Nicor Gas
Exhibit 2.1

Nicor Gas Market Potential Study Report

Energy Efficiency Program

USING ENERGY WISELY FOR A BETTER FUTURE℠

Draft: September 29, 2010

BASS&COMPANY

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Service Territory Baseline and Energy Efficiency Market Potential Study

For

nicor GAS

Energy Efficiency Program

USING ENERGY WISELY FOR A BETTER FUTURE™

August 2010

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BONNIE B. JACOBSON, STUDY AUTHOR
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Executive Summary

The Nicor Gas Market Potential Study was initiated to achieve several goals. The primary research goal for this study was to ascertain the current market saturation levels of energy-using end-uses (the percentage of units and applications found in the service territory at this point in time, also defined as the baseline saturations) and the qualities of the facilities in which they are installed within the Nicor Gas service territory. The analytical goal of the study was to compute the magnitude of the possible energy efficiency impact for the service territory by affecting the end-uses through efficient upgrades. An additional goal of this study was to address the need for enhanced market data used for energy efficiency program planning and to assess the state of the current Nicor Gas customer data within the company databases. This study addressed each of these goals.

To achieve the initial goal, Bass and Company conducted a substantial primary data collection that included 1058 completed telephone surveys with Nicor Gas customers (residential, commercial, industrial) and trade allies. These calls queried customers regarding their gas use and building (or housing) envelope characteristics from a projectable (or statistically reliable) sample of each of the customer segments; collected building occupancy demographics and energy usage profiles for pertinent customer segments; and discussed trade perspectives on energy efficiency measures that could be or are available in the Nicor Gas marketplace.

Energy efficiency review, program planning and program evaluation all require a great deal of data to support the analyses required for each. It is imperative that utilities initiating their venture into each activity have the required data and make it usable for analysts by allowing it to be linked to specific customer billing records. If the utility does not have the required data, then it is vital that this data be collected, maintained, and updated on a regular basis such that the analyses can provide the best estimates of impact and configure the most appropriate energy efficiency programs for the utility system and the customer base. This project assessed the available data and used what was available, and implemented the survey to collect what was not previously found within the utility databases. Some data had been collected by the utility in the past, but it was found to be too old to be applicable. The study questionnaires include the data that should be collected and maintained on a regular basis at Nicor Gas.

The study includes the assessment of a comprehensive set of gas energy-efficiency measures applicable to the climate and customer characteristics of the Nicor Gas service territory based on 192 gas energy-efficiency measures, representing well over 1000 measures when considering permutations and combinations of measures across customer sectors and business/building categories. The data collection finally served as the foundation for estimating the technical (what

measures are technically possible given the current energy-using equipment and building characteristics found within the customer base), economic (what measures are available that pass the States' economic screening criteria or Total Resource Cost Test), and realistically achievable potentials (what measures are technically feasible and also pass the economic screening criteria) for implementing the measures to address the need for energy efficiency within the Nicor Gas customer base. It is the intention of this study to produce results that can lead to the development of well-informed customer programs that promote measures that will succeed in reducing energy use, lowering customer energy bills and meet the goals and objectives of the Act.

RESIDENTIAL OPPORTUNITIES

- **The most common residential heating systems were found to be, on average, greater than ten years old.** This indicates that there might be potential for heating system replacements to higher efficiency units in the next several years given the average lifetime of a unit is estimated to range between 13 and 15 years. It was reported in the survey that residential supplementary heating is essentially non-existent; there are also very few zone heating dwellings and a very small percentage of gas fireplaces.
- **The saturation of gas water heating in the "no heat" customer segment is significantly lower than that for "heat" customers.** Since the "no heat" customers were found from the survey to be lower income households, there may be an opportunity for replacing their much less efficient heat and water heating units with higher efficiency versions or with a combined heat and water heating unit if the upfront costs can be made realistically economic for these customers.
- **Nicor Gas has a real opportunity for providing energy efficiency audits as fewer than 10% of the residential segment reported receiving an energy audit.** This is consistent across all residential sub-segments. So, the majority of residential customers may not be aware of the benefits and opportunities for lowering their energy bills and thus, there is opportunity for energy efficiency education in this market.
- **Area trade allies report that they specify energy efficiency measures in their customer interactions and they build efficient Energy Star (ES) new homes.** They report that half the houses they built in 2008 and 2009 were ES homes and roughly 40% of these were located within the Nicor Gas service territory. The most commonly specified measures that they normally promote include energy efficient water heaters (91%), space heating and cooling (80%) and attic insulation (48%).
- **Trade allies see a real opportunity to work together with Nicor Gas to promote energy efficiency, although not all are equally eager.** Some are asking for assistance in showing the energy saving potential of upgrading appliances and performing the proper sizing of equipment.
- **There may be great opportunity to promote gas heating upgrades or other efficiency improvements in the "No Heat" segment.** One-third of the "No Heat" customers own their own homes, and a significant number of other "No Heat" customers may, in fact,

live in master-metered dwellings that do have gas as their heating source. This is a market segment that requires further definition in the future since they compose a large amount of residential customers and may well have gas for heat but are not marked as such on their customer files.

SPECIFIC LOW-INCOME OPPORTUNITIES

There appear to be challenges ahead in meeting low-income energy efficiency goals. With the exception of mobile homes with heat where nearly half, or 43%, qualify for low income assistance per the survey (self-reported via income), most opportunities for making inroads in the low income sector are with customers with "no heat" designators since they comprise a relatively large group in total.

- Single-family "no heat" customers technically qualify for low income assistance (39%) per self-reported income.
- Multi-family "no heat" customers, technically qualify for low income assistance (25%).
- Of the others with "heat" classifications, few qualify for low income assistance: multi-family (18%) and single family (14%).
- **The energy opportunities with these low-income "no heat" customers are not inconsistent with what was found for the general residential "no heat" customers.**

SMALL – MID SIZED COMMERCIAL OPPORTUNITIES

- **Within the small to mid-sized commercial customer segment, 64% own their building**. These buildings, on average, are 37 years old and have just less than 50,000 square feet of floor space. These are constructed primarily of brick averaging 1.7 floors above ground and having metal frames and clear glass windows. 40% have an indoor gas, forced air furnace. On average these furnaces are 13 years old.
- **77% have a gas hot water heater, 88% of which are conventional**. On average these are 8.2 years old.
- **Only 15% of these businesses have participated in an energy audit,** but 34% have added energy conservation measures to their businesses such as adding extra roof insulation or low-energy windows.
- **9% of small-midsized businesses anticipate building shell changes in the next 12 to 24 months**. 11% also indicate that they'll have to replace equipment and of these 50% indicate that it will be natural gas using equipment. 16% indicate that they will incur end-of-life equipment replacement. This suggests that 61% will replace with efficient gas equipment. Thus, they should be motivated to perform these and other energy saving measures. The average size of their building is just less than 50,000 square feet.
- **Trade allies who specialize in commercial customer interactions are ready partners for Nicor Gas**. Two-thirds of the commercial allies already participate in Energy Star or

LEED programs and just under a quarter (22%) of their projects in 2008 and 2009 were characterized as high performing buildings.

- **80% of the commercial trade allies are recommending energy efficient measures** for both existing and new construction.

LARGE COMMERCIAL AND INDUSTRIAL OPPORTUNITIES

- **Within this segment, 95% of Large Commercial and 82% of Industrial businesses own their own building(s.)** The average size for a large C&I building is 322,636 square feet. These tend to be old, multi-story brick buildings in the case of large commercial and 2-story, metal and/ brick in the case of industrial customers. Many natural gas space heating systems are older and present an efficient replacement opportunity for Nicor Gas.
- **Large Commercial businesses have older gas water heaters**. This may indicate an area for energy efficiency emphasis.
- **There is an opportunity to educate customers about energy design assistance and energy efficient gas equipment options**, as 40% of Large Commercial businesses anticipate building shell changes in the next 12 to 24 months, 40% also indicate that they'll have to replace equipment and of these 63% indicate that it will be natural gas using equipment.
- **63% of the Large Commercial respondents indicate that they will incur end-of -life (average lifetime) equipment replacement** with 82% of the equipment using natural gas.
- 9% of Industrial-Heat businesses anticipate building shell changes in the next 12 to 24 months; 15% say that equipment replacement will occur in 12- 24 months and of these, **78% suggest that the replacement will be with natural gas using appliances**.
- **29% of the Industrial respondents indicate end-of-life equipment replacement and 82% of that equipment will use natural gas**.

POTENTIAL FOR ENERGY EFFICIENCY IN THE NICOR GAS SERVICE TERRITORY

This study economically reviewed 190 individual energy efficiency measures that provided a comprehensive assessment of possible impacts on market sector energy use if programs were configured and offered to the Nicor Gas customers. Reviewed were current and anticipated future measures, 49 for the Residential class, 90 for the Commercial and 51 for the Industrial. All measures were assessed for their individual benefit-cost ratios (BCR), computed as the required Total Resource Cost (TRC) test without the program inputs related to administrative costs, incentives, and marketing strategies for customer voluntary participation. When analyzed, it was determined that Nicor Gas has a technical energy efficiency potential of 185,677,000 annual therms for the

Residential class, 201,176,000 annual therms for the Commercial Class, and 106,209,000 annual therms for the Industrial class, all by year 2013 if all measures possible were implemented.

After performing the economic screen on all the measures and assuming that only measures falling above 0.99 for their BCR would be implemented via utility programs or would have natural market acceptance and implementation (i.e., the market itself would drive the measure implementation) and imposing an 85% realization rate for market acceptance (achievable) of the measures resulted in a possible potential of 6% reduction in total customer sales in 2013, the specific market sector therm values are shown in the table below. The economic screen imposed here results in 17 residential measures falling out of the analysis, 24 commercial measures, and 13 industrial measures dropping out. The remainder were configured into generic programs and analyzed for end-use impacts.

MARKET POTENTIALS BY CUSTOMER CLASS BY 2013

Customer Market Segment	Technical Potential -x1000 therms[1]	Economic Potential-x1000 therms[2]	Achievable Potential-x1000 therms[3]	% Energy Savings Impact (Achievable Potential) on Forecasted Sales-2013
Residential	185,677	107,118	91,050	4%
Commercial	201,176	158,659	134,860	7%
Industrial	106,209	68,037	57,832	10%
Total Potential	**493,062**	**333,814**	**283,742**	**6%**

End-use achievable impact analysis indicates that the largest areas of achievable potential for the residential and commercial market segments are for space heating and domestic hot water measures. The largest end-use potential for the industrial market is for domestic hot water and other hot water measures (process related). These are summarized in the table below.

ACHIEVABLE SAVINGS AS A PERCENT OF SALES BY 2013

Customer Market Segment	Space Heating	Consumer Water Heating	Appliances	Cooking	Process Heat	Process Steam	Other Water Heating
Residential	3.8%	0.2%	0.1%				
Commercial	5.3%	2.5%		0.1%			
Industrial	2.0%				3.1%	3.2%	1.3%

An opportunity for targeted marketing exists within the regions:

- Energy efficiency opportunities for Single Family homes might be greater in the Rockford region than in Chicago Metro. **Rockford has more Single Family-No Heat dwellings (31%) than does Chicago Metro (10%).**

[1] Technical Potential impacts represent all energy measures in the analysis.
[2] Economic Potential impacts represent energy measures passing BCR of 0.99 and greater.
[3] Achievable Potential impacts represent energy measures passing BCR of 0.99 and greater and imposing an 85% realization rate.

- Bloomington-Normal has more Mobile Homes (31%) than does Chicago Metro (4%) or Rockford (13%).
- Chicago Metro has more gas dryers (74%) than does Bloomington-Normal (44%) or Rockford (51%). **Thus, there might be opportunity for gas appliance programs within the Chicago Metro region.**

RELEVANT UTILITY COMPARISONS

The project team reviewed other available Market Potential reports for Illinois' utilities found that a comparison between Nicor Gas and Ameren ("AIU") provided the most comparable data for our analyses. The source of all AIU we inspected for this comparison is the CADMUS market potential study dated March 12, 2010.

Examination and comparison revealed substantive differences between Nicor Gas and AIU's potential figures. We note four specific reasons why there is a difference in the overall percent of base sales available as achievable savings:

- Ameren's measurement horizon is three years longer than that for Nicor Gas. This gives the hypothetical programs longer to mature and begin to yield results.
- The Ameren service territory has a greater percentage of base sales in Industrial enterprises (46% for Ameren vs. 14% for Nicor Gas). Since industrial measures tend to have higher percentage reductions and strong Benefit Cost Ratios, this relatively larger presence of industrial savings potential pushes the overall totals higher for Ameren.
- End use profiles are substantially different between the two service territories.
- There are substantial differences in the computational methodologies used in these two studies.

Therefore, direct comparisons of findings between the utilities' reports should be performed with caution and should be done only after understanding the basis for all study findings.

1. Rationale for Study

This market potential study is the first in-depth analysis of the energy use patterns, appliance and energy-use measure saturations and building stock characteristics for Nicor Gas' service territory. The study is necessary as Nicor Gas sets the initial course for determining how it will meet Illinois Section 8-104 EEP requirements with its first three-year Energy Efficiency Plan. The predecessor programs established as part of the Rider 29 program were not informed by a market study and, as such, provide a set of basic programs that are not subject to the same commitment in terms of energy savings goals and budgets as required in Section 8-104. In addition, in order to do an effective job of meeting the evaluation requirements in Section 8-104, Nicor Gas needs to establish baseline energy usage, appliance saturations, and housing stock information. This information will also set the stage for future program planning as it supports the work of market researchers, program managers, and communications personnel.

Nicor Gas, as a company, is different than the other major gas utilities in the state. Each of the other gas utilities have service territories outside of Illinois where they have operated energy efficiency initiatives and their staff is more informed about energy efficiency trends, measures, and options. Because utility-driven energy efficiency is relatively new to Illinois, there is essentially little information to rely upon specific to the state. In addition, the Nicor Gas natural gas service territory demonstrates different characteristics from Ameren's downstate service territory People's customer base in the city of Chicago, and North Shore's territory in the northern suburbs of Chicago. The mix of suburban, small city and rural customers makes the Nicor Gas service territory unique.

The intent of this market potential study is to provide a base building block for Nicor Gas' current and future energy efficiency efforts. The study provides a strong foundation in a variety of ways:

- **Program Design Input** - The information contained in this study will provide key inputs to the design of Nicor Gas' initial Energy Efficiency Programs. Program selection and design will be informed by the quantitative data contained within this study.
- **Baseline for Measurement** - This study will set a baseline from which to measure program performance and overall portfolio effectiveness.
- **Customer Baseline Database** - On a longer-term basis, the study will inform decisions made by Nicor Gas' staff as they modify the program portfolio, select and target market campaigns, and develop additional information about their customers to compare to the original study to determine success in meeting needs over time.

The development of Nicor Gas' initial Energy Efficiency Programs will be directly aided by the results and conclusions of this study as the information is assessed by the Nicor Gas staff and contractors. The overall results will help set the direction for Nicor Gas to achieve cost-effective energy efficiency, while providing that base of knowledge for future program design and evaluation decisions.

2. Market End-use Saturation

Data collected through the telephone interviews allowed Bass and Company to develop estimates of market saturation of the major end-uses and building characteristics of the Nicor Gas customers. In this study, **saturation** is a measure of the extent of an end-use or measure's volume in the market at a singular point in time (now) expressed as a percentage of the total market. Understanding a measure's current level of saturation helps to estimate what the likely **penetration** (rate at which the measure enters the purchase stream) in the market will be over time. These values of point estimate and rate play a key role in determining the **likely naturally occurring level** of energy efficiency measures input to the customer base as opposed to what is driven by a utility or other program. It is for this reason that great care was taken to develop reasonable saturation values that represent the entire Nicor Gas customer baseline per market segment, all based on recognized and accepted statistical sampling methods.

The statistical analysis performed by the project team indicates that the saturation and penetration values represented in this report are accurate for the respondents to the survey (sample) as well as for the overall Nicor Gas customer baseline with minimal—if any—bias impacting the results.

3. Description of Nicor Gas Service Territory and Customers

The Bass and Company analytical team determined, with the assistance of Nicor Gas data experts, that it would be too lengthy and cumbersome a process given the timeline to complete the study to have Nicor Gas extract the needed base customer data by which a sample could be drawn. It was also found that elements of customer data desired for sample design did not lie within a singular database. In order to facilitate the resolution of this data issue, Bass and Company experts agreed to implement a two-stage sample design (specifics addressed in a later section) which resulted in a large random sample of 62,565 unique customers from which we could design the sample base for telephone surveying. We refer to this initial large random sample as the **population** (or P'). Since it was randomly drawn and substantially large, it represents the characteristics of the Nicor customer baseline. Thus, it provided the team with sample design characteristics. It should be noted though, that this P' population is NOT the entire Nicor Gas customer base and therefore shows some differing characteristics from those known or assumed by the Nicor Gas staff. However, it does reflect the general characteristics of the Nicor Gas customer base and was able to serve as a solid basis for the survey sample.

The following information describes this population and can be interpreted as a description of the Nicor Gas customer population in total. We show these characteristics to form a basis for interpreting the survey results and to provide an overview of what customer data is currently available from the Nicor Gas customer records. It therefore sets the stage for what data is required to be collected via the customer survey described in subsequent chapters.

