NYSERDA LOW- TO MODERATE-INCOME MARKET CHARACTERIZATION STUDY
METHODOLOGY REPORT – RESIDENTIAL ENERGY CONSUMPTION SURVEY

1.0 Introduction to Residential Energy Consumption Survey

The Residential Energy Consumption Survey (RECS) is a nationally representative survey of housing units administered by the U.S. Energy Information Administration. The RECS is conducted every four-to-six years and collects information on energy characteristics of the housing unit, usage patterns, and household demographics. This is combined with data from the households' energy suppliers (i.e., electric and gas utilities, and delivered fuel vendors) to estimate energy costs and usage for heating, cooling, appliances, and other uses.[1]

2.0 2009 RECS Survey

Public use data files are available for each recurrence of the Residential Energy Consumption Survey. The 2015 RECS, the most recent iteration of the survey, is not yet available for analysis; as a result, the project team used data from the 2009 RECS.

Table 2.1 - Sample Size of New York State 2009 RECS Survey Data File

Data File	NYS Sample Size
2009 RECS	839

3.0 Income, Housing, and Usage Data

The LMI Market Characterization Study used variables that were taken directly from the RECS data files as well as some computed variables. The following are a list of the main computed variables.

- Heating Fuel Usage – Used data on heating fuel usage for fossil fuel main heating households to create one comprehensive variable.

- Indoor Lighting – Used data on various usage categories of indoor lighting to create a total for the number of indoor lights in the household.

The following table shows the complete set of variables used in the analysis, including a brief description of the variable and information on whether the variable was developed by the project team or was used directly from the RECS data file.

---

[1] https://www.eia.gov/consumption/residential/about.php

Table 3.1 - LMI Market Characterization Study RECS Data – Income, Housing, Usage

Variable Name	Variable Description	RECS or Computed
reportable_domain	Reportable states and groups of states	RECS
moneypy	Annual income; categorical ranges in 2009 dollars	RECS
income	Mid-point of annual income categorical variable provided	Computed
poverty150	Identifies whether household is at or below 150% of the federal poverty line	RECS
nhsldmem	Number of household members; re-named to *hh_num* for analysis	RECS
stmed_4	2010 state median income (SMI) for a four-person household in New York	Computed
multa	Multiplier to adjust state median income (SMI) for household size	Computed
smi100	New York state median income (SMI) adjusted for household size; 2010 dollars	Computed
smi80	80% of New York state median income (SMI) adjusted for household size; 2010 dollars	Computed
lmi_hhlds	Identifies low- to moderate-income (LMI) households (households with annual income less than or equal to 80% SMI)	Computed
fuelheat	Main space heating fuel	RECS
fuelheat_con	Main heating fuel (consolidated)	Computed
fuelh2o	Main water heating fuel	RECS
btung	Annual natural gas usage; thousand BTU	RECS
btufo	Annual fuel oil usage; thousand BTU	RECS
btulp	Annual LPG usage; thousand BTU	RECS
btuker	Annual kerosene usage; thousand BTU	RECS
fuelheat_usage	Annual main heating fuel usage for fossil fuel main heat households; thousand BTU	Computed
fuelheat_usage_dist	Annual main heating fuel usage for fossil fuel main heat households; categorical ranges in thousand BTU	Computed
kwh	Annual electricity usage; kilowatt-hours (kWh)	RECS
kwh_dist	Annual electricity usage; categorical ranges in kilowatt-hours (kWh)	Computed
aircond	Identifies if the household uses air conditioning equipment	RECS
dntac	Identifies if the household has unused air conditioning equipment	RECS
cooltype	Type of air conditioning equipment used	RECS
cooltypenoac	Type of unused air conditioning equipment	RECS
ac_equip	Type of air conditioning equipment (used or unused)	Computed
numfrig	Number of refrigerators used	RECS
agerfri1	Age of most-used refrigerator	RECS
agerfri2	Age of second most-used refrigerator	RECS

Variable Name	Variable Description	RECS or Computed
agerfri3	Age of third most-used refrigerator	RECS
pfrig_10over	Identifies whether primary refrigerator is greater or less than 10 years old	Computed
typehuq	Type of housing unit	RECS
hu_type_sfmf	Type of housing unit (consolidated)	Computed
tvcolor	Number of televisions used	RECS
lgt12	Number of indoor lights turned on 12+ hours during a typical summer day	RECS
lgt4	Number of indoor lights turned on 4-12 hours during a typical summer day	RECS
lgt1	Number of indoor lights turned on 1-4 hours during a typical summer day	RECS
num_lights	Total number of indoor lights used	Computed
lights_10over	Identifies whether a household has greater or less than 10 indoor lights	Computed
totsqft_en	Total square footage; used in EIA data tables	RECS
nweight	Survey weight	RECS

