



Portland General Electric 2017 Integrated Resource Plan Survey

Survey conducted: August-October 2017

ISO 20252 Certified

IRP Stakeholder Roundtable – February 14, 2018



MARKET STRATEGIES
INTERNATIONAL



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PGE 2017 Integrated Resource Plan (IRP) Survey Objectives

PGE has commissioned an updated IRP Survey in 2017 **to assess customers' resource preferences and cost expectations in order to inform PGE's long-term resource planning and the development of customer service plans and rates**, with the following specific objectives:

- Provide information on customer preferences to support the public process of Integrated Resource Planning.
- Understand customer concerns and preferences as they relate to Integrated Resource Planning.
- Quantify customers' (residential, general business, and key business customers) perceptions and receptivity to a variety of energy resource options, allowing PGE to assess individual resource options and resource mix options on a ratio scale of customer support.
- Determine which resource options customers would be most likely to support, and also the degree to which certain options would be supported over others, given differences in price and resource mix.



Market Changes Since the Most Recent 2012 PGE IRP Survey

Since conducting the most recent PGE Integrated Resource Plan (IRP) Survey in 2012:

- The state of Oregon has made an historic decision to **move away from coal** and **implement higher Renewable Portfolio Standards**
- The use of **renewable energy** and **demand side resources** have increased considerably, including:
 - Energy efficiency
 - Distributed generation (solar)
 - Energy storage
 - Electric vehicles
 - Smart thermostats
 - Energy management systems



Methodology

- Random samples of PGE Residential and General Business customers were screened and recruited to complete a web survey about PGE's future power supply.
- PGE's 2017 Integrated Resource Planning Survey was completed by:
 - n=**502** PGE Residential customers, screened as their household's any decision-maker.
 - n=**186** General Business customers, screened as a person responsible for making energy-related policy decisions for their company.
- After completing the screener, the main Integrated Resource Planning Survey took approximately 40 minutes to complete on average, via a self-administered web survey.

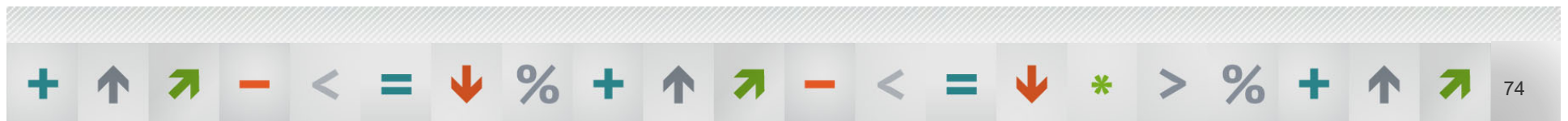
Detailed Findings

Portland General Electric
2017 Integrated Resource Plan Survey



Initial Electricity Resource Preferences

Before being provided with detailed information about each resource

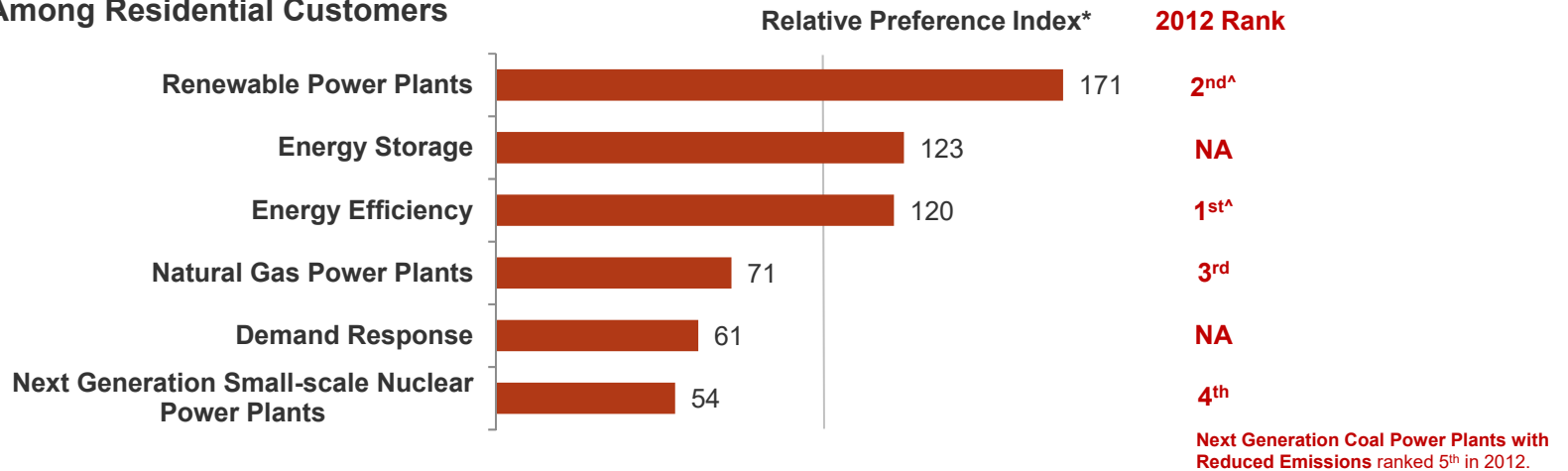




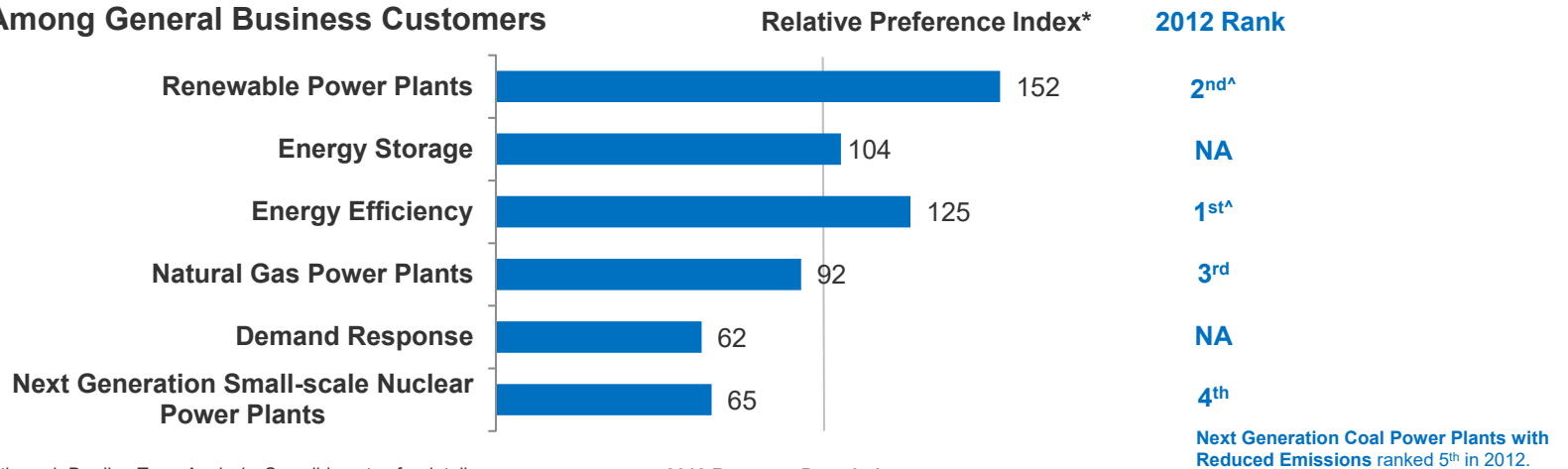
Initial Electricity Resource Prioritization: Ranking of Resources PGE Could Use to Meet the Demand for Power in Oregon

- > In the “Screening” section preceding the main IRP survey, customers ranked *Renewable Power Plants*, *Energy Efficiency*, and *Energy Storage* as their three most preferred resources for meeting the demand for power in Oregon.

Among Residential Customers



Among General Business Customers



*Relative Preference determined through Bradley-Terry Analysis. See slide notes for details.

[^]Wording and metric changed from 2012; use caution when interpreting trends.

S6-S9. Now, please think about the resources PGE might use to meet the demand for power in Oregon.

Which of the following would be your first/second/third/last choice for how PGE meets this demand for power?

2012 Resource Descriptions:

Renewable Resources (Wind, Solar, Biomass, Geothermal, but not including Hydro-electric power plants)

Customer energy efficiency and energy conservation (i.e., CFL bulbs, more efficient appliances, lowering the thermostat)



Initial Electricity Resource Prioritization Comparison: Customers Who Completed the IRP Survey *versus* Customers Who Completed Screening but Opted Not To Complete the Main Survey

Among Residential Customers Who Completed the 2017 IRP Survey
(n=502)

	Most Preferred	Least Preferred
Renewable Power Plants	60%	3%
Energy Storage	12%	4%
Energy Efficiency	10%	3%
Natural Gas Power Plants	4%	15%
Demand Response	2%	23%
Next Generation Small-scale Nuclear Power Plants	8%	44%

Among Residential Customers Who Completed the Screener, But Did Not Complete the 2017 IRP Survey
(n=202)

	Most Preferred	Least Preferred
Renewable Power Plants	55%	2%
Energy Storage	10%	4%
Energy Efficiency	16%	1%
Natural Gas Power Plants	4%	11%
Demand Response	3%	27%
Next Generation Small-scale Nuclear Power Plants	5%	37%

Among General Business Customers Who Completed the 2017 IRP Survey
(n=186)

	Most Preferred	Least Preferred
Renewable Power Plants	47%	8%
Energy Storage	7%	8%
Energy Efficiency	17%	1%
Natural Gas Power Plants	8%	11%
Demand Response	2%	18%
Next Generation Small-scale Nuclear Power Plants	16%	50%

Among General Business Customers Who Completed the Screener, But Did Not Complete the 2017 IRP Survey
(n=254)

	Most Preferred	Least Preferred
Renewable Power Plants	41%	4%
Energy Storage	3%	8%
Energy Efficiency	22%	2%
Natural Gas Power Plants	6%	14%
Demand Response	6%	18%
Next Generation Small-scale Nuclear Power Plants	13%	48%

S6-S9. Now, please think about the resources PGE might use to meet the demand for power in Oregon. Which of the following would be your first/second/third/last choice for how PGE meets this demand for power?

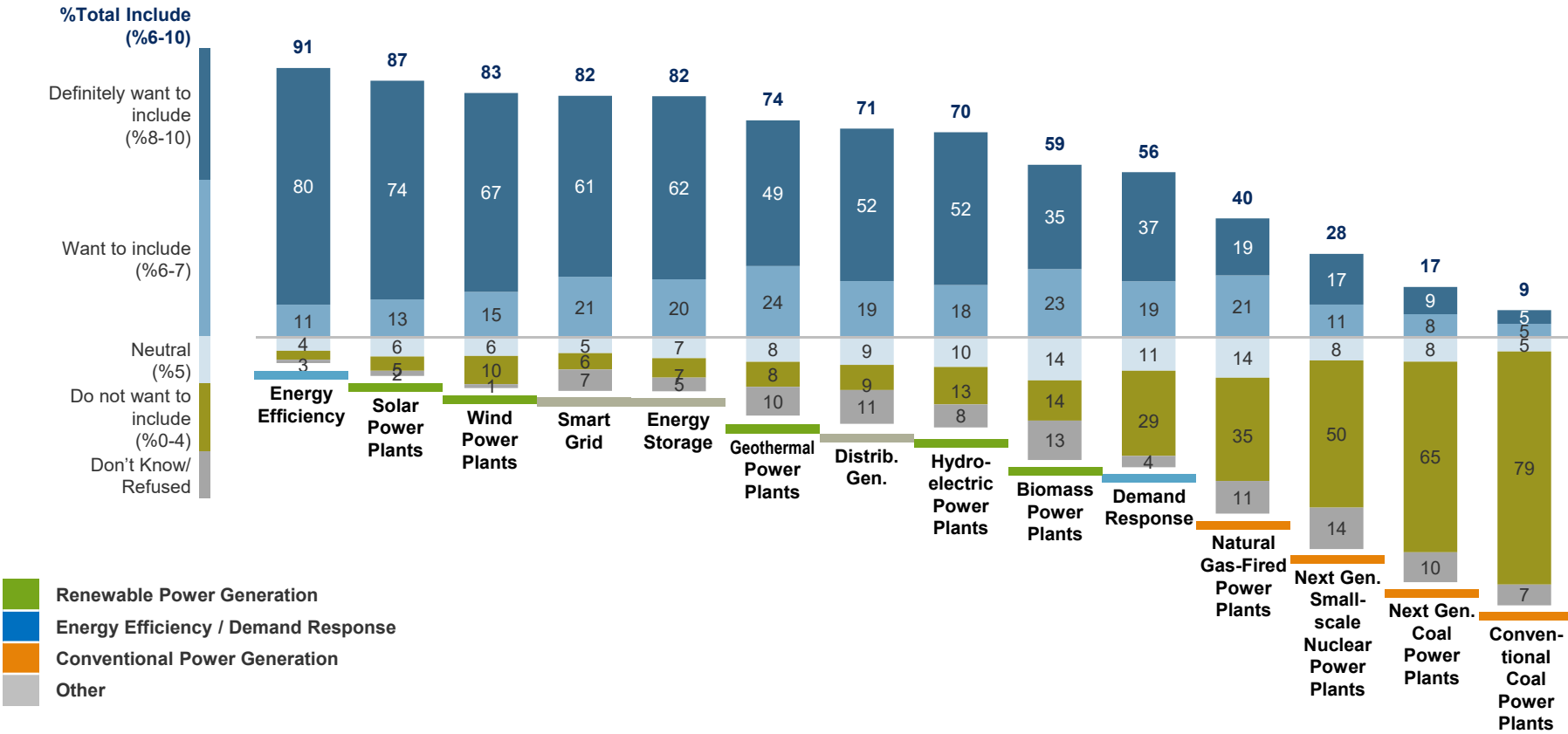


Initial Electricity Resource Preferences – *Residential*

(Prior to Seeing Detailed Information About Each Resource)

n=502

- > Before reviewing detailed information about each resource, PGE Residential customers indicated a strong preference for energy efficiency and renewable resources over conventional fossil-fuel resources for inclusion in Oregon’s future energy supply.



Q4A-Q4N. Please indicate how much you would prefer that each type of resource be included in a future energy supply plan for Oregon.