Nicor Gas Customer Baseline (P')

The Nicor Gas population includes Industrial, Commercial, Residential and Trade Allies, even though Trade Allies are not necessarily Nicor Gas customers (and hence, do not have an assigned account identification). The table below shows the different customer groups by North American Industrial Classification Code (NAIC) and, thus, shows the general distribution of the commercial and industrial customer base. Residential customers are not represented by NAICs but are shown in this table for comparison. The NAICs codes utilized for this population characterization were drawn from several different sources supplied by the Nicor Gas staff. There may be some variance as to the assignment of the codes by the different sources.

TABLE 3–1: POPULATION BY NAIC CODE

	Commercial and Industrial				Residential			
Industry Classification By Customer Classification	Largest 200	Small/Mid Commercial	Commercial - Suppl No Heat	Trade Allies	Res w/ Heat	Res w/out Heat	Res - Suppl No Heat	Total
Accommodation and Food Services		75	176					251
Admin, Support & Waste Mgmt/Remediation Srvcs	2	-	1					3
Agriculture, Forestry, Fishing and Hunting		1						1
Arts, Entertainment, and Recreation		34	49					83
Construction		4	1					5
Educational Services	6	42	11					59
Finance and Insurance	1	23	68					92
Health Care and Social Assistance	29	75	53					157
House Cleaning		1						1
Industrial		-	1					1
Information		1	38					39
Manufacturing	122	111	13	2				248
Mining	3	1						4
Other	9	388						397
Other Services (except Public Administration)		27	116					143
Professional, Scientific, and Technical Services		4	4					8
Public Administration	4	24						28
Real Estate and Rental and Leasing		128	663	1				792
Res w/ Heat		-			21,617			21,617
Res w/out Heat		-				123	32,757	32,880
Retail Trade	3	174	77					254
Transportation and Warehousing	3	22	7					32
Utilities		5	2					7
Wholesale Trade	7	68	14					89
Commercial		-	4,338					4,338
Unknown		1,036		224				1,260
Total	**189**	**2,244**	**5,632**	**227**	**21,617**	**123**	**32,757**	**62,789**

The Commercial and Unknown NAIC categories include Commercial and Industrial (C&I) customers for whom the NAIC code is unknown. NAIC categories were assigned using two methodologies:

- NAIC provided by Nicor Gas from previous studies, and,
- Assigned on the basis of business name by the project team

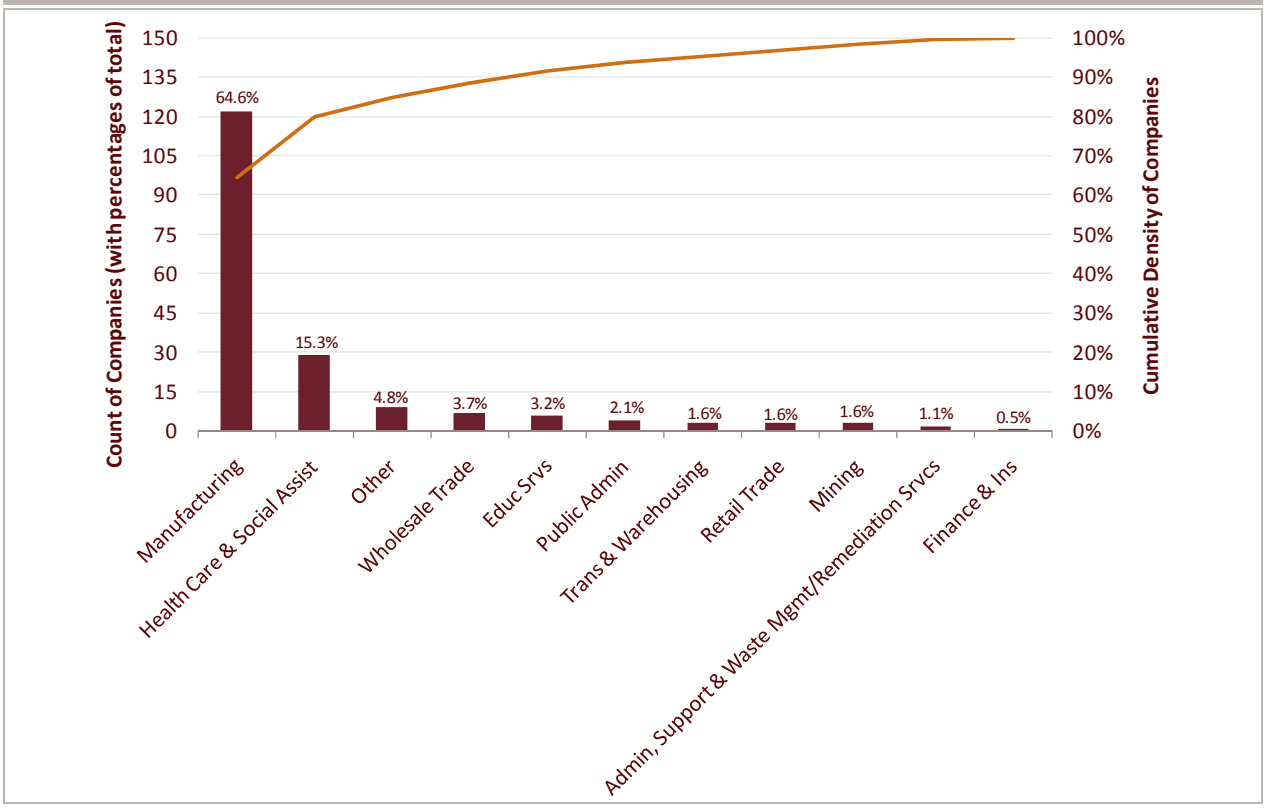
Although not scientifically derived, the project team does believe that the NAICs assignments are generally reliable, although there does seem to be a very large number of manufacturing facilities in the population database. This might be due to the inability to identify a facility as anything more specific than "manufacturing" based on the business name. The facilities were more accurately identified within the sample. Therefore, care should be taken when making assumptions about the

manufacturing market size based solely on the population file (P') statistics. Decisions for this market should be based largely on the survey results.

NAIC Distribution

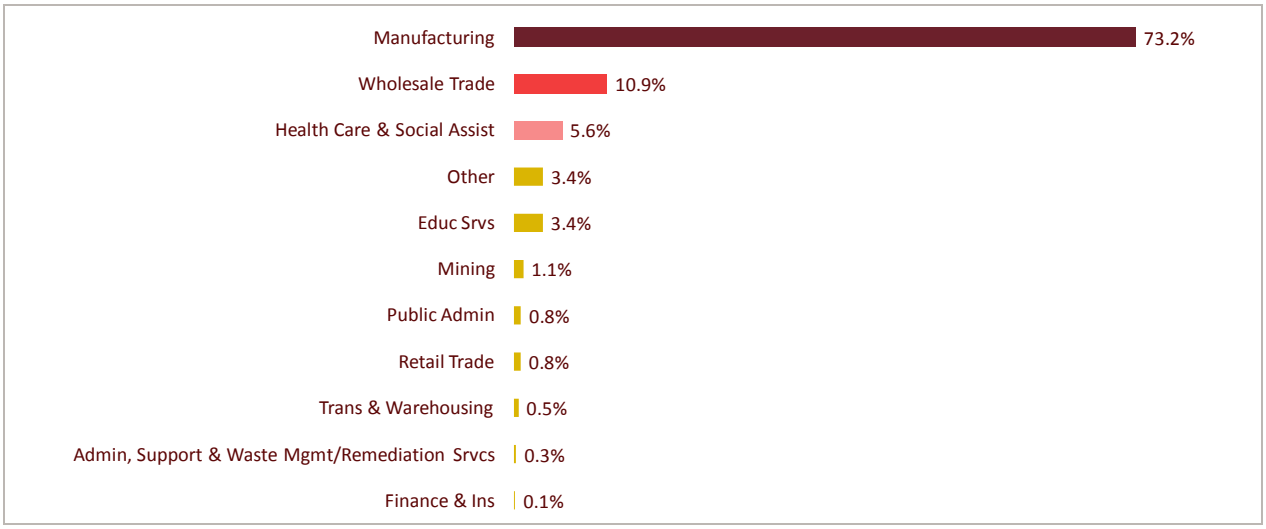
Outside of Residential and Unknown, the largest NAIC category is 'Real Estate and Leasing', followed by 'Other' and 'Retail Trade'. (This may have been due to the supplement of the largest 200 customers in the P' data file. This population supplement and process is described later in this report.) For the largest customers – based on their 2009 Annual Bill – 64 percent of customers are classified as 'Manufacturing' (see Figure 3–1: Top 200 Customers by NAIC Groupings, below). The only other NAIC category with more than 5 percent representation is Health Care and Social Assistance (15 percent). None of these findings influenced the sample draw and are just presented as background to this project.

FIGURE 3–1: TOP 200 CUSTOMERS BY NAIC GROUPINGS



Looking at total 2009 annual usage for the largest 200 customers by NAIC classification, Manufacturing accounts for 73.2 percent of total usage in therms (see Figure 3–2). This large percentage, on the surface, cannot be explained by known customer information but certainly emphasizes the need to update old databases and develop ongoing and timely data for future energy efficiency planning.

FIGURE 3–2: LARGEST 200 BY NAIC PERCENT CONTRIBUTION TO TOP 200 ANNUAL THERM USAGE



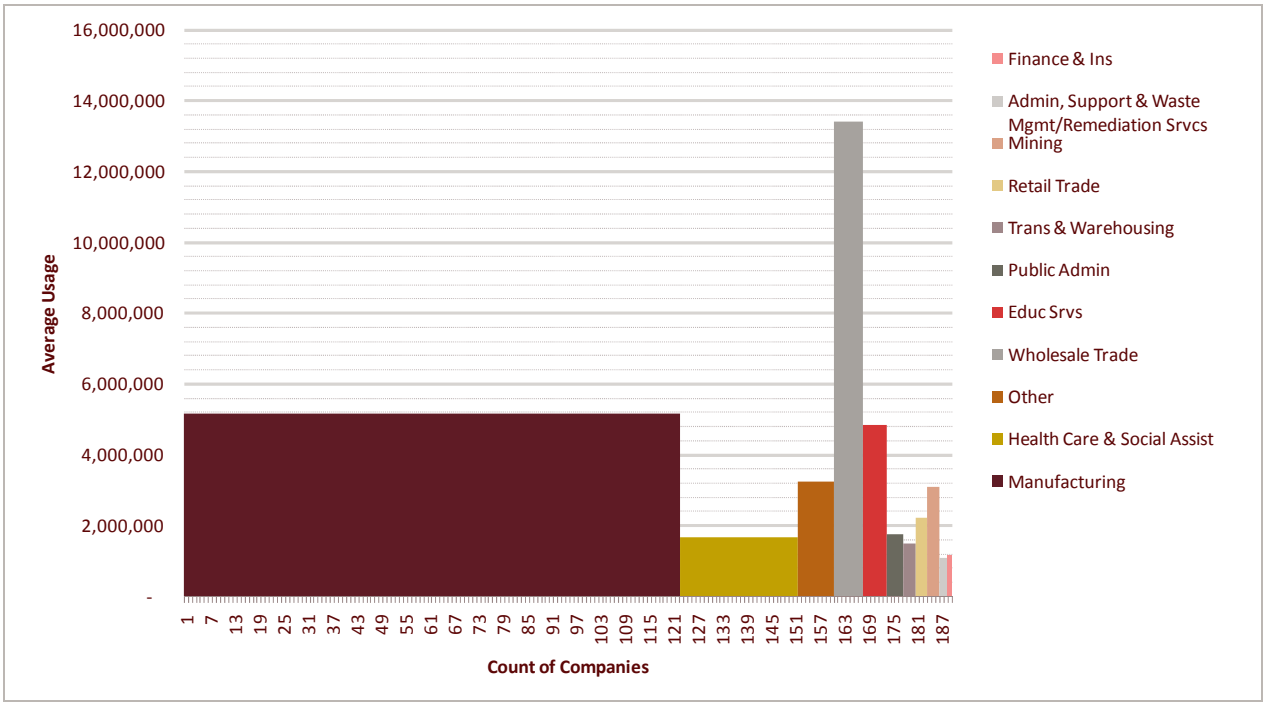
The largest average category of customers in terms of annual therm usage are Wholesale Trade customers – these large customers use close to three times as many therms as other large Nicor Gas customers (See Table 3–2). Again, these customers may well be from other business categories that could not be more specifically identified initially, but will be identified from the survey based on self-reporting of the respondents.

TABLE 3–2: TOP 200 AVERAGE 2009 USAGE BY NAIC

NAIC Category	Average of Usage 2009 (therms)
Wholesale Trade	13,401,913
Manufacturing	5,170,538
Educ Srvs	4,838,759
Other	3,247,847
Mining	3,089,563
Retail Trade	2,214,516
Public Admin	1,749,791
Health Care & Social Assist	1,679,866
Trans & Warehousing	1,484,302
Finance & Ins	1,161,054
Admin, Support & Waste Mgmt/Remediation Srvcs	1,090,388
Average across all categories	**4,562,458**

Now, we can relate average usage to the number of companies in the Top 200 to get a picture of aggregate usage patterns across the Top 200 customers (shown in Figure 3–3). The number of companies in the following graphic multiplied by the average usage per company provides a value (area) that indicates the overall aggregate usage for that NAIC. The shape of the area (low or high average usage versus low or high number of companies in that sector) indicates concentrations, whether in gas usage per company or in number of companies—and thus can highlight areas (business categories) of deep opportunity.

FIGURE 3–3: USAGE PROFILE TOP 200 CUSTOMERS—NUMBER OF COMPANIES AS RELATES TO AVG USE



As graphically indicated in Figure 3–3 above, the largest overall concentration (colored area) is in manufacturing: 65% of the companies and 73% of all top-200 therm consumption is represented here. Wholesale trade shows a relatively low number of companies—just under 4% (as indicated by the narrow width)—yet accounts for over 10% of annual therms (the high average therms is indicated by the area's height). Conversely, Health Care represents over 15% of the count of companies (the width) but somewhat under 6% of the therms used (due to a low average, shown in that area's height).

As a note to the report reader, the project team included the self-directed customers (those who removed themselves for eligibility in the next 3 years of energy efficiency programs) in our analysis based on discussions with Nicor Gas staff since those customers may want to participate after the initial 3 year program cycle and thus, it provided additional planning information for our study. Additionally, the sectorsthey represent likely would look like the non-self-directed customers based on their characteristics, usage, and efficiency needs.

Residential

There are over 50,000 customers in the residential population (P'), with over 20,000 customers that are categorized on the Nicor Gas records as being heating customers who use natural gas as their fuel source (noted in tables and charts as "Heat," and over 30,000 that use some other fuel for heat or are master metered customers who may have gas for heating ("No Heat"). The survey team believes that these numbers for gas heating might change if master-metered dwellings with gas as

heating fuel could have been surveyed, but that data was not available to the project team. Therefore, the team believes that a significant number of the "No Heat" customers who are master-metered look similar to the residential customers having the "Heat" label. For customers with Heat, the most prevalent premise type included in the population are Single Family (RS-SF), and for those Without Heat, the most prevalent Premise Type is Multi-Family homes (RS-Multi). All saturations are shown in the table below.

For clarification, the Single Family home category includes any residential dwelling having 2 or less units. Multi-Family homes are those that include more than 2 residential units. Thus, triplexes, and small apartment buildings with less than 3 units are classified as single-family homes in the tabulations and the survey results. However, the analysis of market potential presented later in this document defined Single-family as those containing 4 or less units. This is because from a planning and potential standpoint, buildings of 2, 3, or 4 units are usually constructed like a traditional single-family home and, therefore, measures would be applied to them in the same fashion as that for a single-family building. All Market Saturation findings for Multi-family reflect the Nicor Gas classifications of 3 or more units.

TABLE 3–3: NUMBER OF RESIDENTIAL ACCOUNTS IN POPULATION

Heat Premise Type	Number of customers	Percent of customers
With Heat	**21,617**	**40%**
RS-SF	18,623	34%
RS-MULTI[4]	2,743	5%
RS-MB (mobile homes)	251	0%
Without Heat	**32,879**	**60%**
RS-SF	6,182	11%
RS-MULTI	26,667	49%
RS-MB	30	0%
Total	**54,496**	**100%**

It is noted that this breakout of percentage of customers differs from that found in company statistics, where 98.3% of their residential customers have gas heat (as opposed to the 40% shown in the table above). The P' dataset does show enough gas heat customers from which to draw representative customers. And, the P' "heat" customers are reflective of the typical Nicor Gas "heat" customers with their average annual usage as shown below.

Nicor Gas provided therm usage for 2009 for the Residential population for all but 3 customers with Heat and 556 customers Without Heat. Most of the analysis that follows will focus on Single Family homes with Heat.

[4] The RS-Multi designation comes from the Nicor Gas premise type, which may, in fact, reflect master-metered heating with gas

TABLE 3–4: NUMBER OF RESIDENTIAL ACCOUNTS IN POPULATION WITH USAGE INFORMATION

Heat Usage Information Provided	Number of customers	Percent of customers
With Heat	**21,617**	**40%**
Yes	21,614	40%
No	3	0%
Without Heat	**32,880**	**60%**
Yes	32,324	1%
No	556	59%
Total	**54,497**	**100%**

Table 3–5 shows the average total usage in therms for residential customers with usage information across their space heating fuel (natural gas or other) and by premise type. Customers who use natural gas for space heating used, on average, 1142 therms in 2009 (company statistics show 1155 therms on average for 2009 for residential customers), while customers who use another fuel for space heating used an average of only 97.7 therms. This is also consistent with other reported results, such as that provided by an analysis of the 2000 U.S. Census[5], showing 68.5 percent of residential natural gas use is for space heating. However, Nicor Gas will likely show higher percentages for gas usage than in the 2010 U.S. Census, based on discussions with Nicor Gas staff.

