**Feedback and Questions on Modeling Portfolios, Scenarios, Sensitivities Associated with August 12, 2024 Meeting of the Electric Utility Commission**

| Commiss-ioner | Question from EUC | Response from Austin Energy |
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| Alvarez | The different options don't add up to the same number of megawatts. The affordability scenario removes 1800 megawatts but only adds 1100 and actually deletes from the demand side. The two hydrogen proposals remove 1800 and only add back 1000 to 1100. Please explain why the options don't seem to have the same target. | Austin Energy sells all of its generation into the ERCOT market and purchases all the electricity required for the service territory's load from the market, so there is no requirement to set a "target" for a specified total generation capacity. Different types of generation resources also have different capacity factors, which is the percentage of time throughout the year that the unit produces electricity, so nameplate capacity does not equate to total annual megawatt-hours of generation. As such, portfolios do not necessarily add up to the same number of megawatts. Having different total amounts helps show the range that output metrics can have and the tradeoffs between each.<br><br>A more important consideration in designing portfolios is the relationship between local generation (meaning generating assets physically located in the Austin Energy service territory), local peak load, and transmission import capacity. The total capacity of local generation should be as close as possible (in both magnitude and timing) to local peak load plus import capacity to minimize risk of load zone price separation and controlled outages during high peak load periods. |
| Alvarez | Where did the EUC-1 and EUC-2 options come from. They are the same so why are they listed as two different ones? Or is this a placeholder where we are supposed to fill-in some desired scenarios? | "EUC-1" and "EUC-2" are blank portfolios available for the EUC to complete and submit to Austin Energy. These portfolios will be modeled and the output metrics will be provided during an EUC meeting in September 2024. |
| Alvarez | In the option that says replace FPP in 2028, we appear to keep 1800 megawatts and add 575. What does that option mean? By articulating this options, does this mean that the other options don't | In the "Replace FPP in 2028" portfolio option, Austin Energy has 1,800 MW of solar and wind PPAs to meet the 65% renewable energy as percent of load goal, and the utility adds 575 MW of local dispatchable generation through a combination of natural gas combined cycle and combustion turbines. In this portfolio option, |

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| | include replacement of FPP that year? If not, then what does each scenario assume in terms when replacement of generation from FPP will be needed? | Austin Energy assumes a retirement date for FPP of Dec. 31, 2028.<br><br>In all of the other portfolios (except for "Affordability," in which FPP retires at the end of 2031), Austin Energy assumes a retirement date for FPP of Jan.1, 2025. This information is provided in the "Specifications" section at the top of each of the detailed portfolio tabs colored in green.<br><br>Since FPP is outside of the Austin Energy load zone, its capacity does not need to be replaced operationally to minimize reliability risk. However, FPP's capacity does need to be replaced to minimize financial risk. That is, Austin Energy gets to sell the electricity from FPP at local load zone prices (through an ERCOT mechanism called pre-assigned congestion revenue rights, or PCRR's). This significantly helps to minimize the financial impact of load zone price separation for that amount of generation. From a cost perspective (not a reliability perspective), it is in Austin Energy's best interest to replace FPP generation with as much local generation as possible to help mitigate load zone price separation risk. |
| Alvarez | "Affordability" Option - Change Name to Something Else<br><br>I would ask that you not label the scenario marked "affordability" in that way. I do not like the insinuation that affordability is at odds with reliability and sustainability. This is more a reliability proposal than an affordability proposal, so maybe have a Reliability 1 proposal and a Reliability 2 proposal. Once you run each scenario, then you can estimate the cost to customers for each option and just rank them in terms of cost | The intent of the portfolio option titled "Affordability" is to approximate the "least cost" pathway to providing electricity to the Austin Energy load zone with no other constraints. It is designed only as a reference point to which the output metrics from other portfolios can be compared. By removing constraints such as the replacement of expiring PPAs, 100% carbon-free by 2035 goal, 65% renewable energy goal, FPP retirement in 2025, and Decker/SHEC retirement in 2035, the Affordability portfolio focuses solely on least cost at the expense of the other values of reliability and environmental sustainability. Setting these extremes in the modeling exercise allows the team to more accurately quantify the tradeoffs between output metrics. The Affordability portfolio does meet basic reliability criteria because it includes sufficient local generation to minimize financial risk from load |

