Main Offices
Albuquerque, NM 87158 -1105
P 505 241-2700
F 505 241-2347
PNM.com

October 3, 2022

Ms. Melanie Sandoval
Records Bureau Chief
prc.records@state.nm.us
New Mexico Public Regulation Commission
P.O. Box 1269
Santa Fe, NM 87504

Re: Case No. 22-00058-UT- PNM's Application for Authorization to Implement Grid Modernization Components That Include Advance Metering Infrastructure and Application to Recover the Associated Costs Through a Rider, Issuance of Related Accounting Orders, and Other Associated Relief.

Dear Ms. Sandoval:

Public Service Company of New Mexico ("PNM") hereby files its Application for the *Authorization to Implement Grid Modernization Components That Include Advance Metering Infrastructure and Application to Recover the Associated Costs Through a Rider, Issuance of Related Accounting Orders, and Other Associated Relief.*

The following documents are included in the filing:

- Executive Summary
- Application
- Testimony of Laura E. Sanchez
- Testimony of Julie A. Rowey
- Testimony of Mario A. Cervantes
- Testimony of Omni B. Warner
- Testimony of Jonathan C. Hawkins
- Testimony of Eric C. Morgan
- Testimony of Kyle T. Sanders
- Testimony of Stella Chan

This application is being served on parties to Case Nos. 22-00058-UT and 16-00276-UT ("2016 Rate Case").

Included is the $25.00 filing fee for the Application. If you have any questions, please contact me at 505-241-2483 or at brian.buffington@pnm.com.

Sincerely,

/s/ Brian Buffington
Brian Buffington
Senior Project Manager- Regulatory Policy and Case Management

GCG#59882

Executive Summary

Grid modernization is the keystone to New Mexico's and the U.S.'s energy transition. A modernized grid provides the platform for a more resilient, reliable, efficient and decarbonized electric system.[1] With this Application, PNM proposes to invest in a comprehensive grid modernization plan to set New Mexico on a path to succeed in this energy transition, while meeting customers' needs and evolving expectations.

The modern grid must have more and better communication between utilities and customers. The modernized grid proposed here will join the digital age by:

- Enhancing customer reliability;
- Allowing better integration of carbon-free resources;
- Ensuring benefits flow to all customers; and,
- Improving the customer experience.

PNM is embarking on an 11-year grid modernization deployment to bring its grid into the 21st century. It starts with this focused six-year Grid Modernization Implementation Plan (Plan). This Plan, the result of a 20-month collaborative engagement process by PNM and the public, identifies the investments that are necessary to achieve the promised benefits of our energy transition. While no investment plan is "future proof," PNM's Plan does its best to modernize the grid in ways that will serve customers well into the future and be adaptable to customer needs as they develop.

I. The Modernized Grid

Historically, the electric grid has relied on one-way communication. Electrons flow down the grid for the customer to use. An analog meter counts the electrons any given customer uses;

[1] Reliability means that the lights always come on when you turn on the switch. Resilience means that the electrical system can mitigate, survive, and/or recover from high impact threats. Source: https://securethegrid.com/reliability-vs-resilience/

the utility then sends a bill based on the number of electrons used. A modernized grid transforms this one-way, analog communication path into a two-way, real-time digital communication pathway. The technology backbone of this pathway is advanced metering infrastructure ("AMI") working with an Automated Distribution Management System ("ADMS") and a Distributed Energy Resource Management System ("DERMS").

Converting the grid to a two-way communication path is a game-changer. The AMI deployment enables a new Customer Energy Management Platform to roll out, giving customers control and insight into their energy usage and choices. PNM has planned its AMI deployment to prioritize economically disadvantaged customers. Once the communications infrastructure is in place, the network and its systems can evolve along with the needs of customers. PNM, meanwhile, will have new automation and information on the real-time status of the distribution grid. This means problems can be avoided before they happen, and programs can be designed using more accurate data.

II. Customer Benefits

First and foremost, the modernized grid will be more efficient and adaptive. This means:

- Customers can access user platforms that give them insight and control over energy usage, allowing them to take advantage of using energy when rates are low, or conserving energy when rates are high;
- Rooftop solar and other distributed generation resources can be more safely, effectively and efficiently connected to the grid; and
- The scope and length of outages can be reduced, and costs and completion times for service connections and disconnections can also be reduced.

Customers benefit from these efficiencies in multiple ways. Energy efficiency and load management programs can become more effective. Customers who want to use distributed resources can get and use them more quickly. Reliability and system resiliency will be enhanced

because PNM will have better insight into what is happening on the distribution system. Outage times can be reduced, and even eliminated by identifying problems before they occur.

III. Environmental Benefits

A modern and efficient grid means that customers will be better able to conserve and shape their usage and that distributed resources can be more quickly planned for, deployed, and optimized on the grid.

The challenges of the energy transition are illustrated by the shifting characteristics of how and where customers get power. With the pre-modernized grid, large central station power plants supplied the electricity with firm, 24/7 baseload generation. One-way communication was fine for such a system. A modern grid starts to turn that old model inside out. A modern grid needs to accommodate an increased number of smaller, intermittent renewable generation resources. A modern grid can better utilize larger scale renewable generation resources located at the edge of the local system on distribution feeders. Turning that traditional grid inside-out as the energy transition promises is only possible with a grid that has robust two-way communication, real-time situational transparency, and more automation.

IV. Grid Modernization and Low-Income Communities

Consistent with the legislature's goal that grid modernization prioritize low-income and underserved communities for access to clean energy, PNM has prioritized rollout of the AMI grid investments to such communities. Distribution system upgrades will also be prioritized for low-income and underserved communities. PNM's stakeholder process to devise the Plan emphasized how grid modernization could best serve low-income and underserved communities, and that feedback informed our prioritized rollout for low-income communities. By prioritizing these communities for AMI and distribution upgrades, the modernization plan gives low-income

customers timely and equal access to the clean energy opportunities and customer service that the statute envisions.

V. Cost-Effectiveness of Grid Modernization Investments

PNM is aware of the cautionary tales when it comes to technological modernization. That is why planning and investment in infrastructure modernization will begin immediately and continues in orderly, and strategically phased projects over a multi-year period.

With that in mind, in concert with its vendors and technology partners, PNM has done its best to avoid the hazards of a "modern grid" becoming an "obsolescent grid" because of misguided technology choices. The vendors and technology standards involved with the proposed investments have a proven track record of current performance and come with a continuous ability to upgrade the capabilities of the modernized and always modernizing grid that PNM and its customers want.

PNM has developed its Plan so that later projects build on the investments and benefits of the initial AMI and distribution system technology deployments. The Plan provides flexibility over time to respond to changing customer needs and to consider new technology requirements. Importantly, the proposed annual rate-rider and cost recovery mechanism allows for project adjustments while retaining regulatory oversight of PNM's grid modernization progress throughout the initial six-year period of the Plan.

VI. PNM's Grid Modernization Plan

This Application seeks approval of PNM's Plan and grid modernization investments in years one through six of the Plan. The Plan is part of PNM's broader long-term grid modernization strategy, which will take place over 11 years. PNM proposes to roll out AMI to all its customers, prioritizing low-income communities. Along with the AMI rollout, PNM proposes to invest in

greater physical- and cyber-infrastructure to protect the data and information generated by the new AMI capabilities. These initial grid modernization investments will overlay a secure communication network on the existing electric grid infrastructure using both wireless and fiber optic technologies.

This modernized communication path between PNM and its customers will generate data – lots and lots of data – to inform customers and PNM on new and improved ways of managing energy usage. While AMI deployment is underway, PNM proposes to construct a Customer Energy Management Platform that will give customers information on their usage and begin to allow customers to customize when and how much energy they use. Finally, PNM will enhance the distribution system with ADMS, DERMS, and a Fault Location, Isolation and Service Restoration (FLISR) module to support automation of the physical infrastructure. Automating existing mechanical or manual processes on the distribution system will make it more resilient and adaptive by using digital technology. Likewise, these systems will give PNM better information about what is happening on the distribution system in real-time. This means distributed resources can be accommodated on the grid more quickly while also identifying problems while, or even before, they happen.

VII. Conclusion

Grid modernization is a necessary step for the transition to a carbon free energy system that empowers customers to make energy choices that meet their needs. With input from the broad array of stakeholders, PNM's proposed Grid Modernization Plan will set New Mexico on a path to meet its energy policy goals and give customers more options and insight as they make their energy choices.

BEFORE THE NEW MEXICO PUBLIC REGULATION COMMISSION

IN THE MATTER OF PUBLIC SERVICE COMPANY OF NEW MEXICO'S APPLICATION FOR AUTHORIZATION TO IMPLEMENT GRID MODERNIZATION COMPONENTS THAT INCLUDE ADVANCED METERING INFRASTRUCTURE AND APPLICATION TO RECOVER THE ASSOCIATED COSTS THROUGH A RIDER, ISSUANCE OF RELATED ACCOUNTING ORDERS, AND OTHER ASSOCIATED RELIEF	))))))))	**Case No. 22-00058-UT**

APPLICATION

In 2020, the Legislature adopted Section 62-8-13 ("Grid Modernization Statute" or "Statute") of the New Mexico Public Utility Act ("PUA") to encourage grid modernization projects that benefit customers and the State of New Mexico. Public Service Company of New Mexico ("PNM") files this Application pursuant to the Grid Modernization Statute. PNM's approach to grid modernization aligns with the Legislature's statutory goals and balances the interests of customers and investors. The projects included in this Application improve customers' ability to customize their use of energy and ensure that customers, including low-income customers, are a top priority and will benefit consistent with the Grid Modernization Statute. PNM's proposal to modernize its electricity grid through infrastructure and technology improvements also increases the efficiency, reliability, resilience, and security of PNM's electric system.

I. SUMMARY OF PNM'S GRID MODERNIZATION IMPLEMENTATION PLAN

Grid modernization is the keystone for achieving New Mexico's energy transition. PNM is re-designing the electricity grid over the next decade to partner with customers on realizing decarbonization goals and tailoring energy usage to meet each customer's evolving needs. Grid modernization, however, is not instantaneous or free. A modernized grid requires two-way

communications and automation of the system itself. With increasingly sophisticated communications and automation comes the need for increased cybersecurity. A comprehensive and orderly long-term plan is critical to supporting the energy transition with modernized infrastructure and technology.

Importantly, the primary focus of PNM's grid modernization effort is to ensure that its customers experience tangible benefits and new opportunities in alignment with stated customer preferences. PNM undertook an approximately 20-month engagement process, holding customer and stakeholder meetings to receive input and understand customer priorities and answer stakeholder concerns. To ensure that no customer group is left out of this effort, PNM has focused on the interests of low-income customers, prioritizing deployment of metering and distribution infrastructure to low-income portions of PNM's service territory.

PNM's Grid Modernization Implementation Plan ("Implementation Plan") begins in Year 1 with planning, program management and engineering efforts, moving quickly to installation and deployment of advanced metering infrastructure ("AMI"), communications equipment and other technology necessary for the deployment of AMI for PNM's customer base.[1] AMI deployment will continue through Year 4. In Year 2, PNM will advance the use of customer energy data by implementing a Customer Energy Management Platform, aiding customers in making informed decisions about their individual energy use and utility programs and rates that support their choices. PNM's Implementation Plan also includes a significant distribution planning and engineering element throughout Years 1-6. Years 7-11 are presented for informational purposes

[1] The Implementation Plan is attached to the Direct Testimony of PNM witness Laura E. Sanchez as PNM Exhibit LES-3.

only, and PNM's actual grid modernization projects and plans for those outer years will be the subject of a future application.[2]

II. PNM'S REQUESTED APPROVALS AND TIMING

PNM is filing its Application in accordance with the Grid Modernization Statute, as well as two relevant orders from the New Mexico Public Regulation Commission's ("NMPRC" or "Commission") issued in this docket: the March 23, 2022 Order[3] and the May 25, 2022 Order.[4] In its March 23, 2022 Order at Paragraph 7, the Commission found that:

> [T]he implementation of AMI comports with the Grid Modernization Statute, will benefit PNM's New Mexico retail customers and the public, and will provide a net public benefit. Specifically, the implementation of AMI will: facilitate grid modernization; improve the efficiency, reliability, resilience, and security of PNM's system; give customers real time data regarding energy usage that allows them to monitor and reduce consumption as they deem appropriate; allow PNM to maintain reasonable operations, maintenance, and customer costs; improve PNM's ability to develop and implement demand-side management programs; improve PNM's ability to accommodate increased levels of distributed energy resources; reduce emissions; increase New Mexico's capability to supply regional needs through clean and renewable electricity; increase access to and use of renewable energy; support a flexible, diversified, and distributed energy portfolio; improve customer education; and allow for capital investment and skilled jobs in related services.

Consistent with the Commission's orders, the Application seeks authorization to implement grid modernization projects that include AMI, intelligent grid devices, communication networks, distribution system hardening, and physical and cybersecurity, among other technologies ("Grid Mod Projects" or "Projects"). PNM requests approval of the first six years of investments in Grid Mod Projects that will total $344 million, with this total investment subject to

---

[2] PNM's 11-year strategic vision for grid modernization is discussed in EnerNex's Guide for PNM's Grid Modernization Implementation ("Guide"), which is attached to the Direct Testimony of PNM witness Laura E. Sanchez as PNM Exhibit LES-2.

[3] *Order Requesting Public Service Company of New Mexico to File an Application for Authorization to Implement Grid Modernization Components that Include Advanced Metering Infrastructure*, Case No. 22-00058-UT (Mar. 23, 2022) ("March 23, 2022 Order").

[4] *Order Granting Extension of Time to File an Application for Authorization to Implement Grid Modernization Act*, Case No. 22-00058-UT (May 25, 2022) ("May 25 Order").

an annual review and reconciliation proceeding through which PNM will file both updated forecasted costs for the following rate year based on the best available information and will true-up forecasted costs from the prior year to the actual costs incurred. The estimated revenue requirement for Year 1 is $9.8 million.

The Application seeks to recover the costs of these Projects through a Grid Modernization Rider ("Grid Mod Rider" or "Rider"), for which PNM will file an advice notice after Commission approval of PNM's Application. In this Application, PNM seeks approval of the proposed ratemaking methodologies used to develop the Grid Mod Rider, as well as PNM's proposal to collect the Grid Mod Rider as a fixed monthly charge per customer. PNM also seeks approval of the monthly charge amount by customer class listed in the proposed Grid Mod Rider, subject to the Commission's approval of this Application.

Specifically, PNM seeks approval of the following actions:

1) Approval of PNM's Application by July 1, 2023,[5] authorizing PNM's Implementation Plan, which represents the first phase (Years 1-6) of PNM's overall 11-year strategy for grid modernization;

2) Approval of Grid Mod Project costs and related ongoing operations and maintenance ("O&M") costs identified in PNM's Implementation Plan and discussed in witness testimony;

[5] In order to begin timely deployment of projects necessary to implement AMI technologies, PNM requests that the Commission issue a Final Order on PNM's Application during the second quarter of 2023, within six to nine months of the filing date, or by no later than July 1, 2023.

3) Approval of the proposed Grid Mod Rider by September 1, 2023[6]—for which an advice notice will be filed after the approval of PNM's application—subject to an annual review and reconciliation process;

4) Authorization for PNM to create related regulatory assets and liabilities, permitting PNM to record for recovery or refund the following:

a) costs incurred for the development and implementation of PNM's Implementation Plan between the requested approval of the Application on July 1, 2023, and the implementation of the Grid Mod Rider by September 1, 2023;

b) undepreciated investments associated with legacy meters being replaced with AMI meters; and

c) over- or under-collection of costs through the Grid Mod Rider;

5) Approval of the proposed format of an Opt-Out Consent Form, for which PNM will file an advice notice with the Commission prior to AMI meter deployment;

6) Approval of the methodology to determine PNM's proposed cost-based opt-out fees, which includes a one-time fee and a monthly fee, for which PNM will seek approval in separate advice notices;

7) Approval of the reporting criteria by which PNM proposes to establish a baseline regarding the deployment of the Grid Mod Projects and track PNM's progress;

8) Approval of variances from Commission Rules 410 and 530;

[6] Should the Commission approve PNM's Application prior to July 1, 2023, PNM would prefer to implement the Rider prior to September 1, 2023, taking into consideration PNM's concerns with implementing the Rider during the summer peak season. PNM witness Stella Chan addresses implementation of the Rider during the summer months of June, July and August.

9) Approval of a revision to PNM's Petition for Variance from Rule 17.9.560 NMAC and Case No. 2124 Order on Meter Testing Program, filed on June 17, 2022 in this matter; and

10) Such other approvals, authorizations and actions required under the Grid Modernization Statute, the Public Utility Act, and Commission rules and orders to implement PNM's Grid Mod Projects and recover costs associated with its Implementation Plan.

PNM respectfully requests the earliest reasonable date for issuance of a Final Order on its Application, in order to move forward as promptly as possible to implement Year 1 of the Implementation Plan.

In support of this Application, PNM states the following:

III. PNM's Implementation Plan

After a 20-month process, with almost a dozen meetings with stakeholders and customers, resulting in significant input, PNM developed its 6-year Implementation Plan. The Implementation Plan identifies the Grid Mod Projects covered by the Application that further the goals of the Grid Modernization Statute. The Implementation Plan explains (1) the purpose and benefits of PNM's proposed grid modernization investments, (2) the proposed timeline for deploying the proposed Projects; (3) an overview of Project costs; and (4) identification of the witnesses sponsoring each Project. Finally, the Implementation Plan explains how PNM will collect the costs associated with the Projects via the Grid Mod Rider and how PNM will update the Grid Mod Rider as part of an annual review and reconciliation filing with the Commission.

IV. Grid Modernization Statute

The Grid Modernization Statute authorizes PNM to file an application to "include requests for approval of investments or incentives to facilitate grid modernization, rate designs or programs that incorporate the use of technologies, equipment or infrastructure associated with grid modernization and customer education and outreach programs that increase awareness of grid modernization programs and of the benefits of grid modernization."[7] The Statute further provides that in evaluating applications seeking approval of grid modernization projects, the Commission shall consider the reasonableness of the projects and whether the requested investments, incentives, programs, and expenditures are:

1) reasonably expected to improve the public utility's electrical system efficiency, reliability, resilience and security; maintain reasonable operations, maintenance and ratepayer costs; and meet energy demands through a flexible, diversified and distributed energy portfolio, including energy standards established in Section 62-16-4 NMSA 1978;

2) designed to support connection of New Mexico's electrical grid into regional energy markets and increase New Mexico's capability to supply regional energy needs through export of clean and renewable electricity;

3) reasonably expected to increase access to and use of clean and renewable energy, with consideration given for increasing access to low-income users and users in underserved communities;

4) designed to contribute to the reduction of air pollution, including greenhouse gases;

5) reasonably expected to support increased product and program offerings by utilities to their customers; allow for private capital investments and skilled jobs in related services; and provide customer protection, information or education;

6) transparent, incorporating public reporting requirements to inform project design and commission policy; and

7) otherwise consistent with the state's grid modernization planning process and

[7] NMSA 1978, § 62-8-13(A).

priorities.[8]

Based on this comprehensive legislative framework, the Commission can determine that the Projects set out in PNM's supporting testimonies and Implementation Plan satisfy the statutory criteria and are in the public interest. PNM's Implementation Plan and supporting testimonies satisfy the criteria in the Grid Modernization Statute as follows:

- Section 62-8-13(B)(1): PNM witnesses Omni Warner and Jonathan Hawkins detail how PNM's Implementation Plan is reasonably expected to enhance reliability, resilience and security, as well as maintain reasonable operations and maintenance and meet future energy demands with a flexible, diversified portfolio of resources. The planned Projects in this case will transform PNM's aging system into a more transparent, advanced digitalized and flexible system. The proposed grid modernization projects support enhanced integration of carbon-free resources to more efficiently interconnect and optimize the use of distributed energy resources ("DERs"). The proposed upgrades also will reduce outages and restore power faster with new sensors and automation. PNM witnesses Warner and Laura Sanchez address how the Grid Mod Projects are expected to minimize ratepayer costs.
- Section 62-8-13(B)(2): As discussed in the testimony of PNM witnesses Warner and Sanchez, the increased capability to integrate carbon-free resources, including optimization of interconnected DERs, could facilitate export of power into regional energy markets. PNM has focused the first six years of its grid modernization plan on the distribution upgrades in this Application, but will continue to invest in its transmission system outside of the Implementation Plan. PNM continues to explore participation in a regional

[8] NMSA 1978, § 62-8-13(B)(1)-(7).

transmission organization ("RTO") or other regional market and is committed to that endeavor. The optimization and efficiency gains PNM expects from the Grid Mod Projects proposed in the Implementation Plan, particularly distribution automation, will help ensure PNM's grid is optimized for joining an RTO and participating in regional markets in the future.

- Section 62-8-13(B)(3): PNM's proposal is reasonably expected to increase access to and use of clean and renewable energy, with consideration given for increasing access to low-income users and users in underserved communities. PNM witness Warner discusses how the proposed distribution upgrades will increase PNM's ability to integrate clean and renewable energy, particularly DERs. PNM witness Sanchez addresses how PNM is prioritizing the AMI deployment along meter reading routes with high concentrations of low-income customers, ensuring that low-income customers will be in the first groups of customers able to take advantage of AMI data once PNM fully deploys the Customer Energy Management Platform and the other technologies required to process and make AMI data accessible to customers. Mr. Warner and Ms. Sanchez discuss the use of a geographic mapping and screening tool that allows PNM to screen and review environmental and demographic data (*i.e.*, low-income data) to assist PNM in prioritizing Grid Mod Projects and assessing the impact of the Projects on communities, particularly disadvantaged communities, as well as developing mitigation responses where Project impacts are identified.
- Section 62-8-13(B)(4): PNM's proposal is designed to contribute to the reduction of air pollution, including greenhouse gases, by facilitating interconnection of renewable resources of varying sizes, and providing customers with usage information that improves

their ability to select energy efficiency and demand response programs, and time-of-day rates. These features also aid in the transition to carbon-free generation required by the Energy Transition Act, as well as PNM's commitment to be carbon-free by 2040. The capabilities of the Customer Energy Management Platform are described in the testimony of PNM witness Mario Cervantes, and the integration of DERs is described in the testimony of PNM witness Warner.

- Section 62-8-13(B)(5): PNM's proposal is reasonably expected to support increased product and program offerings by PNM to its customers, as described in the testimony of PNM witnesses Cervantes and Stella Chan. The Implementation Plan also allows for increased private capital investments given the faster and more efficient interconnection of DERs, as outlined in the testimony of PNM witness Warner. The Implementation Plan results in increased numbers of skilled jobs in related services, with one example being PNM's planned redeployment of meter readers to higher-skilled positions, as described in the testimony of PNM witness Eric Morgan. PNM's Implementation Plan also provides increased customer protections, both in terms of empowering customers to control their own energy usage, but also via cybersecurity and data privacy protections specific to the grid modernization technology, as described in the testimony of PNM witnesses Cervantes and Hawkins. An important part of PNM's proposal is its ongoing Customer Education and Communication Plan to inform its customers about the benefits of grid modernization, as discussed in the testimony of PNM witness Julie Rowey.
- Section 62-8-13(B)(6): PNM has taken a transparent approach to its Implementation Plan. PNM representatives participated in the New Mexico Energy, Minerals and Natural Resources Department's ("EMNRD") Grid Modernization Roadmap development

("Roadmap"). Additionally, several PNM representatives participated in the Commission's Grid Modernization workshops facilitated by GridWorks. As addressed by PNM witness Sanchez, PNM proposes regular reporting metrics intended to provide transparency on PNM's grid modernization efforts. As further described above, PNM's screening tool will be used to engage traditionally disadvantaged communities on project design and potential impacts.

- Section 62-8-13(B)(7): PNM participated in and reviewed extensively the Roadmap recommendations developed as a result of multiple stakeholder meetings held by EMNRD over the course of a year. PNM ensured that the Roadmap and the U.S. Department of Energy's Modern Distribution Grid Report (2019)[9] were consulted in forming PNM's Implementation Plan, consistent with the state's grid modernization planning process and priorities.

The Grid Modernization Statute provides that applications for approval of grid modernization projects should be filed under Section 62-9-1 of the PUA, as applicable. Section 62-9-1 does not apply to PNM's requests in this case, as PNM is not seeking authorization to construct or operate a plant or system for which a Certificate of Convenience and Necessity would be required, and instead is proposing a series of distribution projects that would fall within applicable informational provisions of Rule 17.5.440 NMAC.[10] Should the Commission

[9] *See* U.S. Department of Energy, Modern Distribution Grid (DSPx), *available at* https://gridarchitecture.pnnl.gov/media/Modern-Distribution-Grid_Volume_I_v2_0.pdf.

[10] *See In the Matter of the Investigation of Public Service Company of New Mexico's Proposed Construction of a Norton-Tesuque 115 KV Transmission Line Extension and Installation of a Substation on Tesuque Pueblo Land*, Case No. 2673, Final Order (Oct. 19, 1998) (adopting the Recommended Decision that concluded a CCN was not needed for a 115 kV transmission project because it was in the ordinary course of business).

determine that Section 62-9-1 of the PUA applies, PNM's supporting testimonies and exhibits provide sufficient evidence to satisfy the requirements of that statute.

V. PNM's Proposed Grid Mod Rider

The Grid Modernization Statute authorizes a public utility that undertakes grid modernization projects approved by the Commission to recover its reasonable costs through an approved tariff rider or in base rates, or through a combination of the two.[11] Costs that are no greater than the amount approved by the Commission for a utility grid modernization project are presumed to be reasonable.[12]

PNM proposes the Grid Mod Rider to recover costs associated with the grid modernization Implementation Plan. The proposed Rider will use forecasted information to calculate a projected revenue requirement, which will be charged for the upcoming rate year. PNM's proposed Rider will recover capital costs, operating expenses, and taxes associated with grid modernization Projects. PNM seeks to implement the Grid Mod Rider through an advice notice filed upon issuance of a Final Order approving PNM's Application and proposed Rider. PNM proposes to re-set the Grid Mod Rider rates annually through a review and reconciliation filing.

The annual review and reconciliation filing will be based on two components: updated forecasted costs for the following rate year based on the best available information; and a reconciliation of the previous period's revenues to actual grid modernization costs. PNM will provide compliance reports on any metrics established by the Commission as part of PNM's annual review and reconciliation filing, together with information in support of the Projects to be implemented during the following rate year. PNM proposes to make the annual review and

[11] NMSA 1978, § 62-8-13(C).
[12] *Id*.

reconciliation filing with projected revenue requirements and rates on March 1 of each year to be effective September 1 of the same year. The projected revenue requirement for the following year will either be reduced or increased based on whether the reconciliation of revenues collected to actual costs resulted in an under-collection or over-collection. PNM witness Kyle Sanders discusses the operation of the Rider and the annual review and reconciliation process in more detail, while PNM witness Chan sponsors the derivation of the monthly charges included in the Rider.

VI. Regulatory Assets or Liabilities

PNM seeks approval of two regulatory assets and one regulatory asset or liability. PNM seeks approval of a regulatory asset permitting PNM to record costs incurred between approval of the Application and the effective date of the Grid Mod Rider. PNM also seeks approval of a regulatory asset for the undepreciated investment associated with legacy meters being replaced with AMI meters. Finally, PNM seeks approval of a regulatory asset or liability to record over- or under-collection of costs through the Grid Mod Rider. PNM witness Sanders supports approval of these regulatory assets or liabilities.

VII. PNM Customer Education and Communication Plan and Opt-Out Proposal, including Approval of the Proposed Format of an Opt-Out Consent Form

PNM has prepared a Grid Modernization/AMI Customer Education and Communication Plan ("Communication Plan") to educate customers on grid modernization, which is sponsored by PNM witness Rowey. Prior to receiving an AMI meter, customers will receive several types of communications over a period of time leading up to the AMI meter installation. The Communication Plan explains how customers can opt-out of AMI, if they choose to do so.

PNM proposes to charge customers who opt out of an AMI meter a one-time fee of either $18.60 (if the customer opts out of an AMI meter prior to installation of the AMI meter) or $49.17 (if the customer opts-out of an AMI meter after installation), and a monthly fee of $28.31. These fees are designed to recover the costs associated with opting out of an advanced meter, are reasonable, and will ensure that the costs of opting out are not subsidized by customers who receive AMI meters.

PNM also seeks approval of the draft of PNM's proposed Opt-Out Consent Form ("Opt-Out Form"), for which PNM will file an advice notice with the Commission prior to AMI meter deployment. PNM witness Morgan sponsors this Opt-Out Form.

VIII. PNM's Reporting Criteria Proposal

Consistent with the Grid Modernization Statute's requirement on transparency, which includes public reporting requirements to inform program design and Commission policy, PNM proposes to provide updates on key metrics through a compliance report included with the annual Grid Mod Rider review and reconciliation filing. PNM's proposed metrics and report schedule are addressed by PNM witness Sanchez.

IX. PNM Witnesses Supporting the Application

In support of its Application, PNM is filing the direct testimony and exhibits of the following eight witnesses:

a. Laura E. Sanchez, Chief Policy and Legal Advisor, PNMR Services Company, introduces the overall policy objectives of the Application and identifies the Grid Mod Projects. Ms. Sanchez discusses the overall benefits of grid modernization. She also discusses the tools PNM will use to identify portions of its service territory that are low-income and PNM's plans to account for the interests of low-income customers. Ms.

Sanchez explains how the Application meets the criteria of the Grid Modernization Statute. She also details the stakeholder outreach PNM engaged in prior to filing this Application. Ms. Sanchez introduces PNM's proposed evaluation metrics for deployment of PNM's Implementation Plan. She also discusses Grid Reliability and Resilience funding opportunities through the Department of Energy, as a result of the Infrastructure Investments and Jobs Act of 2021. Finally, Ms. Sanchez supports PNM's proposed variances.

b. Julie A. Rowey, Vice President and Chief Customer Officer, testifies to the importance of the customer perspective to the development of PNM's Implementation Plan, including the customer benefits of PNM's Grid Mod Projects. Ms. Rowey also addresses PNM's customer outreach efforts that informed the Implementation Plan, and the results of the customer surveys conducted to assess interest in and the value of grid modernization technology. Ms. Rowey also discusses focus groups and customer forums held with PNM customers. Ms. Rowey sponsors the Communication Plan for customers regarding AMI deployment, and its benefits and opportunities.

c. Mario A. Cervantes, Director of Customer Experience, describes how AMI will improve the customer ability to manage electricity usage and understand and manage their bills, including discussing the features and benefits of the Customer Energy Management Platform. Mr. Cervantes also describes PNM's focus on providing benefits to low-income customers via the deployment of AMI and its associated technology. He addresses the call center staffing needs for AMI deployment. Finally, Mr. Cervantes supports PNM's requested variances to NMPRC Rule 410.

d. Omni B. Warner, Director Distribution Engineering, discusses the specific distribution grid modernization projects included in PNM's filing. Mr. Warner further discusses several of the operational benefits of these projects, cost information on grid-facing modernization projects, PNM's proposed distribution automation projects, and deployment of distribution technologies.

e. Jonathan C. Hawkins, Associate Director for Innovation and Communications, describes the AMI meters chosen for deployment, as well as the capabilities of these meters. Mr. Hawkins also describes various information and communication technology that must be deployed in conjunction with the AMI meters, as well as the cybersecurity measures PNM proposes to implement with its grid modernization Projects. Mr. Hawkins will also discuss the protection and management of customer data associated with the grid modernization deployment. Mr. Hawkins supports the selection of the AMI vendor, integration of AMI technology into PNM's existing systems, and health and safety concerns over AMI meters.

f. Eric C. Morgan, Manager for Meter Reading and Collection for PNM, discusses deployment of advanced meters; employee impacts related to AMI integration; the ongoing costs PNM will incur for customers to exercise the option to opt out of receiving an AMI meter; and continuing skilled job opportunities at PNM for meter readers.

g. Kyle T. Sanders, Director, Cost of Service and Budget, discusses the costs included in and other details of PNM's proposed Grid Mod Rider, as well as the annual review and reconciliation process, and how PNM will address undepreciated investments in legacy meters.

h. Stella Chan, Director, Pricing, discusses the rate design of PNM's proposed Rider and sponsors the Rider; supports PNM witness Morgan on the function of the opt-out fees and

how PNM intends to collect such fees; and supports the bill impacts of the Rider on customers.

X. Requested Variances

PNM is requesting that the Commission grant a variance from the data filing requirements of Rule 530 to the extent that it is required. Rule 530 requires the filing of extensive data schedules that are unnecessary for review and approval of the Rider in this case. The Commission has granted similar variances from Rule 530 in the past for rate changes that were not part of a general rate case (*e.g.*, Case No. 20-00237-UT, Approval of PNM's Transportation Electrification Program). PNM witness Sanchez addresses the requested variance from Rule 530.

To the extent necessary, PNM also is requesting a variance to the provisions of Rule 17.5.410 that imply that a utility employee will be sent to a customer's premises to discontinue service, once the AMI technology is in place. At that time, PNM plans to connect and disconnect customers remotely rather than manually. For customers that opt out of AMI, the existing provisions of Rule 17.5.410 shall continue to apply. PNM witness Cervantes addresses the variance for the provisions of Rule 17.5.410 NMAC.

Additionally, PNM filed a *Petition for Variance from Rule 17.9.560 NMAC and Case No. 2124 Order on Meter Testing Program* in this docket on June 17, 2022. The Petition describes the reasons for the variance. The date used in the Petition for estimating the number of meters to be replaced and the potential cost to customers was December 31, 2024. However, deployment of advanced meters in this Application will occur on a rolling basis through year four after approval by the Commission, which will extend beyond December 31, 2024. PNM therefore revises its requests for a variance from meter testing through the end of that four-year period.

XI. Compliance with Commission Orders

The March 23, 2022 Order requested that PNM file an application pursuant to the Grid Modernization Statute that addresses the following issues: a) a proposal for AMI or "smart meters," including automatic meter reading, remote fault detection and includes a discussion of updated rate design options consistent with variable availability resources that use smart meter capabilities and should include time of use options; and b) identification of demand response and grid management programs being considered for implementation using smart meter capabilities and how they work in conjunction with proposed rate design principles. PNM witness Sanchez addresses PNM's compliance with the March 23, 2022 Order.

XII. Requested Tariffs

In accordance with the Grid Modernization Statute, PNM is proposing a Grid Mod Rider to recover the costs of the Implementation Plan. PNM seeks Commission approval of the form of its proposed Grid Mod Rider, including the rate design and cost recovery methodology, as addressed by PNM witness Chan. The proposed Grid Mod Rider is attached to the Direct Testimony of Stella Chan, but PNM does not seek to implement the Rider at this time. PNM will file an advice notice with the Commission after approval of this Application to implement the Grid Mod Rider.

XIII. Notice and Procedural Requirements

PNM's proposed Notice to Customers is attached as Exhibit A. Concurrent with filing, PNM served a copy of this Application, a proposed Notice to Customers, and supporting testimony on the Commission's Utility Division Staff, the New Mexico Attorney General, and all parties to PNM's most recent general rate case (Case No. 16-00276-UT).

PNM will publish notice of this Application and provide notice to customers as directed by the Commission.

The New Mexico Public Regulation Commission ("Commission") is authorized by law to provide protection from public disclosure of confidential or proprietary information and trade secrets. NMSA 1978, §§ 14-2-1(A)(6), (8) (2011), 62-6-17(C) (1993). Pursuant to 1.2.2.8(A) and (B) NMAC, a Commission-designated hearing examiner is authorized to enter appropriate protective orders to prevent public disclosure of confidential information. PNM will shortly be filing a Motion for Entry of a Protective Order.

PNM's attorneys and corporate representatives who should receive all notices, pleadings, discovery requests, and responses and other documents related to this case are:

Leslie Padilla Corporate Counsel Stacey J. Goodwin Associate General Counsel PNMR Services Company Corporate Offices - Legal Dept. Albuquerque, NM 87158-0805 Phone: 505-241-4942 505-241-4927 Leslie.padilla@pnmresources.com Stacey.Goodwin@pnmresources.com	Debrea M. Terwilliger Wilkinson Barker Knauer LLP 2138 W. 32nd Ave, Suite 300 Denver, CO 80211 Phone: (303)-626-2350 Email: dterwilliger@wbklaw.com

All pleadings, correspondence and other documents should also be delivered electronically to the following email addresses:

Brian.buffington@pnm.com
Mark.fenton@pnm.com
Carey.salaz@pnm.com

WHEREFORE, PNM respectfully requests that the Commission enter a final order granting the following relief:

1) Approval of PNM's Application by July 1, 2023, authorizing PNM's Implementation Plan, which represents the first phase (Years 1-6) of PNM's overall 11-year strategy for grid modernization;

2) Approval of Grid Mod Project costs and related ongoing operations and maintenance ("O&M") costs identified in PNM's Implementation Plan and discussed in witness testimony;

3) Approval of the proposed Grid Mod Rider by September 1, 2023—for which an advice notice will be filed after the approval of PNM's application—subject to an annual review and reconciliation process;

4) Authorization for PNM to create related regulatory assets and liabilities, permitting PNM to record for recovery or refund the following:

a) costs incurred for the development and implementation of PNM's Implementation Plan between the requested approval of the Application on July 1, 2023, and the implementation of the Grid Mod Rider by September 1, 2023;

b) undepreciated investments associated with legacy meters being replaced with AMI meters; and

c) over- or under-collection of costs through the Grid Mod Rider;

5) Approval of the proposed format of an Opt-Out Consent Form, for which PNM will file a compliance advice notice with the Commission prior to AMI meter deployment;

6) Approval of the methodology of determining PNM's proposed cost-based opt-out fees, which includes a one-time fee and a monthly fee, for which PNM will seek approval of in separate advice notices;

7) Approval of the reporting criteria by which PNM proposes to establish a baseline regarding the deployment of the Grid Mod Projects and track PNM's progress;

8) Approval of variances from Commission Rules 410 and 530;

9) Approval of a revision to PNM's Petition for Variance from Rule 17.9.560 NMAC and Case No. 2124 Order on Meter Testing Program, filed on June 17, 2022 in this matter; and

10) Such other approvals, authorizations and actions required under the Grid Modernization Statute, the Public Utility Act, and Commission rules and orders to implement PNM's Grid Mod Projects and recover costs associated with its Implementation Plan.

Respectfully submitted,

PUBLIC SERVICE COMPANY OF NEW MEXICO

By: */s/ Leslie M. Padilla*
Leslie Padilla
Corporate Counsel
Stacey J. Goodwin
Associate General Counsel
PNMR Services Company
Corporate Offices – Legal Dept.
Albuquerque, NM 87158-0805
Phone: 505-241-4942
505-241-4927
Leslie.padilla@pnmresources.com
Stacey.Goodwin@pnmresources.com

Debrea M. Terwilliger
Wilkinson Barker Knauer LLP
2138 W. 32nd Ave, Suite 300
Denver, CO 80211
Phone: (303)-626-2350
Email: dterwilliger@wbklaw.com

Attorneys for Public Service Company of New Mexico

GCG#529880

Exhibit A

BEFORE THE NEW MEXICO PUBLIC REGULATION COMMISSION

IN THE MATTER OF PUBLIC SERVICE COMPANY OF NEW MEXICO'S APPLICATION FOR AUTHORIZATION TO IMPLEMENT GRID MODERNIZATION COMPONENTS THAT INCLUDE ADVANCED METERING INFRASTRUCTURE AND APPLICATION TO RECOVER THE ASSOCIATED COSTS THROUGH A RIDER, ISSUANCE OF RELATED ACCOUNTING ORDERS, AND OTHER ASSOCIATED RELIEF	))))))))	**Case No. 22-00058-UT**

FORM OF NOTICE TO PNM'S CUSTOMERS REGARDING PROCEEDING AND HEARING ON PNM'S GRID MODERNIZATION PLAN APPLICATION

NOTICE is hereby given of the following matters pertaining to the above-captioned case pending before the New Mexico Public Regulation Commission ("NMPRC" or "Commission"):

On October 3, 2022, Public Service Company of New Mexico ("PNM") filed its Application for Authorization to Implement Grid Modernization Components that Include Advanced Metering Infrastructure and Application to Recover the Associated Costs Through a Rider, Issuance of Related Accounting Orders, and Other Associated Relief ("PNM Application") pursuant to the Grid Modernization Act at NMSA 1978, Section 62-8-13 (the "Grid Modernization Statute"). The Application seeks authorization to implement Grid Modernization Projects that include advanced metering infrastructure ("AMI"), intelligent grid devices, communication networks, distribution system hardening, physical security, cybersecurity, and other technologies ("Grid Mod Projects").

PNM's Application asks the Commission to approve PNM's Application, including the following approvals:

- Approval of PNM's Application by July 1, 2023,[1] authorizing PNM's Implementation Plan, which represents the first phase (Years 1-6) of PNM's overall 11-year strategy for grid modernization;

- Approval of Grid Mod Project costs and related ongoing operations and maintenance ("O&M") costs identified in PNM's Implementation Plan and discussed in witness testimony;

- Approval of a proposed Grid Modernization Rider ("Grid Mod Rider") by September 1, 2023[2]—for which an advice notice will be filed after the approval of PNM's application—subject to an annual review and reconciliation process;

- Authorization for PNM to create related regulatory assets and liabilities, permitting PNM to record for recovery or refund the following:

  a) costs incurred for the development and implementation of PNM's Implementation Plan between the requested approval of the Application on July 1, 2023, and the implementation of the Grid Mod Rider by September 1, 2023;
  b) undepreciated investments associated with legacy meters being replaced with AMI meters; and
  c) over- or under-collection of costs through the Grid Mod Rider;

- Approval of the proposed format of an Opt-Out Consent Form, for which PNM will file a compliance advice notice with the Commission prior to AMI meter deployment;

- Approval of the methodology of determining PNM's proposed cost-based opt-out fees, which includes a one-time fee and a monthly fee, for which PNM will seek approval of in separate advice notices;

- Approval of the reporting criteria by which PNM proposes to establish a baseline regarding the deployment of the Grid Mod Projects and track PNM's progress;

- Approval of variances from Commission Rules 410 and 530;

- Approval of a revision to PNM's Petition for Variance from Rule 17.9.560 NMAC and Case No. 2124 Order on Meter Testing Program, filed on June 17, 2022, in Case No. 22-00058; and

[1] In order to begin timely deployment of projects necessary to implement AMI technologies, PNM requests that the Commission issue a Final Order on PNM's Application during the second quarter of 2023, within six to nine months of the filing date, or by no later than July 1, 2023.

[2] Should the Commission approve PNM's Application prior to July 1, 2023, PNM would prefer to implement the Rider prior to September 1, 2023, taking into consideration PNM's concerns with implementing the Rider during the summer peak season. PNM witness Stella Chan addresses implementation of the Rider during the summer months of June, July and August.

- Such other approvals, authorizations and actions required under the Grid Modernization Statute, the Public Utility Act, and Commission rules and orders to implement PNM's Grid Mod Projects and recover costs associated with its Implementation Plan.

PNM expects that the first six years of investments in Grid Mod Projects will total approximately $344 million, with this total investment subject to an annual review and reconciliation proceeding where PNM will file both updated forecasted costs for the following rate year based on the best available information and will true-up forecasted costs from the prior year to the actual costs incurred. As part of PNM's Application, PNM proposes to recover $9.8 million through the proposed Grid Mod Rider in Year 1. PNM is proposing that the Grid Mod Rider become effective by September 1, 2023, in addition to any other charges that the customer is paying and be collected through a line-item charge on customers' bills. The proposed Grid Mod Rider will use forecasted information to calculate a projected revenue requirement, which will be charged for the upcoming rate year. The Grid Mod Rider will recover capital costs, operating expenses, and taxes associated with Grid Mod Projects. PNM seeks to implement the Grid Mod Rider through an advice notice filed upon issuance of a Final Order approving PNM's Application.

The following tables present the current bills and anticipated bills, including the proposed Grid Mod Rider for Year 1, for each affected customer class:

1A - Residential

Consumption Level	Annualized Monthly Bill at Present Rates	Annualized Monthly Bill with GMR	$ Change	% Change
500 kWh	$68.93	$70.13	$1.20	1.744%
750 kWh	$107.49	$108.69	$1.20	1.118%
1,000 kWh	$147.85	$149.05	$1.20	0.813%

1B - Residential TOU

Consumption Level	Annualized Monthly Bill at Present Rates	Annualized Monthly Bill with GMR	$ Change	% Change
500 kWh	$96.10	$97.30	$1.20	1.251%
750 kWh	$130.41	$131.61	$1.20	0.922%
1,000 kWh	$164.72	$165.93	$1.20	0.730%

2A - Small Power				
Consumption Level	Annualized Monthly Bill at Present Rates	Annualized Monthly Bill with GMR	$ Change	% Change
500 kWh	$85.88	$88.86	$2.98	3.466%
1,500 kWh	$224.95	$227.93	$2.98	1.323%
5,000 kWh	$711.71	$714.68	$2.98	0.418%

2B - Small Power TOU				
Consumption Level	Annualized Monthly Bill at Present Rates	Annualized Monthly Bill with GMR	$ Change	% Change
1,500 kWh	$228.98	$231.95	$2.98	1.300%
5,000 kWh	$725.09	$728.07	$2.98	0.410%
10,000 kWh	$1,433.83	$1,436.81	$2.98	0.208%

3B / 3D - General Power TOU				
Consumption Level	Annualized Monthly Bill at Present Rates	Annualized Monthly Bill with GMR	$ Change	% Change
30,000 kWh and 50 kW	$2,960.30	$2,979.93	$19.63	0.663%
50,000 kWh and 75 kW	$4,681.97	$4,701.60	$19.63	0.419%
75,000 kWh and 150 kW	$7,844.71	$7,864.34	$19.63	0.250%

3C / 3E - General Power Low Load Factor TOU				
Consumption Level	Annualized Monthly Bill at Present Rates	Annualized Monthly Bill with GMR	$ Change	% Change
10,000 kWh and 50 kW	$1,632.07	$1,649.50	$17.43	1.068%
12,000 kWh and 50 kW	$1,857.81	$1,875.23	$17.43	0.938%
15,000 kWh and 75 kW	$2,405.66	$2,423.09	$17.43	0.724%

4B - Large Power Service TOU				
Consumption Level	Annualized Monthly Bill at Present Rates	Annualized Monthly Bill with GMR	$ Change	% Change
150,000 kWh and 500 kW	$20,071.59	$20,168.51	$96.92	0.483%
500,000 kWh and 1,500 kW	$61,900.33	$61,997.25	$96.92	0.157%
1,500,000 kWh and 2,500 kW	$140,736.58	$140,833.49	$96.92	0.069%

5B - Large Service for Customers >= 8,000kW min. at 115kV, 69kV or 34.5kV				
Consumption Level	Annualized Monthly Bill at Present Rates	Annualized Monthly Bill with GMR	$ Change	% Change
2,000,000 kWh and 8,000 kW	$233,258.77	$233,379.81	$121.05	0.052%
2,500,000 kWh and 10,000 kW	$289,240.25	$289,361.29	$121.05	0.042%

10A Irrigation Service				
Consumption Level	Annualized Monthly Bill at Present Rates	Annualized Monthly Bill with GMR	$ Change	% Change
1,500 kWh	$185.26	$201.15	$15.90	8.580%
3,500 kWh	$418.32	$434.22	$15.90	3.800%
6,000 kWh	$709.66	$725.55	$15.90	2.240%

10B Irrigation Service TOU				
Consumption Level	Annualized Monthly Bill at Present Rates	Annualized Monthly Bill with GMR	$ Change	% Change
5,000 kWh	$301.78	$317.67	$15.90	5.267%
7,500 kWh	$447.44	$463.33	$15.90	3.553%
10,000 kWh	$593.10	$608.99	$15.90	2.680%

11B Water and Sewage Pumping Service TOU				
Consumption Level	Annualized Monthly Bill at Present Rates	Annualized Monthly Bill with GMR	$ Change	% Change
75,000 kWh	$6,744.37	$6,829.04	$84.67	1.255%
90,000 kWh	$7,998.83	$8,083.50	$84.67	1.058%
150,000 kWh	$13,016.67	$13,101.34	$84.67	0.650%

15B Large Service for Public Universities > 8,000kW min. at 115kV				
Consumption Level	Annualized Monthly Bill at Present Rates	Annualized Monthly Bill with GMR	$ Change	% Change
2,000,000 kWh and 8,000 kW	$227,184.40	$227,256.42	$72.02	0.032%
4,500,000 kWh and 12,000 kW	$407,054.85	$407,126.87	$72.02	0.018%

30B Large Service for Manufacturing >= 30,000kW minimum at distribution voltage				
Consumption Level	Annualized Monthly Bill at Present Rates	Annualized Monthly Bill with GMR	$ Change	% Change
25,000,000 kWh and 40,000 kW	$2,046,107.57	$2,046,512.86	$405.29	0.020%
25,000,000 kWh and 45,000 kW	$2,163,018.12	$2,163,423.41	$405.29	0.019%
30,000,000 kWh and 50,000 kW	$2,496,181.85	$2,496,587.14	$405.29	0.016%

33B Large Service for Station Power TOU				
Consumption Level	Annualized Monthly Bill at Present Rates	Annualized Monthly Bill with GMR	$ Change	% Change
200,000 kWh and 500 kW	$13,481.36	$13,555.79	$74.43	0.552%
300,000 kWh and 500 kW	$18,720.18	$18,794.60	$74.43	0.398%
400,000 kWh and 750 kW	$25,233.82	$25,308.24	$74.43	0.295%

35B Large Power Service >= 3,000kW TOU

Consumption Level	Annualized Monthly Bill at Present Rates	Annualized Monthly Bill with GMR	$ Change	% Change
2,000,000 kWh and 3,000 kW	$151,473.91	$151,595.99	$122.08	0.081%
3,000,000 kWh and 5,000 kW	$234,015.34	$234,133.48	$118.13	0.050%
4,000,000 kWh and 7,000 kW	$315,161.32	$315,279.46	$118.13	0.037%

36B Special Service Rate - Renewable Energy Resources				
Consumption Level	Annualized Monthly Bill at Present Rates	Annualized Monthly Bill with GMR	$ Change	% Change
38,963,000 kWh and 61,000 kW	$1,181,678	$1,181,750	$71.81	0.006%
47,618,000 kWh and 73,000 kW	$1,437,300	$1,437,372	$71.81	0.005%
55,278,000 kWh and 88,000 kW	$1,680,615	$1,680,687	$71.81	0.004%

Lighting rate classes	
Per Light	GMR per light ($/light)
6 - Private Area Lights	$0.03
20 - Streetlighting	$0.01

The proposed rate changes stated by customer rate class are for informational purposes only. The final rates approved by the Commission in this proceeding may vary from the rates set forth above.

PNM proposes to charge customers who opt out of an AMI meter a one-time fee of $18.60 if the customers opts out of an AMI meter prior to the installation, or approximately $49.17 if the customer opts out of an AMI meter after installation, and a recurring monthly fee of $28.31. These fees are designed to recover the costs associated with opting out of an advanced meter.

On _____, 2022 the Commission entered an Order designating the undersigned to preside over this proceeding and to issue a Recommended Decision.