TABLE 3–5: 2009 RES. ANNUAL AVERAGES FOR CUSTOMERS WITH USAGE INFORMATION IN POPULATION

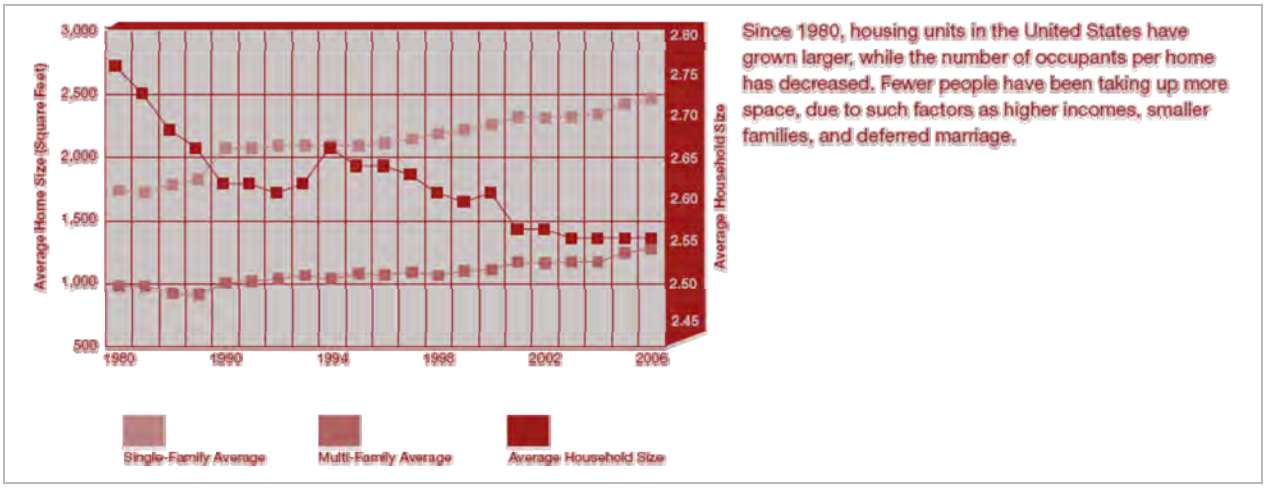
Heat / Premise Type	Average Usage 2009 (therms)*	Winter Average Use (therms) per HDD	Average Winter Use (therms)
With Heat	**1142.4**	**0.15**	**20.7**
RS-SF	1209.3	0.16	21.7
RS-MULTI	729.8	0.09	14.8
RS-MOBILE HOME	688.1	0.09	10.8
Without Heat	**97.7**	**0.00**	**5.8**
RS-SF	209.9	0.00	9.7
RS-MULTI	67.6	0.00	4.8
Average, all types	**1136.5**	**0.15**	**20.6**

* the average use in therms calculated for all winter months' available

Looking across premise type for customers using natural gas for space heating, our results show that RS-SF customers used an average of 1209 therms annually for 2009, while RS-MULTI and RS-MOBILE used 40 percent fewer and 43 percent fewer annual therms respectively. These results are consistent with recent building trends where most multi-family dwelling units are smaller in size than single family homes. According to the U.S. Department of Energy and as seen in the chart below (Figure 3–4), for the U.S as a whole, from 1980 to 2000, new single family homes grew consistently larger in square footage than did multi-family dwelling units. The average difference in size ranged from 750 square feet in 1980 to over 1000 square feet in 1990.

[5] Table 1. Natural Gas Consumption and Expenditures in U.S. Households by End Uses and Census Region, 2001, Energy Information Administration 2001 Residential Energy Consumption Survey: Household Energy Consumption and Expenditures Tables, http://www.eia.doe.gov/emeu/recs/byfuels/2001/byfuel_ng.pdf

FIGURE 3–4: AVERAGE SIZE OF NEW HOMES AND AVERAGE NUMBER OF PEOPLE PER HOME



However, as seen in Table 3–6, the home size square footage for the Population (P') customers with usage does not follow this pattern. For customers whose utility records had square footage ranges, midpoint values were used as estimates of total square footage. The project team also used the engineering analysis rule of 5 or more units constituted a multi-family home in this particular piece of the P' analysis. This was done to coordinate with the later measure technical potential analysis (i.e., 2, 3, or 4 unit buildings are usually constructed in a similar style and material to single family homes and, therefore, this analysis would be able to drive these later measure analyses in a consistent fashion. Analysis of survey results used the Nicor Gas multifamily definition of 2 or more units.

These analyses indicate that the square footage home size for RS-MULTI for customers heating with natural gas is 1755 square feet, over 11 percent larger than that shown for RS-SF. While this result may challenge our view that multi-family homes are on average larger than single family homes, we need to consider the age of construction and how we define single family homes:

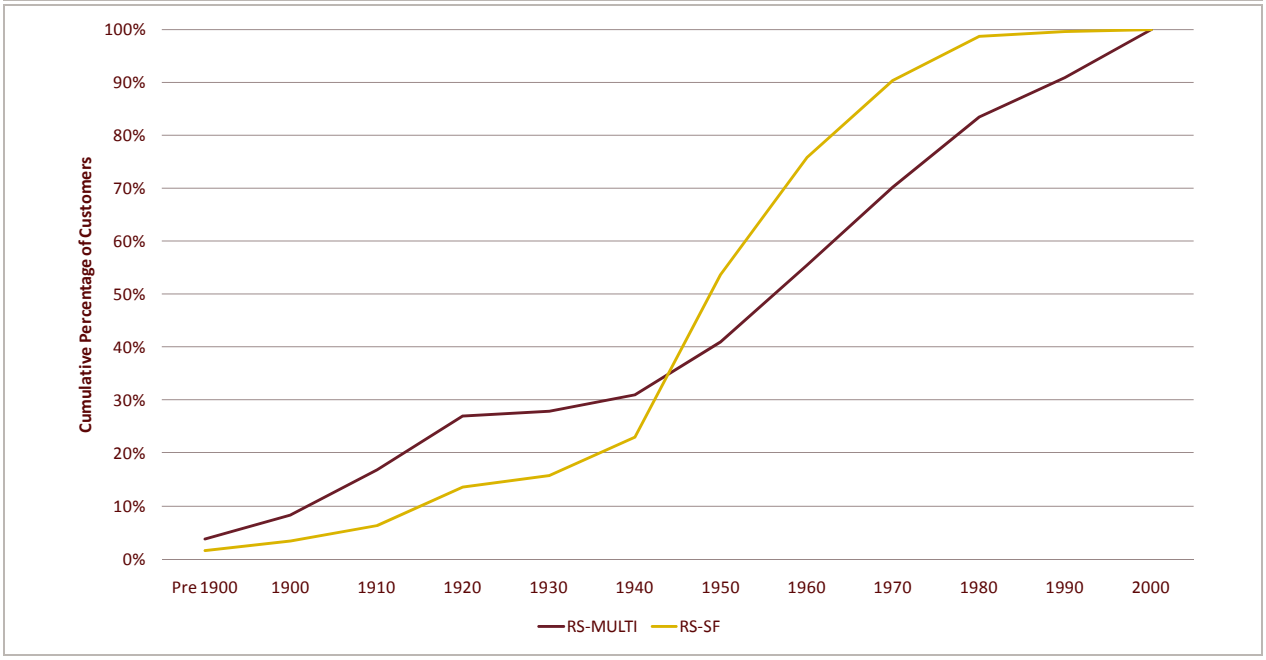
- The RS-SF category includes multi-family housing in buildings with less than five units (duplexes, triplexes, etc.), which may tend to lower the average square footage in this category compared to including only dwellings with one residential unit.
- There are some very old dwellings included in the Population (P'), with estimated construction dates as long ago as 1858 for RS-MULTI and 1865 for RS-SF. These old dwellings are still being used and as we will see below, do not follow the more recent construction trends comparing single family to multi-family dwellings.

TABLE 3–6: 2009 RESIDENTIAL AVERAGES FOR CUSTOMERS WITH USAGE INFORMATION IN POPULATION

Residential	Home Size in Square Feet	Average Age of Home	Oldest Dwelling	2009 Annual Usage (in therms)
With Heat	**1,584**	**1957**	**1858**	**1,142**
RS-MOBILE HOME	1,125	1982	1893	688
RS-MULTI	1,755	1958	1858	730
RS-SF	1,573	1956	1865	1,209
Average	1,584	1957	1858	1,142

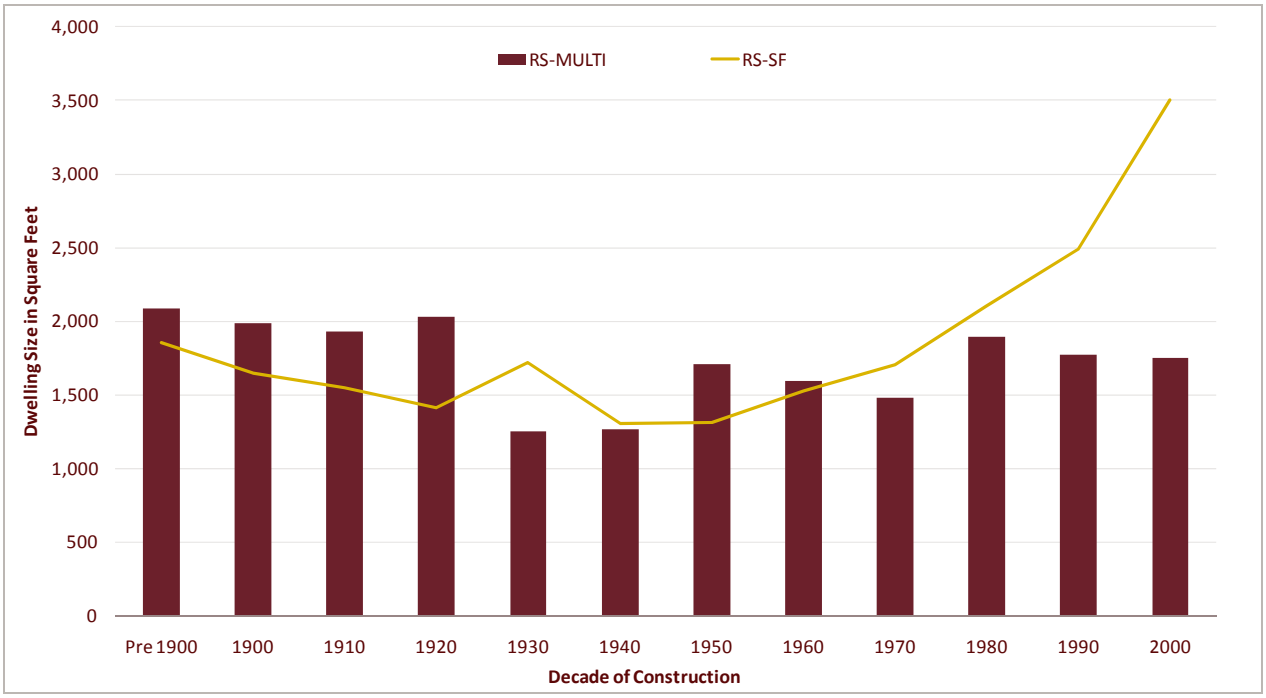
In addition, the population of multi-family dwellings is older in the Population (P') with usage data compared with single family homes. This indicates that in the comparison between multi-family and single family homes, there are proportionally greater numbers of older (and thus larger) multi-family homes than single-family homes. In Figure 3–5, we see that 28 percent of the multi-family homes in the Population (P') were constructed before the 1940s compared with only 16 percent for single family homes.

FIGURE 3–5: RESIDENTIAL WITH HEAT CUSTOMER DENSITY BY DECADE OF CONSTRUCTION



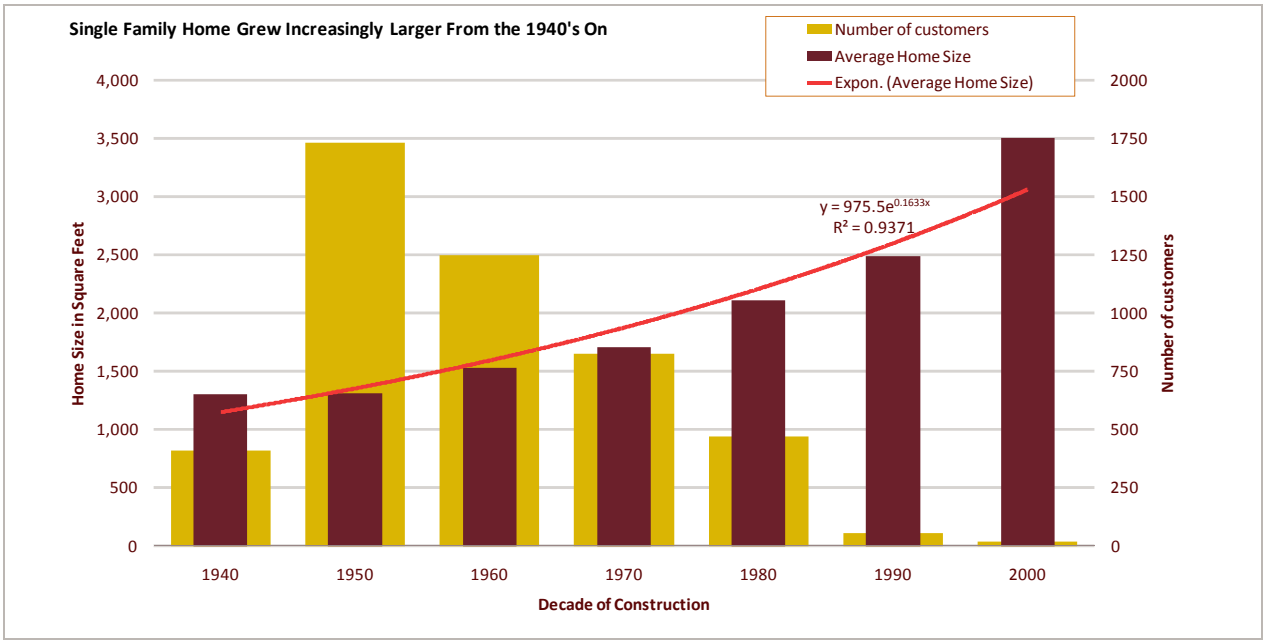
In Figure 3–6 we show why the age of construction is so important. The average dwelling size for older multifamily dwellings still in use today is approximately 2000 square feet if constructed prior to the 1930's. This is quite large compared to the square footage reported for the U.S. as a whole for multi-family homes in 1980s through 2000 as discussed earlier. In the Population (P') with usage data, single family homes were not, on average, larger than multi-family homes until the 1970s and beyond.

FIGURE 3–6: BUILDING SIZE TRENDS BY PREMISE TYPE, RESIDENTIAL CUSTOMERS WITH HEAT



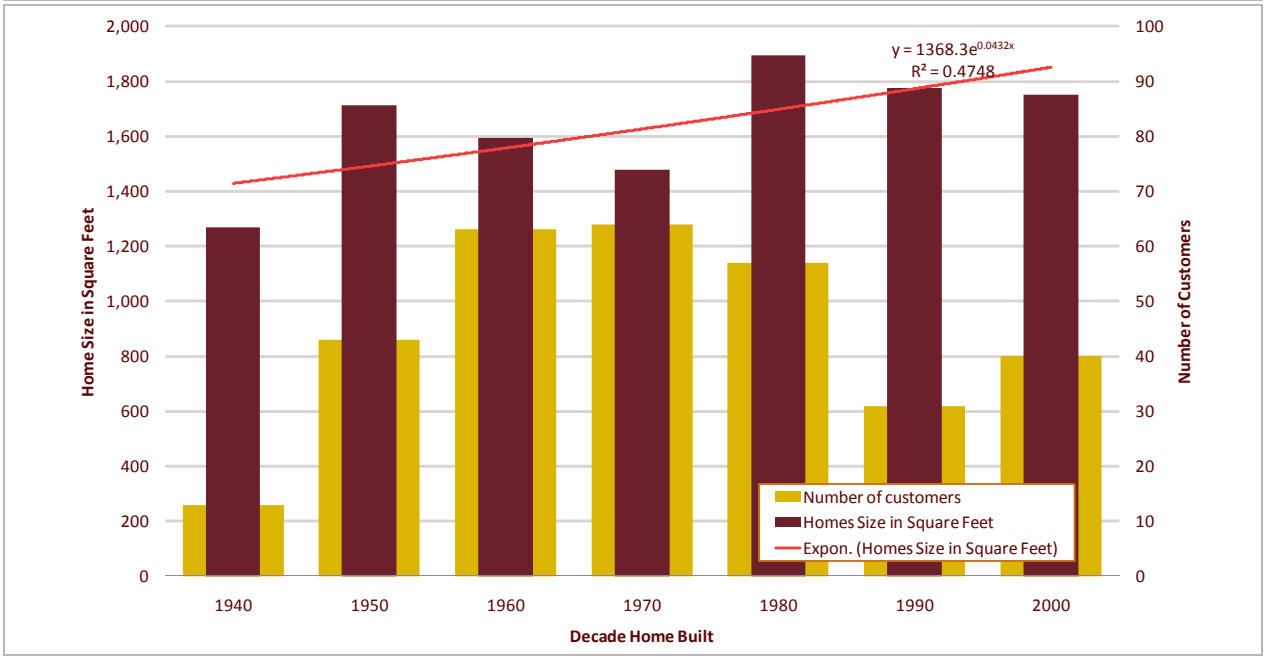
There is a consistent trend for square footage to increase for single family homes beginning in the 1940s. In Figure 3–7, we show that there is a strong correlation between the decade of construction and home size using an exponential fit to the data. Not only did home size increase, but the percentage increase grew faster as time moved from the 1940s to 1990 and beyond. Between 1940 and 1960, the average home size for single family dwellings increased by 17.1 percent. Between 1970 and 1990, the increase had jumped to 46.4 percent.