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| | to customers as one thing to consider. | zone price separation, which also minimizes risk of local controlled outages during periods of high local load and high local transmission congestion.<br><br>To avoid confusion, Austin Energy has re-named many of the portfolios, including the "Affordability" portfolio, based on input and recommendations from EUC. |
| Alvarez | Regarding the Replace w/Green (PPA) and the Replace with Green (65%) Options<br><br>If the 65% option does not use PPA then what are we saying this option will be doing? | Both portfolio options include Purchase Power Agreements (PPAs). In the "Replace w/ Green (PPA)" portfolio option, all existing wind and solar PPAs outside the Austin Energy load zone are replaced as they expire. If a wind PPA expires in 2032, the portfolio includes a new wind PPA of the same megawatt capacity in 2032. The "Replace w/ Green (65%)" portfolio option includes both the replacement of existing PPAs and the addition of new PPAs in order to achieve the 65% renewable energy goal by 2027. Achieving the 65% goal requires about 750 MW of additional wind and solar PPAs by 2035. Holding this variable as the only difference between these two portfolios allows the modeling team to quantify the difference in modeling output metrics between simply replacing existing PPAs and fulfilling the full 65% renewable energy goal. |
| Alvarez | Regarding use of PPA's<br>Can you please provide a schedule of each of your current Green Power PPA's with their respective purchase power amounts and expiration dates. | The list of current Austin Energy PPAs with expiration dates can be found at the link below:<br><br>https://austinenergy.com/about/company-profile/environment/renewable-power-generation |
| Alvarez | What is the typical duration of our Green power PPAs? Will we need to consider longer term contracts if we decommission Fayette and our gas powered units? If not, then are we not putting ourselves at a greater risk every time our PPAs end? | Austin Energy's PPAs typically range from 12 to 25 years, but different contract terms can be more cost-effective during different periods of time. Austin Energy looks for best value and fit when entering into renewable PPAs. Interest rates, technology innovations and merchant risk are some of the factors that play a role in determining desirable and best value term length. Sometimes, it may be better to sign a shorter-term contract if there are strong indications that better terms may be available in |

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| | | the near future, rather than locking in unfavorable terms for a longer period. |
| Alvarez | If the idea is to offset the loss of generation from Fayette with PPAs, then how quickly will that need to ramp up if we assume the generation is lost in 2028? Is it even possible for us to enter into agreements to secure that much power in that short of a time period? | We have not yet determined the appropriate mix of technologies to replace FPP, though we expect the modeling work to help provide insight into that question.<br><br>The "Replace FPP in 2028" portfolio option provides one technology mix for assessment and guiding purposes. As mentioned in an earlier question, that portfolio option models 1,800 MW of solar and wind PPAs to meet the 65% renewable energy as percent of load goal, and it adds 575 MW of local dispatchable generation, all by 2035. This portfolio assumes FPP is retired by Dec. 31, 2028, and at that time, the assumption is that 600 MW of wind PPAs and 425 MW of local dispatchable generation have been brought online.<br><br>We believe this is a feasible possibility in a short time period and look to further explore options as modeling work continues.<br><br>Please see the response to the other "Replace FPP in 2028" portfolio question above (question 3) for additional detail about how local generation of some nature is necessary in the replacement mix to help mitigate load zone price separation risk. |
| Alvarez | Market Conditions for Solar and Wind PPA's<br>What is the current market availability and cost of Remote Utility Scale Solar and Remote Utility Scale Wind? | The most recent ERCOT interconnection queue data includes 152 GW of solar and 31 GW of wind projects slated for years 2024-2030. Entry of a project into the ERCOT interconnection queue does not guarantee it will be constructed, but this gives an indication of the magnitude of projects and trends.<br><br>(https://www.ercot.com/files/docs/2024/07/18/ERCOT-Monthly-Operational-Overview-June-2024.pdf)<br><br>Note: the projects in the ERCOT queue are at various stages of financing, and thus not all are representative of current market availability. In the case when developers are looking for off- |

