



Cornell University

Estimated Energy Use in the Town of Caroline, NY

Preliminary Report October 17, 2011

George R. Frantz, AICP, ASLA
Department of City & Regional Planning
Cornell University



Objective

- **Assist Energy Independent Caroline to identifying types and amounts of energy utilized by the community;**
- **Lay groundwork for exploring ways in which Caroline residents & businesses can localize their energy sources, better control their future, & circulate a larger amount of residents' incomes in the local community.**



- Tompkins County Assessment Department;
- Ithaca - Tompkins County Transportation Council.
- US Census of Population;
- US Department of Energy, Energy Information Admin.;
- Transportation Energy Data Book Edition 30, 2011.

Data Sources



HOUSING OCCUPANCY	
Total housing units	1,495
Occupied housing units	1,403
Vacant housing units	92
For rent	16
Rented, not occupied	4
For sale only	8
Sold, not occupied	1
For seasonal, recreational, or occasional use	27
All other vacants	36

Source: 2010 Census of Population & Housing



HOUSING TENURE	
Occupied housing units	1,403
Owner-occupied housing units	988
Population in owner-occupied housing units	2,392
Average household size of owner-occupied units	2.42
Renter-occupied housing units	415
Population in renter-occupied housing units	861
Average household size of renter-occupied units	2.07

Source: 2010 Census of Population & Housing



- **2010 Census data on household heating source not yet available;**
- **Apply 2000 Census household heating fuel data to 2010 data;**
- **Apply NYS fuel use in BTUs by category from 2005 RECS to Caroline;**
- **Adjust estimated fuel use to account for smaller average household size in Caroline.**

Methodology: Residential Energy Use



Estimated Town of Caroline Residential Energy Consumption for Heating Based on 2005 RECS Data for New York State

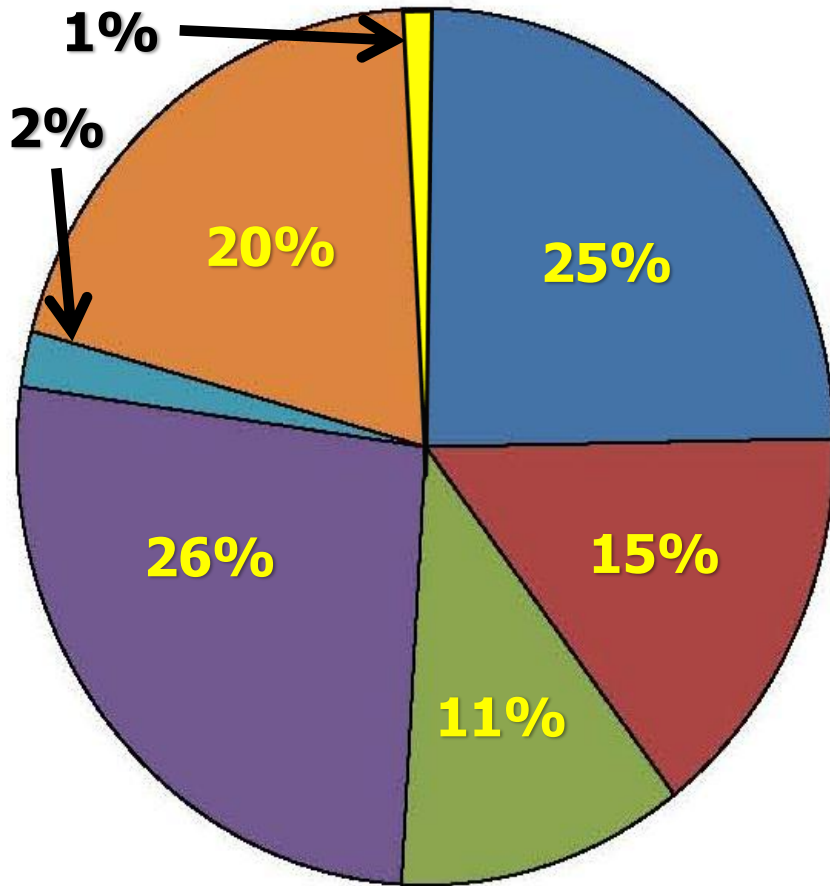
Heating Fuel Type (2000 Census)	Number of Households in Caroline - 2000 Census	Adjustment for # of Households in Caroline - 2010 Census	Estimated 2010 Town of Caroline Consumption for Heating (BTUs)*	Estimated Consumption Adjusted for Average Household Size***
Total - Occupied housing units*	1,162	1,403	173,893,280,000	148,313,578,512
Utility (natural) gas	287	347	42,949,545,060	36,631,666,982
Bottled, tank, or LP gas	173	209	25,889,447,022	22,081,109,365
Electricity **	132	159	19,753,797,728	16,848,014,082
Fuel oil, kerosene, etc	305	368	45,643,244,750	38,929,123,448
Coal or coke	24	29	3,591,599,587	3,063,275,288
Wood	232	280	34,718,796,007	29,611,661,114
Solar energy	-	-	n/a	n/a
Other fuel	9	11	1,346,849,845	1,148,728,233