FIGURE 3–7: TREND OF LARGER HOME SIZE FOR SINGLE-FAMILY HOMES FROM THE 1940S THROUGH 2000



The trend between age of construction and size of home (Figure 3–8) for multi-family housing is weaker. The results show some correlation between the decade of construction and square footage but the average for 1990's is about the same as for 1950's, and the size trended down from the 1950's through the 1970's.

FIGURE 3–8: TREND WEAKER FOR MULTI-FAMILY HOUSING FROM THE 1940S THROUGH 2000



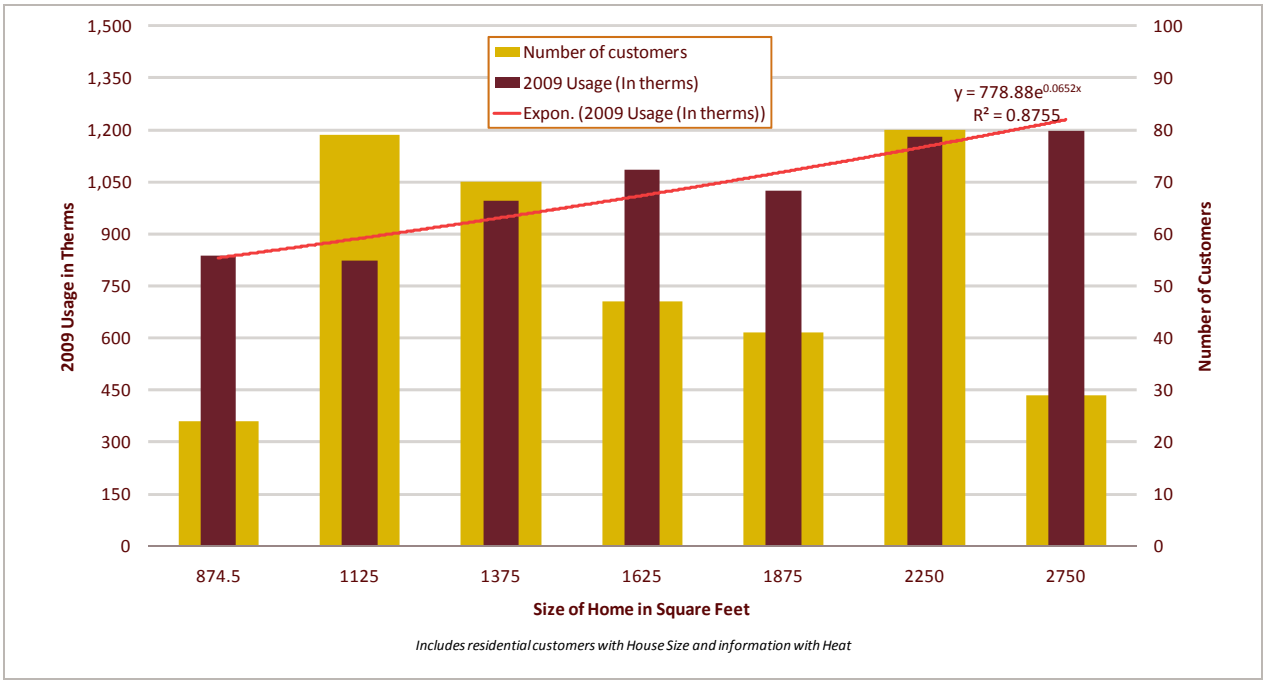
There is a strong correlation between the size of single family homes using natural gas for heat and the total usage for 2009 (see Table 3–7), which highlights the acceleration of the increase in annual usage as homes get larger. As home size increases by 44 percent from 1125 to 1625 square feet, usage only increases by 19 percent. Looking at larger homes, when home size increases by 38 percent from 3250 to 4500 square feet, the therm usage increase jumps by 42 percent.

TABLE 3–7: USAGE AS A FUNCTION OF HOME SIZE INCREASES

Home size change	Percentage change in square footage	Percentage change in 2009 usage
1125 to 1625	44%	19%
3250 to 4500	38%	42%

If we look at the same analysis for multi-family homes and limit the data to size ranges where there is close to 30 customers (Figure 3–9), then we see a similar correlation between home size and total usage. The total usage increase does not accelerate as it does for single family homes.

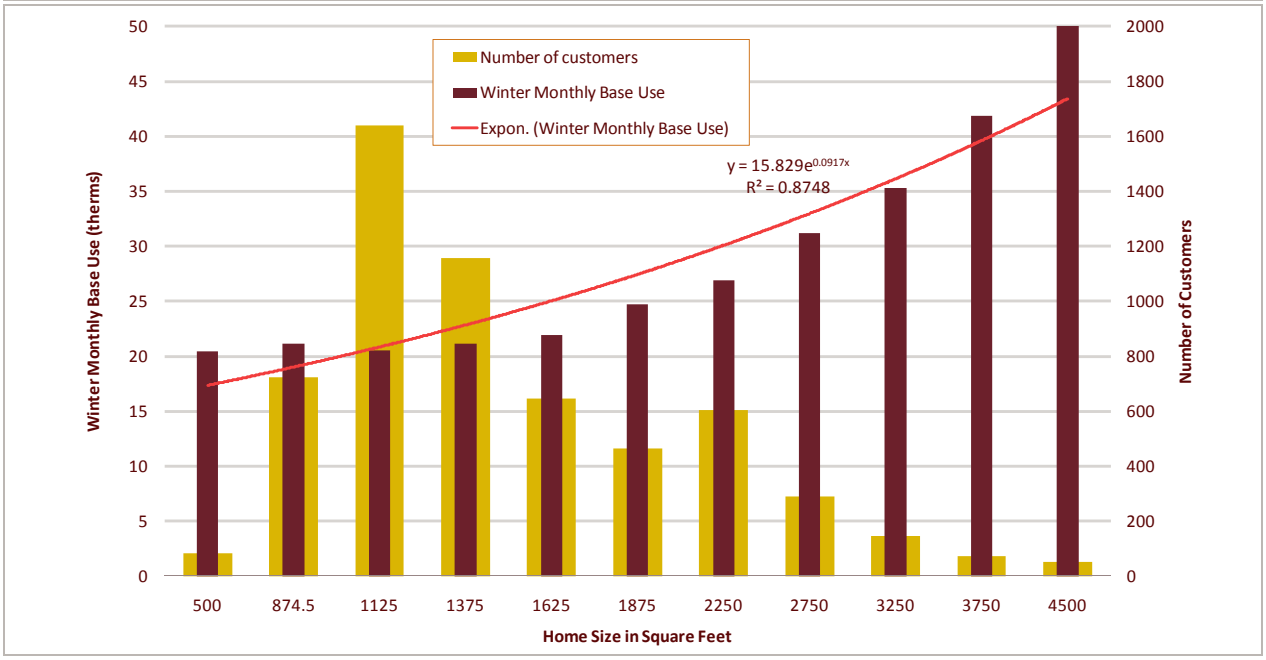
FIGURE 3–9: TOTAL 2009 USAGE FOR MULTI-FAMILY HOMES WITH HEAT BY SIZE OF HOME



Includes residential customers with House Size and information with Heat

Looking at Winter Use by Home Size (Figure 3–10) for single family using natural gas for heat (as delineated on the Nicor Gas billing records), it is found that customers living in larger homes use increasingly more therms of natural gas per winter month. Similar to the results for total usage, the rate of increase accelerates as from smaller to the largest homes.

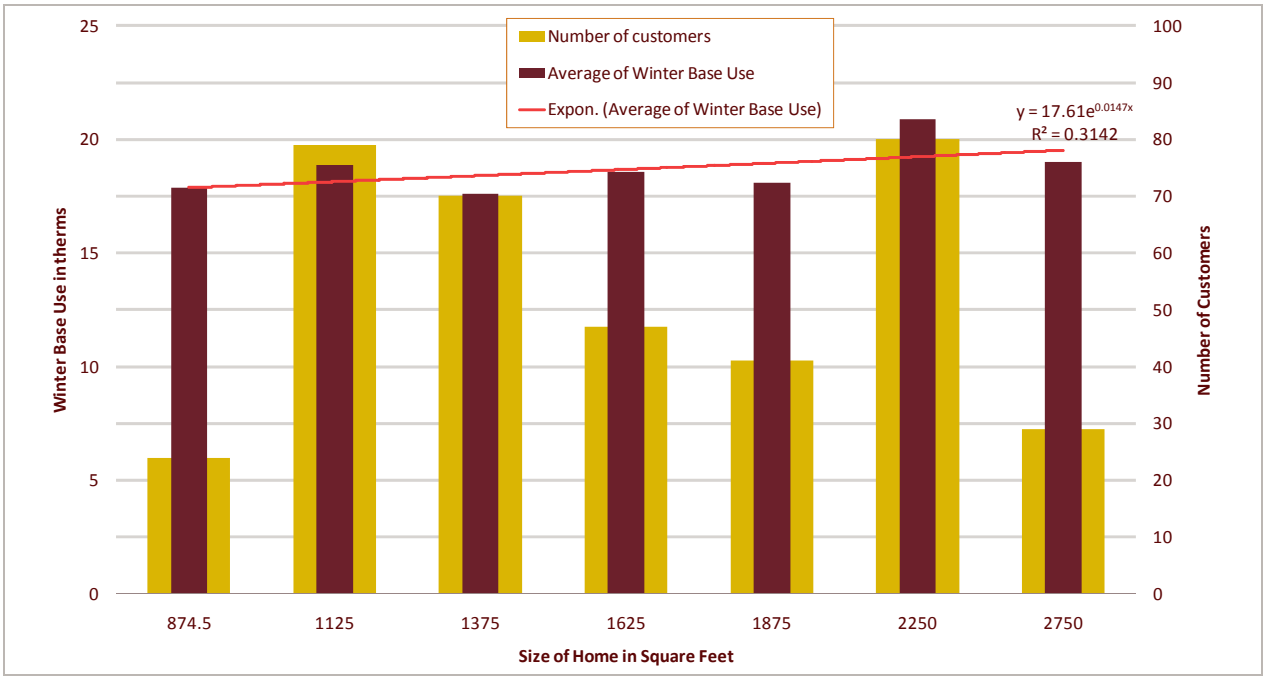
FIGURE 3–10: WINTER USE BY HOME SIZE FOR SINGE FAMILY HOMES WITH HEAT



The increase in winter average use appears to not be significant until the square footage is above 1625 square feet. The winter use is approximately 20 therms per month up to 1875 square feet—and then rapidly increases to over 40 therms when the house size reaches 3750 square feet. At 4500 square feet, the winter average use has increased to over 50 therms.

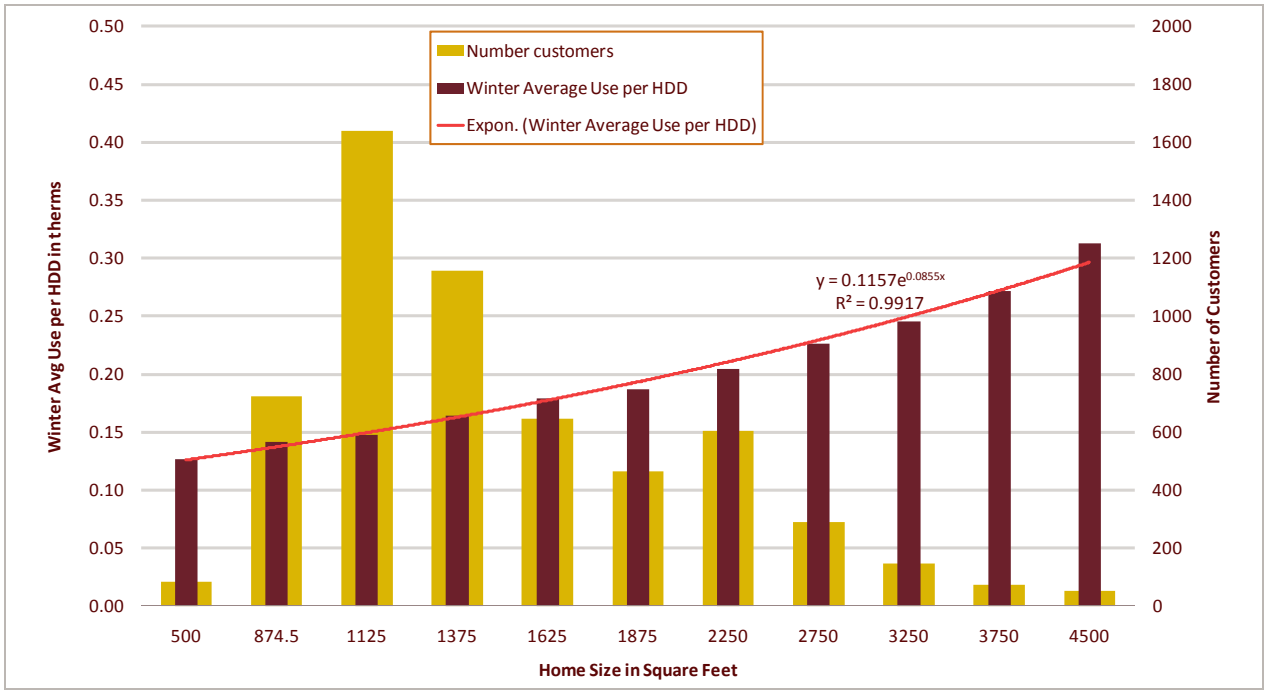
Performing a similar analysis for multi-family homes coded as heat customers, a significantly weaker correlation between square footage and winter use compared to single family homes is found, as shown in Figure 3–11.

FIGURE 3–11: WINTER USE BY HOME SIZE FOR MULTI-FAMILY HOMES WITH HEAT



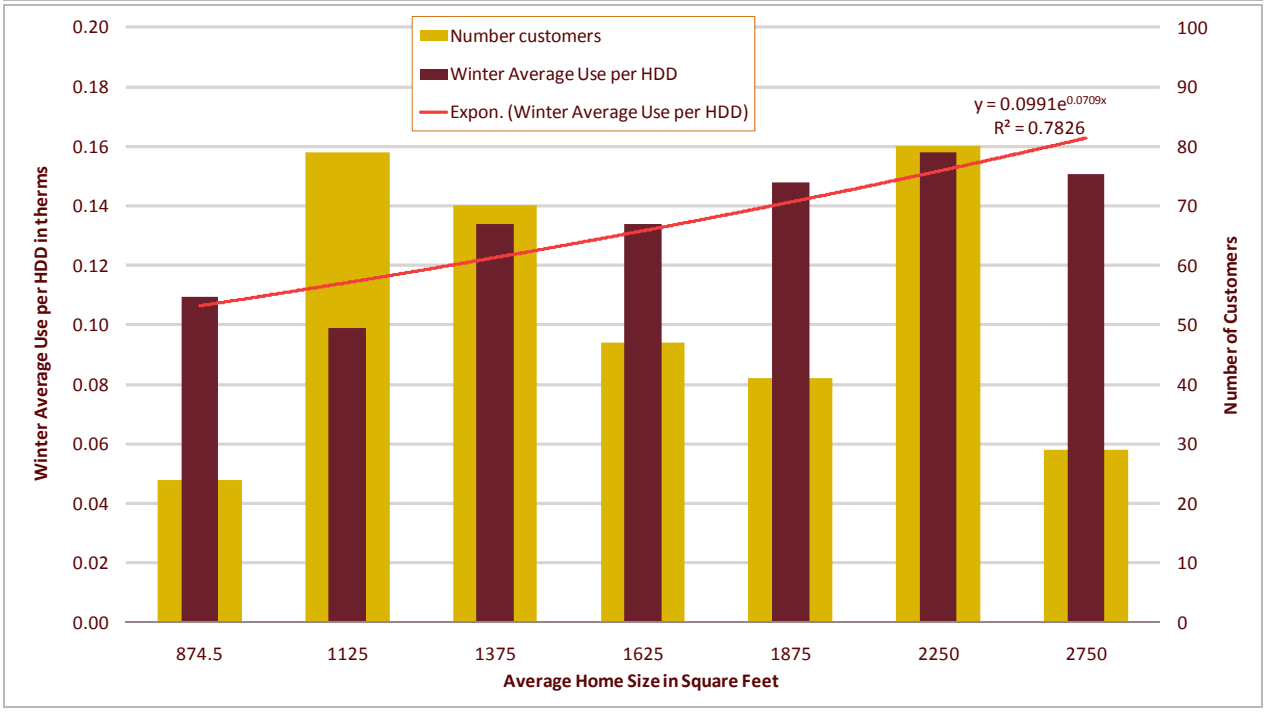
We see even a stronger correlation between House Size and the Winter Average Use per Heating Degree Day (HDD) for single family homes with heat (see Figure 3–12). The more HDD, the colder the average temperature has been during the heating season. As expected, the larger the home, the more therms are used per HDD to maintain a comfortable temperature within the home. Once again, the increase in the use per therm per HDD accelerates as the square footage increases but not as dramatically as for winter use in therms.