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| | | takers, those projects are more representative of what is available now or will be available in the coming years. One way to look at the current market availability is to refer back to the RFP summary presentation that Austin Energy gave at the July EUC meeting.<br><br>https://services.austintexas.gov/edims/document.cfm?id=432181<br><br>Costs of renewable PPAs have been higher recently due to higher interest rates, wages, EPC costs and trade restrictions. |
| Alvarez | What are the projections of what the market availability and cost will be from now until 2035? | Please refer to the cost information provided with the Modeling Framework data for current PPA cost estimates (using an inflationary adjustment of 2% for future years). The values provided there are based on responses to Austin Energy's most recent Request for Proposals for renewable and carbon-free energy. After incorporating EUC feedback, Austin Energy emailed the Modeling Framework to EUC on July 23, 2024.<br><br>Many factors impact the market availability and cost of new solar and wind PPAs, including interest rates, technology innovations, technology costs, supply chain issues, labor costs, transmission system upgrades, etc., so it is difficult to accurately predict when and how the market will change in the short- and medium-term. Easing of inflation and interest rates should lead to more favorable PPA terms and pricing over the next few years. |
| Alvarez | What is the current and future demand for Remote Utility Scale Solar and Remote Utility Scale Wind in the ERCOT market (i.e., what do we know about Green power goals for other Texas utilities)? | Current demand for utility-scale solar and wind in ERCOT is robust, as demonstrated in the ERCOT interconnection queue. Solar is expected to grow as per the interconnection queue, whereas wind has reached a stage where it will grow but not at the same pace as before. The state of Texas does not have a Renewable Portfolio Standard (RPS) mandate that requires utilities to have a certain amount of renewable energy in their generation portfolios, so utilities procure renewables for other reasons. For example, utilities procure renewables if required |

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| | | to do so by local mandates; to help meet shareholder or customer environmental, social and governance (ESG) goals; to provide green rate structures as an option to customers; and/or if it makes economic sense. Municipalities and cooperatives may have local mandates requiring a certain amount of renewable generation.<br><br>In comparison with other utilities, Austin Energy has robust clean energy goals and is a strong leader in the percentage of energy generated from renewables.<br><br>Wind and solar resources will continue to be attractive investments in ERCOT, but growth can be constrained by the availability of sufficient transmission capacity to move the electricity from more remote parts of the state — where renewable resources are best suited to produce electricity — to load centers — where electricity is used. |
| White/Reed | We would like to see a portfolio that represents AE's best effort at affordably and reliably meeting load with 100% carbon-free energy which none of the proposed portfolios appear to do. | Austin Energy's "Hydrogen" and "Hydrogen + Storage" portfolios both intend to affordably and reliably meet local load while achieving the 100% carbon-free goal. The two EUC portfolios may be used to provide alternative approaches to achieving these goals.<br><br>We anticipate being able to design and model additional portfolios to meet these objectives after obtaining results on these initial portfolio options. |
| White/Reed | We also did note that the sensitivities around increased demand and around potential market rule changes are extreme - that is it is unlikely that that much demand is added in the coming years from EVs and data centers and also unlikely that the PCM and some of the cost allocation of renewable energy will actually occur in the ERCOT market but we shall see. We understand these | Testing portfolio performance under extreme conditions is an important part of the modeling process. Given the uncertainties around local load growth, testing portfolios through a scenario where Austin Energy's peak load exceeds current projections indicates a level of exposure to load zone price separation and reliability risk. Comparing those data points to our collective risk tolerances is one component of the portfolio performance analysis process that will be considered in relation to the other output metrics and sensitivity results. The relative probabilities of these events happening can be discussed and |