* Based on total New York State BTUs consumed (.88 quadrillion BTU - Table 1, pt. 1, Table 4) and proportion of Town of Caroline housing units to total number of housing units in State

** Conversion between kWh and BTU is: 3,412 Btu per kWh,

*** Household size in Caroline in 2010 is 2.32 persons, versus New York Average Household size in 2005 RECS tables of 2.72 persons

Source for BTU data: Energy Information Administration, Office of Energy Markets and End Use



- Utility (natural) gas
- Bottled, tank, or LP gas
- Electricity **
- Fuel oil, kerosene, etc
- Coal or coke
- Wood
- Solar energy (0%)
- Other fuel

Home Heating Fuel by Percent



**Estimated Town of Caroline Residential Energy Consumption for Non-Heating Uses
Based on 2005 RECS Data for New York State**

Non-Heating Energy Uses	Number of Households in Caroline - 2000 Census	Adjustment for # of Households in Caroline - 2010 Census	Estimated 2010 Town of Caroline Consumption for Non-Heating Uses (BTUs)*	Estimated Consumption (BTUs) Adjusted for Average Household Size***
Total - Occupied housing units*	1,162	1,403	71,138,028,169	60,673,624,225
Air Conditioning			3,952,112,676	3,370,756,901
Water heating			29,640,845,070	25,280,676,761
Refridgerators			5,928,169,014	5,056,135,352
Other Appliances & Lighting			31,616,901,408	26,966,055,211

* Based on total New York State BTUs consumed (.36 quadrillion BTU - Table 12) and proportion of Town of Caroline housing units to total number of housing units in State

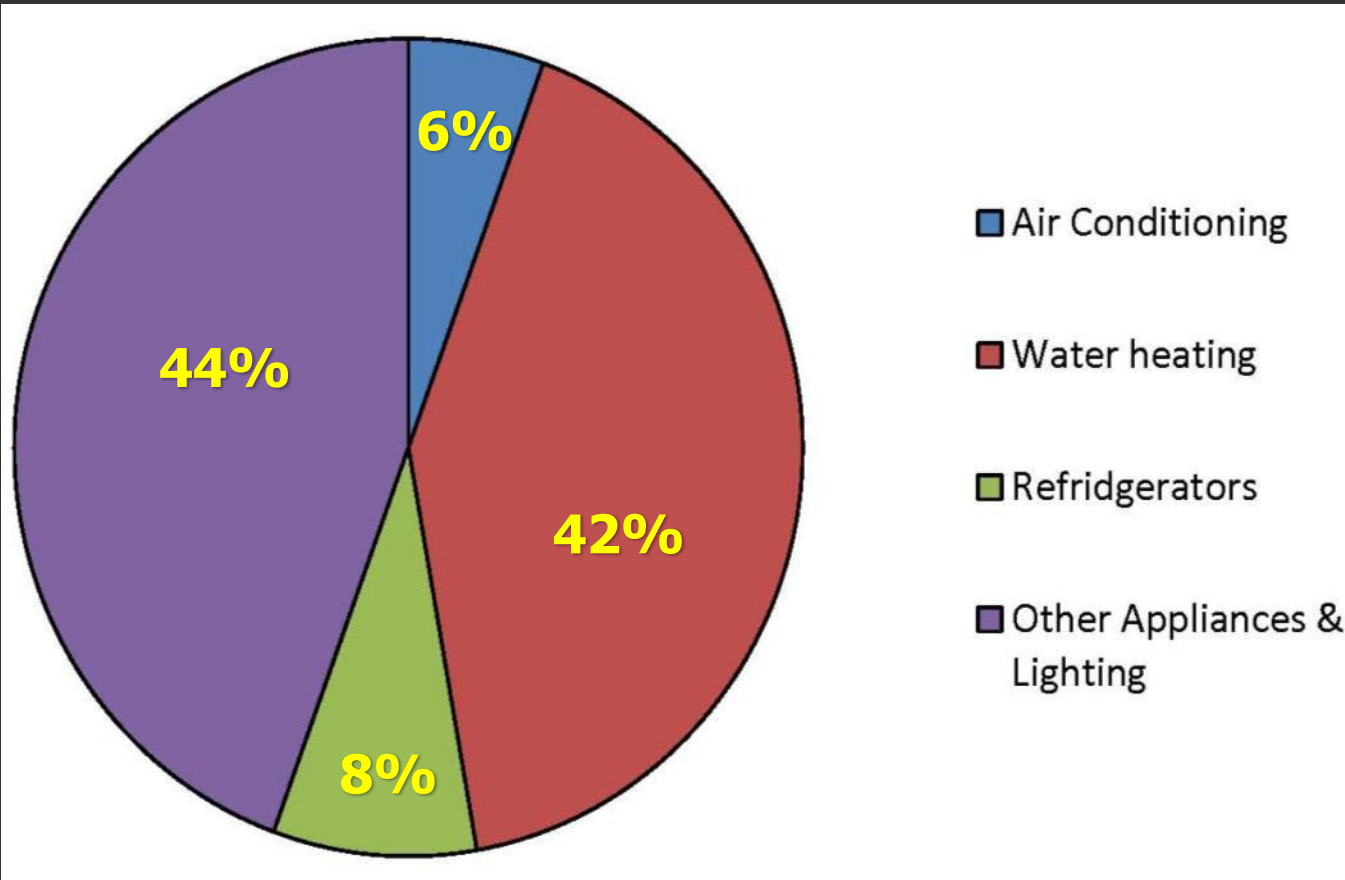
** Conversion between kWh and BTU is: 3,412 Btu per kWh,