FIGURE 3–12: RESIDENTIAL SINGLE-FAMILY WITH HEAT AVERAGE WINTER USE PER HDD BY HOME SIZE



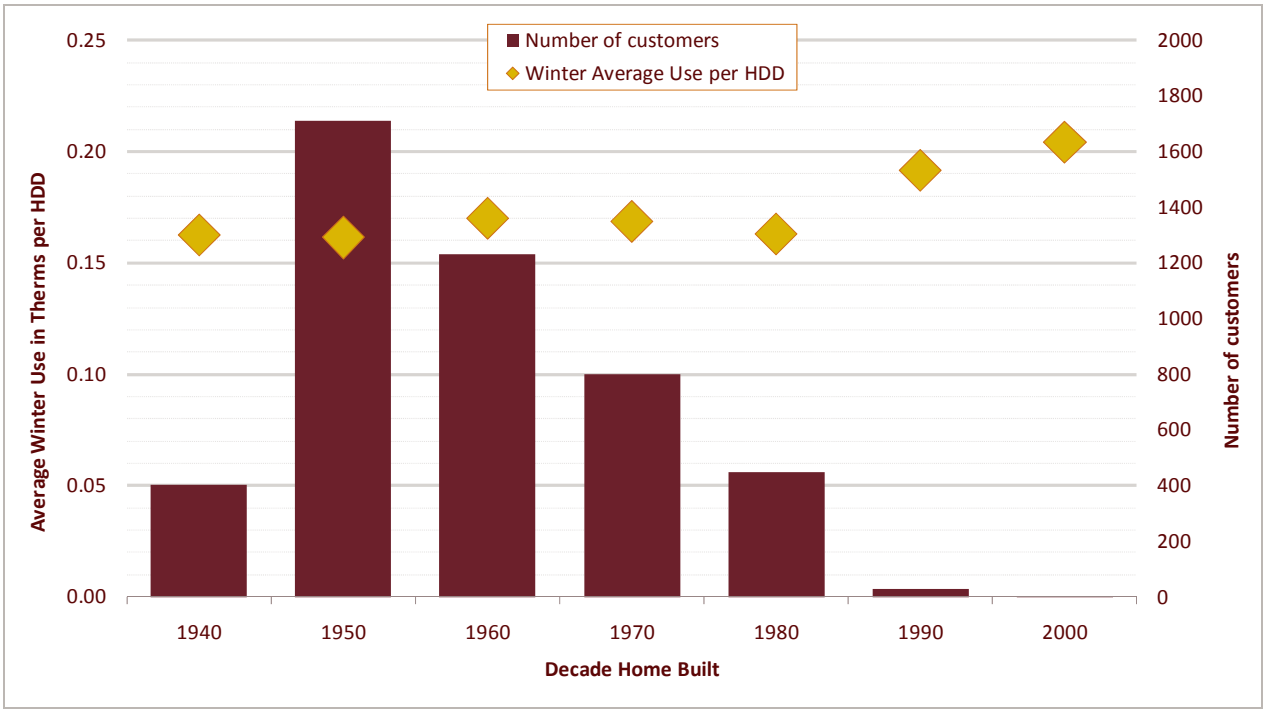
The therm use for multi-family homes coded as heat customers also rises with square footage as shown in Figure 3–13. The increase does not accelerate as the square footage increases, which is similar to the results for single-family homes shown above.

FIGURE 3–13: HEATING USE TIED TO HOME SIZE FOR MULTI-FAMILY HOMES WITH HEAT



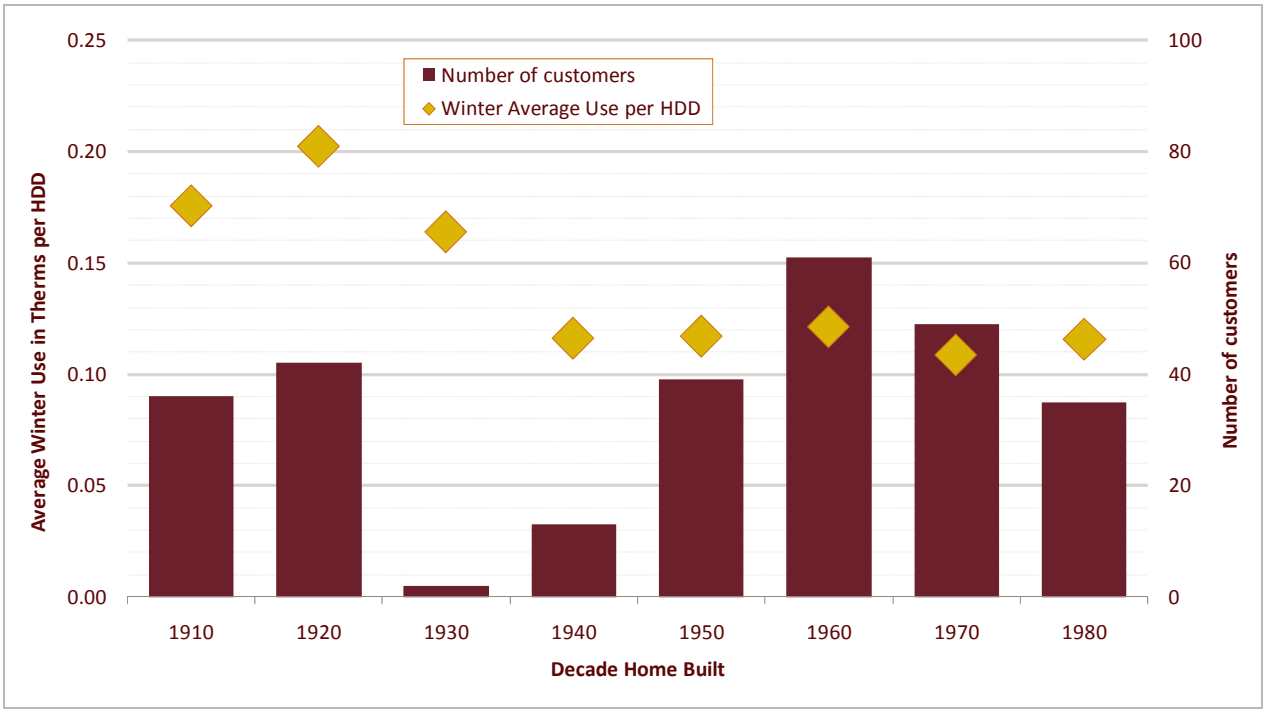
Interestingly, the next chart (Figure 3–14) shows that for single family homes coded as heat customers and constructed from the 1940s through the 1980s, the average winter usage per HDD remained flat even though single family home sizes generally trended to become larger over this period of time. Beginning in 1990, however, the winter usage per HDD began to rise, suggesting that homes constructed after the 1980's were significantly larger—enough so to offset increases in efficiency in space heating.

FIGURE 3–14: RESIDENTIAL SINGLE FAMILY WITH HEAT AVG WINTER USE PER HDD BY YEAR BUILT



Looking once again at multi-family homes using natural gas for heating, it appears that the average winter use per HDD declined for homes built after the 1930s and remained relatively flat through the 1980s (Figure 3–15). The older multi-family dwellings are not as energy efficient when it comes to space heating as apartments constructed beginning in the 1940's through the 1980's. There was insufficient information to assess efficiency from this characteristic for apartments constructed after the 1980's.

FIGURE 3–15: RESIDENTIAL MULTI-FAMILY WITH HEAT—AVERAGE USE PER HDD BY DECADE HOME BUILT



4. Sampling

In order to estimate the market saturation of key customer information for Nicor Gas and to truly understand the current characteristics of the customer base-also known as the customer baseline, it was determined that a survey of the three main market segments should be implemented. The project team reviewed all available customer data from which to design a statistically valid survey sample. The full customer accounts data file was not available to the project team so the team determined that a two-stage sampling approach would be a reasonable approach for this project based upon the knowledge and past experience of the design team. The two stage sampling employed is a commonly used and theoretically based process common to situations found with utility billing records.

SAMPLING: METHOD AND BASIS

A two-stage method for sample development is a well-known and accepted method when the full population is unavailable or too unwieldy to handle for analysis. It involves the pulling of a simple random sample (srs) from the entire customer database that is large enough to allow for the accurate characterization of the full customer database from which a reasonable and accurate random sample can be developed. This is accomplished to support a telephone survey for the collection of new data on the total customer database. This initial sample, which is called P'—or the representation of the full population—amounted to 62,565 unique Nicor Gas customers randomly drawn from all customer accounts. The analysis of these records was summarized above to ascertain the available population characteristics. Also of note is that the project team was required subsequently to have Nicor Gas staff pull additional accounts via a srs sample to allow for the survey to cover all customers, some of which were of such small group size that could not be picked up in the initial "srs". The project team found that the initial sampling fell short in several customer areas (very large businesses and no heat customers). These customers needed to be included in the total sample so the process employed to include them in the telephone survey is described below.

Sources of the Survey Sample

Residential, Commercial and Industrial Sample Sources

As described above, to begin the first stage of the two-stage sampling process and to determine the basic sample design characteristics for the Nicor Gas population, Nicor Gas staff provided:

- A randomly selected Sample File Extract from the Nicor Gas Customer Database, referred to as the EEP data extract. This consisted of 62,565 unique records. This file was analyzed to ensure that all customer groups were included for possible surveying. It was quickly determined that the very largest commercial and industrial customers

were poorly represented in this initial sampling draw. Therefore, an additional draw from the Nicor Gas customer base was accomplished which included:

- The Top 200 Customer List containing Large Commercial and Large Industrial Customers. Continued assessment also indicated that the customers classified as "No Heat" were also poorly represented. A third random draw from the Nicor Gas customer data was performed to include:
- "No Heat" Sample Extract of Small and Medium Commercial Customers and Residential Customers. This final sample draw was added to the other extracts to produce a full representation of the Nicor Gas customer database and with these, the project team felt confident that all relevant customer subgroups had an opportunity to be included within the telephone survey process.

Supplementary Residential Sample Demographic Information Provided by Nicor

To enhance our understanding of Nicor Gas customers, the project team also requested and was provided demographic data extracted from other company data sources which included:

- the "Acxiom" Demographic File; and,
- the Nicor Demographic "Joined" File

These demographic data extracts informed the project team to allow them to appreciate and interpret the survey findings.

Trade Ally Sample Sources

As a final element of information for assessing the market potential for energy efficiency within the Nicor Gas service territory, Nicor Gas staff assisted the team by providing trade ally lists that perform work within the utility service territory. The trade ally survey list was developed from a variety of sources. A comprehensive list covering both residential and commercial-industrial trade allies provided a basis for sampling such in the Nicor Gas service territory.

SAMPLE STRATIFICATION

From the P' records, the project team determined that the telephone sample design would be based on 3 market segments defined by the Nicor Gas rate and other characteristics that allow the utility support staff to provide service to each customer. Therefore, the survey sample was segmented as residential customers with heating and without heating, commercial/industrial small and medium businesses with and without heating (having annual bills less than 10,000 therms) and large customers (having annual bills greater than 10,000 therms.).

After this initial segmentation, the population was stratified by "heat" and "no heat" customer labels per the Nicor Gas billing records. These labels are old company classifications and are no longer relevant to defining the customers as gas heating or no gas heating customers. We leave it to Nicor Gas staff to interpret the basis for these labels on certain customers. The project team does

believe that many of the "no Heat" customers, especially those within the multifamily market, are quite probably gas heat customers who are master metered. There was no way for the project team to confirm this based on the telephone survey. The project team kept these labels to serve as a stratification characteristic. The residential population was also segmented by housing type: single-family, multifamily and mobile home. The distribution of calls during the survey process was based on these segmentations (strata). "Quotas" (or sample sizes) were set for each stratum prior to the survey process based upon a proportional relationship of each stratum to the population. The quotas became the targeted number of completed surveys for each.

To confirm that the subsequent survey responses of residential and small and mid-size business customers would be representative of the Nicor Gas population, a comparison of energy use by segment of the survey sample to that of the corresponding segment of the customer population (P') showed the respondents could not be proved to be statistically different from the population as show below.. This was found to be true for all survey strata except for those classified as large. The large commercial/industrial stratum was shown to statistically differ from the population, but this was expected given the fact that the usage for these customers was significantly skewed and did not follow a normal distribution. To avoid inaccurate weighting of this group, we analyzed and reported them separately from the other customer strata and did not attempt to include them within a total commercial/industrial survey summary classification. This procedure is statistically sound and also provides specific new information for the Nicor Gas staff, who are responsible for supporting these large customers.

The eventual quota sampling scheme was finally based on budgetary and timing constraints for the project and is shown in the tables below along with the number of completed surveys obtained.

TABLE 4–1: RESIDENTIAL SAMPLE

Residential	Available from P'	Sample Size	Respondents
Single Family with Heat	18,628	225	227
Single Family w/o Heat	5,912	75	75
Mobile Home	252	75	46
Multi Family with Heat	2,745	150	154
Multi Family w/o Heat	24,803	75	76

TABLE 4–2: BUSINESS SAMPLE

Business	Available from P'	Sample Size	Respondents
Small/Mid Size Commercial with Heat	1,621	225	221
Small/Mid Size Commercial w/o Heat	4,556	75	76
Large Commercial with Heat	39	75	11
Large Commercial w/o Heat	28	75	10
Industrial with Heat	158	125	36
Industrial w/o Heat	80	25	25
Trade Ally	273	100	101

To inform the overall data developed from this survey, the project team also included a survey of area trade allies as described earlier in this report. This is shown as a separate market segment within the industrial/large business sample, although their responses were not counted as part of the market saturation of any end-use or measure. A discussion of these special survey results is included in an analytical description section below.

Table 4–3 indicates the relationship of the completed surveys to the population (P') when compared statistically. As can be seen and described earlier, all survey segments were found to be representative of the population within a confidence level of 99%. Thus, we believe that the survey results need not be weighted to be projectable to the total Nicor Gas customer base.

TABLE 4–3: COMPLETED SURVEYS COMPARED WITH POPULATION P'

Residential Segment	P' (counts)	Sample Means (therms)	Respondent (counts)	Surveyed Means (therms)
SF Heat	18,395	1,209	227	1,204
Multi Heat	2,587	727	75	785
Mobile Heat	208	681	46	722
SF No Heat	73	212	154	160
Multi No Heat	336	84	76	99

Finally, questionnaires were developed that aided in the collection of building/housing characteristics, appliance/equipment and end-use saturations, and other relevant information related to customer energy use, attitudes, and inclinations regarding energy efficiency. These questionnaires are shown in the Report Appendices and are supplied in the format that was used to facilitate computer input of responses.

After the phone interviews were implemented and data was collected, additional statistical information was performed to indicate how much the responses may vary from the true population parameters. These are represented by the standard deviations (S.D.) of the responses and are indicated in the analyses summary tables where the project team computed mean values of interest.

5. Data Collection

The survey instrument (questionnaire) was developed in collaboration with Nicor Gas staff, Bass and Company, and Integrative Growth, the team member responsible for the surveying. The instruments were divided into four groups:

- Residential
- Small-Mid Sized businesses (commercial)
- Large Sized and Industrial businesses
- Trade Allies

The Residential group queried customers about their home characteristics (number of rooms, number of stories, age of home, construction materials) along with residency characteristics (number of residents, whether anyone age 65 or older or under the age of 5 living in the household, and income) and finally furnace information (type, number and age of furnace). Finally, other uses of natural gas, and any energy efficiency features of the home were sought.

The Business groups were asked about business characteristics (such as number of employees, type of business in which engaged), building characteristics (square footage of floor space, construction materials, percentage of exterior space covered in windows and other fenestration questions), the type, number and age of space heating equipment, and finally other uses of natural gas, any energy efficiency measures in place, and plans for changes to the business that could impact natural gas usage in the near future.

The Trade Allies survey was targeted to businesses that are in the position to recommend or advocate energy efficient building practices and equipment. Business characteristics in which the trade allies deal such as the number of projects they have influenced in the recent past, and the number of high performance projects were asked, as well as what types of energy efficiency measures they had recommended.

Once finalized, the survey instrument was programmed and delivered to a call center. Appropriate interviewers were selected, with the business group surveys conducted by more experienced executive interviewers. Prior to initiation of the dialing on the project, a briefing was held with all interviewers explaining the study and reviewing the survey instrument. The interviewers practiced the script, and limited dialing began on April 5, with employees from Integrative Growth listening in on the calls to ensure quality and to address any issues encountered. The interviewing continued through May 5, 2010.

Residential dialing occurred on Monday through Friday from 3:30pm through 9pm, and on Saturday and Sunday from 9:00am through 8:00pm. Residential dialing was conducted during these times to increase the likelihood of reaching someone who had knowledge of specific topics of interest.

Business dialing occurred on Monday through Friday from 8:00am through 4:30pm. Once contacted, a customer was given the opportunity to participate at that time, or set an appointment at their convenience.

6. Survey Results

READER'S NOTES

Percentages in the results' analyses are shown in whole numbers, while means are generally shown to one decimal place. Sample sizes (or responses) are noted; if a sample size is lowered due to the subsequent filtering of a question or the "don't know/refused/no answer" responses were removed from the accounting, the new sample sizes are be noted.

As an example, the table shown below is typical of those contained in this report. The sample size is 159. 77% of the 159 businesses surveyed responded that they had a gas hot water heater. 113 respondents knew whether their hot water heater was a single or multiple unit. 101 respondents knew the type of gas hot water heater their building used.

Where means are present, standard deviations are also included, symbolized as "σ8.51" in the table below; these appear next to the means in tables that follow. This is noted for the reader to be able to visualize the confidence bounds of the computed means, or to provide comparative information to assess the sample reliability.

Where very small respondent sizes are indicated in the tables, caution should be employed when interpreting results.