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| | sensitivities can help establish potential risk but hope those sensitivities don't drive decision-making since they are unlikely. Probability of the extreme scenarios occurring should be transparently communicated. | taken into account during the portfolio evaluation and risk assessment work.<br>In recent years, we have seen extreme events that were considered improbable leading to costly bankruptcies and loss of life. It is part of Austin Energy's job to understand and mitigate unacceptable risk outcomes to our community. |
| White/Reed | One suggested additional portfolio that could be modeled would be to take the "Flexible Green" approach and see what would happen if one did not add the hydrogen plant but instead simply kept the existing gas plants open into 2035. | Austin Energy has added a new portfolio that is a version of the original "Flexible Green" portfolio with the hydrogen plant removed and Decker and SHEC remaining in service through 2035. |
| White/Reed | We would like to know if the upcoming Solar Standard Offer program was taken into account when assessing local solar potential. | The DNV study included all current Austin Energy solar programs and incentives, including Value of Solar. The Austin Energy Standard Offer program is still under development so was not included in the DNV market potential study. If the EUC would like to add an assumed market potential for that program, please provide some basic assumptions about how the market potential was calculated and costs (or cost ranges) for additional solar capacity added so that they can be accurately modeled. |
| White/Reed | Recommended alternative portfolio names | Austin Energy has updated many of the portfolio names following recommendations and input from EUC. |
| White/Reed | We admit we still have some confusion about some of the greener replacement portfolios and whether they are intended to only replace existing PPAs or are also meant to move beyond 65% and replace the gas plants. | The portfolios that aim to achieve the 65% renewable energy (as % of load) goal and maintain that level through 2035 show a total of 1,800 MW of solar and wind PPAs in 2035. Other portfolios relax that constraint and aim to only replace or renew existing PPAs as they expire, maintaining wind and solar PPAs at current levels through 2035. This results in 1,050 MW of new PPAs, which is equal to the capacity of PPAs that expire through 2035. None of the PPAs are intended to replace gas plants since the generation from PPAs (outside the Austin Energy load zone) does not provide the same |

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| | | operational or financial value as local dispatchable gas capacity. |
| Rhodes | Can you tell me how much curtailment (in MWh and $) we have had per year for our wind and solar resources and expectations for the next 10 years? | See Table 1 at end of this document for data related to wind and solar asset curtailments in 2022-23.<br><br>Austin Energy will provide the weighted average $/MWH separation by load level tranches in a separate email once complete. This is intended to show that there is a higher probability of occurrence and greater magnitude when load is higher (more costly). |
| Rhodes | Can you tell me A) how many hours that AE has experienced load pocket price separation, B) what the simple and load-weighted average $/MWh price differential has been during those hours, and C) BAU expectations for the next 10 years for this issue? | See Figure 1 at end of this document for data related to duration and frequency of load zone price separation (2023 data).<br><br>See Table 2 for data related to the frequency of price separation occurrences at different levels of price separation (between AE Load Zone and Hub Average)<br><br>Austin Energy does not have a good forecast for future expectations as there are many factors that influence power flow, but we see higher probability of occurrence at high load levels so as load continues to grow in Austin and during cold winter events we expect to see this challenge continue and potentially increase. |
| White | The type of hydrogen should be specified and the assumed cost be reflective of that type. Of course our preference is for any hydrogen to be green and that it be produced in a way that doesn't increase grid emissions (using electrolysis that is powered by time and location matched new renewable energy). | The H2 fuel cost provided as part of the Modeling Framework ($7.50/MMBTU available starting in 2028) assumes green hydrogen from electrolysis that receives the full Section 45V investment tax credit, implying it meets the additionality, geographic and temporal matching requirements of the 45V credit program. |