Further information regarding this case can be obtained by contacting PNM or going to the Commission's website at https://edocket.nmprc.state.nm.us. The Commission has assigned Case No. 22-00058-UT to this proceeding and all inquiries or written comments concerning this matter should refer to that case number.

The current procedural schedule for this case is as follows:

a. On or before November____, 2022, any person desiring to intervene to become a party ("intervenor") in this case must file a motion for leave to intervene in conformity with NMPRC Rules of Procedure, 1.2.2.23(A) and (B) NMAC.

b. The Commission's Utility Division Staff and any intervenor testimony shall be filed by _____, 2023.

c. Any rebuttal testimony shall be filed by ____, 2023.

d. A stipulation may be filed by _____, 2023.

e. Opposition to any stipulation shall be filed by _____, 2023.

f. Testimony in support of a stipulation shall be filed by _____, 2023.

g. Testimony in opposition to any stipulation shall be filed by _____, 2023.

h. A public hearing on this matter shall be held beginning on _____, 2023 commencing at 9:30 a.m. at the _____.

The procedural dates and requirements of this case are subject to further order of the Commission or Hearing Examiner.

The Commission's Rules of Procedure at 1.2.2 NMAC shall apply to this case except as modified by order of the Commission or Hearing Examiner. A copy of those Rules may be obtained at the official NMAC website, http://www.nmprc.state.nm.us/nmac/.

Any person whose testimony has been filed must attend the hearing and submit to examination under oath.

Any interested person may appear at the time and place of the hearing and make written or oral comment pursuant to 1.2.2.23(F) NMAC without becoming an intervenor. All such comments

shall not be considered as evidence in this case. Written comments, which shall reference NMPRC Case No. 22-00058-UT, also may be sent to the Commission at prc.records@state.nm.us.

Interested persons should contact the Commission for confirmation of the hearing date, time and place since hearings are occasionally rescheduled. Any interested person may examine PNM's Application and all other pleadings, testimony, exhibits and other documents filed in the public record for this case at the Commission website, or at the offices of PNM at the following address:

Public Service Company of New Mexico
414 Silver Ave. SW
Albuquerque, New Mexico 87102
Telephone: (505) 241-2700

Anyone filing pleadings, testimony and other documents in this case must comply with the Commission's electronic filing policy, as amended from time to time. This includes filings in .pdf format, with electronic signatures, sent to the Records Bureau's e-mail address, as set out on the Commission's website, at: prc.records@state.nm.us, within regular business hours of the due date to be considered timely filed. Regular business hours are from 8:00 am to 5:00 pm MDT. Documents received after regular business hours will be considered as filed the next business day. Parties must serve copies of all filings on all parties of record and the Commission's Utility Division Staff ("Staff"). All filings shall be e-mailed to Staff and the parties on the date they are filed with the Commission. All filings shall be e-mailed to the Hearing Examiner at _____. Additional details regarding this proceeding and its procedural requirements are set forth in the Hearing Examiner's Procedural Order, issued _____, 2022.

Individuals with a disability who require a reader, amplifier, qualified sign language interpreter, or any other form of auxiliary aid or service to attend or participate in the hearing, may contact the Commission's docketing office at least 24 hours prior to the hearing. The

Commission's docketing office may be reached at (505) 827-4526. Public documents associated with the hearing can be provided in various accessible forms for disabled individuals. Requests for summaries or other types of accessible forms also should be addressed to the Utility Division at (505) 827-6941.

ISSUED at Santa Fe, New Mexico this _____ day of _____ 2022.

NEW MEXICO PUBLIC REGULATION COMMISSION

_____

Hearing Examiner

GCG#529881

BEFORE THE NEW MEXICO PUBLIC REGULATION COMMISSION

IN THE MATTER OF PUBLIC SERVICE COMPANY OF NEW MEXICO'S APPLICATION FOR AUTHORIZATION TO IMPLEMENT GRID MODERNIZATION COMPONENTS THAT INCLUDE ADVANCED METERING INFRASTRUCTURE AND APPLICATION TO RECOVER THE ASSOCIATED COSTS THROUGH A RIDER, ISSUANCE OF RELATED ACCOUNTING ORDERS, AND OTHER ASSOCIATED RELIEF	))))))))	**Case No. 22-00058-UT**

DIRECT TESTIMONY

OF

LAURA E. SANCHEZ

October 3, 2022

NMPRC CASE NO. 22-00058-UT
INDEX TO THE DIRECT TESTIMONY OF
LAURA E. SANCHEZ

WITNESS FOR
PUBLIC SERVICE COMPANY OF NEW MEXICO

DIRECT TESTIMONY
OF LAURA E. SANCHEZ
NMPRC CASE NO. 22-00058-UT

I. INTRODUCTION AND PURPOSE

Q. PLEASE STATE YOUR NAME, POSITION AND BUSINESS ADDRESS.

A. My name is Laura E. Sanchez. I am the Chief Policy and Legal Advisor for PNM Resources, Inc. ("PNMR") and am employed by PNMR Services Company. My testimony is submitted on behalf of Public Service Company of New Mexico ("PNM" or the "Company"), a public utility subsidiary of PNMR. My business address is 414 Silver Ave. SW, Albuquerque, New Mexico 87102.

Q. WHY IS GRID MODERNIZATION AN IMPORTANT NEXT STEP FOR PNM?

A. Ensuring that electricity service remains reliable, resilient, and secure while transitioning to carbon-free generation is a key policy objective for PNM. PNM's internal policies are driving toward a carbon-free transition by 2040, ahead of state law.[1] The New Mexico Legislature—also recognizing the need for definitive and significant change to enable the transition to carbon-free—passed legislation that ensures reliability, enables carbon free resources, and enhances customer service, all while providing for a financially sound utility. To capture these objectives, state law authorizes utilities to invest in grid modernization projects to transition the grid to capture the public benefits that come from clean energy and to enable customer participation and choices for clean energy. Customers will benefit from this transition. PNM's plans for grid modernization ensure that customers

[1] New Mexico's Energy Transition Act requires PNM to supply 100% percent of all retail sales of electricity in New Mexico from zero carbon resources by January 1, 2045. NMSA 1978, § 62-16-4(A)(6) (2019). By January 1, 2040, no less than 80 percent of all retail sales of electricity in New Mexico are to be supplied through renewable energy resources. *See* Section 62-16-4(A)(5).

are a top priority and will benefit consistent with the Grid Modernization Statute, NMSA 1978, Section 62-8-13 ("Grid Mod Statute" or "Statute").[2]

Q. HOW HAS PNM ACCOUNTED FOR CUSTOMER INTERESTS IN THIS FILING?

A. A key objective of PNM's grid modernization effort is to ensure that its customers experience tangible benefits and new opportunities in alignment with stated customer priorities. To accomplish this objective, PNM has engaged in a multifaceted process to understand what customers want and to consider constructive feedback from stakeholders.[3] Specifically, PNM undertook an approximately 20-month engagement process, holding customer and stakeholder meetings to receive input and understand customer priorities and answer stakeholder concerns. Based on this feedback, PNM's grid modernization plan focuses on:

- equitable access to a modern electric grid for all customers, particularly low-income customers;
- enhanced customer reliability and resiliency;
- faster and more efficient integration of carbon-free resources, including behind-the-meter distributed energy resources ("DERs"); and

[2] The Grid Mod Statute specifically contemplates increased product and program offerings for customers, including new customer information platforms designed to provide improved customer access, greater service options and expanded access to energy usage information. NMSA 1978, § 62-8-13(B)(5), (F)(12).

[3] In this context where my testimony discusses "stakeholders," I mean the entities that typically participate in New Mexico Public Regulation Commission proceedings or entities that may have a particular interest in grid modernization-related activities.

- improved access to electricity usage information, empowering customers with more visibility on their energy usage and enhancing customer optionality for rates (*i.e.,* time-of-day rates) and programs or offerings *(i.e*., energy efficiency, DERs and electrification).

Q. HOW EXTENSIVE ARE PNM'S PLANS FOR MEETING KEY OBJECTIVES FOR A CARBON-FREE TRANSITION AND ENHANCING CUSTOMER BENEFITS?

A. Like many utilities, PNM's 1970s era grid reflects the best technology of that time. That grid has served customers well. But it is essentially a one-way communication path that was built for a system with large, central station power. Today's grid needs two-way communication to integrate carbon free, distributed resources, as well as to give customers the information to make choices about energy use. These investments to modernize the grid will create a platform to make that happen. PNM has been investing in the current grid on an ongoing basis, but now we need to take a technological step toward changing its current one-way delivery system into a multi-directional grid. In turn, this will support DERs, enhance reliability and resiliency, and provide customers with optionality and critical information.

This transition will not be easy and will require not only infrastructure modernization, but also fundamental changes to all aspects of utility operations, which is why PNM is proposing a multi-year plan. The grid modernization projects authorized by the Grid Mod

Statute, as well as the cost recovery tools the Legislature included in the statute, facilitate a means for the transformative change necessary to achieve the aligned objectives of PNM and the State for a carbon-free future. Fundamentally, Commission approval of PNM's planned path for grid modernization means that today's grid enhancements will meet tomorrow's evolving energy policies and priorities, and helps meet current and future customer needs and desires for energy delivery.

Q. WHAT DOES GRID MODERNIZATION MEAN?

A. Grid modernization is a catch-all phrase used to describe modern technologies on the power grid that enhance reliability, accommodate more distributed resources, and improve communications. The New Mexico Legislature defined grid modernization as:

> [I]mprovements to electric distribution or transmission infrastructure through investments in assets, technologies or services that are designed to modernize the electrical system by enhancing electric distribution or transmission grid reliability, resilience, interconnection of distributed energy resources, distribution system efficiency, grid security against cyber and physical threats, customer service or energy efficiency and conservation…[4]

The Legislature enumerated several categories as part of grid modernization, including advanced metering infrastructure ("AMI") and related communications networks. Section 62-8-13(F)(1) NMSA 1978. Practically speaking, grid modernization upgrades enable PNM to provide more detailed electricity usage information to residents and business owners about when and how they use electricity, so they have greater control over their energy use. Grid modernization upgrades also provide PNM with better

[4] Section 62-8-13(F) NMSA 1978.

information about the conditions of the grid so that system operators can make better decisions to improve electric resiliency and reliability, reduce grid congestion, and improve power quality.

Q. WHAT IS THE PURPOSE OF YOUR TESTIMONY?

A. My testimony serves as a roadmap to PNM's request for approval of its application for authorization to implement certain grid modernization components that include AMI and a request to recover associated costs through a rider (the "Application"), pursuant to the Grid Mod Statute. In 2020, the Grid Mod Statute was passed into law, permitting utilities like PNM to file an application with the Commission for approval of grid modernization projects needed by the utility. Even before the adoption of the Grid Mod Statute, PNM has been proactively considering how to effectively and efficiently modernize its grid to achieve a carbon-free future.

My testimony outlines the story of how PNM's proposed grid modernization projects in this Application will aid PNM in achieving its goals for a carbon-free transition, including identifying the other witnesses that discuss PNM's objective of capitalizing on grid modernization to pave the way for the grid of the future. My testimony also discusses the key objective of meeting customer needs, and accounting for constructive feedback from stakeholders on PNM's grid modernization efforts. To ensure that no customer group is left out of this effort, I also discuss how PNM has focused on the interests of low-income customers. The primary focus of PNM's grid modernization effort is to ensure that its

customers experience tangible benefits and new opportunities in alignment with stated customer preferences. I, along with other PNM witnesses, discuss how PNM has engaged with its customers and key stakeholders about the grid of the future.

In addition to introducing the overall policy objectives of the Application, my testimony addresses the following:

- Identifies other witnesses testifying in support of the Application and briefly summarizes the scope of each witness's testimony;
- Provides the long-term view of PNM's grid modernization implementation plan and how this Application fits into the broader strategic goals PNM is working to achieve;
- Describes the projects PNM is proposing in this grid modernization Application ("Grid Mod Project(s)" or "Project(s)"), as well as the customer benefits associated with those Projects;
- Discusses the cost estimates for the Grid Mod Projects that are part of PNM's implementation plan and the overall plan for recovery of those costs, noting other witnesses who will provide additional details;
- Reviews the Grid Mod Statute and how this Application meets the seven criteria in that Statute;

- Discusses the stakeholder outreach PNM engaged in prior to filing this Application, particularly highlighting the requirements to conduct outreach into certain matters as a result of the Recommended Decision in Case No. 15-00312-UT;[5]
- Discusses the methodology PNM plans to use to identify portions of its service territory that are low-income and PNM's plans to take into account the interests of low-income customers;
- Introduces an environmental justice screening tool that PNM intends to use for grid modernization projects;
- Introduces PNM's proposed evaluation metrics for deployment of PNM's grid modernization implementation plan;
- Addresses the Commission's March 23, 2022, Order Requesting Public Service Company of New Mexico to File an Application for Authorization to Implement Grid Modernization Components that Include Advanced Metering Infrastructure, Case No. 22-00058-UT ("March 23 Order"); and
- Discusses Grid Reliability and Resilience funding opportunities through the Department of Energy, as a result of the Infrastructure Investments and Jobs Act of 2021 ("IIJA"), and PNM's related evaluation and application process for considering any potential funding opportunities.

[5] *See* Case No. 15-00312-UT, In the Matter of the Application of Public Service Company of New Mexico for Prior Approval of the Advanced Metering Infrastructure Project, Determination of Ratemaking Principles and Treatment, and Issuance of Related Accounting Orders, *Recommended Decision*, at 81-84 (Mar. 19, 2018).

Q. WHAT APPROVALS IS PNM SEEKING IN ITS APPLICATION?

A. In accordance with the Grid Mod Statute, PNM requests that the Commission approve PNM's Grid Mod Projects, cost recovery, and request for rate relief, and specifically requests the following authorizations:

- Approval of PNM's Application as of July 1, 2023, authorizing PNM's Grid Modernization Implementation Plan ("Grid Mod Plan" or "Plan"), which represents the first phase (years 1-6) of PNM's overall 11-year strategy for grid modernization deployment;[6]
- Approval of Grid Mod Project costs and related ongoing operations and maintenance ("O&M") costs identified in PNM's Plan and discussed in witness testimony;
- Approval of a proposed Grid Modernization Rider ("Grid Mod Rider" or "Rider") by September 1, 2023,[7] for which PNM will file an advice notice after Commission approval of PNM's Application, and approval of PNM's proposed ratemaking methodologies for recovery of the Grid Mod Projects' operating expenses and capital costs through the proposed Grid Mod Rider;
- Approval of a regulatory asset for costs incurred for the engineering, planning and other associated costs incurred between approval of the Application on July 1, 2023, and implementation of the Grid Mod Rider by September 1, 2023;

[6] PNM's Grid Modernization Implementation Plan is attached to my testimony as PNM Exhibit LES-3.
[7] Should the Commission approve PNM's Application prior to July 1, 2023, PNM would prefer to implement the Rider prior to September 1, 2023, taking into consideration PNM's concerns with implementing the Rider during the summer peak season. PNM witness Stella Chan addresses implementation of the Rider during the summer months of June, July and August.

- Approval of a regulatory asset for the undepreciated investment associated with legacy meters being replaced with AMI meters;
- Approval of a regulatory asset or liability to record over- or under-collection of costs through the proposed Grid Mod Rider;
- Approval of the proposed format of an Opt-Out Consent Form, for which PNM will file a compliance advice notice with the Commission prior to AMI meter deployment;
- Approval of the methodology of determining PNM's proposed cost-based Opt-Out Fees, which includes a one-time fee and a monthly fee, for which PNM will seek approval of in separate advice notices;
- Approval of the evaluation metrics PNM proposes to track and establish a baseline regarding the roll-out of the Grid Mod Projects;
- Approval of a variance from Rules 410 and 530;
- Approval of a revision to PNM's Petition for Variance from Rule 17.9.560 NMAC and Case No. 2124 Order on Meter Testing Program, filed on June 17, 2022, in Case No. 22-00058; and
- Such other approvals, authorizations and actions required under the Grid Mod Statute, the Public Utility Act, and Commission rules and orders to implement PNM's Grid Mod Projects and cost recovery.

Q. ARE YOU SPONSORING ANY EXHIBITS?

A. Yes. I am sponsoring the following exhibits described below and attached to my testimony:

- PNM Exhibit LES-1: Resume of Laura E. Sanchez
- PNM Exhibit LES-2: EnerNex's Guide for PNM's Grid Modernization Implementation
- PNM Exhibit LES-3: PNM's Grid Modernization Implementation Plan
- PNM Exhibit LES-4: Low-Income GIS Tracts Using 2020 Census Data
- PNM Exhibit LES-5: Explanation of the Environmental Justice Screening Tool
- PNM Exhibit LES-6: PNM's Grid Modernization Evaluation Metrics
- PNM Exhibit LES-7: Table of Stakeholder Meetings
- PNM Exhibit LES-8: Table of Government, Community and Business Outreach
- PNM Exhibit LES-9: Table of Questions from Recommended Decision in Case No. 15-00312-UT
- PNM Exhibit LES-10: Estimated Grid Mod Program Management Office Costs

Q. WHAT OTHER PNM WITNESSES WILL BE PROVIDING TESTIMONY AS PART OF THIS CASE?

A. There are seven additional witnesses providing testimony on behalf of PNM in this matter:

- Julie Rowey, Vice President and Chief Customer Officer, testifies on the importance of the customer perspective to the development of PNM's Plan, including the customer benefits of PNM's Grid Mod Projects; describes PNM's customer outreach efforts as part of the development of its Plan; discusses the results of customer surveys conducted to assess interest in and the value of grid

modernization technology, and of focus groups and customer forums held with PNM customers.

- Mario Cervantes, Director of Customer Experience, describes how AMI will improve the customer ability to manage electricity usage and understand and manage their bills, including discussing the features and benefits of the Customer Energy Management Platform; describes PNM's focus on providing benefits to low-income customers via the deployment of AMI and its associated technology; discusses the limits of PNM's billing system as it relates to AMI and describes the call center staffing needs for AMI deployment; and addresses required variances to NMPRC Rule 410.
- Eric Morgan, Manager for Meter Reading and Collection for PNM, discusses deployment of advanced meters; employee impacts related to AMI integration; the ongoing costs PNM will incur for customers to exercise the option to opt-out of receiving an AMI meter; and re-deployment opportunities for PNM's meter readers.
- Jonathan Hawkins, Associate Director for Innovation and Communications, describes the AMI meters chosen for deployment, as well as the capabilities of these meters and cost of AMI deployment; describes various information and communications technology that must be deployed in conjunction with the AMI meters, as well as the cybersecurity measures PNM proposes to implement with its Grid Mod Projects; discusses the protection and management of customer data associated with the grid modernization deployment; and supports the selection of

the AMI vendor, integration of AMI technology into PNM's existing systems, and health and safety concerns over AMI meters.

- Omni Warner, Director, Distribution Engineering, details how PNM's grid modernization efforts will support PNM's carbon-free transition by 2040; discusses the specific distribution grid modernization Projects included in PNM's filing and why those Projects are needed now, as well as the operational and customer benefits and costs for the planned Projects; and supports PNM's long-term strategy for distribution modernization.
- Kyle Sanders, Director, Cost of Service and Budget, presents PNM's annual revenue requirement associated with implementation of the Grid Mod Project, which PNM intends to recover through a proposed Grid Modernization Rider (the "Grid Mod Rider" or "Rider"); discusses the annual review process for the Grid Mod Rider and the timeline for PNM's proposed annual filings to update the Rider; and supports PNM's request to create regulatory assets or liabilities.
- Stella Chan, Director, Pricing, discusses the rate design of PNM's Rider and sponsors the proposed Rider; supports PNM witness Morgan on the function of the opt-out fees and how PNM intends to collect such fees; and supports the bill impacts of the proposed Rider on impacted customers.

Q. HOW ARE YOU QUALIFIED TO OFFER THIS TESTIMONY?

A. As Chief Policy & Legal Advisor, I am responsible for the oversight, development, and implementation of regulatory policies and strategy that support PNMR's overall

operational strategy and functions. I help identify public policy priorities and help shape the Company's public policy and regulatory agenda. I assist in addressing public policy challenges by ensuring appropriate internal and external stakeholders are involved. I serve as the senior adviser on public policy and research to the President and Chief Operating Officer. I also conduct research and analysis on public policy and regulatory matters.

A full statement of my experience and qualifications, including a list of the Commission proceedings in which I have participated, is attached as PNM Exhibit LES-1.

II. PNM'S GRID MODERNIZATION STRATEGY

Q. WHAT WAS THE PROCESS PNM USED TO DEVELOP ITS LONG-TERM GRID MODERNIZATION STRATEGY TO TRANSITION TO CARBON-FREE GENERATION WHILE PROVIDING TANGIBLE CUSTOMER BENEFITS?

A. PNM has employed a thorough and thoughtful plan to craft its strategy for grid modernization.[8] After a 20-month process, with almost a dozen stakeholder and customer meetings, PNM developed its Grid Modernization Plan for the next decade. In developing its Plan, PNM also relied on the Department of Energy's Modern Distribution Grid Report (2019), which provides a next generation distribution system platform that has been used in over 20 states to inform core customer and grid technologies. PNM also participated in

[88] As used in this testimony, PNM's "strategy" is a vision that includes grid modernization investments over the next 11 years. PNM's "Plan" is defined in the next paragraph and spans the first six years of this strategy, which is the subject of this application.

and reviewed the New Mexico Energy, Minerals and Natural Resources Department's ("EMNRD") Grid Modernization Road Map recommendations developed as a result of multiple stakeholder meetings held by EMNRD over a year.

Additionally, PNM retained grid modernization consultants, EnerNex and Newport Consulting, who have extensive experience developing grid modernization plans in other states. These consultants advised the Company throughout Plan development, aiding PNM in development of a systematic approach to grid modernization and guiding PNM on a specific implementation Plan that results in an efficient and effective strategy for the roll out of Grid Mod Projects. The results of EnerNex's advice to PNM can be found in PNM Exhibit LES-2, which is EnerNex's Guide for PNM's Grid Modernization Implementation ("Guide"). Based on this Guide, PNM has prepared a Grid Modernization Implementation Plan, attached as PNM Exhibit LES-3 ("Plan"). The Plan identifies the Projects that PNM is proposing in its Application in furtherance of the goals of the Grid Mod Statute and PNM policy objectives; the estimated costs of the Projects; the proposed timeline for deploying each Project; an overview of why those Projects are beneficial to PNM's customers and satisfy the statutory criteria; identification of the witnesses that are sponsoring each Project; and an explanation of how PNM will collect the costs associated with the Projects via the proposed Grid Mod Rider and how it will update the proposed Rider as part of each annual filing.

Q. PLEASE EXPLAIN HOW PNM'S STRATEGIC PRIORITIES ARE DRIVING THE GRID MODERNIZATION INVESTMENTS IDENTIFIED IN PNM'S PLAN.

A. As described in the Guide, PNM's priorities for grid modernization are driven by PNM's decarbonization goals, but importantly, also by customer, community and stakeholder input. Through this engagement with customers and stakeholders, PNM is emphasizing three key outcomes: value, reliability and sustainability. These outcomes drive efforts at customer empowerment and service enhancements. Customer empowerment encourages customers to take a more proactive role as an energy partner with PNM to achieve decarbonization. Service enhancements are aimed at improving service quality while integrating renewable energy and DERs, as well as achieving beneficial electrification. As discussed in more detail below, a key priority for PNM is not leaving any customer behind in this effort to modernize PNM's grid, meaning that PNM has specifically contemplated its low-income and otherwise disadvantaged customers in its deployment plans.

Q. HOW DOES THIS APPLICATION PLAY A ROLE IN PNM'S LONG-TERM GOAL FOR MODERNIZING ITS GRID AND ACHIEVING A CARBON-FREE FUTURE?

A. The approvals sought in this Application for the critical Projects identified for the first six years of PNM's 11-year grid modernization strategy will aid PNM in achieving its carbon-free transition. PNM witnesses Julie Rowey and Mario Cervantes explain why customer-facing technology, including AMI and the Customer Energy Management Platform, will provide customers with sufficient information and choices to change behavior and aid

PNM's transition to a carbon-free future. PNM witness Omni Warner details how a modernized, more flexible distribution system will facilitate a transition to carbon-free by, among other things, more efficiently interconnecting and optimizing the use of clean energy generally and DERs specifically, as well as providing greater visibility, automation and analytic capabilities to ensure reliability and provide for sophisticated investment planning and prioritization.

The Application seeks Commission approval to pursue the Projects consistent with PNM's Plan, as supported by witness testimony and referenced guidance documents from PNM's consultants. Additionally, the Application references an overview of the Company's 11-year strategic vision consistent with EnerNex's Guide that highlights the customer benefits of grid modernization investments. This is the first time PNM has made a filing seeking approval of grid modernization investments under the new Grid Mod Statute, and PNM believes this is a comprehensive plan that incorporates not just details on the investments, but also an analysis of the customer benefits, particularly for low-income customers.

Q. HOW HAS PNM INCLUDED ITS CUSTOMERS IN ITS PLAN?

A. PNM's Plan is focused on partnering with its customers. Whether customers are adopting DERs or are participating in rate structures that affect grid usage, customers will play a critical role in PNM's efforts to achieve the planned carbon-free transition by 2040. In fact, without participation from customers, PNM's goals may be more difficult to achieve. Through customer outreach, PNM sought to understand what customers want and how they

might be incentivized to engage in PNM's efforts to make the transition to carbon-free. PNM witness Rowey explains the Company's extensive efforts at customer outreach to not only understand customer needs and desires, but also to aid customer understanding of PNM's objectives and the critical role customers will play in achieving a modernized grid and a carbon-free future.

To ensure that no customer group is left out of this effort, PNM has focused on the interests of low-income customers. Affordability and cost-effective deployment are goals for PNM's Grid Modernization Plan. For example, PNM seeks to minimize bill impacts by deploying its Plan over an initial 6-year period, with some projects planned for years 7-11 to carry out over time PNM's longer term grid modernization strategy. In other words, PNM intends to strategically phase-in investments to provide customer value and operational efficiency.

In addition to phasing in investments to minimize rate impacts, the Company will strategically prioritize its AMI and distribution modernization investments in low-income areas of PNM's service territory. When low-income and vulnerable areas in PNM's service territory are overlayed on a map with information on aging infrastructure, the areas of the system that are aging and most in need of system upgrades are also the same areas where low-income people live. *See* PNM Exhibit LES-4. As such, as a matter of fairness, PNM has planned its AMI deployment so that customers that are economically disadvantaged will be equipped to participate from the start when customer platforms are enabled. Once

the necessary infrastructure is in place, PNM's grid modernization plan gives disadvantaged communities timely and equal access to the opportunities and customer service that the Grid Mod Statute envisions.

Specifically, once AMI is deployed and the Meter Data Management System and Customer Energy Management Platform are available, low-income customers will see several benefits, including: pick your own bill date, prepay options on their bill, automated detection of outages, and remote connection and reconnection of service. These options will give low-income customers more flexibility and control over their monthly electric bills, bringing them much value beyond just AMI deployment.

Q. PLEASE DESCRIBE THE TOOLS THAT PNM WILL USE TO ENSURE BENEFITS ARE REALIZED FOR ITS LOW-INCOME OR OTHERWISE DISADVANTAGED CUSTOMERS.

A. PNM will be employing a geographic mapping and screening tool that will provide screening and review of environmental and demographic data (*i.e.*, low-income data) to assist PNM in prioritizing Grid Mod Projects and assessing the impact of the Projects on communities, particularly disadvantaged communities, as well as developing mitigation responses where Project impacts are identified. A more comprehensive description of this Environmental Justice Screening Tool ("EJ Screening Tool" or "Tool") is attached as PNM Exhibit LES-5. As described in PNM Exhibit LES-5, the EJ Screening Tool combines Geographic Information System ("GIS") map data of PNM's service territory integrated

with a variety of data from governmental and other sources to develop a heat map of areas of environmental justice concern. For example, the EJ Screening Tool will pull information from a variety of governmental databases, including from the U.S. Census Bureau, the Centers for Disease Control, the Environmental Protection Agency's Environmental Justice Screen and the Council on Environmental Quality's Climate & Economic Justice Screening Tool. Field canvassing is then utilized to verify or "ground truth" the mapping data and confirm a connection to the community. Once areas of environmental justice concern are identified and confirmed, the EJ Screening Tool will aid PNM in its effort to prioritize Grid Mod Projects and evaluate the Grid Mod Projects with respect to design and impact in order to develop appropriate design adjustments and other mitigation actions. In addition, the EJ Screening Tool assists PNM in developing a strategy for how to most effectively reach out to affected communities.

III. OVERVIEW OF PNM'S GRID MODERNIZATION APPLICATION AND PLAN

Q. PLEASE SUMMARIZE PNM'S PLAN.

A. As detailed in PNM Exhibit LES-3, PNM's Plan identifies the Projects PNM is proposing as part of this Application to further the goals of the Grid Mod Statute, as well as PNM's policy objectives. The Plan outlines (1) the purpose and benefits of PNM's proposed Grid Mod Projects; (2) the proposed timeline for deploying the Projects; (3) an overview of the Project costs; and (4) identification of the witnesses sponsoring each Project. While I am attaching this Plan, multiple PNM witnesses support the Projects identified in the Plan.

Q. IS PNM SEEKING A SERIES OF SEPARATE APPROVALS IN THIS APPLICATION?

A. No. PNM is seeking approval of its Application, including all of the Projects identified in the Plan without modification or removal of elements. Specifically, PNM seeks approval of its Plan for six years of investments as part of its 11-year grid modernization strategy.[9] Many of the Grid Mod Projects for the first six years outlined in this Application are interconnected, in that one specific project relies on another to accomplish the objective of grid modernization. For example, for advanced meters to be fully functional, it is necessary to ensure PNM has the Neighborhood Area Network ("NAN") telecommunication installed, capable of facilitating the meters' two-way communication. Likewise, as more intelligent switches are deployed on the distribution system, the more advanced outage management approach called Fault Location Isolation & Service Restoration ("FLISR") helps minimize the number of customers affected by an outage, more accurately identifying the likely location of the outage and using available data sources to validate outage restoration. In other words, removing one Project from the list of requested approvals could have a cascading effect and impede other planned Projects or the intended outcome of those Projects. As discussed above, PNM engaged best-in-class consultants to work with PNM on every aspect of its Plan. The consultants spent several months working with PNM engineers and other subject-matter experts to determine PNM's needs for a modernized grid, as well as the best strategy and timing for deploying each component of

[9] The broader 11-year strategy for grid modernization is discussed in the Guide from EnerNex. *See* PNM Exhibit LES-2.

grid modernization to ensure that roll-out was efficient, cost-effective and results-oriented. Denying approval of or delaying a component (or multiple components) of the Plan could negatively affect PNM's ability to roll out the next component and capture the benefits of grid modernization. Importantly, denial or delay of a component (or multiple components) could increase the cost of the overall Grid Mod Project deployment, as the inability to install one piece of technology could increase the costs associated with the next deployment Project, as that Project may be dependent on the technology that was delayed or denied. For example, as stated in the Guide, the capabilities of the automated distribution management system ("ADMS") planned for deployment in years 1-11 are dependent upon the distribution automation SCADA system, and distribution automation field devices to enhance the monitoring, control, and automation capabilities for distribution grid operations and management. Denial or delay of SCADA or distribution automation could negatively affect PNM's ability to deploy ADMS or impact the overall cost of ADMS.

It is also significant to note that supply chain issues may complicate any denial or delay of specific Grid Mod Projects. Given that these supply chain issues are causing widespread delay and will already affect PNM's timing of grid modernization, a delay in approval by the Commission would exacerbate this issue. Since equipment cannot be ordered until final approval, a delay in approval would mean a delay in initial ordering and a subsequent delay in receiving equipment to proceed with the Grid Mod Projects.

Q. PLEASE DESCRIBE THE ANNUAL REVIEW PROCESS PNM WILL USE TO MODIFY ITS PROPOSED GRID MOD RIDER ON AN ANNUAL BASIS.

A. Given PNM's request for an Application that includes 6 years of Projects, PNM proposes that it make annual review and reconciliation filings for the Grid Mod Rider that will provide a transparent means for the Commission and stakeholders to track PNM's progress with its Plan. For each annual review and reconciliation filing, PNM will file both updated forecasted costs for the following rate year based on the best available information and will true-up forecasted costs from the prior year to the actual costs incurred.

Grid modernization requires a multi-year approach to be successful, and PNM has set out the specific individual Projects over Year 1 through Year 6. As noted above, later projects build on the earlier deployments that are required to support additional technologies that are included in the Plan. Balancing PNM's need to have an overall Plan that results in benefits to the grid with the necessary staging of deployment of these Projects, PNM's cost estimates for Years 4-6 necessarily are less certain than the costs for the AMI related projects that are the focus of Years 1-3. The annual review and reconciliation process contemplated for the Grid Mod Rider allows the Commission and intervenors to follow PNM's progress on each phase of the deployment of AMI and related technologies. The annual review and reconciliation process also provides PNM with an opportunity to demonstrate certainty for cost estimates on the Projects planned for deployment in the following rate year. In summary, PNM believes that its annual review and reconciliation process for the Rider provides transparency and certainty in that it ensures that the costs

remain consistent with the Commission's approvals of the overall Plan in this Application, forecasted costs are subject to timely review of the actual costs that were collected, and there is documented support for the next year's estimates used in setting the annual rates for customers.

Q. PLEASE DESCRIBE HOW PNM INTENDS TO TRACK ITS PROGRESS ON MEETING THE OBJECTIVES OF ITS PLAN.

A. As detailed in PNM Exhibit LES-6, PNM has proposed a list of Grid Modernization Evaluation Metrics ("Metrics"). PNM will report on the progress of its Metrics annually when it makes its annual review filing for the Grid Mod Rider. The Metrics are divided between AMI and distribution automation technology.

IV. OVERVIEW OF CUSTOMER BENEFITS

Q. HOW WILL PNM'S GRID MODERNIZATION INVESTMENTS BENEFIT CUSTOMERS AND ENABLE PNM TO MEET EVOLVING CUSTOMER EXPECTATIONS?

A. PNM's Plan includes customer-facing technology that will empower customers to take more control of their energy usage, including access to near real-time energy use, billing and rate options. Grid modernization investments will also enable service enhancements so customers can have more options to choose clean energy, energy efficiency and electrification. Specific customer benefits are discussed in the testimony of PNM witness

Mario Cervantes. PNM's outreach has demonstrated that customers value flexibility and control over their energy usage, while also valuing the environment and a stable, reliable grid. The outcome of PNM's customer outreach efforts is summarized in the testimony of PNM witness Rowey. As customer expectations continue to evolve, a modern grid will allow them to partner with PNM for two-way communications so the Company can continue to develop programs and products that bring customers benefits into the future.

The following customer benefits result from the approval of the Projects discussed in the Plan, and are further examined in the testimony of each PNM witness in parentheses:

- Enhanced electrical system efficiency, reliability, and resiliency (Warner);
- Increased DER deployment, integration, and optimization (Warner);
- Access to additional energy usage information and enhanced energy management tools, including the Customer Energy Management Platform (Cervantes);
- Enhanced customer bill payment options (Cervantes);
- Opportunities for skilled job creation (later in this testimony and Morgan);
- Focused consideration of and benefits for low-income customers and, more broadly, disadvantaged communities (Rowey/Cervantes/Warner); and
- Planned and expanded potential for new rate options (Chan).

Q. WHAT DID PNM DO TO ADDRESS COST-EFFECTIVENESS FOR CUSTOMERS?

A. PNM has sought to incorporate cost-effectiveness throughout its grid modernization planning. PNM's phased approach to Project deployment over an 11-year period is cost-effective in that Projects are staggered such that each new piece of technology builds on existing infrastructure or grid modernization Projects deployed as part of the Plan. Additionally, as discussed in the testimony of PNM witness Warner, grid modernization could affect future resource planning, thereby resulting in long-term cost benefits. As Mr. Warner explains, when PNM sufficiently deploys the various grid modernization technologies, the grid intelligence, automation and optimization gained from such technologies is likely to inform the planning and engineering of the grid as PNM determines the need for, location, size, and operations of additional generation and energy storage resources. While it is difficult to predict at this time what drivers might affect the need for additional generation resources, grid modernization will aid PNM in optimizing the use of all resources on its system. PNM witness Warner further discusses this issue.

As discussed in the testimony of PNM witness Hawkins, a competitive procurement process results in cost benefits to customers. Additionally, as discussed in the testimony of PNM witness Morgan, PNM's opt-out rates reflect a cost-based flat fee if the customer opts out prior to AMI meter installation, and a different flat fee, also cost-based, if the customer opts out *after* AMI meter installation. PNM also proposes a cost-based, ongoing monthly rate for opt-out customers that reflects only the costs PNM will incur to maintain

the existing meter technology and to conduct manual meter reads. PNM will not charge the opt-out rate until deployment is complete for AMI and the communications equipment and other technology required to integrate PNM's AMI meter data into PNM's billing system. Furthermore, at that time, PNM will know the number of customers who have opted out and will file to update this proposed monthly opt-out rate. Using a cost-based rate without a discouragement fee for opting out reduces customer costs.

V. THE GRID MOD STATUTE

Q. PLEASE PROVIDE AN OVERVIEW OF THE GRID MODERNIZATION STATUTE.

A. The Grid Mod Statute, Section 62-8-13 NMSA 1978, became effective in 2020 and establishes a public policy of promoting projects that support grid modernization, including the implementation of AMI, intelligent grid devices, communication networks, distribution system hardening, and physical and cybersecurity, among other technologies.

Q. WHAT ARE THE REQUIREMENTS OF THE GRID MODERNIZATION STATUTE?

A. The Statute authorizes a public utility to file an application with the Commission to approve grid modernization projects that are needed by the utility, or upon request of the Commission. The Statute further states that applications may include requests for approval of investments or incentives to facilitate grid modernization, rate designs or

programs that incorporate the use of grid modernization technologies, equipment or infrastructure. The Statute also authorizes applications that include customer education and outreach programs that increase awareness of grid modernization programs and of the benefits of grid modernization.

Q. DOES THE STATUTE PROVIDE GUIDANCE ON HOW THE COMMISSION SHOULD EVALUATE GRID MODERNIZATION APPLICATIONS?

A. Yes. Subsection 62-8-13(B) NMSA 1978 provides seven criteria for Commission evaluation of grid modernization applications. The Commission is required to consider whether the requested investments, incentives, programs, and expenditures are:

(1) reasonably expected to improve the public utility's electrical system efficiency, reliability, resilience and security; maintain reasonable operations, maintenance and ratepayer costs; and meet energy demands through a flexible, diversified and distributed energy portfolio, including energy standards established in Section 62-16-4 NMSA 1978;

(2) designed to support connection of New Mexico's electrical grid into regional energy markets and increase New Mexico's capability to supply regional energy needs through export of clean and renewable electricity;

(3) reasonably expected to increase access to and use of clean and renewable energy, with consideration given for increasing access to low-income users and users in underserved communities;

(4) designed to contribute to the reduction of air pollution, including greenhouse gases;

(5) reasonably expected to support increased product and program offerings by utilities to their customers; allow for private capital investments and skilled jobs in related services; and provide customer protection, information or education;

(6) transparent, incorporating public reporting requirements to inform project design and commission policy; and

(7) otherwise consistent with the state's grid modernization planning process and priorities.

Q. HOW DOES PNM'S APPLICATION ADDRESS EACH REQUIREMENT OF THE GRID MOD STATUTE?

A. Through PNM's testimony and supporting documents, the Commission will be able to confirm that the investments, incentives, programs, and expenditures in PNM's proposal meet the criteria in the Grid Mod Statute. My testimony details below how PNM has addressed these statutory requirements.

(1) PNM witnesses Warner and Hawkins detail how PNM's Plan is reasonably expected to enhance reliability, resilience and security, as well as maintain reasonable operations and maintenance and meet future energy demands with a flexible, diversified portfolio of resources. As detailed by Mr. Warner, PNM's distribution system is aging; the planned Projects in this case will transform the Company's aging system into a more transparent, advanced digitalized and flexible system commensurate with customer needs and expectations today and into the future. In particular, grid modernization supports enhanced integration of carbon-free resources, providing a means for PNM to more

efficiently interconnect and optimize the use of DERs. The proposed upgrades also will reduce outages and restore power faster with new sensors and automation. Both Mr. Warner and I address how grid modernization projects are expected to minimize ratepayer costs.

(2) PNM's Plan will increase New Mexico's capability to generate and distribute clean and renewable electricity, and in this way, could facilitate export and support connection of New Mexico's electrical grid into regional energy markets. While the Grid Mod Statute permits investments into automated control systems for electric transmission and distribution circuits and substations, PNM has made an important decision to focus on distribution upgrades in this Application. While transmission system upgrades will not occur as part of grid modernization nor be included in the Rider proposed in this filing, PNM will continue to invest in its transmission system. Furthermore, PNM continues to explore its options for participating in a regional transmission organization ("RTO") or other regional market and is committed to that endeavor, having participated in regional meetings over the past two years with other utilities, nonprofits or other non-governmental organizations, state legislators, federal and state regulators, and others. It is important to note that the optimization and efficiency gains PNM expects from the grid modernization Projects proposed in the Plan, particularly distribution automation, will aid PNM in reaping the benefits of joining an RTO or other regional market when that opportunity is realized.

(3) PNM's proposal is reasonably expected to increase access to and use of clean and renewable energy, with consideration given for increasing access to low-income users and users in underserved communities. Specifically, the testimony of PNM witness Warner

discusses how the proposed distribution upgrades will increase PNM's ability to integrate clean and renewable energy, particularly DERs. PNM is prioritizing the AMI deployment along meter reading routes with high concentrations of low-income customers. This prioritization in deployment means that low-income customers will be one of the first groups of customers able to take advantage of the AMI data once PNM fully deploys the Customer Energy Management Platform and the other technologies required to process and make AMI data accessible to customers. PNM will also prioritize distribution upgrades to low-income or otherwise disadvantaged communities, prioritizing the enhancement of reliability and resiliency for these customers. Both Mr. Warner and I discuss the use of the EJ Screening Tool described above to prioritize and understand the impact that grid modernization upgrades will have in low-income and underserved communities.

(4) PNM's proposal is designed to contribute to the reduction of air pollution, including greenhouse gases, by facilitating increased distributed generation that will offset the need for large carbon-emitting resources. The use of advanced meters will also provide customers with more control over their usage information through the Customer Energy Management Platform, allowing them the ability to consider increased energy efficiency and integration of DERs into their household. In this way, this Plan is extremely important to the overall reduction of air pollution and the transition to carbon-free generation required by the Energy Transition Act, but also to PNM's commitment to be carbon free by 2040. Discussion of the capabilities of the Customer Energy Management Platform is described in the testimony of PNM witness Cervantes, and the integration of DERs is described in the testimony of PNM witness Warner.

(5) PNM's proposal is reasonably expected to support increased product and program offerings by PNM to its customers, as described in the testimony of PNM witnesses Cervantes and Chan. The Plan also allows for increased private capital investments given the faster and more efficient interconnection of DERs, as outlined in the testimony of PNM witness Warner. The Plan results in increased numbers of skilled jobs in related services, with one example being PNM's planned redeployment of meter readers to higher-skilled positions, as described in the testimony of PNM witness Morgan. PNM's Plan also provides increased customer protections, both in terms of empowering customers to control their own energy usage, but also via cybersecurity and data privacy protections specific to the grid modernization technology, as described in the testimony of PNM witnesses Cervantes and Hawkins. An important part of PNM's proposal is its ongoing Customer Education and Communication Plan to inform its customers about the benefits of grid modernization, as discussed in the testimony of PNM witness Rowey.

(6) PNM's efforts in developing this Plan have been transparent, incorporating public reporting requirements to inform project design and Commission policy. Two PNM representatives, Carlos Lucero and Jonathan Hawkins, participated in the EMNRD's Grid Modernization Roadmap development. Additionally, several PNM representatives participated in the Commission's Grid Modernization workshops held by GridWorks. In an effort to be as transparent and pro-active as possible, PNM commits to certain regular reporting Metrics as outlined in this testimony at PNM Exhibit LES-6. Additionally, as discussed above, PNM's planned EJ Screening Tool will engage the community as to

project design where the Tool identifies that disadvantaged communities will be impacted by a Grid Mod Project.

(7) Finally, in developing this Plan, PNM ensured that the State's Roadmap and the Department of Energy's grid modernization guidance were consulted. As described above, PNM representatives participated in EMNRD's workshops held with stakeholders to develop the State's Grid Modernization Roadmap. As a result, this proposal is consistent with the state's grid modernization planning process and priorities.

Q. DOES THE STATUTE AUTHORIZE UTILITIES TO RECOVER THE COSTS ASSOCIATED WITH GRID MODERNIZATION PROJECTS?

A. Yes. The Statute authorizes a public utility that undertakes grid modernization projects approved by the Commission to recover its reasonable costs through an approved tariff rider or in base rates, or a combination of the two.

Q. DOES THE STATUTE LIMIT A UTILITY'S ABILITY TO RECOVER COSTS FROM CERTAIN CUSTOMERS?

A. Yes. Section 62-8-13 (D) states: "Costs for a grid modernization project that only benefits customers of an electric distribution system shall not be recovered from customers served at a level of one hundred ten thousand volts or higher from an electric transmission system in New Mexico." This means that the proposed Grid Mod Rider will only apply to customers that are served at a level below one hundred ten thousand volts (110kV).

Q. DOES PNM'S PROPOSED RIDER TAKE THIS LIMITATION INTO ACCOUNT?

A. Yes. Please see the direct testimony of Ms. Chan for discussion of the allocation of costs that results in the proposed Grid Mod Rider.

Q. DOES THE STATUTE ESTABLISH A DEADLINE FOR THE COMMISSION TO ISSUE A DECISION?

A. Yes. Section 62-8-13(C) authorizes the Commission to suspend a proposed tariff rider within 30 days of filing the application and requires the Commission to issue a decision within 180 days thereafter, or the application is deemed approved.

Q. HOW DOES SECTION 62-9-1 PERTAIN TO THIS FILING?

A. The Grid Mod Statute provides that applications for approval of grid modernization projects should be filed under Section 62-9-1 of the Public Utility Act ("PUA"), as applicable. This Section does not apply to PNM's request in this case, as PNM is not seeking a Certificate of Convenience and Necessity pursuant to Section 62-9-1 NMSA 1978.

Q. WILL PNM'S PROPOSAL RESULT IN A PUBLIC BENEFIT?

A. Yes. PNM's proposal will result in a public benefit in several important ways. First, the proposal supports New Mexico's environmental goals. The policy goals established by the Energy Transition Act in 2019 are to transition the state to 100% carbon-free generation by 2045. As previously stated, PNM's goal is to be carbon-free by 2040. The Grid Mod

Projects in PNM's Plan will contribute to increased use of clean energy and a related reduction in the most abundant greenhouse gas that causes climate change, carbon dioxide. The distribution system upgrades discussed in PNM witness Warner's testimony will facilitate the use of intermittent resources on PNM's grid, and in particular, will result in faster and more DER integration, as well as more optimized use of the DERs on PNM's system. In this way, PNM's proposal will result in a public benefit of further facilitating a responsible transition away from carbon-intensive resources toward clean energy.

Second, PNM's proposal will result in the deployment of advanced meters and related telecommunications that will enable two-way communication and real-time energy usage information. These capabilities, along with a Customer Energy Management Platform, will empower customers to have more knowledge of and control over their energy use. Customers also will be able to consider, based on their energy usage patterns, the benefits of enrollment in energy efficiency or other PNM program offerings, as well as beneficial changes in consumption behavior. Customers will also be able to take advantage of time-of-day rates once PNM's pilot time-of-day rate is complete. All of this will result in more opportunities for energy conservation, potentially resulting in environmental benefits via reduced peak demand usage, as well as energy cost savings. These are real public benefits for New Mexicans.

Third, some of the Grid Mod Projects will specifically address enhancement of reliability and resilience for PNM's grid, providing significant public benefit. As reflected in our

customer feedback summarized in PNM witness Rowey's testimony, customers repeatedly cite the desire for reliable service as a top priority. Simply put, customers want to make sure the lights stay on, and that if the lights do go out, that those outages are addressed quickly. PNM's Plan accounts for this customer feedback by investing in technology to better identify and address outages, improve two-way communications—both from customer to utility and from utility to customer—and utilize technology to ensure the grid is more resilient to extreme weather, as summarized in PNM witness Warner's testimony.

PNM's proposal results in public benefit through furthering clean energy and climate change goals, enabling customer control over energy usage, and increasing grid reliance and resilience. Other public benefits resulting from PNM's grid modernization Plan or overall strategy are identified throughout PNM testimony.

VI. OVERVIEW OF COST ESTIMATE AND RECOVERY

Q. WHAT ARE THE OVERALL ANTICIPATED COSTS OF PNM'S GRID MODERNIZATION PROJECT?

A. PNM expects that the first six years of investments in grid modernization will total $344 million. Further detail of these expenses, including the breakdown of total amount of expected capital expenses and expected O&M expenses, are summarized in the testimony of PNM witness Kyle Sanders. Mr. Sanders' testimony details how it is reasonable for

PNM to spend this amount over the 6-year period to accomplish the goals of the Grid Mod Statute.

Q. HOW DOES PNM INTEND TO PURSUE COST RECOVERY FOR GRID MOD COSTS AND INVESTMENTS IN THIS APPLICATION?

A. PNM is requesting approval of a proposed Grid Mod Rider that will recover the costs of Grid Mod Projects identified in the Plan for the next six years. See the testimony of PNM witnesses Sanders and Chan for details on the proposed Rider. My testimony above addresses why the proposed annual review and reconciliation process contemplated for the Grid Mod Rider is a transparent and robust mechanism that allows the Commission and stakeholders a means to track PNM's progress on carrying out its Plan.

VII. STAKEHOLDER OUTREACH

Q. DESCRIBE THE APPROACH TO STAKEHOLDER OUTREACH THAT PNM HAS TAKEN IN THIS CASE?

A. PNM took a comprehensive, broad approach to obtaining stakeholder input in this case. First, PNM reviewed the outreach efforts of other utilities such as Commonwealth Edison Company, Consolidated Edison Company of New York, Inc., and Hawaiian Electric to gain an understanding of the outreach activities of other utilities regarding grid modernization. Next, PNM identified stakeholders whose input has been valuable to other matters to engage them on its grid modernization strategy. PNM identified ten stakeholder

groups that have been intervenors in many of its cases, and at least two additional groups that should be included in the outreach. See attached PNM Exhibit LES-7. Additionally, renewable energy developers and the New Mexico Renewable Energy Industry Association members were invited to participate in a webinar, and PNM held a webinar specifically for commercial customers. PNM also spoke with members of business organizations, local governments and community members in our service territory. See attached PNM Exhibit LES-8.

Q. WHAT WAS THE FEEDBACK RECEIVED BY STAKEHOLDERS ON PNM'S GRID MOD PROJECTS?

A. Through its outreach, PNM gained valuable insight into the priorities that stakeholders and customers believed were important features to incorporate into the Plan. Among those were the following:

- Support for increased DER integration
- Support for the Customer Energy Management Platform and customer control over energy usage
- Support for more energy efficiency and demand response programs using additional data provided by AMI meters
- Support for time-of-day rates
- Support for increased electrification
- Overall support for a robust AMI filing
- Specific suggestions for the AMI RFP – that the meters should be capable of:
  - Measuring sub-second data;

- Analyzing data directly on the meter (often called grid-edge computing or distributed intelligence);
- Receiving remote software updates (*e.g.*, for adding new capabilities, removing outdated software, and updating software to fix bugs, etc.); and
- Facilitating direct customer data access via a home area network ("HAN"), using the IEEE 2030.5 standard. Through the HAN, customers should be able to access their one-second demand data and five-second energy data.