TABLE 6–1: SATURATION EXAMPLE

Segments	Saturation, n=159
Gas Hot Water Heater (Owns Building)	77%
Single Unit	(n=113) 72%
Multiple Unit	(n=113) 28%
Type of Gas Hot Water Heater	
Conventional	(n=101) 88%
Indirect-Fired Storage Tank/connected to gas boiler	(n=101) 8%
Tankless, on-demand	(n=101) 2%
Other	(n=101) 2%
Average Years of Age of Gas Water Heater	8.2 σ8.51

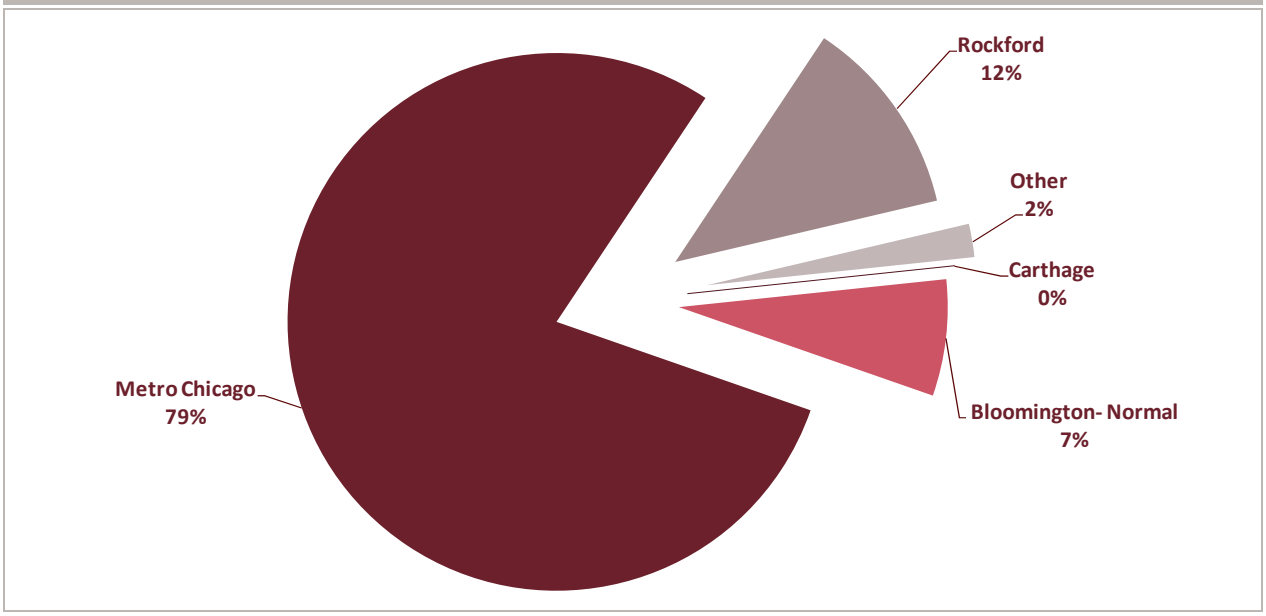
In addition to the telephone survey forms, the raw data collected through this project and the banner tables (cross-tabulations) produced for this analysis are provided as an Appendix to this report.

RESIDENTIAL SEGMENT

Residents' Characteristics

Most (79%) of the respondents reside within Metro Chicago, 12% in Rockford, 7% in Bloomington-Normal, with 2% unclassified (those having no zip code match to any specific region as defined by Nicor Gas staff; see Figure 6–1).

FIGURE 6–1: GEOGRAPHIC DISTRIBUTION OF SURVEY RESPONDENTS



As shown in Table 6–2, most of the population living in Single-Heat (94%) and Mobile homes (91%) own their homes, while three out of four of those in Multi-Family-heat (74%) also own. Single Family-no heat households are more evenly split between ownership (56%) and renters (44%). For those who rent, gas usage is rarely included within the rent payment for the heat segments (0% for Single Family-Heat, 5% for Multi Family-heat, 0% for Mobile Home), but is included for one out of three residents of the no heat segment (33% for Single Family–no heat, 30% for Multi Family–no heat).

TABLE 6–2: TENANCY PROFILE BY HOUSEHOLD TYPE

Ownership	Single Family (Heat) n=227	Single Family (No Heat) n=75	Multi Family (Heat) n=154	Multi Family (No Heat) n=76	Mobile Home (Heat) n=46
Own	94%	56%	74%	37%	91%
Rent	6%	44%	26%	63%	9%
Gas Usage in Rent	0%	33%	5%	30%	0%
Receives gas info	-	(n=11) 91%	(n=2) 100%	(n=13) 69%	-

As can be seen in Table 6–3, Single Family and Multi Family- heat households have the highest average incomes at $84,092 and $72,214 respectively, followed by those in Single Family-no heat at $61,856 and Multi Family-no heat at $54,891. Mobile Home householders report the lowest incomes, at $43,282.

TABLE 6–3: AVERAGE INCOME BY HOUSEHOLD TYPE

	Single Family (Heat) n=227	Single Family (No Heat) n=75	Multi Family (Heat) n=154	Multi Family (No Heat) n=76	Mobile Home (Heat) n=46
Average Income	$84,092	$61,856	$72,214	$54,891	$43,282
(S.D.)	σ58,463	σ67,047	σ43,13	σ37,082	σ46,715

Single Family-heat households have the highest average number of people in the household (2.8), while Single Family-no Heat (2.2), Multi Family-heat (2.3) and Multi Family-no heat (2.3) have similar sized households (see Table 6–4). Roughly 20% of these households have a child younger than 5 years of age living within them. One-third of Single Family-heat (32%), Single Family-no heat (29%), and Multi Family-heat (33%) households have a resident who is aged 65 years or older, while only 22% of the Multi Family-no heat households does so. Mobile home households have the lowest average number of occupants (2.0), the lowest percentage of occupants under 5 years of age (12%), and the highest percentage aged 65 years or older (43%).

TABLE 6–4: OCCUPANT AGE PROFILE BY HOUSEHOLD TYPE

Occupants	Single Family (Heat) n=227	Single Family (No Heat) n=75	Multi Family (Heat) n=154	Multi Family (No Heat) n=76	Mobile Home (Heat) n=46
Average in Household	2.8	2.2	2.3	2.3	2.0
(S.D.)	σ1.48	σ1.29	σ1.42	σ1.35	σ1.11
Under 5 years	20%	18%	21%	22%	12%
65 years or older	32%	29%	33%	22%	43%

Low Income Status is defined as customers who qualify for energy assistance in the State of Illinois, and is dependent upon a combination of annual household income and number of people residing in the household. Customers may be eligible to receive assistance under the Low Income Home Energy Assistance Program (LIHEAP) if their household combined income for the 30 days prior to application is at or below the following levels shown on the chart below. For renters, if heat and/or electricity are included in the rent, then the rent must be greater than 30% of the household income in order to be eligible to receive benefits. The figures shown below in Table 6–5 are based on the federal poverty guidelines. The Guidelines posted were effective July 1, 2009.

TABLE 6–5: LIHEAP QUALIFICATION GUIDELINES

Family Size	30 Day Income	Annual Income
1	$1,354	$16,245
2	$1,821	$21,855
3	$2,289	$27,465
4	$2,756	$33,075
5	$3,224	$38,685
6	$3,691	$44,295
7	$4,159	$49,905
8	$4,626	$55,515

Looking at Table 6–6, for each additional household member, add $467.50. It is estimated that single family no heat households (39%) are more likely to qualify for Low Income Status than the multi family No Heat (25%). Mobile Home households have fewer occupants than any other residential segment (2.0), and have the lowest income which qualifies a high percentage of them into the Low Income Status (43%). The assumption of eligibility within the survey respondents are based on their self-reported income.

TABLE 6–6: PERCENTAGE OF RESIDENTS QUALIFYING FOR LOW INCOME STATUS-SELF REPORTED INCOME

Low Income Qualification	Single Family (Heat) n=227	Single Family (No Heat) n=75	Multi Family (Heat) n=154	Multi Family (No Heat) n=76	Mobile Home (Heat) n=46
Qualifies for Low Income Status (yes/no)	14%	39%	18%	25%	43%

Housing Characteristics

No Heat homes, both Single and Multi Family, are smaller and older than those to whom Nicor Gas reports as heat customers, as shown in Table 6–7. Single Family and Multi Family heat homes are constructed in a variety of materials, with wood and brick dominating. Three-quarters of Multi Family no heat homes are constructed of brick. Mobile Homes commonly have exterior siding made of aluminum, which may account for the high percentage of the "other" comments.

Single Family Heat and No Heat homes have a similar distribution of number of rooms, stories, and basement/crawlspace. Multi Family homes with No Heat are more likely to be single story (64%) compared to Multi Family-Heat (46%) homes. Most Mobile homes are one story (96%).

TABLE 6–7: RESIDENTIAL DWELLING PROFILES

Dwelling Information	Single Family (Heat) n=227	Single Family (No Heat) n=75	Multi Family (Heat) n=154	Multi Family (No Heat) n=76	Mobile Home (Heat) n=46
Size of Home					
1350 square feet	60%	99%	28%	94%	26%
1800 square feet	21%	1%	22%	3%	37%
2200 square feet	19%	0%	50%	3%	37%
Average Year Home Built (S.D.)	1967 σ26.38	1926 σ46.29	1980 σ28.77	1942 σ30.93	1983 σ18.01
Rooms	n=153	n=73	n=137	n=76	n=45
Average	7.4	6.4	5.7	4.6	5.4
(S.D.)	σ3.00	σ3.15	σ2.45	σ2.12	σ2.03
Average Not Heated	0.3	0.2	0.3	0.4	0.1
(S.D.)	σ0.74	σ0.44	σ1.11	σ0.72	σ0.29
Number of Stories					
One	44%	41%	46%	64%	96%
Two	45%	40%	46%	24%	2%
Three +	11%	19%	8%	11%	2%
Space Below Ground					
Basement	72%	65%	41%	44%	2%
Crawlspace	35%	32%	17%	8%	31%
Construction Material					
Wood	54%	36%	41%	11%	41%
Brick	26%	55%	40%	74%	7%
Stucco	3%	1%	1%	0%	0%
Other	13%	5%	12%	7%	35%
Don't Know	4%	3%	6%	9%	17%

Current Gas Usage

Furnace Systems

Among the three segments of Nicor Gas residential customers who report heating with natural gas, forced air/wall heater furnace systems are most prevalent (73% for Single Family households, 64% for Multi family, and 70% for Mobile Homes), followed by central heat-not forced air/wall heaters (39% for Single Family, 44% for Multi Family, and 24% for Mobile Homes). One in ten Mobile home dwellers (11%) do not know what type of heating system they have. A small percentage of respondents said they had some other type of heat (4% of Single Family and Mobile Home, 3% of Multi-Family). When asked what type of system they had, one-half said "gas" or "furnace." Other single mentions included a corn stove, a natural gas stove, a wood stove, a steam boiler, and an oil burner. There were also two mentions of electric heat. It should be noted that *if* the multi-family residences are master-metered facilities, the values for them might change.

The average age of most forced air and central heat systems is greater than nine years old, as shown in Table 6–8. Some of the older models may be ready for replacement with more energy efficient systems.

TABLE 6–8: NICOR GAS RESIDENTIAL HEAT CUSTOMERS FURNACE SYSTEMS

Type of Furnace System	Single Family n=227	Multi Family n=154	Mobile Home n=46
Forced air/wall heater	73%	64%	70%
Average Age	10.0	9.6	10.9
(S.D.)	σ8.40	σ6.94	σ9.26
Central heat	39%	44%	24%
Average Age	12.4	12.2	9.7
(S.D.)	σ11.29	σ9.12	σ6.90
Hot water/baseboard	12%	14%	9%
Average Age	10.1	8.8	1.5
(S.D.)	σ12.79	σ6.28	σ0.58
Other	4%	3%	4 %
Average Age	7.4	15.3	11.0
(S.D.)	σ6.29	σ12.66	σ11.31
No furnace dedicated to unit	0%	2%	0%
Don't know	2%	6%	11%

The average number of thermostats in Single and Multi Family homes is 1.2; in Single Family homes 75% (0.9 out of 1.2) of the thermostats are programmable, and 67% (0.8 out of 1.2) are programmable in Multi Family homes. Only 36% (0.4 out of the 1.1) of the thermostats are programmable in Mobile Homes (see Table 6–9).

For those residents who have programmable thermostats, seven in ten who reside in Single Family or Multi Family homes actually auto program the device (shown in Table 6–9 as "HH Programs" plus "HH Does Both" (where HH stands for "household"), while six in ten Mobile home residents do so. From these comparisons, we can assume that there is opportunity for improved energy efficiency through possible education in the use and operation of the programmable thermostats.

TABLE 6–9: RESIDENTIAL THERMOSTAT PROFILES BY DWELLING TYPE

Nicor Gas Heat Customers Thermostats	Single Family n=227	Multi Family n=154	Mobile Home n=46
Average Number of Thermostats	1.2	1.2	1.1
(S.D.)	σ0.62	σ0.6	σ0.26
Average No. of Programmable Thermostats	0.9	0.8	0.4
(S.D.)	σ0.72	σ0.53	σ0.50
HH Programs	38%	31%	47%
HH Sets Manually	29%	28%	41%
HH Does Both	33%	41%	12%
HH Has Zone Heating	14%	14%	7%

Few customers have secondary heating sources, although the percentage is slightly higher than those in Multi Family homes:

TABLE 6–10: PERCENT OF HOMES WITH SECONDARY HEATING BY HOUSEHOLD TYPE

Nicor Gas Heat Customers Secondary Heating	Single Family n=227	Multi Family n=154	Mobile Home n=46
Secondary Heating Source (% Yes)	11%	14%	7%

Water Heating Systems

Natural gas is used to heat water by a majority of Single Family heat (94%) and Multi Family heat (89%) homes, as well as Mobile (78%), while no heat homes are less likely to use natural gas to heat their water (63% for Single Family-No Heat and 54% for Multi Family-No Heat); see Table 6–11.

Conventional Tank systems are most common; however, a significant number of residents (and especially those in Multi Family no Heat homes) do not know what type of system they have. Across all of the segments, residents who know the temperature setting of their hot water system are in the minority. There may be opportunities for impacting conventional tank systems since they are high in saturation, as well as opportunities for impacting dwellings having tankless on demand units located in smaller residences.

TABLE 6–11: RESIDENTIAL WATER HEATING PROFILES BY HOUSEHOLD TYPE

Water Heating	Single Family (Heat) n=227	Single Family (No Heat) n=75	Multi Family (Heat) n=154	Multi Family (No Heat) n=76	Mobile Home (Heat) n=46
Heating Water – Natural Gas	94%	63%	89%	54%	78%
Type of System					
Conventional Tank	74%	64%	65%	39%	69%
Central Hot Water System	9%	4%	14%	22%	3%
Tankless on Demand	2%	4%	0%	0%	3%
Other	1%	7%	2%	0%	6%
Don't know	13%	20%	19%	39%	20%
Knows Temp Setting	30%	21%	21%	7%	21%
Average setting	123	103	117	120	123

A high percentage of these water heating systems are Energy Star rated (61% in Single Family-heat homes, 62% in Single Family-no Heat homes, 55% in Multi Family-heat homes, and 67% in Mobile Homes); however, the percentage is significantly less (29%) in Multi Family-no Heat homes. As seen in Table 6–12, a substantial percentage of residents did not know whether or not their water heater was Energy Star rated (22% for Single Family-heat homes, 24% for Single Family-no Heat, 33% for Multi Family-heat, 21% for Multi Family-no Heat, and 25% for Mobile homes.

