



Research Report

Energy & Environment Consumer Survey Consumer Attitudes and Awareness about 13 Clean Energy Concepts

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Section 1

EXECUTIVE SUMMARY

1.1 Introduction

Pike Research conducted a web-based consumer survey of more than 1,000 U.S. adults, based on a nationally representative and demographically balanced sample, during the fourth quarter of 2011. As part of that survey, to better understand consumer attitudes about energy and environmental concepts, Pike Research asked respondents to rate their impressions of 13 specific topics. Namely, respondents were asked the following:

Please indicate your impression of each of the following concepts related to energy and the environment. If you are not familiar with a term, please choose N/A.

Strongly unfavorable
Somewhat unfavorable
Neutral
Favorable
Very favorable
N/A- Not sure / not familiar

Clean Energy

- *Solar energy*
- *Wind energy*
- *Clean coal*
- *Nuclear power*

Clean Transportation

- *Hybrid vehicles*
- *Biofuels*
- *Electric cars*
- *Natural gas cars*

Smart Grid

- *Smart grid*
- *Smart meters*

Carbon Management

- *Carbon offsets/credits*
- *Cap and trade*

Building Efficiency

- *LEED certification*

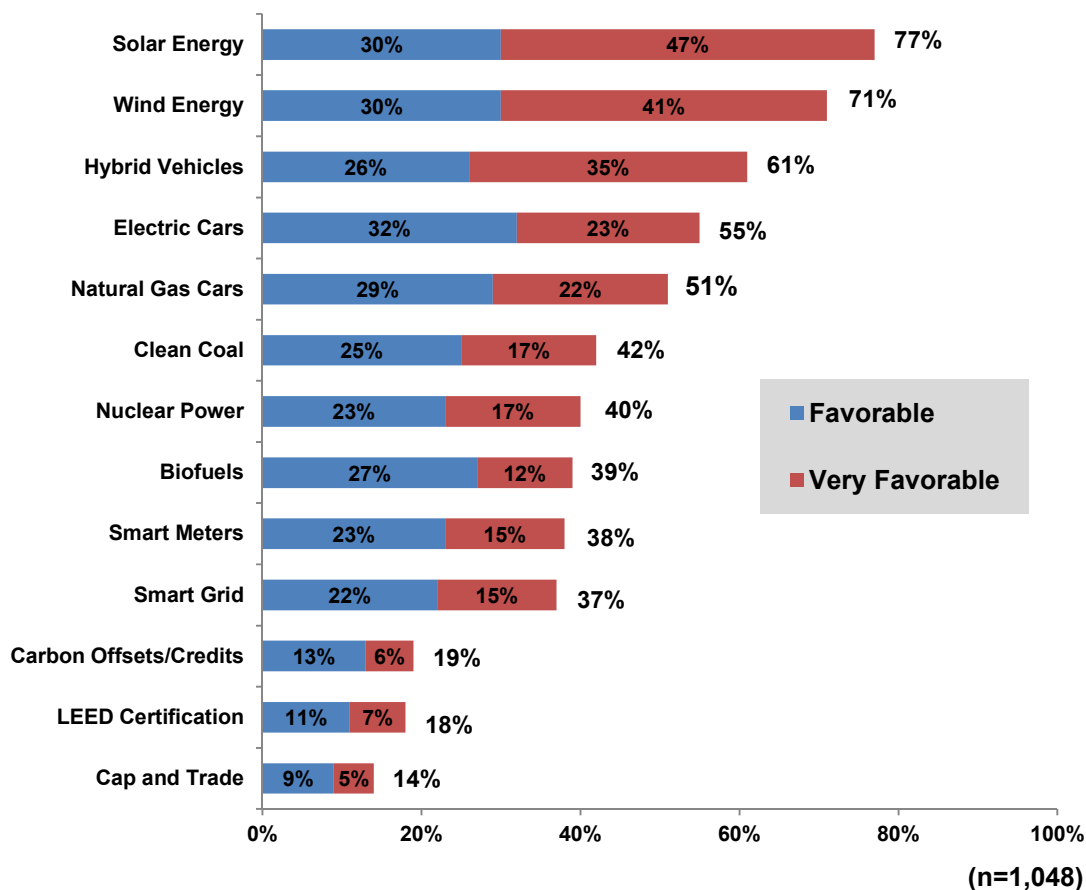
To compare consumer views of one concept against another, this white paper presents all responses to this question. In addition to favorable and unfavorable opinions, the number of respondents unfamiliar with a topic is an indicator of the respective levels of consumer awareness across these concepts.

1.2 Key Findings

Chart 1.1 shows the percentage of “favorable” and “very favorable” responses to each of the 13 topics presented in the survey. The following are noteworthy findings:

- With more than three-quarters of respondents (77%) favoring the concept, solar energy led in terms of favorable responses
- Cap and trade received the fewest favorable responses, with only 14%

Chart 1.1 *Favorable Impressions of Energy and Environmental Concepts*

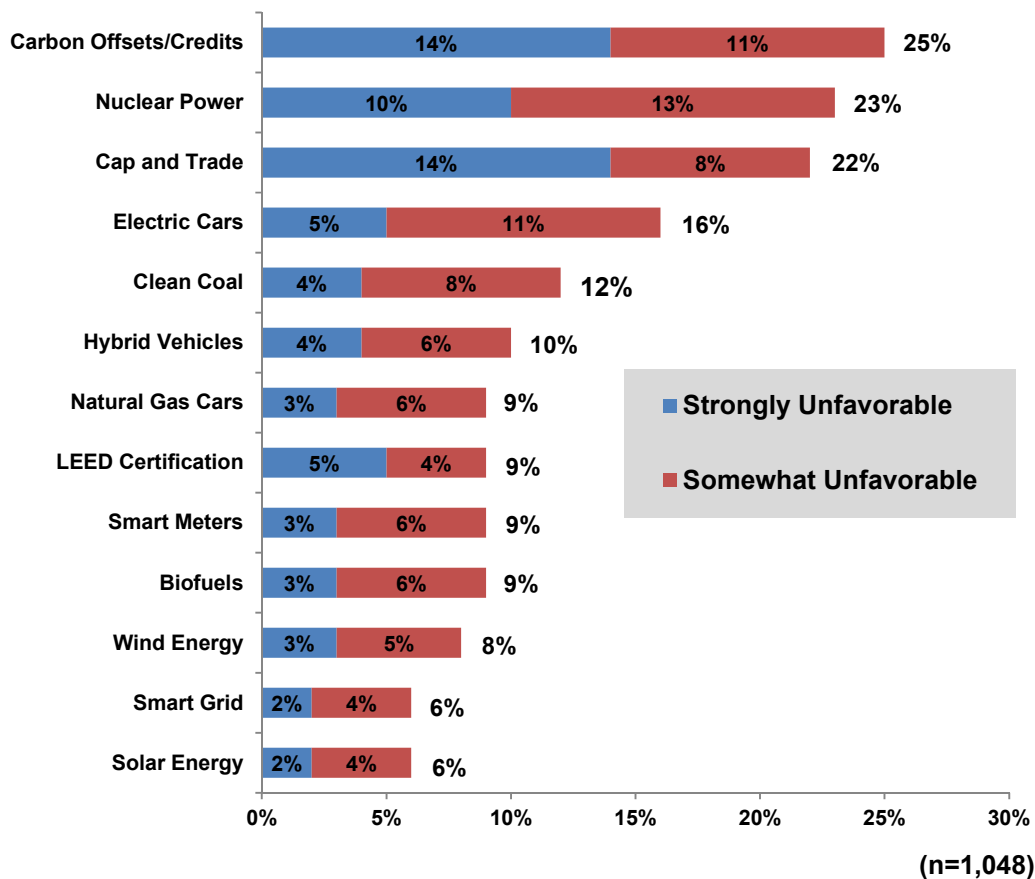


(Source: Pike Research)

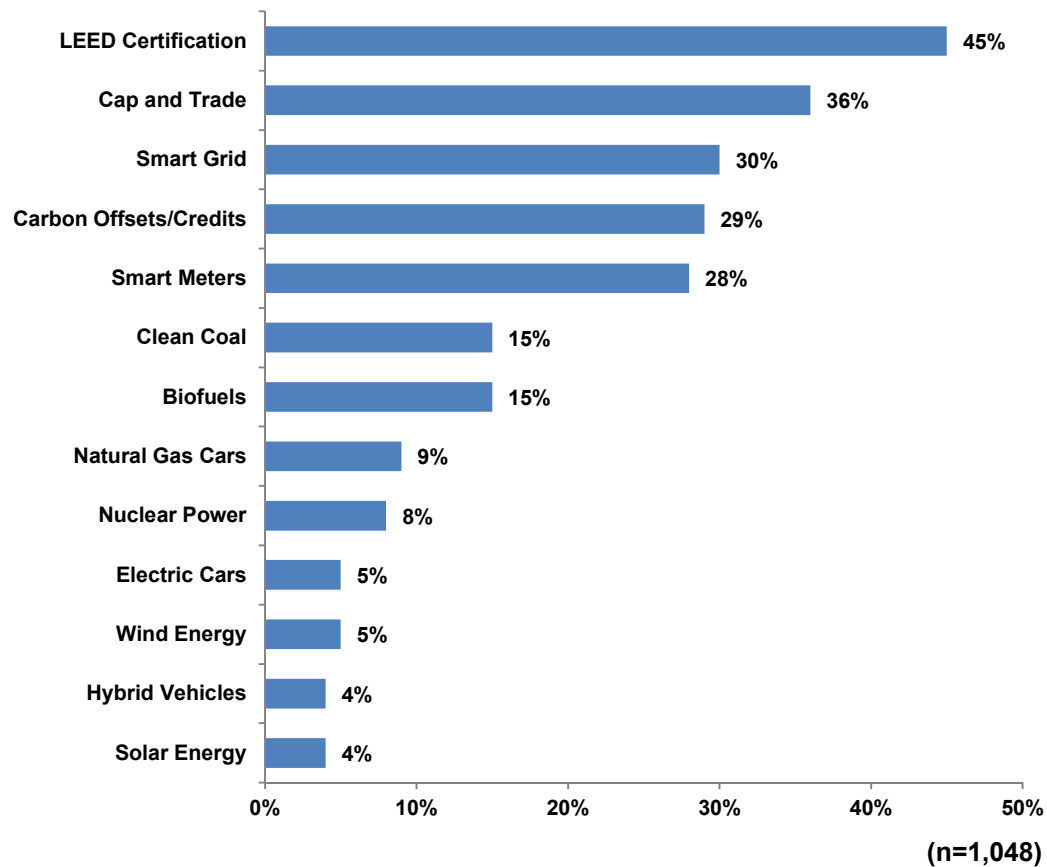
Chart 1.2 illustrates the percentage of unfavorable responses while Chart 1.3 shows the percentage of respondents who were unfamiliar with each topic. These summary graphs reveal the following key results:

- Carbon credits/offsets, nuclear power, and cap and trade garnered the most unfavorable reactions with 25%, 23%, and 22%, respectively, while solar and smart grid had the smallest percentage of negative responses (6% each).
- Consumers were least familiar with LEED certification, with 45% of respondents reporting that they were “not sure/not familiar” with the concept. In contrast, solar energy and hybrid vehicles were recognizable to nearly all consumers.

Chart 1.2 ***Unfavorable Impressions of Energy and Environmental Concepts***



(Source: Pike Research)

Chart 1.3 **Percentage of Respondents Unfamiliar with Energy and Environmental Concepts**

(Source: Pike Research)

1.3 Comparison to 2009 and 2010 Surveys

1.3.1 Favorable Rating Comparisons

One of the most interesting trends in the 2010 and 2011 editions of Pike Research's Energy & Environment Consumer Survey was the eroding support among consumers for clean energy concepts.

Favorable ratings deteriorated for several key concepts over the three editions of the survey. Overall, the average favorable rating of clean energy concepts fell from 50% in 2009 to 43% in 2011, with the most significant drop occurring between 2009 and 2010. Pike Research did not probe consumers on why they responded as they did.

Biofuels suffered the most precipitous decline in favorability, dropping 17 points from 56% in 2009 to 39% by 2011. Favorability ratings of Smart Grid and Clean Coal were tied for the second largest decline, each falling 10 points over the two-year period.

Table 1.1 Favorable Ratings: 2009, 2010, and 2011 Surveys

Concept	"Extremely" or "Very" Favorable		
	2009	2010	2011
Solar Energy	81%	79%	77%
Wind Energy	79%	75% ↓	71% ↓
Hybrid Vehicles	70%	64% ↓	61%
Electric Cars	62%	57% ↓	55%
Natural Gas Cars	N/A	N/A	51%
Clean Coal	52%	47% ↓	42% ↓
Nuclear Power	47%	42% ↓	40%
Biofuels	56%	47% ↓	39% ↓
Smart Meters	N/A	37%	38%
Smart Grid	47%	37% ↓	37%
Carbon Offsets/Credits	26%	24%	19% ↓
LEED Certification	16%	19%	18%
Cap and Trade	16%	15%	14%
Average Favorability	50%	45% ↓	43%

Arrows indicate a significant increase or decrease from the previous year, outside the +/- 3% margin of error for this survey.

(Source: Pike Research)

1.3.2 Unfavorable Rating Comparisons

Similarly, the 2011 survey indicated a general increase in “strongly” or “somewhat” unfavorable ratings, particularly compared to the 2009 survey. The increase in unfavorable ratings was not outside the margin of error in any year-over-year comparison, however there was a significant increase for the total period between 2009 and 2011.

The increase in unfavorable ratings was not as steep as the decrease in favorable ratings shown in Table 1.1, suggesting that consumer support for clean energy concepts is waning, but is not necessarily turning into animosity.

Nuclear Power and Electric Cars were tied for the largest increase in unfavorable ratings, with each concept having a 7-point uptick in unfavorable scores. Carbon Offsets/Credits increased 5 points from 20% unfavorable in 2009 to 25% unfavorable by 2011.

Table 1.2 Unfavorable Ratings: 2009, 2010, and 2011 Surveys

Concept	“Strongly” or “Somewhat” Unfavorable		
	2009	2010	2011
Solar Energy	3%	4%	6%
Wind Energy	4%	5%	8%
Hybrid Vehicles	8%	9%	10%
Electric Cars	9%	10%	16% ↑
Natural Gas Cars	N/A	N/A	9%
Clean Coal	11%	11%	12%
Nuclear Power	16%	19%	23% ↑
Biofuels	8%	9%	9%
Smart Meters	N/A	7%	9%
Smart Grid	7%	5%	6%
Carbon Offsets/Credits	20%	18%	25% ↑
LEED Certification	5%	5%	9% ↑
Cap and Trade	12%	18% ↑	22% ↑
Average Favorability	9%	10%	13%

Arrows indicate a significant increase or decrease from the previous year, outside the +/- 3% margin of error for this survey.

(Source: Pike Research)

Section 2

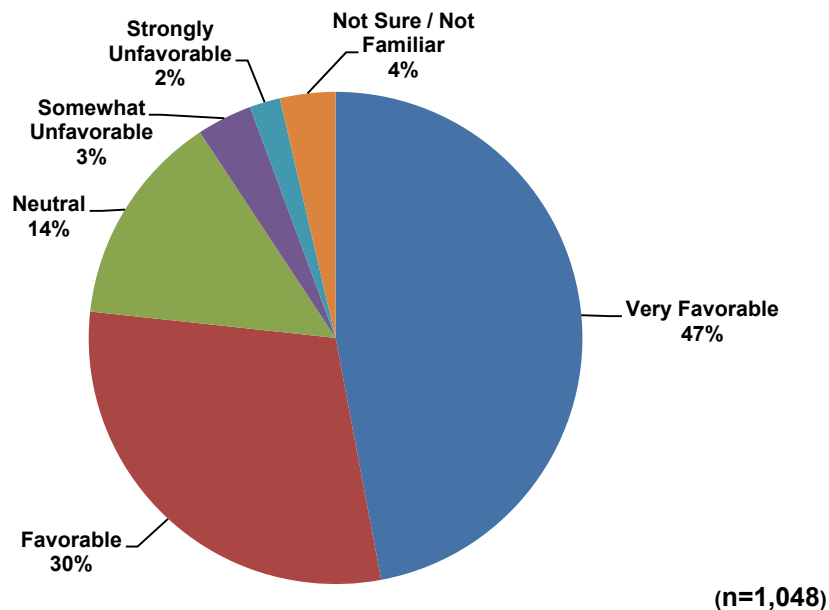
CLEAN ENERGY

2.1 Solar Energy

As was depicted in Charts 1.1 and 1.2, solar energy garnered both the highest percentage of favorable opinions (77%) and the lowest percentage of unfavorable opinions (6%) among the 13 energy and environmental concepts included in the survey. Moreover, solar energy also received the smallest percentage of “neutral” (14%) and “not sure/not familiar” (4%) responses. Chart 2.1 illustrates the specific breakdown of consumer impressions for this concept.

With a majority of respondents (47%) indicating a “very favorable” impression, solar energy represents one of the least controversial green technologies in the eyes of consumers. Pike Research attributes the high level of consumer acceptance to the relatively long history of solar energy in the market, its variety of applications, and the non-intrusive nature of most solar technologies including photovoltaic (PV) panels.