^aWording changed from 2012; use caution when interpreting trends.

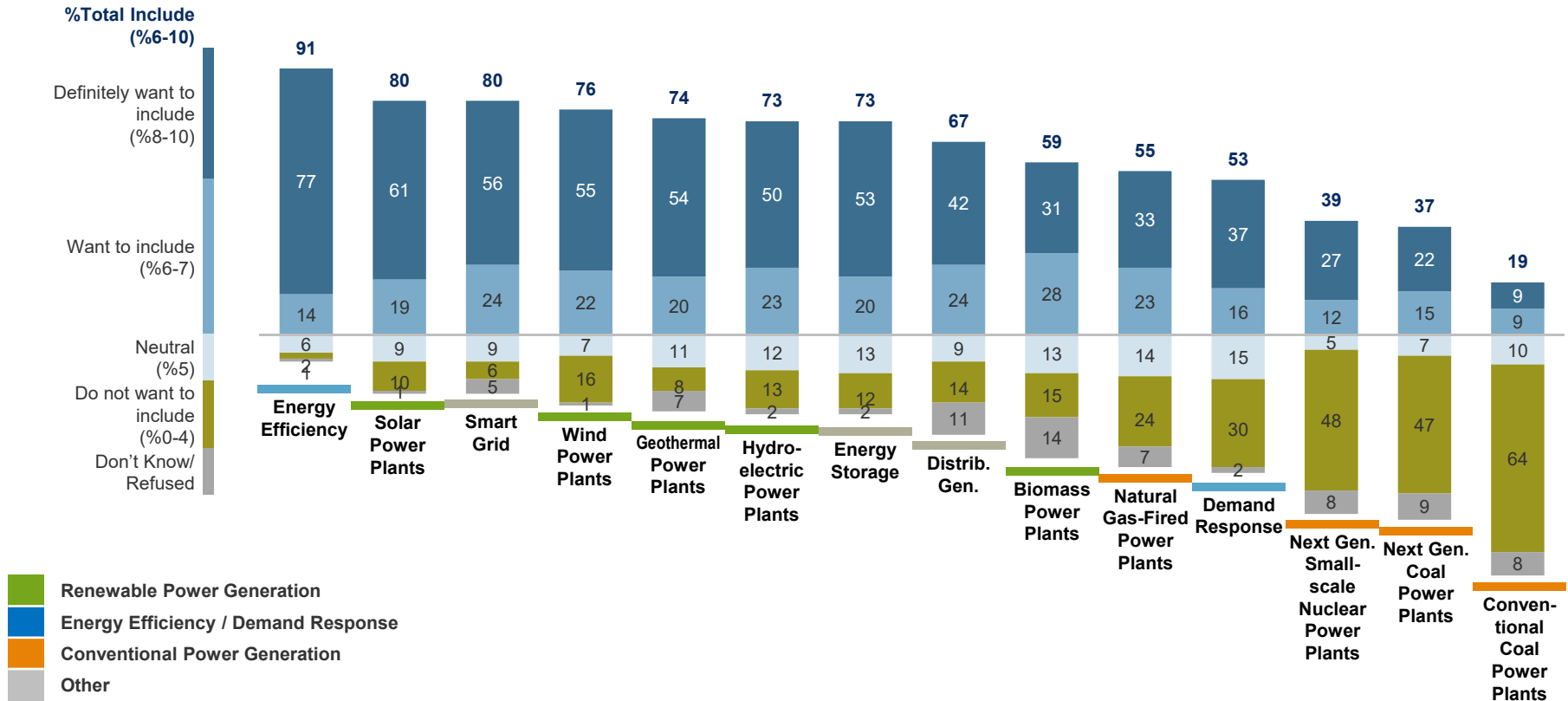
Initial Electricity Resource Preferences – *General Business*

(Prior to Seeing Detailed Information About Each Resource)

n=186



- > Generally in line with PGE Residential customers, PGE Business customers also indicated a strong initial preference for energy efficiency and renewable resources over conventional fossil-fuel resources.



Q4A-Q4N. Please indicate how much you would prefer that each type of resource be included in a future energy supply plan for Oregon.



Informed Electricity Resource Preferences

After being provided with detailed information about each resource

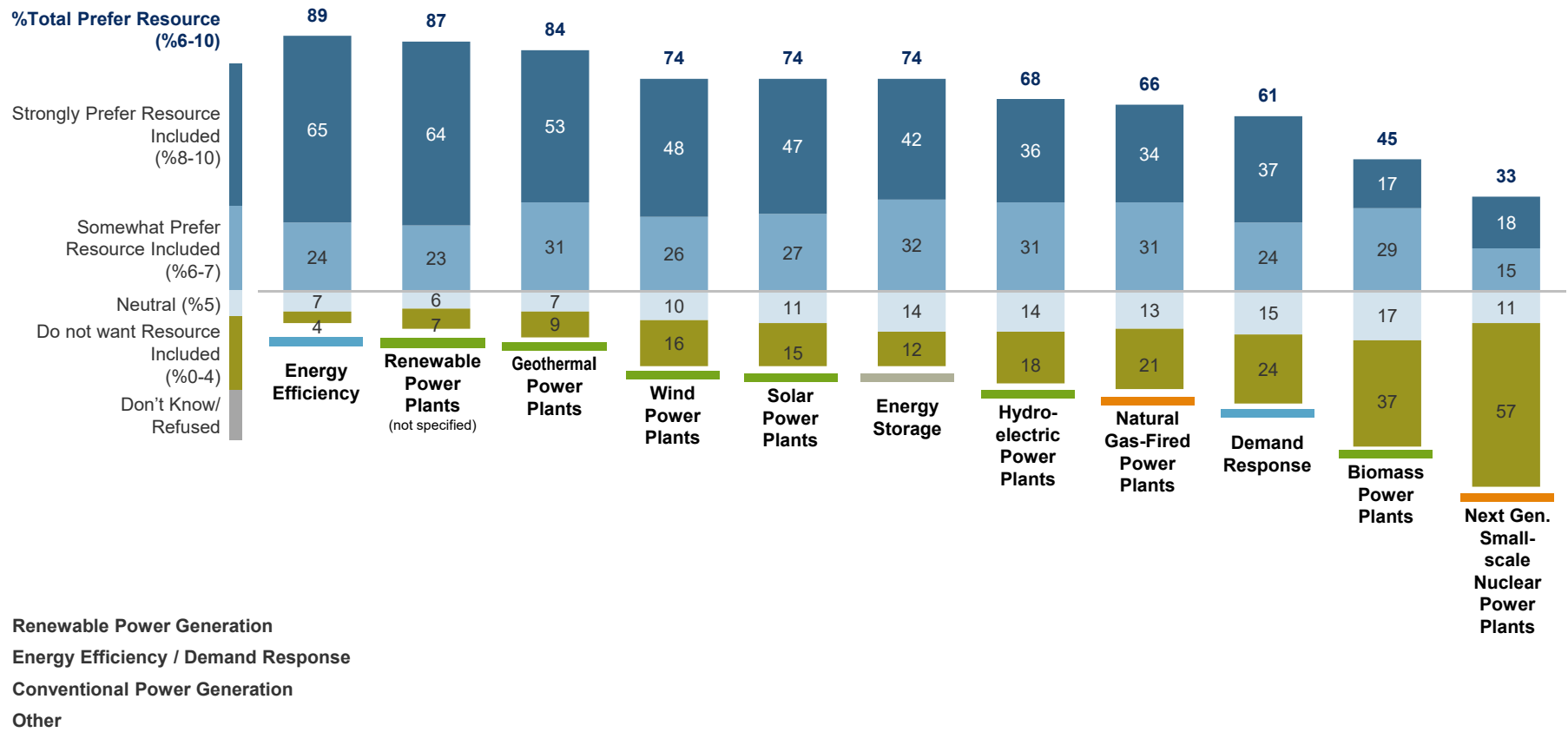
Electricity Resource Preferences for PGE's Long-Term Energy Plan

Residential (After Seeing Detailed Information About Each Resource)

n=502



- > After being provided with more detailed information about each resource, Residential customers continued to indicate a strong preference for energy efficiency and renewable resources for inclusion in PGE's long-term energy plan.



Given these factors, please rate [RESOURCE] in terms of the extent to which you would prefer that this resource be part of PGE's long-term energy supply plans.
 REN_1, NG_1, NUC_1, EE_1, DR_1, ES_1, WIND_1, SOL_1, GEO_1, HYDRO_1.

^ In 2006, Natural Gas was described as having "low" price stability, and "increasingly imported".

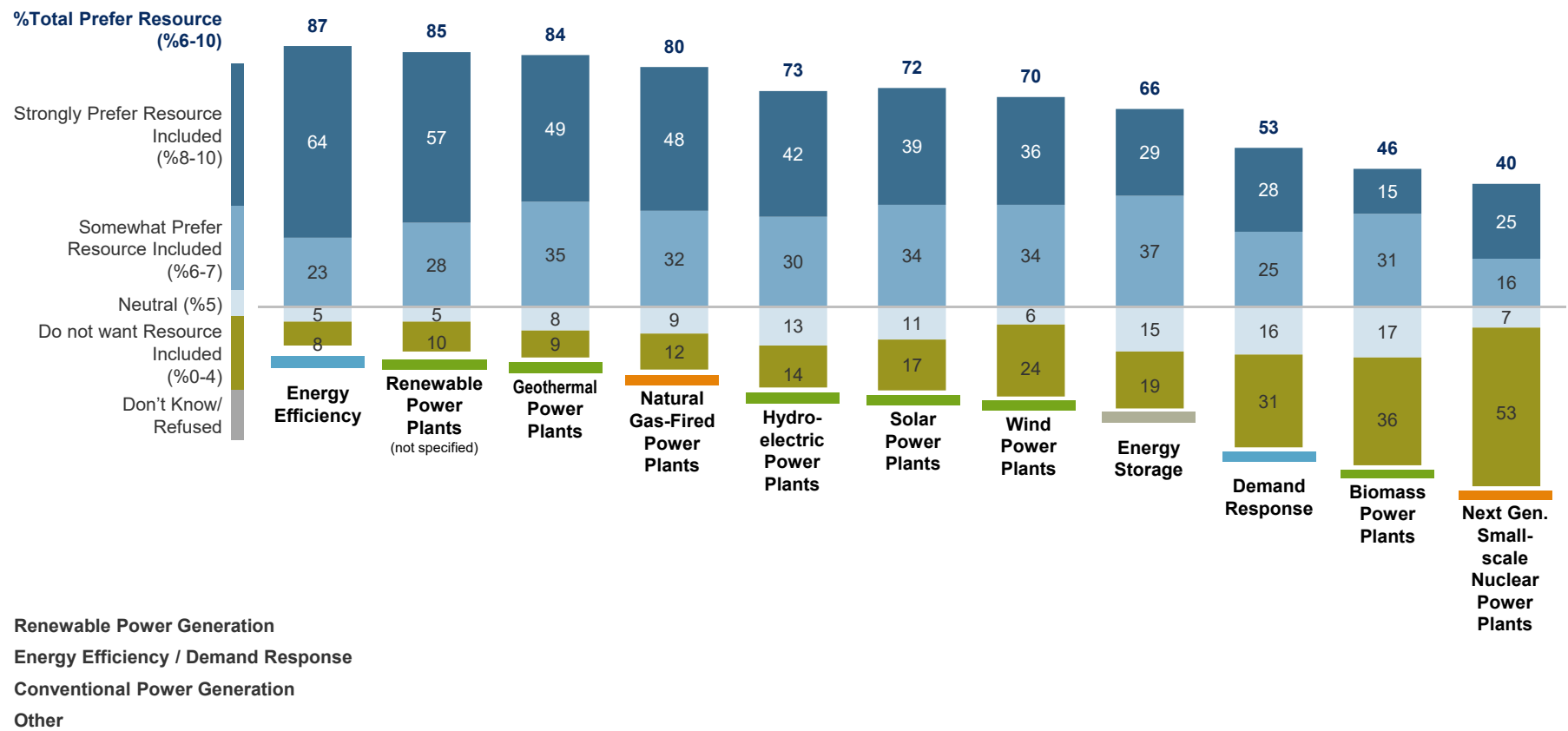
Electricity Resource Preferences for PGE's Long-Term Energy Plan

General Business (After Seeing Detailed Information About Each Resource)

n=186



- > After reviewing more information about each resource, PGE Business customers' preference for natural gas-fired power plants increased notably, though energy efficiency and renewable resources continued to receive the strongest preference for inclusion in PGE's long-term energy plan.



Given these factors, please rate [RESOURCE] in terms of the extent to which you would prefer that this resource be part of PGE's long-term energy supply plans.
 REN_1, NG_1, NUC_1, EE_1, DR_1, ES_1, WIND_1, SOL_1, BIO_1, GEO_1, HYDRO_1.