TABLE 6–12: PRESENCE AND KNOWLEDGE OF ENERGY STAR RATED WATER HEATING BY HOUSEHOLD TYPE

Energy Star Water Heating	Single Family (Heat) n=227	Single Family (No Heat) n=75	Multi Family (Heat) n=154	Multi Family (No Heat) n=76	Mobile Home (Heat) n=46
Energy Star Rated Natural Gas Hot Water System					
Yes	61%	62%	55%	29%	67%
Don't Know	22%	24%	33%	21%	25%

Other Appliances

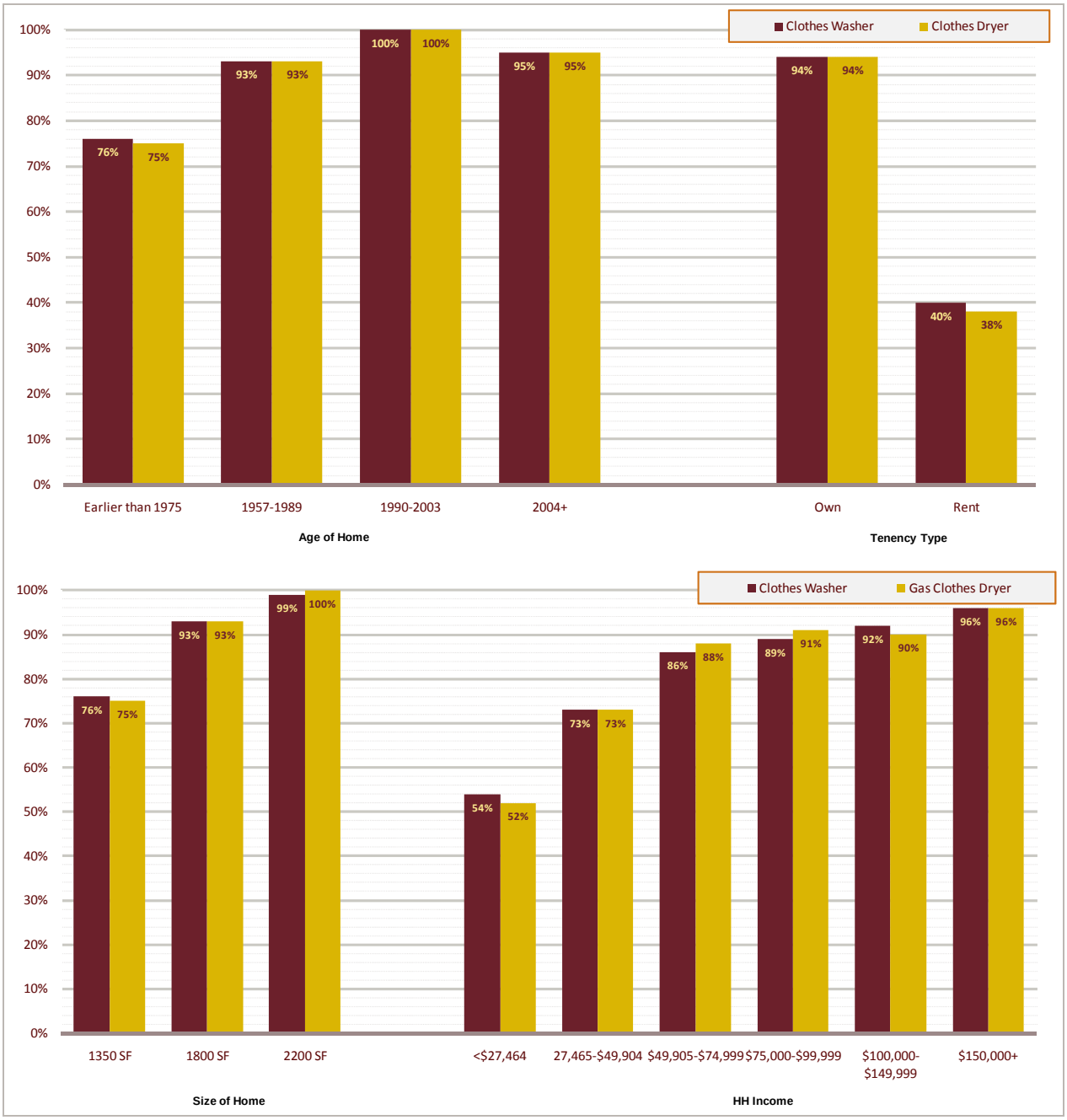
As shown in Table 6–13, 96% of Single Family and 90% of Multi Family Heat homes have both a clothes washer and a dryer, while 78% of Mobile homes have these appliances. 68% of Single Family-No Heat homes have both a clothes washer and dryer, with Multi Family-no Heat households being least likely to have these appliances, at 29%.

TABLE 6–13: RESIDENTIAL CLOTHES WASHING AND DRYING PROFILES BY HOUSEHOLD TYPE

Clothes Washing & Drying	Single Family (Heat) n=227	Single Family (No Heat) n=75	Multi Family (Heat) n=154	Multi Family (No Heat) n=76	Mobile Home (Heat) n=46
Clothes Washer	96%	68%	90%	29%	78%
Clothes Dryer	96%	68%	90%	29%	78%
Natural Gas	(n=159) 74%	(n=27) 56%	(n=89) 68%	(n=11) 57%	(n=19) 56%
Weekly Number of Loads Dried	5.7	4.7	4.2	4.8	4.1
(S.D.)	σ3.49	σ3.34	σ2.96	σ2.86	σ3.25

Other indicators for the presence of washer and dryer include ownership of home (94%) versus renting (40% for washer/38% for dryer), larger and newer homes, and higher income households, as shown in Figure 6–2. Residents with lower incomes (<$27,464) are more likely to have an electric powered dryer (53% versus 30% for higher income households.)

FIGURE 6–2: RESIDENTIAL CLOTHES WASHING AND DRYING CHARACTERISTICS



Residents of Multi Family-No Heat homes are most likely to cook with natural gas, at 95%. 87% of Mobile homes use natural gas for cooking, followed by 84% of Single Family-no Heat, 82% of Multi Family-heat, and 78% of Single Family-heat. Of the households that cook with natural gas, most have both a gas cook top and oven, as shown in Table 6–14. It is suspected that the mobile home respondents may have confused using natural gas for their cooking equipment with propane-fired

equipment. But, possible gas efficiency improvements could also be applicable to propane equipment.

TABLE 6–14: RESIDENTIAL COOKING PROFILES BY HOUSEHOLD TYPE

Cooking	Single Family (Heat) n=227	Single Family (No Heat) n=75	Multi Family (Heat) n=154	Multi Family (No Heat) n=76	Mobile Home (Heat) n=46
Natural Gas	78%	84%	82%	95%	87%
Cook top	(n=170) 86%	(n=61) 89%	(n=122) 89%	(n=67) 91%	(n=38) 71%
Gas Oven	(n=160) 90%	(n=56) 89%	(n=117) 96%	(n=67) 97%	(n=39) 98%

Relatively few households across all segments have hot tubs or spas, gas fireplaces, BBQ grills with direct gas piping, or swimming pools (see Table 6–15).

6% of Single Family-heat households report having a Hot Tub or Spa, 4% of Single Family-no heat households, and just 1% of Multi-Family-heat and No-Heat households have one. 7% of Single Family-no heat households have a Gas Fireplace, followed by Single and Multi Family-heat with 4%, and Multi Family-no heat with 1%. Of the small percentage who own a Gas Fireplace, one-third indicate they use this fireplace to help heat their home.

4% of Single Family-heat and no heat households have a fixed line Gas BBQ Grill, 3% of Multi Family-heat households have one, and 1% of Multi Family-no Heat households also have one. 3% of Single Family-no heat households have a swimming pool, with 1% of Single Family-heat homes having one; no other segments reported having a swimming pool. Mobile home residents did not report having any of these amenities.

TABLE 6–15: RESIDENTIAL GAS AMENETIES BY HOUSEHOLD TYPE

Amenity	Single Family (Heat) n=227	Single Family (No Heat) n=75	Multi Family (Heat) n=154	Multi Family (No Heat) n=76	Mobile Home (Heat) n=46
Hot Tub or Spa	6%	4%	1%	1%	0%
Gas Fireplace	4%	7%	4%	1%	0%
Gas BBQ Grill (fixed line)	4%	4%	3%	1%	0%
Swimming pool	1%	3%	0%	0%	0%

As seen in Table 6–16, 11% of Mobile Home households intend to purchase a new gas appliance within the next 12 months, followed by 8% of Single Family-heat, 7% of Single Family-no heat, 6% of Multifamily-heat, and 3% of Multi Family-no Heat households. This is a relatively low percentage across all segments, and may indicate the need for a strong gas appliance replacement program with appropriate incentives to entice more households to upgrade their equipment.

TABLE 6–16: RESIDENTIAL INTENT TO PURCHASE NEW GAS APPLIANCES BY HOUSEHOLD TYPE

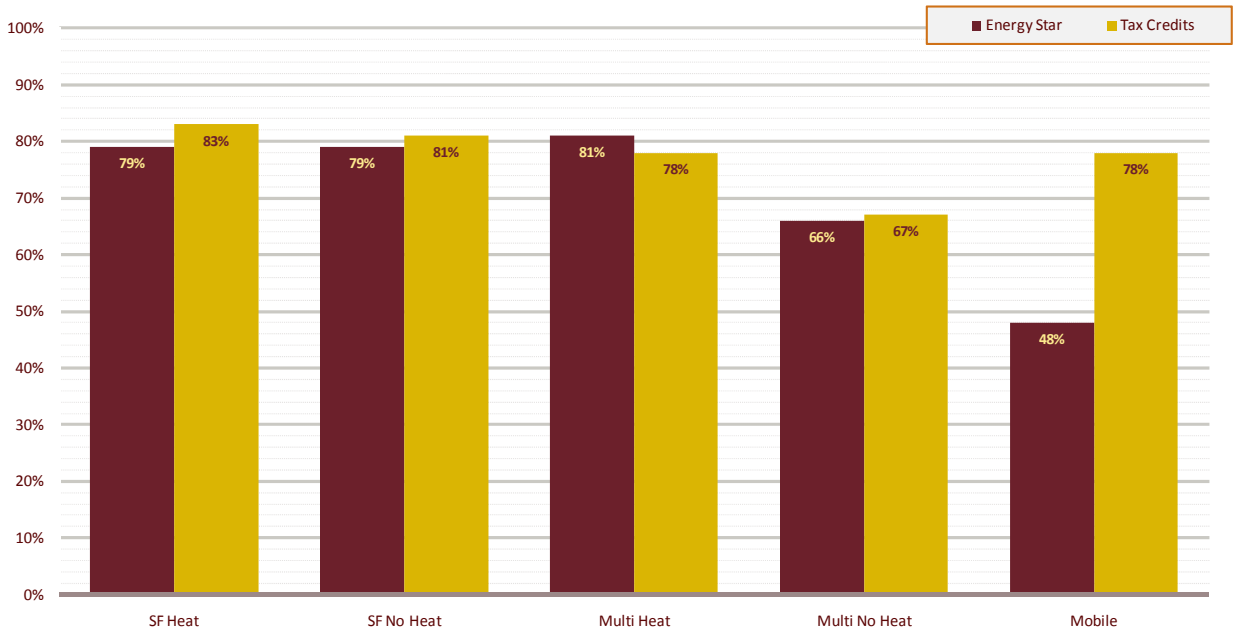
Purchase Intent	Single Family (Heat) n=227	Single Family (No Heat) n=75	Multi Family (Heat) n=154	Multi Family (No Heat) n=76	Mobile Home (Heat) n=46
Intends to purchase new gas appliance	8%	7%	6%	3%	11%

Energy Efficiency Measures

There is high awareness of the Energy Star program among residents of Single and Multi Family homes; residents of Mobile homes are less aware of the program (see Figure 6–3). Of those aware of Energy Star, most were able to provide a good description of its energy efficiency nature.

There is similar awareness of the availability of federal tax credits for some energy efficiency measures purchased and installed, but Mobile home residents have higher awareness of this program.

FIGURE 6–3: RESIDENTIAL ENERGY STAR AND TAX CREDIT PERCENTAGES BY HOUSEHOLD TYPE



99% of respondents live in homes that have at least one shower, and 71% of Single Family-heat, 62% of Single Family-no heat, and 67% of Multi Family-heat, 61% of Multi Family-no Heat, and 70% of Mobile home households have installed at least one low flow showerhead (shown in Table 6–17). There is lower saturation for water flow restrictors across all segments, with 28% of those in Mobile homes having this device, followed by 27% in Single Family-heat households, 25% in both Single Family-no heat and Multi Family-heat households, and 16% in Multi Family-no heat households.

TABLE 6–17: RESIDENTIAL WATER DEVICES BY HOUSEHOLD TYPE

Water Devices	Single Family (Heat) n=227	Single Family (No Heat) n=75	Multi Family (Heat) n=154	Multi Family (No Heat) n=76	Mobile Home (Heat) n=46
Low Flow Showerhead					
At least one	71%	62%	67%	61%	70%
Don't Know	12%	11%	14%	21%	26%
Flow Restrictors					
Yes	27%	25%	25%	16%	28%
Don't Know	11%	17%	20%	28%	17%

Looking at Table 6–18, 95% of Single Family-heat and Mobile homes have insulation installed in their walls, followed by 93% of Multi Family-heat, 86% of Single Family-no heat, and 80% of Multi Family-no heat households. 96% of Single Family-heat households have insulation installed in their ceilings, while 95% of Mobile homes, 88% of Multi Family-heat, 87% of Single Family-no heat, and 80% of Multi Family-no heat households do so.

TABLE 6–18: RESIDENTIAL INSULATION PROFILES BY HOUSEHOLD TYPE

Insulation	Single Family (Heat) n=227	Single Family (No Heat) n=75	Multi Family (Heat) n=154	Multi Family (No Heat) n=76	Mobile Home (Heat) n=46
Walls	95%	86%	93%	80%	95%
Ceiling	96%	87%	88%	80%	95%

Few residents have had an energy audit performed: 9% of Mobile home households report participating, 8% of those residing in a Single Family-no heat homes, 7% in a Single Family-heat homes, 3% in Multi Family-heat and 2% in a Multi Family-no heat homes say they have had an energy audit (see Table 6–19). There is an opportunity for Nicor Gas to offer energy audits, as this represents an underserved need for residents to decrease their natural gas usage and save money.

TABLE 6–19: RESIDENTIAL ENERGY AUDIT SATURATION BY HOUSEHOLD TYPE

Energy Audits	Single Family (Heat) n=227	Single Family (No Heat) n=75	Multi Family (Heat) n=154	Multi Family (No Heat) n=76	Mobile Home (Heat) n=46
Energy Audit Performed	7%	8%	3%	2%	9%

As seen in Table 6–20, respondents report a higher participation in weatherization programs than energy audits, whether formal or self-initiated (29% of Single Family-heat households have participated in a formal program, 42% in a self-initiated program, Single Family-no heat at 22% formal and 38% self-initiated, Multi family-heat at 13% formal and 23% self-initiated, Multi Family-no heat at 13% formal and 15% self-initiated, with Mobile homes at 26% formal and 36% self-initiated).

The most popular measures installed within weatherization activities include installing new windows and doors and adding insulation, including pipe insulation. There are a number of "other" mentions (from 35 – 44%), and these include putting plastic on windows and upgrading heating and air conditioning.

TABLE 6–20: WEATHERIZATION PROFILES BY HOUSEHOLD TYPE

Weatherization	Single Family (Heat) n=227	Single Family (No Heat) n=75	Multi Family (Heat) n=154	Multi Family (No Heat) n=76	Mobile Home (Heat) n=46
Formal Program	29%	22%	13%	13%	26%
New windows/doors	75%	81%	53%	88%	82%
Caulking/weather-stripping	30%	19%	37%	13%	18%
Additional insulation	40%	6%	0%	13%	36%
Pipe insulation	3%	6%	5%	13%	0%
Low flow showerhead	3%	6%	0%	0%	0%
Hot water tank wrap	3%	0%	5%	0%	0%
Other*	28%	13%	26%	0%	45%
Self Initiated	42%	38%	23%	15%	36%
New windows/doors	41%	31%	36%	40%	44%
Caulking/weather-stripping	53%	42%	48%	20%	25%
Additional insulation	46%	27%	30%	20%	38%
Pipe insulation	3%	0%	0%	0%	6%
Low flow showerhead	2%	0%	0%	0%	0%
Hot water tank wrap	3%	8%	0%	0%	0%
Other*	35%	38%	39%	40%	44%

* responses that fell outside of these listed categories were all recorded as "other"

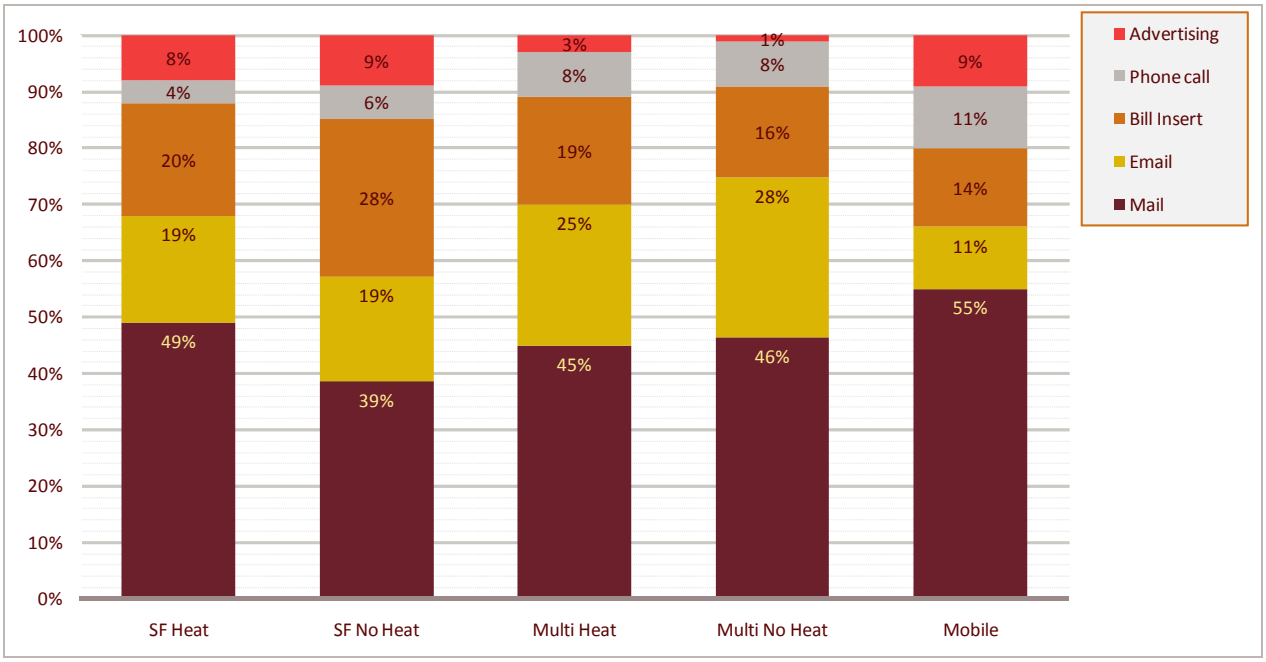
Those who own their homes are more likely to have performed some kind of weatherization (26% of those who own have participated in a formal program versus 6% of renters, and 38% of those who own have self-initiated measures versus 17% who rent); those who live in older homes are more likely to have participated in a formal weatherization program (27% of those who live in homes built earlier than 1975 and 26% of those who live in homes built between 1975 and 1989, versus 12 % of those who live in homes built between 1999 and 2003 and 10% of those who live in homes built later than 2004). See Table 6–21.