Chart 2.1 Overall Impressions of Solar Energy



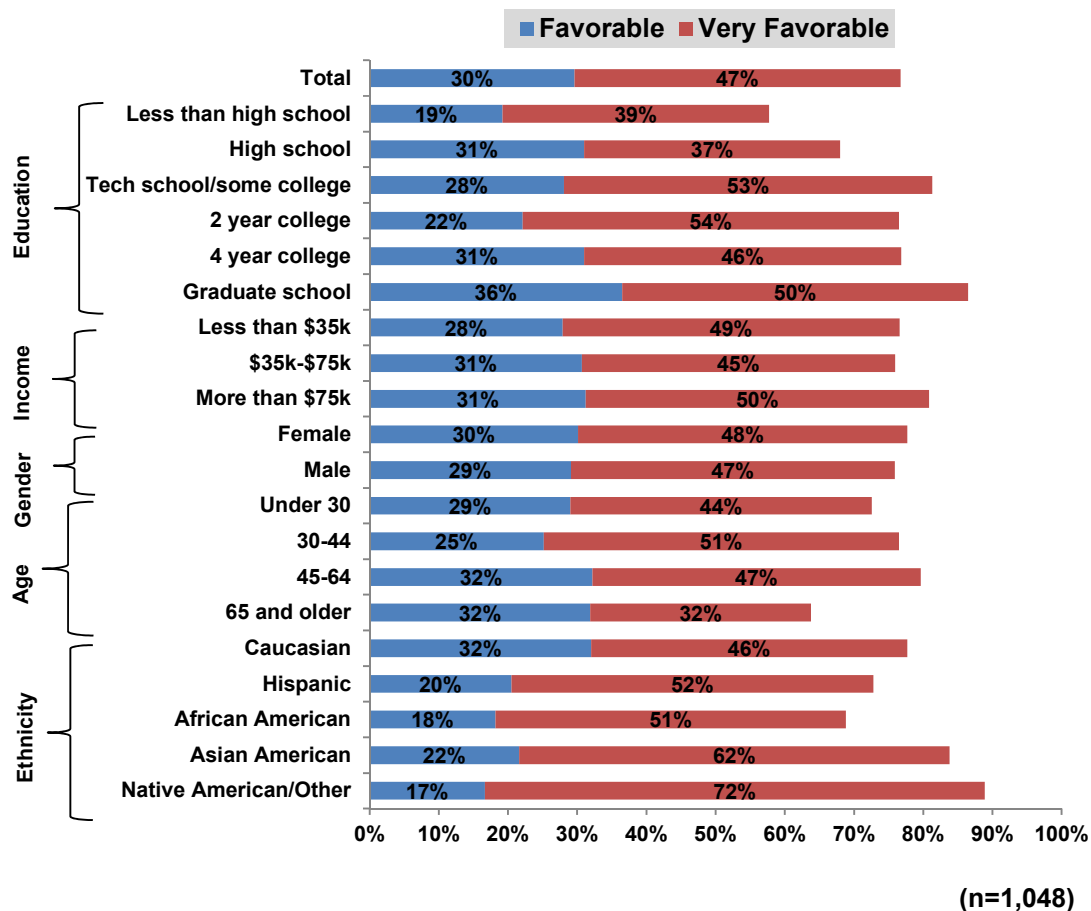
(Source: Pike Research)

Pike Research’s demographic analysis of responses to the solar energy concept revealed few distinct trends, as shown in Chart 2.2 below. The high levels of favorable impressions across gender, income, education, and age segments suggest that it enjoys widespread appeal from the mass market. Additionally, while favorable opinions were high among all education segments, those with the highest level of education had the highest favorable rating for solar energy (87%) and those with the lowest exhibited a distinctly lower percentage of favorable responses (58%). It should be noted that the sample size of the “less than high school” education segment was small (only 23 respondents). This erodes

the credibility of the correlation between finishing high school and favoring solar energy. However, with levels of favorability slightly lower in the “high school graduate” segment than the more educated segments, the positive correlation between education and a favorable view of solar energy is more pronounced than in other demographic categories. In addition, this finding is consistent with previous Pike Research *Energy & Environment Consumer Survey*, which showed similar trending.

Another interesting demographic correlation exists across age segments. Surprisingly, older respondents were more likely to have a favorable view of solar energy than younger respondents were. While it is commonly assumed that younger consumers are more enthusiastic about renewable energy technologies, the percentage of favorable responses in the “under 30” age segment was 8 points lower than in the “45-64” segment. However, the oldest age segment (“65 or older”) exhibited the lowest percentage of favorability toward solar energy (64%).

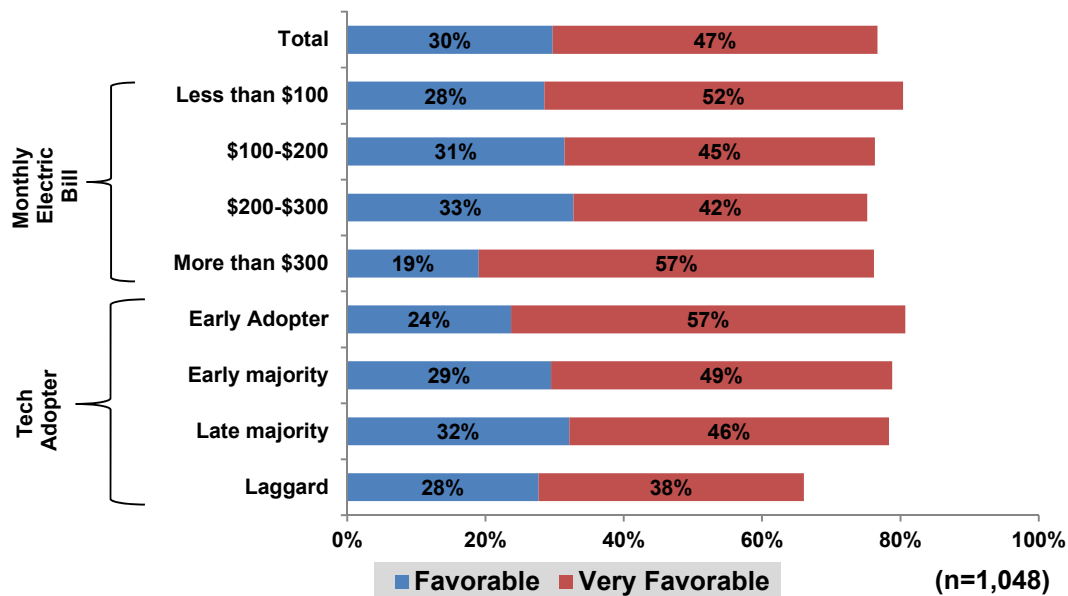
Chart 2.2 *Favorable Impressions of Solar Energy by Demographic Segment*



(Source: Pike Research)

A segmentation analysis based on behavioral trends, such as respondents' monthly spending on electricity and self-identification in the tech adopter lifecycle, revealed no significant tendencies aside from "laggards." As shown in Chart 2.3, favorability levels varied across monthly electric spending segments and differences between segments in other categories were insignificant. Similar to the lack of correlations across demographic segments, this implies that the benefits of solar energy are equally appealing to consumers regardless of differences in energy consumption, home ownership status, and rate of uptake for new technologies.

Chart 2.3 *Favorable Impressions of Solar Energy by Behavioral Segment*

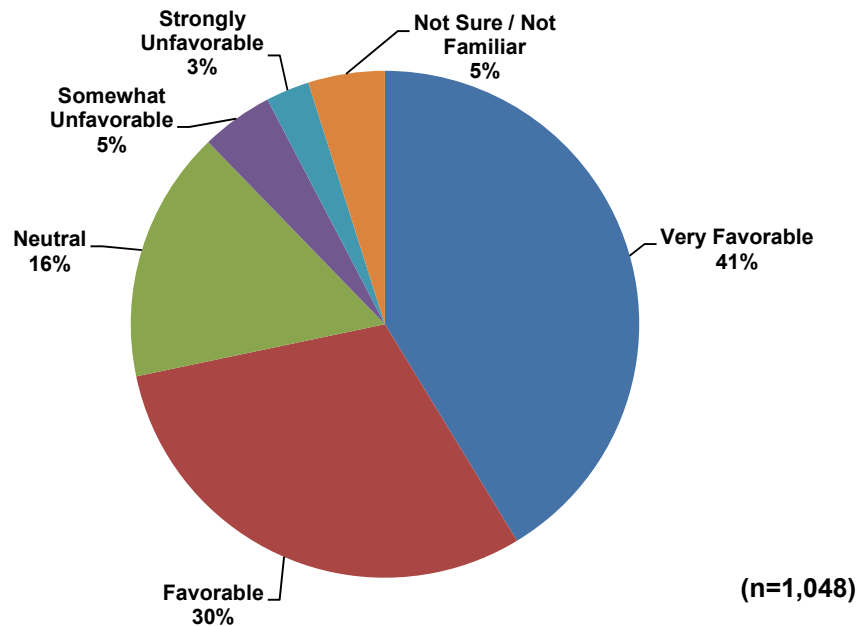


(Source: Pike Research)

While the merits of some clean technologies have yet to be established in the minds of consumers, solar energy has reached a point where the vast majority of consumers view it in a positive light. This bodes well for an increase in solar power generation to meet the growing energy demands in the United States.

2.2 Wind Energy

Chart 2.4 Overall Impressions of Wind Energy

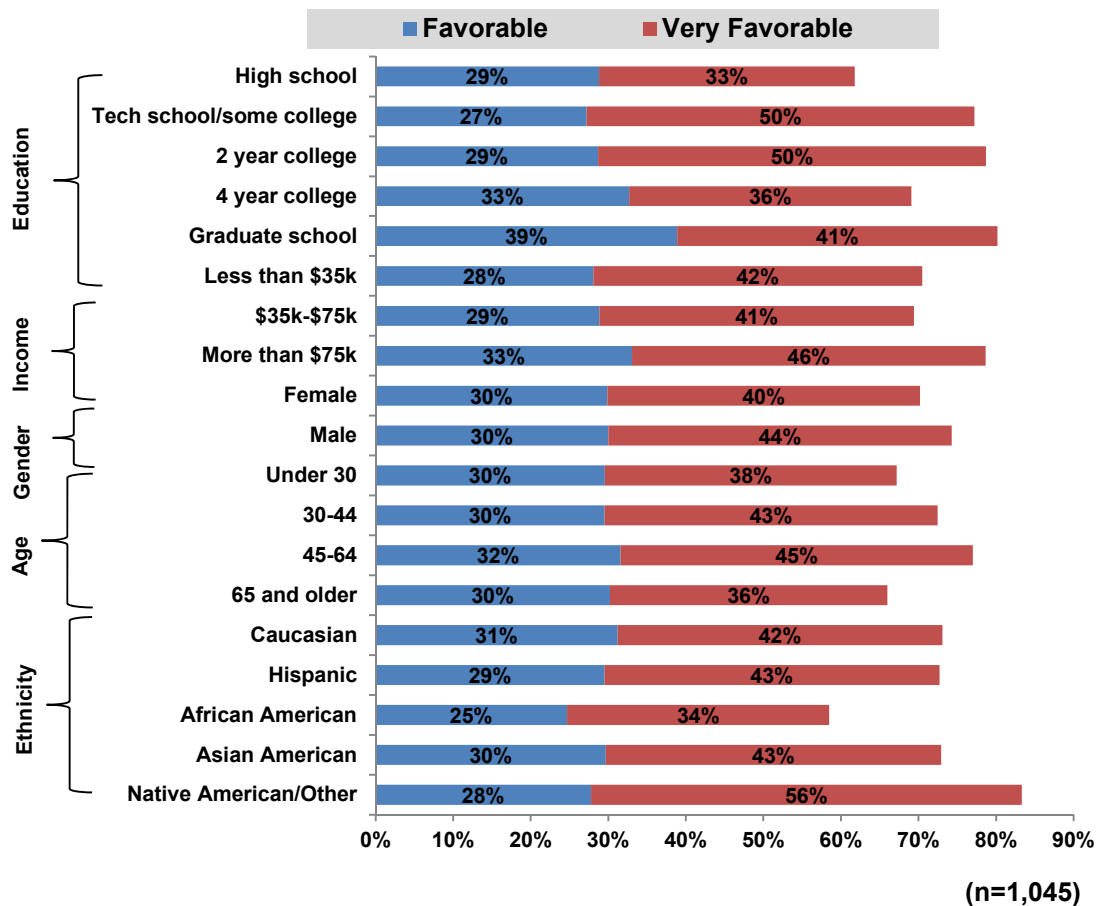


(Source: Pike Research)

Only slightly less popular than solar energy, wind energy was viewed as either “favorable” or “very favorable” by 71% of respondents. Similarly, wind energy was second only to solar energy in terms of the smallest percentage of unfavorable responses (5%). The preceding chart, Chart 2.4, displays these results along with the breakdown of the remaining responses. The similarly high levels of favorable views toward solar and wind energy indicates that consumers are generally supportive of the more established renewable energies that harness naturally occurring power sources. Pike Research asserts that consumers consider these two renewable energies to be important pieces in the power generation portfolio of the future.

Demographic patterns in consumer views of wind energy are analogous to those of solar energy. As shown in Chart 2.5, the education and age categories exhibit the most significant impact on consumers' views of wind energy. Once again, the "less than high school" segment displayed a significantly lower percentage of favorable responses (50%) and the "high school graduate" segments displayed a slightly lower (62%) percentage than the more educated segments. The "45-64" age grouping exhibited the highest positive correlation with wind energy (77%), while the top ("65 and older") and bottom ("under 30") groupings were least enthusiastic about wind energy (66% and 68%, respectively).

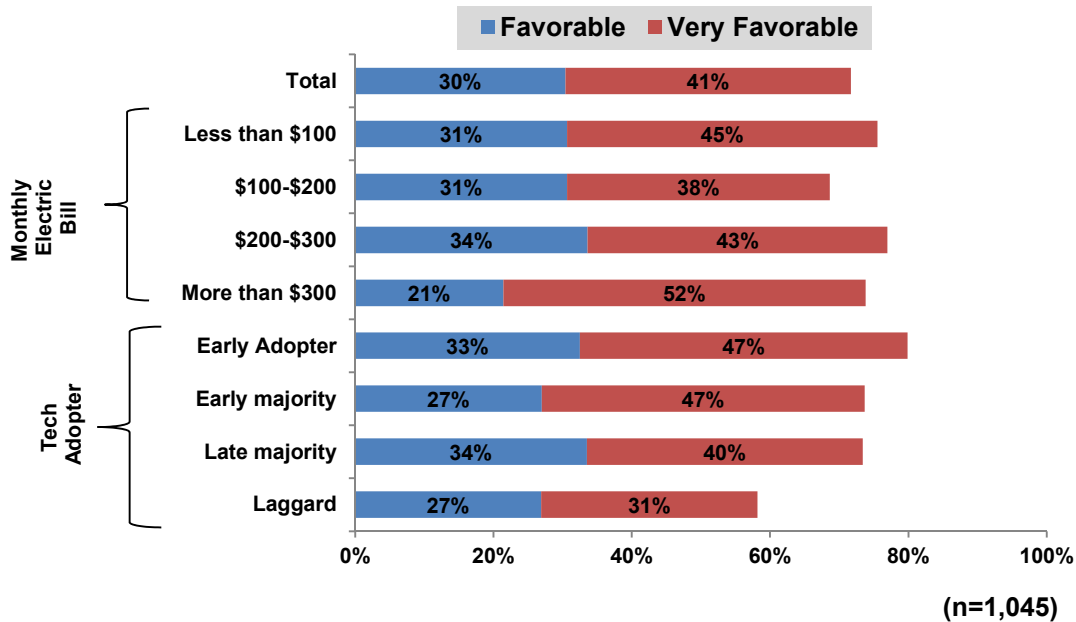
Chart 2.5 *Favorable Impressions of Wind Energy by Demographic Segment*



(Source: Pike Research)

Also similar to solar energy, behavioral segmentation analysis shows that monthly spending on electricity has less of an impact on a respondent's attitude toward wind power than their rate of uptake for new technologies.