- Suggestion to consider microgrid and energy storage explicitly
- Request to address RTO participation and increased export of clean, renewable energy

Q. HOW WAS STAKEHOLDERS' FEEDBACK INCORPORATED INTO PNM'S GRID MOD PROPOSAL?

A. Stakeholders' feedback was incorporated into the Plan, which can be confirmed by reviewing PNM Exhibit LES-3. Specifically, PNM's Plan integrates DERs and provides customers with increased transparency and control over their energy usage. PNM also expects that the AMI data will provide opportunities for designing refined or new energy efficiency and demand response programs. PNM has sought to include a robust AMI program in its Application, including incorporation of stakeholders' specific suggestions for the AMI RFP. If this Application is approved, the advanced meters, together with the necessary communications upgrades, will be capable of providing increased data for both PNM and its customers, to better address energy usage and make important system and household decisions. The meters will also facilitate the more effective introduction of time-

of-day ("TOD") rates that will be available to customers in the future.[10] PNM witness Jonathan Hawkins addresses the specific AMI RFP specifications provided to PNM during the stakeholder process. The distribution upgrades in PNM's Plan will also increase the integration of more electrification. While some stakeholders suggested that PNM include microgrid and energy storage in its plans for grid modernization, PNM did not include such projects in this Application, but believes both of these suggestions are important technologies that can serve to facilitate further transition to a clean energy future. PNM anticipates further exploring both of these areas for future filings. Finally, PNM was also encouraged to fully explore participation in an RTO. PNM is doing just that, even if it is not part of the Application explicitly, as explained in Section V above.

VI. OTHER ISSUES

Q. WAS PNM REQUIRED TO ADDRESS ANY AREAS FROM ITS LAST AMI CASE, 15-00312-UT?

A. Yes. In PNM's last AMI case (Case No. 15-00312-UT), the Recommended Decision directed PNM to specifically ask about certain questions in its public input process that were raised in the course of the proceeding. Among the topics were: developing future energy efficiency programs, opt-out fees, electromagnetic sensitivity, and privacy of customer data and cybersecurity. A table with the references to the Recommended

[10] A pilot TOD program is expected to be proposed in PNM's next rate case.

Decision in 15-00312-UT is attached as PNM Exhibit LES-9. These topics were all addressed during PNM's public and stakeholder outreach process.

Q. CAN YOU ADDRESS SPECIFIC REQUIREMENTS NOTED BY THE COMMISSION IN ITS MARCH 23 ORDER, WHICH REQUIRED THAT PNM FILE FOR APPROVAL OF AMI?

A. The Order of March 23, 2022, stated:

> The Commission finds that the implementation of AMI comports with the Grid Modernization Statute, will benefit PNM's New Mexico retail customers and the public, and will provide a net public benefit. Specifically, the implementation of AMI will: facilitate grid modernization; improve the efficiency, reliability, resilience, and security of PNM's system; give customers real time data regarding energy usage that allows them to monitor and reduce consumption as they deem appropriate; allow PNM to maintain reasonable operations, maintenance, and customer costs; improve PNM's ability to develop and implement demand-side management programs; improve PNM's ability to accommodate increased levels of distributed energy resources; reduce emissions; increase New Mexico's capability to supply regional needs through clean and renewable electricity; increase access to and use of renewable energy; support a flexible, diversified, and distributed energy portfolio; improve customer education; and allow for capital investment and skilled jobs in related services.[11]

In addition to these findings and the express request to PNM for an AMI proposal, the Commission directed PNM's application to include "identification of demand response and grid management programs being considered for implementation using smart meter capabilities and how they work in conjunction with proposed rate design principles." *See* Order at ¶ 9 b). I address that request here.

[11] *See* the Order Requesting Public Service Company of New Mexico to File an Application for Authorization to Implement Grid Modernization Components that Include Advanced Metering Infrastructure, issued March 23 2022 (the "Order"), at ¶ 7.

AMI will empower customers to understand how their energy usage may benefit from changed behavior or enrollment in PNM programs. Approximately 200,000 PNM customers are already getting a monthly home energy report regarding their energy usage with approximately 170,000 of those being digital reports, while approximately 30,000 are paper reports. This customer-specific energy usage data is available today through the vendor's proprietary software, and will be available in the future through PNM's proposed grid modernization investments, specifically the Customer Energy Management Platform. In fact, AMI may increase customer enrollment in demand response programs, because customers will be able to better understand how such programs can benefit them. Additionally, expansion of these demand response programs may be more efficient because of the two-communications that result from AMI deployment—and specifically the Customer Energy Management Platform—making it easier for PNM to alert customers as to periods when demand response would benefit the grid and providing customers with information as to exercising their options regarding these demand response programs.

In addition to these programs, other types of load-shifting programs or the use of dynamic pricing will be able to be implemented and expanded, as more information and expansion opportunities will be available. In short, the increased amount of information PNM will receive as a result of AMI will result in opportunities for PNM to design future programs that are beneficial to both the grid and customers. As the breadth of AMI data is analyzed and understood, PNM will have the necessary information to design new programs or re-design existing programs. More information means better designed programs to offer to

customers, and overall, means more education and opportunities for customers given their unique energy usage patterns.

Q. DOES PNM INTEND TO HAVE DEDICATED STAFF TO MANAGE ITS GRID MODERNIZATION PLAN?

A. Yes. PNM's Plan includes establishing a Program Management Office ("PMO") at PNM to focus specifically on implementation of its Grid Mod Plan, upon Commission approval. PNM believes it is important to ensure this effort, with its broad and long-term scope, has dedicated staff with responsibility for planning, implementation, deployment, evaluation and regular reporting to the Commission. PNM's proposal for establishment of a PMO includes operations and management ("O&M") costs in the amount of $7.9 million over six years related to program management services. These costs reflect new employees, including a Grid Modernization Director who will have responsibility and accountability to the Company, internal and external stakeholders, and to the Commission for the overall Plan. The PMO will include an Associate Director, two business analysts, a program manager and two project managers. The PMO will ensure that grid modernization technologies are deployed and implemented by directing both internal PNM employees, as well as external consultants, from design and planning, through deployment and ongoing reporting and evaluation. Details on the projected O&M costs per year for these employees is reflected in PNM Exhibit LES-10. A portion of the PMO costs will be capitalized with the projects that each department works on and have been included in the capital numbers presented by each PNM witness's testimony.

Q. HAS PNM EXPLORED ANY FUNDING OPPORTUNITIES AVAILABLE THROUGH THE FEDERAL INFRASTRUCTURE INVESTMENT AND JOBS ACT of 2021 ("IIJA") FOR GRID RELIABILITY AND RESILIENCE?

A. Yes. PNM has been actively monitoring and reviewing information on IIJA grid-related funding since the law was passed to seek opportunities to off-set the cost impacts of infrastructure upgrades on its customers. There are two tracks of grid funding from IIJA and PNM has established an evaluation process for considering applying for any potential funding opportunities. The first track is in the form of formula-funding from the U.S. Department of Energy ("DOE") to the State Energy Office ("SEO"), which in New Mexico is the Energy, Minerals and Natural Resources Department. The NMSEO will receive and administer grants in an aggregate amount of approximately $7.2 million for each of five years, if the State's plan is approved by the federal government. This funding is proposed to be targeted at 60% for "small utilities" – which includes municipal utilities and rural cooperatives – and 40% targeted to fund projects from other eligible entities, including investor-owned utilities. PNM provided comments to the NMSEO on its proposal in late August, 2022 on this issue. As of the time of this filing, details on the criteria and size of grants through the NMSEO are not yet available, but PNM will review, evaluate and apply for such opportunities, as appropriate.

The second funding track is in the form of competitive grants directly from the DOE, known as the Grid Resilience and Innovation Partnership ("GRIP") Program. DOE issued a Request for Information ("RFI") on August 30, 2022 on this program, seeking input from

parties to be submitted by October 14, 2022. PNM is currently evaluating the proposal and considering whether to submit comments in response to the RFI. A final Funding Opportunity Announcement ("FOA") is expected from DOE by the end of 2022. PNM will continue to monitor, review and consider applying for any FOA available to offset customer impacts.

Q. IS PNM REQUESTING ANY VARIANCES FROM NMPRC RULE REQUIREMENTS IN THIS APPLICATION?

A. Yes. First, PNM is requesting that the Commission grant a variance from the data filing requirements of Rule 530 to the extent that it is required. Rule 530 requires the filing of extensive data schedules that are unnecessary for review and approval of the proposed Rider in this case. The Commission has granted similar variances from Rule 530 in the past for rate changes that were not part of a general rate case (*e.g.*, Case No. 20-00237-UT, Approval of PNM's Transportation Electrification Program). Second, PNM is also requesting a variance from Rule 410, which is addressed by PNM witness Cervantes.

Finally, PNM filed a Petition for Variance from Rule 17.9.560 NMAC and Case No. 2124 Order on Meter Testing Program on June 17, 2022, in this case (the "Petition"). The Petition describes the reasons for the request for variance. The date used in the Petition for estimating the number of meters to be replaced and the potential cost to customers was

December 31, 2024.[12] Deployment of advanced meters in this Application will occur on a rolling basis through year four after approval by the Commission, which will be beyond December 31, 2024. PNM therefore respectfully revises its request for a variance from meter testing through the end of that four-year period, as it is not in the financial interest of customers for PNM to replace functioning meters associated with the failed meter group and then remove and replace those new meters during the course of AMI deployment (assuming this Application is approved). PNM will continue to test and replace individual meters based on customer requests or defects identified in the ordinary course of business, in accordance with the remaining provisions of Rule 17.9.560.14 NMAC.

Q. DOES THIS CONCLUDE YOUR TESTIMONY?

A. Yes, it does.

GCG#529877

[12] *See* Petition, paragraph 13.

LAURA E. SANCHEZ

PNM, 414 Silver Ave. SW, MS 1215, Albuquerque, NM 87102
Work: (505) 241-4602 ♦ laura.sanchez@pnmresources.com

PROFESSIONAL EXPERIENCE

PNM RESOURCES, INC., ALBUQUERQUE, NEW MEXICO

Chief Policy & Legal Advisor (December 2019 – current) – Serves as the senior adviser on public policy and research to the President and Chief Operating Officer, and other executives as directed. Guides and facilitates the formulation, implementation and support of regulatory policy strategies. Responsible for the oversight, development, and implementation of regulatory policies and legal strategy that support PNM Resources' overall operational strategy and functions. Identifies public policy priorities and creates relevant, impactful programs and initiatives, while also providing legal support. Provides the organization with the expertise to successfully address public policy challenges ensuring appropriate internal and external stakeholders are involved. Researches and analyzes complex regulatory policy issues, possible legal implications, and impact of proposed policies and policy revisions on key areas of the organization; consults with subject-matter experts, including senior leadership and other stakeholders.

AFFIRM, INC., SAN FRANCISCO, CALIFORNIA

Senior Director, Government Relations & Regulatory Counsel (March 2019-December 2019) – Leadership position reporting to Affirm's VP of Gov't Relations and Public Policy on government relationship management, political affairs, and public policy advocacy with federal and state governmental agencies and other stakeholders. Supported Affirm's contacts with state and federal regulatory agencies and provided legal advice on a variety of government relations, policy and regulatory matters. Skilled in the government relations tradecraft, in strategizing and developing public policy objectives, and in developing legislative and policy analyses for the company's external affairs advocacy with the policymaking community. Worked with other cross-functional groups, to ensure that Affirm's external affairs work is cohesive, holistic, and aligned with the strategic and operational needs of the business.

CUDDY & MCCARTHY, LLP, ALBUQUERQUE, NEW MEXICO

Partner (November 2015 – March 2019) – Provided legal services to a variety of private and public sector clients in utility regulation, administrative law, municipal law, education law, and public finance. Focused on regulation and legislative matters for PNM and other proceedings at the NMPRC, providing subject matter expert testimony in legislative committees and drafting legislation. Drafted legislation involving bonds, taxation, securitization, distributed energy disclosure, consumer protection, and other trade practices. In public sector representation, experience in municipal bonds, litigation, employment matters, and other commercial transactions. Conducted litigation management, witness preparation, discovery management, and research, and wrote briefs, motions and legal memos addressing clients' needs.

SANCHEZ LEGAL SOLUTIONS, LLC, ALBUQUERQUE, NEW MEXICO, ESTAB. IN 2007

Owner and Manager (February 2015 – October 2015 and April 2014 – October 2014) – Private practice in a variety of areas including wills, employment, litigation, transactional work, business planning, regulatory matters, renewable energy project management and energy policy development. Experience handling legal matters and lobbying, as well as providing consulting services for several nonprofits, businesses and renewable energy clients.

U.S. ARMY CORPS OF ENGINEERS, ALBUQUERQUE DISTRICT, NEW MEXICO

Assistant District Counsel (October 2014 - February 2015) – Provided legal advice to District management on personnel matters, Freedom of Information Act requests, tort claims and real estate matters. Prepared memos, correspondence and pleadings, prepped witnesses, reviewed various real estate instruments for legal sufficiency, handled Merit System Protection Board and Equal Employment Opportunity Commission matters for the District, conducted research, and wrote briefs and memos.

NEW MEXICO GREEN CHAMBER OF COMMERCE, ALBUQUERQUE, NEW MEXICO

Chief Executive Officer/In-House General Counsel (May 2013 – May 2014) – Lead the organization in

all daily matters and strategic planning. Developed policy positions, lobbied, prepared advocacy materials, including fact sheets, briefing papers, and testimony on renewable energy and utility matters. Managed staff and resources, prepared annual budget, conducted fundraising, developed office procedures and employment policies, managed, assigned and evaluated work of staff. Served as attorney on energy matters at the NMPRC. Served concurrently as Executive Director of NMGCC's sister organization, the Partnership for Responsible Business. Conducted grant-writing, compliance, and program development.

NEW MEXICO TAXATION AND REVENUE DEPARTMENT, SANTA FE, NEW MEXICO
Staff Attorney (August 2012 – May 2013) – Conducted legal research and analyzed federal and state statutes, regulations, policies, and guidelines regarding tax, including tax credit programs such as the Renewable Energy Production Tax Credit and Advanced Energy Tax Credit. Interpreted, applied, implemented and resolved legal issues for the Department. Represented the Department in District Court on property tax issues, served as lead counsel for all Property Tax Division matters. Interviewed and prepared witnesses, prepared pleadings and discovery, motions and briefs, conducted depositions, participated in hearings, and handled appeals for the Department. Provided oral and written advice, prepared and reviewed documents on interagency and intergovernmental agreements, and agreements with tribal entities. Reviewed pre- and post-award contracts, and provided advice on contract administration issues.

NATURAL RESOURCES DEFENSE COUNCIL (NRDC), ALBUQUERQUE, NEW MEXICO
Staff Attorney (February 2007 – June 2012) – Represented NRDC in regulatory, administrative and legislative proceedings in energy and natural resources in New Mexico and Arizona. Responsibilities included research, analysis, administrative law advocacy, lobbying and outreach. Practiced before the NM Public Regulation Commission and the Arizona Corporation Commission. Provided expert testimony at legislative hearings. Managed consultants and organized stakeholder engagement from diverse communities on a variety of efforts. Monitored program expenditures from multiple foundation grants, produced regular program status reports, developed grant proposals, ensured compliance with funding requirements. Executed on-the-ground strategies to accomplish goals, coordinating work with the San Francisco office.

MODRALL, SPERLING, ROEHL, HARRIS & SISK, P.A., ALBUQUERQUE, NEW MEXICO
Lawyer (April 2004 – September 2006) – Practiced in commercial real estate, lending and banking transactions, industrial revenue bonds and corporate formations, mergers and acquisitions, and public finance, including bond counsel services; provided advice on general obligation and revenue bonds. Prepared and reviewed legal documents such as deeds, easements, rights-of-way, leases, mortgages, deeds of trust, contracts, and subordination agreements. Required an understanding of municipal bond law, public budgeting process, and federal and state tax law implications of public debt.

NON-LEGAL EXPERIENCE

"NEW MEXICO IN FOCUS" PROGRAM – NEW MEXICO PBS (KNME-TV), ALBUQUERQUE, NM
Regular Panelist (March 2008 – current) Provide political and technical analysis on a variety of current events and social and policy issues around NM in a roundtable weekly format. Serve as resident expert on environmental, utility and renewable energy matters. See www.newmexicoinfocus.org for archives.

NM RENEWABLE ENERGY TRANSMISSION AUTHORITY BOARD, SANTA FE, NEW MEXICO
Chair, Projects Committee, and Member of the Board of Directors (June 2009 – July 2011) Appointed by Governor Richardson to this public financing entity for renewable energy electricity transmission and storage. Provided direction and oversight of RETA's first-ever issuance of $50,000,000 in revenue bonds for a large wind farm. Served on Projects Committee and Personnel Committee. Contributed to RETA's success by developing a project selection policy, eminent domain policy, and assisting with legislation, including ensuring confidentiality of proprietary information and clarifying RETA's bonding authority.

CAESARS ENTERTAINMENT- RHODE ISLANDERS FOR JOBS & TAX RELIEF, PROVIDENCE, RI
Director, Corporate Campaign GOTV (September – December 2006) – Directed Get-Out-the-Vote (GOTV) effort to pass a ballot initiative to bring a resort casino to the Narragansett Indian Tribe of Rhode

Island with corporate partner Harrah's, prior to merging with Caesars. Supervised staff to mobilize voters in final weeks of campaign. Implemented GOTV plan and budget, directed daily activities, and managed hundreds of staff and volunteers. Ensured compliance with local, state and federal laws.

EDUCATION

JURIS DOCTOR, MAY 2004 – UCLA SCHOOL OF LAW, LOS ANGELES, CALIFORNIA
Completed the Program in Public Interest Law & Policy and Critical Race Studies Concentration

MASTER OF PUBLIC ADMINISTRATION, MAY 2001 – THE UNIVERSITY OF ARIZONA, TUCSON
Completed Concentration in Public and Non-Profit Finance and Local Government; Pi Alpha Alpha, Public Administration Honor Society, inducted August, 2000

BACHELOR OF ARTS, MAY 1999 – THE UNIVERSITY OF ARIZONA, TUCSON, ARIZONA
Major in Political Science with a Pre-Law Thematic Minor

LEGISLATIVE EXPERIENCE

- Majority Analyst, New Mexico Senate Judiciary Committee (2007 Legislative Session)
- Fiscal & Policy Analyst, California Legislative Analyst's Office (2000) – Assigned to higher education, CalState and UC systems
- Minority Analyst, Arizona Senate, Committee on Agriculture & Natural Resources (1999 Legislative Session)
- Legislative Expert for Public Service Company of New Mexico, 2017-current
- Registered lobbyist in NM (2007-2014) Government Affairs Clients included: Education Networks of America, EDF Renewable Energy, Element Power, Propylon, NM Green Chamber of Commerce, Partnership for Responsible Business, Coalition for Clean Affordable Energy, and NRDC

DISTINCTIONS

- Past President, South Valley Academy
- Member of the National Association of Bond Lawyers
- Past President, Board of Directors of the NM Bar's Natural Resources, Energy & Environmental Law Section
- Member of the New Mexico Hispanic Bar Association
- Member of the Hispanic National Bar Association
- Named a Top Lawyer by American Law Society in 2018
- Recognized for Excellence in Law by *Continental Who's Who*, 2018

PUBLICATIONS

- Working title: "New Mexico's Energy Transition: A Proposed Path for Cost Recovery for Power Plant Closure," *VISTA*, NM Natural Resources, Energy & Environmental Law (NREEL) Section Newsletter, January 2019
- "Clean Power Plan," *VISTA*, NM NREEL Section Newsletter, December 2015
- "2014 New Mexico Legislative Wrap-Up," *Green Fire Times,* March 2014, http://greenfiretimes.com
- Co-author, *Task Force Report to the Legislature on Recommendations for Renewable Energy Storage Development*, 2013
- "New Mexico's Responsible Business Movement and Our Own Action-Tank Model," *Green Fire Times*, November 2013

LANGUAGES

Fluent in English & Spanish

BAR ADMISSIONS

New Mexico – September 2004; Arizona – February 2012

EXPERIENCE IN REGULATORY & LEGISLATIVE MATTERS

Represented the Natural Resources Defense Council and Southwest Energy Efficiency Project in Case No. **07-00077-UT**, In the matter of the Application of Public Service Company of New Mexico for revision of its retail electric rates pursuant to advice notice No. 334

Intervened as co-counsel with Alletta (Letti) Belin representing the Coalition for Clean Affordable Energy in Case No. **08-00220-UT**, In the matter of the 2008 Application of Public Service Company of New Mexico for Approval of Gas Energy Efficiency Programs and Program Cost Tariff Rider pursuant to the New Mexico Utility and Efficient Use of Energy Acts

Represented Interwest Energy Alliance as Special Local Counsel in Case No. **12-000131-UT**, In the matter of Public Service Company of New Mexico's Renewable Portfolio Procurement Plan for 2013. Also sponsored Interwest's Colorado Counsel to participate in the case *pro hac vice*

Represented New Mexico Green Chamber of Commerce and Partnership for Responsible Business in submitting comments in this Notice of Proposed Rulemaking (NOPR), August 2013, Case No. **13-00152-UT** In the matter of Amending Rule 17.9.572 NMAC, Renewable Energy for Electric Utilities

Represented the PRB and NMGCC in Case No. **13-00183-UT**, In the matter of Public Service Company of New Mexico's Renewable Energy Portfolio Procurement Plan for 2014 and Proposed 2014 Rider Rate Under Rate Rider No. 36, intervened in September 2013

Represented Interwest Energy Alliance as local counsel and sponsored IEA's counsel from Colorado *pro hac vice* in docket No. **13-000183-UT**, In the matter of Public Service Company of NM's Renewable Energy Portfolio Procurement Plan for 2014 and Proposed 2014 Rider Rate Under Rate Rider No. 36

Represented New Mexico Green Chamber of Commerce in drafting comments in Case No. **13-00310-UT**, an Energy Efficiency Rule NOPR, November 2013

Represented PRB and NMGCC in Case No. **13-00390-UT**, In the matter of the Application of Public Service Company of New Mexico for Approval to Abandon San Juan Generating Station Units 2 and 3, Issuance of Certificates of Public Convenience and Necessity for Replacement Power Resources, Issuance of Accounting Orders and Determination of Related Rate-Making Principles and Treatment, filed to intervene on February 17, 2014, withdrew as a party on November 13, 2014. Also sponsored Interwest Energy Alliance's Colorado counsel *pro hac vice* to intervene in the case above: No. **13-00390-UT**

Witness in Case No. **21-00017-UT**, in the matter of the Application of Public Service Company of New Mexico for Approval of the Abandonment of the Four Corners Power Plant and Issuance of a Securitized Financing Order, testifying on policy and securitization matters

Filed rebuttal testimony in Case No. **21-00083-UT**, in the matter of the Application of Public Service Company of New Mexico for Decertification and Abandonment of 114MW of Leased Palo Verde Nuclear Generating Station Capacity and Sale and Transfer of Related Assets and for Approval to Procure New Resources Under 17.9.551 NMAC

Witness in Case No. **19-00018-UT**, *Show Cause Proceeding* in the matter of Public Service Company of New Mexico's Abandonment of San Juan Generating Station Units 1 and 4, testifying on the timing of bond issuance

<u>Environmental Improvement Board matters</u>
Petition No. **EIB 08-19(R)**, In the matter of the Petition for Hearing to Adopt New Regulations and Amend Various Sections of 20.2.1, 20.2.2, 20.2.70 and 20.2.72 NMAC, Statewide Cap on GHG Emissions

Petition No. **EIB 10-04(R)**, In the matter of the Petition a Proposed New Regulation, 20.2.350 NMAC - Greenhouse Gas Cap and Trade Provisions

In the Legislature
Low Income Energy Assistance (2009)
Renewable Energy Production Tax Credit (2014)
Distributed Generation Consumer Protection (2017)
Energy Redevelopment Bond Act (2018)
Energy Transition Act (2019)
Grid Modernization Act (2020)
Utility Easements for Broadband Act (2021 & 2022)

Guide for PNM's Grid Modernization Implementation

September 30, 2022

Prepared by

Contents

Table of Figures

Table of Tables

I. Introduction

Public Service Company of New Mexico's (PNM) mission and focus is to safely, reliably, and effectively serve customers. Consistent with this mission, PNM's grid modernization implementation plan strives to create enduring value for customers, communities and shareholders built on a foundation of environmental, social and governance principles.

This plan is informed by customer, community, and stakeholder input, in addition to New Mexico state policies. PNM is modernizing its distribution grid to empower customers' ability to manage their energy bill, to enhance electric service quality, to enable electrification and distributed resource integration and to facilitate New Mexico's grid modernization objectives to meet decarbonization goals.[1,2] In this broader context, this grid modernization implementation plan is integrally linked with PNM's decarbonization plan and planned infrastructure upgrades as a holistic effort to advance New Mexico's clean energy future.

The grid modernization implementation plan is the result of collaborative planning efforts with customers and the community. PNM serves 530,000 customers' needs through a diverse mix of generation and purchased power resources totaling 3 gigawatts of capacity, with a goal to achieve 100% carbon-free energy by 2040. The grid modernization implementation plan is a critical component to meeting the carbon-free goal while maintaining reliable and affordable electric service.

PNM's grid modernization implementation plan centers on customer needs. Over the past two years, PNM has commissioned several customer surveys regarding customer preferences and goals for grid modernization. Through these grid modernization related surveys and PNM's ongoing customer engagement, customer needs and expectations have consistently prioritized three key outcomes:

1. **Value:** Addressing customer needs regarding service, not just affordability
2. **Reliability:** Reducing service outage events and duration and improving system resilience
3. **Sustainability:** Enabling customer options for clean energy and electrification

Figure 1: PNM Grid Modernization Purpose, Vision & Objectives

These outcomes shape the PNM grid modernization strategy's two primary objectives: Customer Empowerment and Service Enhancement:

- **Customer Empowerment:** Encouraging customers to take a more proactive role as an energy partner with PNM by increasing their visibility of energy information (usage, bills, service content) and enabling enhanced customer optionality (pricing, clean energy, energy efficiency, electrification).
- **Service Enhancements:** Improving service quality while integrating renewable and distributed energy resources and enabling beneficial electrification.

Together, Customer Empowerment and Service Enhancements provide a pathway to meet PNM's goal to "work together with our customers and community to serve their energy needs."[3] Figure 1 illustrates

[1] NM Governor's Executive Order 2019-003, *available at* https://www.governor.state.nm.us/wp-content/uploads/2019/01/EO_2019-003.pdf
[2] New Mexico's Energy Grid Modernization Roadmap (HB 233), 2020
[3] *See* https://www.pnm.com/about-pnm

how PNM is balancing the relationship between customer-identified priorities and the grid modernization plan objectives.

II. Grid Modernization Overview

A modern 21st century grid, as highlighted by the New Mexico Energy, Minerals, and Natural Resources Department (EMNRD) report[4] and the U.S. Department of Energy's (DOE),[5] requires new functionality to enable increased electrification and the interconnection of various types of distributed energy resources (DERs). At the same time, PNM must ensure that the grid is able to achieve the level of reliability and resilience required and expected by customers and the communities PNM serves. The increasing dependency on the electric grid to concurrently meet both customer needs as well as reach New Mexico's decarbonization targets increasingly depend upon complex and coordinated electric grid operations at the distribution level. In short, the existing distribution grid that served New Mexico well for many years cannot support the more dynamic and flexible grid needs of the future without modernization.

This required transition and evolution was recognized in New Mexico's Energy Grid Modernization Roadmap (Roadmap)[6] which identified the need to evolve the grid toward a more dynamic and flexible framework. The Roadmap defines grid modernization as: "*improvements to electric distribution or transmission infrastructure through investments in assets, technologies or services that are designed to modernize the electrical system by enhancing electric distribution or transmission grid reliability, resilience, interconnection of distributed energy resources, distribution system efficiency, grid security against cyber and physical threats, customer service or energy efficiency and conservation.*"

To address these needs, PNM expanded upon the Customer Empowerment (Table A) and Service Enhancement (Table B) objectives to further articulate the capabilities required to meet the Roadmap objectives.

Table A: Customer Empowerment Objectives & Capabilities

Customer Empowerment	
Customer Energy Management	Detailed usage and price information so customers have more control over when and how they use energy
Service Information	New billing and rate options, like time-of-day, pick-your-own-due-date, and bill alerts. Timely information about power service and status (i.e., outage restoration)

[4] *See* New Mexico Energy, Minerals, and Natural Resources Department (EMNRD) Grid Modernization Roadmap Baseline Report, *available at* www.emnrd.nm.gov/ecmd/wp-content/uploads/sites/3/Baseline_FINAL.pdf
[5] *See* DOE Modern Distribution Grid Next-Generation Distribution System Platform (DSPx), *available at* http://www.doe-dspx.org
[6] House Bill 233 (HB 233).

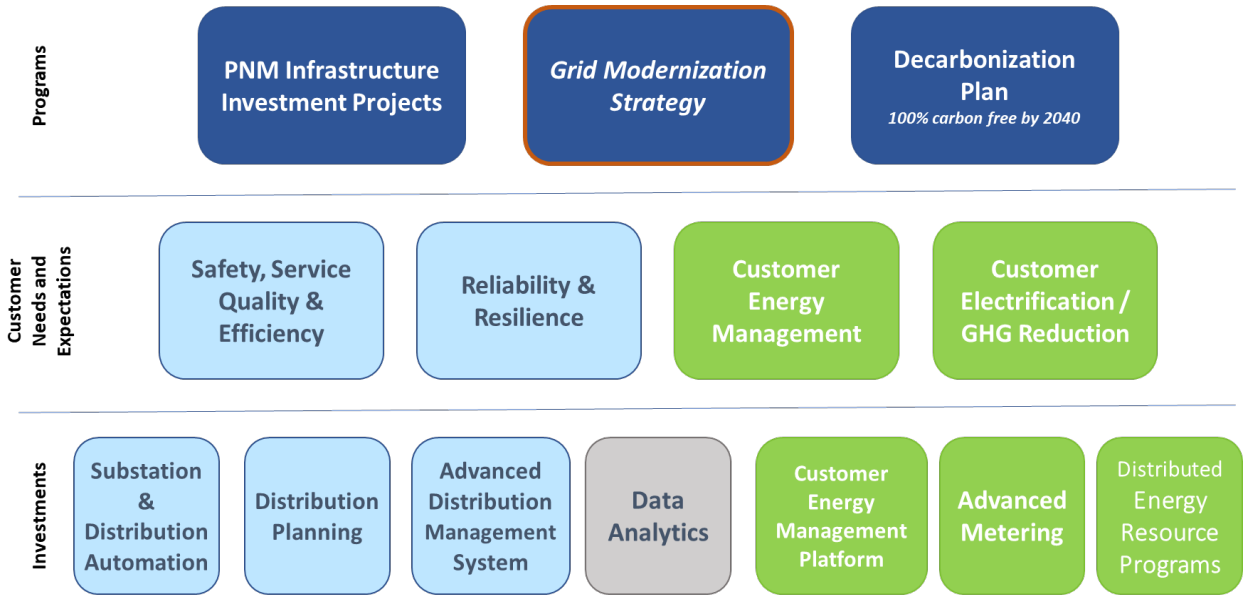
Customer Empowerment	
 Distributed Energy Resources (DER)	Support customers' ability to install onsite renewable energy resources, energy storage, or battery back-up systems
 Customer GHG Goals	Make it easier for customers to connect their renewable energy and reduce greenhouse gas emissions
 Electrification	Be ready to meet the needs of more electric technologies on the grid, like electric vehicles, HVAC/refrigerated air, and heat pump water heaters

Table B: Objectives & Capabilities of Service Enhancements

Service Enhancements	
 Service Reliability	Better prevent outages, reduce outage duration, and more-rapidly restore outages when they happen
 Service Resilience	Enhance ability to protect against and recover from high impact natural disasters and cyber-terrorism
 Safety, Service Quality & Efficiency	Ensure service safety and power quality meets performance standards

Figure 3 illustrates the general categories of technology investments that help create a modern grid. The flow in Figure 2 shows how certain investments are needed to support the key objectives and capabilities that have been defined through a collaborative effort.

Figure 3: Grid Modernization in the Context of Decarbonization and Infrastructure Investment Projects



Customer Empowerment activities and investments (in green) include enabling both: a) customer energy management, and b) customer electrification and DER adoption. For example, new options for customers to get insight into their energy usage will enable more proactive energy management prior to the monthly electric bill being generated. In this instance, the customer energy management platform will be receiving daily updates on customers' energy usage from the Advanced Metering Infrastructure (AMI) system. Customers will have access to that information when they log in to the customer energy management platform and can receive customer configurable alerts, including consumption and budgeting notifications. This Guide for PNM's Grid Modernization Implementation (Guide) is primarily focused on the Customer Empowerment portions of the grid modernization plan.

Service Enhancement activities and investments (in light blue) are focused on both: a) enhancing reliability and resilience,[7] and b) maintaining safety, service quality and operating efficiency. Reliability must also consider resilience given the increasing severity of climate-related events. Decarbonization will challenge legacy distribution grids tasked with new roles with respect to safety, power quality, and efficient operation. This Guide, together with a separate *Distribution Technology Roadmap* prepared by Burns & McDonnell Engineering Company, Inc. ("Distribution Technology Roadmap"), provides the information and tools for PNM to focus on the Service Enhancement aspects of the grid modernization plan.[8]

The grid modernization investments will transition PNM's largely analog distribution system into a more advanced digitalized system commensurate with PNM customers' needs and expectations both today

[7] *See* https://www.pnm.com/reliability-commitment

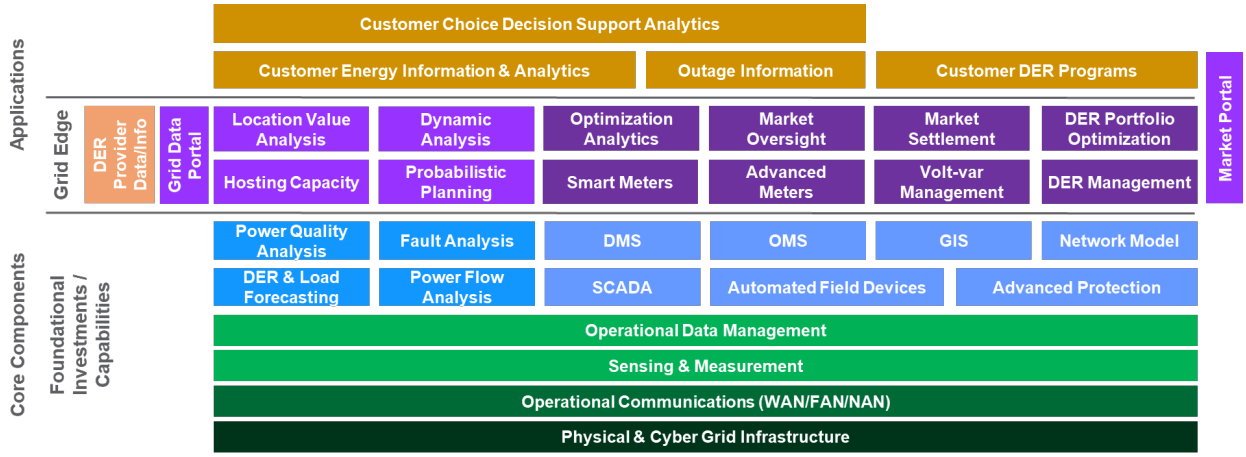
[8] The Distribution Technology Roadmap was prepared for PNM's distribution engineers as a means to identify and guide PNM's modernization efforts for its distribution grid. While the Distribution Technology Roadmap was not prepared solely for the purpose of PNM's grid modernization application, it is a key input to the distribution modernization components being requested by PNM.

and into the future. These core grid modernization investments facilitate greater integration of DER and beneficial electrification while also enhancing electric grid reliability, resilience, and security consistent with New Mexico's policies.

A. High-Level PNM Current State Assessment

This Guide to PNM's grid modernization was developed by referencing and utilizing the DOE's Modern Distribution Grid Report,[9] which has been used in over 20 states to inform a least regrets approach to investing in core customer and grid technologies. Volume III of the four volume DOE report provides an illustration of a next generation distribution system platform (DSPx) as shown below in Figure 4.[10] Figure 4 conceptually illustrates the core platform components and the modular application layers incorporating various distribution system technologies and several related customer-facing technologies.

Figure 4: DOE DSPx Next Generation Distribution System Platform & Applications

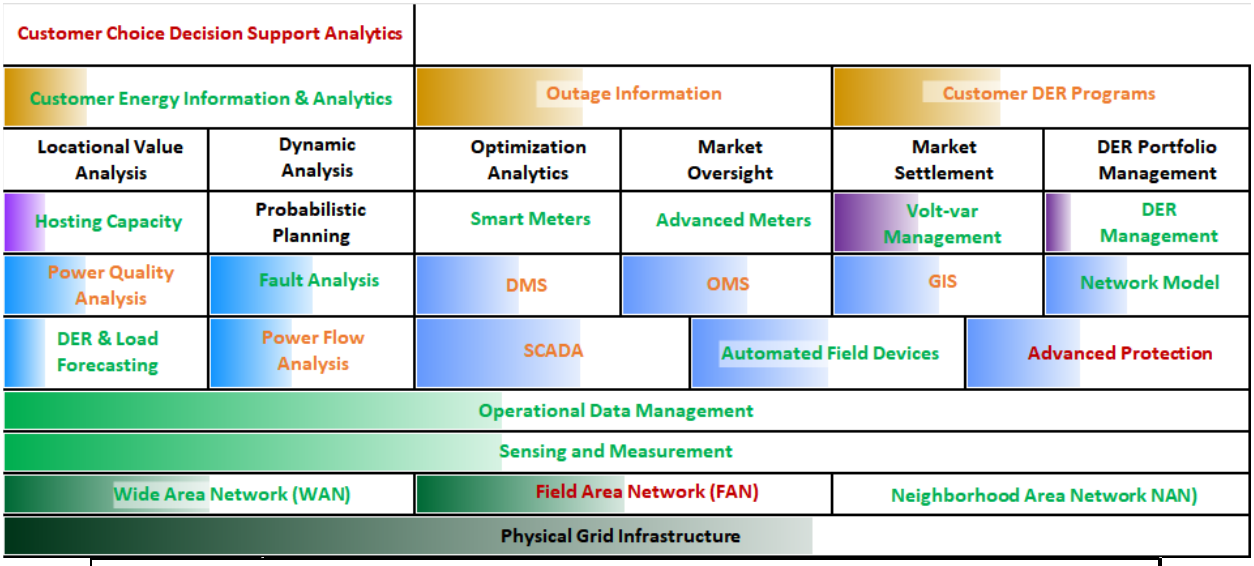


PNM evaluated the current state of the distribution system through several working group meetings and multiple discussions with subject matter experts from various PNM departments. Figure 5 below shows the results of this high-level assessment of PNM's current distribution system state relative to the DSPx framework in Figure 4 above.

The color coding in Figure 5 aligns with the original DSPx groupings, and the degree of shading for each component indicates PNM's self-assessment regarding the status of progress or maturity for the associated technology deployment. Items with black font are not applicable to the current state assessment at this time. It is worth noting that not all DSPx elements need to be fully shaded. Instead, specific grid and customer needs prompt investment in the grid modernization elements outlined in the DSPx framework. Therefore, this assessment provides a snapshot of PNM's current state relative to the DSPx technologies and systems to inform the need and priority for the recommended grid modernization investments described below.

[9] *See* DOE Next Generation Distribution System Platform (DSPx), *available at* http://doe-dspx.org
[10] *See* DSPx Volume III

Figure 5: PNM Current State Self-Assessment



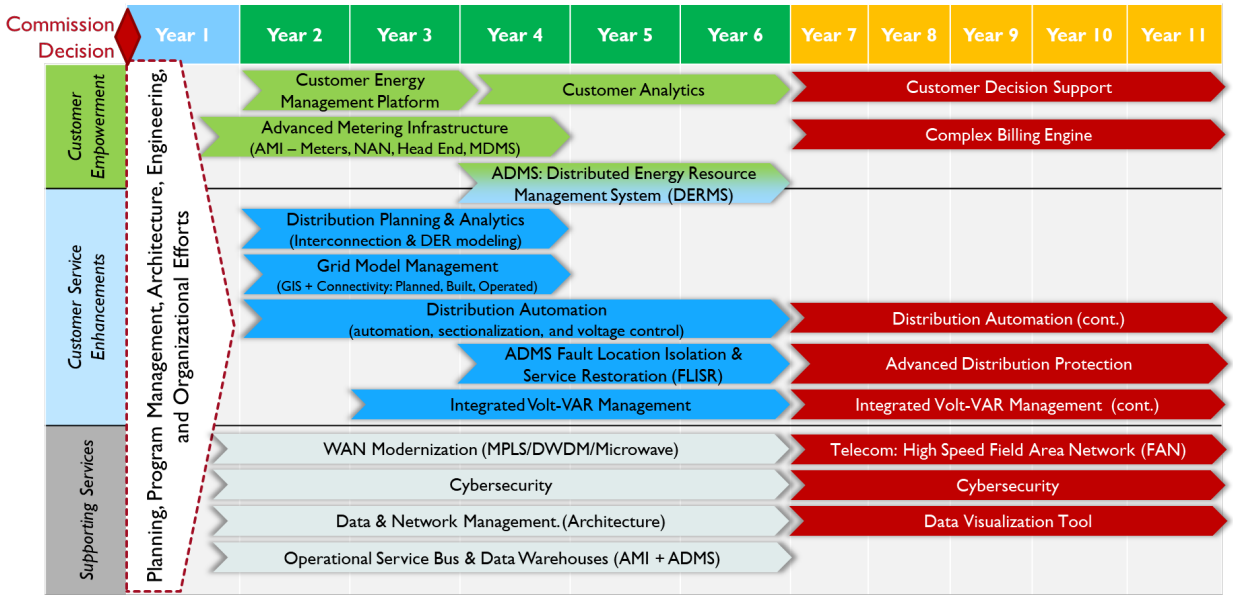
Key	
Shading	Indicates PNM's self-assessment regarding the status of progress or maturity
Green Font	Investments requested in PNM application
Orange Font	Enhancements to existing systems or technologies requested in PNM Application
Red Font	Anticipated investments for second half of 10-year grid modernization roadmap
Black Font	Not within scope for this this grid modernization implementation

Although progress has been made relative to grid modernization efforts, including recent implementation of an ACS Prism Distribution Management System (DMS) and Outage Management System (OMS), some substantive gaps exist relative to planning, field automation and controls, communications, and customer-facing technologies. For example, there is limited SCADA (Supervisory Control and Data Acquisition) deployment to field devices on distribution feeders, as well as relatively few intelligent communicating field switches. The next sub-section provides a high-level guide for PNM's for grid modernization plan.

B. Guide to Grid Modernization Investment

PNM's grid modernization implementation plan sequences the selected grid modernization technologies in a logical manner to enable future activities to build upon the initial investments. There are dependencies between the DSPx platform elements in Figure 4 and certain investments that must be made before advanced functionality can be pursued. PNM's plan for sequencing its grid modernization investments recognizes these dependencies and Figure 6 below illustrates the plan for achieving advanced functionality. The PNM grid modernization strategic plan includes an 11-year planning horizon, but its initial grid modernization rider application only requests funding for the initial 6-year planning and deployment period while proactively identifying the investments that are likely needed in subsequent the second half of the 11-year plan. Figure 6 includes an initial period for detailed planning, engineering and procurement activities followed by a deployment and installation period (years 1-6) followed by the anticipated investments for years 7-11.

Figure 6: High-Level Grid Modernization Plan with Initial Implementation Investments



The dependencies between investments to achieve benefits and capabilities have an effect on grid modernization investment prioritization and sequencing. Additional details for each of the investments in the full 11-year plan are included in the following sections.

The bullet-pointed list below provides a high-level overview of the interactions between investments and the capabilities enabled for customers. Bold font indicates references to items in Figure 5 and Figure 6. The intent is to provide an understanding of how each investment builds on the functionality of other investments to expand PNM capability to support customer needs and expectations.

Customer Energy Information, Analytics, and Decision Support

- **Customer Energy Management Platform**: As **Advanced Meters** are deployed, a **customer energy management platform** with a mobile application will be developed and launched. Once the **customer energy management platform** is implemented, monthly manually read meter data with associated billing information may be provided through the **customer energy management platform** in advance of a customer receiving an **Advanced Meter**. After receiving an **Advanced Meter** and **customer energy management platform** implementation, customers will have more detailed insight into their energy usage based on the 5-minute or 15-minute interval meter data.
- **Customer Analytics**: As customers develop a history of **Advanced Meter** data, **analytics** can be applied to the customer usage information and provide customers with insights and recommendations for saving money or reducing energy usage, including options for alternative rates, and energy efficiency, demand response or **DER programs**.[11]
- **Customer Decision Support**: PNM anticipates the capabilities of the **customer energy management platform** evolving such that the **AMI** data can be combined to inform customer decisions like whether to install solar photovoltaic (PV) on their rooftop or what the potential billing impacts are from purchasing an electric vehicle (EV). **Customer decision**

[11] Demand response and demand side management can be considered distributed energy resources

support can help customers understand the potential costs and savings associated with these choices. However, that level of sophistication is anticipated to occur in in years 6-11 .

Customer DER

- **Distribution Planning and Analytics** will utilize the **Advanced Meter** data to develop more detailed **DER and Load Forecasts** and perform **Hosting Capacity** studies. **Hosting Capacity** studies are performed to determine whether the distribution circuit, feeder or lateral has the capacity to support additional customer DER or loads like EVs. Additional distribution planning software modules and **Power Flow Analysis** tools will be procured to utilize the **Advanced Meter** data for **DER and Load Forecasts** and perform **Hosting Capacity** studies.
- **Advanced Meter** data can be shared with customer-authorized DER providers (e.g., Solar PV installers) to understand current customer usage and propose a solution best suited to the customer's energy needs.
- **Advanced Meters** will enable an evolution in **Customer DER Programs** and rate options.
    - PNM has developed a Whole-House Electric Vehicle (WHEV) rate and plans to propose a time-of-day (TOD) rate pilot. Additional rate options are not only enabled by the interval data from **Advanced Meters**, but the future customer DER programs and rate designs will be informed by the interval data from **Advanced Meters**.
    - PNM will be using the data from **Advanced Meters** to research and develop voluntary **Customer DER Programs**. The **Advanced Meter** data can also be utilized to perform measurement and verification (M&V) to assess the dispatchable DER program performance.
    - However, PNM's current Banner Customer Information System can support two rate tiers (off peak and on peak). As a result, PNM anticipates needing a **Complex Billing Engine** to offer more complex rate options and DER programs after **AMI** deployment is complete.
- **Distributed Energy Resource Management System (DERMS):** As **Customer DER Programs** are developed and PNM utilizes DERs to help address distribution grid needs (e.g., battery energy storage tactically located at substations), a **DERMS** will interface with PNM's existing **DMS** to enable distribution operators' visibility of DERs and provide the ability to dispatch and utilize DER to meet specific grid needs (e.g., mitigate mitigating an over capacity condition). The DERMS to DMS interface helps system operators with **DER Management** by monitoring and understanding the effect of DERs on the distribution grid, identifying the status of dispatchable DER resources, and providing the interface to dispatch DER resources when needed. The DERMS can interface and manage **Customer DER Programs**, community solar, and utility scale resources like energy storage at the substation. For further information on DERMS reference Section III.C.2.d.

Customer Reliability

(Please refer to the detailed information on distribution automation aspects provided in the Distribution Technology Roadmap)

- A significant aspect of the PNM modernization plan is the deployment of **Automated Field Devices** for **Distribution Automation**, including intelligent switches (e.g., reclosers and smart fuses) and faulted circuit indicators (FCIs) that provide grid **Sensing and Measurement** data to the **DMS**.
    - Intelligent switches have two primary functions: 1) opening and reclosing the switch to clear a momentary fault without customers experiencing a prolonged outage; and

2) sectionalizing a circuit or lateral, thereby reducing the number of customers affected by a prolonged outage.
    - The **Sensing and Measurement** capability of the intelligent switches and FCIs combined with the outage notifications from the **Advanced Meters** help the **OMS** with **Fault Analysis** to quickly identify when an outage occurs, coordinate outage response, and provide updated **Outage Information** for customers. For further information on outage management reference Section III.C.2.b.
    - As the **Automated Field Devices** for **Distribution Automation** are deployed, more advanced outage management can be implemented with a **Fault Location, Isolation and Service Restoration (FLISR)** module of the **ADMS**. **FLISR** utilizes the outage data and intelligent switches to 1) determine the most likely root cause of the outage; 2) employ a switching scheme to minimize the number of customers affected by an outage; and 3) coordinate the outage response accordingly.
- **Advanced Distribution Management System (ADMS):** PNM has already invested in the ACS Prism ADMS platform and has deployed the **DMS** and **OMS** modules. The additional investments in **Advanced Meters**, as well as distribution **Sensing and Measurement** and **Automated Field Devices** will expand the analytics and control capability of the ADMS thereby increasing the shading of the DMS and OMS utilization in Figure 5. For more information on the ADMS, please reference Section III.C.2.
    - The existing customer portal providing outage information will be enhanced by the **Customer Energy Management Platform** which will benefit from the outage data provided by **Advanced Meters** and **Automated Field Devices** informing the **OMS** and **FLISR**.[12]
- Customer Power Quality and **Integrated Volt-VAR Management** (see Section III.C.2.c.)
    - Dynamic voltage conditions may be introduced when DER approaches the hosting capacity on a circuit. An **Integrated Volt-VAR Management** module for the **ADMS** combined with SCADA controls on load tap changers, capacitor banks and line regulators will enable coordinated distribution voltage management with advanced inverters. It is necessary for voltage and reactive power management to be managed from the substation to the customer in a coordinated manner to ensure service quality and address potential limitations on hosting capacity.
    - **Automated Field Devices** with **Sensing and Measurement** can record and send voltage measurements and **Advanced Meters** can send swell and sag notifications (including magnitude and duration information) to the **ADMS** to identify when and where voltage/reactive power remediation is needed.
    - Additionally, **Advanced Meters** can provide interval voltage and reactive power data that is particularly useful for identifying secondary voltage issues at service transformers. Distribution system planners and engineers utilize the **Advanced Meter** data to inform **Hosting Capacity Analysis**, **Power Quality Analysis, Power Flow Analysis, and Fault Analysis**.