TABLE 6–21: WEATHERIZATION BY AGE OF HOME AND OWN VERSUS RENT

	Age of Home					
Weatherization Program	Earlier than 1975	1975 – 1989	1999 – 2003	2004+	Own	Rent
Formal	27%	26%	12%	10%	26%	6%
Self-Initiated	38%	29%	28%	14%	38%	17%

When asked how residents would prefer to receive information regarding Nicor Gas energy efficiency programs and activities that could save them money on their energy bills, the most popular communication method was via "information addressed to you and sent directly to your home," referenced as "Mail" in Figure 6–4. Percentage of preference ranged from 55% of Mobile households, followed by 49% among Single Family-heat, 46% of Multi Family-no heat, 45% Multi Family-heat, and 39% Single Family-no heat. The next most popular modes were email (28% of Multi Family-no heat preferred this method, followed by 25% of Multi Family-heat, 19% of Single Family heat and no heat, and 11% of Mobile Home households) and bill insert (28% of Single Family-no heat households, 20% of Single Family-heat, 19% Multi Family-heat, 16% of Multi Family-no heat, and 14% of Mobile Home respondents).

FIGURE 6–4: PREFERRED CONTACT METHODS BY HOUSEHOLD TYPE



COMMERCIAL SEGMENT: SMALL/MID SIZE BUSINESSES

Small-Mid Commercial Economic Use

Business customers were asked of their primary, secondary, and tertiary economic uses of the business space. 38% of these businesses use their primary space as a Commercial Office, 15% for Retail Trade and the remainder for a variety of others. Office space and storage are the most common secondary and tertiary uses (Table 6–22).

TABLE 6–22: SMALL/MID COMMERCIAL PRIMARY, SECONDARY, AND TERTIARY USES OF SPACE

Usage	Primary	Secondary	Tertiary
	n=297	n=100	n=21
Commercial Office	38%	39%	19%
Retail Trade	15%	2%	5%
Manufacturing/Industrial	8%	1%	
Healthcare	5%		
Warehouse (high bay)	5%	6%	
Restaurant/supermarket	4%		
Storage (low bay)	4%	16%	5%
Education Services	3%	2%	
Institutional	2%	3%	
Hospitality	2%	4%	
Automotive Services	2%		
Arts, Entertainment, Recreation	1%	4%	
Other	7%	6%	12%
Don't Know	2%	14%	57%

Business Characteristics

Looking at Table 6–23, Small-Mid businesses are slightly more likely to be housed in single (56%) versus multiple buildings (44%). 64% of businesses own their building, while 36% are in a leasing or renting situation. Of those who rent, 11% have their natural gas payment included in their rent with 36% of that subset receiving information on their natural gas usage (e.g. meter readout, copy of the gas bill).

Those businesses who own their building are more likely to have their business in a single building (62% versus 42%), have a higher number of employees (average of 45.1 versus 14.8), have a common space (47% versus 28%), and are more likely to have instituted energy efficiency measures (78% versus 57%).

TABLE 6–23: SMALL/MID COMMERCIAL BUSINESS CHARACTERISTICS

	n=297
Average Number of Employees/S.D.	34.0 σ118.10
Ownership	
Own Building	64%
Rent/Lease	36%
Gas included in rent	11%
Business Housed in	
Single Building	56%
Multiple Buildings	44%
Percentage of Space Taken By	
Primary Use	84%
Secondary Use	(n=78) 28%
Tertiary Use	(n=6) 17%
Common Spaces Present	40%
Percentage of Space	(n=102) 13%

Building Characteristics

Small-Mid business building construction is dominated by brick (53%), concrete block (12%) and metal (12%), as seen in Table 6–24. Buildings that are 50 years of age or older are more likely to have floors below ground level (0.5% with below ground versus 0.3% above ground); for buildings that are newer, those age 20 years or older are more likely to be made of brick (66% versus 31% for buildings 0 – 19 years old), and newer (under 20 years of age) buildings are more likely to be constructed of metal (31% versus 7% for buildings older than 20 years of age).

Average square footage of the building/complex where the business is located is 48,449 square feet. Only 8% of the Small-Mid buildings have enclosed indoor parking.

TABLE 6–24: SMALL/MID COMMERCIAL BUILDING CHARACTERISTICS

Small-Mid Building Characteristics	n=181
(Owns building)	
Age of Primary Building	(n=163) 37.1
(S.D.)	σ29.07
Total Gross Square Footage	48,449
(S.D.)	σ116,273.36
Floors	
Above Ground Level/S.D.	1.7 σ1.32
Below Ground Level/S.D.	0.4 σ0.53
Exterior Wall Construction (Owns Building)	n=177
Brick	53%
Concrete Block	12%
Metal	12%
Wood	9%
Concrete	7%
Glass	1%
Other	5%

Small-Mid businesses average 22.2% of external wall space in windows, and those businesses that have windows average 3.7 panes of glass. 76% of windows are clear, and 51% of frames are metal, 26% are wood and 16% are of vinyl (Table 6–25).

TABLE 6–25: SMALL/MID COMMERCIAL WINDOW CHARACTERISTICS

Window Characteristics	n=179
Windows	
Percentage of External Wall	22.2%
Average Number of Panes of Glass/S.D.	(n=155) 3.7 σ6.05
Characteristics	n=170
Clear (No Glazing)	76%
Tinted	16%
Reflective	6%
Opaque	2%
Frames	
Metal	51%
Wood	26%
Vinyl	16%
Other	8%

Table 6–26 shows percentage of space used for primary, secondary, tertiary, and common space among those businesses who reported the economic use of their business. It also shows the percent of each space that is heated and cooled.

95% of Small-Mid business space for primary use is heated, although a lower percentage of the space is cooled (77%). 90% of secondary space is heated, and 68% is cooled. 100% of tertiary space is

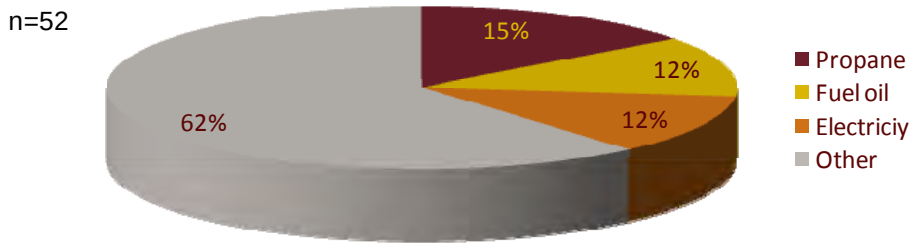
heated and cooled, and 83% of common space (defined as foyers, vestibules or other non-business related areas) is heated, while 68% is cooled. Table 6–26 indicates these results. It should be noted that this table does not sum to 100% because not all facilities had secondary and tertiary space. The percentages represent values for all buildings specifying having primary, secondary, tertiary and common space.

TABLE 6–26: SMALL/MID COMMERCIAL SPACE CONDITIONING

Small-Mid Business Space Conditioning	%
% of Space for Primary Use	(n=260) 84%
Heated	(n=279) 95%
Cooled	(n=275) 77%
% of Space for Secondary Space	(n=78) 28%
Heated	(n=80) 90%
Cooled	(n=80) 68%
% of Space for Tertiary Space	(n=6) 17%
Heated	(n=6) 100%
Cooled	(n=6) 100%
% of Space for Common Space	(n=102) 13%
Heated	(n=114) 83%
Cooled	(n=114) 68%

As shown in Figure 6–5, for businesses that are not Nicor heat customers, heat is provided by a range of fuels, from propane (15%), fuel oil (12%), electricity (12%), and other sources (62%).

FIGURE 6–5: FUEL CHOICES FOR NICOR NON-HEAT SMALL/MID C&I CUSTOMERS



Current Gas Usage

Heating and Cooling Systems

Small-Mid businesses were asked what types of gas space heating units were used at the facility, how many units of each type of gas space heating unit they had, how much square footage each unit heated, and the average age of each unit; the results are presented in Table 6–27. 40% have Indoor Gas Forced Air Furnaces (each unit heating 2490 square feet), 21% have Rooftop or Outdoor

Package Units (each unit heating 4371 square feet), 17% have Indoor Unit Heaters (each unit heating 2321 square feet), 12% have Hot Water Boilers (each unit heating 4250 square feet), 7% have Combined Boiler and Water Heaters (each unit heating 2933 square feet), 6% have Radiant Heaters (each unit heating 3443 square feet), 3% have Steam Boilers with Steam Traps (each unit heating 8175 square feet), and 3% have some other type of space heating system.

Steam Boilers with Steam Traps are the oldest heating systems, with units averaging 25 years of age or older, followed by Hot Water Boilers and Radiant Heaters that average 17.5 years of age, Indoor Gas Forced Air Furnaces averaging 13 years of age, Rooftop/Outdoor Package Units and Indoor Unit Heaters at 9 years of age, and Combined Boiler and Water Heaters (first units average 16 years of age, second units average 3.7 years of age). There seem to be opportunities for heating equipment replacement within the Nicor Gas service territory.

TABLE 6–27: SMALL/MID COMMERCIAL HEATING EQUIPMENT

Space Heating Source	n=212
Indoor Gas Forced Air Furnace/S.D.	40%
No. of Units	2.6 σ2.07
Average S.F. heated	2,490 σ2,191.04
Average Age of Unit #1	13.0 σ8.73
Average Age of Unit #2	12.6 σ7.25
Average Age of Unit #3	13.2 σ6.44
Rooftop or Outdoor Package Unit	21%
No. of Units	3.5 σ2.95
Average S.F. heated	4,371 σ3,617.75
Average Age of Unit #1	10.0 σ8.13
Average Age of Unit #2	9.7 σ7.58
Average Age of Unit #3	9.0 σ9.21
Average Age of Unit #4	9.5 σ9.71
Indoor Unit Heater	17%
No. of Units	3.9 σ3.36
Average S.F. heated.	2,321 σ2,831.82
Average Age of Unit #1	8.6 σ6.32
Average Age of Unit #2	7.2 σ5.74
Average Age of Unit #3	9.3 σ7.85
Average Age of Unit #4	9.3 σ6.15

Space Heating Source	n=212
Hot Water Boiler	12%
No. of Units/S.D.	2.2 σ1.82
Average S.F. heated	4,250 σ3,000.00
Average Age of Unit of #1	17.8 σ15.33
Average Age of Unit of #2	17.3 σ11.69
Combined Boiler and Water Heater	7%
No. of Units/S.D.	2.1 σ1.73
Average S.F. heated	2,933 σ2,100.79
Average Age of Unit #1	16.0 σ15.31
Average Age of Unit #2	3.7 σ4.62
Radiant Heater	6%
No. of Units/S.D.	3.3 σ3.50
Average S.F. heated	3,443 σ3,488.96
Average Age of Unit #1	12.1 σ12.51
Average Age of Unit #2	17.8 σ17.17
Average Age of Unit #3	17.0 σ18.38
Average Age of Unit #4	17.0 σ18.38
Steam Boilers w/Steam Trap(s)	3%
No. of Units/S.D.	2.6 σ1.14
Average S.F. heated	8,175 σ3,650.00
Average Age of Unit #1	34.0 σ16.82
Average Age of Unit #2	31.0 σ21.93
Average Age f Unit #3	25.0 σ20.66
Other	3%

Hot Water Systems

Among those Small-Mid businesses that own their own building and know how their hot water is heated (see Table 6–28), 77% use a gas water heater, 23% use an electric water heater, and 7% heat their water some other way (manner not reported). 72% of the gas hot water heater units are single units, and 28% are multiple units. Of those who have a gas hot water heater, 88% have a conventional gas water heater, 8% have an indirect-fired storage tank connected to a natural gas boiler, 2% have a tankless on-demand unit, and 2% have some other type of water heater. The average age of the primary gas water heater is 8.2 years.

TABLE 6–28: SMALL/MID COMMERCIAL WATER HEATING PROFILES

Water Heating	n=159
Gas Hot Water Heater (Owns Building)	77%
Single Unit	(n=113) 72%
Multiple Unit	(n=113) 28%
Type of Gas Hot Water Heater	
Conventional	(n=101) 88%
Indirect-Fired Storage Tank/connected to gas boiler	(n=101) 8%
Tankless, on-demand	(n=101) 2%
Other (type not reported)	(n=101) 2%
Average Years of Age of Gas Water Heater	8.2 σ8.51

Kitchen Equipment

Small-Mid businesses with NAICs Class 1 or Food Service classifications were asked about what type of kitchen equipment they had, how many units of each type of equipment, and the age of the equipment. The results are shown in Table 6–29. 59% have ovens (2.8 average units, 11.6 average years of age), 50% have grill/griddles (1.7 average units, 2.8 average years of age), 32% have fryer/broilers (2.0 average units, 4.3 average years of age), 32% have ranges (2.6 average units, 7.2 average years of age), 32% have food warmers (1.3 average units, 2.5 average years of age), 27% have steamers (1.0 average units, 6.0 average years of age), and 14% have dishwasher boosters (1.5 average units, 6.0 average years of age). 32% of respondents with NAICs Class 1 or Food Service say they do not have any of these gas appliances.

Other than ovens, the food preparation appliances seem to be of younger vintage. Replacement of ovens with energy efficient and Energy Star labeled units may be an area of opportunity for Nicor Gas in the food service sector.

TABLE 6–29: SMALL/MID COMMERCIAL FOOD PREPARATION PROFILES

	Respondents n=22	Number of units	Age
Small-Mid Commercial			
NAICs Class 1 or Food Service/S.D.			
Oven	59%	2.8 σ1.86	11.6 σ7.60
Grill/Griddle	50%	1.7 σ1.63	2.8 σ1.71
Fryer/Broiler	32%	2.0 σ0.71	4.3 σ3.21
Range	32%	2.6 σ2.07	7.2 σ7.60
Food Warmer	32%	1.3 σ0.58	2.5 σ2.12
Steamer	27%	1.0 σ-	6.0 σ2.83
Dishwasher Booster	14%	1.5 σ0.71	6.0 σ2.83
None of These*	32%	-	-

* small sample size makes interpretation difficult

Refrigeration

11% of Small-Mid and Industrial businesses use a large amount of refrigeration (see Table 6–30). The most common type of refrigerators are stand up models with doors at 73%, followed by floor units with opening tops and refrigerated rooms at 37% each, and "other" at 13%. Among those who have refrigerated rooms, the average square footage for these units is 484.3.

TABLE 6–30: SMALL/MID COMMERCIAL REFRIGERATION CHARACTERISTICS

Refrigeration Characteristics	n=292
Large Amount of Refrigeration	11%
Type of Refrigerators	(n=30)
Stand up with Doors	73%
Floor Units with Opening Tops	37%
Refrigerated Rooms	37%
Average Sq. Footage/S.D.	484.3 σ336.54
Other (type not reported)	13%

Energy Efficiency Measures Adopted

Respondents who knew economic use and percentage of space used for primary, secondary, tertiary, and common space were asked if space was heated/cooled, and if so, if heat and/or cooling setbacks or afterhours shutoff were ever used. As shown in Table 6–31, in the primary space, 62% used heat setback or afterhours shutoff and 69% used cooling setbacks or afterhours shutoff; in the secondary space 68% used heat setbacks or afterhours shutoff and 65% used cooling setbacks or afterhours shutoff; in the tertiary space 20% used heat and cooling setbacks or afterhours shutoff; in the common spaces 60% used heat setbacks or afterhours shutoff and 68% used cooling setbacks or afterhours shutoff.

74% of Small-Mid businesses have a programmable thermostat for their heating system, and 65% of these thermostats are Energy Star rated. 89% of buildings that are 20 years of age or newer have

programmable thermostats, while 68% of buildings aged 20 – 49 years have them, and 69% of buildings 50 years or older do so.

Given that there are a high percentage of programmable thermostats in this market sector, there may be opportunities for re-commissioning by optimizing the settings and possible expansion of the equipment optimization through other controls.

TABLE 6–31: SMALL/MID COMMERCIAL TEMPERATURE CONTROL PROFILES

Temperature Control	Small/Mid Size
Primary Space	
Heat setback	(n=249) 62%
AC setback	(n=199) 69%
Secondary Space	
Heat setback	(n=68) 68%
AC setback	(n=51) 65%
Tertiary Space	
Heat setback	(n=5) 20%
AC setback	(n=5) 20%
Common Space	
Heat setback	(n=91) 60%
AC setback	(n=74) 68%
Programmable Thermostat for Heat System	(n=288) 74%
Energy Star Rated	(n=148) 65%
Adjust Thermostat	
Manually	(n=203) 29%
Program	(n=203) 71%

77% of the Small-Mid businesses (among those who own their own building/complex and have a conventional gas water heater) have Energy Star rated water heaters. Of those who heat water with natural gas and have multiple unit systems (n=32), 78% have a secondary water heater that is a conventional natural gas unit, and of these 80% are Energy Star rated (see Table 6–32).

Just 15% of Small-Mid businesses who own their business have computerized energy controls such as an EMS system. Of those that do have such a system, 83% operate it at the local level, while 17% operate it remotely. Again, this may be a rationale for re-commissioning in this segment where many systems are operated locally.

Only 15% of these businesses have participated in an energy audit, but 34% have added energy conservation measures to their business such as extra roof insulation or low-energy windows.