Renewable Resources, Environmental Issues

Customer support for increased renewable resources

Expected timeframe for PGE's transition to 100% renewable power

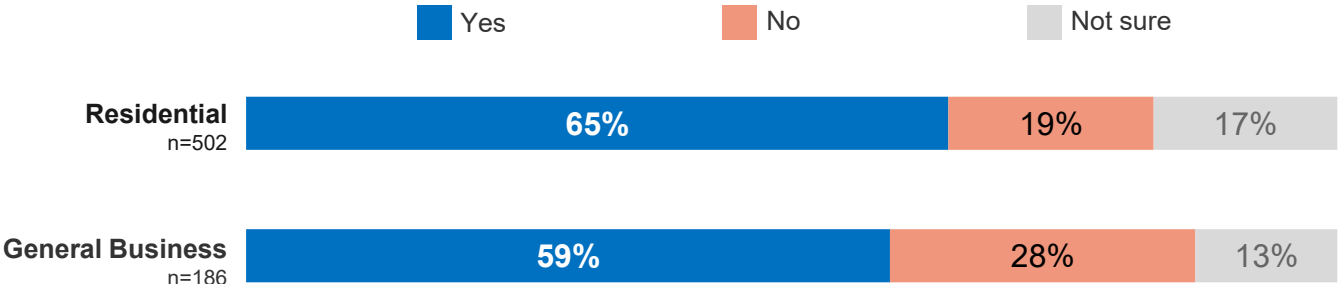
Prioritization of environmental concerns



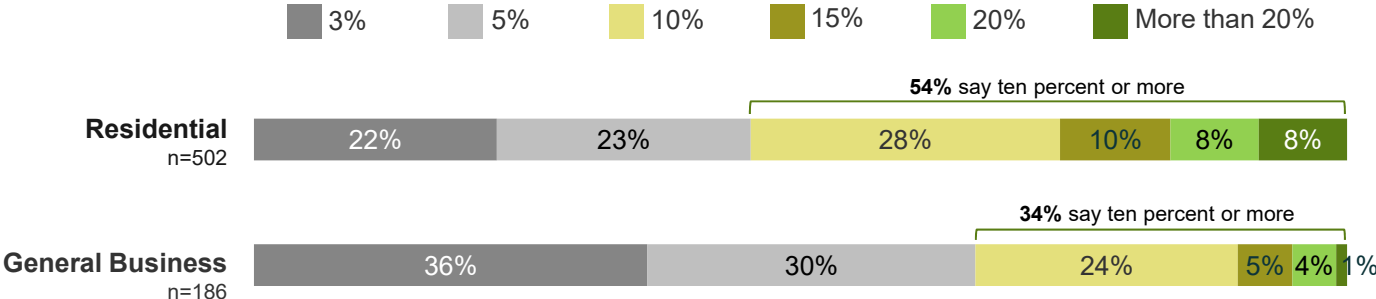
Support for Use of More Renewable Resources Even if All PGE Customers Would Need to Pay More for Electricity

> Nearly two-thirds (65%) of Residential customers and six in ten (59%) General Business customers think PGE should use more renewable resources even if customers would need to pay more for electricity.

Do you think that PGE should use more renewable resources even if this meant that all PGE customers would need to pay more for electricity?



What is the highest additional cost for renewable resources that you think PGE should ever consider paying?



REN_2. Do you think that PGE should use more renewable resources even if this meant that all PGE customers would need to pay more for electricity?

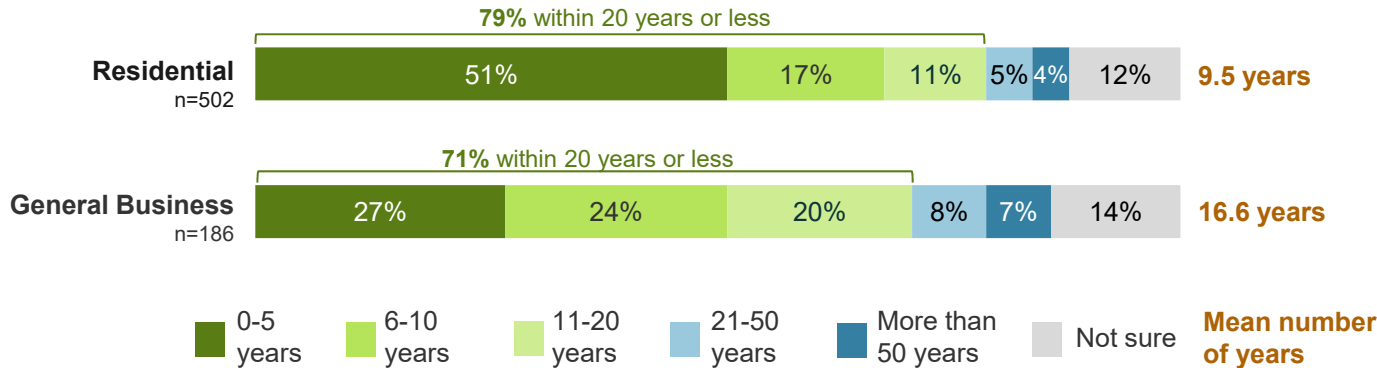
REN_3. What is the highest additional cost for renewable resources that you think PGE should ever consider paying -- recognizing that all customers would ultimately have to bear this cost?



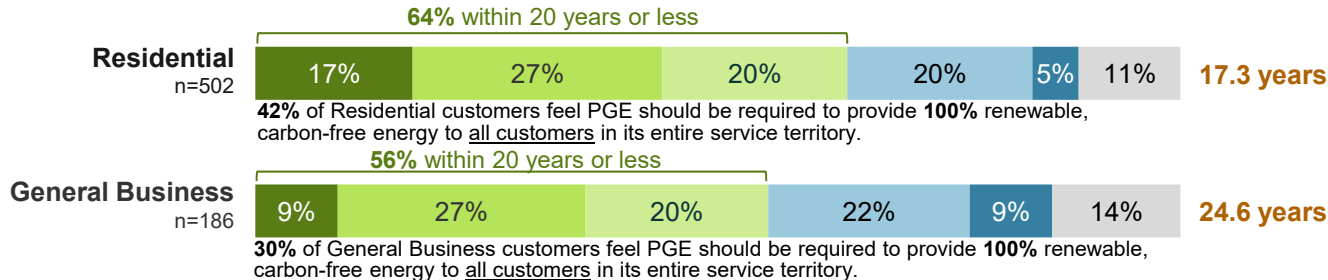
Expected Timeframe for PGE to Provide 100% Renewable Power

- > Majorities of Residential (64%) and General Business (56%) customers feel that PGE should achieve 100% renewable energy across its entire service territory within 20 years.

Desired Number of Years for PGE to Provide Your Home or Business with 100% Clean and Renewable Energy like Wind, Solar, Geothermal, and Hydropower



Expected Number of Years for PGE to Achieve 100% Renewable Energy Supply for Its Entire Service Territory

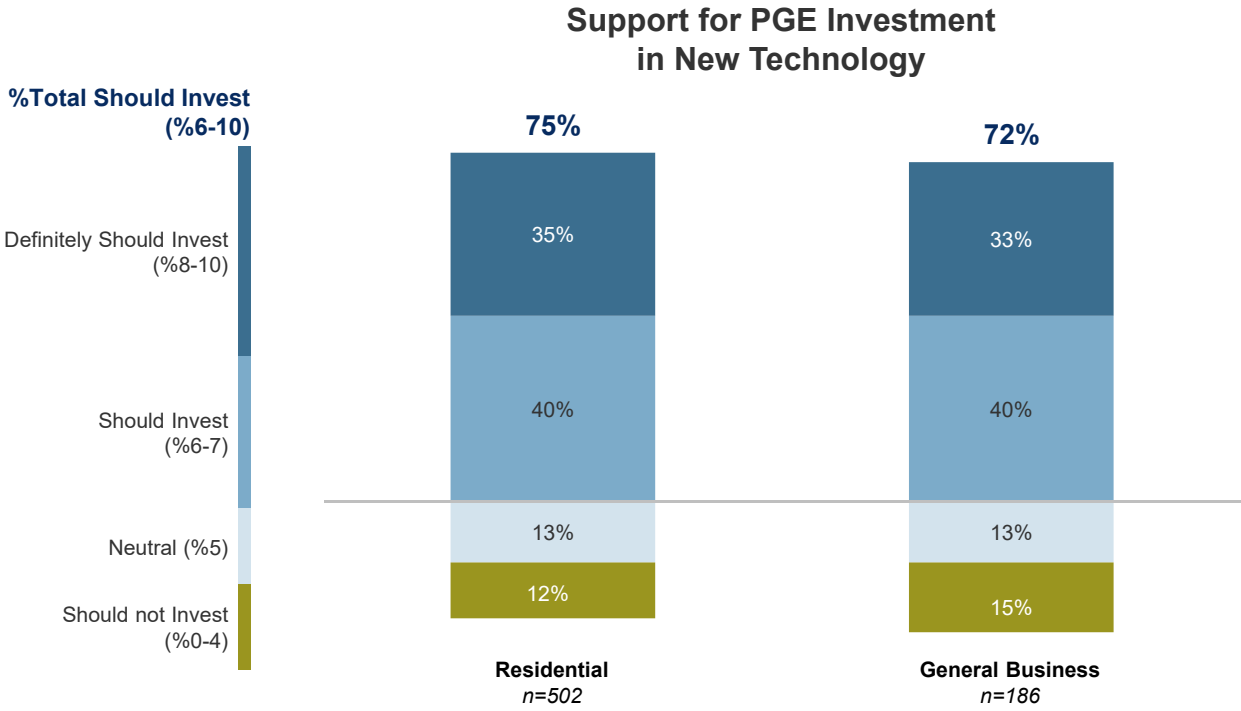


REN_100A. By what year do you want the energy that powers your home/business to be produced by 100% renewable, carbon-free generation resources like wind, solar, geothermal and hydropower?
REN_100. Currently, customers can elect 100% renewable energy through purchase of certified Renewable Energy Certificates. Some cities and states are setting long-term goals to have 100% of their energy supplies produced from renewable, carbon-free sources [i.e. energy supply, not purchased RECs]. By what year do you expect PGE to achieve a 100% renewable, carbon-free energy supply for its entire service territory?



PGE Investment in New Technology to Promote Energy Efficiency, Facilitate the Integration of Renewable Resources, and Make Operations More Efficient

- > Approximately three-quarters of Residential (75%) and General Business (72%) customers feel that PGE should invest ratepayer money in new technologies to promote energy efficiency, facilitate integration of renewable resources, or otherwise make operations more efficient.

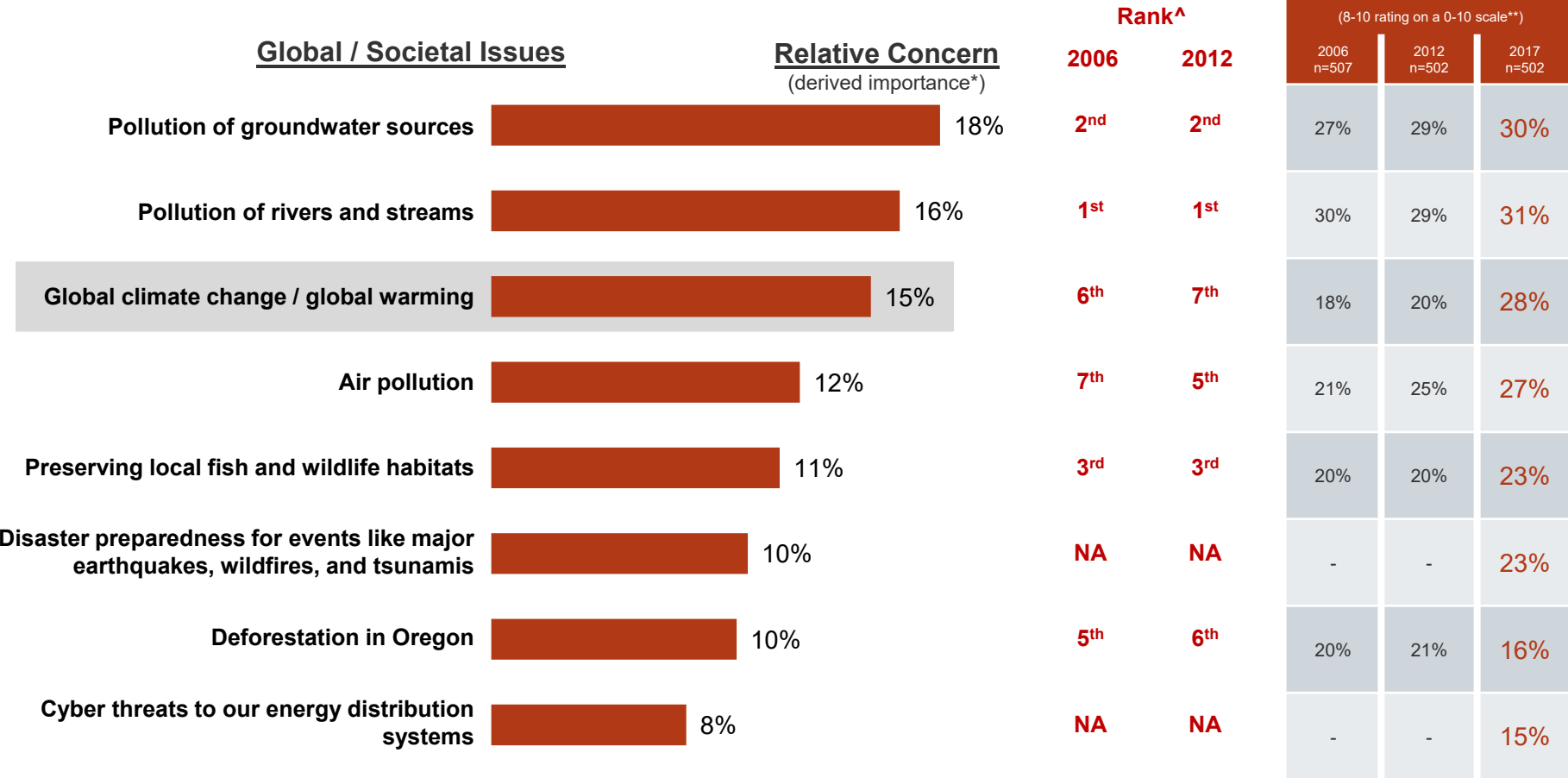


NEWTECH. Some electric utilities invest ratepayer money in research and development of new technologies that might promote energy efficiency, facilitate integration of renewable resources, or otherwise make their operations more efficient. Other utilities do not try to develop new technologies, but simply try to find and implement the best technologies that have already been developed. To what extent do you think that PGE should be investing in developing new technologies?



Concern Regarding Global / Societal Issues, Action Taken Among Residential Customers

> Pollution of groundwater sources (18%), pollution of rivers and streams (16%) and global climate change / global warming (15%) are the most concerning environmental issue for Residential PGE customers.



[^] Items and metric changed from 2006 and 2012; use caution when interpreting ranking trend. PC. Which of these global / societal issues is of most concern to you as a resident of Oregon? ENVCONC1-ENVCONC8. To what degree have you made changes in terms of how you behave/it operates in response to each of these global / societal issues?