Chart 2.6 *Favorable Impressions of Wind Energy by Behavioral Segment*



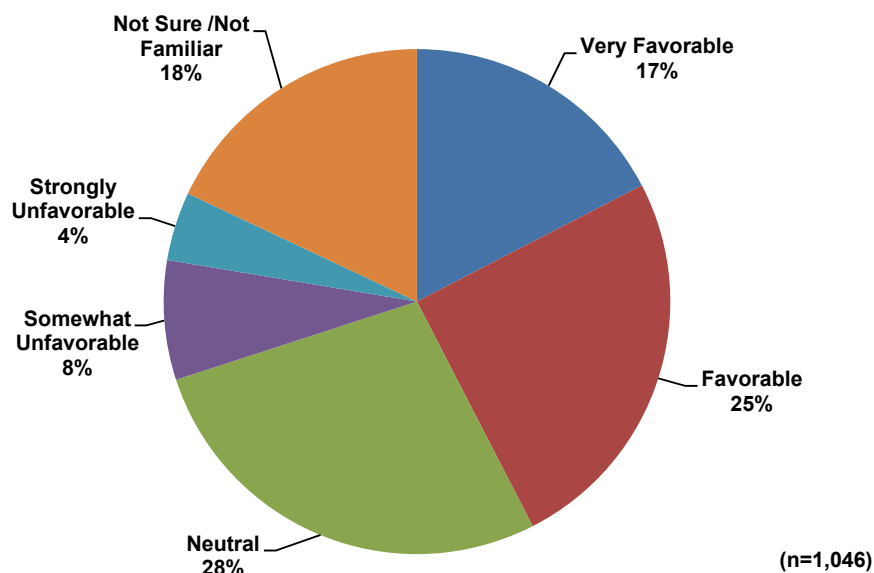
(Source: Pike Research)

2.3 Clean Coal

Consumer impressions of clean coal were less favorable than the renewable energy concepts covered: 42% of the respondents indicated a “very favorable” or “favorable” impression of clean coal, a decrease of 5% from Pike Research’s previous survey. Additionally, this concept ranked fifth in terms of unfavorable impressions (12%).

Among clean energy concepts, consumers were the least familiar with clean coal (18%). Unlike the renewable energy concepts, a significant number of respondents reported a neutral (28%) impression of clean coal.

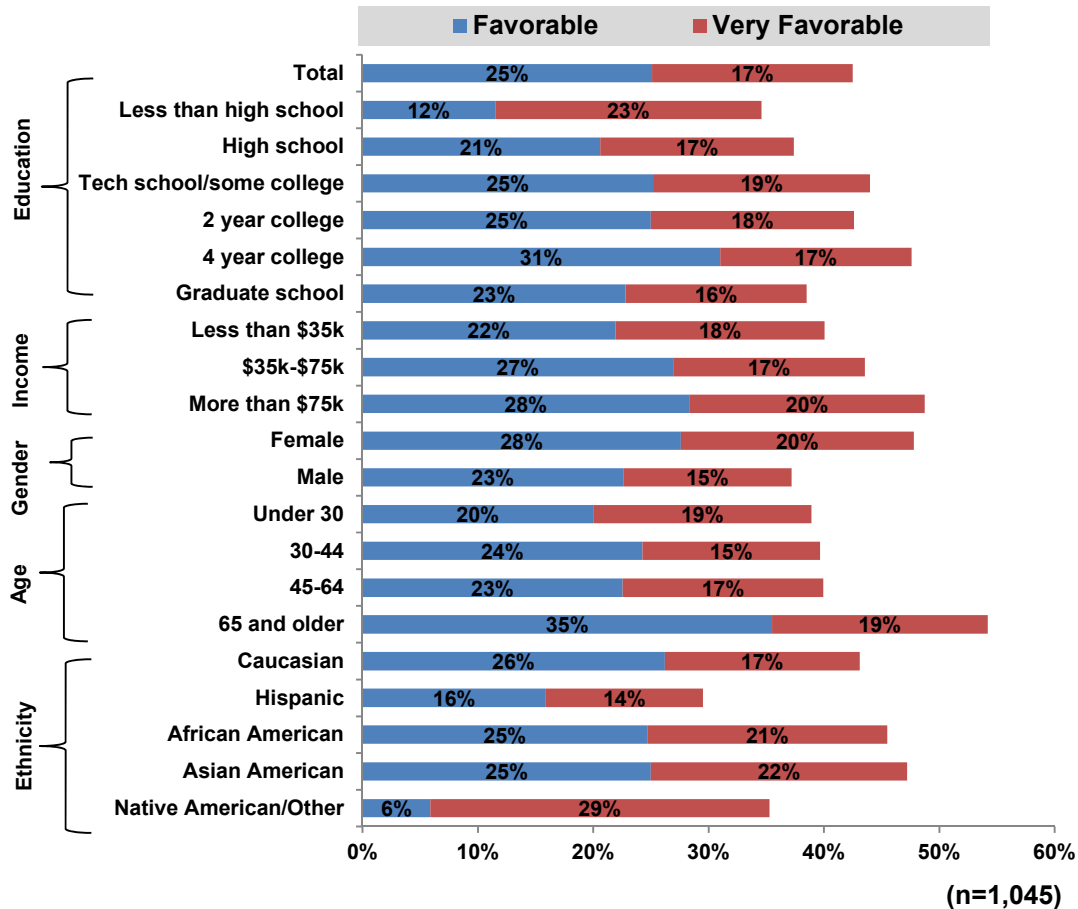
Chart 2.7 Overall Impressions of Clean Coal



(Source: Pike Research)

When demographic information is applied to consumer attitudes toward this particular concept, some interesting variations come into view. As displayed in Chart 2.8, men had a more favorable view of clean coal than women (48% compared to 37%). In addition, favorability varied by age group, with older respondents reporting more favorable opinions. Only 39% of the “under 30” segment showed favorable views on clean coal and only 40% of respondents in the “30-44” and “45-64” groupings viewed it favorably, yet more than half of the “65 and older” segment reported a favorable view on the concept.

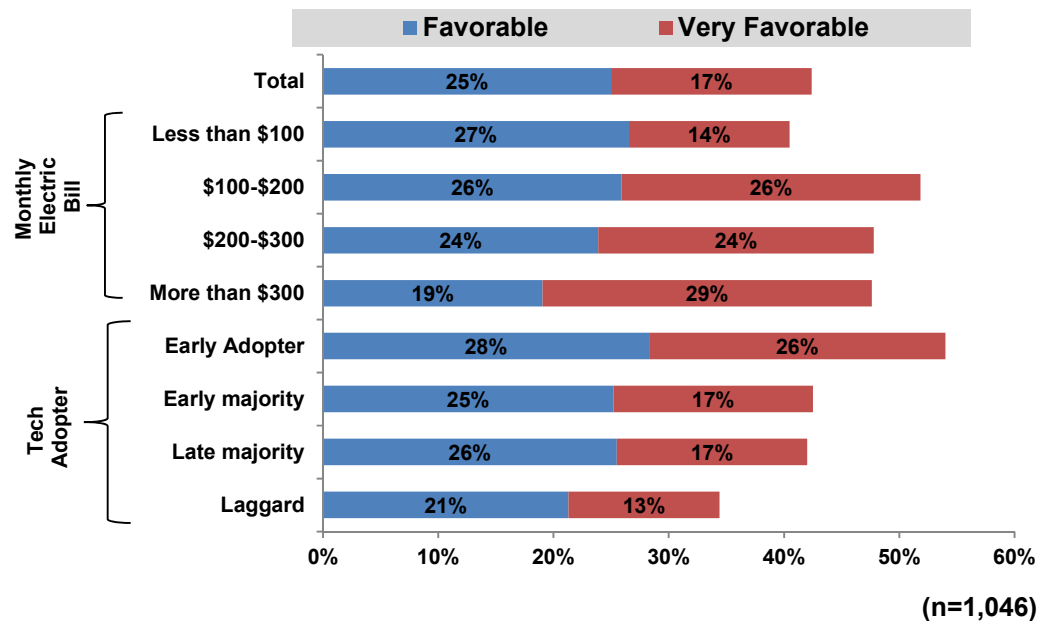
Chart 2.8 *Favorable Impressions of Clean Coal by Demographic Segment*



(Source: Pike Research)

Certain behavioral trends also play a role in a consumer's view of clean coal, as illustrated in Chart 2.9. Consumers who indicated that they are early adopters of new technologies showed significantly higher levels of favorable responses (54%) than the entire sample (42%). In addition, those with electric bills between \$100 and \$200 also held more favorable views of clean coal.

Chart 2.9 *Favorable Impressions of Clean Coal by Behavioral Segment*

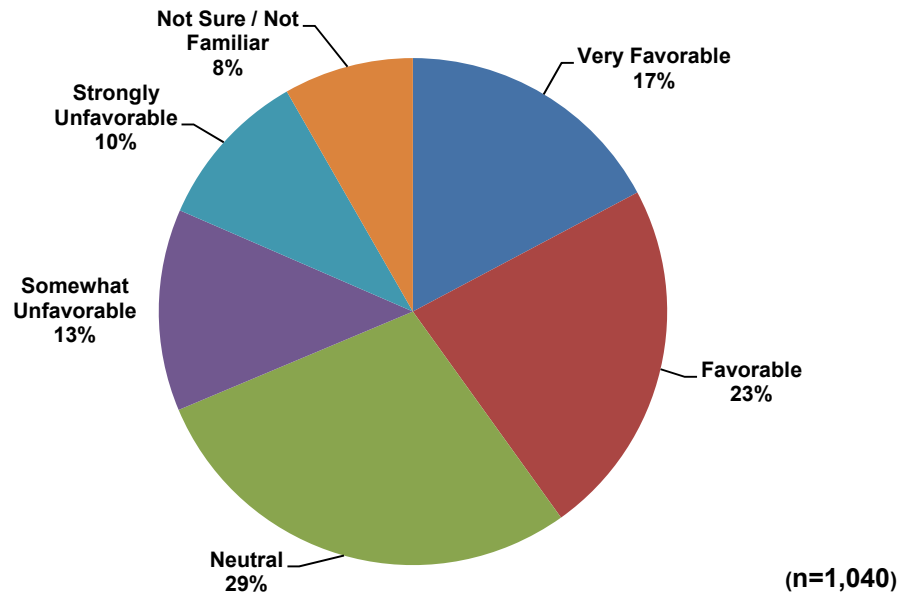


(Source: Pike Research)

2.4 Nuclear Power

Among the clean energy concepts covered, nuclear power is the most controversial to consumers. Of the clean energy concepts, it received the smallest percentage of favorable responses (40%). Moreover, nuclear power garnered the largest percentage of unfavorable responses (23%) among all 13 concepts covered in the survey, and it inspired the largest percentage of neutral responses (29%).

Chart 2.10 Overall Impressions of Nuclear Power



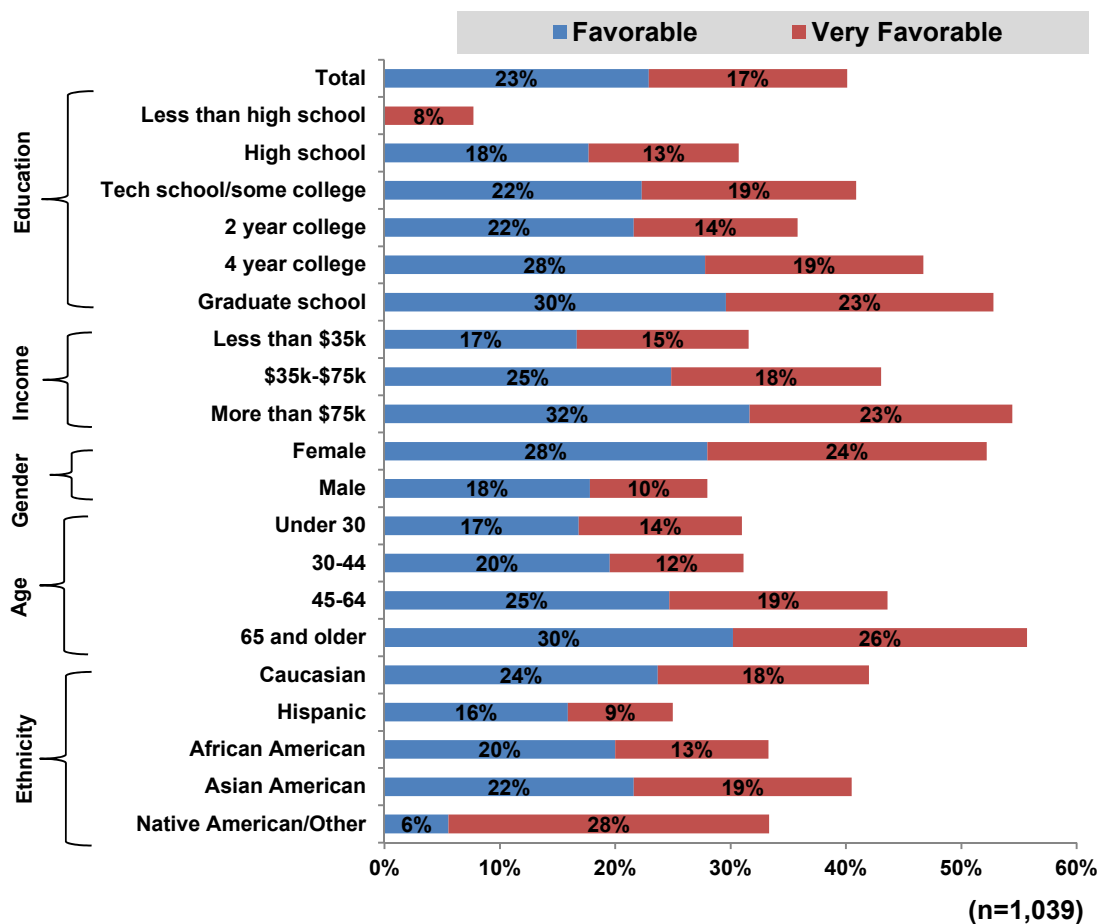
(Source: Pike Research)

Opinions of nuclear power vary significantly depending on the consumer's demographics. As shown in Chart 2.11, clear correlations exist within each demographic category. The most notable differences can be found across gender, with just over one-quarter of women (28%) and more than one half of men (52%) holding favorable views of nuclear energy.

There is also a wide divide when age groups are examined. The younger age groups ("under 30" and "30-44") hold less favorable opinions of nuclear power than older age groups ("45-65" and "65 and older"). In fact, the 65 and older segment represented the greatest percentage of favorable impressions toward nuclear energy (56%). Notably though, this percentage is significantly lower than in Pike Research's previous survey, when 72% of respondents in the 65 and older segment reported a favorable impression of nuclear energy.

There is also a clear positive correlation between level of education and favorability toward nuclear power: The percentage of favorable responses increases along with the level of education across segments. A similarly positive correlation exists across income segments: More than half of respondents (54%) earning more than \$75,000 per year had a favorable impression of nuclear power, while only 32% of those earning less than \$35,000 expressed this view.

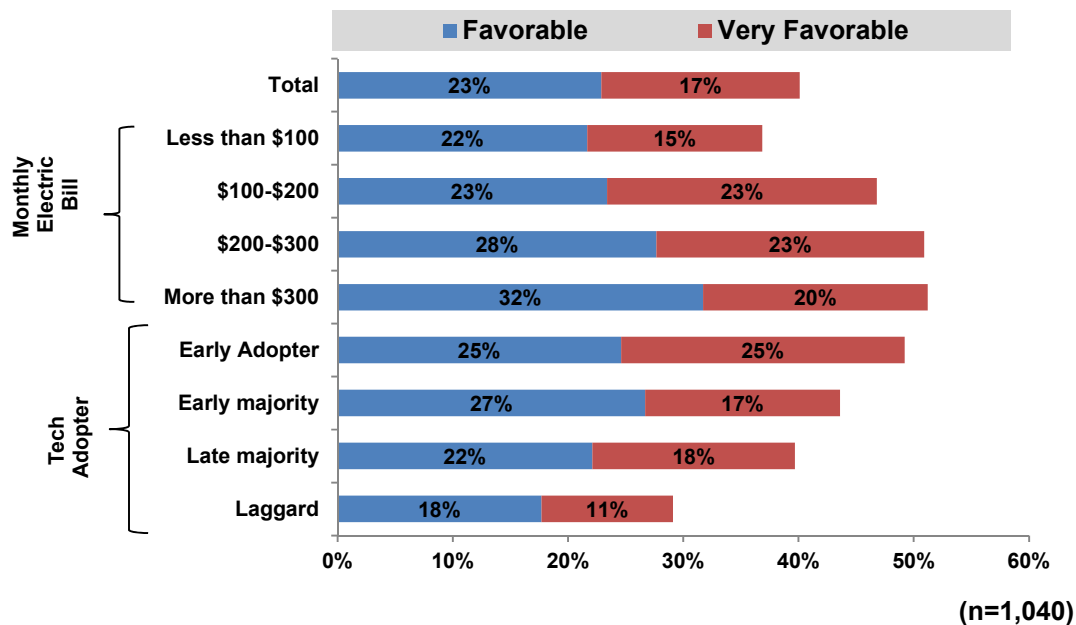
Chart 2.11 Favorable Impression of Nuclear Power by Demographic Segment



(Source: Pike Research)

Behavioral tendencies are weaker indicators of favorability toward nuclear power. However, more than one-half of respondents with an electric bill higher than \$200 a month held positive impressions of nuclear energy. Those consumers who identified themselves as “laggards” in the technology adoption curve, and those with electric bills less than \$100 a month, were less enthusiastic about the concept.