Telecommunication Networks

- The **Wide Area Network (WAN)** primarily supports substation automation. PNM currently has either fiber optic cable and/or microwave communications at transmission substations. The grid modernization plan is to extend the utilization of the fiber optic cable to include the distribution side of the substation and upgrade communication protocols utilized by the fiber to

[12] See PNM Outage Map, *available at* https://www.pnm.com/search-an-outage

support the **Automated Field Devices** for **Distribution Automation** and **Sensing and Measurement** as well as providing a pathway for **Advanced Metering** telecommunications**.**
    - The requested upgrades to communication protocols utilized by the fiber optic WAN will likely be needed to support the high-speed **Field Area Network (FAN)** needs anticipated for the second half of the grid modernization plan.
- The AMI system selected by PNM includes a wireless mesh[13] **Neighborhood Area Network (NAN)**. The **Advanced Meters** will communicate through the **NAN** until the data is relayed to a cellular LTE access point or connected to the WAN.[14] The access point or WAN then sends the data to a head end system, which routes the data to the meter data management system (MDMS). The PNM Banner system then communicates with the **MDMS** to generate bills for customers.
    - In the near term (initial 6-year implementation period), the NAN will also be utilized to enable communication with the **Automated Field Devices** with **Sensing and Measurement** capabilities. The **Automated Field Devices** would communicate through the mesh network until it connects to the **WAN**.
- PNM anticipates that as more **Automated Field Devices** with **Sensing and Measurement** capabilities are deployed, the performance (bandwidth and latency) of the NAN may not support future needs. Therefore, PNM has identified a high-speed **FAN** as a potential investment for the second half of the grid modernization plan.
    - Technologies for high-speed FANs are evolving and relatively expensive at this time. PNM hopes that requirements for a high-speed utility FAN will be better understood and that affordable solutions will be more readily available over the next 5 years.
- As with any telecommunication network, consideration must be made for **Cybersecurity**. **Cybersecurity** must be designed into the solutions from the start and PNM is utilizing industry standards in its approach to **Cybersecurity**.[15] **Cybersecurity** must also evolve and continuously identify and mitigate threats. Therefore, PNM identifies continuous efforts by staff as well as new cybersecurity systems and tools to manage **Cybersecurity** as part of the grid modernization investment. These **Cybersecurity** investments in the new and modified networks associated with the Grid Modernization projects will be done to improve segmentation, monitoring, and alerting of possible incidents within the networks and devices.

Data and Network Management (see Section 3)

- The digital **Grid Model** must be precise and appropriately managed to ensure that the **ADMS** is able to make sense of the data and fully leverage capabilities that are made available through **Distribution Automation**. Therefore, a critical activity to enable the capabilities of these investments is the **data and network management** aspect, including understanding of the grid modernization architecture (see Section IV).

---

[13] With a wireless mesh network, each node (meter or repeater) relays the data until an access point is located.
[14] Cellular technology has progressed through multiple generations. Starting with the 4th generation (4G) the term LTE or "long term evolution" is utilized with the idea that subsequent cellular generations will be retro-compatible with the LTE technology. This is important to utilities who have previously invested in 2G cellular technology which had to be replaced with 3G cellular technology which then had to be replaced with 4G LTE cellular technology. 5G technology is still being finalized and deployed, but utilities are cognizant of the risk of outdated cellular technology that has to be replaced at a future date.
[15] For example, see U.S. National Institute of Standards and Technology (NIST) Interagency Report (NISTIR) 7628 Rev. 1 Guidelines for Smart Grid Cybersecurity, *available at* https://csrc.nist.gov/publications/detail/nistir/7628/rev-1/final

- Grid modernization investments perform the functions described by exchanging data with other systems and each technology or system is focused on specific tasks. As a result, management of the data becomes paramount. A systems architecture approach is needed to design how the grid modernization components will replace or interface with existing systems.
- PNM is requesting a **data warehouse** for distribution management and AMI. The **data warehouse** would be accessible to authorized users and their software tools to perform analytic tasks such as **Hosting Capacity** analysis, **Power Quality Analysis**, and **DER and Load Forecasting**. Additionally, the **customer energy management platform** may use the data warehouse, rather than the MDMS directly, to provide data to customers (depending on the final solution architecture).
- PNM already uses an enterprise service bus (ESB) for enabling communication between enterprise information technology systems (including the PNM customer information system "CIS," referred to as "Banner"). As part of the grid modernization investment PNM is requesting an **operational service bus (OSB)** to facilitate data exchange between the operational systems (ADMS, data warehouse, and distribution planning tools) as well as exchange data with the ESB. Segmentation of the operational and enterprise systems is in line with utility and cybersecurity best practices.[16]

Physical Grid Infrastructure

- PNM has identified needed investments in physical grid infrastructure to address aging assets, as well as upgrades required to support proliferation of renewable and distributed resources. Such infrastructure also will support customer electrification, including adoption of electric vehicles. However, the physical grid infrastructure investments are outside the scope of this grid modernization plan.

The investment plan above is consistent with the New Mexico EMNRD-led Grid Modernization Baseline Report.[17]

III. Grid Modernization Needs and Investments

A. Customer Empowerment

1. Decarbonization

In 2019, New Mexico passed the Energy Transition Act (ETA), which established significant long-term renewable generation goals and carbon-emissions reduction targets for utilities within the state:

- By 2040, all retail sales must be supplied by 80% renewable resources
- By 2045, all retail sales must be supplied by 100% carbon-free resources[18]

---

[16] *See* NIST Smart Grid Framework, *available at* https://www.nist.gov/ctl/smart-connected-systems-division/smart-grid-group/smart-grid-framework

[17] *See* Grid Modernization Baseline Report of New Mexico's Electricity Sector Updated April 2021, *available at* www.emnrd.nm.gov/ecmd/wp-content/uploads/sites/3/Baseline_FINAL.pdf

[18] New Mexico's Energy Transition Act requires PNM to supply one hundred percent of all retail sales of electricity in New Mexico from zero carbon resources by January 1, 2045. NMSA 1978, § 62-16-4(A)(6) (2019). By January 1, 2040, no less than 80 percent of all retail sales of electricity in New Mexico are to be supplied through renewable energy resources. *See* Section 62-16-4(A)(5).

PNM is planning to accelerate the ETA requirements and have 100% of retail sales come from carbon-free resources by 2040. Grid modernization is a key component of PNM's strategy for achieving this goal while maintaining reliability.

Decarbonization for New Mexico not only involves carbon-free utility scale generation, but also customer-owned PV and community solar to serve customer electricity needs. In alignment with national trends, PNM customers are adopting more DER and starting to purchase EVs. The PNM distribution grid needs to enable customers to put solar PV panels on their roof, utilize energy storage, participate in demand response programs, and purchase an EV. Investments in AMI, a customer energy management platform, and analytical tools for the planning and operation of the distribution grid are needed to empower customers to interconnect PV and storage, charge their EV, and electrify other end uses (such as new appliances), while supporting reductions in greenhouse gas (GHG) emissions. The PNM distribution grid will evolve with modern solutions to meet these challenges.

Another component of customer empowerment to achieve decarbonization is enabling time-of-day (TOD) rate structures that align the retail cost of electricity with the supply costs, which vary throughout the day and at different times of the year.

Weather plays a significant role in the transition to carbon free generation where partially cloudy days also introduce intermittent and variable generation for PV while wind speed determines the amount of wind generation output. As customers and PNM transition to renewable energy resources, electricity becomes abundant during blue sky days through customer owned distributed and utility scale PV. However, supply can be more constrained at dawn and evening hours or on cloudy days. This variability and intermittency requires more sophisticated utility systems to balance electricity supply and demand in real time, especially when electricity is not only being supplied to customers but also being provided by customers. The grid modernization aspects to support more dynamic distribution operations is discussed in Section III.C Service Enhancement and Grid-Facing Technologies.

2. Interconnection and Integration of Distributed Energy Resources

PNM is currently in a position of telling customers that there is limited hosting capacity on certain distribution grid circuits thereby limiting the amount of additional PV and EV that customers can interconnect to the distribution grid. Figure 7 illustrates the growth in PNM's customer renewable resource interconnections, and Figure 8 illustrates the increase in interconnection requests by PNM customers from 2019-2022. Approximately 6% of PNM customers have adopted distributed generation (DG), and DG nameplate capacity is now over 10% of PNM peak electricity demand.[19]

[19] See PNM Customer Solar Energy Program, *available at* https://www.pnm.com/customer-solar-energy1

Figure 7: PNM Customer Renewable Program Data

Customer Renewables Monthly Program Report

Today: 8/31/2022

Total Program Statistics	
Total Interconnections	**33,381**
Residential Interconnections	32,345
Commercial Interconnections	1,036
Percent of Total Customer Base	6.3%
Total Capacity [MWdc / MWac]	**276.7 / 225.58**
Percent of Peak Load (2019)	12.2%
Percent of Annual Generation (2019)	5.0%
Total Energy Storage Interconnections	**273**
Residential Energy Storage	262
Commercial Energy Storage	11

Monthly Statistics	
August 2022 Applications	966
August 2022 Interconnections	471
August 2022 Expansions	10
August 2022 Capacity Installed [MWac]	3.12

Annual Comparative Statistics	
YTD 2022 Interconnections	4009
YTD 2021 Interconnections	3939
Year over Year Percent Difference	2%

Current Active Interconnection Applications	
Total Active Projects	5535
PNM Action Required	2053
Applicant Action Required	3479

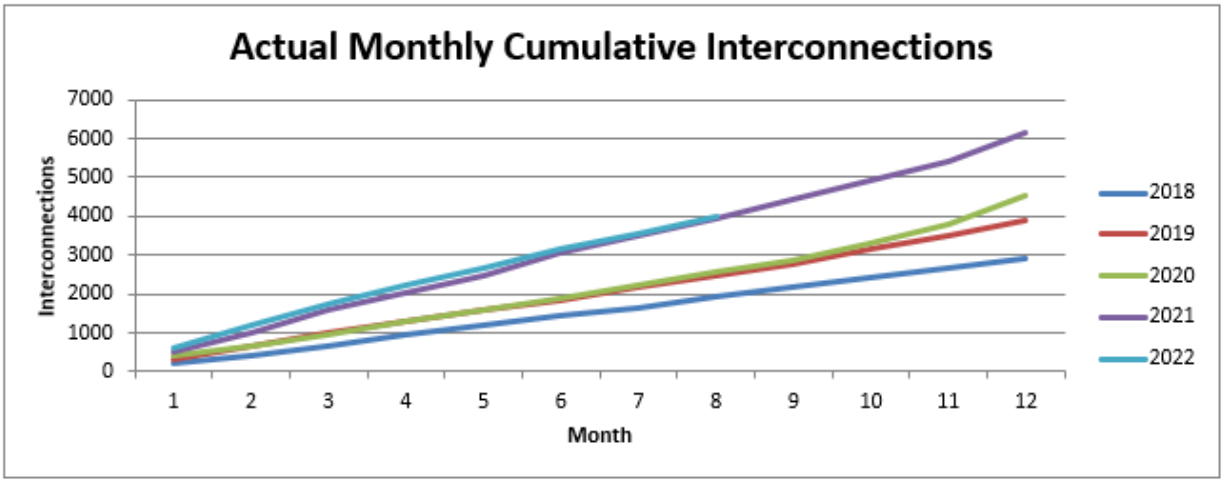


Figure 8: PNM Cumulative Interconnection Applications 2019-2021

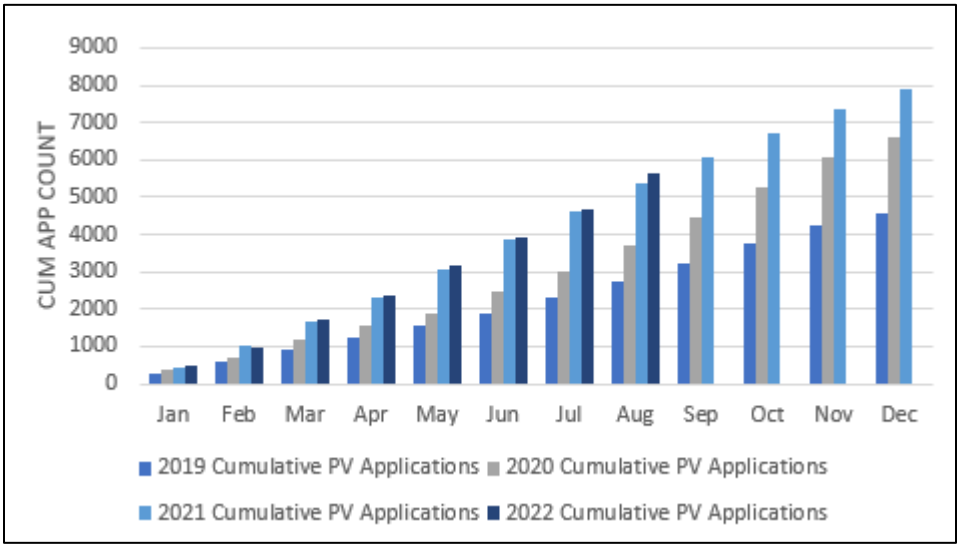


Table C illustrates the continued increase in customer interconnection applications and increase in actual customer interconnections from 2020 - 2022 (actuals through August with projections for remainder of the year). PNM anticipates this trend will continue over the next 5+ years.

Table C: PNM PV Interconnection Applications 2020-2021 Year

	Interconnection Applications	Interconnections
2020 Cumulative Interconnections	6,598	4,551
2021 Cumulative Interconnections	7,871	6,145
2022 Cumulative Interconnections (through August)	5,638	4,012
2021 over 2020 Percent Difference	**+19%**	**+35%**
2022 over 2021 Percent Difference (projected)	**+7%**	**+1%**

From a customer interconnection perspective, PNM's proposed investment in AMI will help customers make well-informed decisions regarding whether to install renewable systems on their homes and businesses by having detailed information about their electricity usage and costs. Customers will have the ability to monitor their usage and make adjustments to lower their bill by evaluating the data and information provided by the customer energy management platform. Customers with PV will have visibility into how much and when their PV system is exporting energy and insight into their net metering, which can help optimize their energy savings.

More broadly, additional sensing on the PNM distribution system will help with distribution planning, engineering modeling for load forecasting, DER forecasting, and hosting capacity analysis. Without the AMI data, the engineering and planning analysis is necessarily conservative to ensure customer reliability, power quality, and system protection. Therefore, the AMI data combined with the distribution planning and engineering tools result in more detailed and accurate load and DER forecasting and analysis. New Mexico's recent community solar legislation supports the need for more proactive hosting capacity

analysis as well as streamlining the interconnection study process. The existing PNM hosting capacity map, which currently is focused on residential behind-the-meter solar, can also be improved with the additional data and refinement of hosting capacity studies.[20]

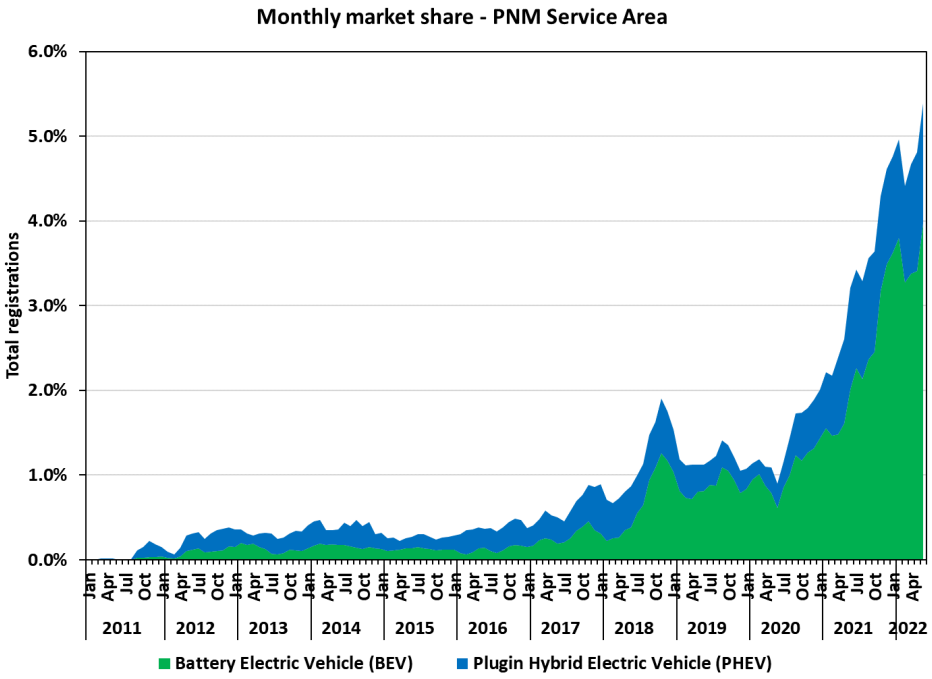
Additionally, AMI, in conjunction with the DERMS, enables PNM to offer more sophisticated DER programs than net metering to reflect the responsiveness, performance and/or value of DER at specific times of day or times of the year. DER programs can also have a dispatch capability, like current PNM demand response programs,[21] such that the capabilities of DER can be utilized to help address grid needs. The recent update to the IEEE advanced inverter technical specification for the interconnection and interoperability between the utility and DER enables not only autonomous voltage support, but also technical capability for inverters to responds to utility dispatch signals.[22] The AMI system selected by PNM includes local networking capability to enable the customer to connect the advanced meter to their Wi-Fi network.[23] One potential interface for this Wi-Fi networking capability is for the advanced meter to communicate with the advanced inverter.[24] However, this Wi-Fi metering interface for customers is a recent development and it will take time for the enabling applications and customer programs to be developed.

3. Transportation Electrification[25]

EVs represent a new paradigm in transportation, and one that has significant impacts for people, for the environment, and for electric utilities. Figure 9 depicts the exponential growth in the adoption rate of EVs in PNM's service area and illustrates that customers are already participating in this transportation sector transformation.[26]

[20] See PNM Hosting Capacity Map, *available at* https://pnm.maps.arcgis.com/apps/webappviewer/index.html?id=cbd3bad85fc64f2180dda652e957bacd
[21] See PNM Power Saver program for residential and small-medium commercial customers, *available at* https://www.pnm.com/income-qualified-rebates, and Peak Saver for large commercial customers, *available at* https://www.pnm.com/peaksaver. *See also* direct load control, *available at* https://www.pnm.com/demandresponse
[22] See Institute of Electrical and Electronics Engineers (IEEE) 1547-2018 Standard for Interconnection and Interoperability of Distributed Energy Resources with Associated Electric Power Systems Interfaces, *available at* https://standards.ieee.org/ieee/1547/5915/
[23] See IEEE 802.11 Standard for Local and Metropolitan Area Networks - Part 11: Wireless LAN Medium Access Control (MAC) and Physical Layer (PHY) Specifications, *available at* https://standards.ieee.org/ieee/802.11/7028/
[24] See IEEE 2030.5-2018 Standard for Smart Energy Profile Application Protocol, *available at* https://standards.ieee.org/ieee/2030.5/5897/
[25] Additional details on benefits to customers/environment from vehicle electrification can be found in Direct Testimony of PNM Witness Alaric J. Babej at PNM Exhibit AJB-2 in Case No 20-00237-UT (Dec. 18, 2020).
[26] *See* PNM Transportation Electrification Program, *available at* https://www.pnm.com/electric-vehicles

Figure 9: Monthly Market Share of EVs in PNM Service Area (2011- June 2022)



While the current adoption rate of all EVs (both plug-in hybrid and battery electric vehicles) in the PNM service area is just over 5%, PNM expects growth in this sector to follow the S-Curve model,[27] which is typical for disruptive technology. In the short term, PNM expects to serve approximately 7,800 EVs in its service area by the end of 2023 through the implementation of the Transportation Electrification Program.[28] However, extrapolating an S-Curve adoption model, this will increase to approximately 50% market share in 2030, and over 90% market share by 2050 (representing over one million vehicles in the population).

Currently, if a PNM residential customer buys an EV, it results in approximately a 40% increase in energy use. However, EV loads are not only flexible in terms of timing of usage, but also can interact with the utility in new ways. Customers must be empowered to manage this new usage in a way that provides them with reliable transportation, while also mitigating any unintended adverse impacts to the electric system. The different levels of charging depicted in Figure 10 illustrate that although total energy (kWh) consumption may be the same, the level of charging chosen could significantly impact the power (kW) requirements of the system where faster charging requires higher electricity demand.

[27] *See* Diffusion of Innovation Theory, *available at* https://sphweb.bumc.bu.edu/otlt/MPH-Modules/SB/BehavioralChangeTheories/BehavioralChangeTheories4.html, applied to electric vehicle adoption https://www.wri.org/insights/what-projected-growth-electric-vehicles-adoption

[28] *See* NMPRC Case No. 20-00237-UT

Figure 10: Different Standard Charging Levels for EVs[29]

Therefore, PNM must plan for EVs from a system resource perspective and explore emerging approaches such as smart charging, vehicle-to-grid (V2G), and vehicle-to-whatever (V2X) technology. PNM envisions a future where EVs will play a critical role in demand side management (DSM) programs to serve multiple functions when needed, including reducing the peak demand and providing emergency services. While this may seem like EVs are similar to traditional interconnections such as solar and energy storage, they differ by the fact that EVs are by nature mobile and can interconnect anywhere an outlet or charging station is available. Therefore, grid modernization investments with sensing capabilities to monitor electricity demand and variable DER will provide PNM with the insights to manage a more dynamic electric distribution grid.

The electrical system must have appropriate equipment and infrastructure to serve an electrified transportation sector. In order to serve this new load, utilities must have granular visibility into interval power requirements as well as energy usage over time. In the Transportation Electrification Program, PNM adopted a set of limited-enrollment TOD rates to improve alignment between the wholesale and retail cost of electricity at different times of day. These rates include a residential TOD WHEV rate and a non-residential EV Charging TOD rate. The WHEV rate structure has an off-peak period that incentivizes overnight EV charging, which other utilities have shown can shift charging behavior in approximately 90% of customers and offer both savings to the consumer as well as grid benefits. Prior to AMI, cellular enabled advanced meters will be utilized for customers that enroll in the WHEV rate. Subsequent to AMI, a customer will have the advanced meter capabilities necessary to support WHEV or other TOD rate structures.

Similar to a customer interconnection request for interconnecting PV, an engineering study often needs to be performed to ensure that the distribution infrastructure in a neighborhood can support EV charging. As illustrated in Figure 10, Level 2 and especially DC Fast Charging can add significant EV customer electricity demand over and above the electricity demand from today's homes and businesses. Therefore, PNM must ensure that the distribution grid can accommodate the incremental EV load. The AMI data integrated with distribution planning and engineering tools for forecasting and power flow analysis will provide the tools necessary to perform this evaluation.

4. Time of Day (TOD) Rates

As the PNM portfolio shifts to include more intermittent renewable resources, including customer owned rooftop solar PV, PNM expects that the cost to serve evening electricity demand will exceed the cost to serve the daytime hours. Encouraging customers to shift their electricity load off peak hours via

[29] *See* Electric Power Research Institute (EPRI) Consumer Guide to Electric Vehicles, *available at* https://evconsumerguide.epri.com/

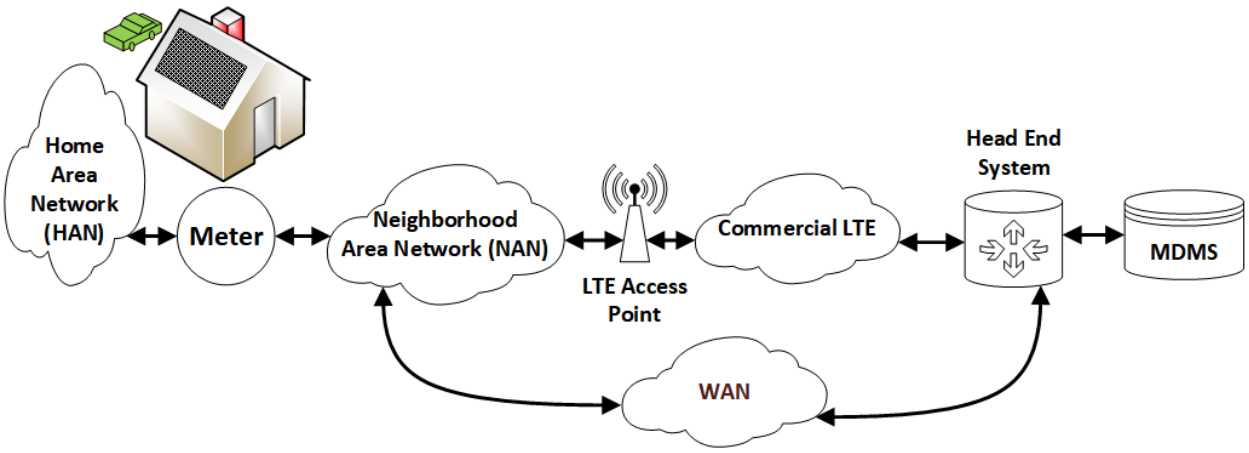
a TOD rate will aid PNM's efforts for decarbonization while providing customers with an opportunity to save money via changed usage behavior. In its upcoming rate case, PNM plans to propose a TOD pilot rate, including a Residential TOD rate and a Small Power TOD rate. Advanced meters that record interval meter data are required to support TOD rates and other potential future tariff structures. Early TOD implementations utilized meter registers for the TOD rate tiers while still reading the meters manually. However, that approach did not provide customers with insights on energy usage prior to a bill being generated and interval data also provides flexibility in tariff evolution rather than requiring meter registers to be reprogrammed each time a tariff provision changes.

B. Customer- Facing Technology

1. Advanced Metering Infrastructure

AMI is a key enabling customer-facing technology to support customer DER, EVs and TOD rates. PNM's AMI solution is comprised of advanced meters, a standards-based neighborhood area network ("NAN") incorporating cellular LTE enabled telecommunication access points and WAN telecommunication pathways to communicate to a head end system, which then sends meter data to a meter data management system ("MDMS"). Figure 11 illustrates the components of the AMI system.

Figure 11: Components of the PNM AMI System



a. Advanced Meters

According to the Federal Energy Regulatory Commission (FERC) 2021 Assessment of Demand Response and Advanced Metering,[30] advanced metering has now been deployed to 60 percent of electric customers in the U.S.

PNM is already spending time, money, and resources on meter exchanges for required meter replacements required based on sample testing. Due to PNM's aging in-service meter inventory, between 2000 and 3000 meters are replaced every month. Additionally, PNM is required to replace batches of meters based on sample testing. At this time, PNM expects that 35-38% of existing meters will need to be replaced by the end of 2024. This tranche of meter replacements will likely replace the remainder of mechanical meters still in operation with non-communicating solid state meters. Given the

[30] See FERC 2021 Assessment of Demand Response and Advanced Metering, *available at* https://www.ferc.gov/news-events/news/ferc-staff-issues-report-2021-assessment-demand-response-and-advanced-metering

expected volume of scheduled meter replacements, it is logical for PNM to invest in AMI rather than continuing to deploy this high volume of non-communicating solid state meters. As a result, PNM filed a variance to the meter replacement policy to defer required meter replacements (other than broken meter replacements) until its AMI deployment is approved. If the AMI deployment is not approved, PNM will need to deploy approximately 195,000 non-communicating solid state meters to be compliant with the meter replacement policy.

PNM's selected advanced meter solution is a 5th generation smart meter. The DSPx illustration in Figure 4 identifies both smart meters and advanced meters. This differentiation was in part to denote the differences between earlier generation smart meters, which primarily monitored energy usage (kilowatt-hour or kWh) at 1-hour or 15-minute intervals and provided outage notifications. Utilities would sometimes also deploy advanced meters capable of monitoring additional electrical attributes at lower interval data resolution to develop load studies. PNM's selected 5th generation of advanced meters can measure the electrical characteristics outlined in Table D at programmable interval lengths of 5, 10, 15, 30 or 60 minutes to provide advanced meter capabilities to all customers.

Table D: Meter Metrology

Meter Data	Unit
Active Energy (delivered)	Watt-hour (Wh)
Active Energy (received)	Watt-hour (Wh)
Active Energy (net)	Watt-hour (Wh)
Active Power (net aggregate)	Watt (W)
Active Power (maximum)	Watt (W)
Active Power (average)	Watt (W)
Active Power (minimum)	Watt (W)
Current (maximum)	Ampere (A)
Current (average)	Ampere (A)
Current (minimum)	Ampere (A)
Voltage (maximum)	Volt (V)
Voltage (average)	Volt (V)
Voltage (minimum)	Volt (V)
Power Factor (net aggregate)	
Volt-Ampere (net aggregate)	VA
Volt-Ampere (maximum)	VA
Volt-Ampere (average)	VA
Volt-Ampere (minimum)	VA
Reactive Power (net aggregate)	Volt-Ampere-Reactive (VAR)
Reactive Power (maximum)	Volt-Ampere-Reactive (VAR)
Reactive Power (average)	Volt-Ampere-Reactive (VAR)
Reactive Power (minimum)	Volt-Ampere-Reactive (VAR)
Frequency	Hertz (Hz)
Internal Temperature	Centigrade (C)

PNM envisions utilizing 15-minute interval data as the default advanced meter setting and utilizing 5-minute interval data for customers with DER or EVs to provide greater resolution information for those customers with more dynamic energy use and variable generation resources. The final list of metrology values to be collected will be finalized with the meter vendor during the project planning process, which would commence upon Commission approval. Both the metrology values collected, and the interval length are programmable over the network without the need for manually removing or reprogramming the meter.

Meters will provide outage notifications to the PNM ACS Prism OMS module and the ADMS will evolve with FLISR capabilities. FLISR will be able to recommend or automatically reconfigure the system to minimize the number of customers affected by an outage, more accurately identify the likely location for the root cause of the outage and use available data sources to validate outage restoration.

Additionally, meters will monitor voltage and provide interval voltage data – primarily for DER and EV customers – to identify voltage issues that may be associated with hosting capacity for distribution planning purposes. Voltage monitoring will also log events for voltage sags and swells relative to configurable limits within the nominal residential small commercial service voltage range of +/- 5%.[31] Voltage sag and swell information provide both the magnitude and duration of voltage excursions outside of the specified limit values.

PNM's selected AMI vendor utilizes applicable industry standards for the meters and NAN including ANSI C.12 standards for metering,[32] NISTIR 7628 Guidelines for Smart Grid Security, and relevant standards from American Society for Quality (ASQ),[33] ASTM International,[34] Code of Federal Regulations (CFR) 47, Part 15 telecommunication radio frequency devices, Institute of Electrical and Electronics Engineers (IEEE),[35] International Electrotechnical Commission (IEC),[36] National Electrical Manufacturers Association (NEMA),[37] National Fire Protection Association (NFPA),[38] and Underwriters Laboratory (UL).[39]

b. Head End and Meter Data Management System

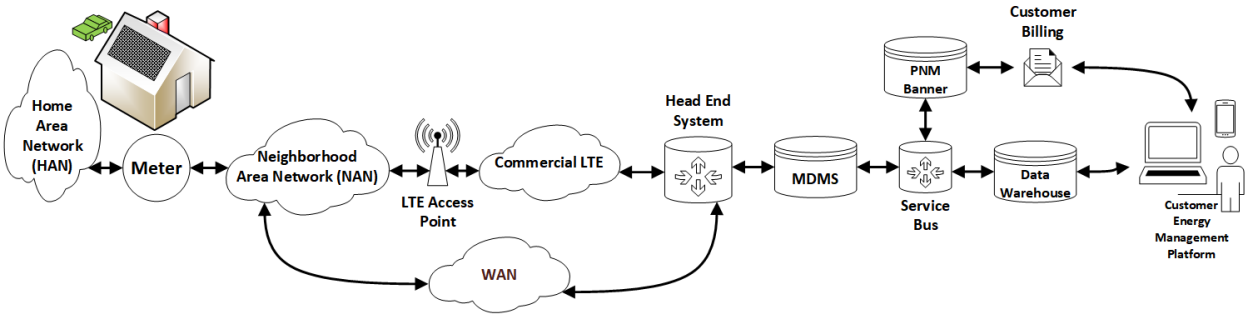
The head end system manages the AMI network and connected devices (including device firmware and meter programs) and provides a layer of cybersecurity and authentication for the AMI system. It collects the advanced meter data from the cellular LTE access points and WAN and relays the data to the appropriate system. In the case of energy usage data, the data is relayed to the MDMS. Outage data is routed to the OMS and voltage sag and swell notifications can be sent to the DMS. All AMI data will also be stored on the data warehouse.

The MDMS is the system of record for meter data used for customer billing by the CIS. As illustrated in Figure 12, the MDMS provides billing determinates to the CIS billing system to generate customer bills. The MDMS runs validation, estimation, and error correction (VEE) routines on all interval energy usage data collected and ensures that the interval data adds up to midnight meter register reads each day. The validated meter data is then provided to the customer energy management platform the following day.

---

[31] *See* American National Standards Institute (ANSI) C84.1-2020 Electric Power Systems and Equipment - Voltage Ratings (60 Hz), *available at* https://webstore.ansi.org/Standards/NEMA/ansic842020
[32] *See* ANSI C12, *available at* https://webstore.ansi.org/industry/smartgrid/ansi-c12
[33] *See* ASQ, *available at* https://asq.org/
[34] *See* ASTM International, formerly known as American Society for Testing and Materials, *available at* https://www.astm.org/products-services/standards-and-publications.html
[35] *See* IEEE Standards, *available at* https://standards.ieee.org/
[36] *See* IEC, *available at* https://www.iec.ch/standards-development
[37] *See* NEMA, *available at* https://www.nema.org/standards/all-standards
[38] *See* NFPA, *available at* https://www.nfpa.org/codes-and-standards/all-codes-and-standards/list-of-codes-and-standards/detail?code=70
[39] *See* UL, *available at* https://www.shopulstandards.com/ProductDetail.aspx?UniqueKey=30184 and https://www.shopulstandards.com/ProductDetail.aspx?productId=UL2735

Figure 12: Components of the PNM AMI System including Billing and Customer Energy Management Platform



C. Service Enhancement and Grid-Facing Technologies

While customer empowerment technologies are primarily focused on improving customer engagement, service enhancement technologies are implemented to improve the quality of service realized by the customer. Importantly, service enhancements to the grid also aid PNM is achieving its objective for a carbon-free transition. Collectively, investments in service enhancements help PNM achieve its overarching objective to deliver greater value, reliability, a cleaner grid, and sustainability to the customer.

1. DER Interconnection Service Enhancements

DER interconnection enhancements focus on expanding capabilities to support the increasing amount of DER interconnection requests. Distribution planning analytics for DER integration includes both assessment of the current state for hosting capacity (the ability for the distribution system to interconnect additional DER), as well as DER forecasting to proactively assess DER growth and perform hosting capacity analysis for the future. Advanced meters provide the detailed data necessary to 1) perform hosting capacity studies for individual customers, 2) provide broader circuit (or even system) hosting capacity assessments, and 3) provide a basis for both DER and load forecasts accounting for the changes to load profiles as customers adopt DER.

PNM currently utilizes an industry leading software package called Synergi for distribution planning and engineering analysis.[40] To utilize the AMI data, as well as the sensing and measurement data from automated field devices (e.g., reclosers and smart fuses), PNM needs to procure, integrate and provide training to utilize the electric load flow core and protection module licenses from Synergi to perform the fault and protection analysis, integration capacity analysis, and interconnection integration functions listed in Table E.

Table E: Overview of Distribution Planning Analysis Needs and Synergi Capabilities

Capability	Synergi Capabilities
1. Power Flow Studies	X
2. Optimization	+
3. Fault & Protection Analysis	X
4. Integration Capacity Analysis	X

[40] *See* Synergi, *available at* https://www.dnv.com/services/power-distribution-system-and-electrical-simulation-software-synergi-electric-5005

Capability	Synergi Capabilities
5. Forecasting Integration	
6. Interconnection Integration	X
7. Reliability & Resilience Analysis	X
8. Locational Value Analysis	
9. Power Quality Analysis	X
10. Electromagnetic Dynamic/Transient Analysis	
11. Safety Analysis	X
X = aligned capabilities + = limited capability (capacitor and regulator placement)	

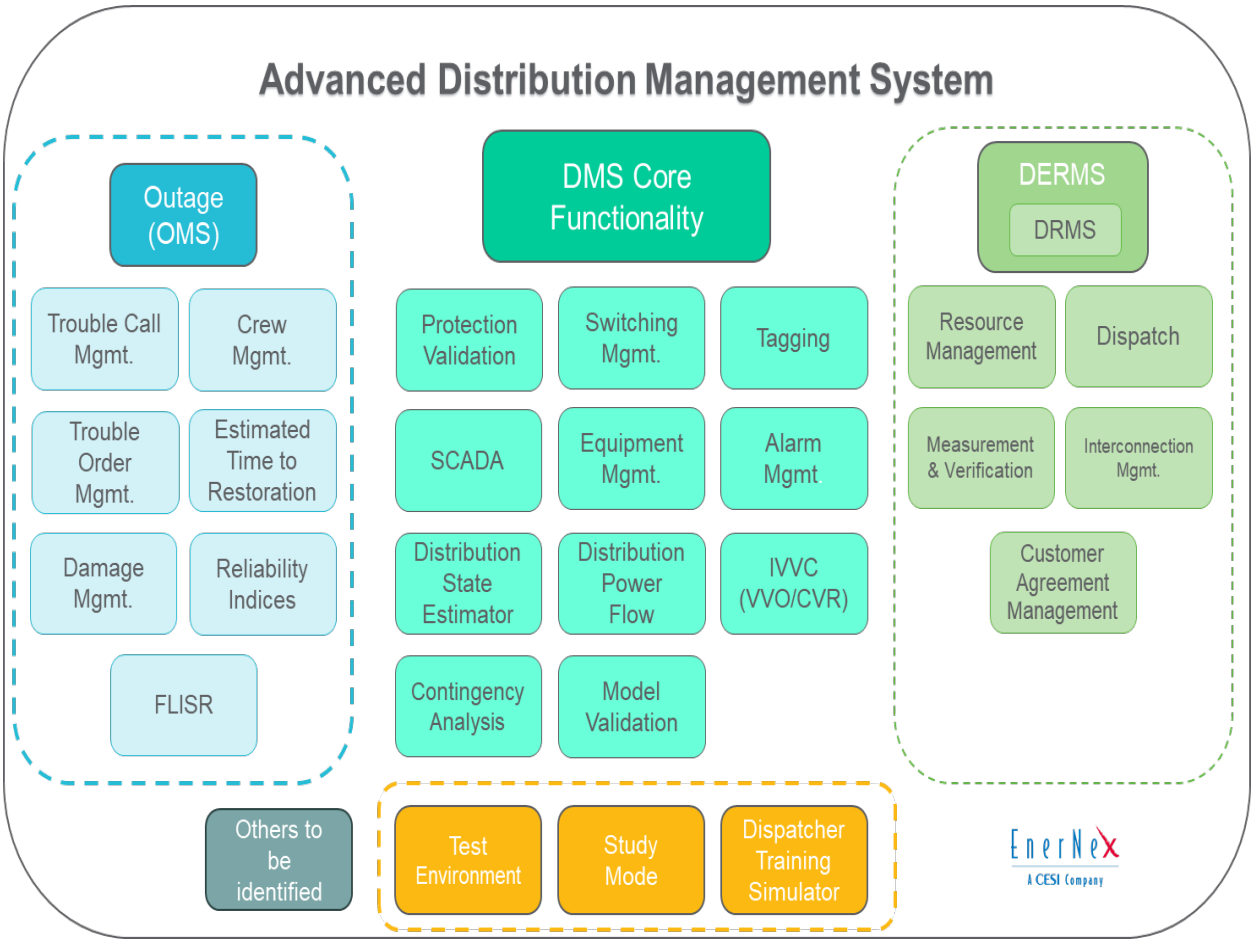
One component that Synergi does not currently provide is the forecasting integration function from Table E. Distribution forecasting and risk software applications centralize the economic and engineering analysis to support short-term feeder segment level and long-term aggregate substation forecasts on a granular temporal basis, depending on sensing and measurement data availability from automated field devices and advanced meters. This type of software integrates with existing engineering power flow models to support hosting capacity analysis and granular distribution-level load and DER forecasting. Consistent with industry best practices, PNM anticipates initiating a procurement for a commercial distribution forecasting and risk software package that can leverage intelligent field device and AMI data as part of the initial 6-year grid modernization plan.

The other aspect of interconnection requests is tracking, reviewing, and approving or denying individual customer interconnection applications. The improved distribution planning tools will make the engineering hosting capacity assessments more accurate and more efficient to produce.

2. Advanced Distribution Management System (ADMS)

An ADMS is a software platform that can integrate numerous operational systems, provide automated outage restoration, and optimize distribution grid performance. An ADMS utilizes the sensing and measurement capabilities of substation automation SCADA, distribution automation field devices, and advanced metering to enhance the monitoring, control and automation capabilities for distribution grid operations and management. Table F identifies the modules (OMS, DMS and DERMS) often associated with an ADMS platform.

Table F: Modules and Functions Associated with an ADMS



PNM has previously implemented the DMS and OMS modules of the ACS Prism ADMS platform.[41] The capabilities of an ADMS are dependent upon SCADA and distribution automation field devices to enhance the monitoring, control, and automation capabilities for distribution grid operations and management. As such, both the ACS Prism DMS and OMS have functionality that can be enhanced by the deployment of distribution automation field devices and additional ADMS modules. The ADMS modules are described below and additional details on the automation field devices (intelligent switches and FCIs) are discussed in the *Distribution Technology Roadmap*.

a. Distribution Management System (DMS)

The DMS is an operational system capable of collecting, organizing, displaying, and analyzing real-time or near real-time electric distribution system information. The DMS can also allow operators to plan and execute complex distribution system operations to increase system efficiency, optimize power flows, and prevent overloads. A modern DMS interfaces with other applications, such as GIS, OMS, and CIS to create an integrated view of distribution operations.

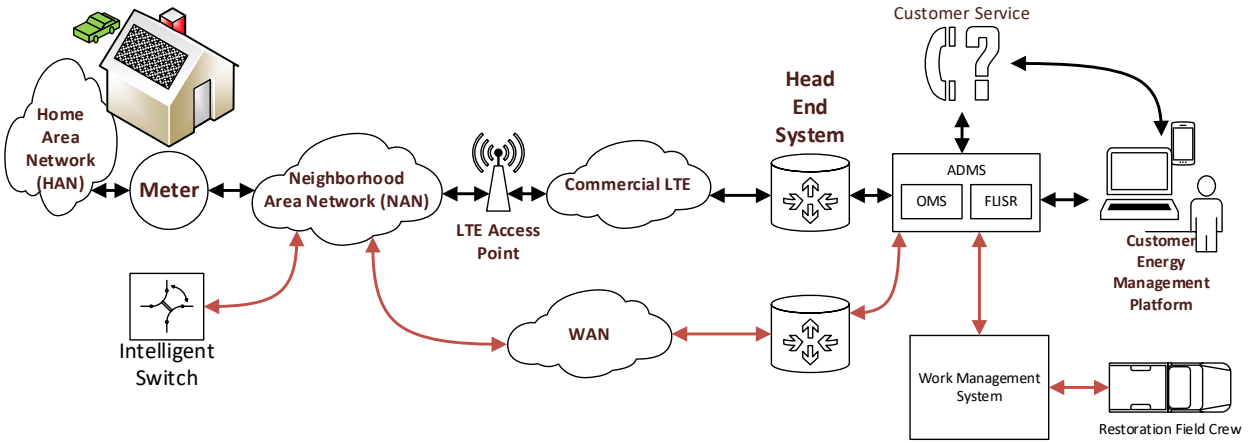
[41] *See* minsait/minsait, *available at* https://www.onesait.com/products/grid/

b. Outage Management System (OMS)

An OMS integrates automated field device data and advanced metering outage notifications and other information (such as interactive voice response from customer calls) to identify and assess outages and coordinate restoration activities. Analysis of outage data identifies interrupted equipment and circuits, enabling work crews to be dispatched to the location of the fault and decreasing the time to repair and the duration of the outage. It can also provide suggested switching plans to reduce the number of customers affected by an outage and ensure restoration crew safety.

Multiple grid modernization technologies can assist PNM with outage response. Intelligent switches (reclosers and smart fuses) both notify operators of an outage and open or close to isolate the fault and minimize the number of customers affected by an outage. Sensing and measurement devices including intelligent switches and FCIs supplement the outage notifications provided by AMI. As illustrated in Figure 13, the existing OMS will receive this outage data as well as the existing customer outage submittal channels through the call center, text messages, interactive voice response (IVR) system and eventually the customer energy management platform to estimate the location of the outage and coordinate outage restoration activities with field crews in conjunction with the work management system.

Figure 13: Outage Restoration



Advanced meters can provide outage restoration verification to confirm that power has been restored to customers – including the individual customers who notified PNM about an outage. PNM can then contact the customer to let them know that power has been restored and inform customers to contact PNM if there are any further issues. Outage restoration verification is useful – especially during storm conditions – when a field crew has finished repairs only to realize that there is a separate smaller outage (aka embedded outages) with a different root cause within the boundary of the larger outage that was just repaired. Without AMI, restoration crews may assume that power was restored to all customers downstream of the repair they just completed, and the utility may not know about the embedded outage until customers call to say they are still suffering an outage. Delays in identifying embedded outages can be mitigated by utilizing meter outage restoration verification and outage alerts to reassess the outage condition.

The more precise outage data can also be populated on the customer energy management platform to provide customers with updated information and estimated time for power restoration.[42]

As more intelligent switches are deployed, the more advanced outage management approach of FLISR can be implemented. FLISR is an ADMS module that supplements the OMS capabilities with algorithms to recommend or automatically reconfigure the system to minimize the number of customers affected by an outage, more accurately identify the likely location for the root cause of the outage and use available data sources to validate outage restoration. Additionally, the intelligent switches record and report on momentary outages which can help identify areas where vegetation may be encroaching on the conductors and tree trimming may be required.[43]

c. Voltage Management

A Volt-VAR Optimization (VVO) / Integrated Volt-VAR Control (IVVC) application as part of ADMS includes analytics models to determine which automated field devices to adjust and by how much to ensure power quality, particularly in support of increasing and proliferating adoption of solar PV including community solar and rooftop solar. The software system, in a centralized or decentralized arrangement, can control and coordinate devices, such as substation load tap changers (LTCs), feeder voltage regulators, capacitor banks, and smart inverters.

As a circuit approaches hosting capacity, power quality can be affected. Table G summarizes the potential voltage issues that can occur as hosting capacity is approached. Sometimes these hosting capacity issues can be localized to the customer with DER or just within their neighborhood and therefore not detectable at the substation or even by the sensing and measurement data from automated field devices.[44]

Table G: Potential Voltage Issues as Hosting Capacity is Approached

Voltage Condition	Potential Causes
Voltage Increase	A drop in electricity demand relative to local distributed generation output
	An increase in local distributed generation relative to electricity demand
	Both a drop in electricity demand and an increase in local distributed generation
Voltage Decrease	An increase in electricity demand relative to local distributed generation output
	A drop in local distributed generation relative to electricity demand
	Both an increase in electricity demand and a decrease in local distributed generation

PNM's plan is to address distribution system voltage issues as grid modernization capabilities are deployed and the needs arise as follows:

1) Deploy PNM's selected advanced meters with voltage sensing capabilities (interval voltage data as well as voltage swell and sag alerts) to identify where voltage issues are occurring at the customer level.

---

[42] *See* https://www.pnm.com/search-an-outage

[43] Utilizing momentary outage data to help identify areas for proactive vegetation management prior to a tree causing a sustained outage or even causing a fire is an emerging utility best practice.

[44] *See* Hawaiian Electric Company *Rooftop PV Interconnections: A Methodology of Determining PV Circuit Hosting Capacity*, filed in Docket No. 2014-0192 on December 11, 2015, *available at* https://dms.puc.hawaii.gov/dms/DocumentViewer?pid=A1001001A15L14B02558J79992

2) Utilize sensing and measurement data from automated field devices to determine where localized voltage issues are occurring on the circuit.
3) Work with the NMPRC and interested stakeholders and working groups to update New Mexico interconnection practices functionality with the updated IEEE standard,[45] including autonomous Volt-VAR and Volt-Watt functionality as well as capabilities for DER dispatchability when customers enroll in a potential future DER program
4) Identify appropriate voltage management solutions where needed in a coordinated manner based on the specific issues being encountered. A wide range of voltage and reactive power devices are employed in distribution systems including:
    - Transformer online load tap changers (OLTC)
    - Substation voltage regulators
    - Substation capacitor banks
    - Line voltage regulators
    - Line shunt capacitors
    - Secondary VAR controllers (Edge devices)
    - Advanced inverters for community/customer solar PV and battery storage

The grid modernization deployment of advanced meters and automated field devices will provide the sensing to identify where additional voltage controls are needed and the tactical deployment of voltage control devices to mitigate voltage issues where they are occurring. Additionally. PNM has been participating in the New Mexico Advanced Inverter Working Group ("AIWG") led by Gridworks. In September 2022, the AIWG was preparing its recommendations for Phase II of stakeholder engagement. The stated intent of Phase II was to support integration of DERs into New Mexico's electric power system through adoption of IEEE 1547-2018 and implementation of smart inverters.

d. Distributed Energy Resource Management Systems (DERMS)

A DERMS is a software solution that incorporates a range of capabilities to monitor and adjust the production and/or consumption levels of disparate DER either directly or through an aggregator. DERMS visibility of the distribution grid is typically from the substation downward (or outward) to the low-voltage secondary transformer and includes different levels of aggregation, such as at the substation bank, individual feeders, segments comprising a feeder, and distribution transformers. A DERMS may individually address disparate DER at the edge of the distribution grid by communicating directly with smart inverters, DC converters, other equipment, or communicating with third-party providers who have aggregated DER in an operational area and are presenting the aggregated DER as a combined controllable resource. This is important as different DER technologies have different attributes in terms of precision and response time that align with different grid needs and future DER programs should consider these performance attributes when determining the best use or application for each of the DER technologies. A DERMS enables DER programs based on specific DER attributes and grouping disparate DER technologies together to deliver specific grid services (e.g., load management) to help satisfy grid needs.

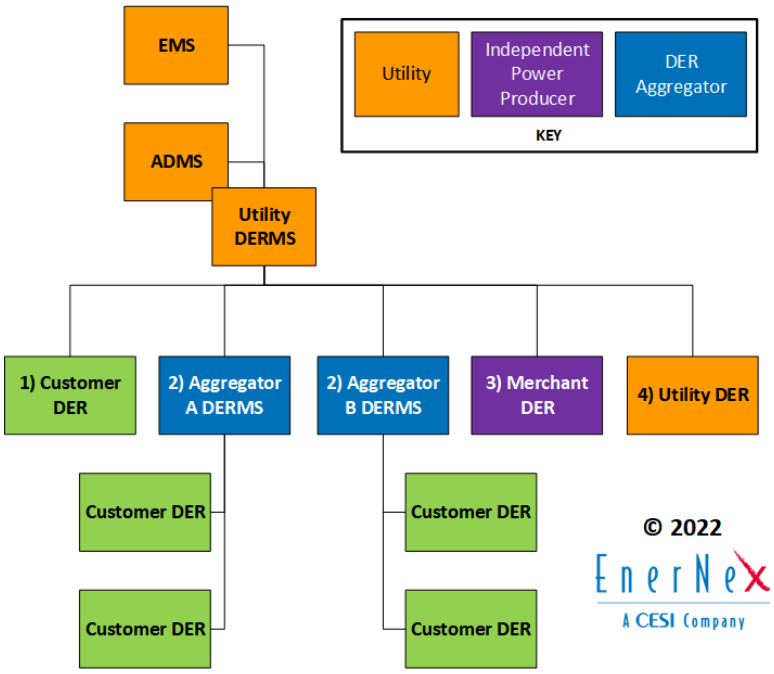
A DERMS is often considered a module of the ADMS platform. A DERMS may need to support multiple business models with different pathways to manage, monitor, and dispatch utility, merchant, aggregator, and customer owned DER. Figure 14 is intended to show the multiple business models for managing, utilizing, and interfacing with DER. A utility can have:

[45] See IEEE 1547-2018 at https://webstore.ansi.org/Standards/IEEE/IEEE15472018

1. direct-to-customer utility DER programs (including demand response (DR) programs);
2. aggregator(s) acting on behalf of the utility to fully manage or partially manage customer DER program(s);
3. a power purchase agreement with a merchant power producer to implement/manage DER (e.g., substation battery storage, community solar) at tactical points in the distribution system; and/or
4. utility owned/managed DER (e.g., substation battery storage, community solar) at tactical points in the distribution system.