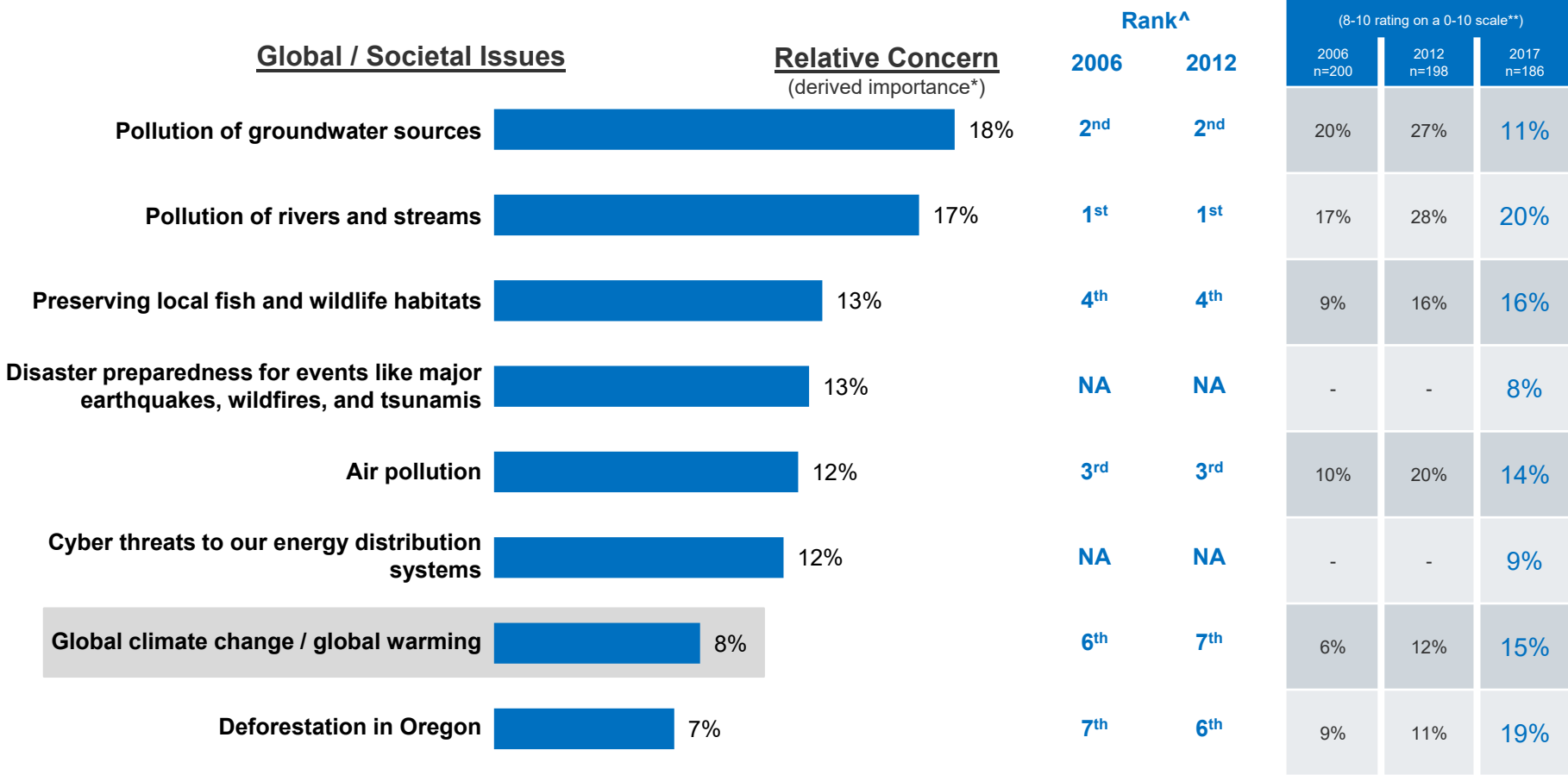
* Relative Concern[^] is based on "derived importance" modeled from paired-comparison results across these eight global / societal issues.

** Scale for changes made in response to issue: 0=Little or no change, 10=A great deal of change



Concern Regarding Global / Societal Issues, Behavioral Changes Among General Business Customers

> Global climate change / global warming (8%) is a lesser concern relative to other global societal issues among General Business customers compared with their Residential counterparts.



PC. Which of these global / societal issues is of most concern to you as a resident of Oregon? ENVCONC1-ENVCONC8. To what degree has your facility made changes in terms of how you behave/it operates in response to each of these global / societal issues?

* Relative Concern" is based on "derived importance" modeled from paired-comparison results across these eight global / societal issues.

** Scale for changes made in response to issue: 0=Little or no change, 10=A great deal of change



Resource Allocation Exercises

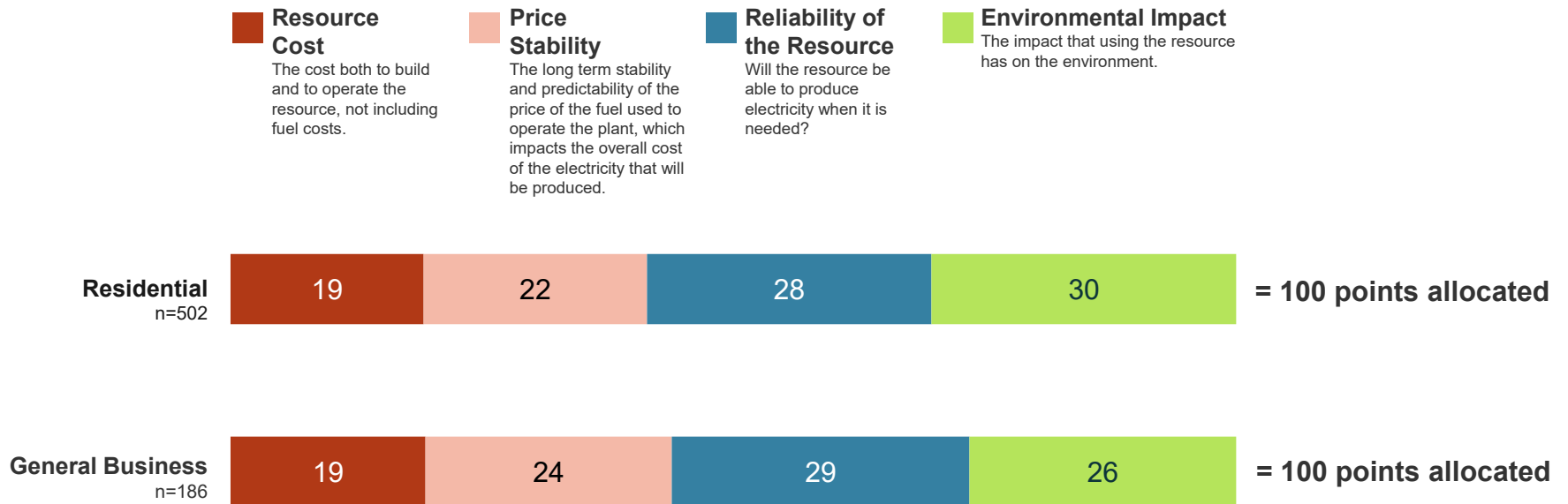
Customer-developed long-term energy resource plans



Relative Importance of Key Factors in Resource Evaluation

- > When evaluating energy resources, both Residential and Business customers apportion slightly more importance to Environmental Impact and Reliability versus Resource Cost and Price Stability factors.

Average Allocation of 100 Points Across Four Key Factors Used for Evaluating Each Energy Resource



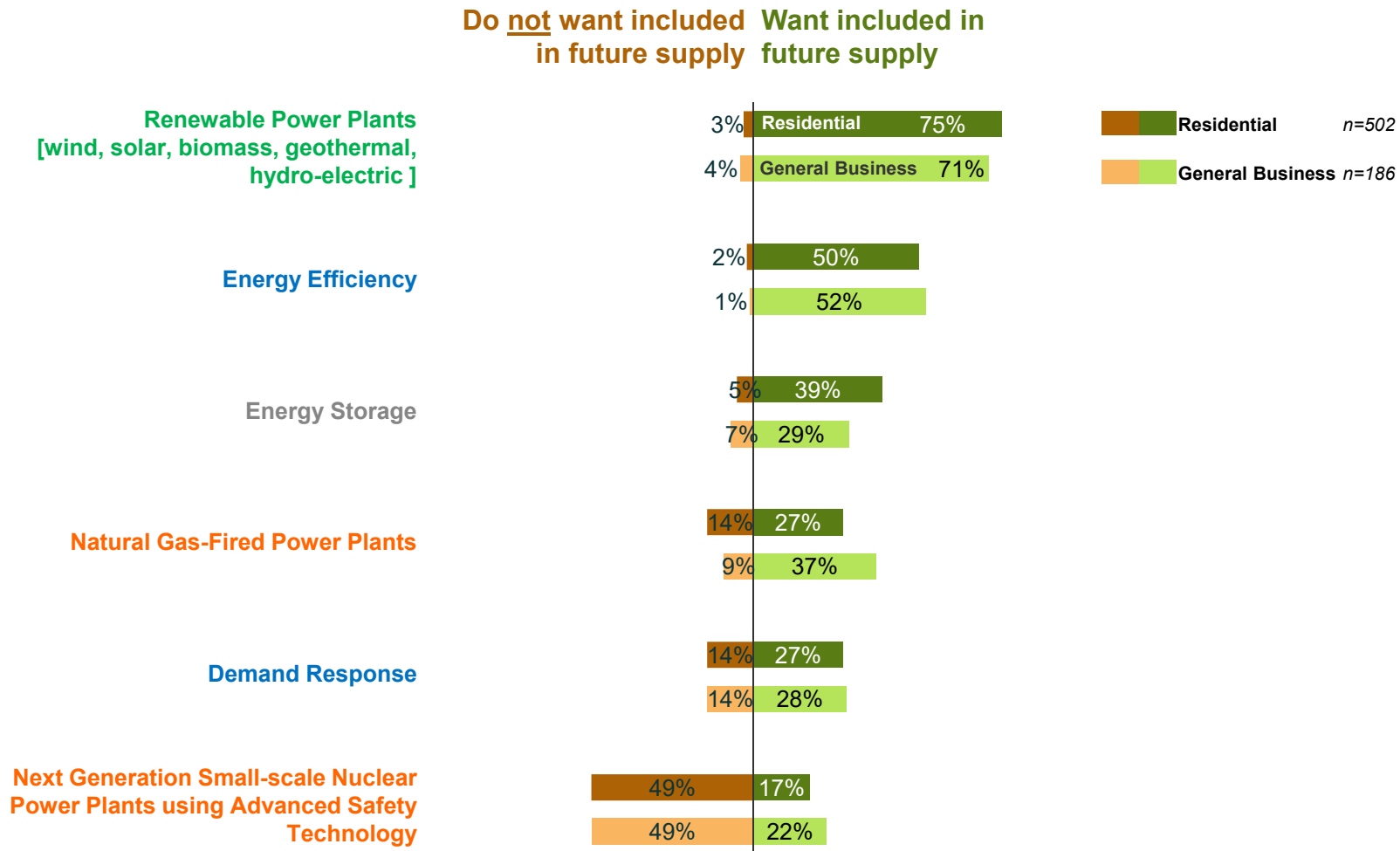
Note: "Factor Importance" values are means calculated for each factor from the 100-point allocation exercise.

FACTOR_1-4. Please indicate how important these different factors are to you in evaluating each energy resource. Allocate a total of 100 points across the four different factors in a way that indicates how more or less important you believe each factor should be in evaluating a potential electricity generation resource. The more points you give a factor, the more important this means the factor is to you. When you are finished, the total number of points you have allocated should total 100.



Resources to Include / Exclude in PGE's Future Electricity Supply Regardless of Price

- > Three quarters (75%) of Residential customers and seven in ten (71%) General Business customers want *renewable power plants* included in the future electricity supply, while *next generation nuclear* is the least desired resource for future energy supply with approximately one-half (49%) of both customer segments indicating they do not want it included.



DEF_INCL. Which of these resources would you definitely want PGE to include in a future electricity supply plan regardless of how expensive it was relative to other options?
 NOT_INCL. Which of these resources would you definitely NOT want PGE to include in a future electricity supply plan, regardless of how inexpensive it was relative to other options?

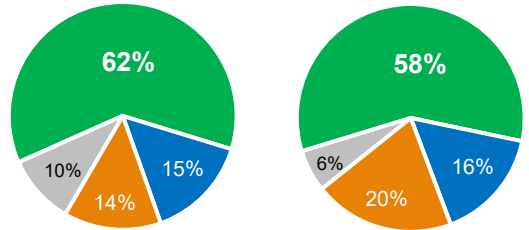
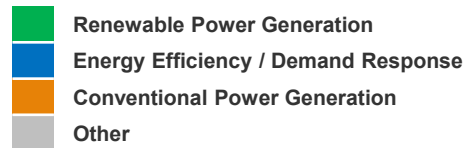


Prioritization of New Electricity Resources to be Developed Over the Next 10 Years

> When several specific types of renewable power plants are presented alongside the other options, Residential and General Business prioritization of resources to be developed over the next 10 years are similar, with four out of five specific renewable power plant types (all except Biomass) preferred over the other options.