Chart 2.12 Favorable Impressions of Nuclear Power by Behavioral Segment



(Source: Pike Research)

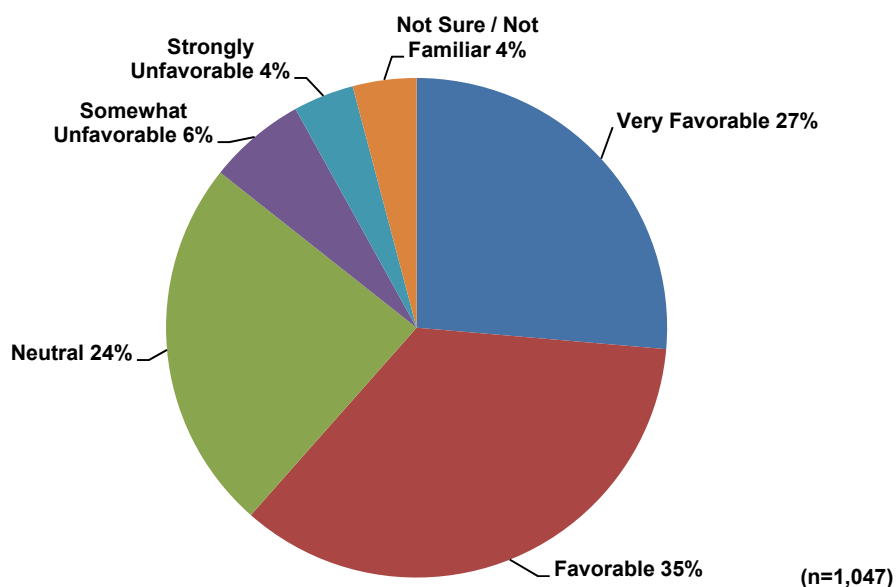
Section 3

CLEAN TRANSPORTATION

3.1 Hybrid Vehicles

After the two renewable energy concepts (solar power and wind energy), hybrid vehicles received the highest percentage of favorable responses (62%). Hybrid vehicles also received the second fewest “not sure/not familiar” responses among all 13 concepts covered in the survey (4%). With a majority of favorable responses, only 10% unfavorable responses, and a low incidence of unfamiliarity, hybrid vehicles are another widely accepted clean technology among consumers. The full breakdown of responses is depicted in Chart 3.1.

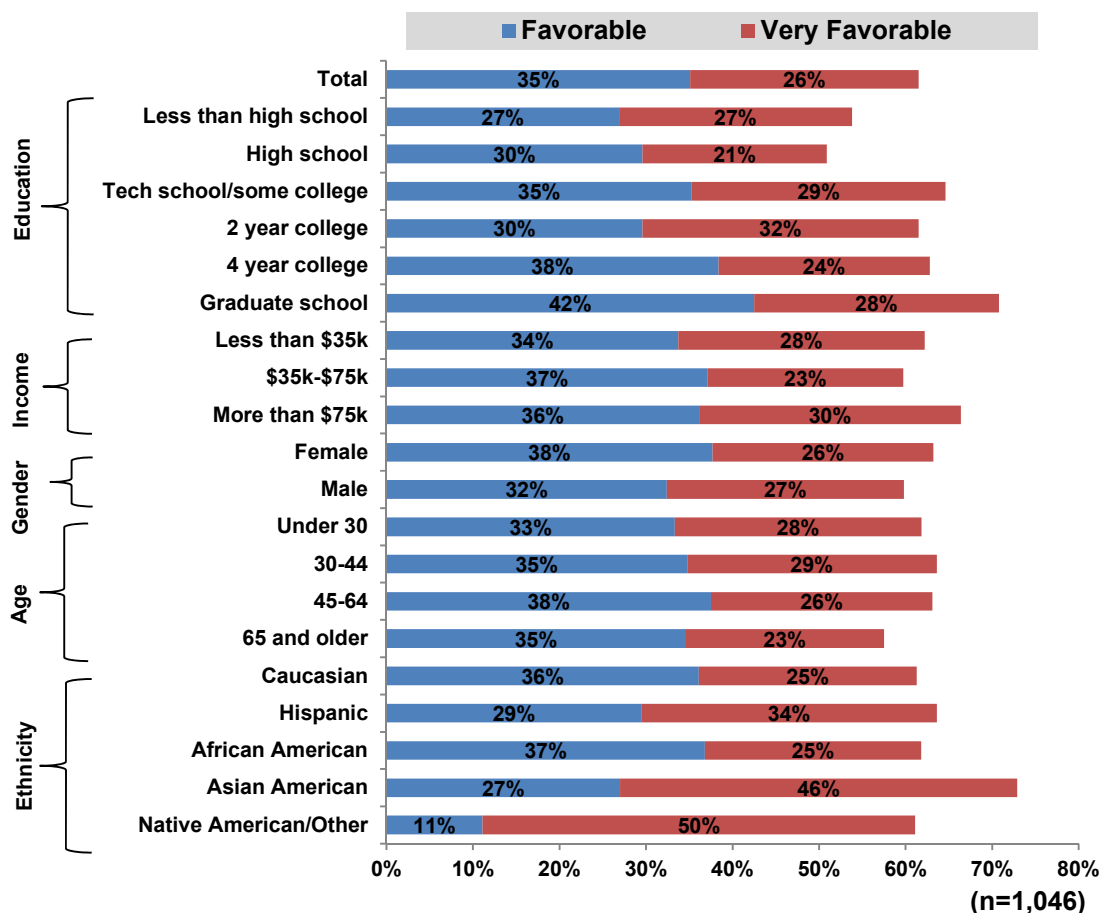
Chart 3.1 Overall Impressions of Hybrid Vehicles



(Source: Pike Research)

A demographic segmentation analysis of responses within the hybrid vehicle section shows little significant variation. The exceptions exist within education levels: Respondents with a high school or less than high school education reported a lower favorability rating while those with graduate degrees had the highest favorability rating (71%). Asian Americans also held more favorable opinions of hybrid vehicles than other demographic groups (73%), but the low sample size may be skewing the results somewhat.

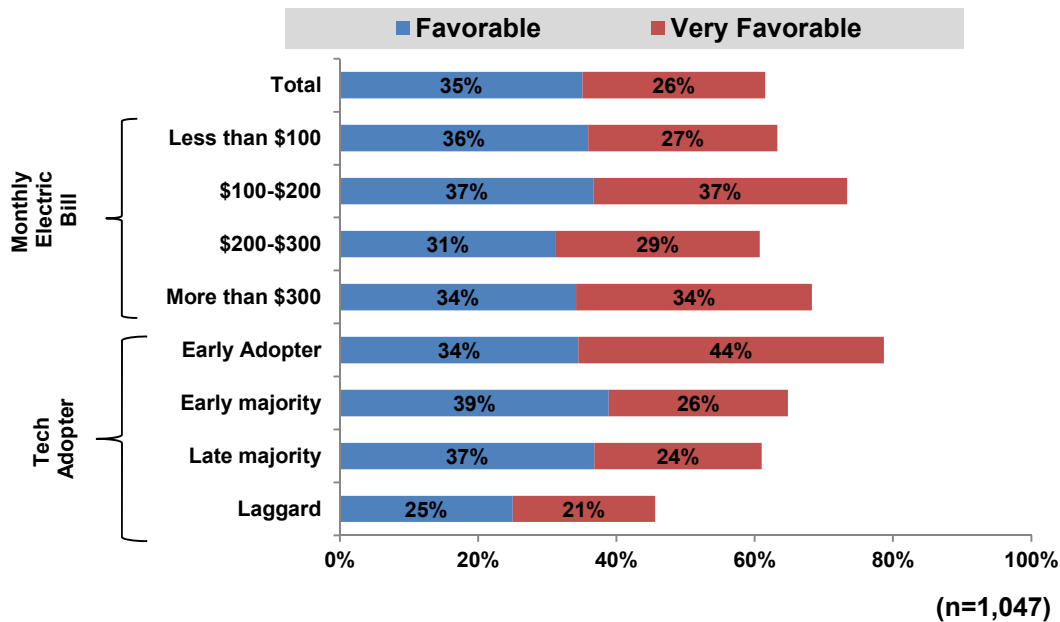
Chart 3.2 *Favorable Impressions of Hybrid Vehicles by Demographic Segment*



(Source: Pike Research)

Chart 3.3 demonstrates that a segmentation analysis based on behavioral habits revealed a few notable findings. In general, consumer opinions on hybrid vehicles appear fairly ubiquitous within the mass market. As expected, those respondents who categorized themselves as early adopters of new technologies held more positive views of hybrid vehicles while those that described themselves as laggards held less favorable opinions. In addition, respondents with electric bills ranging from \$100 to \$200 held more favorable opinions of hybrid vehicles.

Chart 3.3 *Favorable Impressions of Hybrid Vehicles by Behavioral Segment*

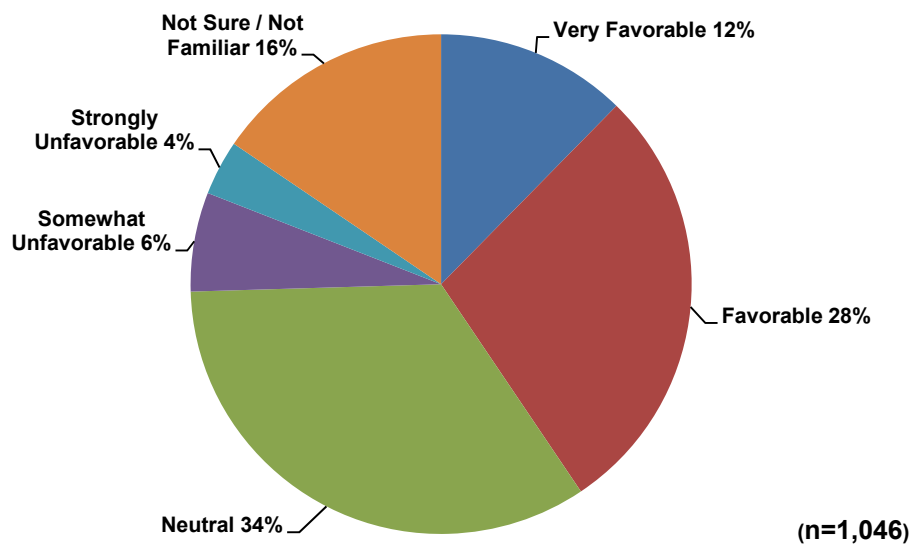


(Source: Pike Research)

3.2 Biofuels

Favorable views on biofuels were less common than for any other clean transportation concept. Similar to the clean coal concept, the percentage of neutral and unfamiliar responses was almost as high as that of favorable responses. However, with 39% favorable and only 9% unfavorable responses, consumers appear to have a fairly positive impression of biofuels. Chart 3.4 depicts the breakdown of responses from the entire respondent base.

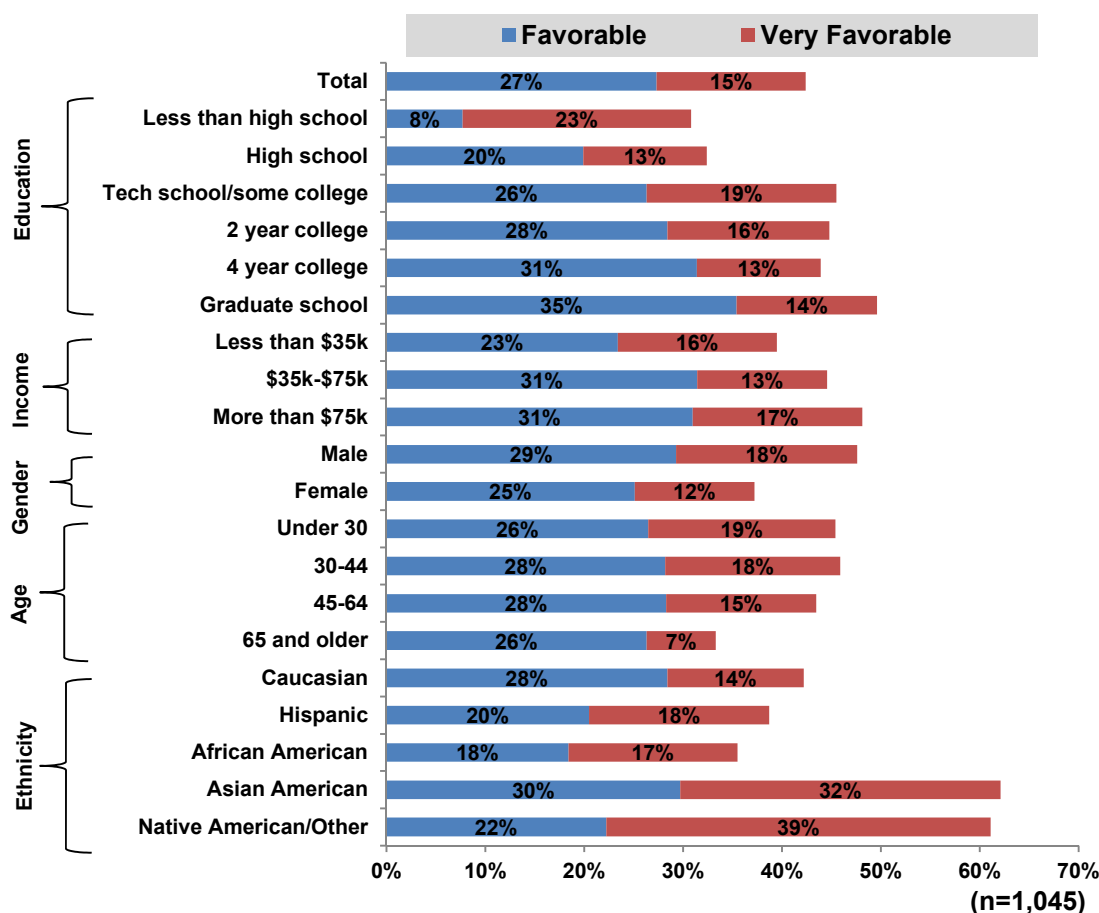
Chart 3.4 Overall Impressions of Biofuels



(Source: Pike Research)

Chart 3.5 presents the favorable impressions of biofuels by the various demographic segments. Like many of the energy and environmental concepts covered in the survey, higher levels of education translate to higher levels of favorability. One half of the respondents with a graduate degree reported a favorable view of the concept, while less than one-third of respondents within the “high school” or “less than high school” groupings expressed a favorable opinion. Interestingly, age groups except for “65 and older” showed opinion ratings that were very consistent with the overall average for the topic, and men were more positive on the concept than women (by 8 percentage points). Asian Americans and Native Americans/Others also exhibited higher percentages of favorable impressions, though this is likely due to the small sample size for these ethnicities.

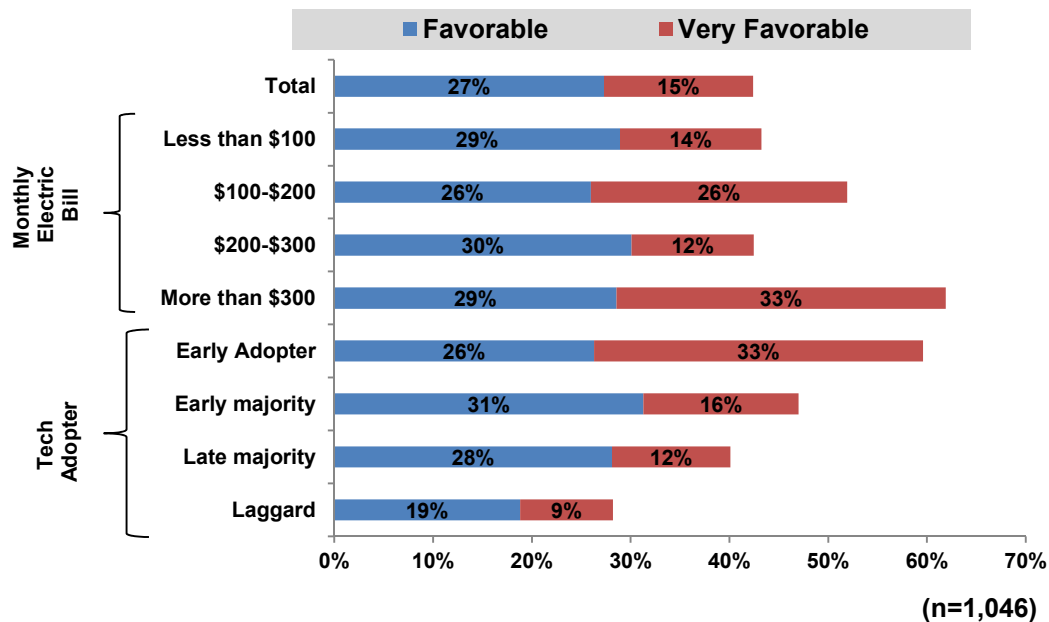
Chart 3.5 *Favorable Impressions of Biofuels by Demographic Segment*



(Source: Pike Research)

As displayed in Chart 3.6, early adopters of new technologies and respondents with high electric bills look upon biofuels most favorably: A full 60% of early adopters, 62% of respondents with electric bills in excess of \$300, and 52% of respondents with monthly electric bills ranging from \$100 to \$200 reported favorable impressions.