*** Household size in Caroline in 2010 is 2.32 persons, versus New York Average Household size in 2005 RECS tables of 2.72 persons

Source for BTU data: Energy Information Administration, Office of Energy Markets and End Use

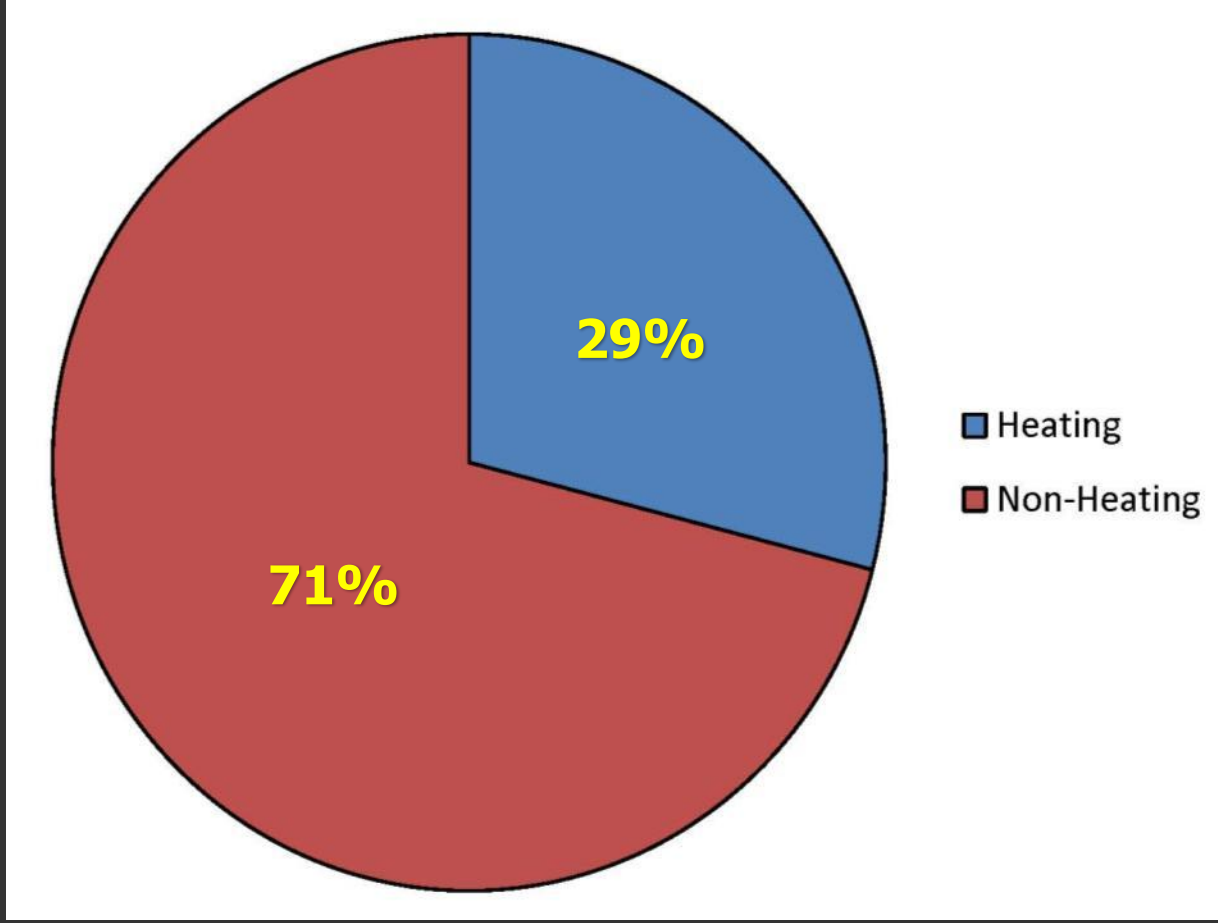


Non-Heating Home Energy Use by %