These DER resources can be utility self-scheduled to support system wide grid needs, potentially interfacing with the bulk electric system energy management system (EMS) or at the distribution level (ADMS). In the near-term, PNM expects that substation batteries currently in the planning process as well as aggregator DR programs would interface with the DERMS (boxes 2 and 4).

Figure 14: DERMS Business Models



3. Distribution Network Model and Geographic Information System (GIS)

A GIS is used to capture, store, manipulate, analyze, and manage all types of geospatially referenced data. GIS tools enable users to create queries, analyze spatial information, edit data and maps, and present the results. Relevant geodata types might include land-based data, streets, ownership/real estate, vegetation, network topology, GPS location data for grid devices and components, and census data.

An electrical network connectivity model is a data set, in spatial context that contains geospatial grid asset details (physical data), configuration information, customer and DER connectivity details, and electrical network information (including electrical engineering parameters) to accurately depict the distribution system. This model is often visually represented in a GIS and used in power flow studies.

Distribution network connectivity software models provide a web-based, geospatial visualization of the electric distribution network and assets providing a single view of data and analysis for all users of the software system. The models are capable of dynamic updates and automated integration with GIS systems, power engineering, and planning modeling tools. An operating system such as an ADMS unifies

data from DMS, SCADA, and OMS to maintain a real-time "as-operated" distribution network connectivity model.

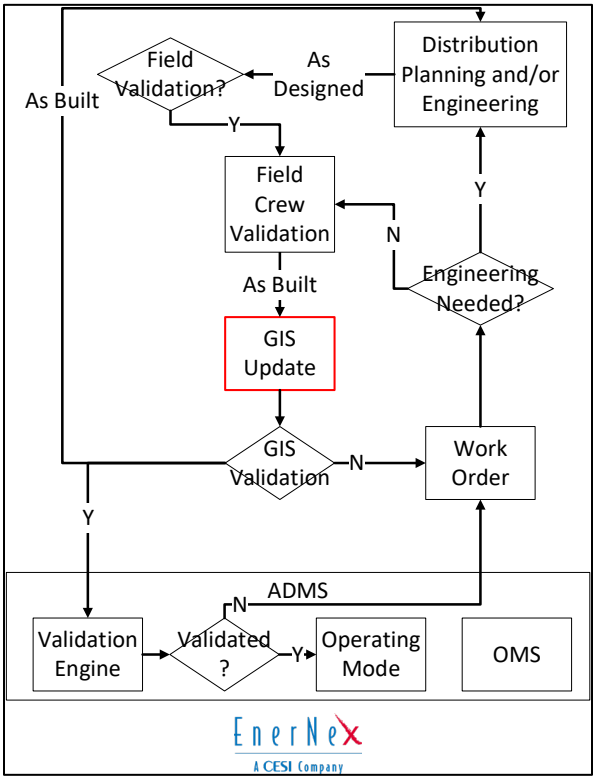
Essentially, the GIS keeps track of where each piece of utility infrastructure is located while a distribution network model keeps track of how each piece of infrastructure is connected along with associated equipment attributes.

The ADMS used by distribution operators as well as the distribution planning software require a representative digital network model of the physical distribution grid infrastructure based on the GIS data in order for the analysis, planning evaluations, and operational assessments to be accurate. As utilities make progress with grid modernization investments, the level of detail needed in the distribution network model evolves. PNM has already implemented the DMS and OMS modules of an ADMS and effort was put into both the GIS and distribution network model to provide an appropriate level of detail and accuracy to support those applications. However, as distribution planners begin utilizing additional software tools for hosting capacity analysis and additional modules are implemented for the ADMS (e.g., DERMS, FLISR, IVVC), an increased level of detail, accuracy, and management is needed by the distribution network model and GIS. The network model is sometimes called a digital twin of the physical grid. The accuracy of the network model will determine to what extent the advanced functions and capabilities of modern grid systems can be realized because the network model is at the core of all of the algorithms for analytic systems. As a result, grid modernization projects necessarily include significant effort to "clean up" and refine both the GIS and network model.

As illustrated in Figure 15, both the GIS and network model support the utility from planning through operations:

1) The distribution planners and engineers develop the "as designed" network model.
2) Work orders are developed to implement the "as designed" changes to the physical infrastructure resulting in an "as built" network model and the GIS is updated based on the "as built" infrastructure attributes.
3) The "as built" network model is:
    a. uploaded to the DMS, which is the system of record for the "as operated" network model reflecting the current switching conditions among other grid attributes.
    b. provided back to the distribution planners so that they are working from a current representation of the physical grid model.

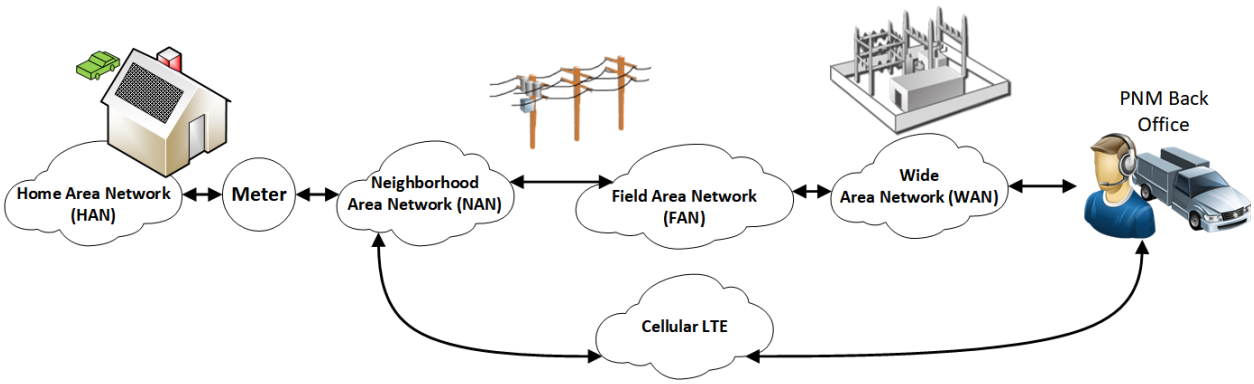
Figure 15: GIS and Network Model Management



D. Supporting Telecommunication Technologies

Operational communication infrastructures for the distribution grid include wide area networks (WAN), field area networks (FAN), and neighborhood area networks (NAN). The diagram in Figure 16 is an idealized representation of such a hierarchical network architecture. Additionally, the AMI system is capable of supporting customers who would like to connect the meter to their Wi-Fi network through a home area network (HAN). PNM is requesting funding for the NAN (as a component of AMI) and upgrades to the WAN while identifying a high-speed FAN as a likely investment for years 6-11 of the implementation.

Figure 16: Telecommunication Network Hierarchy



1. Wide Area Network (WAN)

Within the context of the distribution grid, the utility's WAN spans up to an entire service area, linking substations, and operating or control centers. The WAN may also provide the two-way network needed for SCADA devices at the substation and can be the bridge for telecommunication between the FAN and/or NAN and back office systems. A WAN may also involve the use of public (or private) cellular networks to connect to field devices and gateways that link to AMI neighborhood area mesh networks (NAN).

PNM currently utilizes both microwave and fiber optic communications as part of their WAN. However, the configuration of the WAN needs updating to modernize and increase bandwidth (telecommunication speed) and latency (telecommunication delay) to support grid modernization investments. The current fiber telecommunication backbone utilizes synchronous optical networking (SONET) serial communication. While appropriate for transmission assets for multiple reasons, the proliferation of distribution grid sensors and controls require a modern networking approach. Three investments have been identified to update the WAN:

1) **Multiprotocol label switching (MPLS) transport conversion**: MPLS will enable the routing capabilities needed to support modern networking capabilities for distribution automation
2) **Dense Wavelength Division Multiplexing (DWDM) conversion**: DWDM will enable the existing and future fiber optic cable to support both SONET and networked substation and distribution automation devices
3) **WAN Microwave system modernization:** The current microwave system bandwidth supports the SONET serial communication technology currently used in PNM's system. As the systems are moved to MPLS transport, modernization of the microwave system will be required to support the higher bandwidth requirements. In addition, an evaluation will be done on all communication done in the 6 GHz spectrum for possible conversion to the 11 GHz spectrum to mitigate interference caused by new Wi-Fi version 6e consumer equipment.

The WAN primarily supports telecommunication for substation automation but can also be utilized for communicating between the FAN and/or NAN and the PNM back office. The WAN can communicate through fiber optic cables, Microwave, Commercial Carrier Encrypted Cellular LTE, Private LTE, or Licensed 900 MHz RF to a head end system. WAN technology updates and enabling the NAN to WAN interface is in scope for the initial 6-year grid modernization plan.

2. Field Area Network (FAN)

The FAN primarily provides a communication path for distribution sensing and measurement and automated field devices outside of the distribution substation. Typically, the FAN relays data back to the WAN which then provides the telecommunication pathway to back-office systems. The FAN may also be utilized to connect the NAN to the WAN.

Alternatively, cellular LTE can be utilized as access points for both automated field devices and the NAN.

With the increase of distribution sensing and measurement and automated field devices, utilities are seeking a high-speed FAN solution at an affordable price. There are emerging solutions including private-LTE and licensed 900 MHz wireless networks that may address this need.

The existing licensed 900 MHz wireless band that PNM has been using for the FAN uses technologies and protocols that need to be updated to support grid modernization technologies. PNM has not yet

been successful in identifying an updated technical solution that could utilize the existing PNM licensed wireless bandwidth.

In the near term, PNM will utilize and assess whether the AMI NAN can support the technical bandwidth and latency requirements for the distribution automation field devices as well as the advanced meters. For this specific solution, the distribution automation field devices will use the NAN to relay data to the WAN.

PNM will also need to plan for the high-speed FAN to support emerging technical solutions for various sensor architectures, and peer-to-peer (P2P) communications between distribution automation field devices for protection and control. PNM anticipates requesting funding for a high-speed FAN for years 6-11 of the grid modernization plan.

3. Neighborhood Area Network (NAN)

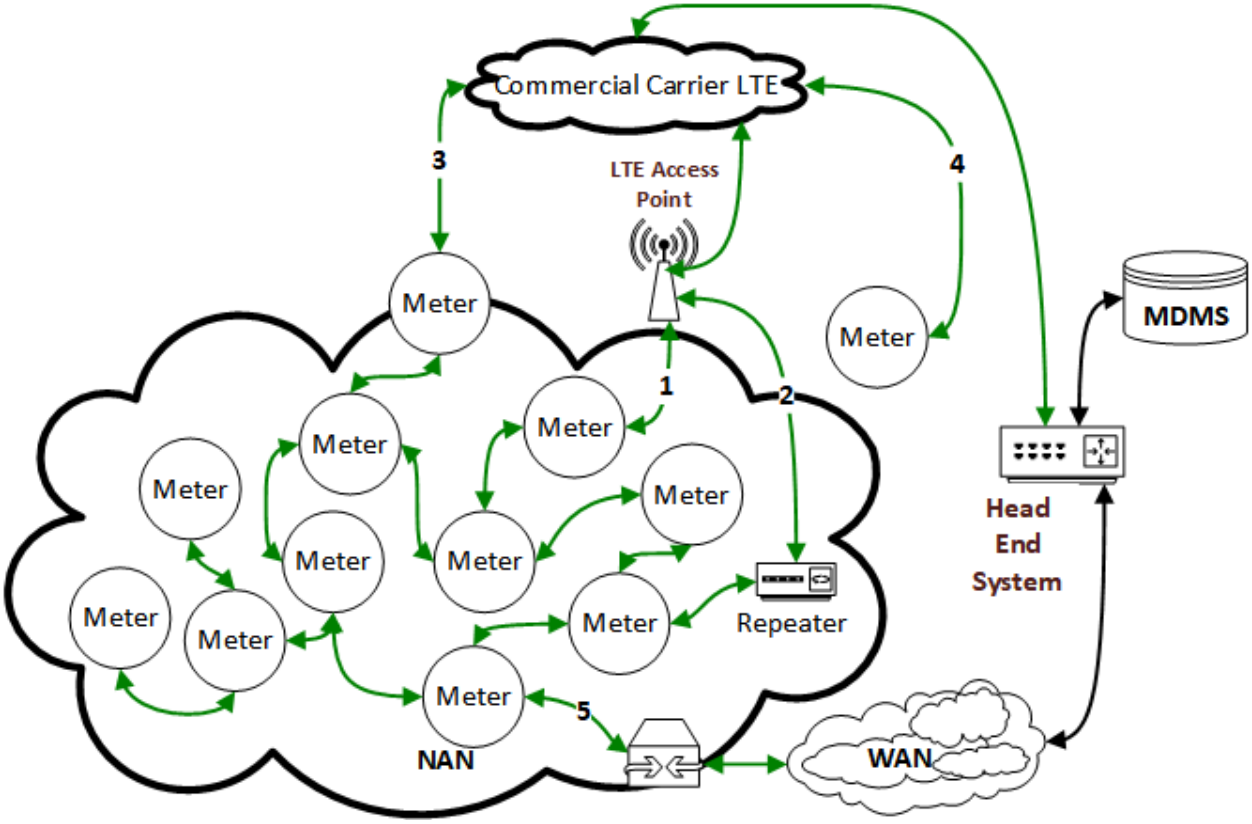
The NAN will utilize a mesh network[46] and is capable of utilizing the Wi-SUN communication protocol.[47] The meters will have several telecommunication options for communicating with the NAN:

1) A mesh meter that relays data to neighbor meters until it reaches an access point;
2) A mesh meter that uses neighbor meters as well as a relay to reach an access point;
3) A mesh meter that has an access point collar at the meter socket and can serve as an access point for neighbor meters; or
4) A mesh meter that has an LTE modem and communicates to the head end
5) A mesh meter that relays data to neighbor meters until it reaches the WAN

The high-level conceptual architecture for PNM's selected AMI solution is depicted in Figure 17 below which identifies the meter telecommunication pathways through the NAN to the head end system utilizing commercial carrier cellular LTE. The meters, relays, and access points are all capable of receiving firmware updates over the network.

[46] See IEEE 802.15.4 ISO/IEC/IEEE International Standard Local and metropolitan area networks Part 15 for low-rate wireless personal area networks (WPANs), *available at* (https://standards.ieee.org/ieee/8802-15-4/10031/) and IEEE 802.15.4aa-2022 IEEE Standard for Low-Rate Wireless Networks Amendment 4: Higher Data Rate Extension to IEEE 802.15.4 Smart Utility Network (SUN), *available at* (https://standards.ieee.org/ieee/802.15.4aa/10466/)
[47] See Wi-SUN Alliance, *available at* https://wi-sun.org/

Figure 17: Advanced Metering Infrastructure Conceptual Architecture



4. Home Area Network (HAN)

The 5th generation advanced meter selected by PNM includes the capability of joining a customer's Wi-Fi network. This capability is relatively new and is an evolution from prior AMI HAN capabilities which utilized different standards and never achieved the envisioned adoption or utilization by customers.[48] The transition of AMI to utilize existing and expanding customer adoption Wi-Fi for the AMI HAN will hopefully make it easier for customers to utilize near-real-time energy usage information.[49]

There are three primary applications for customers who would like to connect their advanced meter to their Wi-Fi network:

1) Receive near-real-time energy consumption data
2) Coordinate energy usage with smart appliances (e.g., thermostats, lighting, home entertainment, washer-dryer, refrigerators) and/or home energy management systems
3) Coordinate energy usage and export data with advanced inverters.

Rather than utilizing this Wi-Fi HAN communication between the meter and customer devices for customer DER program dispatch, this communication will enable customer devices to understand how much and when a customer is using electricity from the grid or exporting energy to the grid. However,

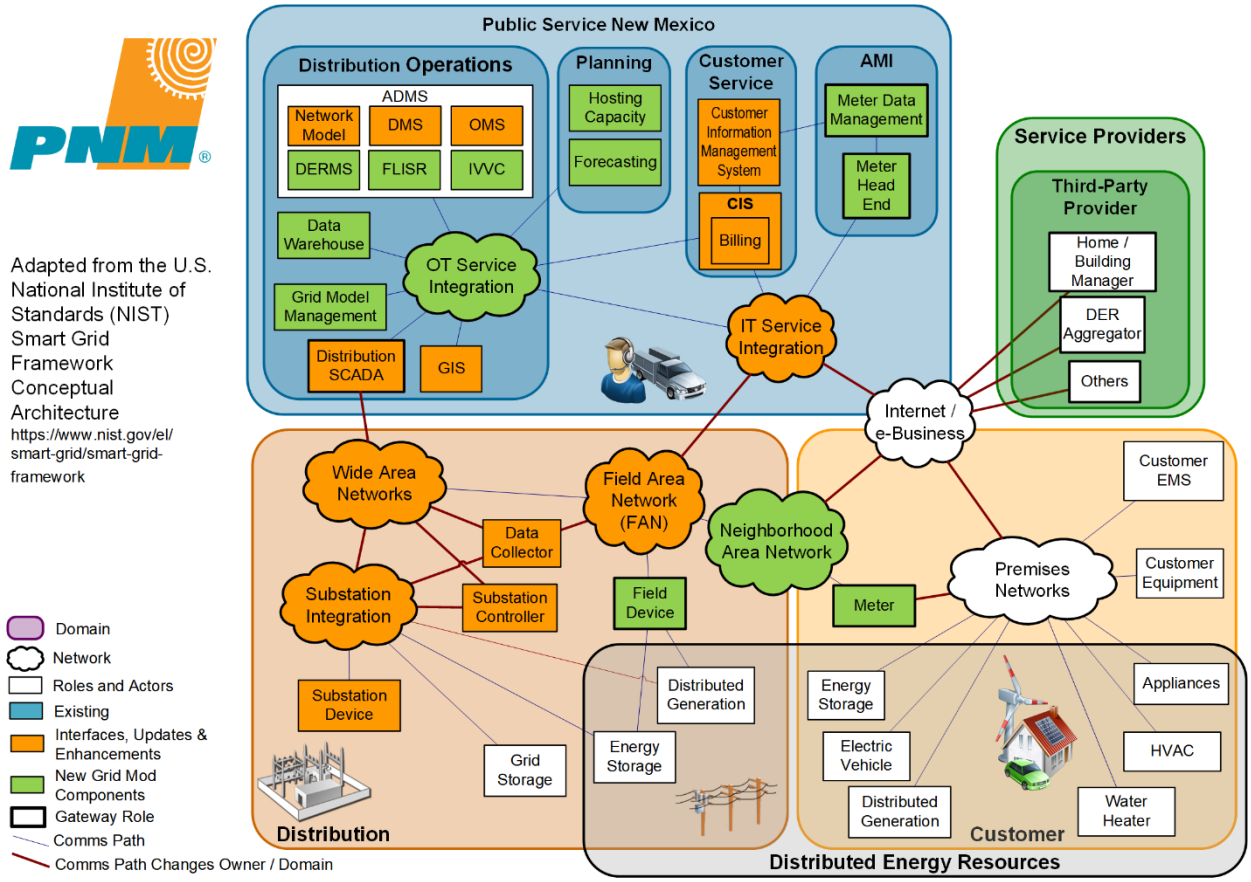
[48] *See* Zigbee Smart Energy, *available at* https://csa-iot.org/all-solutions/smart-energy/
[49] Approximately 88.8% of New Mexicans have access to wired or fixed wireless broadband: *See* https://broadbandnow.com/New-Mexico#:~:text=Internet%20Coverage%20by%20Demographic%20in%20New%20Mexico%201,3%20Cellular%20data%20only%3A%2012%25%204%20Satellite%3A%209%25

this evolution to a Wi-Fi interface for the AMI HAN is a recent development and it will take time for the enabling applications and customer programs to be developed.

IV. PNM Grid Modernization Conceptual Architecture

The National Institute of Standards and Technology (NIST) smart grid framework is an effective logical architectural reference model that is specifically tailored to electric utilities.[50] This logical model helps to highlight and identify data and control pathways across various domains (generation, transmission, distribution, utility operations, service providers, and customer). The NIST framework was utilized to develop Figure 18 which is an initial conceptual architectural view of the new grid modernization components for PNM's grid modernization implementation (depicted as green boxes) and existing systems and technologies that will be updated and enhanced to support the grid modernization components (depicted as orange boxes).

Figure 18: PNM Adaptation of NIST Smart Grid Framework Reference Architecture Domain Illustration



The resulting architectural representation illustrates how the DSPx system platform components fit together across the utility, service provider, distribution, and customer domains. The illustration highlights relative interdependence of new grid modernization components with existing systems and technologies.

[50] See NIST Smart Grid Framework, *available at* https://www.nist.gov/el/smart-grid/smart-grid-framework

V. Table of Acronyms

Table H: Potential Voltage Issues as Hosting Capacity is Approached

Acronym	Definition
ADMS	Advanced Distribution Management System
AIWG	Advanced Inverter Working Group
AMI	Advanced Metering Infrastructure
ANSI	American National Standards Institute
ASQ	American Society for Quality
ASTM	formerly known as American Society for Testing and Materials
BEV	Battery Electric Vehicle
C	Centigrade
CFR	Code of Federal Regulations
DER	Distributed Energy Resource
DERMS	Distributed Energy Resource Management System
DG	distributed generation
DMS	Distribution Management System
DOE	U.S. Department of Energy
DR	Demand Response
DSM	Demand Side Management
DSPx	U.S. Department of Energy Next Generation Distribution System Platform
EMNRD	New Mexico Energy, Minerals, and Natural Resources Department
EMS	Energy Management System
EPRI	Electric Power Research Institute
ESB	Enterprise Service Bus

Acronym	Definition
ETA	Energy Transition Act
EV	Electric Vehicle
FAN	Field Area Network
FCI	Faulted Circuit Indicator
FERC	Federal Energy Regulatory Commission
FLISR	Fault Location, Isolation and Service Restoration
GHG	Greenhouse Gas
GIS	Geographic Information System
Hz	Hertz
IEC	International Electrotechnical Commission
IEEE	Institute of Electrical and Electronics Engineers
IVR	Interactive Voice Response
IVVC	Integrated Volt-VAR Control
kW	Kilowatt
kWh	Kilowatt-hour
LTC	Load Tap Changer
LTE	Long Term Evolution
M&V	measurement and verification
MAC	Medium Access Control
MDMS	Meter Data Management System
NAN	Neighborhood Area Network
NEMA	National Electrical Manufacturers Association
NFPA	National Fire Protection Association

Acronym	Definition
NIST	National Institute of Standards and Technology
NISTIR	National Institute of Standards and Technology Interagency Report
OLTC	Online Load Tap Changers
OMS	Outage Management System
OSB	Operational Service Bus
PHEV	Plugin Hybrid Electric Vehicle
PHY	Physical Layer
PNM	Public Service Company of New Mexico
PV	Solar Photovoltaic
SCADA	Supervisory Control and Data Acquisition
SUN	Smart Utility Network
TOD	Time-of-Day
UL	Underwriters Laboratory
V	Volt
V2G	Vehicle-To-Grid
V2X	Vehicle-To-Whatever
VA	Volt-Ampere
VAR	Volt-Ampere-Reactive
VEE	Validation, Estimation, and Error correction
VVO	Volt-VAR Optimization
W	Watt
WAN	Wide Area Network
Wh	Watt-hour

Acronym	Definition
WHEV	Whole House Electric Vehicle
WPAN	Wireless Personal Area Network

PNM's Grid Modernization Implementation Plan

I. Introduction

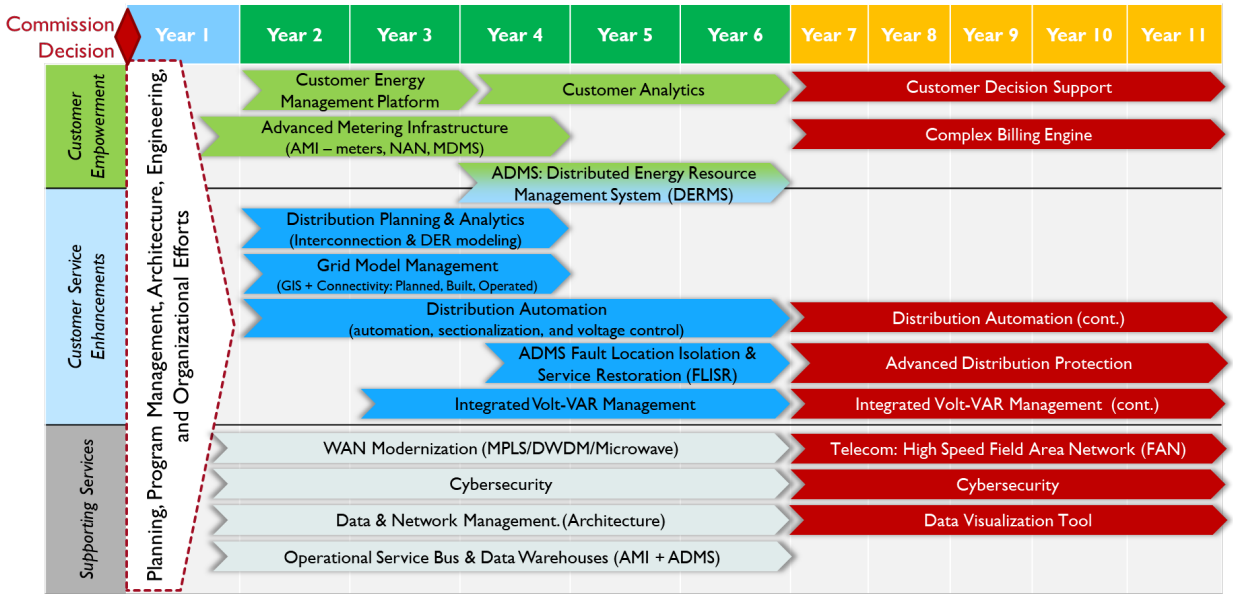
This Implementation Plan[1] identifies the projects PNM proposes as part of its Application to further the goals of the Grid Mod Statute and PNM policy objectives. The Implementation Plan provides (1) the purpose and benefits of PNM's proposed grid modernization investments, (2) the estimated timeline for deploying the proposed projects; (3) an overview of project costs; and (4) identification of the witnesses sponsoring each project. Finally, this Implementation Plan explains how PNM will collect the costs associated with the projects via the Grid Mod Rider and how PNM will update the Grid Mod Rider as part of an annual filing with the Commission.

II. Grid Modernization Implementation Plan Overview

PNM's Implementation Plan proposes a series of interrelated grid modernization investments designed to help PNM partner with its customers to achieve its decarbonization goals and the objectives outlined in the Grid Mod Statute. Figure 1, below, provides a high-level overview of PNM's Implementation Plan timeline and initial investments.

Figure 1

High-Level Grid Modernization Implementation Plan



As Figure 1 shows, PNM's Implementation Plan includes an 11-year vision for grid modernization beginning upon Commission approval of the Application. Years 1 through 6[2] constitute the Implementation Plan period, while Years 7 through 11 represent PNM's long-term strategy for grid modernization. PNM's proposed grid modernization investments generally fall into three categories: (1) customer empowerment, (2) customer service enhancements, and (3) supporting services. The PNM grid modernization Implementation Plan provides a cohesive and balanced

[1] All capitalized terms are defined in Appendix A.
[2] For the purpose of this Implementation Plan, references to "Year X" are consistent with Figure 1.

set of grid modernization investments that work synergistically to enable the energy transition to carbon-free generation, enhance reliability and improve customer service while maintaining affordability and minimizing bill impacts.

In the first half of Year 1, PNM will conduct planning, program management and engineering activities. PNM's Application proposes specific strategically phased-in grid modernization investments beginning in the last half of Year 1 and continuing through Year 6. The Application specifically requests authorization to implement the investments identified in Years 1 through 6.

Figure 1 also shows PNM's long-term grid modernization strategy for Years 7 through 11. PNM is not currently requesting authorization for investments included in this latter period but presents the long-term vision to show the logical progression and program sequencing.

III. PNM's Grid Modernization Investments

The subsections below introduce the proposed grid modernization investments included in the initial six-year Implementation Plan for which PNM is requesting Commission authorization in the Application. Each subsection explains the purpose and benefits of the proposed grid modernization investment. In addition, these subsections provide PNM's proposed timeline for project deployment and costs. Finally, the Implementation Plan identifies the PNM witnesses supporting each investment and the associated cost recovery.

A. Advanced Metering Infrastructure

i. Purpose & Benefits

Advanced metering infrastructure, or AMI, is the foundational element of PNM's grid modernization strategy. PNM's proposed AMI solution is comprised of advanced meters, a wireless mesh neighborhood area network incorporating cellular LTE and fiber-enabled telecommunication access points, a head-end system to communicate with advanced meters, and a meter data management system, or MDMS, to store and manage the meter data and interface with other PNM systems, including the CIS billing system.

PNM's proposed advanced meters enable remote disconnect and reconnect, alerts regarding service status, outages and outage restoration, and tamper and theft detection. The meters will be able to measure and transmit granular energy-usage interval data and voltage that, when combined with other grid modernization projects included in the Application, will allow customers and PNM to monitor energy usage, optimize DER hosting capacity, and improve distribution automation.

The AMI investments are necessary to unlock the full benefits associated with other aspects of PNM's grid modernization Application. For example, AMI must be operational and able to communicate with PNM's systems prior to providing planned customer information and analytics through the Customer Energy Management Platform (discussed in Section 3.D below). Similarly, AMI is necessary to enable PNM to improve distribution automation and distribution planning and engineering (discussed in Sections 3.E and 3.G). AMI will allow PNM and its customers to maximize the overall benefits provided by the grid modernization projects included in this Application.

ii. Deployment Timeline and Costs

In Year 1, PNM's grid modernization efforts will focus on detailed planning, engineering, and procurement activities as well as AMI infrastructure upgrades. PNM will begin installing the systems necessary to support advanced meters, including the MDMS and the head-end system, in Year 1. In Year 2, PNM, through its selected vendor, will begin installing advanced meters in its service territory. The advanced meter installation will occur over a three-and-a-half-year period (approximately Years 2-4), concurrent with complementary grid modernization investments in telecommunications, cybersecurity, and data management and architecture.

PNM will employ an EJ Screening Tool to allow for screening and review of environmental and demographic data (*i.e.*, low-income data) to assist PNM in prioritizing the deployment of grid modernization projects in disadvantaged communities, identifying potential impacts on those communities, and in developing mitigation responses. PNM plans to use the EJ Screening Tool to prioritize low-income and underserved communities for advanced meter installation and distribution upgrades.

Table 1 below shows PNM's proposed AMI capital clearings and O&M expenses[3] over the initial six-year Implementation Plan.

Table 1

	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6
Total Advanced Metering Capital Clearings	**1,684,766**	**48,294,544**	**63,456,155**	**55,808,134**	**1,722,540**	**-**
Customer Information & Analytics Portals	-	19,262,799	39,927,021	36,129,813	-	-
AMI Meter Installation Labor	-	8,711,245	18,056,257	16,339,040	-	-
Handheld units	-	38,359	-	-	-	-
Initial Project Costs	-	5,023,500	3,342,275	3,339,281	1,722,540	-
MDMS	-	1,447,615	-	-	-	-
MDMS System Integration	-	2,134,889	2,130,602	-	-	-
Meter Head End	-	8,202,897	-	-	-	-
PNM AMI Access Point Installation	1,684,766	3,473,242	-	-	-	-
Total Advanced Metering O&M Expenses	**5,704,238**	**6,410,562**	**4,917,000**	**3,334,244**	**1,404,840**	**(2,418,265)**

As Table 1 shows, AMI capital clearings begin in Year 1 as PNM installs AMI access points, starts implementing software systems, and prepares for meter installation. Additional capital clearings occur in Years 2 through 6, when PNM plans to install the advanced meters and related AMI systems. AMI O&M expenses begin in Year 1 as PNM begins customer outreach efforts, meter reader retraining and AMI licensing, maintenance, and SaaS costs. The O&M expenses increase in Year 2 as PNM deploys the MDMS and head-end systems necessary to store and read data

[3] Table 1 includes total AMI O&M expenses.

produced by the advanced meters. In Year 3, net AMI O&M expenses begin to decrease as PNM uses the advanced meters for remote meter reads, thereby avoiding manual meter reading costs.

iii. PNM Supporting Witnesses

PNM witnesses Julie Rowey, Mario Cervantes, Jon Hawkins, and Eric Morgan support the AMI project costs.

B. Cybersecurity

i. Purpose and Benefits

PNM proposes to implement new or upgraded tools as part of its grid modernization efforts to proactively address cybersecurity issues. The AMI relies on telecommunication networks to communicate data to PNM and its internal systems. PNM must put appropriate cybersecurity measures in place to protect the data and the integrity of its networks. To meet this objective, PNM uses industry standards to (1) identify threats, (2) protect the system against infiltration, (3) detect and deter cyber threats, (4) respond to compromising events by assessing, containing and mitigating damages, and (5) recover capabilities and return systems to normal.

PNM's grid modernization Application proposes the following cybersecurity-related capital investments:

(1) A security monitoring system specifically addressing industrial control systems devices used within the distribution system. This system will help identify, detect and respond to cybersecurity issues with these devices.

(2) Additional firewalls between networks to provide network access rules between various new networks. The firewalls will help protect and detect appropriate or inappropriate data traffic to allow or block, as appropriate, between networks.

(3) Network security monitoring and a Security Information and Events Management system for the new operational networks. This system will monitor and serve as an alert system to identify, detect, and respond to cybersecurity issues on the new networks.

(4) Software-defined networking and network segmentation for the new networks. These applications will allow PNM to separate networks virtually within a single physical network to control where data can traverse within the network.

The cybersecurity investments proposed in the Application are necessary to protect the new devices and telecommunication networks deployed to achieve grid modernization.

ii. Deployment Timeline and Costs

PNM plans to begin investing in cybersecurity upgrades in Year 1. The initial investments include implementing software platforms for network monitoring. In Year 2, PNM plans to deploy or upgrade firewalls between networks, security information and event management software, and software-defined networking and network segmentation. PNM will also incur cybersecurity O&M costs related to annual software maintenance fees beginning in Year 2.

Table 2 below shows PNM's proposed cybersecurity capital clearings and O&M expenses over the initial six-year Implementation Plan.

Table 2

	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6
Total Cybersecurity Capital Clearings	**69,295**	**4,062,099**	**210,662**	**210,473**	**217,142**	**-**
Industrial Control device (monitoring)	17,722	89,972	53,875	53,827	55,532	-
Firewalls/IDP	-	321,329	-	-	-	-
Network Security Monitoring (five-year investment)	51,574	261,838	156,787	156,647	161,610	-
SIEM	-	1,028,253	-	-	-	-
Software Defined Networking / Network segmentation	-	2,360,708	-	-	-	-
Total Cybersecurity O&M Expenses	**-**	**217,350**	**228,218**	**239,628**	**251,610**	**264,190**
Cyber Systems - Annual Software Maintenance Fees	-	217,350	228,218	239,628	251,610	264,190

iii. PNM Supporting Witnesses

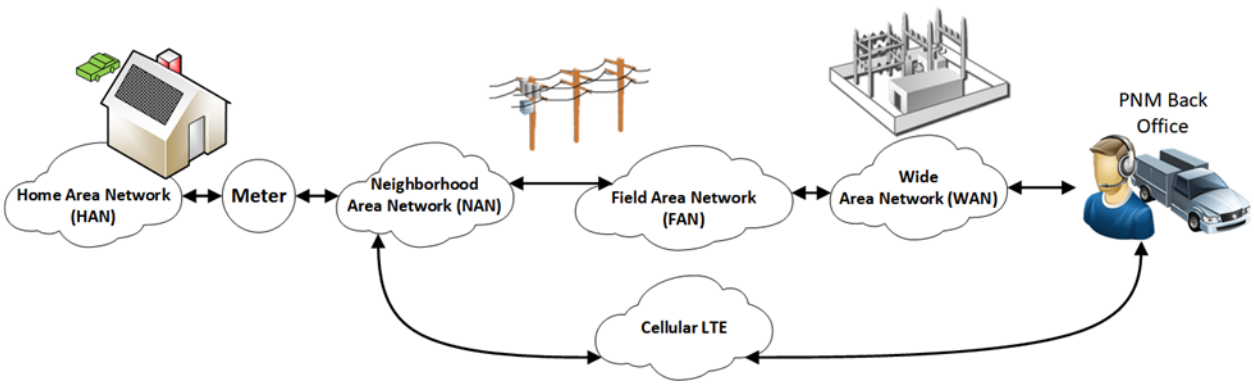
PNM witness Jonathan Hawkins supports the cybersecurity project costs.

C. Telecommunications

i. Purpose and Benefits

PNM proposes grid modernization investments to develop telecommunications networks to support AMI, distribution automation field devices, and the operation of future advanced grid applications. PNM plans to deploy a neighborhood area network, or NAN, to serve as the telecommunications network supporting AMI deployment and distribution automation devices. The NAN will use cellular Access Points, or APs, as well as PNM's wide area network, or WAN, to bring data back to PNM's software systems. In addition, PNM's proposed AMI system will eventually support customers that choose to connect the advanced meter to their Wi-Fi network through a home area network, or HAN. PNM anticipates investing in a high-speed field area network, or FAN, in years 6-11. Figure 2 below shows the idealized representation of such a network architecture.

Figure 2



PNM's grid modernization Application includes investments to improve its existing WAN and to deploy the NAN. These investments are discussed in detail below.

a. Wide Area Network Updates

The wide area network, or WAN, generally provides for communications between substations and operating or control centers. The WAN may also provide the two-way network needed for SCADA devices at the substation and can be the bridge for telecommunication between the NAN or FAN and back-office systems.

PNM's WAN configuration needs to be updated to increase bandwidth (telecommunication speed) and decrease latency (telecommunication delay) to support grid modernization investments. PNM's grid modernization Implementation Plan identifies the following investments to update the WAN:

1) **Multiprotocol label switching transport conversion**: Enables the routing capabilities needed to support modern networking capabilities for distribution automation and can offer key capabilities for reliability, resilience, and security for new distribution communication applications.
2) **Dense wavelength division multiplexing conversion**: Enables aggregation across the network backbone and additional capacity between data centers and control centers.
3) **WAN microwave system modernization:** Modernizes PNM's microwave system to support the higher bandwidth requirements necessary to support distribution automation.

The WAN primarily supports telecommunication for substation automation but can also be utilized for communicating between the FAN or NAN and PNM's back office. The primary benefit of the WAN upgrades is to provide live data to the distribution operations center for decision making.

b. Neighborhood Area Network and Field Area Network Deployment

PNM plans to deploy a neighborhood area network, or NAN, to serve as the telecommunications network supporting AMI deployment and distribution automation devices. The NAN will use a wireless mesh network. In the near term (initial 6-year implementation period), PNM will also use the NAN to enable communication with the automated field devices with sensing and measurement capabilities. PNM anticipates that as it deploys more automated field devices, the performance (bandwidth and latency) of the NAN may not support future needs. Therefore, PNM has identified a potential need for a high-speed FAN in the second half of the 11-year grid modernization strategy.

The AMI wireless mesh NAN will communicate with the head-end system either through cellular access points or through direct connection to the WAN where possible. The AMI system cannot function without these enabling telecommunication devices. Implementing the NAN, and eventually the FAN, will provide reliable communication capabilities for AMI and distribution automation field devices. PNM's grid modernization Implementation Plan increases the number of distribution sensing and measurement and automated field devices, which will eventually require a high-speed FAN solution, but PNM plans to use the NAN mesh network for the initial six-year investment period.

PNM's current grid modernization Application proposes several NAN-related investments. PNM's grid modernization application requests approval for investments to (1) design the network systems and provide cybersecurity, (2) configure the software and hardware components of the

NAN in the back office, and (3) install wireless mesh NAN devices (*e.g.*, meters, repeaters and cellular access points), (4) install distribution automation network interface controls, and (5) integrate the NAN with the WAN for distribution automation telecommunication support.

ii. Deployment Timeline and Costs

The telecommunications network deployment and upgrades will begin in Year 1, with PNM incurring capital costs for FAN devices and incremental O&M costs for telecommunication employees. In Year 2, PNM will begin clearing capital costs related to the WAN upgrades, which will continue on a relatively flat basis from Year 2 through Year 6.

Table 3 below shows PNM's proposed telecommunication capital clearings and O&M expenses over the initial six-year Implementation Plan.

Table 3

	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6
Total Telecommunications Capital Clearings	**182,938**	**7,881,382**	**8,034,705**	**8,070,839**	**8,326,547**	**8,198,063**
DA NAN Bridge	182,938	169,488	338,296	381,325	393,407	378,940
WAN DWDM Conversion	-	1,542,379	1,539,282	1,537,903	1,586,628	1,563,825
WAN Microwave system modernization	-	3,598,884	3,591,658	3,588,440	3,702,132	3,648,924
WAN MPLS Transport conversion	-	2,570,631	2,565,470	2,563,171	2,644,380	2,606,374
Total Telecommunications O&M Expenses	**383,371**	**400,269**	**765,378**	**799,174**	**834,490**	**871,396**
DA NAN Bridge O&M Annual Software Maintenance Fees	1,364	1,364	1,364	1,364	1,364	1,364
Telecom Engineering Employees	-	-	764,014	797,810	833,126	870,032
Telecom Operations & Management Employees	382,007	398,905	-	-	-	-

Table 3 above does not include the NAN access point installation costs because those communication system costs are included in the AMI vendor contract. As a result, the telecommunication costs included in Table 3 are primarily related to the WAN upgrades.

iii. PNM Supporting Witnesses

PNM witness Jonathan Hawkins supports the telecommunication project costs.

D. Customer Information & Analytics

i. Purpose and Benefits

PNM's Implementation Plan includes investment for the Customer Energy Management Platform (Platform) that enables customers to access and interact with their energy-usage information collected by the AMI system. The Platform will enable the exchange and display of granular

energy-usage information based on the customer's AMI interval data. PNM's Customer Energy Management Platform will provide customers (or a customer-designated authorized user) access to their granular usage data via intuitive web-based graphs and charts.

The Customer Energy Management Platform will be able to display previous days' usage, as well as historical usage data that can provide forecasted monthly bill amounts and bill alerts based on customer-set thresholds. Customers will be able to compare current usage data to historical usage to determine opportunities to conserve or shape their energy use and save money. Additionally, PNM's contact center representatives will be able to access the customer's meter data to assist customers with bill inquiries. Over time, the Customer Energy Management Platform will provide additional functionality to customers, including options to pre-pay bills and pick your own bill date.

PNM anticipates the Customer Energy Management Platform will eventually evolve to enable customers to use AMI data to inform whether to install solar photovoltaic or to determine potential billing impacts from purchasing an electric vehicle.

ii. Deployment Timeline and Costs

PNM plans to deploy the Customer Energy Management Platform investments in Year 2. Related O&M costs will begin concurrently. The Customer Energy Management Platform relies on the AMI implementation, including the MDMS and head-end system, to provide customers with their granular energy usage data. As a result, the Customer Energy Management Platform implementation is coordinated to be completed at approximately the same time as those AMI systems.

Table 4 below shows PNM's proposed customer information and analytics capital clearings and O&M expenses over the initial six-year Implementation Plan.

Table 4

	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6
Total Customer Information & Analytics Capital Clearings	**-**	**521,989**	**-**	**-**	**-**	**-**
Customer Information & Analytics Portals	-	521,989	-	-	-	-
Total Customer Information & Analytics O&M Expenses	**-**	**1,390,214**	**1,404,781**	**1,420,003**	**1,435,911**	**1,452,534**
Customer Info & Analytics Support O&M	-	1,060,000	1,060,000	1,060,000	1,060,000	1,060,000
Customer Portal Management & Analytics Employees	-	330,214	344,781	360,003	375,911	392,534

iii. PNM Supporting Witnesses

PNM witness Mario Cervantes supports the customer information and analytics project costs.

E. Distribution Automation

i. Purpose and Benefits

PNM's proposed distribution automation investments include intelligent switches (*i.e.*, reclosers and smart fuses), voltage management devices including capacitor banks and tap changers, and fault current indicators. These devices contain sensors, on-board analytics, microprocessors, and communication interfaces. PNM anticipates it will take 11 years to fully deploy its envisioned distribution automation devices. The grid modernization Application only includes investments for the initial six-year deployment.

Distribution automation is the most significant grid-facing investment for PNM's six-year Implementation Plan and the benefits are similarly significant. Fault current indicators assist in detecting faults on overhead and key underground facilities. Smart fuses improve upon traditional fuse operation by allowing faults that are transient in nature to be cleared by reclose operations, thus eliminating the need for truck rolls to replace blown fuses. Reclosers typically provide the first level of sectionalizing after the station feeder breaker. Voltage controls provide voltage regulation and volt-amp reactive, or VAR, support in the circuit to maintain power factor requirements and compliance standards on service voltage particularly required with the increased penetration of PV on distribution feeders. Together, these distribution automation investments provide immediate improvements to PNM's distribution system reliability and resilience.

In the long term, the distribution automation investments will be integrated with the telecommunication systems, ADMS, and distribution planning tools to provide additional distribution system visibility and analytic capabilities and improved controls to address power outages and customer service quality issues. The FLISR and integrated Volt-Var management capabilities, discussed below, depend upon the enabling distribution automation technologies being deployed. The initial six-year Implementation Plan puts the systems and technologies in place to evolve PNM capabilities even further.

ii. Deployment Timeline and Costs

PNM proposes capital investments for distribution automation mesh repeaters in Years 1 and 2, as the repeaters must be installed to support AMI telecommunication. Investments for fault current indicators, reclosers and smart fuses will begin in Year 2, with relatively consistent annual investments over the initial six-year deployment period. PNM will begin upgrades to voltage management devices (*e.g.*, substation load tap changes, field capacitor banks, and line regulators) beginning in Year 3. Similarly, the bulk of distribution automation O&M costs, which are tied to new employees, begin in Year 2 with gradual increases over the initial deployment period.

Table 5 below shows PNM's proposed distribution automation capital clearings and O&M expenses over the initial six-year Implementation Plan.

Table 5

	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6
Total Distribution Automation Capital Clearings	**4,152,671**	**16,184,942**	**16,150,848**	**16,620,468**	**17,661,467**	**17,929,861**

Voltage Management Devices	-	-	3,848,205	3,960,099	4,208,134	4,272,084
Distribution Automation Intelligent Switches (Reclosers)	-	10,843,694	11,146,579	11,470,689	12,189,139	12,374,372
Distribution Automation Intelligent Switches (Single Phase Reclosers / Smart Fuses)	-	1,028,253	1,056,974	1,087,707	1,155,834	1,173,399
FCIs	-	96,399	99,091	101,973	108,359	110,006
PNM Dist Automation Mesh Repeater	4,152,671	4,216,597	-	-	-	-
Total Distribution Automation O&M Expenses	**9,750**	**618,471**	**741,521**	**893,465**	**1,082,979**	**1,324,568**
Distribution Automation Employees	9,750	618,471	741,521	893,465	1,082,979	1,324,568

iii. PNM Supporting Witnesses

PNM witnesses Jonathan Hawkins and Omni Warner support the distribution automation project costs.

F. ADMS

i. Purpose and Benefits

ADMS is a software platform that can integrate numerous operational functions including distribution management, outage management, and distributed energy resource management to optimize distribution grid performance. An ADMS utilizes the sensing and measurement capabilities of substation automation SCADA, distribution automation field devices, and advanced metering to enhance the monitoring, control and automation capabilities for distribution grid operations and management.

PNM has partially installed ADMS platform that includes a distribution management system, or DMS, and an outage management system, or OMS that requires expansion under the PNM's Implementation Plan. The ADMS is integrated with GIS, an operational data repository, and a SCADA system for substation breakers and a very limited number of substation load tap changers, field switches and capacitor banks. These prior investments provide some initial functionality to support outage management and operational efficiency. However, considerable gaps in visibility and operational control remain.

PNM's Implementation Plan includes investments to expand its existing DMS and OMS platform with ADMS capabilities, including Fault Location, Isolation and Service Restoration, or FLISR, integrated Volt-Var control, and a Distributed Energy Resource Management System, or DERMS.

The ADMS together with the grid modernization telecommunication and distribution automation investments will allow operators and engineers to plan, design, and execute complex distribution system operations to increase system efficiency, optimize power flows, and prevent overloads.

The OMS will integrate automated field device data, advanced metering outage notifications and other information (such as interactive voice response from customer calls) to identify and assess outages and coordinate restoration activities.

As PNM deploys more reclosers and smart fuses, we will implement the FLISR ADMS module to supplement OMS capabilities. The FLISR ADMS module will use algorithms to recommend or automatically reconfigure the distribution system. This will minimize the number of customers affected by an outage, more accurately identify the likely outage root cause locations, and provide available data sources to validate outage restoration. FLISR implementation will also strengthen PNM's ability to optimize DERs and storage resources on its system.

PNM's Implementation Plan also includes an integrated Volt-Var control application as part of the ADMS investments. Integrated Volt-Var management can help PNM address the changing dynamics resulting from increased solar production and EV charging on the distribution grid. PNM's initial six-year Implementation Plan approach is to gain intelligence through AMI and grid sensing to determine where voltage support is needed.

Finally, PNM's Implementation Plan includes ADMS investments to implement a DERMS software solution. The DERMS will monitor and adjust the production and/or consumption levels of disparate DERs. The DERMS can integrate with demand management capabilities to enable managed charging through EV rates and programs. In the near-term, PNM expects that substation batteries currently in the planning process as well as aggregator DR programs would interface with the DERMS.

ii. Deployment Timeline and Costs

PNM's Implementation Plan for ADMS expansion includes O&M costs for business process change management throughout the six-year Implementation Plan period. The ADMS expansion for integrated Volt-Var management will occur in Year 4, while the FLISR and DERMS modules will be implemented in Year 6. Software maintenance fees for each ADMS module expansion will begin in the year prior to module implementation.

Table 6 below shows PNM's proposed ADMS capital clearings and O&M expenses over the initial six-year Implementation Plan.