4.0 Energy Burden Data

The LMI Market Characterization Study includes information on households' energy burden. This information is derived from both the RECS and the American Community Survey (ACS) using billing and income information. The RECS provides billing data as the household's annual energy bill for each fuel type, while the ACS provides self-reported data for the previous month's energy bills. Since energy usage varies by month (e.g., gas bills are much higher in winter months than in summer months), the annualized energy bill from the ACS is likely to be much higher than the respondent's actual energy bill for some households and much lower than actual for others.

Table 4.1 shows the distribution of Natural Gas Expenditures from the ACS compared to those from the Residential Energy Consumption Survey. The ACS expenditure distribution is more variable that the RECS distribution; the RECS data furnish more accurate information on the distribution of expenditures and therefore the distribution of energy burden.

Table 4.1 - Distribution of Natural Gas Expenditures - ACS vs. RECS

Survey	10%	25%	Median	75%	90%
ACS Survey	240	366	977	1,802	2,931
RECS Survey	669	893	1,205	1,602	2,051

Table 4.2 shows the distribution of Electric Expenditures from the ACS compared to those from the Residential Energy Consumption Survey. As with natural gas, the ACS electric expenditure distribution is more variable that the RECS distribution.

Table 4.2 - Distribution of Electric Expenditures - ACS vs. RECS

Survey	10%	25%	Median	75%	90%
ACS Survey	488	841	1,221	2,160	3,120
RECS Survey	497	660	957	1,467	2,117

Because of this measurement issue, the ACS energy burden data is used to furnish statistics on the average group energy burden, but it is not used to furnish statistics on the distribution of energy burden.

The project team therefore developed a variable for individual energy burden using the data elements provided in the RECS data file. The summary variable was developed using the following steps.

- Annual Energy Cost – Total annual energy cost in 2009 dollars.

- Annual Income – Used the mid-point value of self-reported annual income category.

- Energy Burden – Computed as Annual Energy Cost divided by Annual Income

The following table shows the complete set of variables used to conduct the energy burden analysis, including a brief description of each variable and information on whether the variable was developed by the project team or was used directly from the RECS data file.

Table 4.3 - LMI Market Characterization Study RECS Data – Energy Burden Analysis

Variable Name	Variable Description	RECS or Computed
moneypy	Annual income; categorical ranges in 2009 dollars	RECS
income	Mid-point of annual income categorical variable provided	Computed
poverty150	Identifies whether household is at or below 150% of the federal poverty line	RECS
nhsldmem	Number of household members; re-named to *hh_num* for analysis	RECS
stmed_4	2010 state median income (SMI) for a four-person household in New York	Computed
multa	Multiplier to adjust state median income (SMI) for household size	Computed
smi100	New York state median income (SMI) adjusted for household size; 2010 dollars	Computed

Variable Name	Variable Description	RECS or Computed
smi80	80% of New York state median income (SMI) adjusted for household size; 2010 dollars	Computed
smi60	60% of New York State SMI adjusted for household size; 2010 dollars	Computed
lmi_hhlds	Identifies low- to moderate-income (LMI) households (households with annual income less than or equal to 80% SMI)	Computed
liheap_hhlds	Identifies LIHEAP income-eligible households (households with annual income less than or equal to 60% SMI)	Computed
low_mod	Identifies households as "Low Income" (LIHEAP income-eligible) or "Moderate Income" (LMI eligible but not LIHEAP income-eligible)	Computed
dollarel	Annual electricity cost; 2009 whole dollars	RECS
dollarng	Annual natural gas cost; 2009 whole dollars	RECS
fuelheat	Main space heating fuel	RECS
fuelheat_con	Main heating fuel (consolidated)	Computed
fuelh2o	Main water heating fuel	RECS
typehuq	Type of housing unit	RECS
btung	Annual natural gas usage; thousand BTU	RECS
btung_dist	Annual natural gas usage; categorical ranges in thousand BTU	Computed
totaldol	Annual total energy cost excluding wood consumption; 2009 dollars	RECS
energyburden	Individual energy burden	Computed
energyburden_cat	Individual energy burden; categorical ranges	Computed
nweight	Survey weight	RECS