Chart 3.6 *Favorable Impressions of Biofuels by Behavioral Segment*

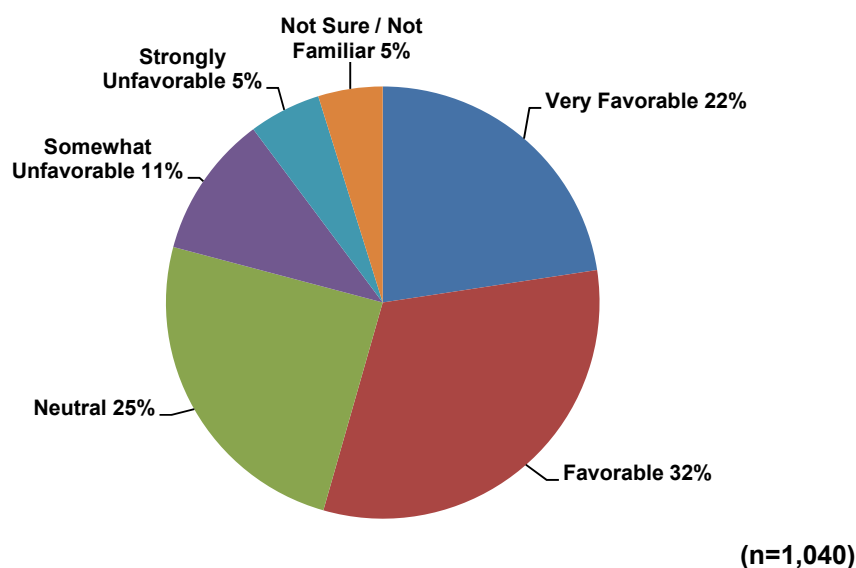


(Source: Pike Research)

3.3 Electric Cars

Electric cars exhibited the fourth highest percentage of favorable responses (55%) among the 13 topics covered in the survey – following behind wind energy, solar power, and hybrid vehicles. As displayed in Chart 3.7, of the remaining 46%, one-quarter were neutral (25%), some held unfavorable views (16%), and only a few respondents were unfamiliar with the concept (5%).

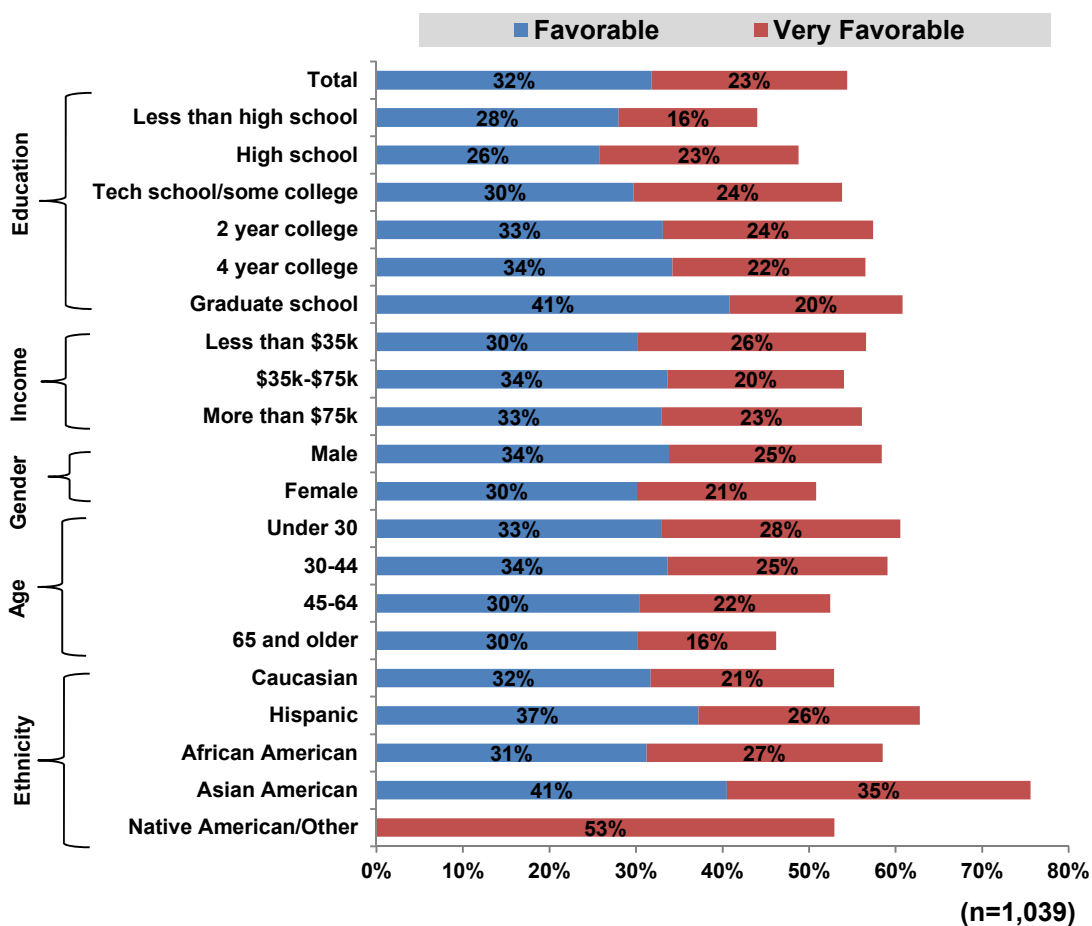
Chart 3.7 Overall Impressions of Electric Cars



(Source: Pike Research)

When favorable responses were segmented by the demographic characteristics of the respondents, differences were noted among education and age, as depicted in Chart 3.8. The least educated respondents had the lower favorability ratings for electric cars (44%), while the most educated had the highest favorability ratings (61%), a difference of 17 percentage points. Similar trends were seen among the age groups, with younger consumers holding a more positive view of electric cars (61% for those under 30) than the than older consumers (46% for those old than 65). This data indicates that manufacturers of electric vehicles will commonly target consumers with higher levels of education. Some variation was also seen across the ethnicity segments, though this could be attributed to a smaller sample size (less than 50 respondents within the Asian American, Native American, and Hispanic breakouts).

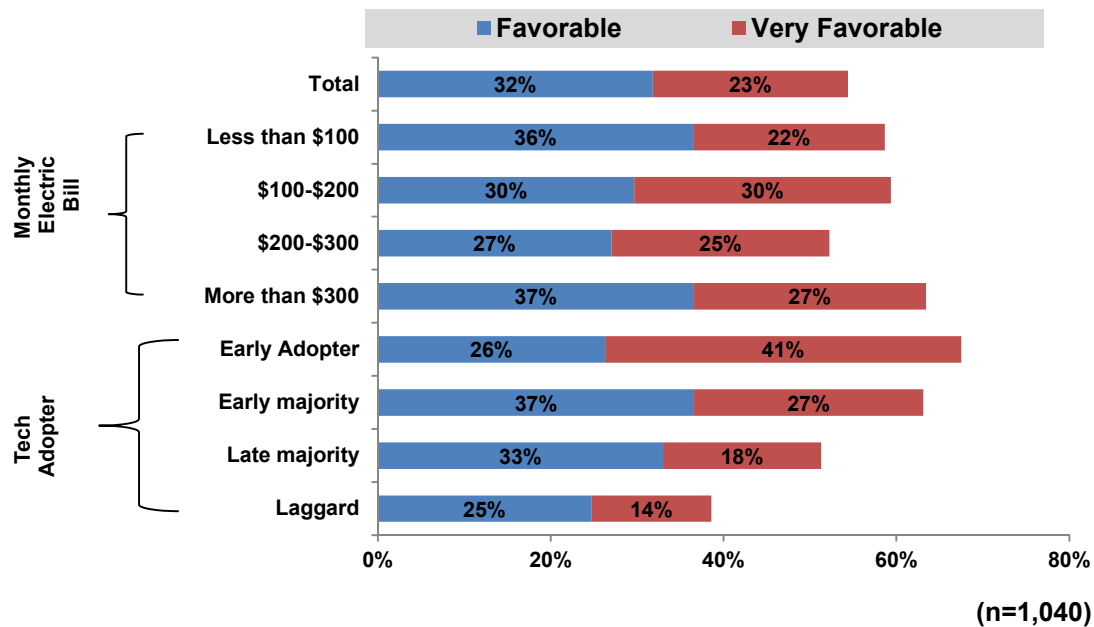
Chart 3.8 *Favorable Impressions of Electric Cars by Demographic Segment*



(Source: Pike Research)

As Chart 3.9 details, there were no unexpected differences in terms of favorable impressions within behavioral segments. Those respondents that identified themselves with the early adopter and early majority groups held higher favorability ratings for electric vehicles. In addition, those with higher electric bills (monthly bills in excess of \$300) looked more favorably upon electric vehicles.

Chart 3.9 **Favorable Impressions of Electric Cars by Behavioral Segment**

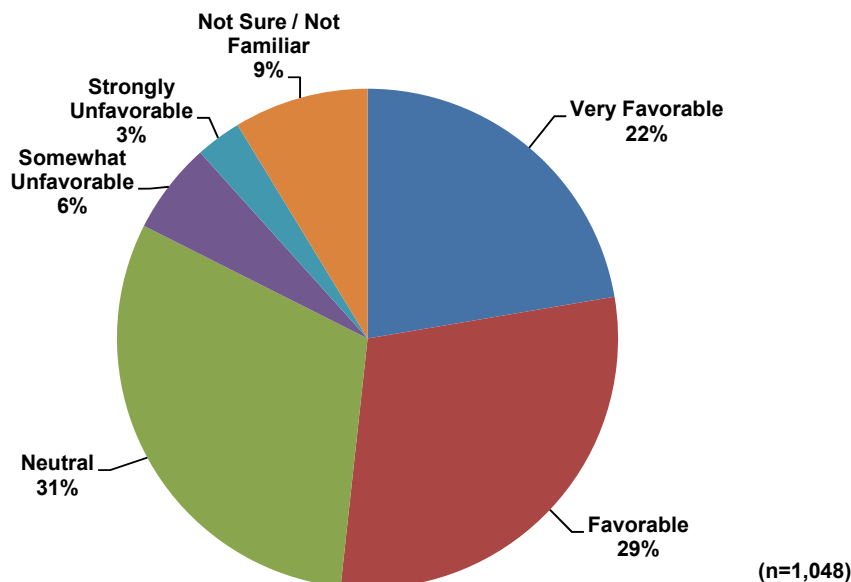


(Source: Pike Research)

3.4 Natural Gas Cars

In this year's survey, Pike Research asked respondents about natural gas vehicles for the first time. Like electric cars, consumers had a favorable opinion of natural gas cars (52%). As shown in Chart 3.10, close to one-third of respondents reported neutral impressions of the topic (31%). Meanwhile, only 9% held unfavorable views and only 9% were unfamiliar with the concept.

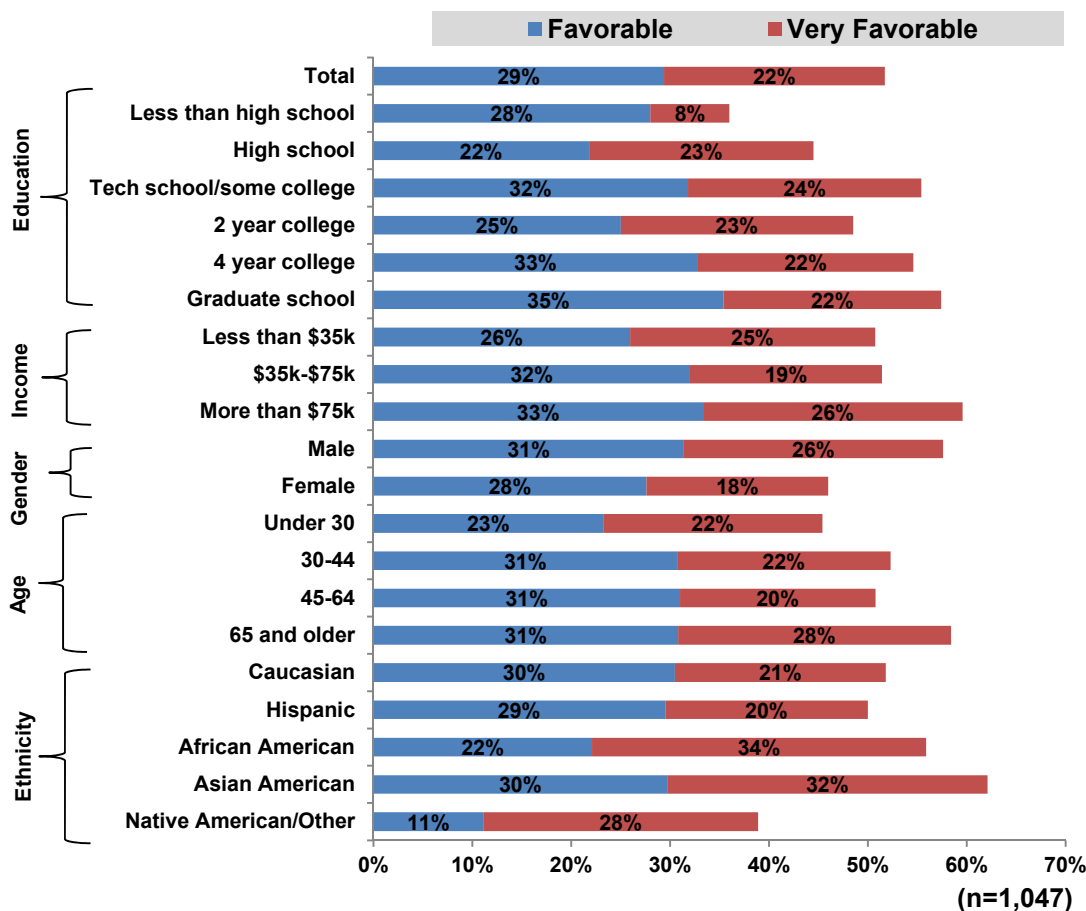
Chart 3.10 Overall Impressions of Natural Gas Cars



(Source: Pike Research)

When segmenting the favorable responses by the demographic characteristics of the respondents, some variations were evident across the education segment: Respondents with less than a high school degree reported fewer favorable impressions of natural gas cars than those with advanced degrees (36% compared to 57%). In addition, those that earned more than \$75,000 annually held a more favorable impression of natural gas cars (59%), as did men (57%). Interestingly, survey participants in the “65 or older” age group also reported a greater number of favorable impressions of natural gas vehicles compared to the younger age groups.

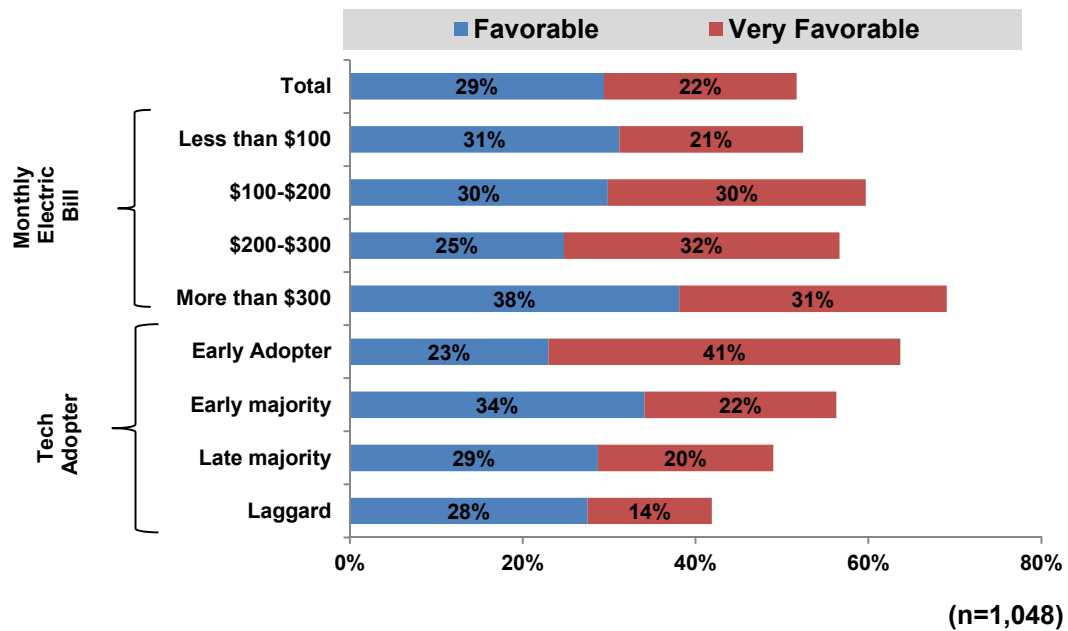
Chart 3.11 Favorable Impressions of Natural Gas Cars by Demographic Segment



(Source: Pike Research)

When segmented by behavioral characteristics, trends for natural gas vehicles were similar to those for electric vehicles. As depicted in Chart 3.12, older consumers and those who self-identified as early or early majority in terms of technology adoption held more favorable impressions of natural gas cars.

