MOREHOUSE COLLEGE

830 WESTVIEW DR. SW

ATLANTA, GA 30314

SOCIOECONOMIC RESEARCH AND ANALYSIS PROGRAM

U.S. DEPARTMENT OF ENERGY

OFFICE OF ECONOMIC IMPACT AND DIVERSITY

FINAL PROGRESS REPORT

DOE-MC-00000030

SUBMITTED BY

DAVID A. POYER, PH.D.

PRINCIPAL INVESTIGATOR

February 10, 2014

EXECUTIVE SUMMARY

The objective of this project was to develop and maintain an ongoing research program, and to sustain a capability in support of ED's legislative mandate that called for assessment of the effect of energy policies, regulations, and other actions of the department and its components on minority populations and minority enterprises. The product of this effort was the development of a database and assessment methodologies. As it relates to the U.S. ethnic minority populations, limited access to emerging opportunities in clean energy development, patterns of energy use and the continuing increase in the cost of energy, and the effects of climate change such as air pollution and rising temperatures disproportionately impact ethnic minorities and low-income groups in terms of poorer health and economic loss. To construct generalizable descriptive statistics, the 2001 and 2005 Residential Energy Consumption Survey data was used to conduct descriptive statistical analyses on total energy expenditure by demographic, socioeconomic, and geographic status. In particular, data were analyzed to show energy use by category (e.g., space heating or air conditioning, etc.), fuel type (e.g., natural gas, electricity, etc.), expenditures, and share of household income across populations. This project adds to our understanding of factors associated with environmental, health, education, and governance matters associated with energy production and use, and will benefit the public through informed legislation and policy development.

COMPARISON OF ACTUAL ACCOMPLISHMENTS WITH THE GOALS OF THE PROJECT

The goals of this project consisted of four tasks each of which was completed and described in greater detail in the previously submitted periodic reports. The elements of each task is summarized below:

TASK 1 – Startup:

1. Conducted a search of the scientific literature to minority groups.
2. Developed a curricular practicum that was introduced in the Morehouse College courses, “Principals of Econometrics,” and “Topics of Econometrics.”
3. Consulted with ED and EIA to identify appropriate data sources.

TASK 2 – Training:

1. Completed online or web-based training in SAS statistical analysis software.

TASK 3 – Database Development:

1. Constructed a SAS database that combined, merged, or catalogued appropriate variables from which the data analyses were conducted.
2. Developed Minority Energy Consumption, Expenditure and Assessment (MECEA) database documentation. Also, incorporated the American Housing Survey that contains a significant sample of Native American households.

TASK 4 – Conduct Preliminary Descriptive Analyses:

1. Completed statistical description of energy use, expenditures, and share of household income by population group.

SUMMARIZE PROJECT ACTIVITIES FOR THE ENTIRE PERIOD OF FUNDING

ORIGINAL HYPOTHESES

For this project, no hypotheses were tested. Rather, the data analysis goal was to construct generalizable descriptive statistics of energy use, consumption and expenditures from which hypotheses can be developed for testing in future research.

APPROACHED USED

This project used a combination of scientific literature review, mentored research internship, curriculum/practicum development and secondary data analysis to identify patterns in energy use among ethnic minority populations.

PROBLEMS ENCOUNTERED

In fall 2011, a request to change the principal investigator from Dr. David Poyer to Dr. John Handy was submitted to the agency. However, this request was not approved. Further, per arrangement through the agency, a sub-contract with Clifford A. Minor & Associates was initiated, and the sub-contractor submitted an invoice to Morehouse College. In October 2011, a teleconference was scheduled with representatives of the agency and Morehouse College. During the teleconference, Ms. Jody Tallbear discussed and outlined several concerns she had with the analysis and interpretations of data as it related to Native Americans.

Ms. Tallbear's concerns are summed up as this: "There are conclusions drawn that are wholly uninformed by the unique history of Indian people in this country and our status today. Specifically, the author never references the federal Indian policy eras which assumed elaborate

control over Native lives and societies which still effect our "economy and sociology" as well as geographic disbursement. Additionally, the author ignores tribal land bases and tribal membership to a large degree and the elaborate control the Department of Interior still to this day has over our land bases which stymies economic development on tribal lands and which has a direct corrolation to our high poverty rate. It's impossible to draw accurate conclusions about Indian people without taking all of these things into account. Rather the author continually juxtaposes Native people to African Americans and white Americans and tries to draw conclusions from that which is just not helpful. Both those groups, as well as immigrants that are also compared, have had radically different experiences and do not have the same contemporary political (tribal membership) and geographic (reservation land base) circumstances that Native people do.