**Table 1: Generation Curtailments of Austin Energy Wind and Solar Assets (MWh) 2022-2023**

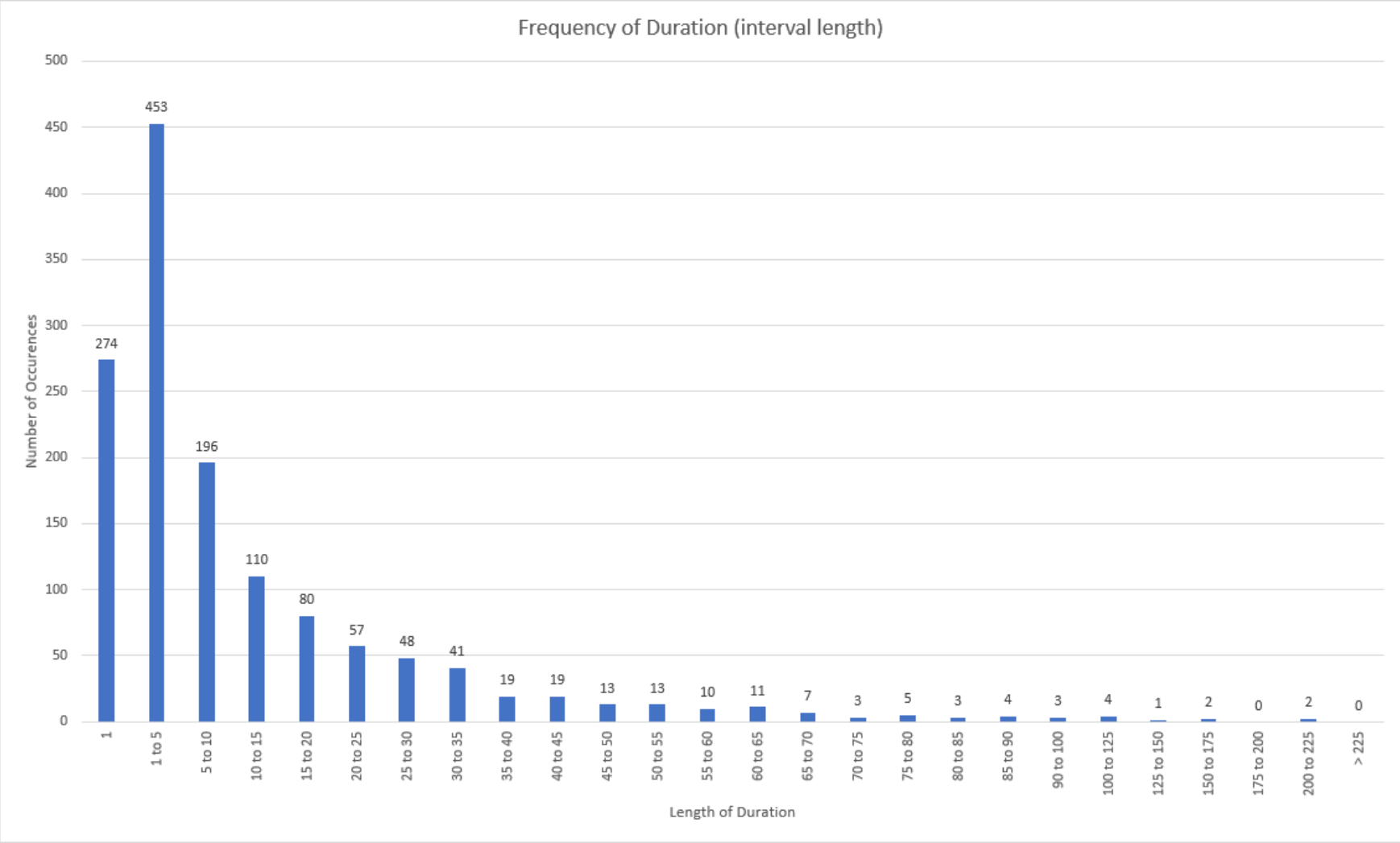
**TOTAL CURTAILED PRODUCTION FROM AE WIND/SOLAR (2022) (MWh)**