Chart 3.12 *Favorable Impressions of Natural Gas Cars by Behavioral Segment*



(Source: Pike Research)

Section 4

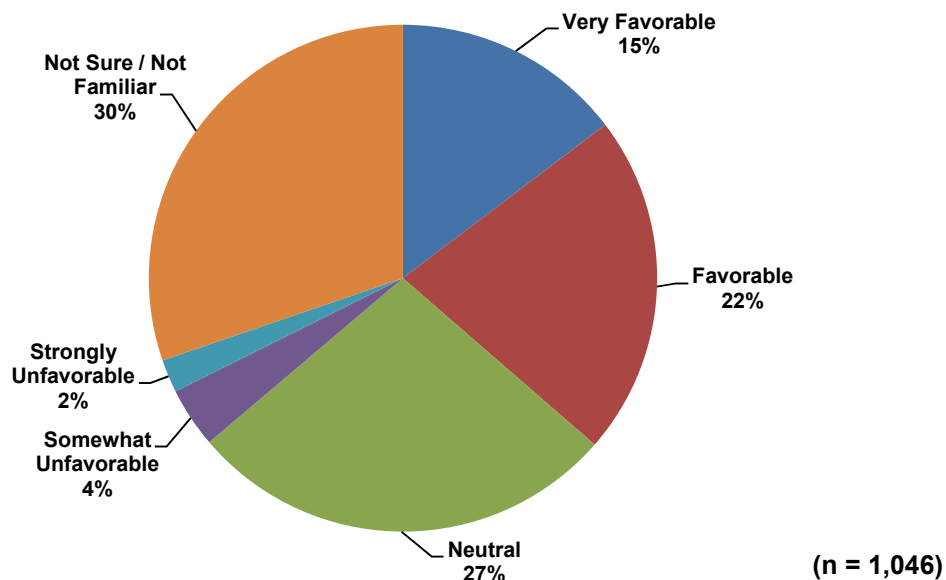
SMART GRID

4.1 Smart Grid

Chart 4.1 below paints a very different picture of consumer opinions than the previously discussed energy and environmental topics. While the clean energy and transportation concepts received high levels of favorable responses and a low incidence of unfamiliarity, consumer impressions of the smart grid were less positive and more uncertain. While 37% favorable responses is not the lowest among the 13 topics covered in the survey, it is approximately half that of the favorable responses among the top two concepts – solar and wind energy. Interestingly, the percentage of unfavorable responses to the smart grid was similar to that of solar energy (6%), the lowest among the topics explored in this study.

The most notable difference between this concept and those previously examined is the high percentage of respondents who were unfamiliar with the smart grid (30%). Of the six response options for this question, “not sure/not familiar” was selected by more respondents than any other was, highlighting the lack of awareness about the smart grid among consumers. This figure represents a small decrease from the previous survey, when 35% of respondents indicated they were unfamiliar with smart grids. The low level of unfavorable responses still indicates that utilities upgrading their infrastructure to include smart grid capabilities have a distinct opportunity to educate consumers about the benefits that smart grid can provide.

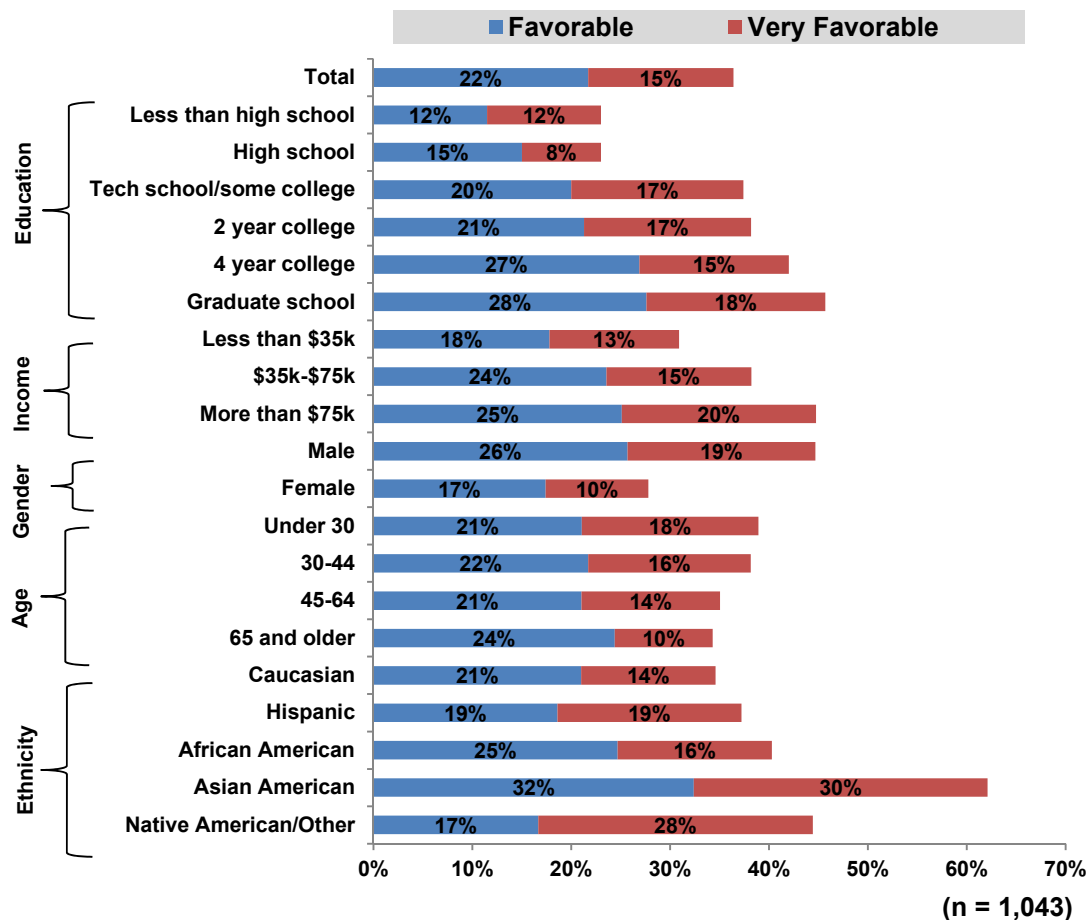
Chart 4.1 Overall Impressions of Smart Grid



(Source: Pike Research)

Chart 4.2 indicates that the favorability rating for smart grid varies by education level, gender, and income. Among respondents with household incomes above \$75,000, 45% reported a favorable impression of smart grid; this compares to 31% among those earning less than \$35,000 annually. In addition, 45% of men held a favorable impression of smart grid technology, compared with just 28% of women. Within the education segment, there was a 22-percentage-point difference among those reporting a favorable impression between the lowest educated (24%) and the highest educated respondents (46%).

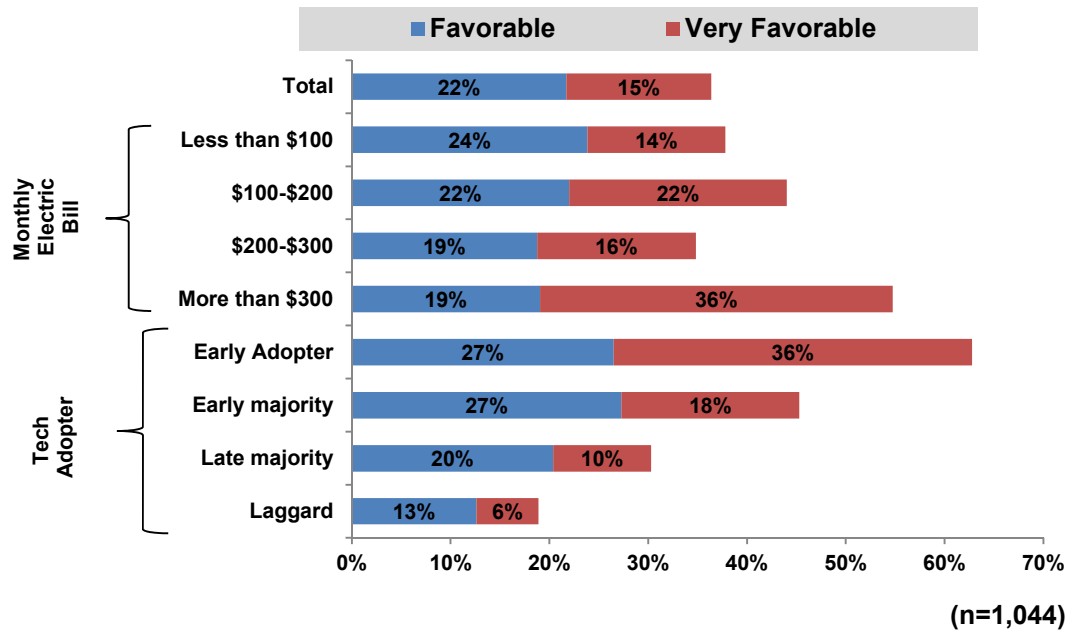
Chart 4.2 Favorable Impressions of Smart Grid by Demographic Segment



(Source: Pike Research)

As depicted in Chart 4.3, early adopters of technology showed a substantially higher percentage of favorable responses (63%) than the overall respondent base (37%). In addition, those with higher electric bills (monthly bills of \$300 or more) had a more favorable opinion of smart grid technology. With more than one-half of all respondents unfamiliar or neutral on the topic of smart grids, the success of future initiatives in this area will hinge on educating consumers about the benefits of the smart grid.

Chart 4.3 **Favorable Impressions of Smart Grid by Behavioral Segment**

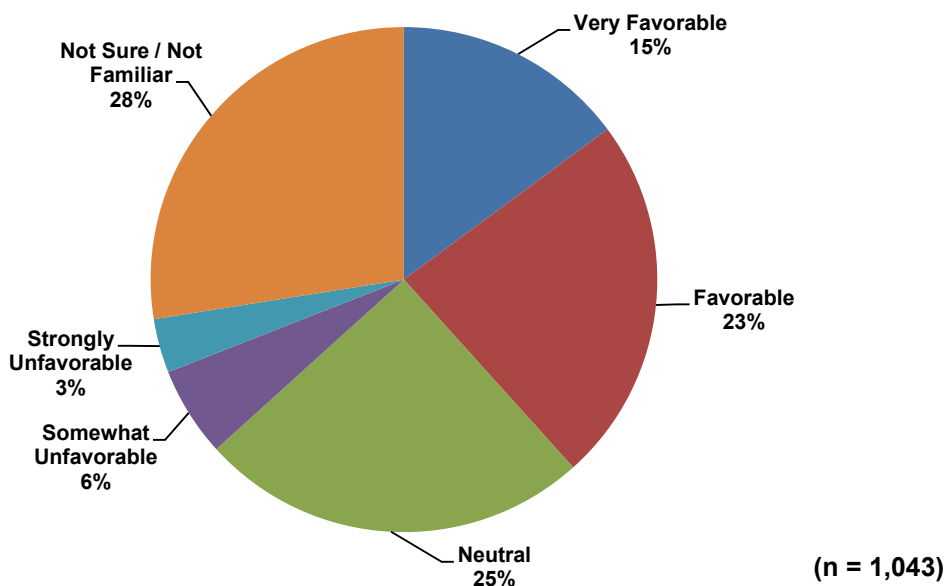


(Source: Pike Research)

4.2 Smart Meters

The breakdown of responses to the concept of smart meters is nearly identical to that of the smart grid, as shown in Chart 4.4. Both concepts received a moderate number of favorable responses (38%), few unfavorable responses (9%), and a relatively large percentage of unfamiliar responses (28%). This suggests that consumers often see the two concepts as indistinguishable.

Chart 4.4 Overall Impressions of Smart Meters

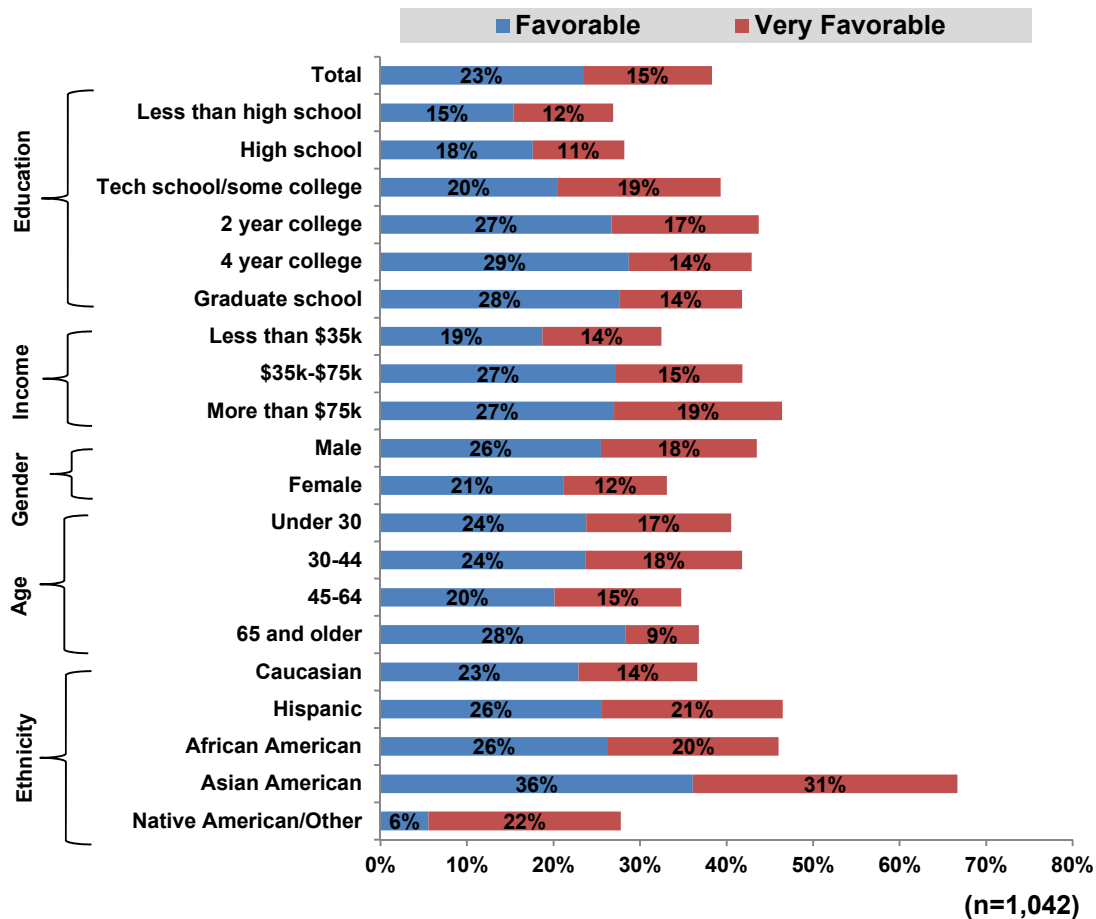


(Source: Pike Research)

Chart 4.5 displays a breakout of favorable responses for smart meters by demographic segment. While little variation exists among the different demographic segments, the data shows that higher-earning consumers are more likely to report a favorable impression of smart meters (46%). Some minority groups (Asian Americans, African Americans, and Hispanics) also had higher percentages of favorable opinions of smart meters, as did men. In terms of age segmentation, the two oldest groupings showed near identical percentages of favorable responses (in the mid-30% range), and these were significantly lower than among the youngest segment (in the low-40% range).

When examining the education segments, the percentages of favorable responses range from 27% (for “less than high school”) to 44% (for “2 year degree”). Respondents with 4-year college degrees and graduate degrees were also more likely to report favorable opinions of smart meters (in the low-40% range).

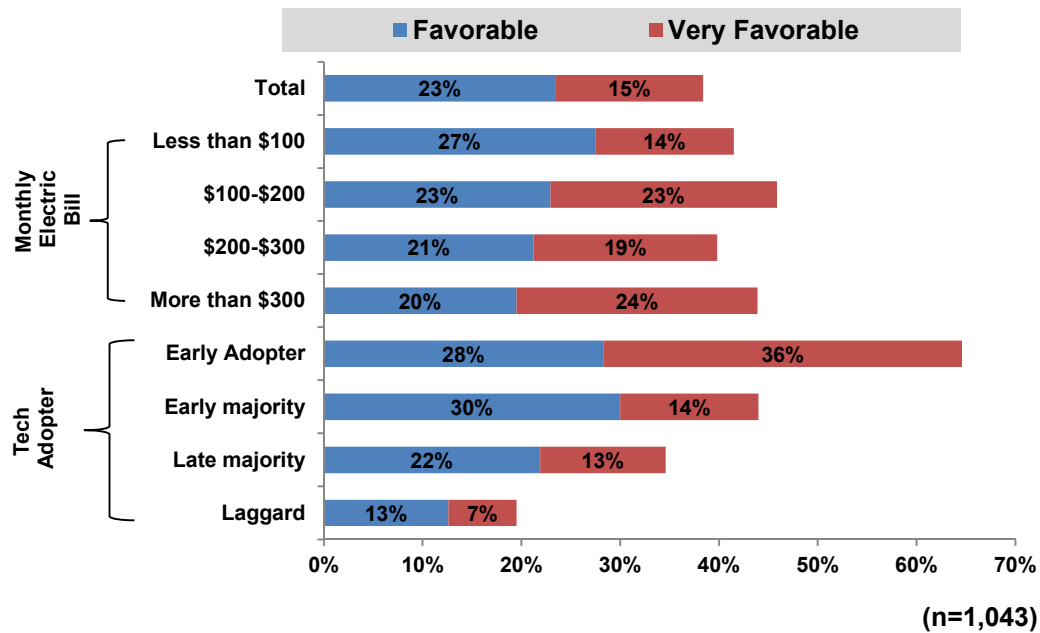
Chart 4.5 *Favorable Impressions of Smart Meters by Demographic Segment*



(Source: Pike Research)

Although there are noticeable differences in favorable views of smart meters across the various demographic segments, only self-identified early adopters of new technologies stand out within the behavioral segmentation view; 64% of early adopters held a favorable impression of smart meters, compared to the average of 39% across all respondents.