For example sake, below are a few conclusions in the report that are at best uninformed and at worst patently false.

1. In trying to explain why Indians are less likely to "migrate" the author references three reasons from an 'internal colonial model', none of which references tribal affiliation and the fact that tribes have land bases which their members live on. This is such on oversight as to render this paragraph meaningless.
2. "92.7% of American Indian couples reside in a state containing a reservation"... "Indian couples change states of residence considerably less often than do white couples" – the point here should be that the Indians are

not leaving the reservation not the state that the reservation is in. Again to not, talk about tribal land bases and societies as a factor in lack of Indian migration is a glaring oversight resulting in a misleading statement.

3. “The urban population at any one time represents only those families who happen to be spending a few years in the cities. Therefore, it can be said that there are few truly urbanized Indians”. This is just false. It also overlooks one of the major federal Indian policy eras called “Relocation” which was responsible for a mass migration of Indians from the reservation to urban centers in the 1950’s.”

Our responses to Ms. Tallbear’s critique follows:

“I’ll be happy to take a look at the material in Appendix D of the report sent to you. If my memory serves me right this was a literature review done by one of your 2011 summer interns from Morgan State University, who worked out of Jamie Scipio’s office. The manuscript was not intended to be a finished product for review but was intended to support subsequent empirical research on American Indian energy use and expenditures that was to be completed in the third year of our grant. However, ED decided to change course and scraped academic research in this area. Issues related to data limitations on American Indian energy use in the Residential Energy Consumption Survey were made clear to ED, and that follow-up work using other data sources would be required. Specifically, we intended to look at information contained in both the American Housing Survey and the Consumer Expenditure Survey – Dr. David Poyer, Principal Investigator.

"We think it is important to put the discussion of Native American energy use into the context of the normal peer review, revise and resubmit framework, as opposed to a deficiency on the part of the researchers and student intern. It is highly unlikely that we would obtain the same level of insight, understanding, or sensitivity that Jody has given her biography and legal knowledge. With this in mind, I would suggest that when the revised report is submitted that Morehouse use more care in how we interpret findings such that we offer plausible explanations rather than conclusions. Moreover, we would suggest that Jody write a response paper to accompany our report such that she fills any gaps, or offers alternative interpretations based upon her unique understanding. This would be a normative way to have scholarly "give and take." – Dr. Terry Mills, Dean, Research & Sponsored Programs.

DEPARTURE FROM PLANNED METHOD

In February 2012, Morehouse College received notification from the agency that per Brenda DeGraffenried, Deputy Director, that this initiative would not be continued. The explanation was that the agency had identified another institution that more closely matched to a small business enterprise. It is our understanding that Clifford A. Minor & Associates was matched with one of the agency's ongoing contracts.

ASSESSMENT OF IMPACT ON PROJECT

As a consequence of the discontinuation of the award, no assessment or statistical analysis of small business was conducted. Moreover, no further analysis was conducted on the specific nature of Native American Indian energy use and consumption patterns.

FACTS, FIGURES, CHARTS

The initial analysis looked at average energy expenditures and assesses it descriptively at the national level; and for all, black, white, Hispanic and non-Hispanic households. Real average household energy expenditures are shown in table 1; and in figures 1 and 2. Along with the average expenditures values, the upper and lower values associated with the 95% confidence level are also shown in figures 1 and 2. It includes both an analysis of inter-temporal and inter-group differences over the six Residential Energy Consumption Surveys.

Inter-Temporal Changes in Real Average Household Energy Expenditures

Overall expenditures increased between 1984 and 1993; decreased between 1993 and 2001; and increased between 2001 and 2005. For all households, the change in expenditures between periods was statistically significant in every case. The pattern of change seen in average energy expenditures at the national level is reflected in the change seen in average energy expenditures for white and non-Hispanic households. For minority households, the pattern of change is both different and not statistically significant in most cases. Only between the last two survey periods (2001 and 2005) is there a statistically significant change in minority household expenditures, and they differ in direction for black households and Hispanic households. It significantly declined for black households and increased for Hispanic households.