Prioritization of New Electricity Resources to be Developed by PGE
(Average Allocation of 100 Points Across 10 Potential Resources)

	Residential	General Business
<i>n</i> =	502	186
Solar Power Plants	17%	14%
Wind Power Plants	15%	13%
Geothermal Power Plants	13%	12%
Hydro-electric Power Plants	12%	14%
Energy Efficiency	11%	12%
Energy Storage	10%	6%
Natural Gas-Fired Power Plants	9%	13%
Next Generation Small-scale Nuclear Power Plants	5%	7%
Biomass Power Plants	5%	5%
Demand Response	4%	4%

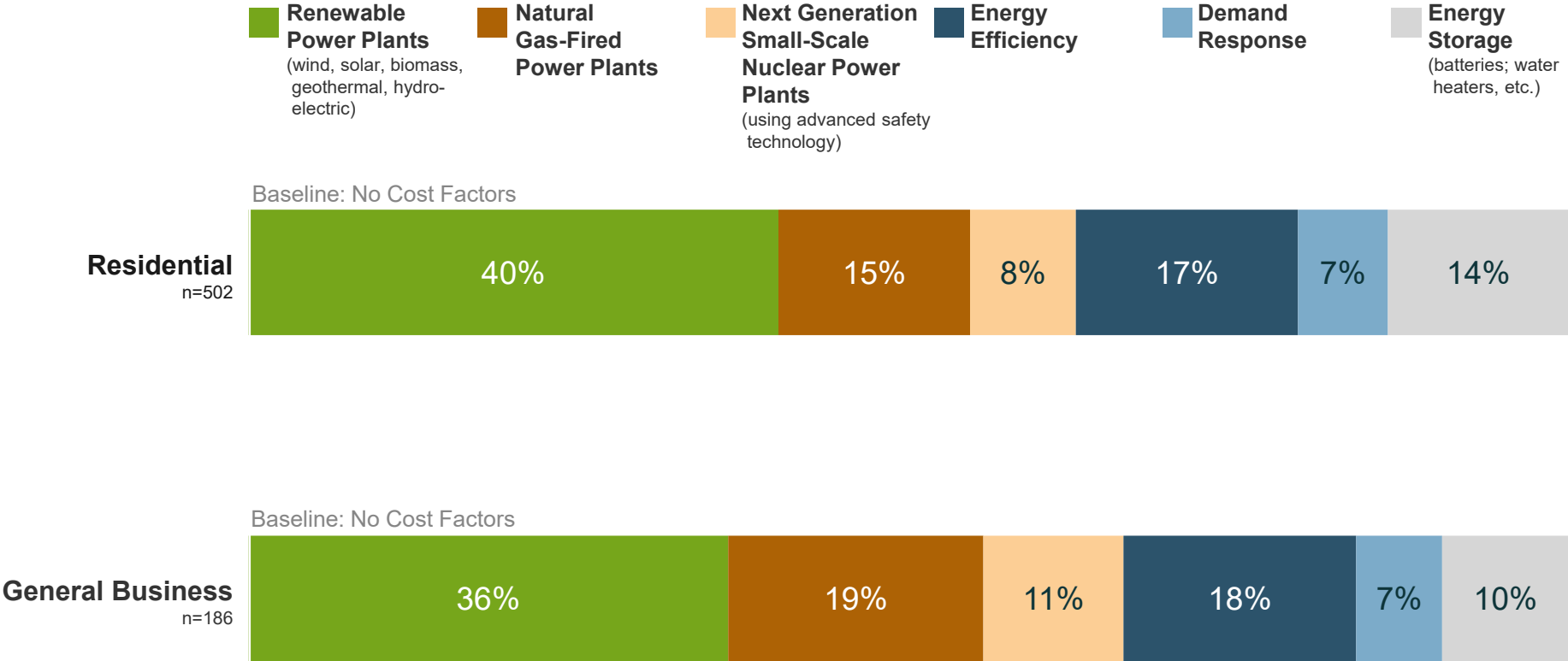


REN10YR. Please allocate those 100 points across the different energy resources in a way that indicates which resources you would most like to see developed, given what you now know about those resources.



Customers' Long-Term Energy Resource Plans: Electricity Resource Allocation Block 1 – All Resource Options

> Among both the Residential and General Business segments, Renewable Power Plants receive the highest percent allocation, even when they are priced at a higher cost than other options.





Customers' Long-Term Energy Resource Plans: Electricity Resource Allocation Block 1 – *All Resource Options* With Renewable Power Plants at Their **LOWEST** Cost / All Other Resources at Their **HIGHEST** Cost

Cost Points
for Each Unit:

75

125

150

100 / 150*

100 / 150*

150

Renewable Power Plants
(wind, solar, biomass, geothermal, hydro-electric)

Natural Gas-Fired Power Plants

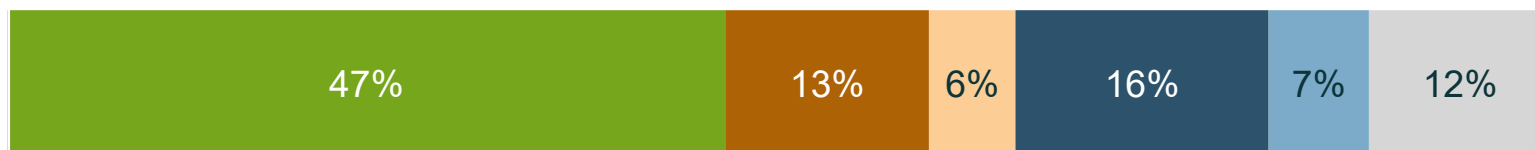
Next Generation Small-Scale Nuclear Power Plants
(using advanced safety technology)

Energy Efficiency

Demand Response

Energy Storage
(batteries; water heaters, etc.)

Residential
n=502



General Business
n=186





Customers' Long-Term Energy Resource Plans: Electricity Resource Allocation Block 1 – *All Resource Options* With Natural Gas-Fired Power Plants at Their **LOWEST** Cost / All Other Resources at Their **HIGHEST** Cost

Cost Points
for Each Unit:

150

75

150

100 / 150*

100 / 150*

150

Renewable Power Plants
(wind, solar, biomass, geothermal, hydro-electric)

Natural Gas-Fired Power Plants

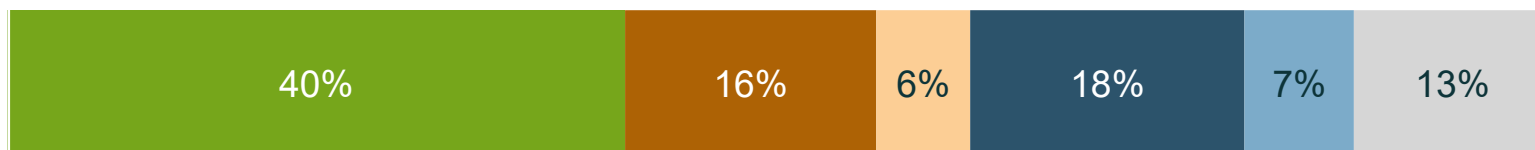
Next Generation Small-Scale Nuclear Power Plants
(using advanced safety technology)

Energy Efficiency

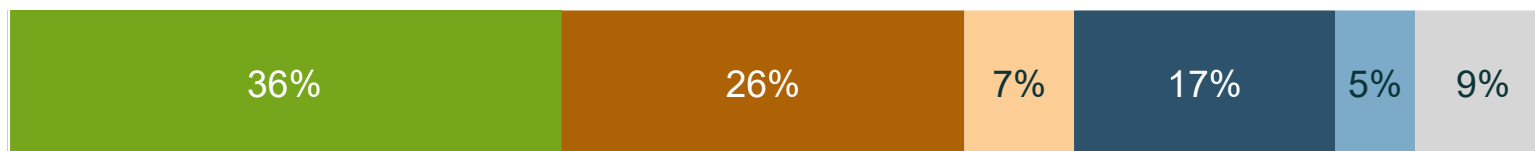
Demand Response

Energy Storage
(batteries; water heaters, etc.)

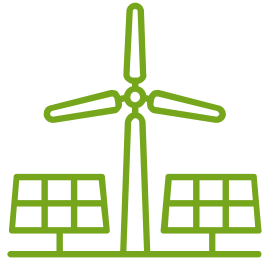
Residential
n=502



General Business
n=186



Key Takeaways



Both residential and business customers desire an increase of renewable sources in the PGE energy mix.



Customers support the effort to increase the use of renewables even if it costs them more.



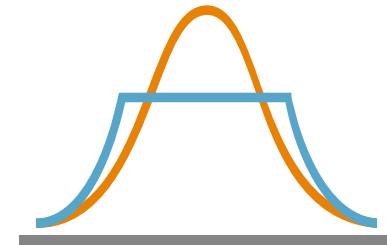
Customers expect PGE to transition to renewable energy sources quickly.



Customers are not exclusively concerned about cost factors when considering energy resources, weighing *environmental impact* and *resource reliability* more heavily than *cost* and *price stability*.



Environmental issues are important to customers, with *climate change* increasing in priority as a global concern among residential customers.



Low preference for *Demand Response*, relative to other energy sources, may be due to incomplete customer knowledge about the programs.

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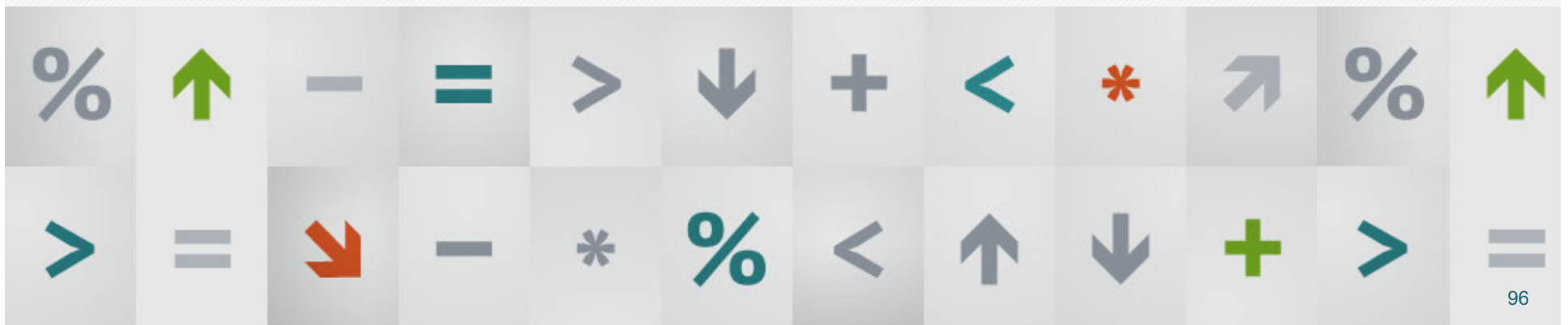
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Appendices

Appendix A: Detailed Methodology, Resource Definitions, Allocation Exercise Design

Appendix B: Knowledge of Current Resources Used for PGE's Power Supply

Appendix C: Additional Resource Allocation Exercise Results

Appendix D: Selected Results Broken Out Among Low-Income Residential Customers

Appendix E: Respondent Profiles

Appendix A: Detailed Methodology, Resource Definitions, Allocation Exercise Design

Data collection methodology

Energy resource definitions

Resource allocation exercise design

2017 IRP Survey Data Collection Methodology



2017 IRP Survey Data Collection Methodology Overview			
	Residential	General Business	Key Accounts
Overall Quotas	502 completed surveys	186 completed surveys	16 completed surveys
Additional Quotas and Weighting	Data weighted by gender, age, county, and PGE Residential Segments.	Medium (\$6K - \$24.9K annual PGE revenue): 135 Large (\$25K+ annual PGE revenue): 51 Data weighted by revenue segment.	No additional quotas or weights applied.
Qualified Respondent	Adult, energy decision-maker for HH, industry screen	Responsible for making energy-related decisions for their company	Main contact identified in PGE's Key Business Customer database
Screening and Recruiting	Web-based screening and recruitment	Web-based screening and recruitment, supplemented with phone screening and recruitment	Web-based screening and recruitment
 Screener Incentives	A drawing incentive for participating in the web Screener survey (chance to win one \$500 grand prize, or one of five \$100 cash prizes)		No Screener incentive; Pre-survey email from PGE encouraging participation
Main IRP Survey	Web survey (restricted to PCs, Macs, and large tablets due to survey layout – no mobile phones)		
Main IRP Survey Incentives (for completed survey)	\$25 check	\$40 check	\$100 check
Survey Length	Screener: 5 – 7 minutes / Main IRP Survey: 35+ minutes		
Survey Sample	Randomly selected customer records from PGE's customer database		All available Key Business Customer records (<100 provided)

Survey Screening: Initial Electricity Resource Prioritization



Now, please think about the resources PGE might use to meet the demand for power in Oregon. Which of the following would be your [first / second / third / least preferred] choice for how PGE meets this demand for power?

Renewable Power Plants (including Wind, Solar, Biomass, Geothermal, and Hydro-electric power plants)

Natural Gas Power Plants

Next Generation Small-scale Nuclear Power Plants using Advanced Safety Technology

Energy Efficiency (installation of energy efficient appliances, lighting, and weatherization)

Demand Response (asking customers to shift time of electricity use or reduce use via behaviors such as turning off lights and appliances)

Energy Storage (battery systems that store excess electricity generation, such as power produced by solar arrays during daytime hours, for use when needed)

Descriptions of Energy Resource Options for Initial Survey Questions



- > More detailed descriptions of selected electricity resource options were provided later in the survey, preceding the resource allocation exercises.

Natural Gas-Fired Power Plants

Conventional Coal Power Plants

Next Generation Coal Power Plants with Reduced Emissions

Next Generation Small-scale Nuclear Power Plants using Advanced Safety Technology

Wind Power Plants

Solar Power Plants

Biomass Power Plants (using plant-derived material)

Geothermal Power Plants (using naturally occurring heat in the earth to generate energy)

Hydro-electric Power Plants

Energy Efficiency (installation of energy efficient appliances, lighting, and weatherization)

Demand Response (asking customers to shift time of electricity use or reduce use via behaviors such as turning off lights and appliances)

Distributed Generation (small-scale generation located at point of consumption. e.g. solar, microhydro, fuel cells, small wind)

Energy Storage (battery systems that store excess electricity generation, such as power produced by solar arrays during daytime hours, for use when needed)

Smart Grid (investments in new technologies and infrastructure to support more efficient management of electricity supplies)



Electricity Resource Allocation Exercises

- > After being presented detailed information about each electricity resource, respondents were asked to complete several “resource allocation exercises” in which they allocated points across several potential resources to create their own long-term energy supply plans.
 - *First, they completed an initial “baseline” resource allocation with no cost factors introduced.*
 - *Then, they completed several additional resource allocation exercises with three different sets of resource options, and price factors for each resource which varied across the exercises.*
- > *An example of one of the resource allocation exercises respondents completed is shown below.*

The table below provides several electricity resource options that are available to you to build an energy plan. It also tells you the cost “points” associated with each unit of electricity resource you select.

To complete this exercise you must:

- Select 10 units of electricity resource in total
- Select only one type of resource or a mix of resources
- Include only the resources you want in your plan

Please note: **The cost points associated with each type of resource may or may not reflect the actual costs that would be associated with acquiring each resource in the marketplace.** For the purposes of this exercise, however, please make your energy planning decisions assuming the relative costs reflected in the resource cost points indicated.

Creating a plan that totals 1000 costs points will result in no increase in PGE customers’ bills. However, you DO NOT have to spend exactly 1000 cost points:

- For every 250 points your plan EXCEEDS 1000 cost points, the bills for ALL PGE customers will go up by 5%
- For every 250 points your plan costs LESS than 1000 cost points, the bills for ALL PGE customers will go down by 5%
- Please enter the number of units of each resource to be included in your plan in the table below. When you have selected the 10 units of electricity resource you want – recognizing the total cost impact of those resource selections – you are done.