Table 6

	Sum of Year 1	Sum of Year 2	Sum of Year 3	Sum of Year 4	Sum of Year 5	Sum of Year 6
Total ADMS Capital Clearings	**-**	**-**	**-**	**7,572,492**	**-**	**15,400,258**
ADMS - DERMS	-	-	-	-	-	6,320,913
ADMS - FLISR	-	-	-	-	-	6,320,913
ADMS - IVVC	-	-	-	6,216,137	-	-
ADMS Expansion - DERMS System Integration	-	-	-	-	-	1,379,217
ADMS Expansion - FLISR System Integration	-	-	-	-	-	1,379,217
ADMS Expansion - IVVC System Integration	-	-	-	1,356,355	-	-

Total ADMS O&M Expenses	**819,333**	**333,333**	**833,333**	**858,333**	**1,884,583**	**1,962,146**
ADMS - DERMS Annual Software Maintenance Fees	-	-	-	-	500,000	525,000
ADMS - FLISR Annual Software Maintenance Fees	-	-	-	-	500,000	525,000
ADMS - IVVC Annual Software Maintenance Fees	-	-	500,000	525,000	551,250	578,813
ADMS (FLISR/IVVC/DERMS) Business Process Change Management	333,333	333,333	333,333	333,333	333,333	333,333
O&M Labor, Professional Services for pre-work (business requirements)	486,000	-	-	-	-	-

iii. PNM Supporting Witnesses

PNM witness Omni Warner supports the ADMS project costs.

G. Distribution Planning & Engineering

i. Purpose and Benefits

PNM's Implementation Plan includes distribution planning and engineering tools to support granular load, electric vehicle, and DER forecasting as well as power flow analysis for more complex hosting capacity capabilities to maximize the carbon-free resource integration on the distribution system. The distribution planning and engineering technology in the Implementation Plan includes expanding PNM's existing Synergi distribution planning software and procuring distribution planning and interconnection forecast tools. This will allow PNM to improve DER and load forecasts based on AMI data.

PNM will procure, integrate and provide training to use the electric load flow core and protection Synergi module licenses for fault and protection analysis, integration capacity analysis, and interconnection integration functions using granular data from the AMI and automated field devices. PNM also anticipates initiating procurement for a commercial distribution forecasting and risk software package to leverage intelligent field devices and AMI data as part of the initial 6-year grid modernization Implementation Plan. The improved distribution planning tools will make the engineering hosting capacity assessments more accurate and more efficient to produce.

ii. Deployment Timeline and Costs

PNM plans to procure the additional Synergi planning and interconnection study modules and interconnection management systems in Year 2 and the forecast tools in Year 3. The cost to expand the distribution planning and engineering is based on estimates provided by the Synergi vendor as well as estimates for implementation, installation, and training. The cost for the distribution planning software is based on reference pricing for software packages that provide this functionality. PNM anticipates the licensing O&M costs for the tools will begin in Year 2 and anticipates incremental distribution engineering employee expenses beginning in Year 1.

Table 7 below shows PNM's proposed distribution planning and engineering capital clearings and O&M expenses over the initial six-year Implementation Plan.

Table 7

	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6
Total Distribution Planning & Engineering Capital Clearings	**-**	**-**	**1,386,084**	**7,459,364**	**-**	**-**
Distribution Planning/Interconnection Forecast Tools	-	-	-	7,459,364	-	-
Distribution Planning/Interconnection Study Tools - Additional Synergi modules	-	-	174,208	-	-	-
Interconnection Management systems	-	-	1,211,876	-	-	-
Total Distribution Planning & Engineering O&M Expenses	**382,007**	**620,905**	**645,223**	**670,536**	**696,885**	**724,313**
Distribution Planning/Interconnection Forecast Tools license	-	200,000	206,000	212,180	218,545	225,102
Preliminary Field Distribution Engineering Employees	382,007	398,905	416,563	435,016	454,299	474,450
Synergi License for Electric Load Flow Core License	-	15,000	15,450	15,914	16,391	16,883
Synergi License for Protection License	-	7,000	7,210	7,426	7,649	7,879

iii. PNM Supporting Witnesses

PNM witness Omni Warner supports the distribution planning and engineering project costs.

H. Data Management and Architecture

i. Purpose and Benefits

PNM proposes several data management and architecture investments as part of the Implementation Plan. PNM plans to implement an operational service bus, which includes system integration software technology, to connect applications and services, support service composition and workflow management, and provide asynchronous data and state transfer among data sources, applications, and processing or transaction services. The operational service bus will facilitate data exchange between the operational systems (ADMS, data warehouse, and distribution planning tools) as well as exchange data with PNM's existing enterprise service bus.

PNM is also requesting authorization for a data warehouse for distribution management and AMI. The data warehouse system stores data for planning and operation of the distribution grid. This

system will be integrated with other applications such as Synergi to utilize historic data in operating and modeling the distribution system. The AMI data warehouse can also provide the data needed for the Customer Energy Management Platform.

ii. Deployment Timeline and Costs

Table 8 below shows PNM's proposed telecommunications capital clearings and O&M expenses over the initial six-year Implementation Plan.

Table 8

	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6
Total Data Management & Architecture Capital Clearings	**2,864,801**	**1,578,605**	**1,090,726**	**1,089,749**	**-**	**-**
Network Model Management/Connectivity Model/GIS Integrations	-	1,092,920	1,090,726	1,089,749	-	-
AMI Data Lake Infrastructure	-	349,655	-	-	-	-
AMI Data Lake Setup Labor	-	136,030	-	-	-	-
Tibco Hardware	459,138	-	-	-	-	-
Tibco Labor cost for setup of new Tibco instance	133,968	-	-	-	-	-
Tibco RedHat and Oracle Licensing	245,589	-	-	-	-	-
Tibco Licensing	2,026,106	-	-	-	-	-
Total Data Management & Architecture O&M Expenses	**1,105,229**	**1,852,563**	**1,987,705**	**2,249,500**	**2,340,365**	**2,435,061**
Data Management - OSI PI Incremental Distribution	-	126,000	129,780	133,673	137,684	141,814
Data Management - OSI PI Servers for AMI	-	532,330	548,300	564,749	581,691	599,142
Operations Technology/Information Technology /Data/Cybersecurity Architecture & Engineering Employees	1,105,229	1,154,233	442,092	461,693	482,177	503,582
Production support / application /database/ info analytics / SYSTEM INTEGRATION (for all applications ADMS/MDMS etc) Employees	-	-	825,534	861,952	900,008	939,777
Tibco Tibco OSB Infrastructure annual support cost	-	40,000	42,000	44,100	46,305	48,620
Tibco Tibco OSB License renewal after the first 3 years	-	-	-	183,333	192,500	202,125

iii. PNM Supporting Witnesses

PNM witness Jonathan Hawkins supports the data management and architecture project costs.

I. Program Oversight

i. Purpose and Benefits

PNM will incur O&M costs for grid modernization program oversight during the initial six-year Implementation Plan period. The program oversight costs reflect new employees, including a Grid Modernization Director who will have responsibility and accountability to PNM, internal and external stakeholders, and to the Commission for the overall Implementation Plan. The program management office will also include an Associate Director, two business analysts, a program manager and two project managers. The program management office will ensure that grid modernization technologies are deployed and implemented by directing both internal PNM employees, as well as external consultants, from design and planning, through deployment and ongoing reporting and evaluation.

ii. Deployment Timeline and Costs

Program oversight O&M costs will begin in Year 1 and will remain relatively steady over the initial six-year Implementation Plan period.

Table 9 below shows PNM's proposed program oversight O&M expenses over the initial six-year Implementation Plan.

Table 9

	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6
Total Program Oversight O&M Expenses	**1,182,863**	**1,235,148**	**1,289,787**	**1,346,884**	**1,406,550**	**1,468,902**
Grid Modernization Director	260,248	271,813	283,899	296,528	309,725	323,517
Project Management Office (Assoc Director)	221,046	230,847	241,088	251,791	262,975	274,663
Project Management Office (2 Business Analysts)	287,993	300,660	313,897	327,730	342,186	357,292
Project Management Office (Program Mgr)	66,851	69,808	72,899	76,128	79,502	83,029
Project Management Office (Project Mgr)	288,937	301,683	315,003	328,922	343,468	358,668
Project Management Office (Project Mgr) - Resource Manager	57,787	60,337	63,001	65,784	68,694	71,734

iii. PNM Supporting Witnesses

PNM witness Laura Sanchez supports the program oversight costs.

IV. PNM's Proposed Grid Modernization Rider

PNM proposes to implement a grid modernization rider to recover costs associated with the grid modernization Implementation Plan. The proposed Rider will use forecasted information to calculate a projected revenue requirement, which will be charged for the upcoming rate year. PNM's proposed Grid Mod Rider will recover capital costs, operating expenses, and taxes associated with grid modernization projects. The rate year for the Grid Mod Rider is expected to be September 1 through August 31, with the initial rate year beginning on September 1, 2023. PNM proposes to true-up and re-set the Grid Mod Rider rate annually.

After the first year following implementation of the Grid Mod Rider, PNM will make an annual grid modernization review and reconciliation filing with the Commission. For each annual review and reconciliation filing, PNM will file both updated forecasted costs for the upcoming rate year based on the best available information and will true-up forecasted costs from the prior year to the actual costs incurred. PNM proposes to make the annual grid modernization review and reconciliation filing with projected revenue requirements and rates on March 1 of each year to be effective September 1 of the same year. The annual review and reconciliation process contemplated for the Grid Mod Rider allows the Commission and intervenors to follow PNM's progress on each phase of the deployment of AMI and related technologies. The annual review and reconciliation process also provides PNM with an opportunity to demonstrate certainty for cost estimates on the grid modernization projects in the Implementation Plan for deployment in the following rate year.

V. SUMMARY

The PNM Implementation Plan provides a cohesive and balanced set of grid modernization investments that work synergistically to enable the energy transition to carbon-free generation, enhance reliability and improve customer service while maintaining affordability and minimizing bill impacts. As laid out in the Implementation Plan, the grid modernization investments proposed by PNM will be deployed in a logical manner to expedite benefits while mitigating rate impacts. PNM looks forward to beginning work on the Implementation Plan consistent with Commission approval of its Application.

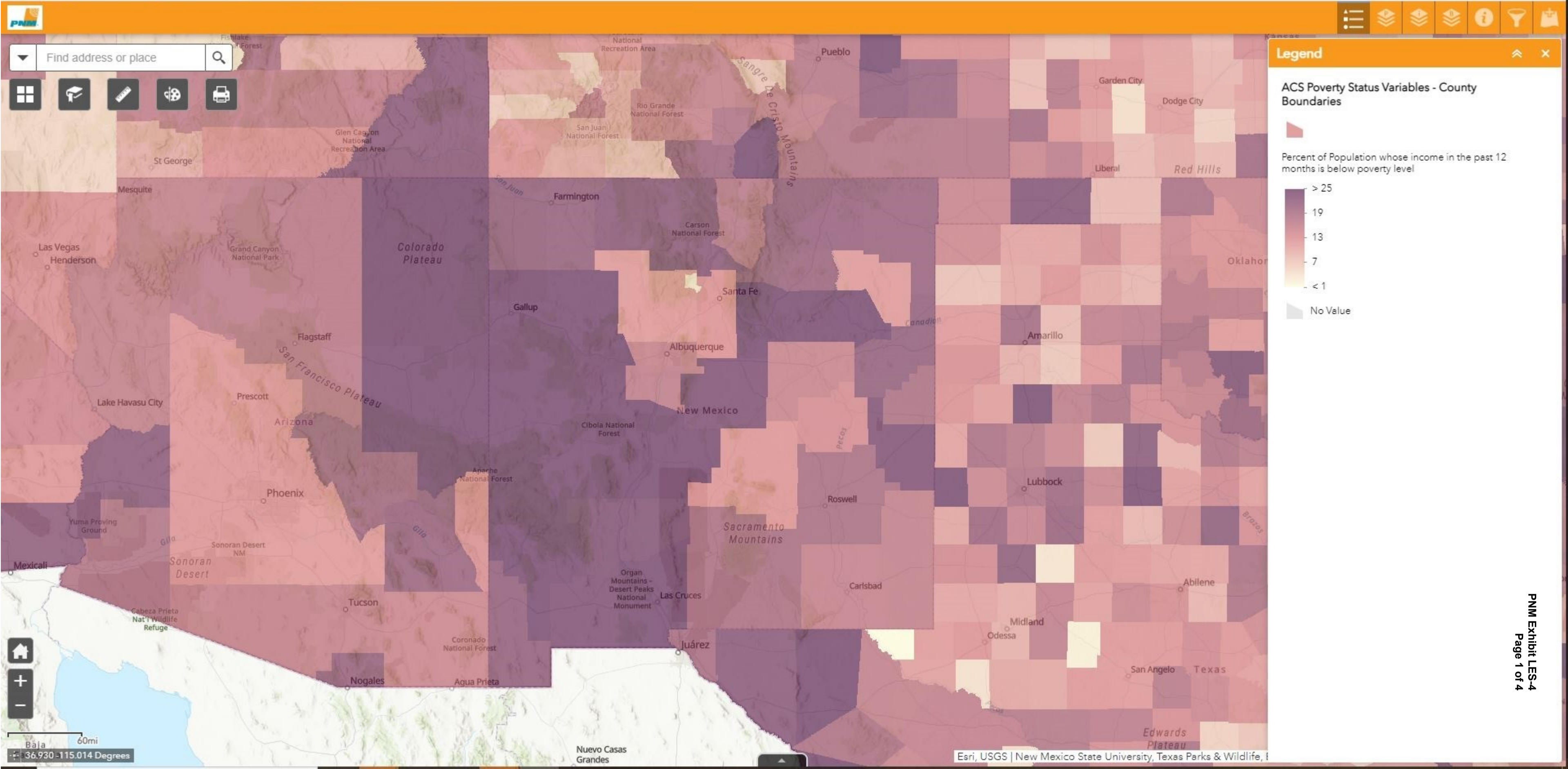
Appendix A

Defined Terms

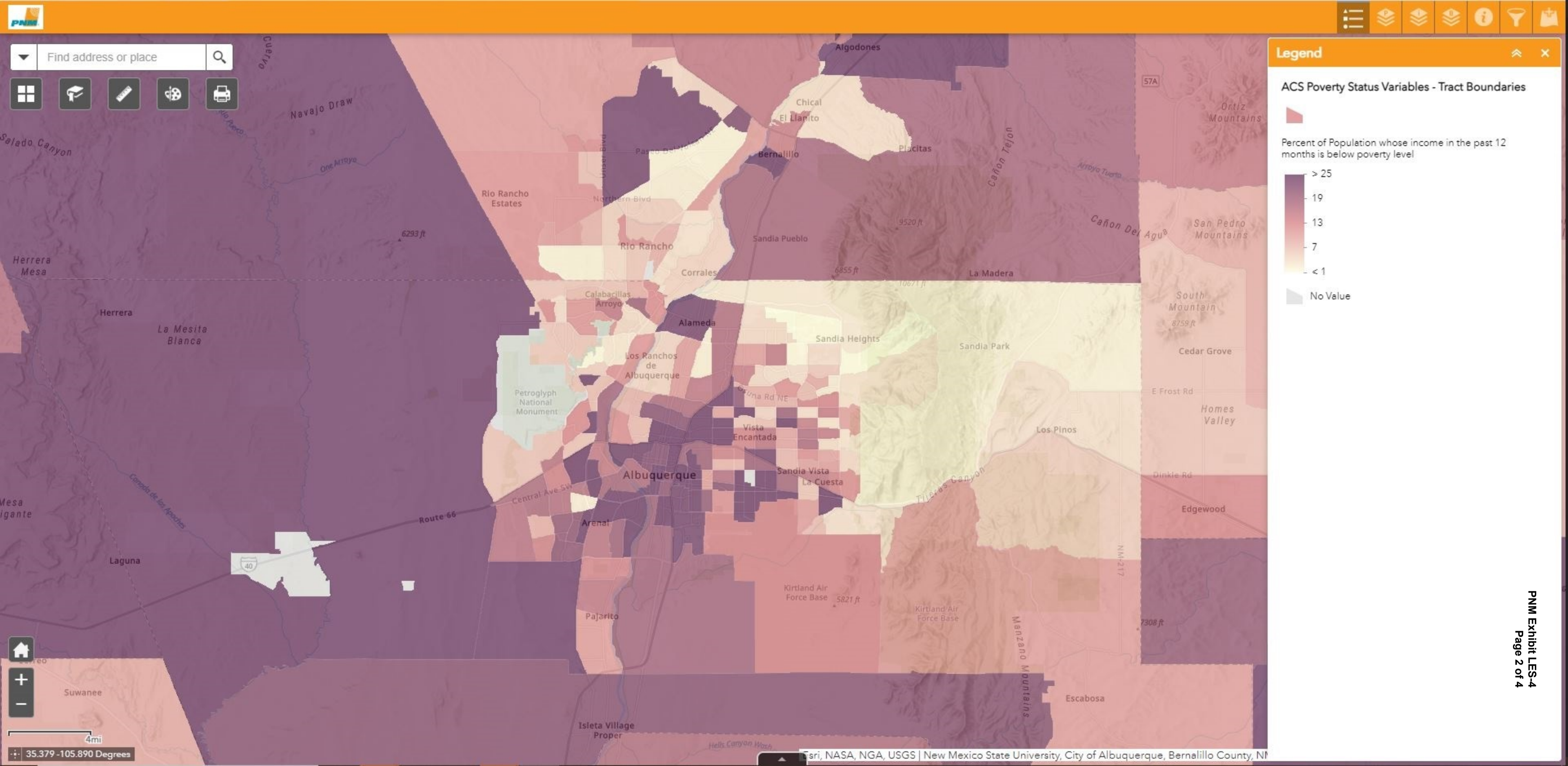
Defined Term	Definition
ADMS	Advanced Distribution Management System
AMI	Advanced Metering Infrastructure
AP	Access Point
Application	PNM's Grid Modernization Application
CIS Billing System	Customer Information System Billing System
Commission	New Mexico Public Regulation Commission
DA	Distribution Automation
DER	Distributed Energy Resource
DERMS	Distributed Energy Resource Management System
DMS	Distribution Management System
DOE	U.S. Department of Energy
DR	Demand Response
DSM	Demand Side Management
DWDM	Dense Wavelength Division Multiplexing
EJ Screening Tool	Environmental Justice Screening Tool
EMNRD	New Mexico Energy, Minerals, and Natural Resources Department
EV	Electric Vehicle
FAN	Field Area Network
FCI	Faulted Circuit Indicator
FLISR	Fault Location, Isolation and Service Restoration
GIS	Geographic Information System
Grid Mod Statue	Energy Grid Modernization Roadmap Act (HB 233)

Grid Mod Rider	Grid Modernization Rider
HAN	Home Area Network
IDP	Intrusion Detection and Prevention
Implementation Plan	PNM's Grid Modernization Implementation Plan
IVR	Interactive Voice Response
IVVC	Integrated Volt-VAR Control
LTE	Long Term Evolution
MDMS	Meter Data Management System
MPLS	Multiprotocol Label Switching
NAN	Neighborhood Area Network
OMS	Outage Management System
O&M	Operations and Maintenance
OSB	Operational Service Bus
PNM	Public Service Company of New Mexico
SaaS	Software as a Service
SCADA	Supervisory Control and Data Acquisition
SIEM	Security Information and Event Management
SONET	Synchronous Optical Network
VAR	Volt-Amps Reactive
WAN	Wide Area Network

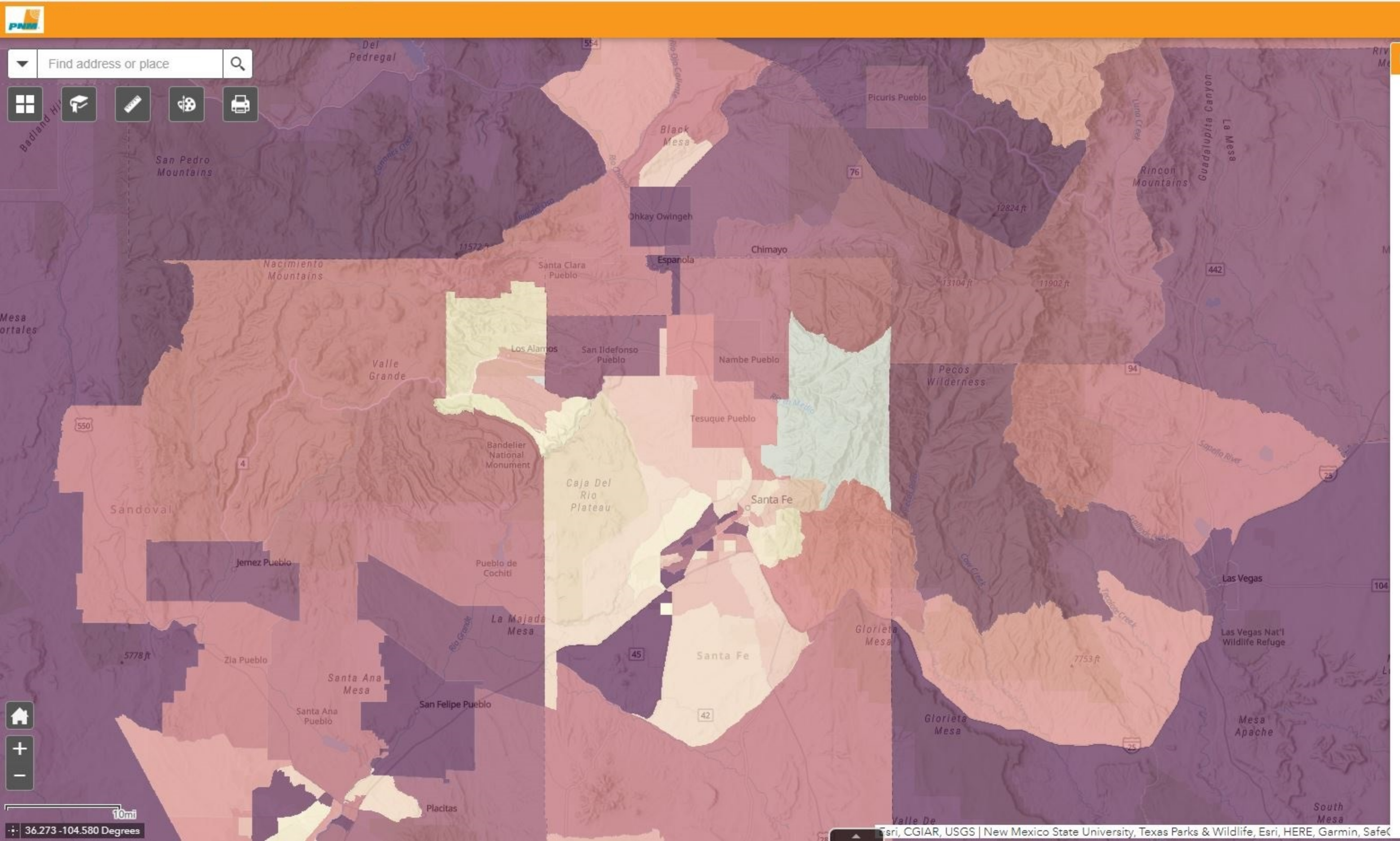
GCG#529878



PNM Exhibit LES-4
Page 1 of 4



PNM Exhibit LES-4
Page 2 of 4



Legend

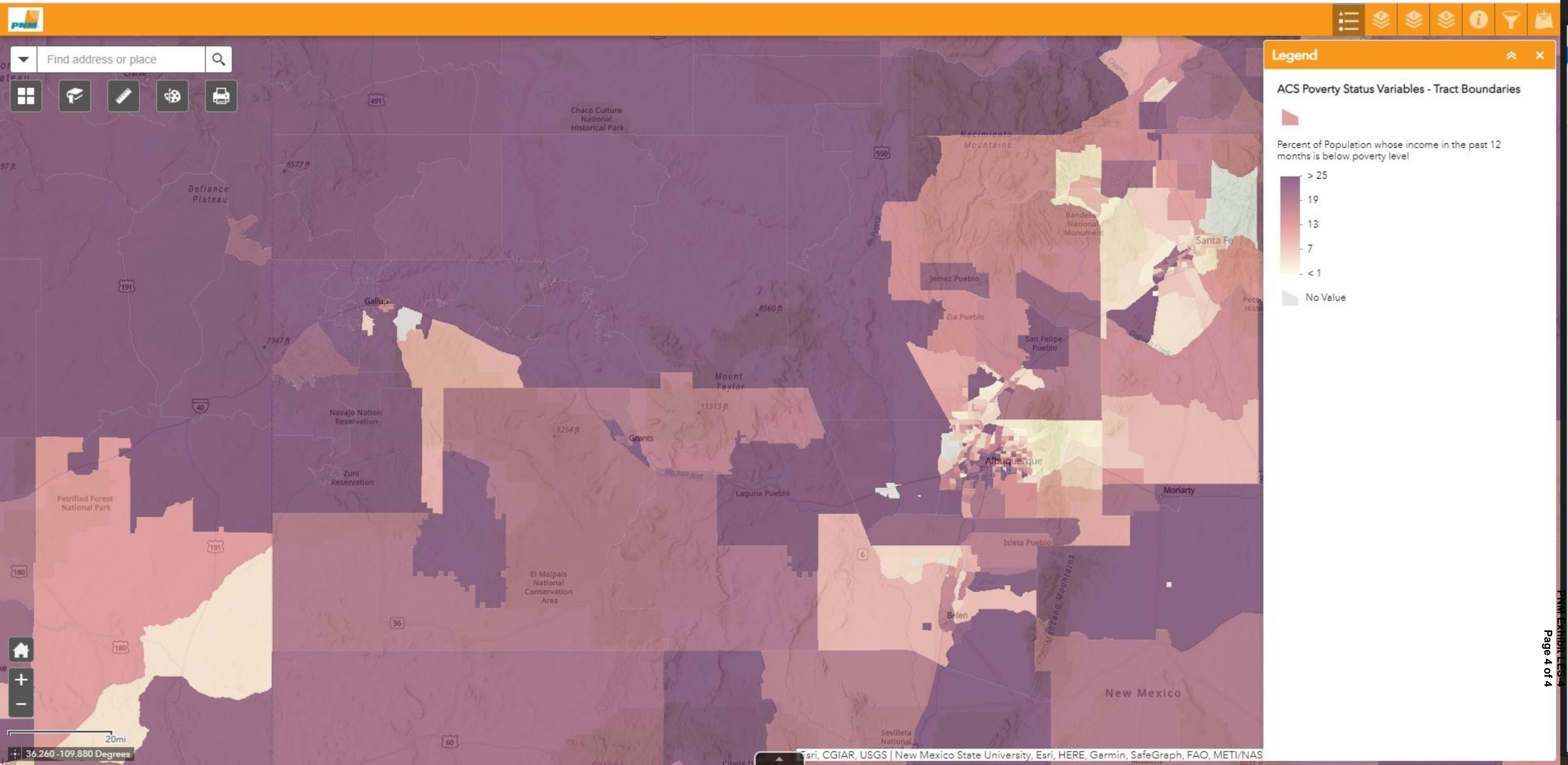
ACS Poverty Status Variables - Tract Boundaries

Percent of Population whose income in the past 12 months is below poverty level

- > 25
- 19
- 13
- 7
- < 1

No Value

PNM Exhibit LES-4
Page 3 of 4


Find address or place
Legend
ACS Poverty Status Variables - Tract Boundaries
Percent of Population whose income in the past 12 months is below poverty level
> 25
19
13
7
< 1
No Value
Chaco Culture National Historical Park
Defiance Plateau
Nacimiento Mountains
Bandelier National Monument
Santa Fe
Jemez Pueblo
Zia Pueblo
San Felipe Pueblo
Gallup
Mount Taylor
Navajo Nation Reservation
Grants
Albuquerque
Zuni Reservation
Laguna Pueblo
Moriarty
Petrified Forest National Park
Isleta Pueblo
El Malpais National Conservation Area
Manzano Mountains
Belen
New Mexico
Sevilleta National
20mi
36.260 -109.880 Degrees
Esri, CGIAR, USGS | New Mexico State University, Esri, HERE, Garmin, SafeGraph, FAO, METI/NAS

PNM Environmental Justice Review Process

Overview:

Introduction

The following is a suggested process by Burns & McDonnell for the establishment of a programmatic environmental justice process. The scope will address: Technical services; outreach documentation; and environmental justice training. Focus will be on each project's possible impact to sensitive EJ communities. Data analysis, field canvassing, and training will help each project team make appropriate decisions to help mitigate the impact of construction and provide direct community benefits.

Triggers

An environmental justice review will be triggered when a project is identified and funded. Level of evaluation will be based on the following thresholds:

- Level 1 – Ancillary maintenance
- Level 2 – Moderate construction resulting in minor changes to environment and footprint, including visual, olfactory and auditory impacts
- Level 3 – Significant construction resulting in major changes to environment and footprint, including visual, olfactory and auditory impacts

Environmental Justice Criteria:

For each project, the following environmental justice considerations should be examined to determine if an environmental justice-specific outreach plan is necessary.

A. Mandated under New Mexico Law
    a. Minority-Majority population: If the community population exceeds a majority composed of recognized minority groups, or a single minority group.
    b. Native American: Lands which are claimed and/or recognized as possessed by Native Americans, and all of the significance associated with this.
    c. English as a second language: A community where more than 5 percent of the population does not speak proficient English or English at all, or a community where 50 percent or less of the population is proficient in English overall.
    d. Income: A population where generally more than 15 percent of the recognized federal poverty level is below said level, or if the median income of the community meets the federal criteria for poverty.
    e. Age: When parameters for children under the age of 5, 18, and adults over the age of 65 exceed the federal standards for that community's population.
    f. Education: Percentage of population with less than a high school education.
B. CDC/EPA Recommended
    a. Transportation: Immediate impacts to public transportation facilities by the project.
    b. Food access: Immediate impacts to readily accessible food sources by the project.
    c. Health: Analysis of existing health conditions such as, known handicap areas within the project area as well as potential changes to include, but not limited to, visual, olfactory and auditory conditions.

Desktop Review Process Steps:

A. Receive project scope from project team
B. Review scope for environmental justice threshold and trigger
C. Perform GIS data collection - integrated GIS and data analysis services for each of the proposed work packets or projects for PNM under the current work agreement.
    a. Desktop data mining from known environmental justice sources, such as the U.S. Census, U.S. CDC, New Mexico GIS and data services, local data services, and other public data services. No data collected will need to be held in confidence or will exceed privacy standards.
        i. A standard "appendix" of EJ layers will be established to allow for review of the data, and continuity across the various projects.
    b. Analysis of that data to provide "heat maps" of areas of environmental justice concern, focusing on impacts to minority/majority, impoverished, educationally deprived, Native/First peoples, transportation, health, English as a Second Language, and food access.
    c. GIS data mapping will be provided to the PNM team in a web browser form, as well as mapping applicable for regulatory permitting.
    d. Field Canvassing will occur to "ground truth" the data, as well as establish connections with the community to assist with development of Community Action Groups, identify locations for open houses and pop-up gatherings, and verify impacts.
        i. Door-to-door canvassing of abutting neighbors
        ii. Identification of social service, religious, and NGOs within the project area for collaboration
        iii. Identification of public services, such as fire/EMS/medical/educational, to verify impacts created by the construction
D. Draft Environmental Justice data report (see Appendix D for Document Template)
    a. Introduction
    b. Potential Project EJ Conditions
    c. EJ Study Summary and Recommendations/Mitigations
        i. Create mitigation plan for specific project
        ii. Publish desktop analysis
        iii. Determination of appropriate tools and tactics to communicate with the public and the affected community according to the identified impacts (language, transportation, food, etc.).
E. Provide high-level synopsis to leadership for discussion for level 2 & 3 projects
F. Deliverables
    a. GIS Maps
    b. Desktop report
    c. Mitigation plan

Appendix A

Training:

Environmental Justice training for outreach: Burns & McDonnell will provide PNM and incoming Burns & McDonnell staff with environmental justice awareness training, as well as training on the data collection and analysis processes described above. Staff members will be trained to:

A. Understand EJ Screen and other public data.
B. Determine best courses of action for identified environmental justice impacts.
C. Determine best tools and tactics for mitigation.
D. Estimated 40 hours per project task per training (Program and GA/Communications)

Appendix B

Graph Example:

The below graph shows the compilation of three criteria (minority/majority, language, income), each scored with one point, to demonstrate a "heat map."

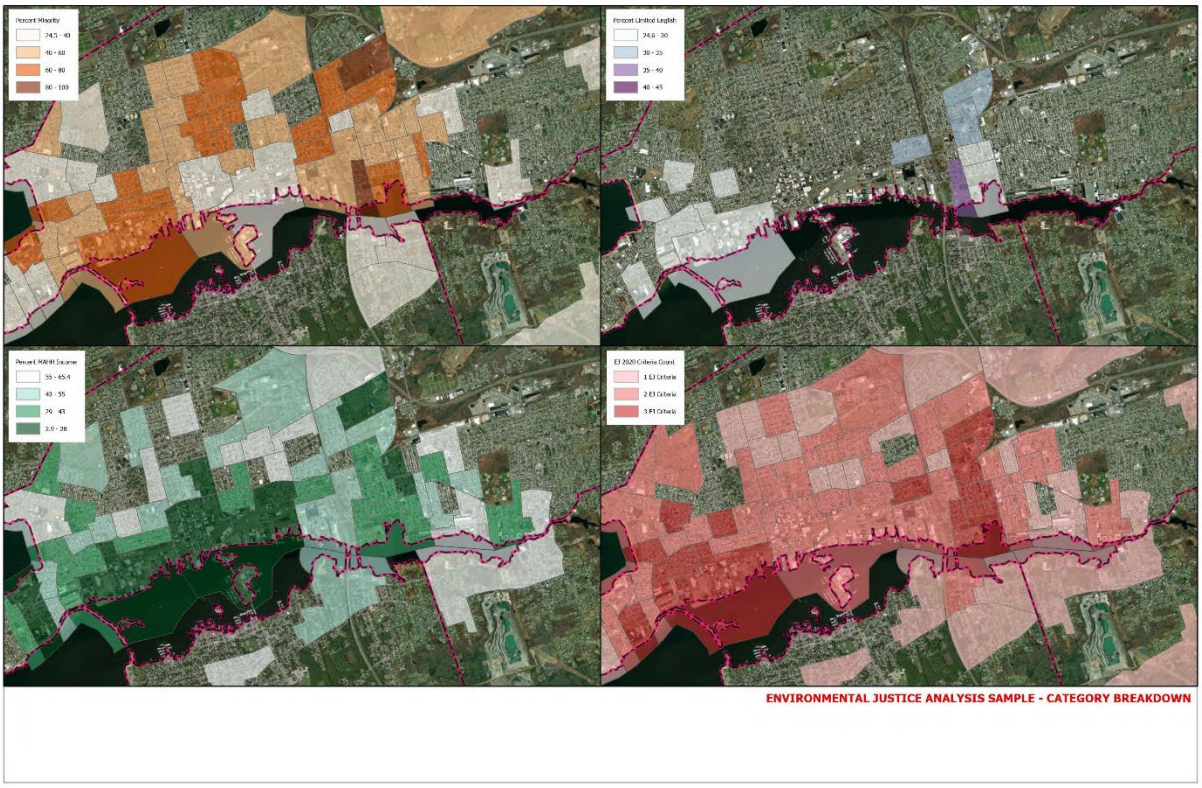


Table Example: Environmental Justice Criteria Summary

Census Block Group #	Census Tract #	Distance from project site	Town	EJ Criteria	Median Household Income (MHHI)	Income Percent of the MA MHHI Median	Total Minority Population	Households with Language Isolation per Block Group	Municipality MHHI	Municipality Percent of MA MHHI	2019 Block Group Population	2019 Block Group Households
3	404	within 1 mile (overlaps)	Wendell	income	$53,875	63%	12%	1% (Spanish + Other Indo-European)	$53,875	63%	862	383
1	8207	within 1 mile	Amherst	minority and income	$38,558	45%	43%	2% (Spanish + Chinese)	$56,905	66%	2,144	705
2	8207	within 1 mile	Amherst	minority	$64,643	75%	40%	7% (Spanish + Chinese)	$56,905	66%	1,454	562
2	8208.01	within 1 mile (overlaps)	Amherst	minority	$96,800	113%	25%	0%	$56,905	66%	1,486	692

Appendix C

References:

The following publicly-available data sources are what are used to perform the desktop survey for the above-stated information.

U.S. EPA EJ Screen Tool Version 2.0

https://www.epa.gov/ejscreen

U.S. Census Bureau 2020 Census

https://www.census.gov/programs-surveys/decennial-census/data.html

U.S. Centers for Disease Control Environmental Justice Tracker

https://www.cdc.gov/nceh/tracking/topics/EnvironmentalJustice.htm#:~:text=Environmental%20justice%3A%20All%20people%E2%80%94regardless,laws%2C%20regulations%2C%20and%20policies.

New Mexico Department of the Environment

https://www.env.nm.gov/data/

City Data (optional)

https://www.city-data.com/

PNM Grid Modernization
Evaluation/KPI Metrics

Type	Category	Description
AMI	Installation and Deployment	Number of advanced meters installed
	Installation and Deployment	Percentage of advanced meters deployed compared to planned installation
	Installation and Deployment	Percentage of customers with advanced meters
	Installation and Deployment	Number of customers electing to opt-out of AMI installation and % above or below assumption
	Installation and Deployment	Percentage of customers aware of AMI
	Installation and Deployment	Number of calls by category to Customer Contact Center and meter installation vendor regarding meter installation
	Post Implementation Survey	Summary of customer survey results after meter installation
	AMI Functionality	Percentage of customers with advanced meters (after communication network is enabled) that receive estimated
	AMI Functionality	Total number of AMI meters used for billing (activated)
	AMI Functionality	Number of customers with an advanced meter with an active customer energy management platform
	AMI Functionality	Number of remote meter disconnect operations after AMI deployment and communication network is enabled
	AMI Functionality	Number of remote meter connect operations after AMI deployment and communication network is enabled
	Customer Engagement	Number of monthly, unique visits to the customer energy management platform
	Customer Engagement	Customer access to hourly or sub-hourly data after launch of customer energy management platform
	Customer Engagement	Percentage of customers with advanced meter that are targeted with energy savings messaging
	Customer Engagement	Percentage of low-income customers with advanced meters that are targeted with; energy savings messaging
	Pre/Post AMI Customer Satisfaction Surveys	Survey of customer satisfaction with outage related communications

PNM Grid Modernization
Evaluation/KPI Metrics

Type	Category	Description
Distribution Automation Tech	Installation and Deployment	Number of three phase reclosers installed
	Installation and Deployment	Percentage of three phase reclosers deployed compared to planned installation
	Installation and Deployment	Number of single phase reclosers installed
	Installation and Deployment	Percentage of single phase reclosers deployed compared to planned installation
	Installation and Deployment	Number of feeders with optimal reclosers installed
	Installation and Deployment	Percentage of feeders with reclosers deployed compared to planned installation
	Installation and Deployment	Number of fault current indicators installed
	Installation and Deployment	Percentage of fault current indicators deployed compared to planned installation
	Installation and Deployment	Number of SCADAmate switches installed
	Installation and Deployment	Percentage of SCADAmate switches deployed compared to planned installation
	Installation and Deployment	Number of SCADA Switchgear switches installed
	Installation and Deployment	Percentage of SCADA switchgear deployed compared to planned installation
	Installation and Deployment	Miles of Fiber installed
	Installation and Deployment	Percentage of Fiber deployed and implemented into SCADA
	Installation and Deployment	Percentage of deployed devices connected to communication network compared to planned installation

GCG#529879

PNM Exhibit LES-7
Table of Stakeholder Meetings

May 5, 2022	
PNM Commercial Customers webinar	Posted to https://www.pnm.com/business-events
May 9, 2022	
Coalition for Clean Affordable Energy	Cara Lynch
NM Affordable Reliable Energy Alliance	Kelly Gould, Peter Gould (invited)
Sierra Club	Camilla Feibelman, Karl Braithwaite
Southwest Energy Efficiency Project	Justin Brant
Western Resource Advocates	Cydney Beadles, Clare Valentine
May 10, 2022	
Albuquerque/Bernalillo County Water Authority	Keith Hermann, Stan Allred, Bagher Dayyani, Gregory Larson (invited), Cassia Sanchez, Charlie Leder (invited)
Commission Staff	Gabriella Dasheno, Christopher Dunn, John Reynolds, Jack Sidler
GridWorks	Margie Tatro
Prosperity Works	Ona Porter
New Mexico Attorney General	Keven Gedko
June 14, 2022	
Affordable Solar	Dylan Connelly
Emera Technologies	Gary Oppedahl
NM Renewable Energy Industry Association	Jim DesJardins, Executive Director
Osceola Energy	Adam Harper
Pivot Energy	John Bernhardt (invited)
Positive Energy Solar	Taiyoko Sadewic (invited)
Sunvest Solar	Kevin Borgia
August 30, 2022$	
Commission Staff	Ed Rilkoff, Elisha Leyba-Tercero, Marc Tupler, Bryce Zedalis, Eli LaSalle, Jonah Mauldin, Bamadou Ouattara$
New Mexico Attorney General	Gideon Elliot
August 31, 2022$	
Coalition for Clean Affordable Energy	Cara Lynch
Coalition for Clean Affordable Energy	Charles de Saillan
Interwest Energy Alliance	Joan Drake
New Mexico Attorney General	Devi Glick
Western Resource Advocates	Cydney Beadles
September 16, 2022	
Albuquerque/Bernalillo County Water Authority	Keith Hermann
City of Albuquerque	Julie Park
Meta	Dennis Derricks
NM Affordable Reliable Energy Alliance	Kelly Gould

PNM Exhibit LES-8
Government, Community and Business Outreach

DATE OF CONTACT	EVENT	STAKEHOLDERS	STAKEHOLDER TYPE
6/7/2022	Southern Territory - Power Partner Community Update (Online)	Various local elected and appointed officials, community members, business leaders, non-profit groups	Government, Business, Non-Profit
6/14/2022	Northern Territory - Power Partner Community Update (In Person)	Various local elected and appointed officials, community members, business leaders, non-profit groups	Government, Business, Non-Profit
6/14/22 - 9/24/22	One-on-One/Small Group Discussions	Federal & State Elected Officials and staff	Government
6/14/22 - 9/24/22	One-on-One, Small Group Discussions, Board Discussions, Community meetings	Business Organizations, Chambers of Commerce, Non-Profit, Stakeholders	Business, Chamber of Commerce, Non-Profit, Stakeholders

PNM EXHIBIT LES-9

Questions from Case No. 15-00312-UT to Ask in Public Input Process

RD PAGE #	DESCRIPTION OF PNM REQUIREMENT
100	The role of advanced metering in developing future energy efficiency programs and a smart grid should be addressed in any future proposal. PNM should ensure that the infrastructure it installs will be technologically compatible with the interests of PNM and its customers in such programs. These issues should be discussed and resolved in the public input process recommended in Section 3.a.i.
107	Regarding opt-out fees, a further PNM proposal should be informed with the public participation process (such as described in Section 3.a.i). Such process could likely address PNM's needs in encouraging maximum participation while at the same time address concerns of customers who desire to opt out.
109	Conditions of the portion of the population who believe they are electromagnetically sensitive deserve acknowledgment and consideration as decisions are made regarding implementation of an AMI project. Accommodations could include reasonable opt-out provisions and fees and perhaps the selection of technologies that minimize impacts on such people, helping to minimize health risks to customers and address the needs and preferences of PNM's customers. Such issues can and should be addressed in a public input process (such as described in Section 3.a.i) before bringing a smart meter proposal to the Commission.
113-114	PNM's plan to protect the privacy of customer data, including the consumption data collected by the advanced meters, should be thoroughly addressed in any future AMI plan filing.
114-117	Cybersecurity should be thoroughly addressed in any future AMI plan filing.

PNM Exhibit LES-10
Estimated Grid Mod Program Management Office Costs

	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6
Grid Modernization Director	256,998	268,563	280,649	293,278	306,475	320,267
Grid Modernization Director Annual Employee Expenses (Flat)	3,250	3,250	3,250	3,250	3,250	3,250
Project Management Office (Assoc Director) - Proj Cost	217,796	227,597	237,838	248,541	259,725	271,413
Project Management Office (Assoc Director) - Proj Cost Annual Employee Expenses (Flat)	3,250	3,250	3,250	3,250	3,250	3,250
Project Management Office (Business Analysts -2) - Proj Cost & On Going Support	281,493	294,160	307,397	321,230	335,686	350,792
Project Management Office (Business Analysts - 2) - Proj Cost & On Going Support Annual Employee Expenses (Flat)	6,500	6,500	6,500	6,500	6,500	6,500
Project Management Office (Program Mgr) - Proj Cost	65,714	68,671	71,761	74,990	78,365	81,891
Project Management Office (Program Mgr) - Proj Cost Annual Employee Expenses (Flat)	1,138	1,138	1,138	1,138	1,138	1,138
Project Management Office (Project Mgr) - Proj Cost	283,249	295,996	309,315	323,235	337,780	352,980
Project Management Office (Project Mgr) - Proj Cost Annual Employee Expenses (Flat)	5,688	5,688	5,688	5,688	5,688	5,688
Project Management Office (Project Mgr) - Resource Manager	56,650	59,199	61,863	64,647	67,556	70,596
Project Management Office (Project Mgr) - Resource Manager Annual Employee Expenses (Flat)	1,138	1,138	1,138	1,138	1,138	1,138
Total	**1,182,863**	**1,235,148**	**1,289,787**	**1,346,884**	**1,406,550**	**1,468,902**

GRAND TOTAL:	**7,930,133**

BEFORE THE NEW MEXICO PUBLIC REGULATION COMMISSION

IN THE MATTER OF PUBLIC SERVICE COMPANY OF NEW MEXICO'S APPLICATION FOR AUTHORIZATION TO IMPLEMENT GRID MODERNIZATION COMPONENTS THAT INCLUDE ADVANCED METERING INFRASTRUCTURE AND APPLICATION TO RECOVER THE ASSOCIATED COSTS THROUGH A RIDER, ISSUANCE OF RELATED ACCOUNTING ORDERS, AND OTHER ASSOCIATED RELIEF	))))))))	**Case No. 22-00058-UT**

SELF AFFIRMATION

LAURA E. SANCHEZ, Chief Advisor, Policy and Legal, PNMR Services Company, upon being duly sworn according to law, under oath, deposes and states: I have read the foregoing **Direct Testimony of Laura E. Sanchez** and it is true and accurate based on my own personal knowledge and belief.

DATED this 3rd day of October, 2022.

/s/ Laura E. Sanchez
LAURA E. SANCHEZ

GCG # 529839

BEFORE THE NEW MEXICO PUBLIC REGULATION COMMISSION

IN THE MATTER OF PUBLIC SERVICE COMPANY OF NEW MEXICO'S APPLICATION FOR AUTHORIZATION TO IMPLEMENT GRID MODERNIZATION COMPONENTS THAT INCLUDE ADVANCED METERING INFRASTRUCTURE AND APPLICATION TO RECOVER THE ASSOCIATED COSTS THROUGH A RIDER, ISSUANCE OF RELATED ACCOUNTING ORDERS, AND OTHER ASSOCIATED RELIEF	))))))))	**Case No. 22-00058-UT**

DIRECT TESTIMONY

OF

JULIE A. ROWEY

October 3, 2022

NMPRC CASE NO. 22-00058-UT
INDEX TO THE DIRECT TESTIMONY OF
JULIE A. ROWEY

WITNESS FOR
PUBLIC SERVICE COMPANY OF NEW MEXICO

PNM Exhibit JAR-1	Resume
PNM Exhibit JAR-2	PNM Smart Meter Customer Sentiment Survey, 2019
PNM Exhibit JAR-3	PNM Grid Modernization Message Testing Survey & Report, October 2021
PNM Exhibit JAR-4	PNM Residential and Small Business Grid Modernization Insight Survey and Focus Groups, May 2022
PNM Exhibit JAR-5	DEFG Customer Insights & Advisory Firm Study on Prepay
PNM Exhibit JAR-6	Customer Education and Communication Plan

Self-Verification

DIRECT TESTIMONY
OF JULIE A. ROWEY
NMPRC CASE NO. 22-00058-UT

I. INTRODUCTION AND PURPOSE

Q. PLEASE STATE YOUR NAME, POSITION AND BUSINESS ADDRESS.

A. My name is Julie Rowey. I am the Vice President and Chief Customer Officer for Public Service Company of New Mexico ("PNM" or "Company"). My address is 414 Silver Avenue, SW, Albuquerque, New Mexico 87102.

Q. PLEASE SUMMARIZE YOUR EDUCATION AND PROFESSIONAL QUALIFICATIONS AND DESCRIBE YOUR JOB DUTIES.

A. I have 20 years of experience in the electric and natural gas utility industry and over 35 years of experience leading marketing and customer experience teams for utilities, financial services, and publishing industries. I was appointed to the role of Vice President, Chief Customer Officer in 2020. Previously, I was appointed as PNM's Executive Director of Customer Marketing in 2018 and was responsible for overseeing the commercial and industrial customer organization and the energy efficiency mass market organization. In that role, I implemented a customer marketing vision along with supporting initiatives to create and deliver strategy and programs.

My previous roles in the utility industry include Vice President of Marketing for Summit Utilities, a multi-state natural gas utility, where I oversaw the customer service and marketing organizations, and Director of Customer Experience & Marketing at Southern California Edison, one the nation's largest investor-owned

electric utilities, where I led marketing and communications as well as the state of California's smart energy brand, Flex Your Power. My educational background and professional experience are summarized in PNM Exhibit JAR-1.

Q. PLEASE DESCRIBE YOUR RESPONSIBILITIES AS VICE PRESIDENT AND CHIEF CUSTOMER OFFICER.

A. My current responsibilities include overseeing all aspects of the customer experience at PNM and overseeing customer operations, including the customer contact center, meter reading, customer interconnections, billing, credit and collections, and customer marketing.

Q. HOW IS THE CUSTOMER SERVICE GROUP SUPPORTING PNM'S GRID MODERNIZATION PLAN?

A. Interactions with customers, and providing them with service options, is fundamental to any grid modernization plan. The customer-facing technologies will empower customers to take a more proactive role as energy partners with PNM by increasing customer visibility to energy information (such as usage, bills, and service content) and enabling enhanced customer optionality (such as pricing, clean energy, energy efficiency, and electrification).[1]

[1] See the Guide for PNM's Grid Modernization Implementation, prepared by EnerNex, at 1 (September 30, 2022) ("Guide"). This Guide is attached to the Direct Testimony of PNM witness Laura Sanchez at PNM Exhibit LES-2.

Q. HAVE YOU PREVIOUSLY SUBMITTED TESTIMONY IN REGULATORY PROCEEDINGS?

A. Yes, I have testified in state regulatory proceedings before the California Public Utilities Commission in support of general rate cases and several energy efficiency proceedings. I also testified in New Mexico Public Regulation Commission ("NMPRC" or "Commission") Case No. 20-00237-UT, supporting PNM's transportation electrification plan.

Q. WHAT IS THE PURPOSE OF YOUR DIRECT TESTIMONY?

A. I explain the importance of the customer perspective in the development of PNM's grid modernization plan. I provide an overview of the customer-facing technologies included in PNM's plan.[2] Also, I describe PNM's customer engagement activities to-date, and PNM's plan to continue engaging customers as the Company implements its grid modernization plan and utilizes these new capabilities.

[2] PNM's Grid Modernization Implementation Plan for years 1 through 6 is attached to the Direct Testimony of PNM Witness Laura Sanchez as PNM Exhibit LES-3.