For the six RECS surveys (1984, 1987, 1993, 1997, 2001, and 2005), average household energy expenditures peaked in 2001 and troughed in 2005 for black households; and troughed in 2001 and peaked in 2005 for Hispanic households –

the two periods between which energy expenditures were significantly different for these households.

Inter-Group Comparisons in Real Average Household Energy Expenditures

The only period in which average household expenditures are statistically significantly different is 2005. In that period, black household and Hispanic household energy expenditures are less than for white households and non-Hispanic households respectively. This initial analysis indicates that in the future, the most fruitful inquiry may be found using the two latest RECS surveys. Along with digging deeper into the data for these two periods will be an identification and assessment of variables/factors that explain/contribute to the differences seen in household energy expenditures; and how they may influence or condition expected energy expenditures across and within these demographic groups.

Table 1. Real Average Household Energy Expenditures (1984\$) 1984 to 2005					
Year	All	Black	White	Hispanic	Non Hispanic
1984	\$1,123	\$1,131	\$1,132	\$992	\$1,130
1987	\$1,154	\$1,173	\$1,162	\$1,044	\$1,161
1993	\$1,199	\$1,169	\$1,222	\$996	\$1,218
1997	\$1,180	\$1,192	\$1,216	\$961	\$1,203
2001	\$1,143	\$1,220	\$1,172	\$922	\$1,166
2005	\$1,165	\$1,113	\$1,198	\$1,057	\$1,182
Source: Various Residential Energy Consumption Survey reports from the Energy Information Administration of the U.S. Department of Energy

Figure 1. Average Household Energy Expenditures (84\$) for Black and Non Black Households

Figure 2. Average Household Energy Expenditures (84\$) for Hispanic and Non Hispanic Households

On the following pages, four tables and seven figures are provided that briefly summarize information on the distribution of black and non-black households over type of housing unit, and heating system by fuel type. The figures were derived from the information provided in the tables and were also developed from an estimated multinomial logit model that is used to simulate the effect of a change in household income on home ownership/type of housing unit/heating system by fuel type for black and non-black households.

Figures 1 to 3 show the distribution of black and non-black households by home ownership, type of housing unit, and space heating fuel. For analytical purposes, these three attributes are combined to identify eleven mutually exclusive home types. To compare and assess, the distribution of black and non-black households over these home types, a multinomial logit model has been estimated. The model will be used to simulate and assess the potential effect of changes in conditional factors – such as household income, and heating and cooling loads – on the distribution of black and non-black households over the different home types.

Figure 1 indicates that in general households are more likely to live in single-family housing units but the distribution across housing units is different for black and non-black households. Black households are more likely to live in multi-family housing units, whereas non-black households are more likely to live in single-family detached housing units. Figure 2 indicates that there is little difference in home ownership rates between black and non-black households living in single-family detached housing units, however, with the exception of smaller multi-family housing units (2 to 4 units) home ownership rates for non-black households are

larger. Figure 3 indicates that natural gas is the most widely used space heating fuel, with about fifty percent of all households (both black and non-black households) using it for that purpose. It also indicates that black households are more likely to use electricity for space heating, offsetting slightly higher uses of natural gas and other fuels used for space heating by non-black households.

In figures 4 and 5, electric and natural space heating are shown by type of housing unit. In line with what is shown in figure 3, figure 4 indicates that single-family housing units occupied by black households are more likely to be heated by electricity. Figure 5 indicates that the distribution of natural gas space heating by type of housing unit is similar for both population groups.

Figures 6 show the distribution of black and non-black households by home types.