Resource	Maximum Units of Each Resource Available	Cost Points for Each Unit (including cost to build, operate & cost of fuel)	Enter Number of Units of Each Resource Included in Your Resource Plan	Cost for Units of Electricity Selected for Each Resource
Renewable Power Plants (wind, solar, biomass, geothermal, hydro-electric)	10	(75-150)	[RECORD UNITS 0-10]	[DISPLAY TOTAL FOR RENEWABLES]
Natural Gas Power Plants	10	(75-125)	[RECORD UNITS 0-10]	[DISPLAY TOTAL FOR NATURAL GAS]
Next Generation Small-scale Nuclear Power Plants using Advanced Safety Technology	10	(125-150)	[RECORD UNITS 0-10]	[DISPLAY TOTAL FOR NUCLEAR]
Energy Efficiency	10	(75-100 for 0-5 units; 125-150 for 6-10 units)	[RECORD UNITS 0-10]	[DISPLAY TOTAL FOR EE]
Demand Response	10	(75-100 for 0-5 units; 125-150 for 6-10 units)	[RECORD UNITS 0-10]	[DISPLAY TOTAL FOR DEMAND RESPONSE]
Energy Storage (batteries, water heaters, etc.)	10	[100-150]	[RECORD UNITS 0-10]	[DISPLAY TOTAL FOR ENERGY STORAGE]
Total Number of Units of Electricity Selected Must Equal 10 →			Click Here for Total [DISPLAY TOTAL NUMBER OF UNITS SELECTED]	Click Here for Total Cost of Energy Plan [DISPLAY TOTAL COST]



Summary of Resource Option Cost Scenarios

Resource Option	Energy Efficiency	Demand Response	Energy Storage	Natural Gas	Next Gen Nuclear	Renewables	Wind	Solar	Biomass	Geothermal	Hydro
COST POINTS RANGE	75-150	75-150	100-150	75-125	125-150	75-150	75-125	75-150	100-150	100-150	100-150
BASELINE SCENARIO (no cost factors)											
Scenario 1 (Baseline)											
SCENARIOS FOR BLOCK 1											
Scenario 2											
Scenario 3											
Scenario 4											
Scenario 5											
Scenario 6											
SCENARIOS FOR BLOCK 2											
Scenario 7											
Scenario 8											
Scenario 9											
Scenario 10											
Scenario 11											
SCENARIOS FOR BLOCK 3											
Scenario 12											
Scenario 13											
Scenario 14											
Scenario 15											



Appendix B: Knowledge of Current Resources Used for PGE's Power Supply

Familiarity with electricity resource options

Knowledge of resources used for PGE's power supply

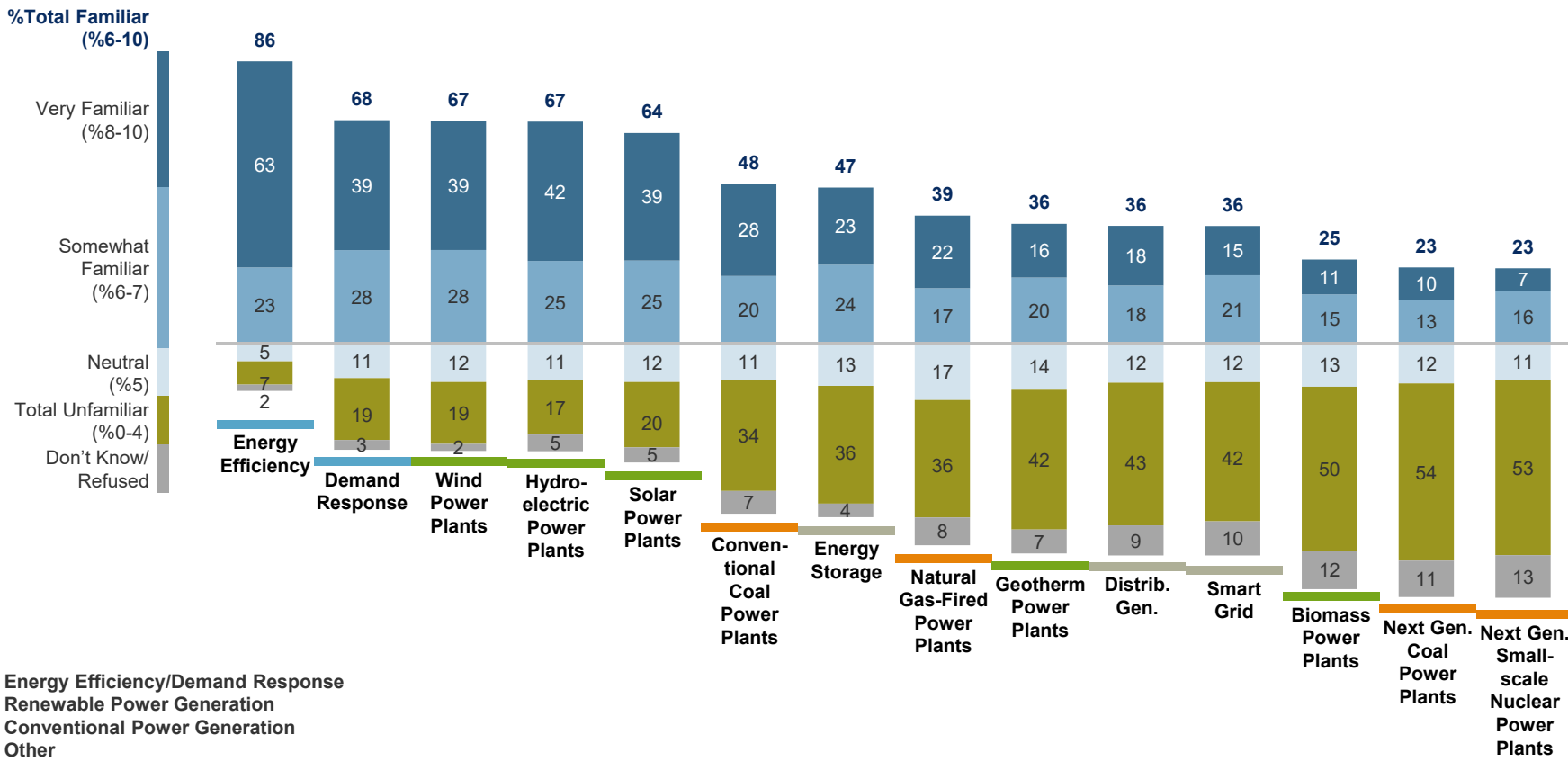
Awareness that electricity received from PGE is generated from renewable resources



Familiarity with Electric Resource Options – Residential

n=502

- > Residential customers report being most familiar with Energy Efficiency, with more than eight in ten (86%) saying they are familiar with this energy resource option. Roughly two in three customers say they are familiar with Demand Response, Wind Power, Hydro-Electric, and Solar Power (64-68%).
- > Familiarity is lowest with Biomass Power, Next Generation Coal, and Next Generation Small-scale Nuclear with approximately one in four customers reporting they are familiar with these options.



■ Energy Efficiency/Demand Response
■ Renewable Power Generation
■ Conventional Power Generation
■ Other

Q1A-Q1N. How familiar are you with each of the following electricity resource options?

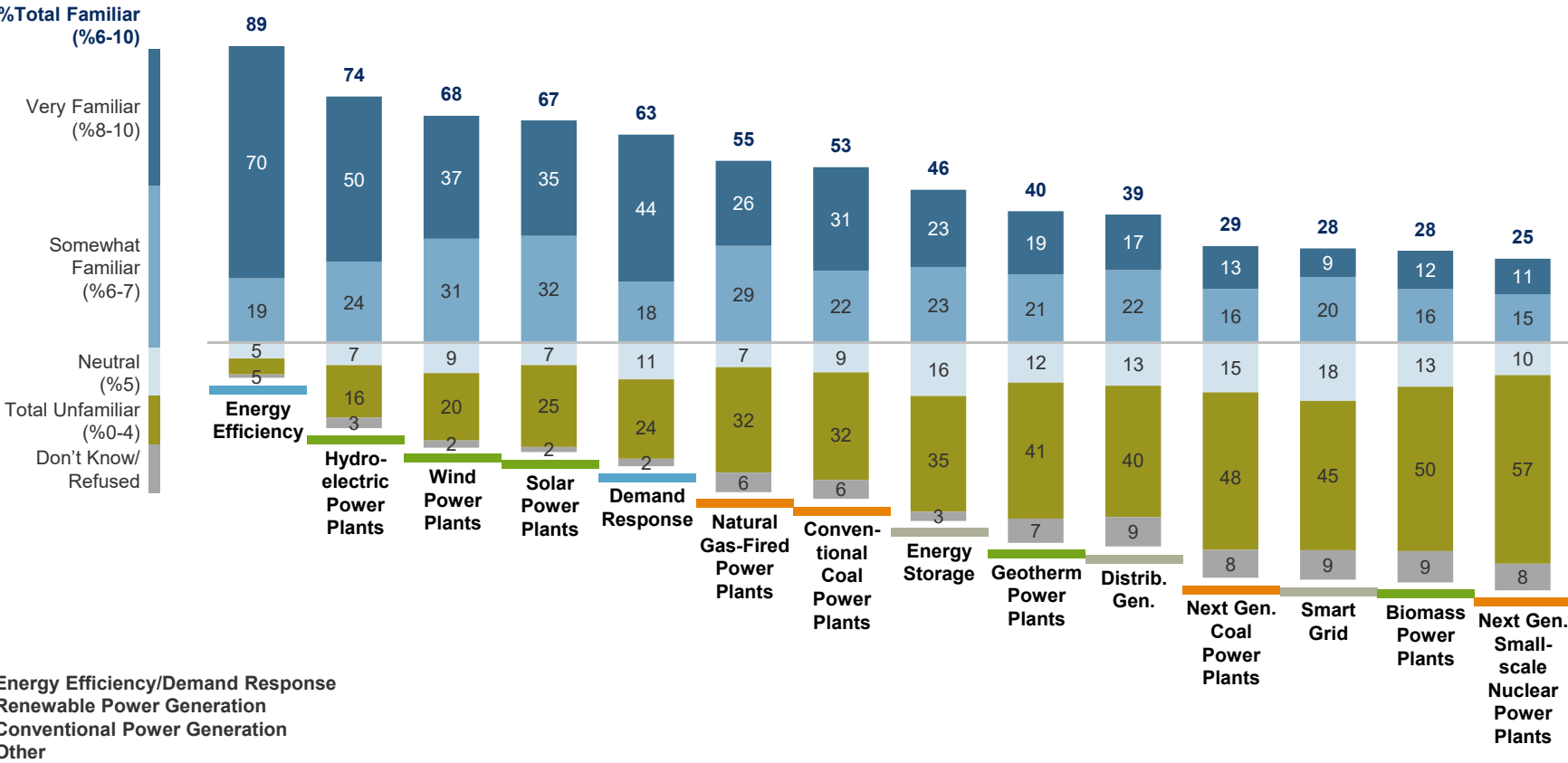
^Wording changed from 2012; use caution when interpreting trends.



Familiarity with Electric Resource Options – *General Business*

n=186

- > Similar to Residential customers, General Business customers report being most familiar with Energy Efficiency, with nearly nine in ten (89%) saying they are familiar with this energy resource option. More than six in ten customers say they are familiar with Hydro-Electric Power, Wind Power, Solar, and Demand Response (63-74%).
- > Familiarity is lowest with Next Generation Coal, the Smart Grid, Biomass Power, and Next Generation Small-scale Nuclear with approximately one in four customers reporting they are familiar with these options (25%-29%).



Q1A-Q1N. How familiar are you with each of the following electricity resource options?

^Wording changed from 2012; use caution when interpreting trends.

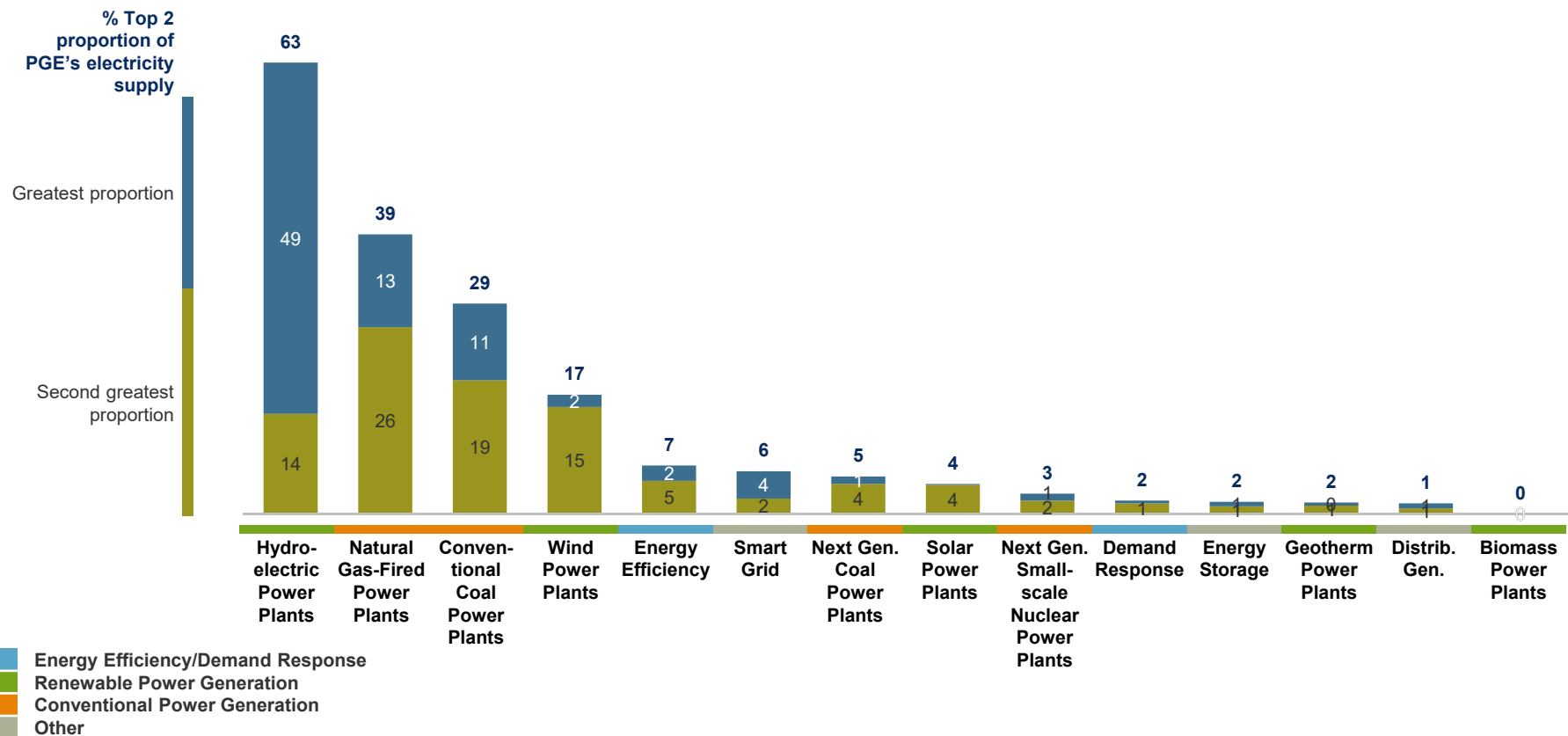
Knowledge of Resources Currently Used for PGE's Power Supply

Among Residential Customers

n=502



- > A majority of Residential customers identify Hydro-electric Power (63%) as one of the top two resources PGE uses to supply electricity, followed by Natural Gas (39%), Conventional Coal (29%) and Wind Power (17%).
- > No other resource is believed to among the top two resources currently used for PGE's electricity supply by more than 7% of Residential customers.