II. CUSTOMER INPUT INTO PNM'S PLAN

Q. WHY IS THE CUSTOMER PERSPECTIVE SO IMPORTANT TO PNM AS IT PURSUES GRID MODERNIZATION?

A. The perspective of our customers is important because customers play a critical role in PNM's efforts as it pursues an energy transition through modernization of the grid. As I explain in my testimony, PNM made extensive efforts at customer outreach to not only understand customer needs and desires as PNM pursues grid modernization, but also to foster customer understanding of the energy transition and the critical role customers will play in that transition.

Q. PLEASE DESCRIBE HOW PNM OBTAINED CUSTOMER INPUT AND FEEDBACK TO SHAPE THE GRID MODERNIZATION PLAN.

A. Through extensive customer outreach, PNM sought to understand what customers want and how they might be incentivized to engage in PNM's efforts to make the transition to carbon-free. PNM conducted customer surveys and focus groups to understand what aspects of grid modernization resonated with customers, and to inform the development of its customer-centric grid modernization plan consistent with the Commission's prior direction regarding advanced metering infrastructure

("AMI").[3] PNM conducted the following customer surveys and focus groups to develop the grid modernization plan, and I have attached the results of those surveys to my testimony as follows:

- PNM Smart Meter Customer Sentiment Survey, 2019, attached as PNM Exhibit JAR-2.
- PNM Grid Modernization Message Testing Survey & Report, October 2021 attached as PNM Exhibit JAR-3.
- PNM Residential and Small Business Grid Modernization Insight Survey and Focus Groups, May 2022 attached as PNM Exhibit JAR-4.

The surveys for customers conducted over a multi-year period represent different opportunities to engage with customers. Portions of the surveys are focused on understanding what customers might know or be interested in regarding AMI or grid modernization, while other portions are more focused on understanding what customers may want once they understand AMI and grid modernization or what insights they can offer PNM regarding AMI deployment and grid modernization. The Grid Modernization Message Testing Survey & Report, PNM Exhibit JAR-3,

[3] The Recommended Decision in Case No. 15-00312-UT (PNM's 2015 application for approval of AMI) included several instructions to PNM about the need for customer input before seeking approval of a future AMI project. See generally pages 81 to 84. The Recommended Decision included the specific suggestion (at page 100) that PNM should ensure any AMI infrastructure it installs will be "technologically compatible" with both the interests of PNM and its customers in future energy efficiency programs and (at page 109) that the needs and preferences of customers related to opt-out provisions should also be considered. Details of specific questions PNM was directed to ask in that case are attached to the testimony of PNM witness Laura Sanchez as PNM Exhibit LES-9.

tries to capture the right message to help customers understand grid modernization and AMI.

Customers were responsive to the surveys, providing generally favorable feedback to the concepts of grid modernization. In addition to the surveys and focus groups referenced above, PNM conducted three public forums to follow up on the customer surveys and to elicit additional feedback on the grid modernization strategy.

Q. WHAT WERE THE KEY FINDINGS FROM THE MAY 2022 CUSTOMER SURVEY ON GRID MODERNIZATION?

A. The May 2022 residential and small business customer survey, conducted by E-Source, a leading energy consumer research firm, found that nearly two-thirds of residential customers and half of business customers believe it is either "very" or "extremely" important for PNM to "modernize the grid." *See* PNM Exhibit JAR-4 at p. 20.

Both residential and commercial customers indicated that it is important for grid modernization efforts to achieve the following benefits, listed in order of importance as identified by the survey respondents:

- Improved reliability and quality of service (including minimizing disruptions or outages);
- Improved ability to detect and prevent cyber-security attacks;

- Reduction of greenhouse gas emissions by making it easier to connect renewable energy resources;
- A range of rate and billing programs to help customers save money and control their bills;
- Receipt of timely energy usage and cost information;
- Better tools and programs to help manage usage; and
- Ability to meet requirements for more electric vehicles ("EVs").

Over 60 percent of both business and residential customers stated that the benefits identified above were either moderately, very, or extremely important. *See* PNM Exhibit JAR-4 at p. 9. Commercial customers felt even more strongly about the reliability benefits of grid modernization than residential customers, although both groups ranked reliability-related benefits highly.

Q. IN THE SURVEY THAT PNM CONDUCTED SPECIFICALLY ABOUT SMART METERS, WHAT ATTRIBUTES OF SMART METERS RANKED THE HIGHEST AMONG CUSTOMERS?

A. Residential customers found both reliability and environmental attributes highly important, with reliability edging out environmental benefits slightly. This is consistent with other public input, with customers repeatedly citing the desire for reliable service as a top priority. The highest-ranking attributes were "real-time troubleshooting to shorten outages," "withstand weather and cyber attacks," and

"detect types of outages." Eighty percent (80%) or more of residential customers named these three reliability-related attributes as important. Over 77 percent of customers ranked the environmental attributes of "benefit the environment" and "help create a more sustainable energy future" as important. The survey results from commercial customers were similar, also naming the reliability and environmental attributes among the most important.

Q. WERE CUSTOMERS RECEPTIVE TO ADVANCED METERS BASED ON THE CUSTOMER SURVEY?

A. Yes. After learning about smart meters, 80 percent of residential customers were at least "somewhat interested" in having an advanced meter installed, with 34 percent being "extremely interested" and 27 percent being "moderately interested." Among commercial customers, 77 percent were at least "somewhat interested" in having an advanced meter installed.

Q. DID PNM GAIN ANY INSIGHTS ABOUT LOW INCOME CUSTOMERS FROM ITS CUSTOMER OUTREACH EFFORTS?

A. Yes. The May 2022 survey (PNM Exhibit JAR-4) included data reported by three different household income levels: 1) less than $50,000/year; 2) $50,000 to $99,999 and 3) $100,000 and above. As might be expected, more customers in the lower income bracket reported that tools to help save money or control their bills were "extremely important" than customers in the other income brackets. Concerns

about the cost of grid modernization were more noticeable among the lower income bracket as well. Eighty-three percent (83%) of lower income respondents stated that it was either "extremely important", "very important" or "somewhat important" that PNM modernize its grid (compared to 90 percent of the middle- and high-income respondents). Only five percent of lower income respondents stated that modernizing the grid was "not at all important." These results support PNM's efforts to ensure that grid modernization benefits all customers, regardless of income.

Additionally, external research from DEFG Customer Insights & Advisory Firm indicates that as the energy burden of utility bills on low-income households increases, the services enabled by AMI are proving to be effective tools to managing electric bills. Prepay, specifically, has proven to be an extremely effective tool to help customers stay current on their bills, save money by saving energy, and pay down debt. *See* PNM Exhibit JAR-5, on "Why Every Utility Should be Offering Prepay Energy" by DEFG Customer Insights & Advisory Firm. PNM intends to offer a prepay option as well as the ability for customers to choose their own due date as key customer programs enabled by advanced metering. PNM witness Mario Cervantes expands upon these programs in his testimony.

Q. DID CUSTOMERS EXPRESS ANY CONCERNS ABOUT GRID MODERNIZATION?

A. Approximately five percent of residential customers and 11 percent of businesses indicated they are very concerned about electromagnetic sensitivity. While PNM has not identified a sound factual basis for these concerns, PNM has taken steps to address the concerns by providing customers an opportunity to opt-out of installation of an AMI meter. PNM's AMI opt-out provisions are discussed in the Direct Testimonies of PNM witnesses Eric Morgan and Stella Chan.

Q. IN ADDITION TO THESE SURVEYS, HOW ELSE DID PNM SOLICIT CUSTOMER INPUT AND FEEDBACK ON GRID MODERNIZATION?

A. In addition to the surveys, PNM held three customer forums: in Albuquerque on July 25, 2022; in Santa Fe on July 26, 2022; and virtually (with a focus on Silver City) on August 3, 2022. The results affirmed that customers believe modernizing the grid is important. Nearly all participants felt it was "extremely" or "very" important that PNM modernize the grid. As one customer explained, "we don't have an option other than to modernize the grid." The other significant takeaway from the forums was customer interest in an enhanced customer experience and access to tools that can address usage and energy efficiency programs.

Q. HOW DID CUSTOMER INPUT SHAPE PNM'S GRID MODERNIZATION STRATEGY?

A. As discussed in the Guide for Grid Modernization Implementation prepared by EnerNex for PNM,[4] PNM developed two fundamental grid modernization objectives based on customer input and the State of New Mexico's public policy goals:

- Customer Empowerment: Enabling customers to manage their energy bill, make informed decisions regarding pricing, have clean energy options and accomplish electrification, and receive relevant service information.
- Customer Service Enhancements: Improving or enhancing service quality, reliability and resilience, and integration of distributed energy resources ("DERs") and EVs.

My testimony primarily focuses on the grid modernization customer empowerment objectives, while PNM witness Omni Warner's testimony details the customer service enhancement aspects associated with modernization of PNM's distribution grid.

[4] Guide at 1.

III. GRID MODERNIZATION CUSTOMER-FACING TECHNOLOGIES

Q. HOW WILL PNM'S GRID MODERNIZATION PLAN EMPOWER CUSTOMERS?

A. PNM's grid modernization plan will empower customers by providing new capabilities for reviewing and managing their energy use and bills. In addition, it will ultimately support informed decisions regarding EV charging, solar and storage investments and operation, and demand side management program participation, thereby empowering customers to effectively manage their individual energy needs and contribute to PNM's decarbonization goals. The customer-facing technology improvements will also simplify customers' experience with PNM services by providing service information through the Customer Energy Management Platform.

Specifically, PNM is pursuing the following six strategic goals to empower customers:

- Equitable access – Assure economically disadvantaged customers are prioritized in meter deployments so when customer-focused programs become available, they are equipped to participate.
- Customer Energy Management – Enable customers' ability to manage energy spend and their energy budget by providing timely usage and cost information and payment options.

- Customer Service Information – Provide relevant and timely information regarding customer service status (*e.g.*, outage information, hosting capacity).
- Customer DER Adoption - Enable customer adoption of onsite clean energy resources, energy conservation and demand response (*e.g.*, demand side management and DER decision support tools).
- Customer Electrification – Enable customer adoption of EVs and smart charging.
- Decarbonization – Enable achievement of customers' environmental interests and state environmental policy goals by providing customers timely information on DER adoption or rate choices that support decarbonization efforts.

My testimony focuses on how the customer-facing technologies included in PNM's grid modernization plan help achieve these customer empowerment goals.

Q. PLEASE DESCRIBE PNM'S PROPOSED CUSTOMER-FACING TECHNOLOGIES.

A. The key customer-facing technologies included in PNM's grid modernization plan are (1) AMI and (2) the Customer Energy Management Platform. These technologies are defined below:

- Advanced Metering Infrastructure or AMI is the energy measurement and collection system, including meters at the customer site, communication

networks between the customer and PNM, and data management systems that make the information available to PNM and the customer. In their testimony, PNM witnesses Mario Cervantes and Jonathan Hawkins discuss the AMI system capabilities, vendor selection, AMI meter deployment, and the related benefits and costs.

- Customer Energy Management Platform is a secure self-service website and mobile application that allows customers to access their energy usage information, to manage their energy bills, and, over time after more functionality is added, to assess DER adoption, energy efficiency solutions, and EV energy decisions with analytic information. Mr. Cervantes' testimony discusses the Customer Energy Management Platform capabilities, vendor selection for this Platform, and the related benefits and costs.

Q. HOW WILL THE CUSTOMER-FACING TECHNOLOGIES HELP PNM ACHIEVE ITS STRATEGIC GOALS TO EMPOWER CUSTOMERS?

A. As AMI is deployed, PNM will concurrently develop the Customer Energy Management Platform. Prior to the installation of the customer's AMI meter, the monthly manually-read meter data with associated billing information will be provided through the Customer Energy Management Platform. After a customer receives an AMI meter and PNM deploys the corresponding data management

systems, the customer will have access to more detailed energy-usage data based on five-minute or 15-minute intervals.

As customers develop advanced meter data history, they can apply analytics to their usage information, which will aid customers with insights and recommendations for saving energy, including whether to pursue options like alternative rates, energy efficiency improvements, demand response program participation, or DER implementation.

PNM anticipates the Customer Energy Management Platform will evolve to allow the AMI data to be combined to inform customer decisions like whether to install solar PV or potential billing impacts from an EV purchase. Customer decision support can help customers understand the potential costs and savings associated with these choices. However, PNM anticipates implementing this advanced level of sophistication in the latter half of the 11-year grid modernization plan. The costs associated with such a deployment are therefore not included in the current grid modernization application.

Q. HOW HAS PNM CHANGED ITS APPROACH TO IMPLEMENTING GRID MODERNIZATION SINCE ITS 2015 AMI APPLICATION?

A. In this application, PNM substantially broadened its approach to implementing grid modernization by taking into account both customer needs and state public policy

goals outlined in New Mexico's grid modernization statute. From a customer-facing perspective, the result is PNM's proposal to deploy an industry-leading AMI meter and customer energy management platform technology. AMI meter technology has improved significantly over the past 15 years, and the latest generation AMI meter offers greater value and advanced capabilities compared to previous meter options. PNM believes that both from the perspective of customer satisfaction and meeting its objective to transition to a carbon-free environment, now is the time for AMI deployment. Delaying the needed transition to an advanced, modern grid is not in the interests of our customers.

IV. CUSTOMER ENGAGEMENT PLAN

Q. HOW WILL PNM ENGAGE CUSTOMERS IN ITS GRID MODERNIZATION PLAN?

A. To support its grid modernization efforts, PNM prepared a Customer Education and Communication Plan ("Communication Plan") for full-scale deployment of approximately 580,000 AMI meters over approximately three and a half years.[5] PNM is focused on delivering a simplified customer experience to ensure the AMI-enabled benefits are intuitive and functionality is easy to manage. The Communication Plan presents a cost-effective yet wide-reaching strategy for

[5] The Education and Communication Plan is included as PNM Exhibit JAR-6

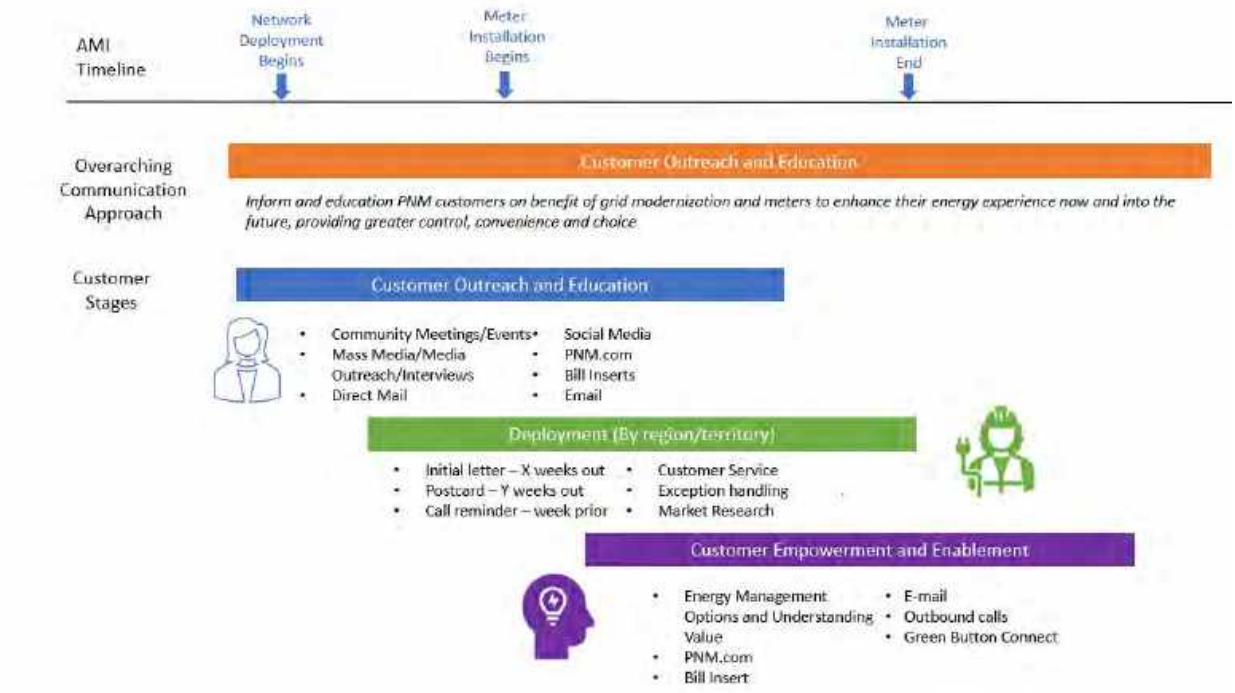
customer education and communication, including a discussion of the technology that will provide energy tools and information. The Communication Plan is a living document subject to change based on Commission direction regarding AMI meter deployment and grid modernization capabilities. The Communication Plan may also change based on any changes to meter installation schedules or timelines.

Q. PLEASE PROVIDE AN OVERVIEW OF THE COMMUNICATION PLAN.

A. PNM's Communication Plan consists of three sequential phases: (1) raising awareness, (2) meter deployment, including the option for customers to opt out of the AMI meters, and (3) customer empowerment and enablement. The awareness phase will be an introductory, wide-reaching effort to inform customers, employees, and community members about AMI meter rollouts and the overall benefits of grid modernization efforts. The deployment phase will emphasize targeted customer outreach by installation community or geographic areas. One critical part of this phase will be informing customers about new meter deployment, ensuring that customers understand the installation process. The final phase, focusing on empowerment and education, will provide targeted follow-up communication to customers who have had an AMI meter installed to ensure satisfaction with the process and inform them about how to take advantage of AMI meter features.

PNM Figure JAR-2 below provides a rough timeline for the three-phase rollout, along with high-level action items for each phase.

PNM Figure JAR-2



Additional details regarding the Communication Plan are discussed in PNM Exhibit JAR-6.

Q. WHAT ARE THE ESTIMATED COSTS OF THE COMMUNICATION PLAN?

A. To accomplish the important tasks envisioned in the Communications Plan, PNM's Grid Modernization Rider includes a $1 million per year budget for five years, plus additional funding required for a full-time employee to manage the Communications Plan. These costs are necessary to successfully execute the intended communication and informational outcomes in the Communications Plan across our entire service territory, which includes targeted and broad messaging via

direct mail, email, digital media (*i.e.*, PNM website), community meetings, advocacy groups, social media, paid media, and customer service support. Under the proposed Communications Plan, the customer education and communication tactics would be executed 90, 60 and 30 days prior to AMI deployment. Marketing and communication activities will continue beyond the 90 days outlined in the Communications Plan to ensure customers have the necessary information to benefit from AMI enabled programs and services.

V. CONCLUSION

Q. DOES THIS CONCLUDE YOUR TESTIMONY?

A. Yes, it does.

GCG#529862

JULIE ROWEY

414 Silver Ave. SW, Albuquerque, NM 87102 (505)241-0649

CUSTOMER EXPERIENCE EXECUTIVE

An award-winning, results-driven executive with extensive experience in increasing revenue, market penetration, awareness, and customer loyalty through effective strategic planning, new product innovation, and continuous improvement. Has held leadership roles spanning the entire customer lifecycle, including customer care, billing, sales, marketing, product management and economic development. Strongly committed to maintaining organizational integrity while maximizing profitability, reducing costs, innovation, improving customer engagement, and exceeding goals and objectives.

PROFESSIONAL EXPERIENCE

Vice President, Chief Customer Officer JAN 2020 – Present

PNM Resources, Albuquerque, NM

Responsible for the entire customer operations lifecycle at PNM Resources, New Mexico's largest investor owned utility. Oversee customer operations, including the customer care center, meter reading, billing, credit and collections, customer products and services, renewables and customer marketing.

- Implemented wide range of customer improvements resulting in improved J.D. Power rankings by over 100 points over 12 months and movement from the fourth to second quartile performance relative to industry peers.
- Leads the strategy and implementation of PNM's multi-year customer improvement journey to transform its customer experience, including implementing an omnichannel strategy, launching new interaction channels, including text and a mobile app, improved self service and digital offerings and customer storm center.
- Lead new product development, including launching electric vehicle customer programs including charging infrastructure and incentives, managed charging, EV rates and customer marketing and education.

Executive Director, Customer Marketing SEPT 2018-DEC 2019

PNM Resources, Albuquerque, NM

Responsible for the commercial and industrial (C&I) large customer segment organization, energy efficiency mass market organization and customer programs and services. Redefined customer segments, developed new product and service offerings, voice-of-the-customer program and built related customer metrics to track and verify success. Helped to transform organization into a customer-centric, high performing team.

Senior Director, Customer Experience JAN 2016 – AUGUST 2018

E SOURCE, BOULDER, CO

Delivered consulting solutions in the areas of customer experience, journey-mapping, omnichannel optimization, marketing communications and self-service enhancements to provide best in class solutions for Fortune 500 energy clients in electric, natural gas, utility and renewable sectors. Engagements included:

- Customer Experience Strategy for Holding Company with 7 operating companies with improving their overall customer experience. Defined a clear business case to quantify the value of improved customer experience through reduced cost to serve and improved customer service metrics which led to positive regulatory proceedings/rate cases and deeper customer penetration in programs and services.
- Created 3-year strategy and roadmap to guide the transformation of the multi state combination electric and natural gas utility to one that is entirely focused on delivering a superior customer experience and company growth.

Vice President, Marketing

SUMMIT UTILITIES, DENVER, CO 2013-2015

Led corporate, branding, PR, advertising, market research, digital, field marketing and customer service for a high-growth, national natural gas distribution company with utilities in three states.

- Developed and launched utility in Maine through integrated sales & marketing strategy in multiple channels resulting in 85% un-aided awareness in 18 months and 30% penetration of potential market.
- Developed and implemented innovative marketing acquisition programs that resulted in doubling customer base and supporting annualized revenue growth from $24mm to $85mm over two years.
- Responsible for both marketing and customer service across three states, aligning frontline customer service with the company brand as we expand into new markets.
- Crafted multi-stage strategic communications approach to regain company credibility after series of construction delays and safety issues threatened company viability. Resulted in improved press relationships, company favorability and media coverage refocused on economic benefits provided to state.
- Initiated first formal customer satisfaction tracking for the utilities and established performance goals and identified improvement opportunities resulting in top quartile performance across topline relationship and satisfaction measures.

Director of Marketing & Communications

TENDRIL, Boulder, CO 2011 – 2012

Led the marketing, communications, and public relations for high growth SaaS company which delivers end-to-end consumer engagement products, applications, and services powered by an open standards platform to enable the smart home.

- Developed integrated marketing plan consisting of new lead generation programs, events strategy, and social and digital media enabling more than 100% year-over-year bookings growth.
- Led PR and corporate reputation efforts establishing thought leadership across several mediums. Established company as early innovator in IoT and software systems for the energy market.

Director of Customer Experience & Marketing

SOUTHERN CALIFORNIA EDISON, Rosemead, CA 2002 – 2011

Led the SCE Marketing Communications department and the State of California's smart energy movement and brand. Managed a budget of more than $50 million and a management team of 30.

- Built brand loyalty by transitioning from a transaction-based customer satisfaction management to an end-to-end measurement of the customer experience that resulted in 80% of customers being fully satisfied (8-10).
- Improved image and favorability by more than 20%, and SCE was ranked in the first quartile of JD Power and Associates nationally and ranked top in the Western Region.
- Led marketing for nation's largest portfolio of energy efficiency programs and services and achieved $450 million of annual bill credits rebates and other incentives for reducing power consumption, the equivalent of powering 950,000 homes for a year that resulted in saving more than 4 billion kilowatt-hours over 5 years.
- Led and implemented enterprise-wide strategy to develop a new customer facing Internet site that resulted in it becoming the second largest and fastest growing delivery channel.
- Developed and managed team to execute and track key acquisition and retention campaigns including renewal, up-sell, loyalty, win-back, and new offers based on needs, competitive landscape, and product offerings.
- Created new customer segmentation for both Residential and Business Customers that became a recognized industry best practice and provided the foundation for all marketing at SCE.
- Forged new partnerships with leading retailers, including Best Buy and Sears, to leverage retail environment.

Vice President of Retail Marketing

SANWA BANK (Acquired by Bank of the West in 2002**),** LOS ANGELES, CA 2001 – 2002

Drove cost-effective consumer acquisitions across all channels, developed and implemented customer retention, cross-sell and loyalty programs and managed the database to develop targeted segmentation marketing plans.

- Managed the consumer advertising and direct marketing agency relationships, and annual budget of $10 million, and a team of marketing managers.
- Generated 30% new brand awareness within 3 months by leading the marketing launch of new banking brand from Sanwa Bank to United California Bank.
- Developed a customer loyalty program and a marketing Segmentation strategy that utilized the bank's customer database to improve cross-selling and increase customer retention and profitability.

Director of Brand & Consumer Marketing

LOS ANGELES TIMES, Los Angeles, CA 1998 – 2001

Led consumer advertising and marketing communications for the Los Angeles Times, latimes.com and Recycler Brands including promotional, direct marketing and online advertising. Managed a budget of $20 million and led multi-disciplinary team of creative, production, and marketing management personnel.

- Created initiatives to increase circulation and readership, improve customer retention and build the brands.
- Reversed decline in readership for first time in Internet era by building brand and direct marketing success.
- Developed and executed segmented direct mail and direct response programs which generated more than 51,150 new subscribers in 1999 and yielded retention rates of 80.4% compared to historical retention rates of 62.1%.

Managing Director

J. WALTER THOMPSON SPECIALIZED COMMUNICATIONS, Los Angeles, CA 1996 – 1998

- Started up Los Angeles branch of agency with core competencies in Healthcare, High Tech, and B2B advertising.
- Won new business including agency's largest accounts: Tenet Healthcare Corp. and the Walt Disney Company.
- Maximized profitability through a series of successful business process re-engineering initiatives.
- Represented agency in contractual dealings with clients, ensuring positive relationships.

EDUCATION

UNIVERSITY OF CALIFORNIA, Los Angeles, CA - ***Bachelor of Arts, English Literature & Communications***
University of Chicago, Executive Management Program

PROFESSIONAL ASSOCIATIONS & BOARD MEMBERSHIPS

EDISON ELECTRIC INSTITUTE CUSTOMER SOLUTIONS EXECUTIVE COMMITTEE
ELECTRIC POWER RESEARCH INSTITUTE ADVISORY COUNCIL
ALBUQUERQUE PUBLIC SCHOOLS FOUNDATION BOARD MEMBER
NAIOP COMMERCIAL REAL ESTATE DEVELOPMENT ASSOCIATION NEW MEXICO BOARD MEMBER

GCG#529834

PNM Smart Meter
Customer Sentiment Survey

Prepared by Swell Group
July 1, 2019

Customer Sentiment Survey Objectives

- PNM is exploring the benefits of Advanced Meter Infrastructure (AMI) throughout their service territory. AMI, namely, smart meters, give customers more information and control over their energy usage, thus working towards reducing emissions and aligning with PNM's 100% zero emissions goal by 2040.
- To determine the appropriate path forward, PNM commissioned Swell Group to conduct a customer survey with the following objectives:
  - Determine current customer knowledge base pertaining to smart meters.
  - Understand what smart meter programs and services are important to customers.
  - Determine customers' preferred communication channels and content pertaining to smart meters.
  - Gauge customer interest in smart meter installation.

Date	Key Milestones
April 29th - May 20th	Secondary research of best practices in AMI strategy and implementation.
Weeks of May 20th and May 27th	Design and program the PNM Smart Meter Customer Sentiment Survey.
June 4th - June 18th	Deploy, monitor and send reminder emails for online survey.
Week of June 17th	Analysis of survey findings and statistical modeling.
Week of July 1st	Final reporting and presentation of findings.

Methodology and Response Rates

- **Response rate:** 5%
- **Completion rate:** 60.3%
- **Quotas.** Survey quotas were set to ensure representation from rural, suburban and urban segments for both residential and commercial customers.
  - *Residential*: Quotas were met or exceeded in all residential customer segments and are statistically valid and representative of the PNM customer base as a whole.
  - *Commercial*: None of the commercial segments met quota, which is typical for surveys with business customers. Therefore, commercial results are directional and not statistically valid.

Segment	Quota	Response Count
Residential Urban	384	387
Residential Suburban	384	444
Residential Rural	384	403
Commercial Urban	357	31
Commercial Suburban	352	20
Commercial Rural	367	93

Summary of Findings

Leverage Key Drivers of Smart Meter Adoption Rate Interest. Address existing concerns about technology and personal safety, and promote how smart meters minimize life disruptions, save customers' money and benefit the environment.

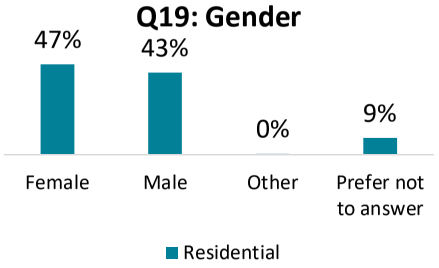
Awareness. Education. Services and Programs. As respondents learned more about the potential benefits, services and programs available as a direct result of smart meter implementation sentiment about smart meters become more positive.

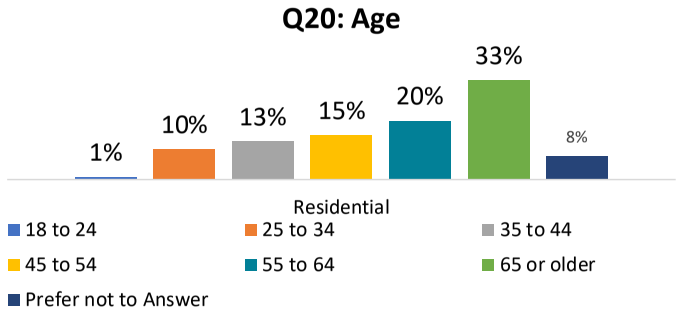
Top concerns should be proactively addressed. The rollout strategy and communication cyber security, EMF and health factors, reduced and minimized outages and restoration times plans. Opt-out offerings should be made clear and fees should be minimized to the extent possible.

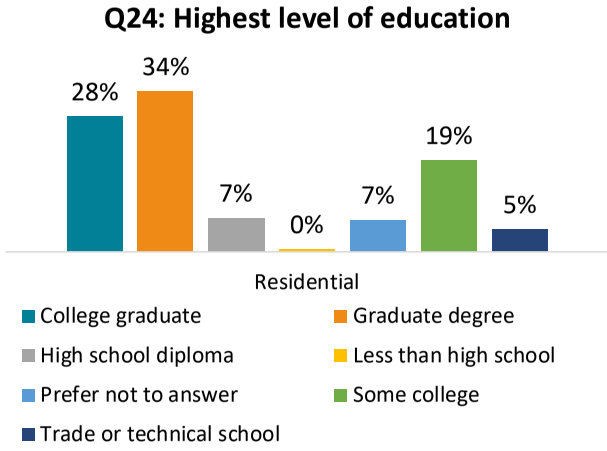
Create a dynamic communication plan and feedback mechanism. Creating FAQs, installation videos and process guides and email and text updates leading up to and during smart meter installation will be critical to a successful rollout. Listen and act upon customer experience feedback.

Residential Respondent Profile

- Over 24% of respondents were of Hispanic, Latino and/or Spanish descent. (Q22)
- 3% indicated they were American Indian or Alaskan Native; 2% Asian; 2% Black or African American; 1% Native Hawaiian or Pacific Islander and 89% White. (Q23)





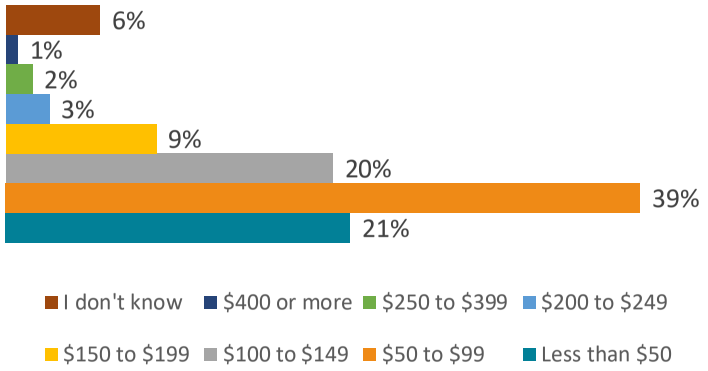


***NOTE:* (Q19)** Residential n=1238; n varied by question

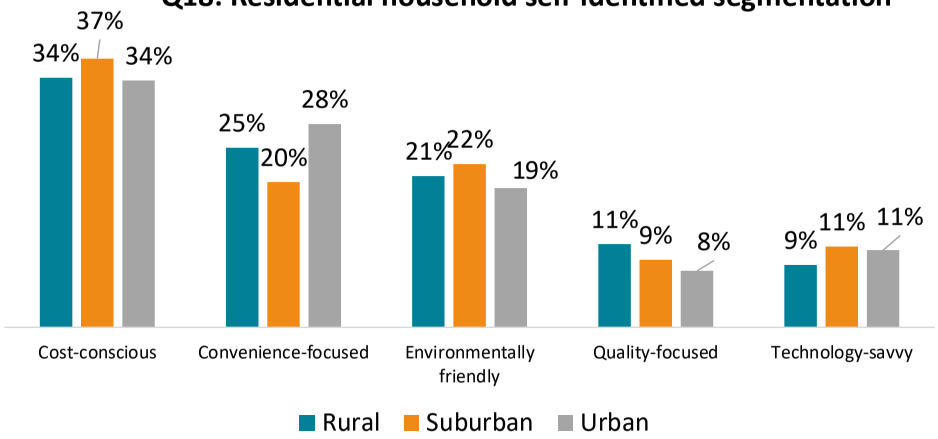
Residential Respondent Profile cont'd

- Approximately 76% of respondents own their primary residences, while 24% rent.
- More than 59% of residential respondents have been PNM customers for ten years or more.
- Most residential customers indicated their monthly PNM bill to be less than $100.
- More households identified with being cost-conscious than any other segment. Suburban residential customers tended to be more environmentally friendly, while more urban customers were convenience-focused.

Q16: How much is your average monthly utility bill?



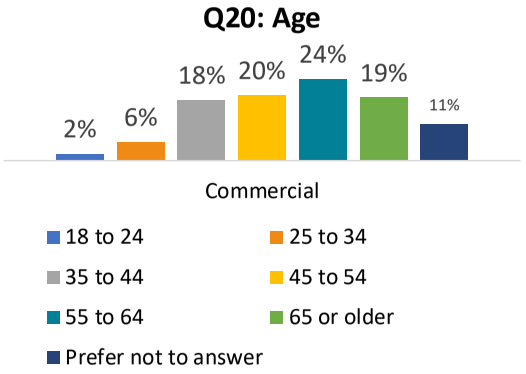
Q18: Residential household self-identified segmentation

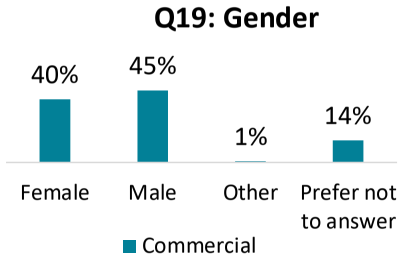


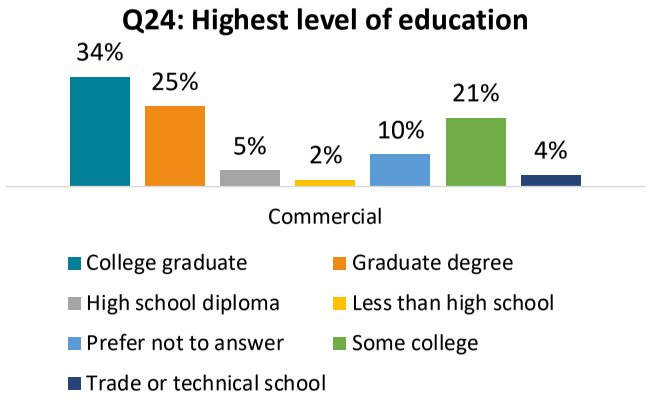
***NOTE:* (Q16)** Residential n=1240; n varied by question

Commercial Respondent Profile

- More than 60% of commercial respondents were age 45 or older.
- Similarly, 59% indicated they had, at minimum, a college degree.
- A significant percentage of respondents preferred not to answer demographic questions.





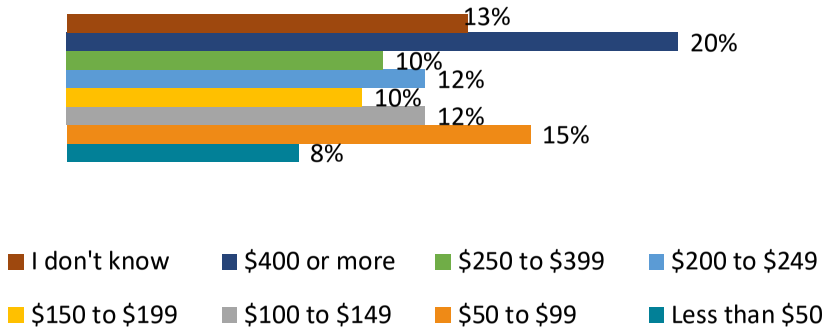


NOTE: (Q16) Commercial n=142; n varied by question

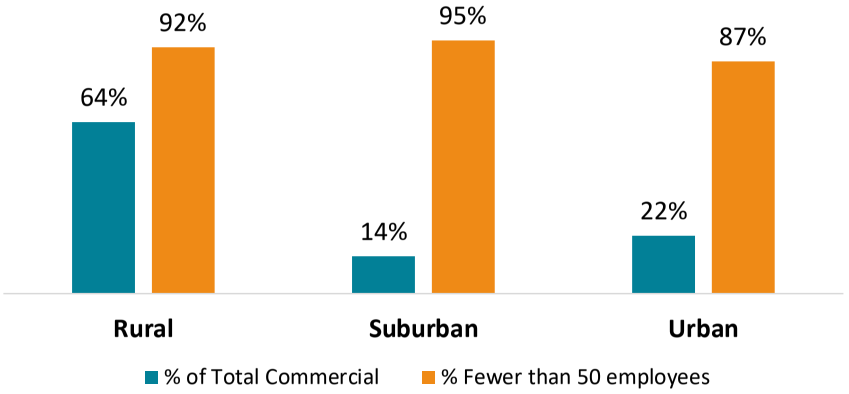
Commercial Respondent Profile

- Over 62% of respondents have been customers of PNM for more than 10 years; 14% 5 to 10 years; 15% 2 to 5 years; 6% 1 to 2 years; 3% less than 1 year. (Q15)

Q16: How much is your average monthly utility bill?



Q17: Representation of commercial customers



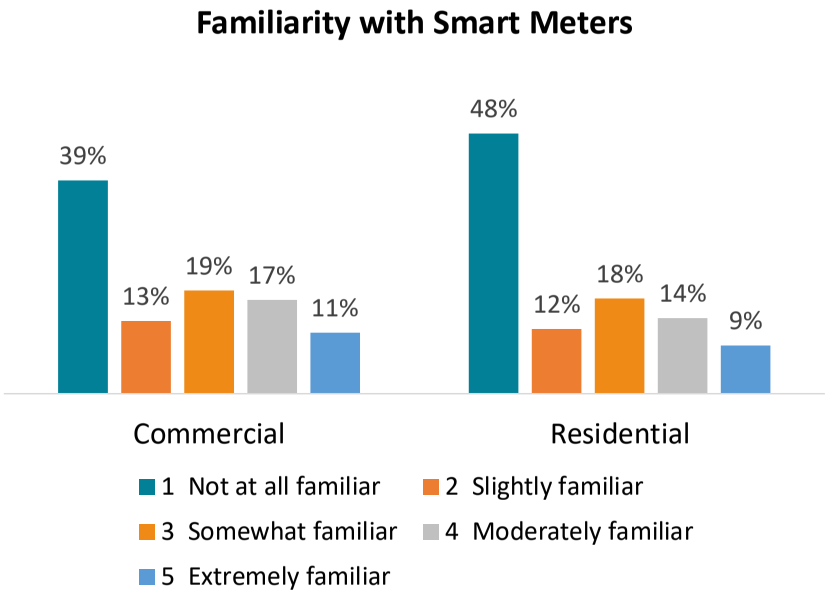
NOTE: (Q16) Commercial n=142; n varied by question

Customer Insights

Unaided Awareness

Smart Meter Familiarity

- Less than half of residential customers had familiarity of smart meters prior to completing the survey.
- Education will be a critical component of the smart meter rollout strategy.



Q1: How familiar are you with Smart Meters? **(Commercial n= 232; Residential n= 1885)**

Unaided Customer Feedback

- Feedback from customers was both positive and negative, and sometimes extremely inaccurate, based on what they knew about smart meters prior to completing the survey.

*"Meter readers as well as others would lose jobs and be **unable to support families.** Customers would be charged for the meters and pay an additional **monthly fee** for using the meter. The microwave radiation emitted will cause multiple **health issues**."*

*"They can be **polled remotely** and can be used by both the company and the customer to **provide historical data**."*

*"Not sure… but think they are meters that can be **read from just driving by** with an electronic reader."*

*"They are very convenient for consumers to control the usage but that it can also **affect employees' jobs** and consumers would have to pay extra for these smart meters."*

*"They make it **easier for the meter readers** but may **emit hazardous wavelengths** similar to a burst of Wi-Fi."*

"Never heard of them."

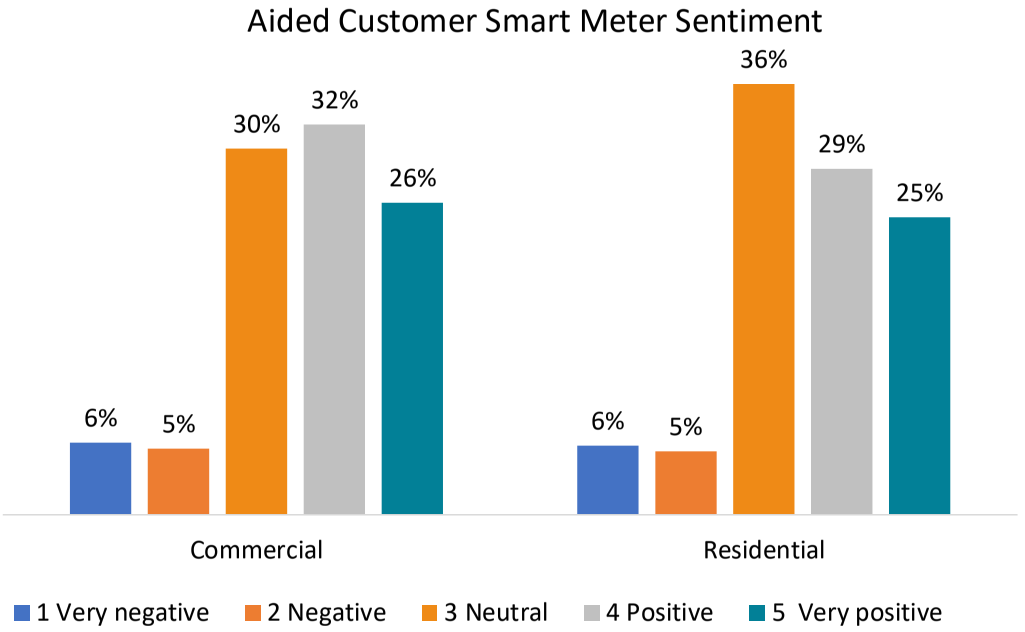
Customers Sentiment

Aided Awareness

Aided Customer Smart Meter Sentiment

Customer Reaction to Smart Meter Summary Statement

Smart meters are digital meters that communicate between your home or business and PNM through a secure wireless communication network. Smart meters do not collect, store or transmit any private or personal information. Installing smart meters will help give every customer more convenience, choice and control over their energy use.



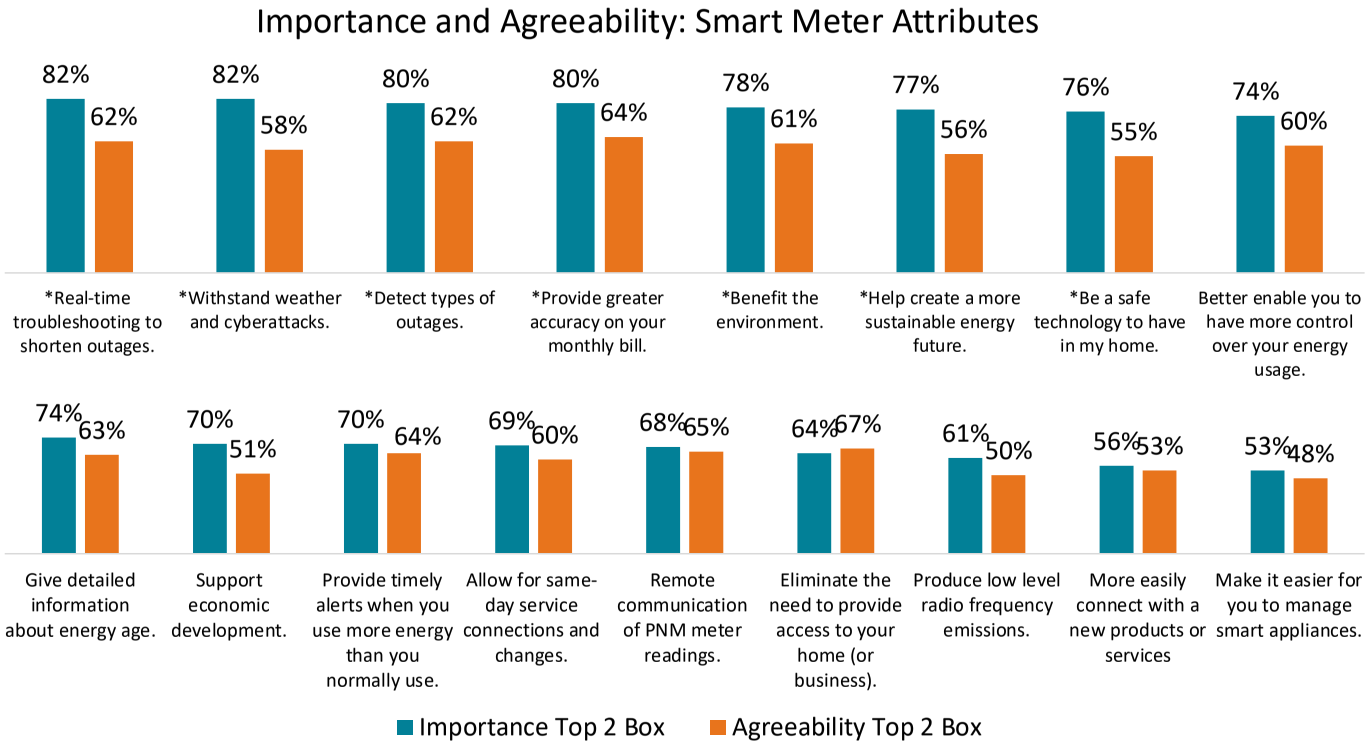
Q4: After reading the statement, how would you rate your overall feelings about smart meters?
(Commercial n = 201; Residential n= 1,695)

Aided Residential Customer Smart Meter Sentiment

Q6: How important are the following attributes of smart meters?

Q7: To what extent do you agree with the following statements about smart meters? (Residential n= 1373)

* Indicates 'Very important' selected by over 50% of respondents)

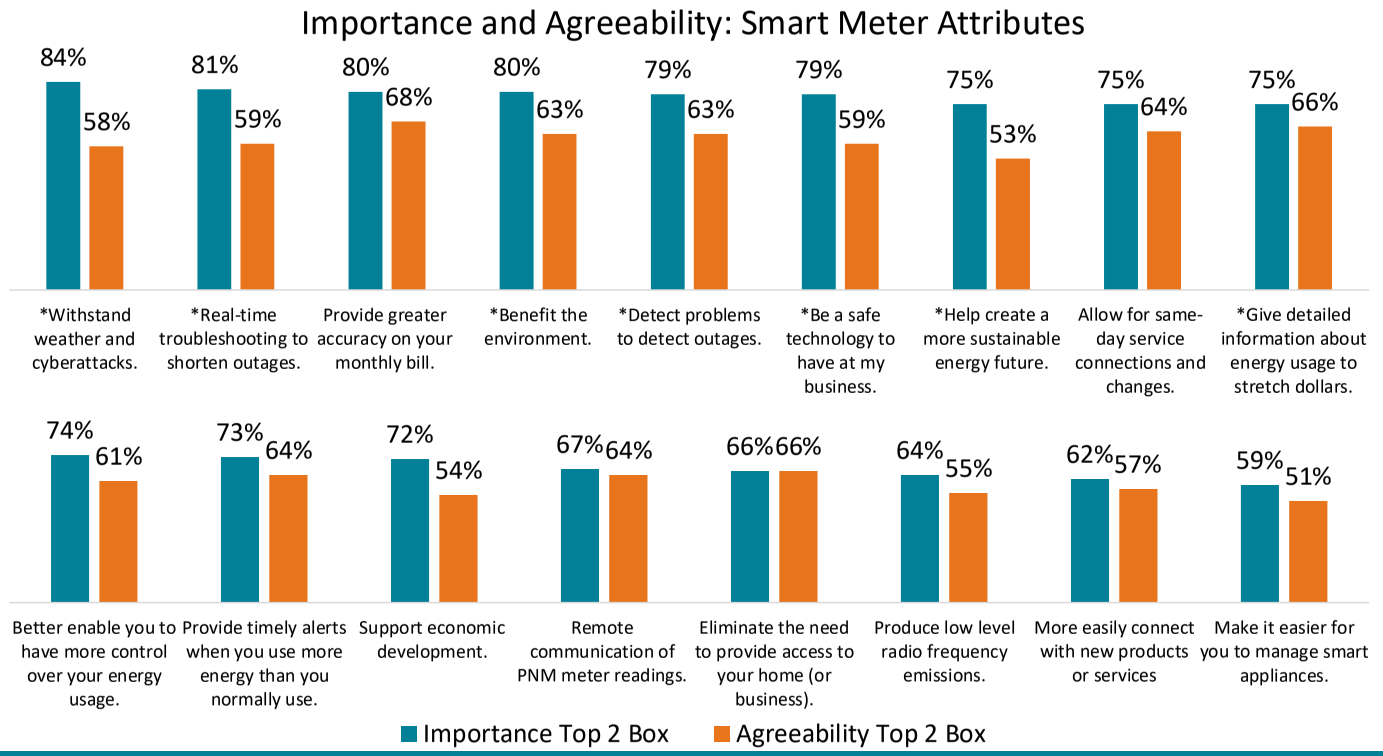


Aided Commercial Customer Smart Meter Sentiment

Q6: How important are the following attributes of smart meters?