There are eleven home types, defined by combining three attributes: home ownership, type of housing unit, and space heating fuel. They are:

1. Owned/Single-Family/Natural Gas¹
2. Owned/Single-Family/Electricity
3. Owned/Single-Family/Other¹
4. Owned/Multi-Family/Natural Gas
5. Owned/Mobile/Other²
6. Rented/ Multi-Family/Natural Gas
7. Rented/ Multi-Family/Electricity

¹ 1 Includes: Bottled gas (LPG or Propane) Fuel Oil Kerosene Electricity Wood Solar District Steam Coal Other Don't Heat Home

² 2 Includes all fuel sources

³ 3 Mobile home or single-family

- 8. Rented/ Multi-Family/Other1
- 9. Rented/ Other3/Natural Gas
- 10. Rented/ Other3/ Electricity
- 11. Rented/ Other3/ Other1

Figure 6 indicates: The largest share is found in the owned/single-family/natural gas home type for both black and non-black households. The share is slightly larger for non-black households. Regardless of other factors non-black households are more likely to live in owner-occupied housing.

Figure 7 provides an example of how the model can be used to simulate the effects of a change in an explanatory variable on the distribution of households over home types. Figure 7 simulates a change in home type shares given a hypothetical change in household income from \$25,000 to \$75,000 per year. The share of owned/single-family/natural gas increases dramatically for both black and non-black households. The share of all renter-occupied housing decreases (not surprisingly).

Table 1. Ownership by Type of Housing Unit: Non-Black Households						
Own/Rent	Type of Housing Unit					
Frequency						
Percent	SINGLE-FAMILY DETACHED HOUSE	SINGLE-FAMILY ATTACHED HOUSE	APARTMENT BUILDING WITH 5 OR MORE UNITS	APARTMENT BUILDING WITH 2-4 UNITS	MOBILE HOME	TOTAL
Row Pct						
Col Pct						
OWN/BUYING	58,300,000	3,690,860	2,167,931	1,449,077	5,341,665	70,950,000
	59.81	3.79	2.22	1.49	5.48	72.79
	82.17	5.2	3.06	2.04	7.53	
	89.33	59.53	16.03	23.75	83.77	
RENT	6,967,003	2,509,129	11,360,000	4,652,638	1,035,084	26,520,000
	7.15	2.57	11.65	4.77	1.06	27.21
	26.27	9.46	42.82	17.54	3.9	
	10.67	40.47	83.97	76.25	16.23	
Total	65,270,000	6,199,989	13,520,000	6,101,715	6,376,749	97,470,000
	66.96	6.36	13.87	6.26	6.54	100

Source: 2005 Residential Energy Consumption Survey

Table 2. Ownership by Type of Housing Unit: Black Households						
Own/Rent	Type of Housing Unit					
Frequency						
Percent	SINGLE-FAMILY DETACHED HOUSE	SINGLE-FAMILY ATTACHED HOUSE	APARTMENT BUILDING WITH 5 OR MORE UNITS	APARTMENT BUILDING WITH 2-4 UNITS	MOBILE HOME	TOTAL
Row Pct						
Col Pct						
OWN/BUYING	5,750,424	475,005	134,840	389,315	405,096	7,154,679
	42.22	3.49	0.99	2.86	2.97	52.53
	80.37	6.64	1.88	5.44	5.66	
	84.7	34.03	4.19	23.55	71.52	
RENT	1,039,115	920,847	3,079,816	1,263,743	161,351	6,464,871
	7.63	6.76	22.61	9.28	1.18	47.47
	16.07	14.24	47.64	19.55	2.5	
	15.3	65.97	95.81	76.45	28.48	
Total	6,789,539	1,395,852	3,214,655	1,653,057	566,447	13,620,000
	49.85	10.25	23.6	12.14	4.16	100

Source: 2005 Residential Energy Consumption Survey

Table 3. Non-Black Space Heating Shares by Fuel and Housing Type						
Fuel Type	Type of Housing Unit					Total
Frequency						
Percent	SINGLE-FAMILY DETACHED HOUSE	SINGLE-FAMILY ATTACHED HOUSE	APARTMENT BUILDING WITH 5 OR MORE UNITS	APARTMENT BUILDING WITH 2-4 UNITS	MOBILE HOME	
Row Pct						
Col Pct						
Natural gas	36,600,000	4,006,307	5,680,804	3,411,999	1,775,329	51,470,000
	37.55	4.11	5.83	3.5	1.82	52.81
	71.1	7.78	11.04	6.63	3.45	
	56.07	64.62	42.01	55.92	27.84	
Electricity	16,060,000	1,691,946	6,285,911	1,750,882	2,676,633	28,470,000
	16.48	1.74	6.45	1.8	2.75	29.21
	56.42	5.94	22.08	6.15	9.4	
	24.61	27.29	46.48	28.69	41.97	
Other fuel	12,610,000	501,735	1,557,355	938,835	1,924,787	17,530,000
	12.93	0.51	1.6	0.96	1.97	17.99
	71.92	2.86	8.88	5.36	10.98	
	19.32	8.09	11.52	15.39	30.18	
Total	65,270,000	6,199,989	13,520,000	6,101,715	6,376,749	97,470,000
	66.96	6.36	13.87	6.26	6.54	100