Q5-Q6. Which one of these resources do you think currently accounts for the greatest / second greatest proportion of PGE's power supply?

^List and item wording changes versus 2012; use caution when interpreting trends. 108

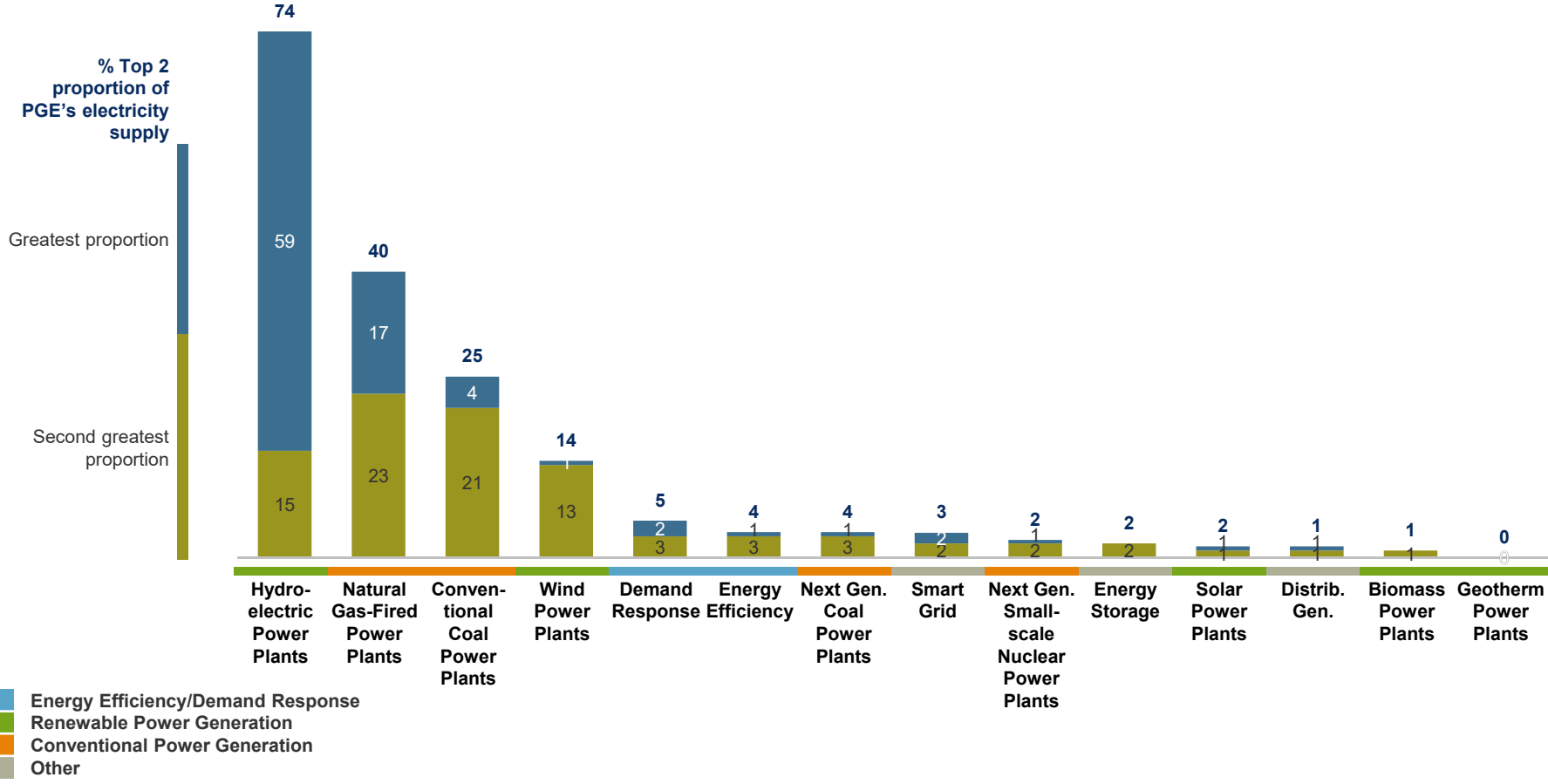


Knowledge of Resources Currently Used for PGE's Power Supply

Among General Business Customers

n=186

- > A majority of General Business customers identify Hydro-electric Power (74%) as one of the top two resources PGE uses to supply electricity, followed by Natural Gas (40%), Conventional Coal (25%) and Wind Power (14%).
- > No other resource is believed to among the top two resources currently used for PGE's electricity supply by more than 5% of General Business customers.



Q5-Q6. Which one of these resources do you think currently accounts for the greatest / second greatest proportion of PGE's power supply?

^List and item wording changes versus 2012; use caution when interpreting trends. 109



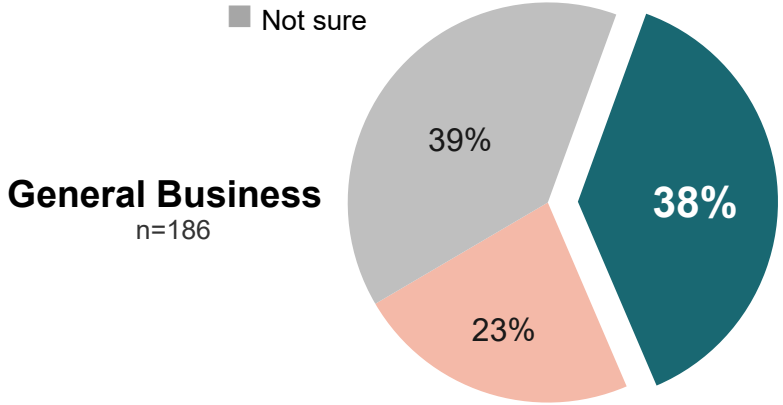
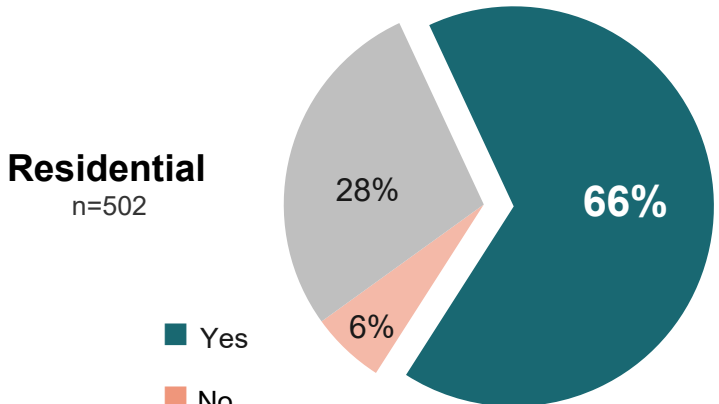
Awareness That Electricity Received from PGE is Generated from Renewable Resources (such as Wind, Solar, Biomass, Geothermal, or Hydro-electric)

- > Two-thirds of Residential Customers believe that some portion of the power they receive from PGE is generated using renewable resources (66%).
- > The proportion of General Business customers that believe their facility receives energy from renewable resources is much lower at 38%.

Awareness That Any Of The Electricity the Customer's Home or Business Receives from PGE Is Generated Using Renewable Resources Such as Solar, Wind, Biomass, Geothermal, or Hydro-electric Power

Estimated Percentage of PGE Electricity That Comes From Renewable Sources

(among customers who believe some energy is generated using renewables)



Percentage Range	Percentage
10% or less	19%
11% to 20%	21%
21% to 30%	18%
31% to 40%	9%
41% to 50%	8%
51% to 70%	5%
71% to 100%	5%
Not sure	15%
Mean	29.4%

Percentage Range	Percentage
10% or less	22%
11% to 20%	24%
21% to 30%	19%
31% to 40%	6%
41% to 50%	2%
51% to 70%	0%
71% to 100%	16%
Not sure	11%
Mean	27.6%

AWR_REN1. To the best of your knowledge, is any of the electricity you receive / your business receives from PGE generated using Renewable Resources?
 AWR_REN2. To the best of your knowledge, approximately what percentage of PGE's electricity currently comes from Renewable Resources such as wind, solar, biomass, or geothermal?



Appendix C: Additional Resource Allocation Exercise Results

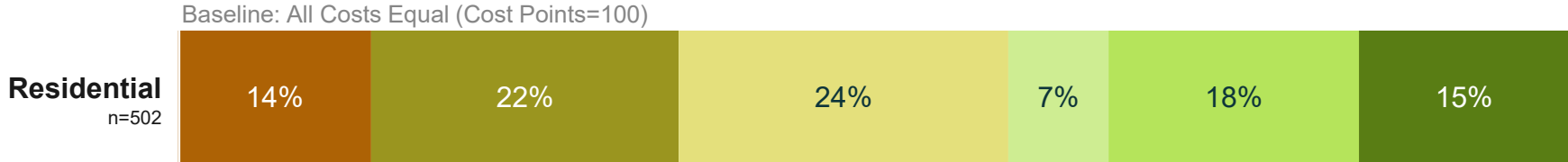
Electricity Resource Allocation Block 2 – *Natural Gas and Specific Renewables*

Electricity Resource Allocation Block 3 – *Renewables Only*



Customers' Long-Term Energy Resource Plans: Electricity Resource Allocation Block 2 – *Natural Gas and Specific Renewables*

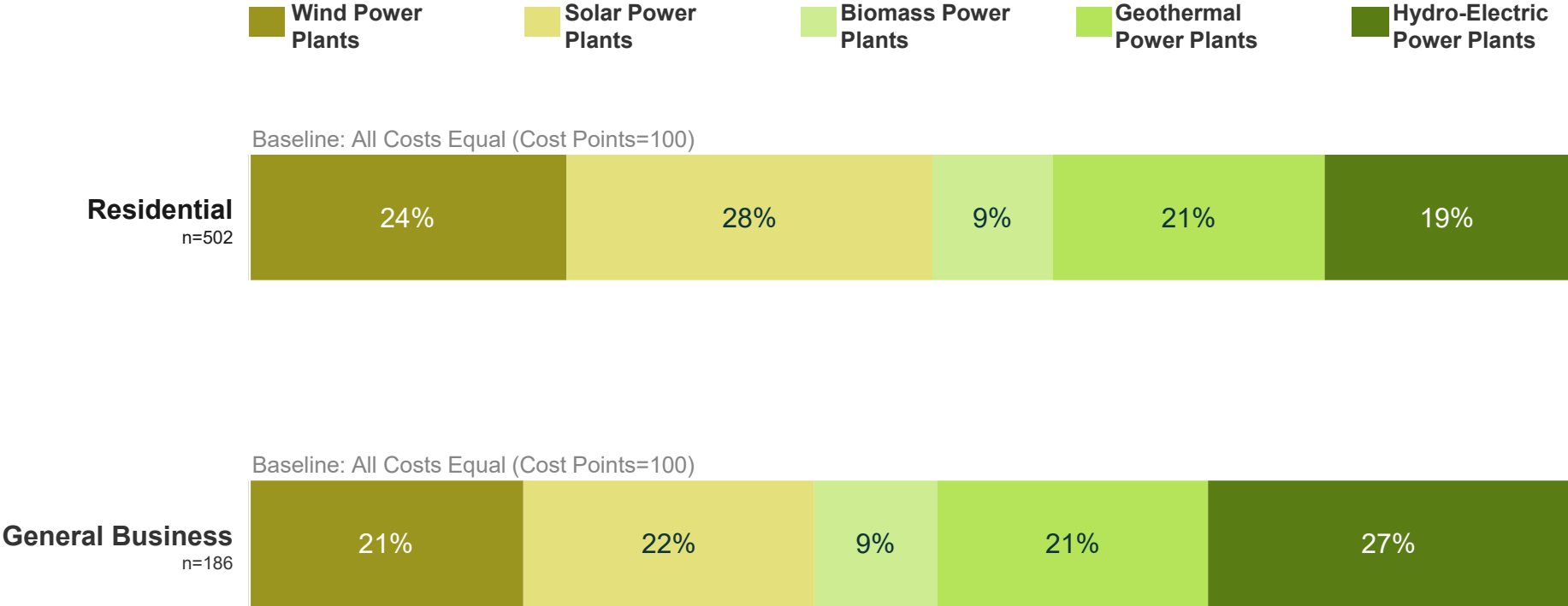
> When presented with a menu of electricity resources consisting of Natural Gas Power Plants and five specific types of Renewable Power Plants, customers overwhelmingly prefer a mix dominated by renewable resources, even when Natural Gas is the least expensive option.





Customers' Long-Term Energy Resource Plans: Electricity Resource Allocation Block 3 – *Renewables Only*

- > When presented with five specific Renewable Power Plant options only and all costs are equal, Residential customers allocate the most of their long-term power plan to Solar Power Plants (28%), while General Business customers give Hydro-Electric Power Plants their highest allocation (27%).
- > Biomass is the least popular resource option among both segments in this scenario.