Chart 4.6 *Favorable Impressions of Smart Meters by Behavioral Segment*



(Source: Pike Research)

Section 5

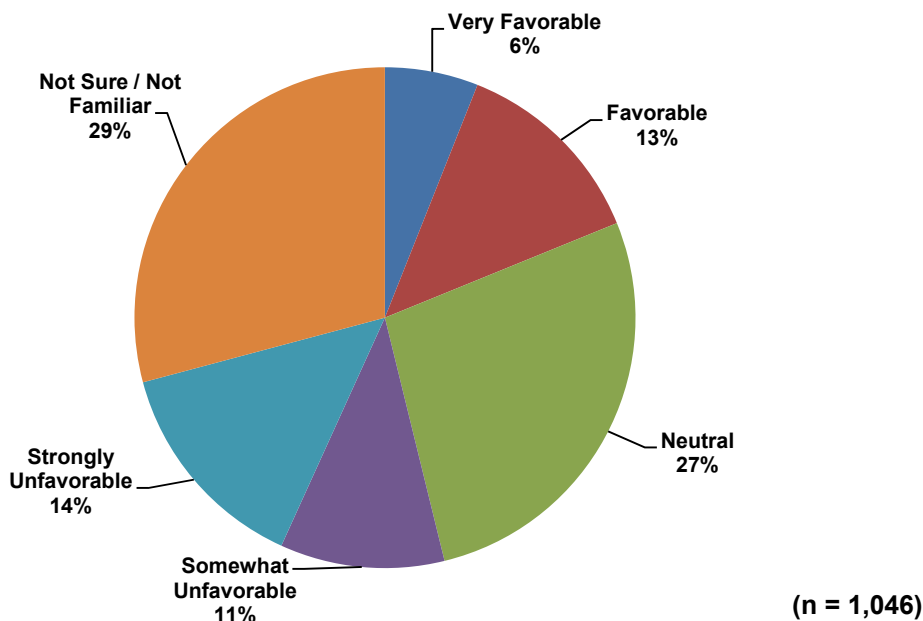
CARBON MANAGEMENT

5.1 Carbon Offsets/Credits

Even more controversial than smart grid concepts, carbon management concepts received some of the highest percentages of unfavorable responses from consumers. Less than one-fifth of respondents held favorable impressions of carbon offsets/credits (19%), making it the third lowest percentage of favorable responses among all concepts included in the survey. More notably, carbon offsets/credits received the highest percentage of unfavorable responses (25%). Yet, the majority of responses were either “neutral” (27%) or “not sure/not familiar” (29%), indicating that many consumers are either ambivalent or unaware of the concept.

Since the concept of carbon offsets/credits is relatively new, these results are not surprising. When compared to the responses to other energy and environmental topics, it is clear that, during this initial stage, few consumers approve of the idea of making payments in exchange for carbon emissions.

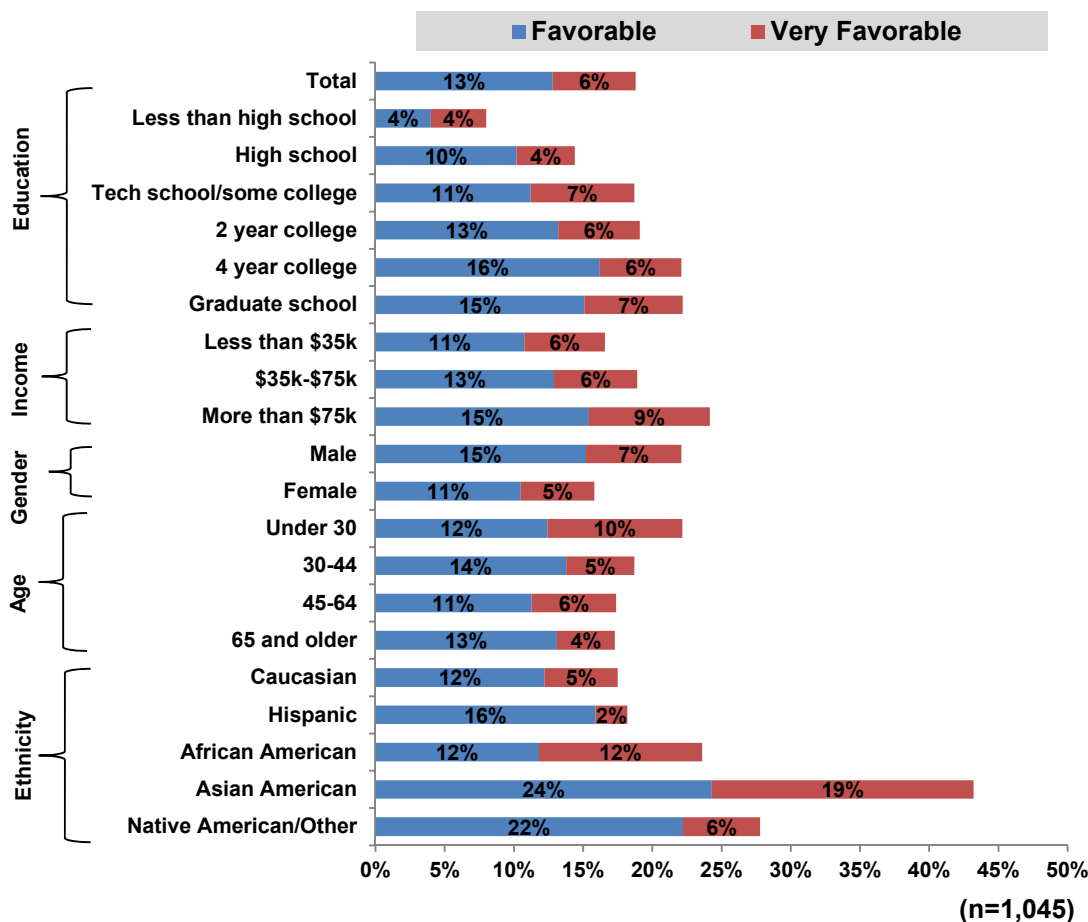
Chart 5.1 Overall Impressions of Carbon Offsets/Credits



(Source: Pike Research)

Chart 5.2 shows the favorability ratings for the carbon offset/credit concept by demographic segment. Unlike many of the other concepts reviewed in this study, no significant differences were apparent by either gender or age. Only those respondents who earn more than \$75,000 annually have a noticeably higher favorability rating for carbon offsets/credits (24%); those with lower levels of education demonstrate a lower favorability rating for carbon offsets/credits (8% for those with less than a high school degree and 14% for those with a high school degree). Some minority groups also have a higher favorability rating for this topic, though this may be somewhat attributable to a smaller sample size.

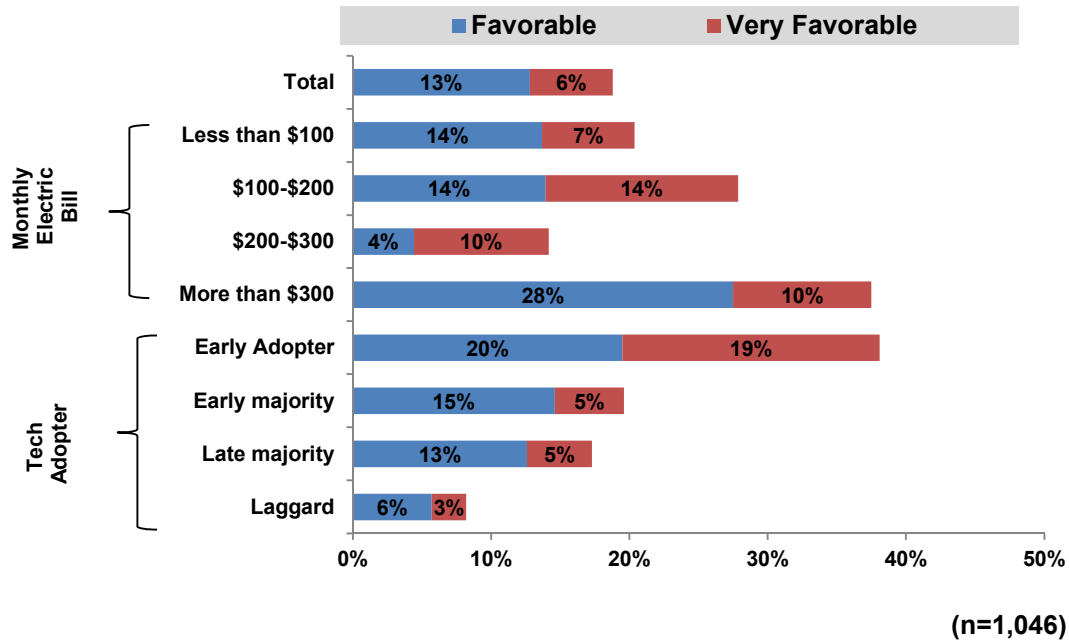
Chart 5.2 Favorable Impressions of Carbon Offsets/Credits by Demographic Segment



(Source: Pike Research)

Chart 5.3 shows consumer opinions toward carbon offsets/credits by behavioral segmentation. From such a view, respondents who identify as early adopters of new technology and respondents who spend \$300 or more on their monthly electric bill had the highest percentages of favorable impressions, each with 38%. As expected, laggards have the lowest favorability rating for carbon offsets/credits (9%), and consumers that spend between \$200 and \$300 per month on electricity were also below the overall average favorability (14%).

Chart 5.3 **Favorable Impressions of Carbon Offsets/Credits by Behavioral Segment**

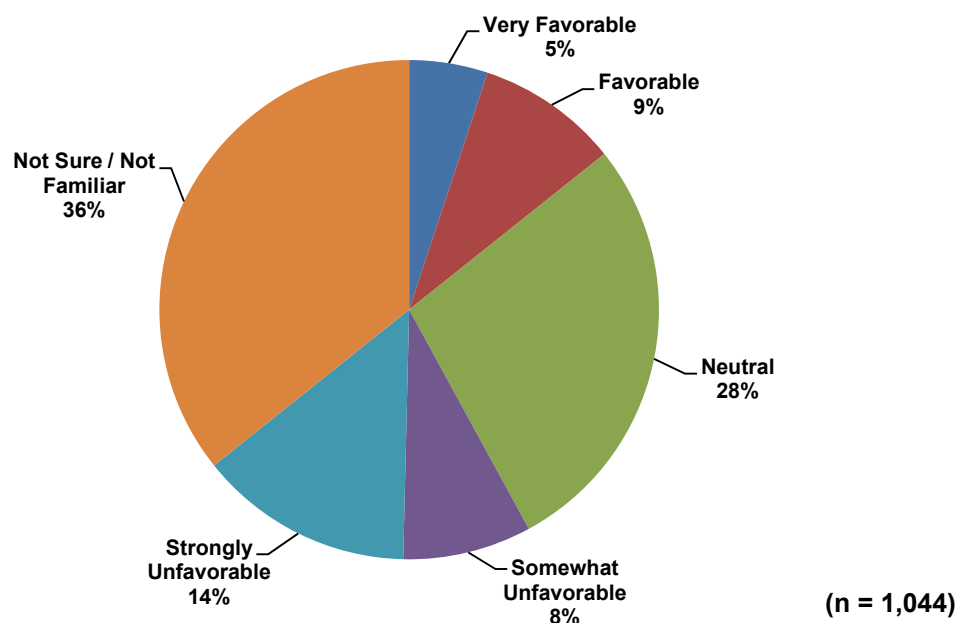


(Source: Pike Research)

5.2 Cap and Trade

The concept of cap and trade, a market-based approach to regulating carbon emissions, continues to be the least favorable topic covered in the survey. The 14% favorable response rate for the topic was the lowest among all covered topics, and the 22% unfavorable response rate marked the highest among all topics. As shown in Chart 5.4, cap and trade was the only concept to receive more unfavorable responses than favorable ones. With 36% of respondents selecting “not sure/not familiar,” the concept had the second highest incidence of unfamiliarity among consumers.

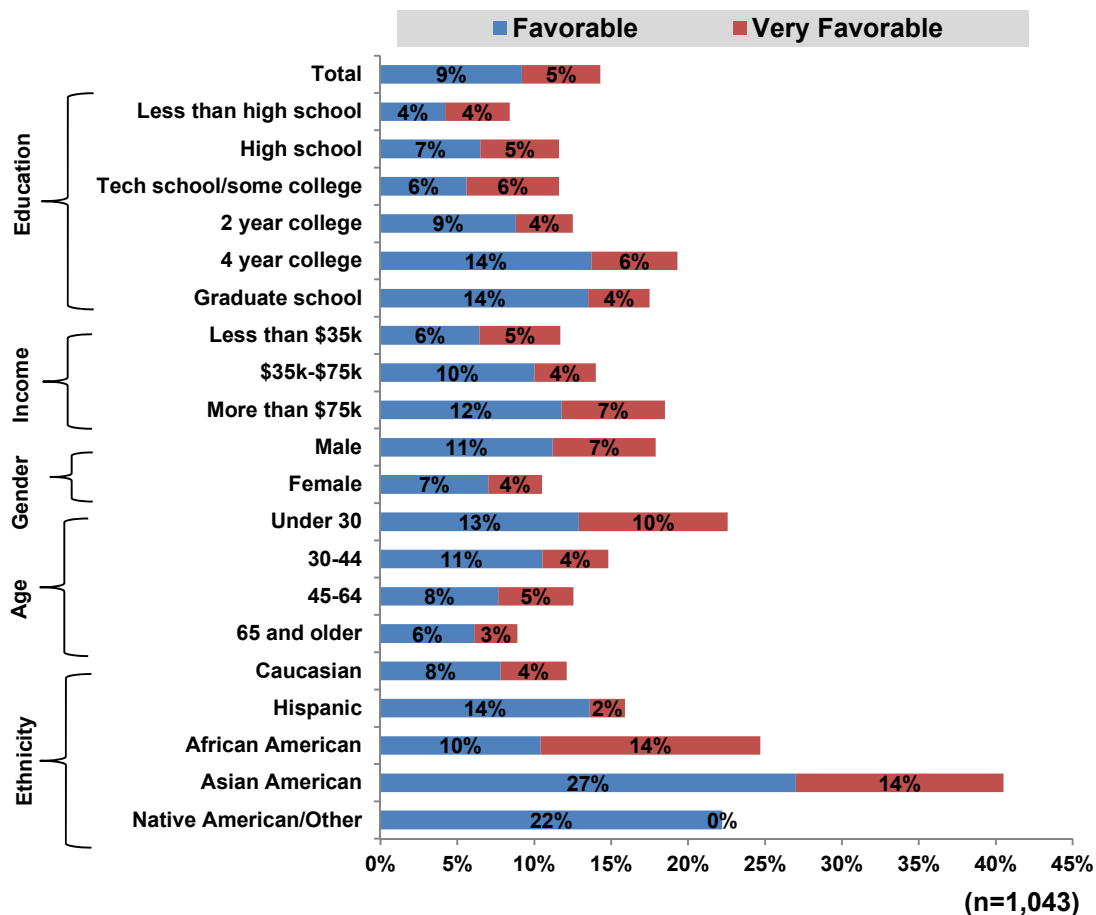
Chart 5.4 Overall Impressions of Cap and Trade



(Source: Pike Research)

Chart 5.5 highlights the demographic characteristics of respondents to the cap and trade question. The most noticeable variation in favorability ratings occurred among the various age groups. The topic received a favorable rating from 23% of the “under 30” group while only 9% of the “65 and older” group reported a favorable impression. When segmented by education level, favorability ratings rise steadily as education level increases. Three minority groups (African American, Asian Americans, and Native American/Other) had higher favorable responses to cap and trade; however, this is likely due in part to smaller sample sizes among these groups. Men held somewhat more favorable opinions of cap and trade than women (18% versus 11%). There was little variation when segmented by income level.