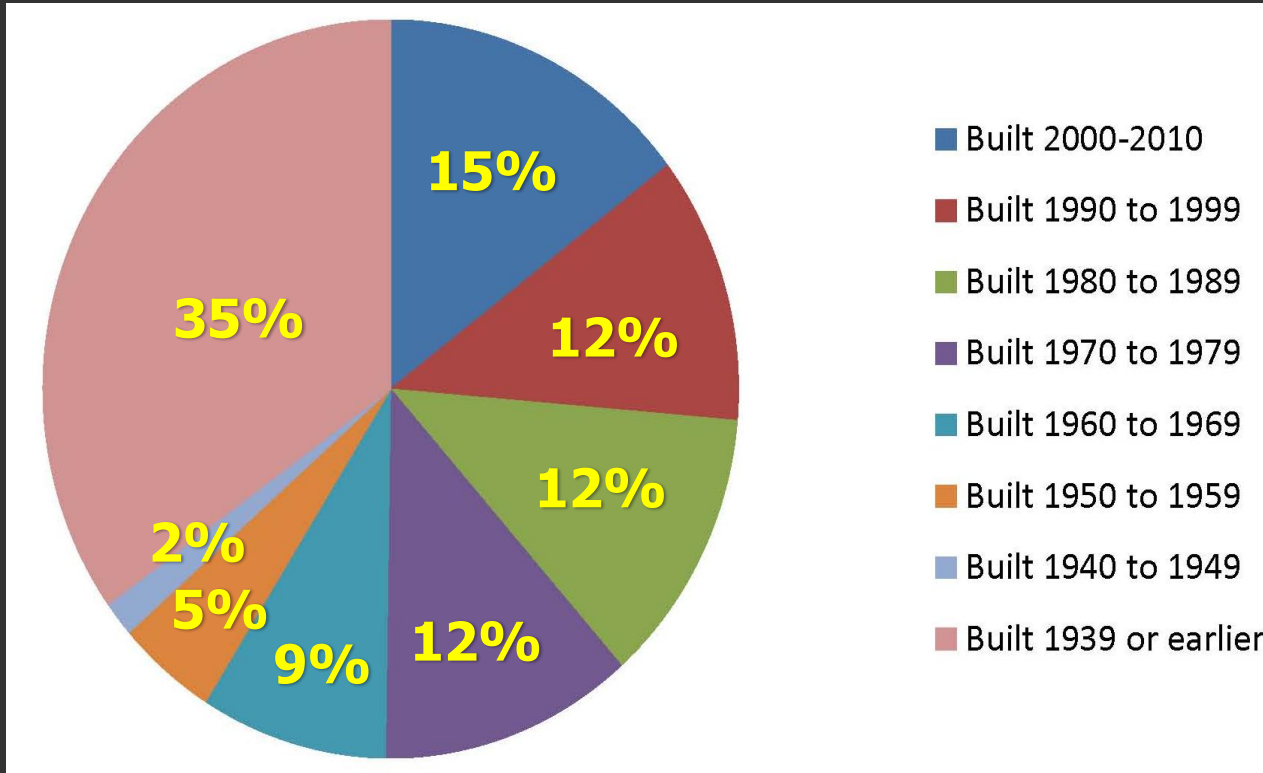




Cornell University



Home Energy Use
by Percent



Age of Caroline Housing Stock



Residential Use: Converting BTUs to Kilowatt Hours

Energy Use	BTUs	kWh	mWh
Heating	60,673,624,225	17,782,422	17,782
Non-Heating	148,313,578,512	43,468,223	43,468
Total	208,987,202,737	61,250,646	61,251