Source: 2005 Residential Energy Consumption Survey

Table 4. Black Space Heating Shares by Fuel and Housing Type						
Fuel Type	Type of Housing Unit					Total
Frequency	SINGLE-FAMILY DETACHED HOUSE	SINGLE-FAMILY ATTACHED HOUSE	APARTMENT BUILDING WITH 5 OR MORE UNITS	APARTMENT BUILDING WITH 2-4 UNITS	MOBILE HOME	
Percent						
Row Pct						
Col Pct						
Natural gas	3,366,506	966,005	1,531,597	998,814	107,191	6,970,112
	24.72	7.09	11.25	7.33	0.79	51.18
	48.3	13.86	21.97	14.33	1.54	
	49.58	69.21	47.64	60.42	18.92	
Electricity	2,418,201	343,251	1,396,395	555,910	232,883	4,946,639
	17.76	2.52	10.25	4.08	1.71	36.32
	48.89	6.94	28.23	11.24	4.71	
	35.62	24.59	43.44	33.63	41.11	
Other fuel	1,004,833	86,596	286,663	98,334	226,373	1,702,800
	7.38	0.64	2.1	0.72	1.66	12.5
	59.01	5.09	16.83	5.77	13.29	
	14.8	6.2	8.92	5.95	39.96	
Total	6,789,539	1,395,852	3214655	1,653,057	566,447	13,620,000
	49.85	10.25	23.6	12.14	4.16	100

Source: 2005 Residential Energy Consumption Survey

Figure 1. Black and Non-Black Household Distributions by Housing Unit

Figure 2. Black and Non-Black Household Distributions by Ownership and Type of Housing Unit

Figure 3. Black and Non-Black Household Distributions by Space Heating Fuel **Figure 4. Black and Non-Black Household Distributions by Electric Heating Fuel and Type of Housing Unit**

PRODUCTS DEVELOPED UNDER THE AWARD

Research Paper Presentations

Three papers written under the auspices of the SERAP were presented at the annual meeting of the American Economic Association in Denver CO. The papers presented are listed below. Each paper will be turned into a manuscript (currently available as PowerPoint files).

- ***Decomposition of Real Household Energy Expenditures for Black and White Households using the 2005 Residential Energy Consumption Surveys (RECS).***

DAVID POYER (Morehouse College)

- ***A Modified Predator-Prey and VAR Model of Energy Prices and Auto Expenditures.*** JOHN HANDY (Morehouse College)

- ***Space Heating: A Comparative Analysis Across Demographic Groups Using the Department of Energy/Energy Information Administration's 2005 Residential Energy Consumption Survey.*** DAVID A. POYER (Morehouse College), ANDREA L. RICE (Spelman College), TIANA RAE PENNEY (Spelman College), KRISTOFER M. TURNER (Morehouse College)

In addition to the papers outlined above, an independent research paper, "Impact of Energy Price and Expenditures on Small Business Performance: Is there a bias?" was authored by Andrea Rice and Tiana Penney (Spelman College), and supervised by Dr. Romie Tribble (Chair of the Spelman Economics Department and the SERAP Spelman Research Advisor).

Databases Developed

During the award period, the project team developed the Minority Energy Consumption, Expenditure and Assessment (MECEA) database. Substantial progress was made incorporating the 2005 RECS data into it. The household characteristics, energy expenditures, space, and water heating files in the 2005 RECS were processed and the household characteristic and energy expenditures files were used to do preliminary analyses on total energy and energy expenditure patterns across different population categories.

Each student was assigned files from the 2005 RECS that were used to process these data into the MECEA database. SAS programming statements provided variable definitions and labels for the 2005 RECS data, and were used to process the 2005 RECS data into the SAS MECEA database.