*, 30Oct09, 261 pp. Tables C-1 and C-2 at FR pp. 56409-56410.

Revised emission factors for selected fuels: Federal Register (2010) EPA; 40 CFR Part 98; *Mandatory Reporting of Greenhouse Gases; Final Rule*, 17Dec10, 81 pp.