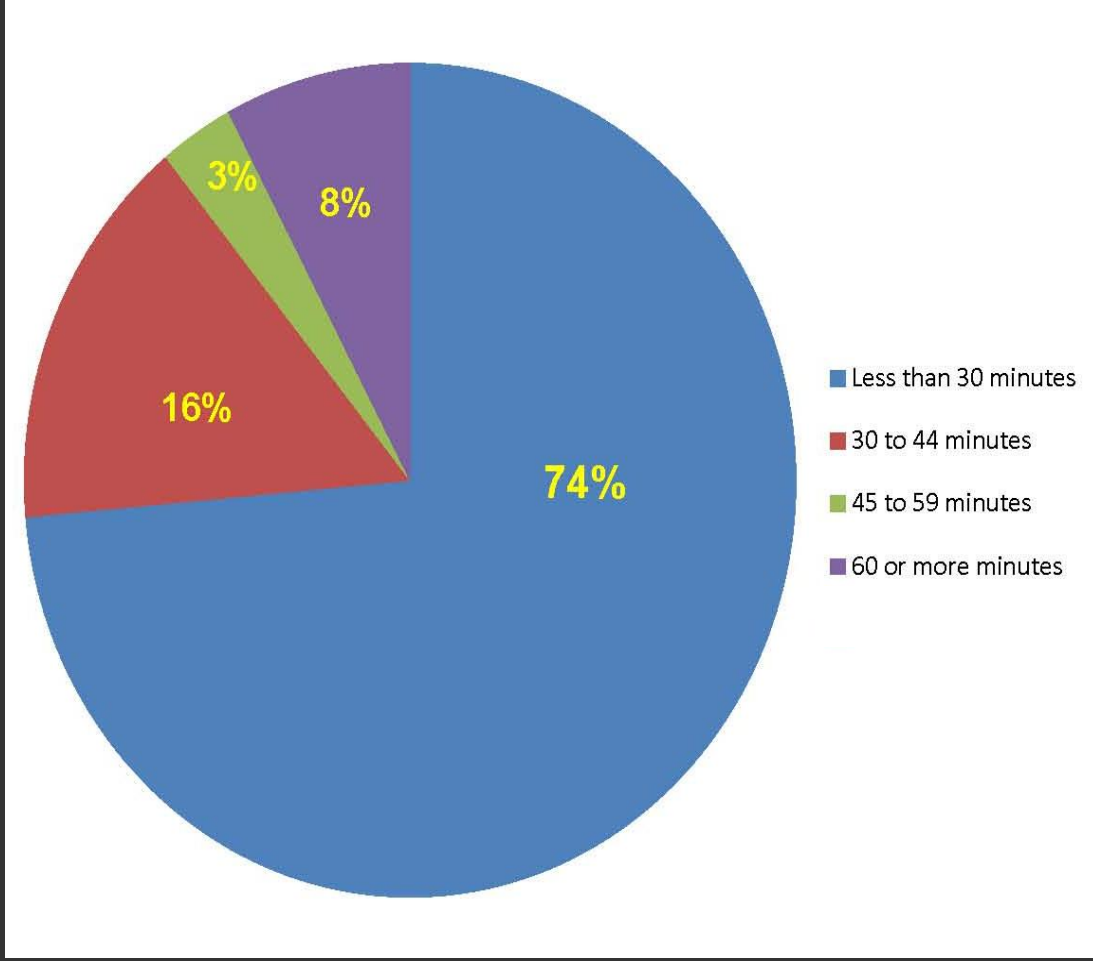


Transportation

- Annual vehicle miles traveled (VMT) by Caroline residents;
- Estimated trips by car & 2-axle light trucks;
- Average fuel mileage (nation);
- Gallons gasoline consumed converted to BTUs.