| Month | Central Solar | West Solar | West Wind | South Wind | Coastal Wind |
|---|---|---|---|---|---|
| 1 | 31 | 5,511 | 21,712 | 5,071 | 6,982 |
| 2 | 1,308 | 20,144 | 25,900 | 9,261 | 45,391 |
| 3 | 193 | 56,987 | 34,178 | 5,124 | 42,664 |
| 4 | 629 | 72,858 | 30,134 | 2,373 | 41,488 |
| 5 | 365 | 36,860 | 12,708 | 3,973 | 13,142 |
| 6 | 39 | 12,664 | 6,294 | 2,596 | 5,275 |
| 7 | 10 | 1,261 | 8 | 2,851 | 15,077 |
| 8 | 6 | 1,467 | - | 1,581 | 3,815 |
| 9 | - | 4,275 | 4,524 | 1 | - |
| 10 | - | 10,858 | 18,374 | 260 | 8,607 |
| 11 | 13 | 27,804 | 16,792 | 1,172 | 8,809 |
| 12 | 1,525 | 22,981 | 16,018 | 3,861 | 20,367 |
| **Total Curtailed Production** | 4,120 | 273,671 | 186,642 | 38,124 | 211,616 |

**TOTAL CURTAILED PRODUCTION FROM AE WIND/SOLAR (2023) (MWh)**

| Month | Central Solar | West Solar | West Wind | South Wind | Coastal Wind |
|---|---|---|---|---|---|
| 1 | 811 | 25,069 | 23,272 | 9,005 | 41,722 |
| 2 | 996 | 47,778 | 24,351 | 22,839 | 51,245 |
| 3 | 17 | 46,729 | 31,294 | 8,666 | 48,910 |
| 4 | 1,336 | 49,495 | 26,140 | 17,438 | 23,662 |
| 5 | 1 | 2,687 | 1,373 | 23,810 | 11,332 |
| 6 | 1,553 | 17,277 | 1,045 | 7,610 | 10,151 |
| 7 | - | 14,711 | 652 | 6,906 | 16,544 |
| 8 | 86 | 7,688 | 229 | 10,264 | 17,691 |
| 9 | 722 | 4,200 | 925 | 3,464 | 6,106 |
| 10 | 1,339 | 7,508 | 6,309 | 9,948 | 32,015 |
| 11 | 22 | 5,460 | 9,265 | 8,300 | 13,965 |
| 12 | 661 | 15,733 | 12,664 | 4,648 | 25,387 |
| **Total Curtailed Production** | 7,544 | 244,337 | 137,518 | 132,899 | 298,728 |

**Figure 1 – Frequency of Different Load Zone Price Separation Durations in AE Load Zone (vs. Hub Avg) – 2023 Data**




* X-Axis unit of measure is "# of intervals" – One interval = 15 minutes

**Table 2 – Frequency of Load Zone Price Separation at Different Levels of Price Separation (LZ_AEN vs. Hub Avg) – 2023 Data**

| Separation Magnitude | Number of Occurences |
|---|---|
| $0 to $5 | 13679 |
| $5 to $10 | 2266 |
| $10 to $15 | 397 |
| $15 to $20 | 174 |
| $20 to $25 | 87 |
| $25 to $30 | 73 |
| $30 to $35 | 60 |
| $35 to $40 | 46 |
| $40 to $45 | 50 |
| $45 to $50 | 28 |
| $50 to $55 | 30 |
| $55 to $60 | 28 |
| $60 to $65 | 24 |
| $65 to $70 | 18 |
| $70 to $75 | 21 |
| $75 to $80 | 9 |
| $80 to $85 | 17 |
| $85 to $90 | 20 |
| $90 to $95 | 14 |
| $95 to $100 | 13 |
| $100 to $150 | 135 |
| $150 to $200 | 65 |
| $200 to $250 | 46 |
| $250 to $300 | 21 |
| $300 to $400 | 74 |
| $400 to $500 | 33 |
| $500 to $600 | 7 |
| $600 to $700 | 16 |
| $700 to $800 | 9 |
| $800 to $900 | 33 |
| $900 to $1000 | 9 |
| $1000 to $1500 | 8 |
| $1500 to $2000 | 2 |
| $2000 to $2500 | 2 |