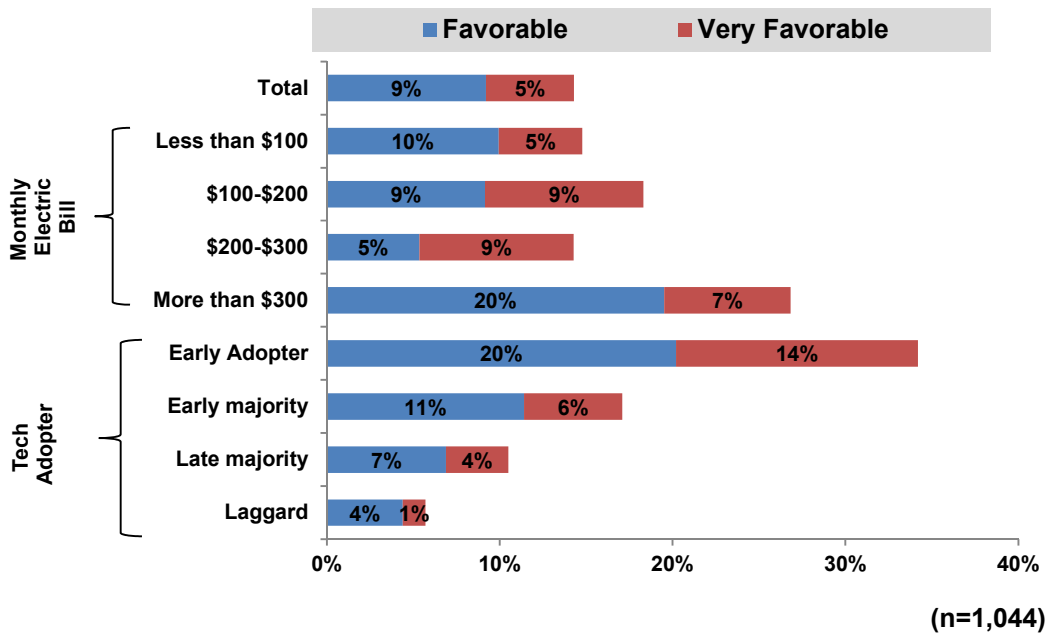
Chart 5.5 *Favorable Impressions of Cap and Trade by Demographic Segment*



(Source: Pike Research)

As Chart 5.6 shows, the level of favorable responses to cap and trade mirror those for the carbon offsets/credits concept: Early adopters were more than twice as likely as the general respondent pool to hold positive impressions of cap and trade (34% versus 14%). In addition, those with higher electric bills (\$300 or more per month) were more likely to hold a favorable opinion of the concept (27%).

Chart 5.6 *Favorable Impressions of Cap and Trade by Behavioral Segment*



(Source: Pike Research)

Section 6

BUILDING EFFICIENCY

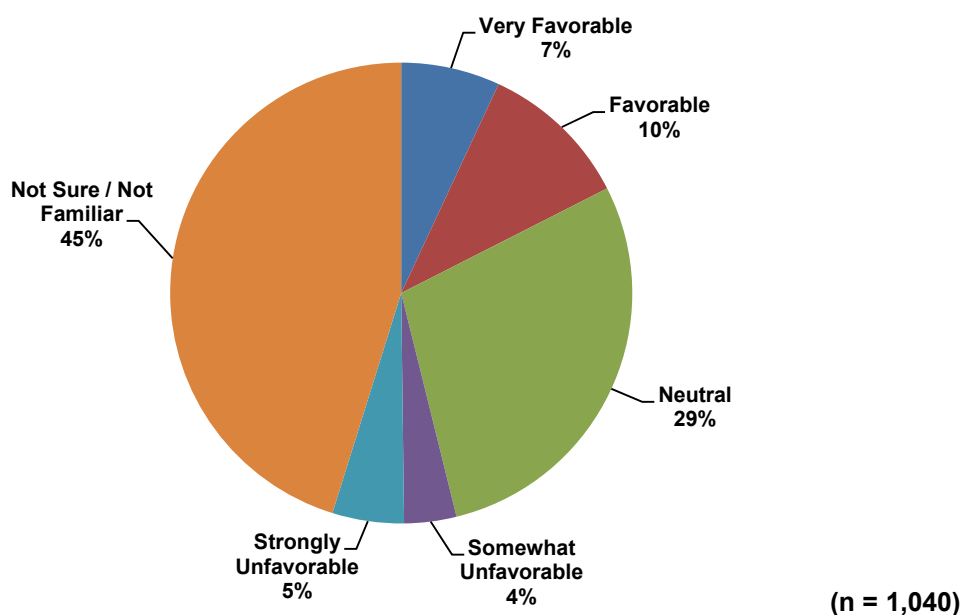
6.1 LEED Certification

With a meager 17% of respondents indicating a “favorable” or “very favorable” impression of LEED certification, it would appear that this building efficiency concept is relatively unappealing to consumers. However, Chart 6.1 paints a more accurate picture of consumers’ views. While LEED certification has the second lowest percentage of favorable responses, it was also in the bottom half among all concepts for unfavorable responses (9%) along with such highly favored concepts as wind energy.

As the large orange slice in the chart indicates, a majority of consumers (45%) are simply unfamiliar with this green building certification program. Familiarity does seem to be on the rise, however, as evidenced by a drop from a 53% unfamiliar rating in Pike Research’s previous survey.

More consumers were unfamiliar with LEED certification than with any of the 12 other concepts included in the survey. Additionally, it represented the only concept for which a majority of respondents selected “not sure/not familiar.” Clearly, this is the concept with the lowest level of consumer awareness. Since LEED certification exists in both residential and commercial buildings, consumers are just as likely to benefit from the program as businesses.

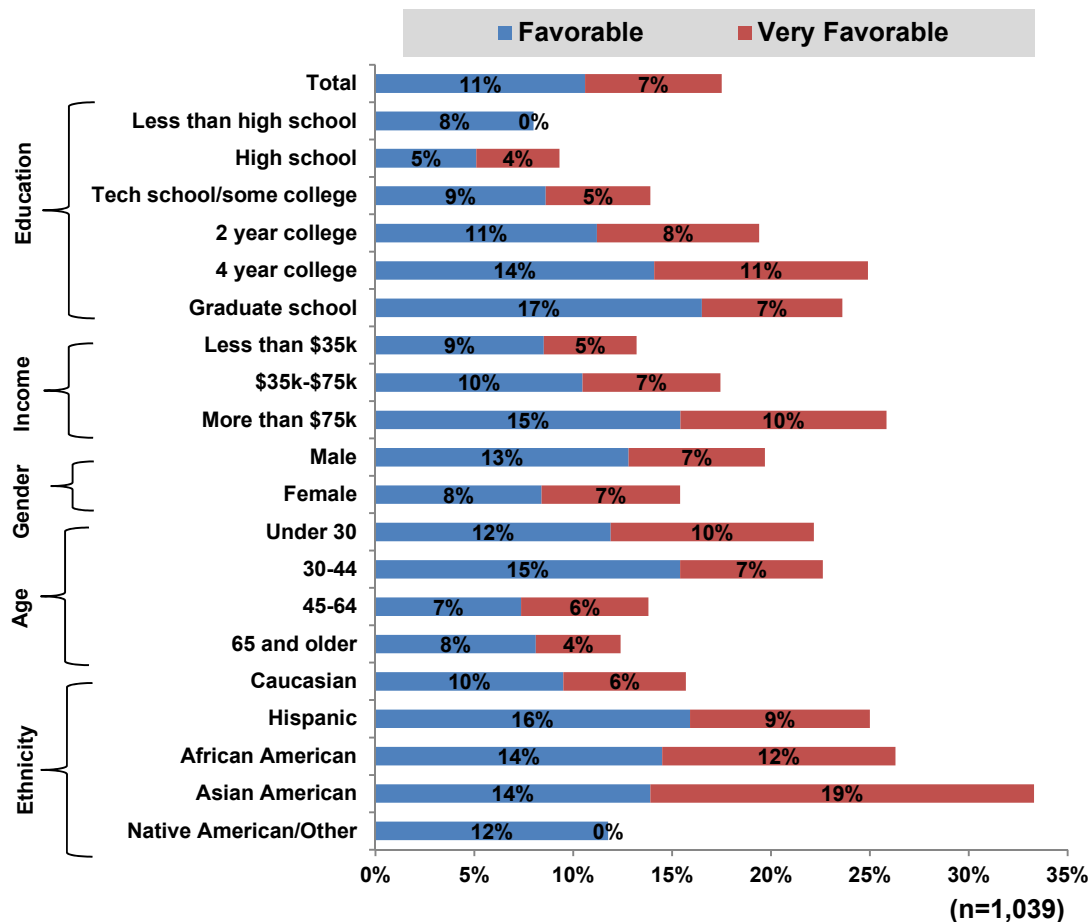
Chart 6.1 Overall Impressions of LEED Certification



(Source: Pike Research)

As shown in Chart 6.2, there are some variations in LEED favorability when broken out by various demographic characteristics. Favorability increases with education, rising steadily from an 8% favorability rating among respondents with “less than high school” education to 25% among those with a 4-year degree. The older demographic groups, those in the “45-64” and “65 and older” groups, held favorability ratings of 13% and 12%, respectively, while younger consumers held favorability ratings in the low-20% range. This may be because older consumers are less aware of LEED certification than younger consumers. Furthermore, 25% of respondents who earned more than \$75,000 report a favorable opinion of the concept, which is twice the rate of respondents earning less than \$35,000 annually.

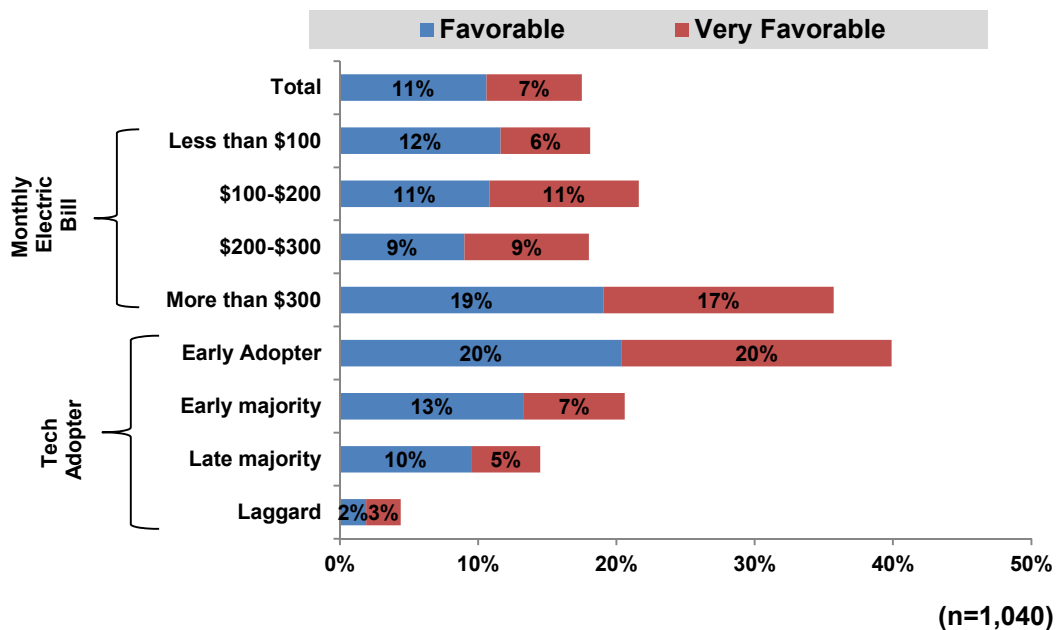
Chart 6.2 *Favorable Impressions of LEED Certification by Demographic Segment*



(Source: Pike Research)

Chart 6.3 shows the behavioral segment breakout by new technology uptake and monthly electric bill. Like the smart grid and carbon management topics, the segment of consumers who identified themselves as early adopters of new technologies had higher rates of favorable impressions of LEED certification (40%) than any other demographic or behavioral segment; meanwhile, only 5% of laggards reported a favorable opinion of the concept. Among those with an electric bill of more than \$300 per month, 36% reported a favorable impression of LEED certification, which was double the average for this category. This indicates that this group may be more receptive to the concept due to their electricity spending.

Chart 6.3 *Favorable Impressions of LEED Certification by Behavioral Segment*



(Source: Pike Research)

Section 7

SUMMARY AND CONCLUSIONS

7.1 Clean Energy

Consumer opinions of the clean energy concepts were generally positive. All four concepts (solar, wind, clean coal, and nuclear) received favorable responses from at least 40% of respondents. Most notably, the two renewable energy concepts, wind and solar, continued to garner favorable opinions by more consumers than any other topic included in the survey. The non-renewable clean energy concepts, clean coal and nuclear power, did not enjoy the same level of enthusiasm from the respondent base. Nuclear power also earned the highest percentage of unfavorable and neutral responses among all energy and environmental concepts.

Of the four clean energy concepts, consumers were the least familiar with clean coal: 15% of respondents selected “not sure/not familiar” for this concept. These results reveal that solar and wind power have reached a point of mass appeal among consumers. Clean energy concepts that do not utilize renewable resources are less likely to appeal to the vast majority of consumers.

7.2 Clean Transportation

Clean transportation concepts are also well received by consumers, though not quite to the same extent as solar and wind energy. More than half of all respondents reported favorable impressions of hybrid vehicles, electric cars, and natural gas vehicles. Biofuels were favored by less than one-fourth of respondents (39%) and received the highest incidence of unfamiliar responses (15%) among the clean transportation concepts.

The popularity of hybrid and electric vehicles is not surprising given the extensive advertising and publicity campaigns for cars like the Toyota Prius, Nissan Leaf, and Chevy Volt. An interesting note is that natural gas powered vehicles received a similar favorability rating despite their being largely limited to commercial vehicles.

Within the various demographic splits, it is the higher-educated and higher-income consumers that continue to report the greatest rates of favorability toward clean transportation. The marketing messages for these alternative-fuel cars focus on the environmentally friendly benefits of fewer gas emissions. With gas prices likely to fluctuate within the United States in coming years, consumers are likely to be drawn to the potential cost savings offered by such vehicles as well as their low impact on the environment.

7.3 Smart Grid

Consumer reactions to smart grid and smart meter concepts appear less favorable; these topics garnered smaller percentages of favorable responses than the clean energy and transportation topics. However, a closer review reveals that few consumers hold an unfavorable view of the smart grid or smart meters (less than 10%). In fact, all four clean transportation concepts and both carbon management topics received higher percentages of unfavorable responses than either of the smart grid concepts.

As with carbon management and building efficiency topics, what stood out in the survey results for the smart grid and smart meters was the high number of respondents reporting they were unfamiliar with the concepts. Approximately one-third of consumers selected

“not sure/not familiar” in response to each of these topics, illustrating that many have yet to form an opinion. In general it was the higher-educated, higher-income-earning male respondents that reported the highest rates of favorable impressions for smart grid technologies. With a limited number of smart meter installations, consumers are still learning about the energy-saving potential of smart grid technologies.

7.4 Carbon Management

Lagging behind nearly all other concepts in terms of favorable responses, the concepts dealing with carbon management (cap and trade, carbon offsets/credits) did not garner a high level of favorable responses by survey respondents. Additionally, this was accompanied by relatively high percentages of unfavorable and unfamiliar responses. This consumer reaction is interesting given that these concepts are designed to be utilized by businesses; it may be that some negative media coverage has drawn consumer attention to these topics.

Carbon credits proved to be among the least favored concepts, with 25% of consumers reporting an unfavorable rating and 19% reporting a favorable rating. In addition, nearly one-third of respondents were unfamiliar with the concept. Cap and trade fared nearly as poorly, with a 22% unfavorable rating, a meager 14% favorable rating, and 36% of respondents stating they were unfamiliar with the concept.

Two noticeable demographic notes emerged from a closer examination of carbon management: Both cap and trade and carbon offsets/credits were better received by younger consumers and consumers in the higher income level.

7.5 Building Efficiency

The only building efficiency topic included in the survey was LEED certification. Consistent with previous Energy and Environment Consumer Surveys, consumers continue to state that they are not acquainted with the concept. Pike Research believes this is because green building certification programs such as LEED have yet to draw significant attention outside of the real estate industry and penetrate the mass market.

With nearly three-fourths of respondents reporting an unfavorable or neutral impression of LEED (45% unfamiliar and 29% neutral), it is clear that a greater emphasis needs to be placed on educating end users about the topic and its benefits. A closer examination shows early adopters and higher-income earners as the most aware of LEED certification; these two segments also report higher rates of favorable opinions of the concept.

While this low level of familiarity among the general population is challenging, a positive finding is that consumers do not generally hold adverse opinions on the concept, meaning there are relatively fewer negative views to overcome.

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Section 10

SCOPE OF STUDY

Pike Research has prepared this report to provide participants involved in clean technology markets with a study of consumer opinions about a select set of energy and environmental topics. One of the major objectives of the report is to impartially assess levels of consumer interest in various concepts dealing with clean energy, clean transportation, smart grid, carbon management, and building efficiency. Pike Research also provides an analysis of key consumer attitudes that are relevant to this market.

Great care was taken in constructing a survey questionnaire that would yield the most accurate and unbiased results possible. However, it should be noted that consumers often have difficulty providing survey responses that will accurately predict their purchase behavior for products that have yet to be introduced to the market.

SURVEY METHODOLOGY

Pike Research conducted a web-based survey of 1,048 U.S. consumers in the fall of 2011 using a structured online questionnaire. The survey invitation was sent to a nationally representative and demographically balanced sample of consumers who are members of a large online panel. Respondents were offered a chance to win prizes in exchange for their participation. The margin of error for these survey results is +/- 3% with a 95% confidence interval.

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