Methodology:

Vehicular
Energy Use



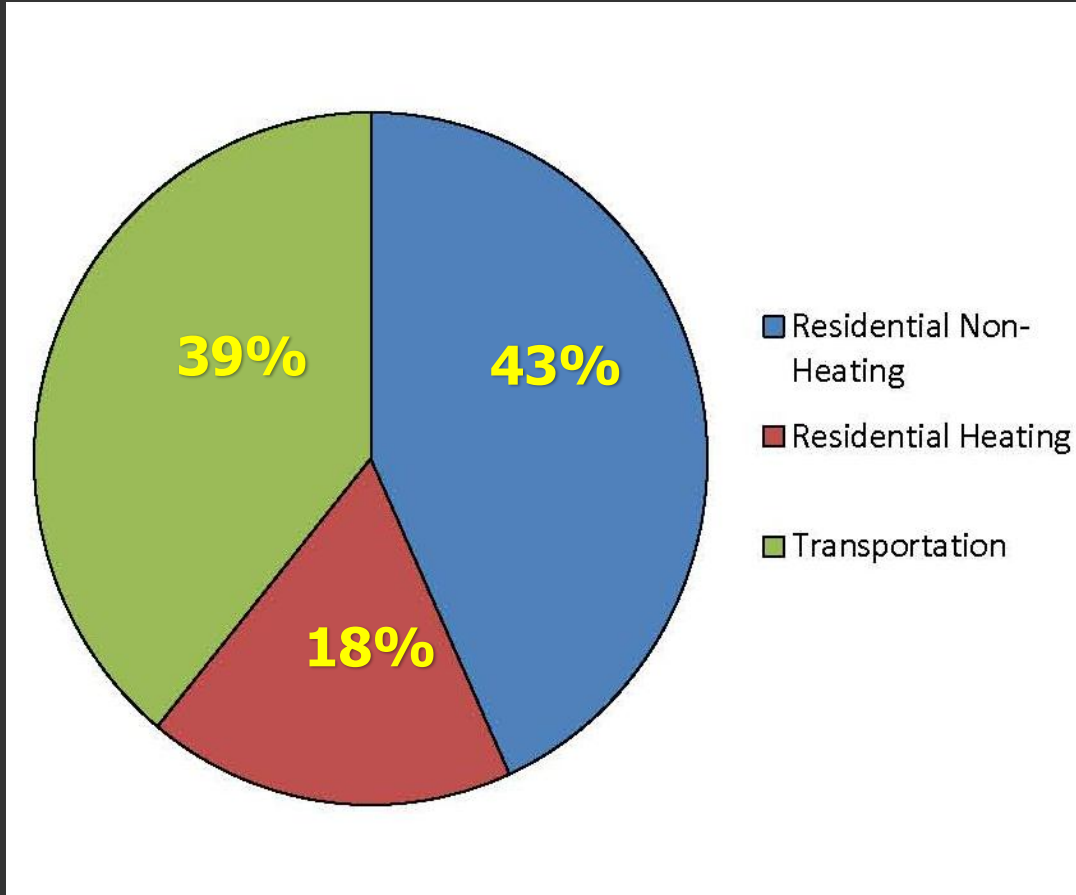
Journey to Work Times: Labor Force



Transportation Energy Use

	VMT (million miles)	Percent	Avg. MPG	Gasoline Consumed (gals.)	BTU Equivalent (million BTUs)
Automobile VMT - Nationwide (million miles)	1,606,815	59%	22.5	71,414,000,000	8,176,903,000
2-Axle truck VMT - Nationwide (million miles)	1,108,656	41%	18.0	61,592,000,000	7,052,284,000
Total VMT Auto & 2-Axle Trucks	2,715,471			133,006,000,000	15,229,187,000
Estimated Automobile VMT - Caroline (million miles)	14.09628	59%	22.5	626,501	71,734
Estimated 2-Axle truck VMT - Caroline (million miles)	9.79572	41%	18.0	544,207	62,312
Total VMT Auto & 2-Axle Trucks	23.892			1,170,708	134,046
				Total BTUs Caroline	134,046,066,000
Gasoline mileage data from TRANSPORTATION ENERGY DATA BOOK: EDITION 30. Oak Ridge National Laboratory. 2011					
Vehicle Miles Traveled data from Ithaca-Tompkins County Transportation Council					

Sources: Ithaca – Tompkins County Transportation Council
Transportation Energy Data Book, Edition 30



Total Residential Energy Use by Percent



Non-Residential Energy Use

	Sq. Feet
• Commercial/Office	59,742
• Industrial/Semi-Industrial (heated)	45,110
• Industrial/Semi-Industrial (unheated)	63,031
• Government Offices	5,198
• Church/Community Center	30,835
• Educational/Correctional	<u>123,454</u>
• Total	327,370



Cornell University

Questions?

George Frantz
Cornell University Department
of City & Regional Planning
(607) 227-4652
grf4@cornell.edu