Appendix D: Selected Results Broken Out Among Low-Income Residential Customers

Support for Use of More Renewable Resources

Resources to Include / Exclude in PGE's Future Electricity Supply

Customers' Long-Term Energy Resource Plans: Electricity Resource Allocation Block 1

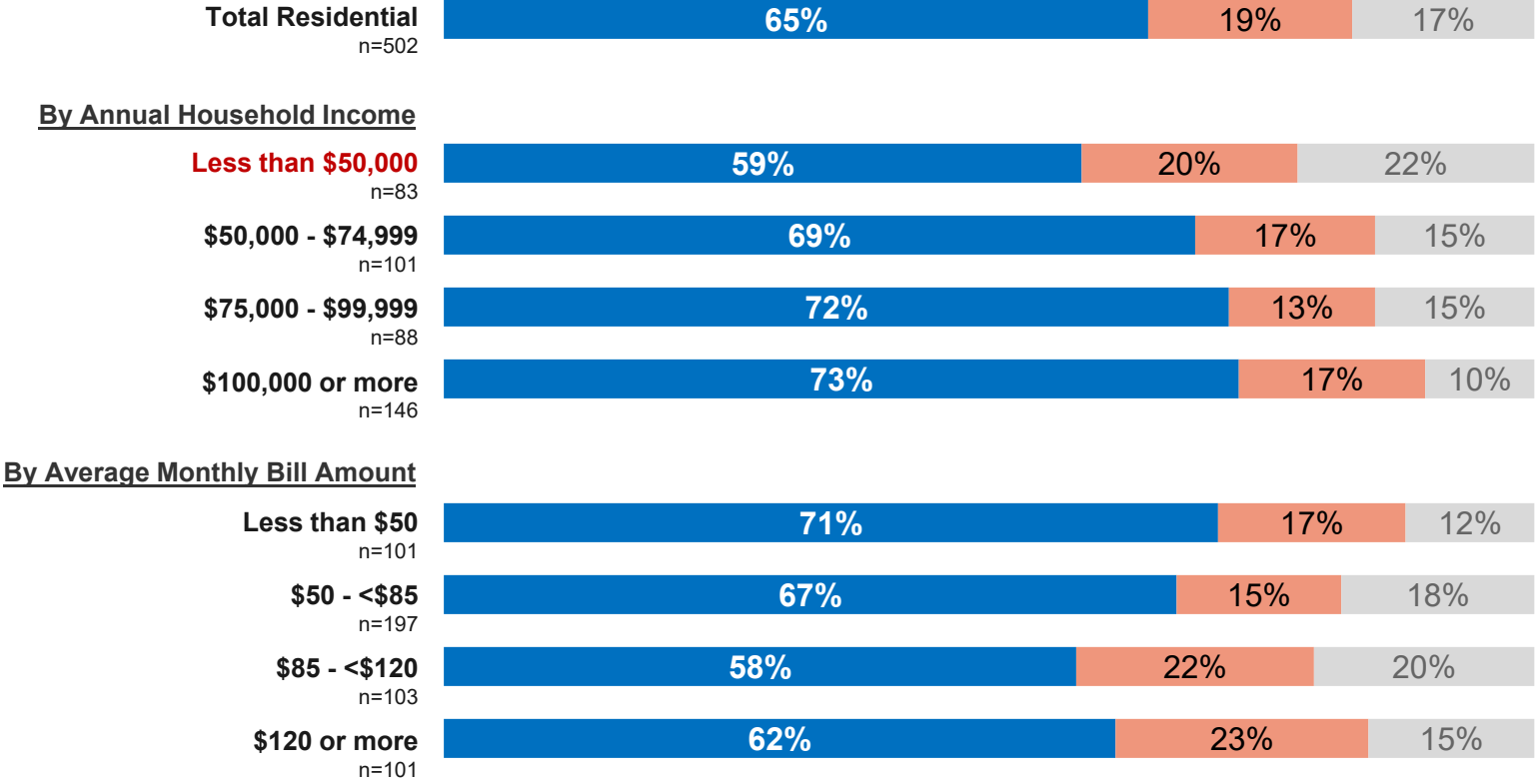


Support for Use of More Renewable Resources Even if All PGE Customers Would Need to Pay More for Electricity

Among Residential Customers, by Household Income, Average Monthly Bill Amount

Do you think that PGE should use more renewable resources even if this meant that all PGE customers would need to pay more for electricity?

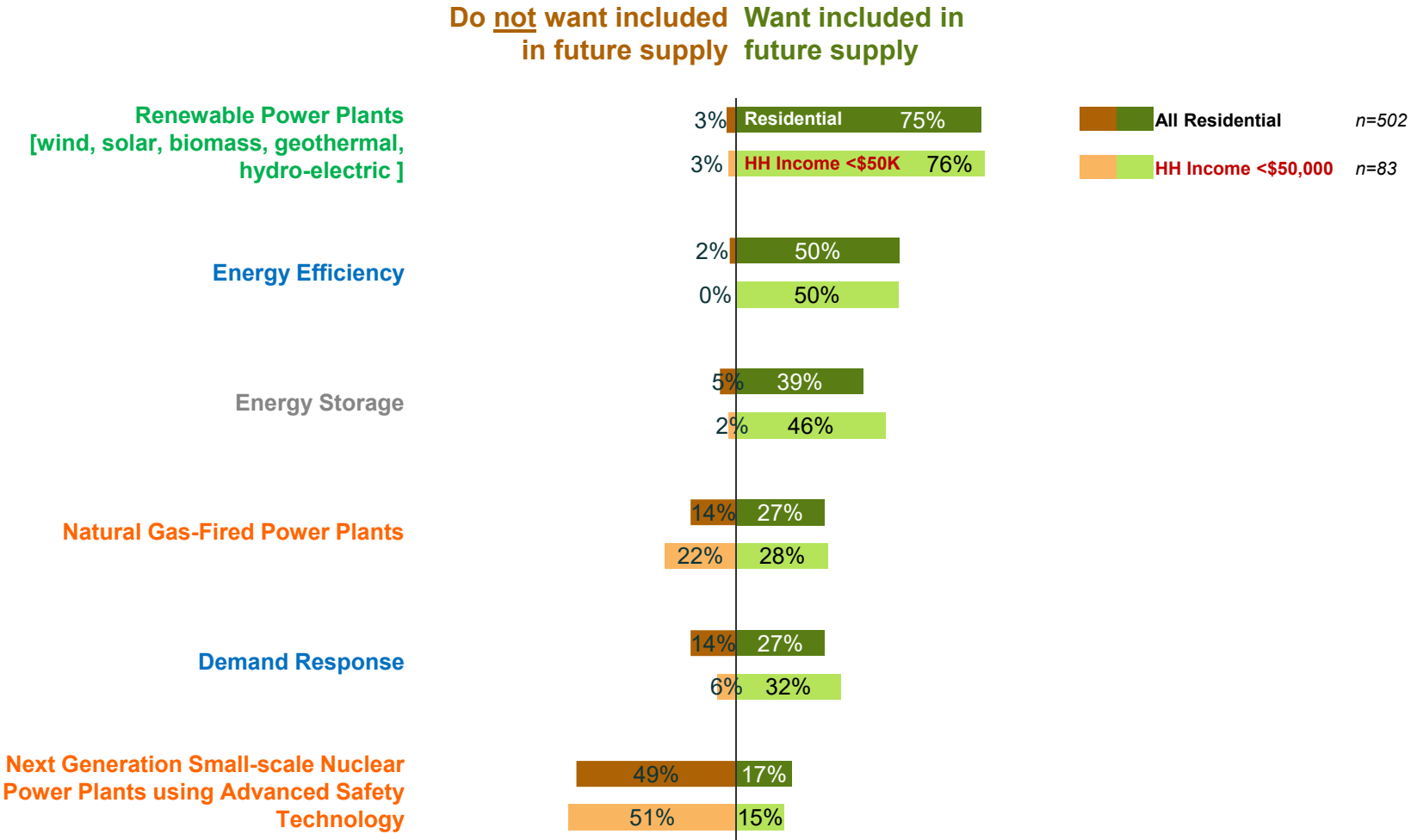
Yes No Not sure





Resources to Include / Exclude in PGE’s Future Electricity Supply Regardless of Price

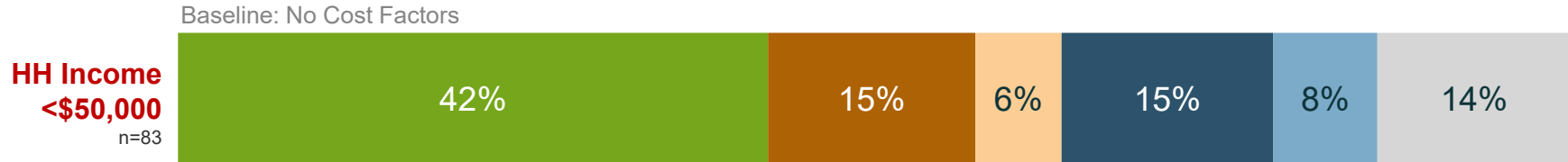
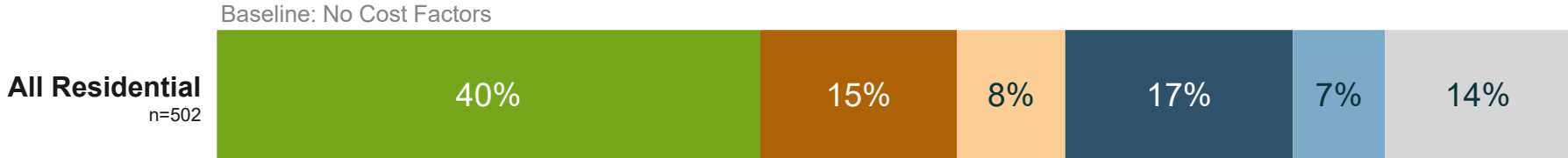
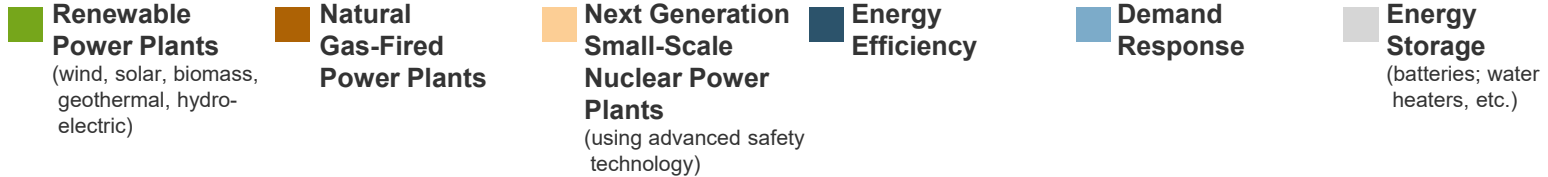
*Among Residential Customers with Annual Household Income
of Less than \$50,000 (versus All Residential Customers)*



DEF_INCL. Which of these resources would you definitely want PGE to include in a future electricity supply plan regardless of how expensive it was relative to other options?
 NOT_INCL. Which of these resources would you definitely NOT want PGE to include in a future electricity supply plan, regardless of how inexpensive it was relative to other options?



Customers' Long-Term Energy Resource Plans: Electricity Resource Allocation Block 1 – All Resource Options *Among Residential Customers with Annual Household Income of Less than \$50,000 (versus All Residential Customers)*





Appendix E: Respondent Profiles

Residential Demographics

General Business and Key Accounts Firmographics

Demographics by segment



	Total	Simply Service (A)	Totally Tech (B)	Innovative Investors (C)	Continually Connected (D)	Sensible Savers (E)
Gender	n= 502	37	172	199	34	60
	%					
Male	47%	48%	53%	50%	35%	41%
Female	53%	52%	47%	50%	65%	59%
Homeowner or Renter						
Homeowner	63%	29%	71% ADE	91% ABDE	34%	56% AD
Renter	36%	71% BCD	29% C	8%	63% BC	44% BC
Education						
H. S. or less	3%	4%	3%	2%	2%	6%
Some college Voc./Tech. Sch.	33%	29%	29%	23%	47% C	47% BC
College graduate/ post graduate	63%	67% E	67% E	73% DE	51%	46%
Income						
Less than \$25k	7%	11% C	5% C	1%	23% BCE	4%
\$25K-\$50K	14%	15%	12% C	6%	28% BC	15% C
\$50K-\$75K	21%	33% C	21%	17%	14%	23%
\$75K+	58%	41%	62% AD	76% ABDE	34%	57% D
Age						
18-24	4%	12% C	6% C	0%	5%	1%
25-34	17%	31% CD	26% CD	6%	15%	11%
35-44	20%	20%	26% CD	16%	23%	11%
45-54	19%	14%	16%	22%	26%	16%
55-64	22%	14%	16%	25% B	21%	31% B
65 or over	18%	9%	10%	30% ABD	9%	29% ABD
Average Monthly Bill						
Less than \$50	18%	19%	27% CD	16%	10%	18%
\$50 to \$64.99	18%	32% CE	20%	14%	14%	14%
\$65 to \$84.99	20%	19%	25%	19%	19%	17%
\$85+	43%	30%	28%	51% AB	57% AB	51% B
Mean bill amount in dollars	\$89.5	\$72.4	\$79.8	\$97.2	\$94.9	\$99.7



Firmographics by Segment

	General Business	Medium Business (A)	Large Business (B)
Length of Current Employment	<i>n=</i> 186	135	51
	%		
Less than 6 months	3%	3%	2%
6 months to less than 1 year	1%	1%	4%
1 year to less than 5 years	24%	25%	20%
5 years or more	70%	68%	75%
Proportion of Operating Costs Accounted for by Electricity Costs			
Less than 1%	11%	12%	10%
1% to less than 5%	36%	34%	43%
5% to less than 10%	23%	22%	25%
10% to less than 20%	13%	13%	12%
20% or more	6%	7%	2%
Number of Locations Served by PGE			
1	35%	36%	31%
2	23%	24%	18%
3	13%	14%	8%
4	23%	19%	33% A
Number of Years as Customer			
Less than 5 years	6%	6%	8%
5 to less than 10 years	10%	11%	6%
10 or more years	81%	80%	82%

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