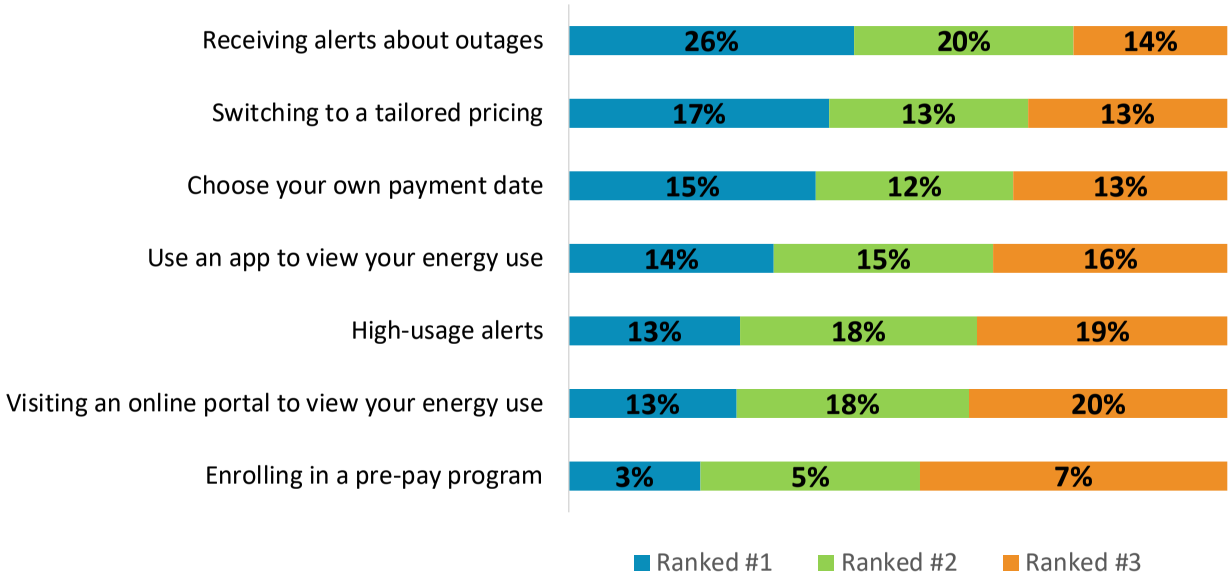
Q7: To what extent do you agree with the following statements about smart meters? (Residential n= 1373)

* Indicates 'Very important' selected by over 50% of respondents)



Top 3 Ranking: Residential Programs and Services

Top 3 Residential Ranking:
Smart Meter Programs and Services



Percentage in Top 3 Ranking

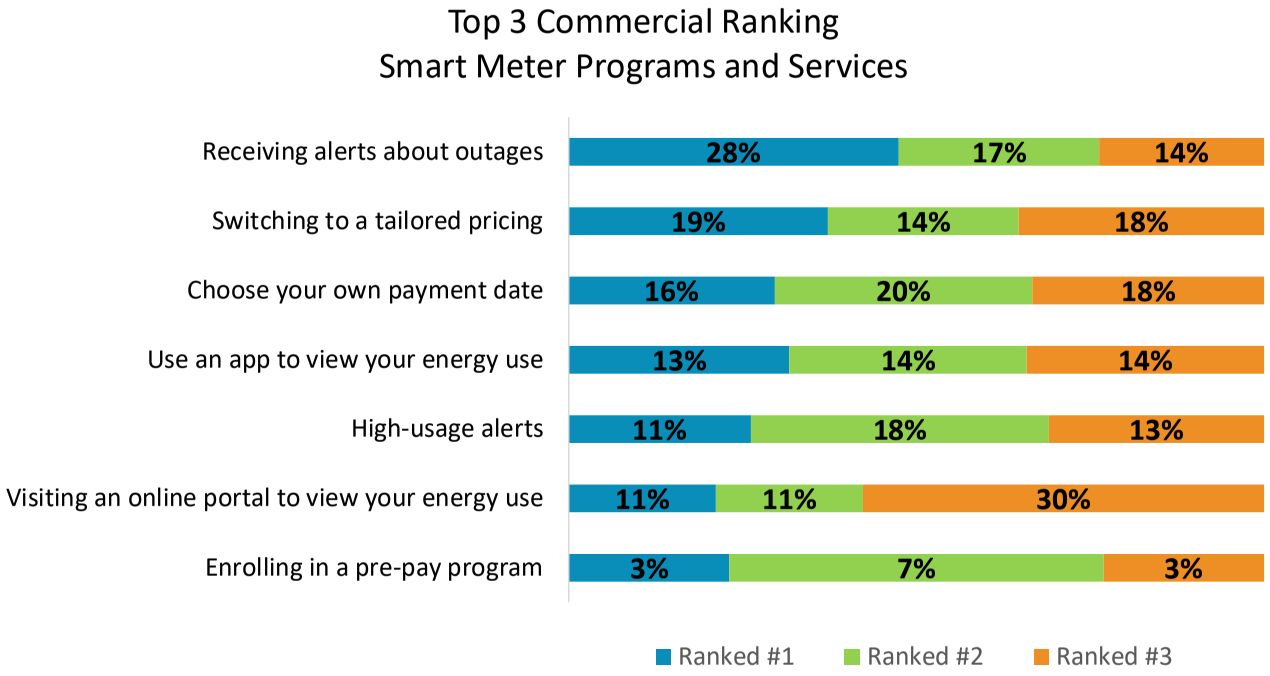
59% Receiving alerts about outages

50% Visiting an online portal

49% High-usage alerts

Q8: Please rank each program and service, with 1 being the 'Most important' and 6 being the 'Least important' possible PNM offering. (Residential n= 1272)

Top 3 Ranking: Commercial Programs and Services



Percentage in Top 3 Ranking

58% Receiving alerts about outages

54% Choose your own payment date

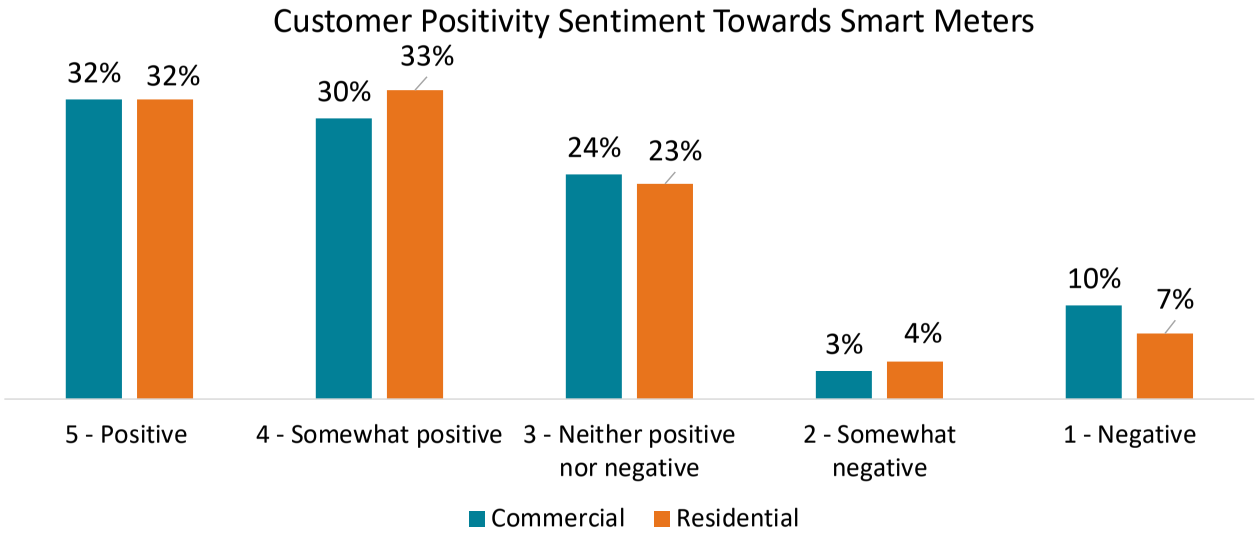
52% Visiting an online portal

Q8: Please rank each program and service, with 1 being the 'Most important' and 6 being the 'Least important' possible PNM offering. (Commercial n= 148)

Customer Sentiment

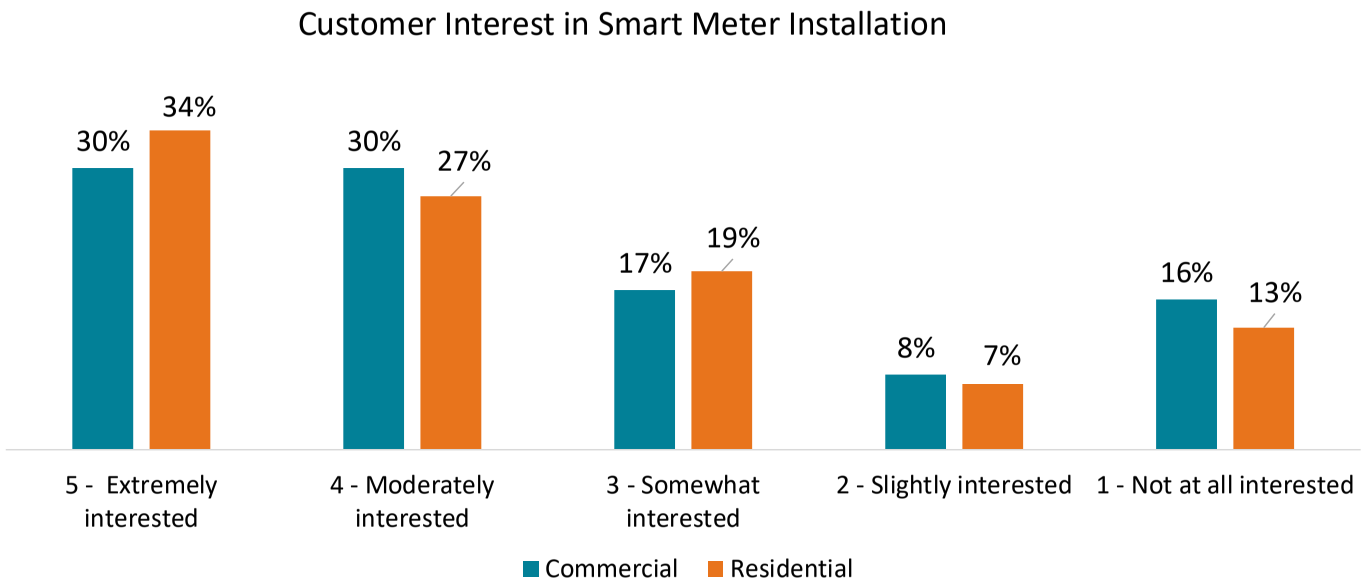
Post Awareness

Post-Awareness Customer Positivity



Q13: Based on the additional information shared during this survey, now how would you rate your overall feelings about smart meters, with 5 being 'Very positive' and 1 being 'Very negative?'
(Commercial n=146; Residential n= 1,243)

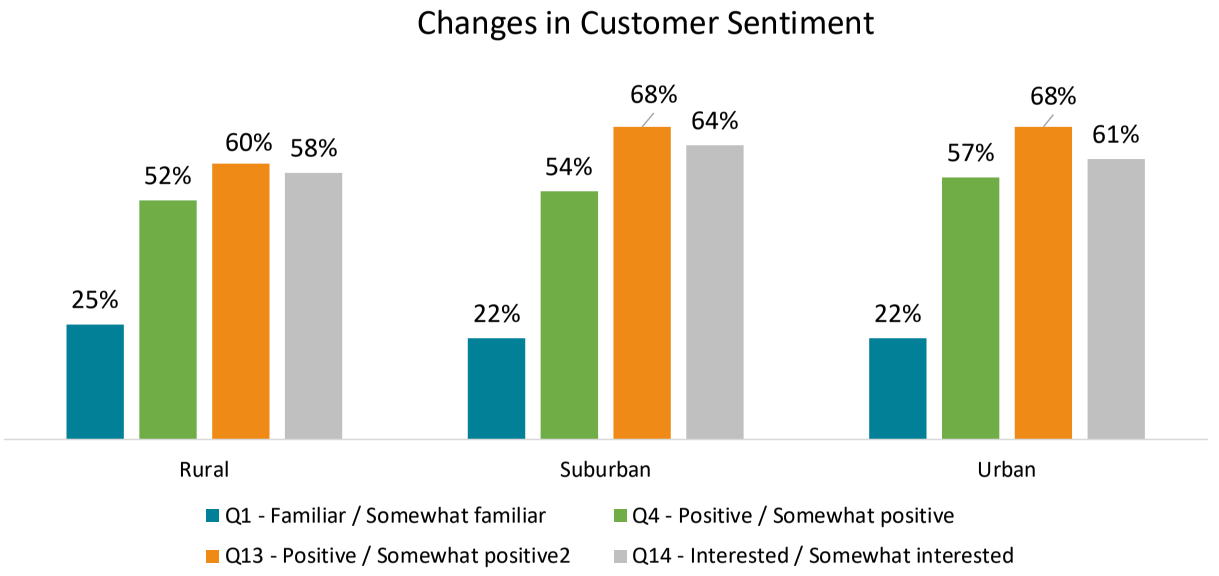
Post-Awareness Customer Interest



Q14: Based on the information shared in this survey, how interested are you in having a smart meter installed, with 5 being 'Extremely interested' and 1 being 'Not at all interested?' (Commercial n=146; Residential n= 1,240)

Changes in Customer Sentiment by Geographic Region

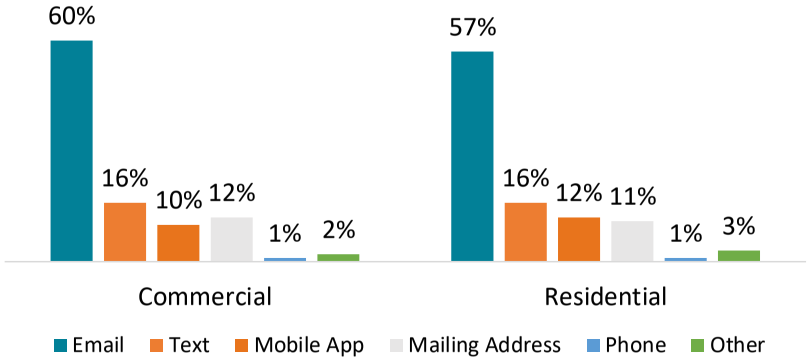
- Positive sentiment increased from the point when customers reviewed the summary statement to when they were asked the same question after reviewing potential smart meter attributes.
- Rural customer sentiment lagged that of suburban and urban customers.
- Though most customers felt positively about smart meters, their interest in having one installed was lower, overall, than their positive sentiment. Communication and education will need to focus on customer benefits.

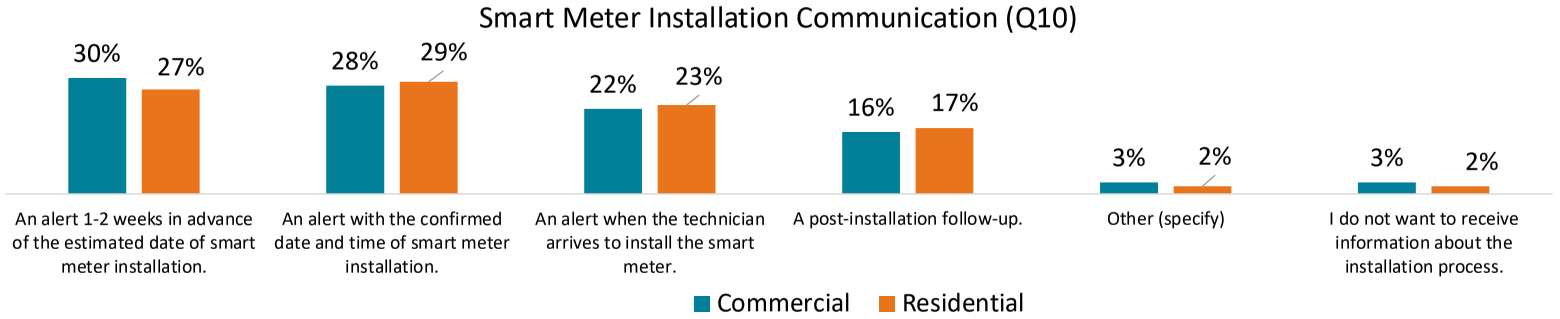


Note: N values changed by question.

Customer Communication Preferences

- Email was the preferred communication channel amongst respondents.
- Providing communication at each phase of the smart meter installation is critical.

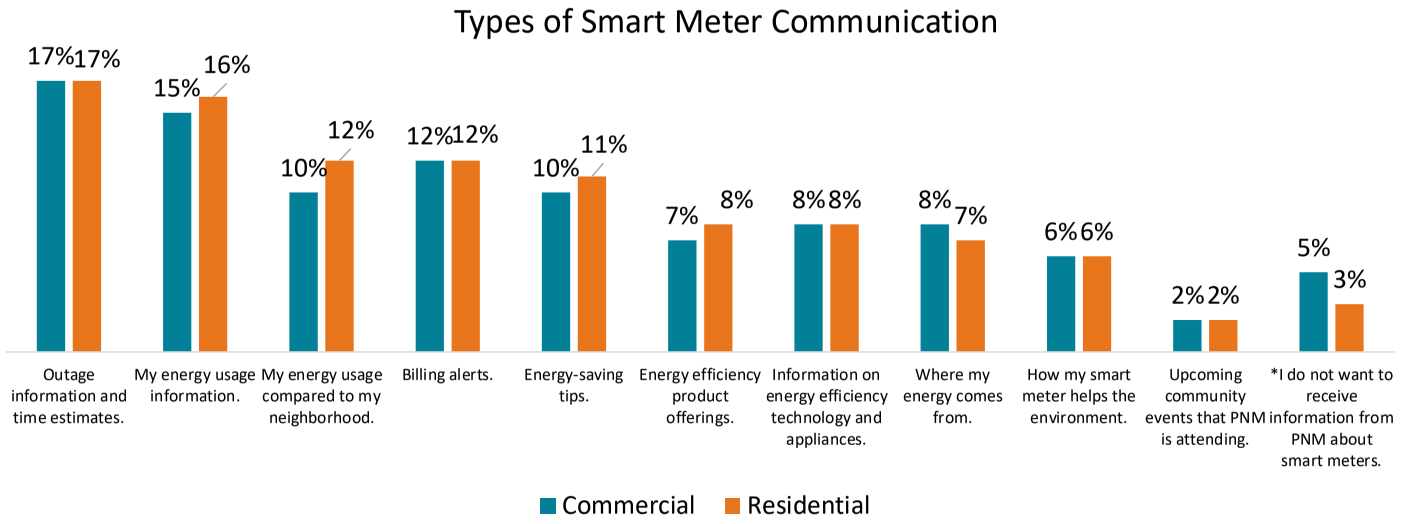


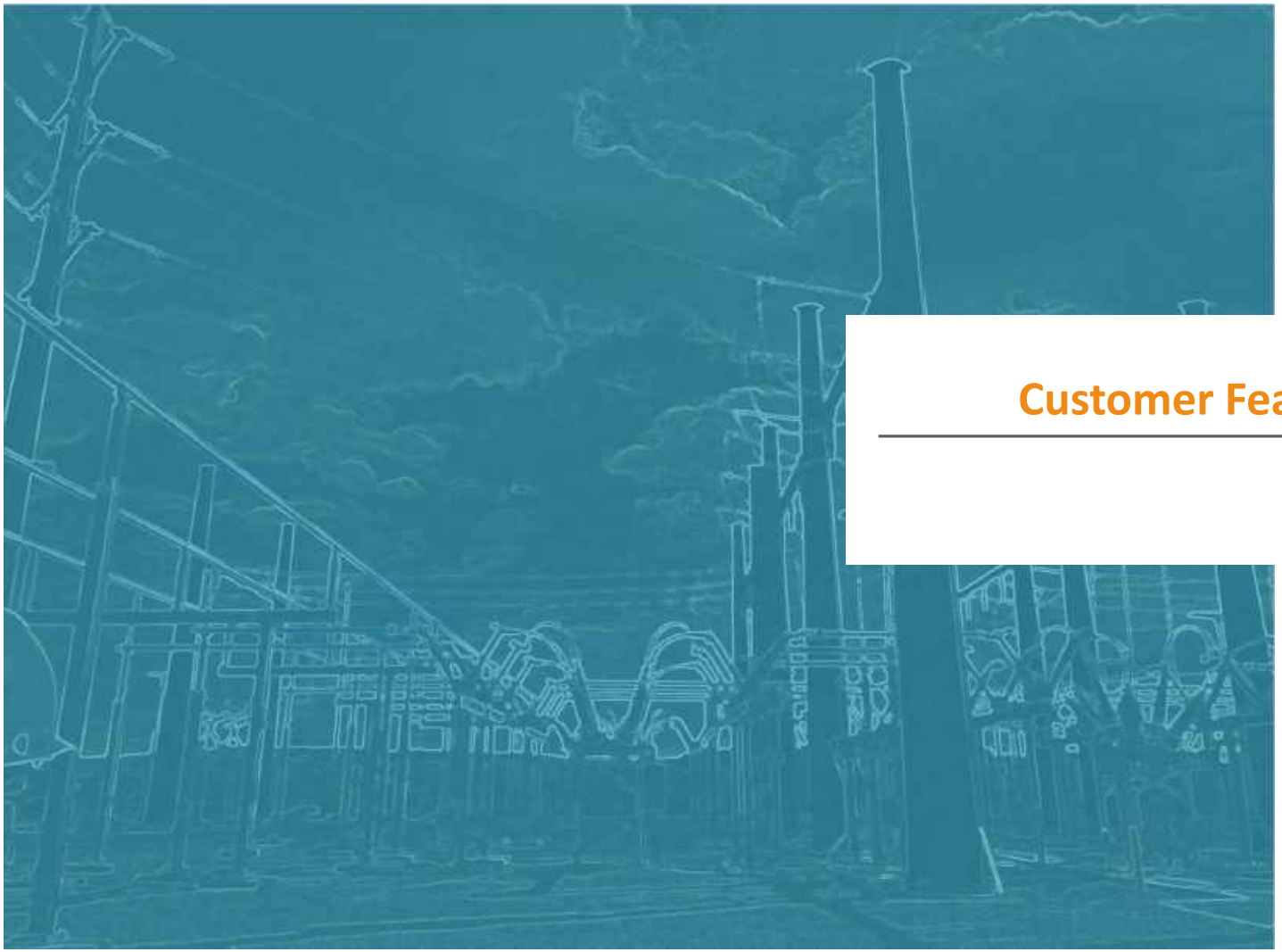


Q9: How do you like to receive communication about smart meter information from PNM in the future? Q10: What communication alert(s) would you like PNM to send to customers through the smart meter installation process? (Commercial n=147; Residential n= 1,260)

Post-Installation Smart Meter Communication

- Outage and energy usage information were preferred PNM smart meter-related message topics.
- Energy-saving and billing alerts were also important message topics.
- A self-elected approach to communication is ideal. Allow customers to select the communication channel of preference and information topics they'd like to receive is the optimal approach to customized communication solutions that increase customer satisfaction.



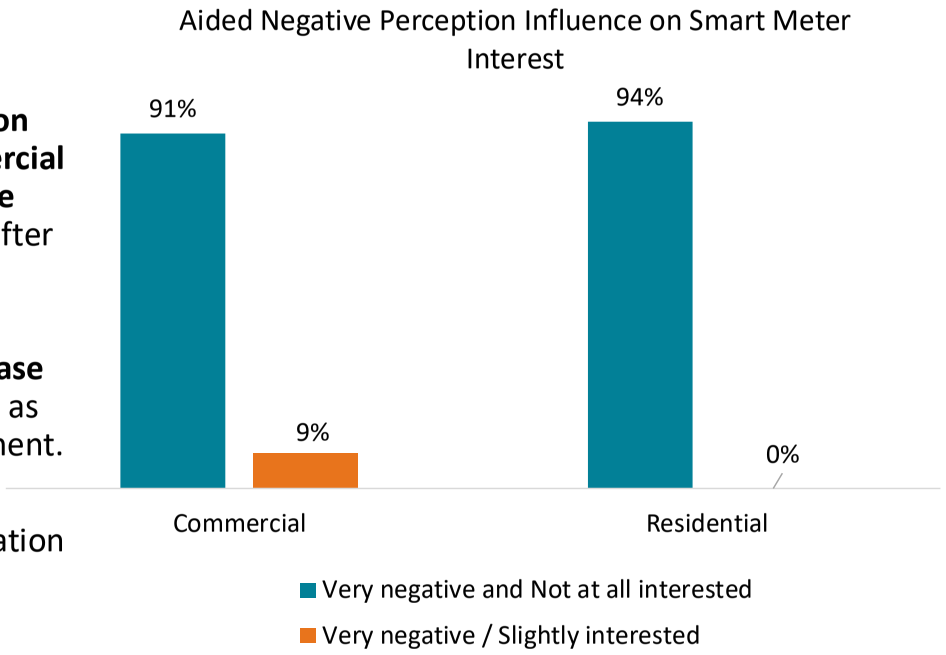


Customer Fears and Barriers

AMI Rollout

Customer Barriers to AMI Implementation

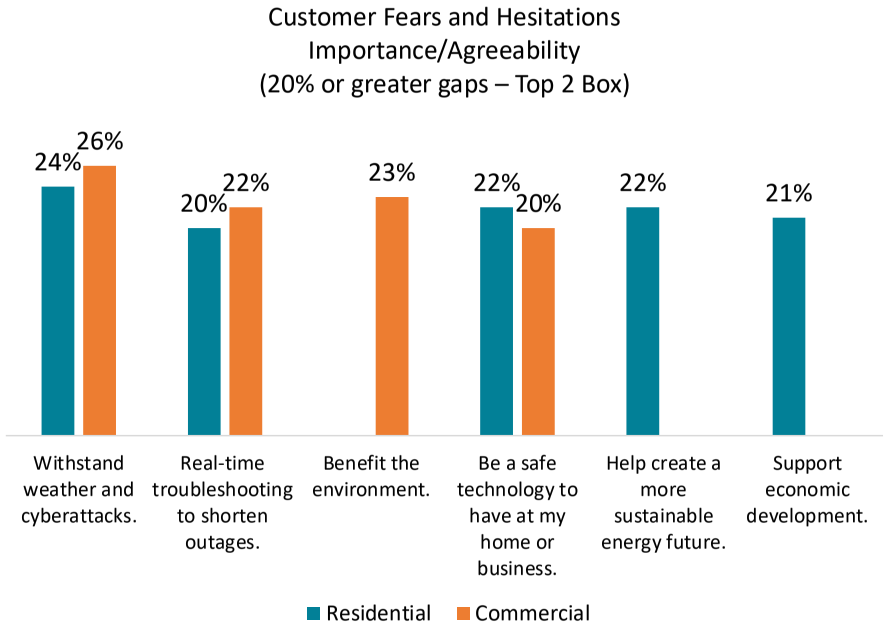
- A total of 15% of commercial and almost 6% of residential respondents had a very negative perception of smart meters after reading the brief summary.
  - **Of the respondents that had a 'very negative' perception** after reading the smart meter summary, **91% of commercial and 94% of residential respondents indicated they were not at all interested in having a smart meter installed** after receiving further education about possible smart meter attributes, benefits, programs and services.
- Interest in **smart meter installation correlated with an increase in an initial positive reaction**, though not to the same extent as those who had a negative impression of the summary statement.
- Those that started with a significant negative perception of smart meters are likely to be resistant to smart meter installation regardless of the education provided by PNM.



Note: Commercial, N=11 and Residential, N=8.

Customer Fears and Hesitations

- The gaps between customers' perceived importance and agreeability is indicative of the biggest barriers to customer interest in smart meter installation.
- While education is unlikely to work on those with a pre-existing significant negative smart meter perception, those with a slightly negative or neutral perception could be more receptive. Educational communication should focus on providing customers with facts about cyber security, EMF safety, shortened outages, environmental benefits, sustainability and economic development to most effectively shift slightly negative or neutral perceptions to positive.



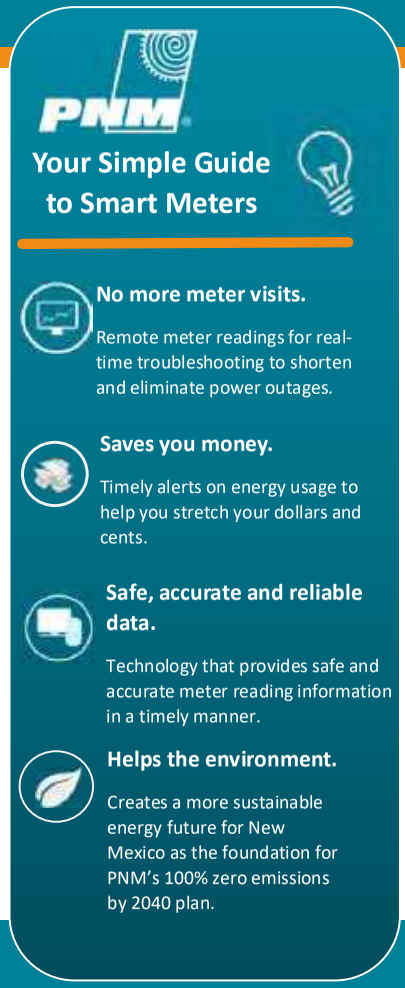
Aligning Customer Insights with Action

Next Steps

Leverage Key Drivers of Smart Meter Interest

The following were the most important key drivers of customer interest in getting a smart meter:

1. Eliminate the need for PNM to access their property
2. Remote meter reading capabilities
3. Provide timely alerts on energy usage
4. Provide detailed information on energy usage to help stretch customer dollars



Phase 1 Pilot:
Utilize Ethnographic and Lifestyle Segmentation

- Understanding customers, their lifestyles, careers and affinity group - or group that shares common interests, beliefs and sometimes goals, is important in understanding the specific and unique barriers you are likely to encounter within each zip code.
- According to the segmentation analysis, Up & Coming and In Style lifestyle segments should be at the forefront of communications and strategy.
- Soccer Moms were the largest secondary lifestyle segment.
- Down the Road would be the tertiary segment of focus, given the zip codes considered for the pilot.
- Of all zip codes, **87122 had the lowest positivity and interest ratings**, on average, after learning about smart meter attributes, features and benefits. This group will require more convincing and support during the initial rollout, most likely.

Meter Ready Cycle	Zip Code	Primary Segment	% of Total Primary Segment	Secondary Segment	% of Total Secondary Segment	Tertiary Segment	% of Total Tertiary Segment
1	87121	Up & Coming	38.9%	American Dreamers	32.40%	Barrios Urbanos	11.3%
2	87113	In Style	36.2%	Soccer Moms	21.90%	Down the Road	18.9%
2	87107	Exurbanite	18.7%	Front Porch	16.50%	Comfortable Empty Nesters	7.2%
3	87109	Old and Newcomer	19.4%	Young & Restless	18.40%	Comfortable Empty Nesters	11.7%
3	87122	Professional Pride	42.7%	Exurbanites	29.90%	Top Tier	16.7%
3	87113	In Style	36.2%	Soccer Moms	21.90%	Down the Road	18.9%
4	87114	Up & Coming	37.4%	Soccer Moms	12.60%	Bright, Young Professionals	9.2%

The Segments of Focus

Up and Coming

- Rely on the Internet for entertainment, information, shopping, and banking.
- Prefer imported SUVs or compact cars, late models.
- Carry debt from credit card balances to student loans and mortgages, but also maintain retirement plans and make charitable contributions.
- Busy with work and family; use home and landscaping services to save time.
- Find leisure in family activities, movies at home, trips to theme parks or the zoo, and sports; from golfing, weight lifting, to taking a jog or run.

In Style

- Partial to late model SUVs: compact SUVs are gaining popularity. • Homes integral part of their style; invest in home remodeling/maintenance, DIY or contractors; housekeeping hired.
- Prefer organic foods, including growing their own vegetables.
- Financially active, own a variety of investments often managed by a financial planner.
- Meticulous planners, both well insured and well invested in retirement savings.
- Generous with support of various charities and causes.
- Actively support the arts, theater, concerts, and museums.

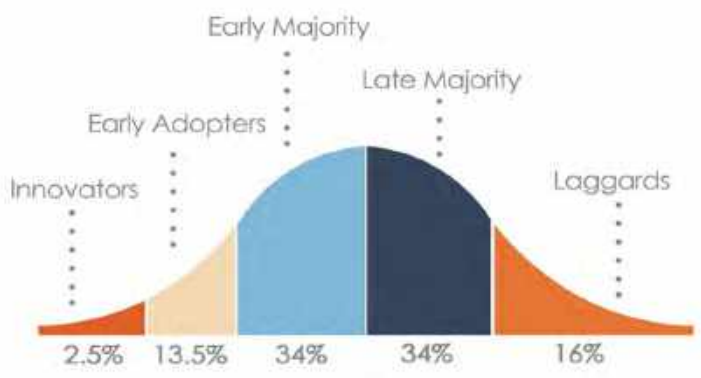
Soccer Moms

- Most households own at least 2 vehicles; the most popular types are minivans and SUVs.
- Family-oriented purchases and activities dominate, like 4+ televisions (Index 154), movie purchases or rentals, children's apparel and toys, and visits to theme parks or zoos.
- Outdoor activities and sports are characteristic of life in the suburban periphery. They attend sporting events, as well as participate in them like bicycling, jogging, golfing, and boating.
- Home maintenance services are frequently contracted, but these families also like their gardens and own the tools for minor upkeep, like lawn mowers, trimmers, and blowers.

Down the Road

- Purchased a used vehicle in the past year, likely maintaining the vehicle themselves.
- Routinely stop by the convenience store to purchase gas, lottery tickets, and snacks.
- Use the Internet to stay connected with friends and play online video games.
- Listen to the radio, especially at work, with a preference for rap, R&B, and country music.
- Enjoy programs on Investigation Discovery, CMT, and Hallmark, typically watching via satellite dish.
- Often prepare quick meals, using packaged or frozen dinner entrees.

Align Marketing and Communication with the Smart Meter Product Lifecycle



Year 1

- General Focus: Awareness and Education – leverage technical experts
- Targeted Focus: Innovators and Early Adopters - Monitor customer feedback

Year 2

- General Focus: Education, Address Phase 1 pain points
- Targeted Focus: Early Majority – leverage customer testimonials and energy savings

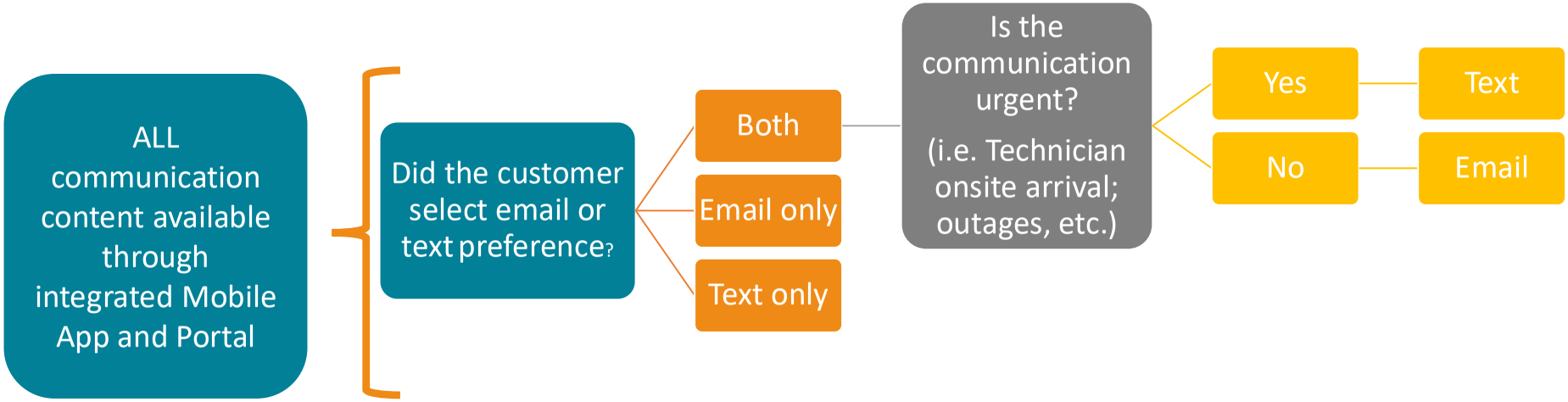
Year 3

- General Focus: Dispel negative PR, use facts to support installation
- Targeted Focus: Late Majority –leverage success stories, energy and cost-savings

Year 3+

- General Focus: Dispel negative PR, use facts to support installation
- Targeted Focus: Laggards

Determine the Appropriate Communication Strategy



- It's important to note that this was an email survey to a random sample of customers with an email address on file with PNM, so preferences may differ from the general customer base.
- Communication strategies will need to reach those customers that PNM does not have digital contact information for on record.

Next Steps

1	**Align Marketing & Installation Phases**	Use evidence to develop the full 3-year AMI rollout plan. Focus on zip codes of lower resistance first. Marketing should focus on awareness first, followed by education and then usage tips.
2	**Mind the Gaps**	There is a dissonance between smart meter attributes of importance and customer agreeability that smart meters can deliver on some of the most important attributes, such as preventing cyberattacks, outages, improving the environment and economic development.
3	**Use Key Drivers to Market Smart Meters**	Marketing targeted at upcoming installation areas should focus on convenience, cost-savings, safety and environmental sustainability to peak interest.
4	**Create a Comprehensive Communication Plan**	There is no one communication channel that is optimal. Some customers will prefer email, others text, and some will want a combination, depending on the context. Give customers as much customizable control over the process as possible, while not sacrificing efficiencies in the AMI rollout.

Next Steps cont'd

5	**Use Customer Segmentation**	Ethnographic and lifestyle data is available by zip code. Use customer personas when tailoring different communications to appeal to zip codes in each phase of the rollout.
6	**Address Meter Reader Jobs**	Qualitative customer insights addressed unaided concerns about job loss as a result of smart meters. Develop a plan to minimize job loss for a successful AMI rollout.
7	**Develop an Opt-Out Plan**	Opt-out fees should cover, but not exceed the expenses associated with having a digital meter instead of a smart meter. Secondary research suggests 1-2% of customer populations tend to opt-out of meters. Setting fees to high to deter customers from opting out could result in increased negative PR and additional mandates, or rejection from the public works commission.
8	**Consider an Employee Ambassador Program**	Employees share a human perspective that is often hard to convey through the organization's brand. They are people within the community – advocates for clean energy and the 100% Zero Emissions plan for PNM.

Questions?

Research Consulting Team

Alissa Tambone, BSBA, PmP, MEd, President & CEO
Swell Marketing Group
Alissa@swellmarketinggroup.com
419.343.8557

Korrina Duffy, BS, PhD, SVP – Market Research
Swell Marketing Group
Korrina.duffy@gmail.com
602.373.4649

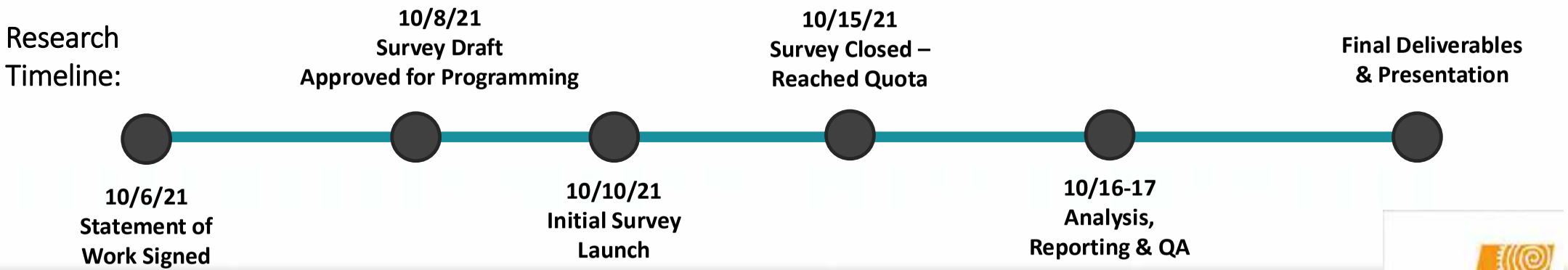
PNM Grid Modernization Message Testing Report

PNM Corporate Communications
via Swell Marketing Group (October 2021)

Presented to Executive Sponsors on November 11, 2021

RESEARCH OVERVIEW AND TIMELINE

- Oversampling was used to program and close the survey for final reporting in under a week to meet internal PNM requirements. The sample was balanced in advance to be a representative distribution by PNM region.
- A total of **38,687** emails were sent to PNM residential customers between Monday, October 11th and Tuesday, October 12th 2021.
  - Response rate: 2.9% (n=**1128**)
  - Completion rate: 47.9% (n=**540**)
  - Results are valid at a 95% confidence interval; +/-4.3%



MESSAGES TESTED

1. Customer Service

We're modernizing the grid not just to enhance customer service but to empower our customers.

Now is the time to update New Mexico's power grid. The benefits to customers are many, including shorter outages, timely electricity use and cost information, and easier access to clean energy with distributed energy resources. How will this happen? Advanced meters will improve reliability and help shorten outages, while providing customers with helpful information on pricing and program options. As we transition from large fossil fuel plants to renewable energy resources, modernizing the grid will help maximize efficiency, enhance system resilience and stability, and protect against outside threats.

2. Mitigate Risk

Demand for energy is increasing. So are concerns about safety, cyber security and natural disasters. This is why we must modernize the grid now.

This past winter, according to energy operators, Texas was minutes away from a total grid failure that would have led to a statewide blackout for weeks. We can't let New Mexico be threatened by such a disaster. Modernizing New Mexico's grid will help ensure continued service, safety and power quality, and enhance system resilience to protect and recover from natural disasters and cyber terrorism threats. Modernization will also help shorten outages, provide customers with timely electricity use and cost information, and provide more efficient access to clean energy.

3. Tech-forward

The grid we have now can't power us up tomorrow.

Transforming the grid to power the future. Electricity has powered technology over the past century. It's time for technology to return the favor as we modernize the power grid. Grid modernization benefits customers in many ways including advanced meters for improved access to energy information, using closer-to-home, distributed clean energy resources as we transition from large fossil fuel plants, and addressing climate change impacts and other threats to energy reliability, resilience, and stability.

4. Keep Life Going

Smart, clean, reliable energy optimized for your life.

At PNM, we know that you want to be confident that you and your family have safe, reliable, and affordable clean energy now and in the future. But the future presents us with challenges. Due to the acceleration of climate change and high-impact natural disasters, increased cyber security threats, and the rapid economic growth taking place in New Mexico, the grid we have today needs to be modernized. It needs to be more secure and more resilient than ever before. We get it. We've been keeping the lights on for over 100 years. This is why we must modernize our grid now, so that New Mexicans like you have the energy they need when they need it for generations to come.

STRATEGIC RECOMMENDATIONS

STRATEGIC RECOMMENDATIONS – A TWO PHASE APPROACH

Pre-Regulatory Approval Messaging

Approach Two (Mitigate Risk to Energy Reliability)

"Demand for energy is increasing. So are concerns about safety, cyber security and natural disasters. This is why we must modernize the grid now."

- Focus on safety and security to build trust leading up to grid modernization regulatory proceedings. Consistently, in PNM JD Power and Image Survey results, power quality and reliability (PQR) is a top concern for customers. Combined with media surrounding PG&E infrastructures that were deemed cause of many fires, Texas mid-winter outages, and documentaries on natural disasters impacting PQR, initial messaging should focus on what could happen without PNM grid modernization.

Post-Regulatory Approval Messaging

Approach Four (Keep Life Going)

"Smart, clean, reliable energy optimized for your life."

- Once decoupling, automated metering, and foundational grid modernization plans have passed regulatory, focus on a message of hope and positivity for the future. A future of renewable energy.

STAKEHOLDER ENGAGEMENT

STAKEHOLDER OUTREACH

Stakeholder Group	Who Will Reach Out	Timeline
Government 1:1	Gov't Affairs	Ongoing (in person)
Tribal	Tribal Affairs & GM Group	TBD (in person, with optional virtual)
Regulatory Intervenors 1 Group	Enernex	Scheduling 2nd wk of Nov (based on availability, virtual)
Regulatory Intervenors 2 Group	Enernex	Same as above
Other Local Governments	Enernex	Same as above
Developers	Enernex	Same as above
Customer groups	Customer Service, Enernex	ASAP (via email)

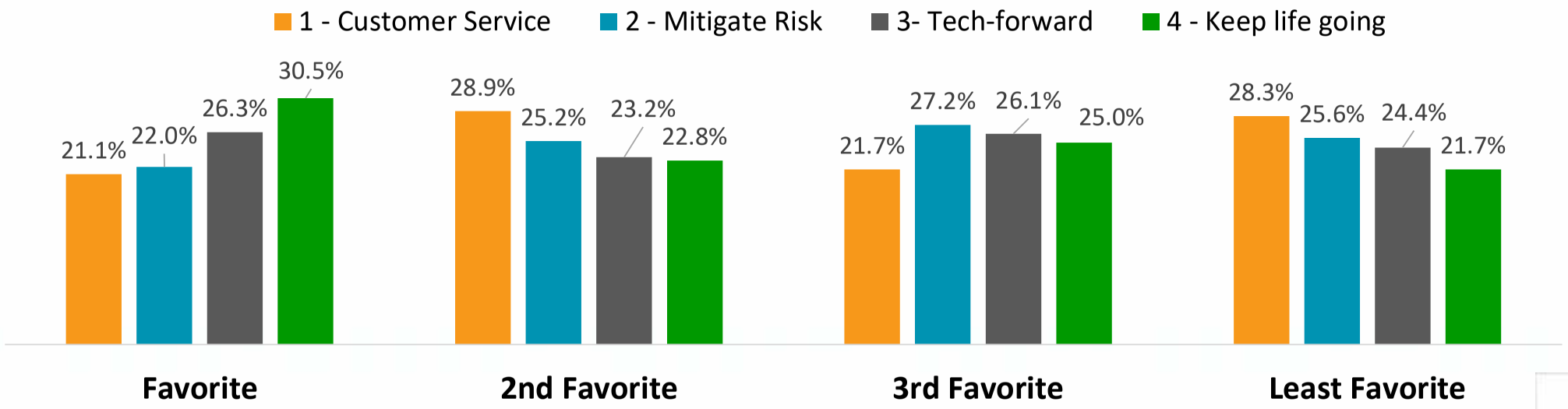
Next steps – develop outline of material using framing message, determine number of meetings, determine how to conduct meetings and how frequently

CUSTOMER MESSAGE RANKING AND PREFERENCES

MESSAGE PREFERENCE RANKING

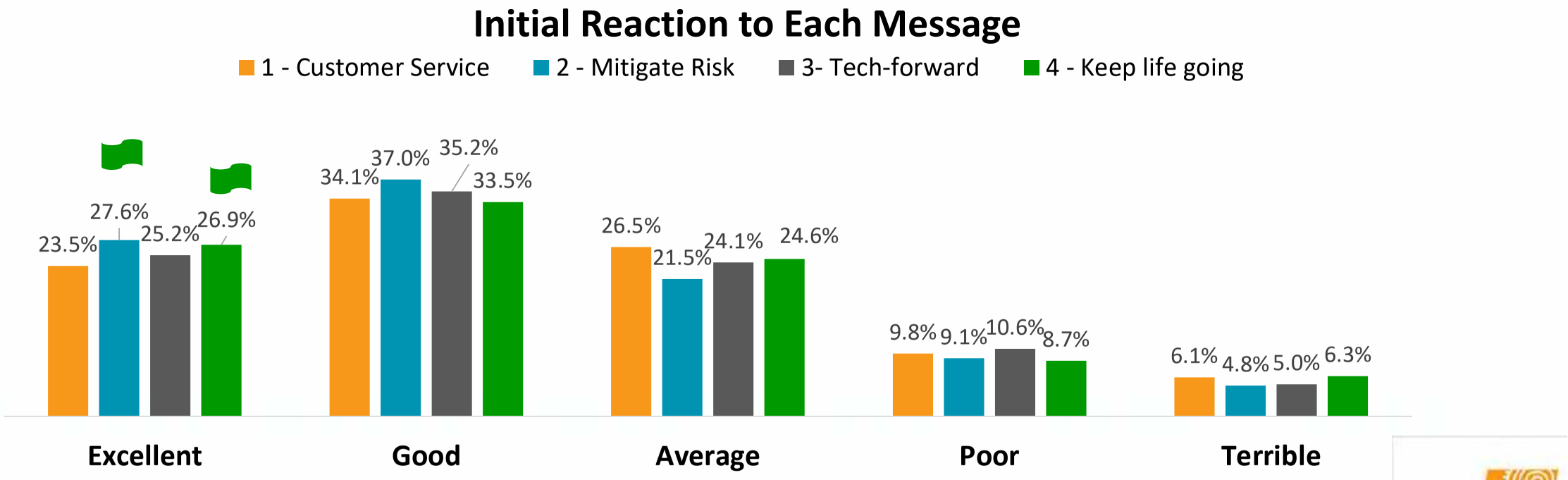
- In ranking the messages, customers favored the more positive message – 'Keep life going.' However, a more thorough analysis on attributes and perceptions reveal a deeper sentiment and strategic recommendation on messaging.

Please rank the following grid modernization messages, with '1' being your favorite and '4' being your least favorite.



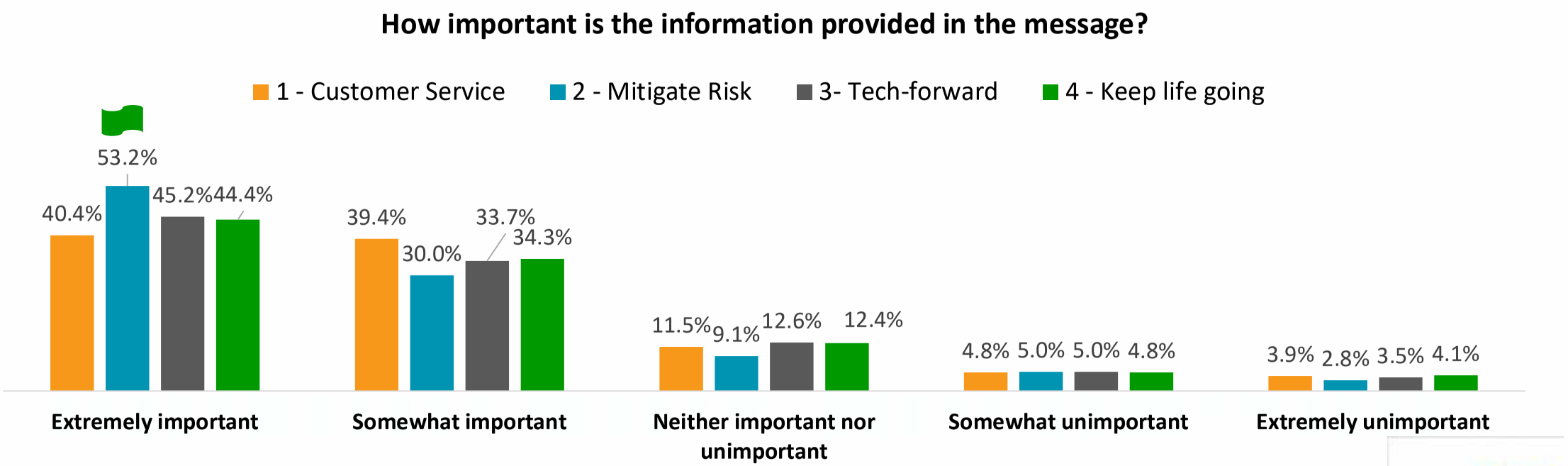
INITIAL REACTION TO MESSAGE

- In contrast to the overall ranking of messages, customers initial reaction was most positive to message two – 'Mitigate risk to energy reliability.' Secondary was the most prevalent favorite message – 'Keep life going.'



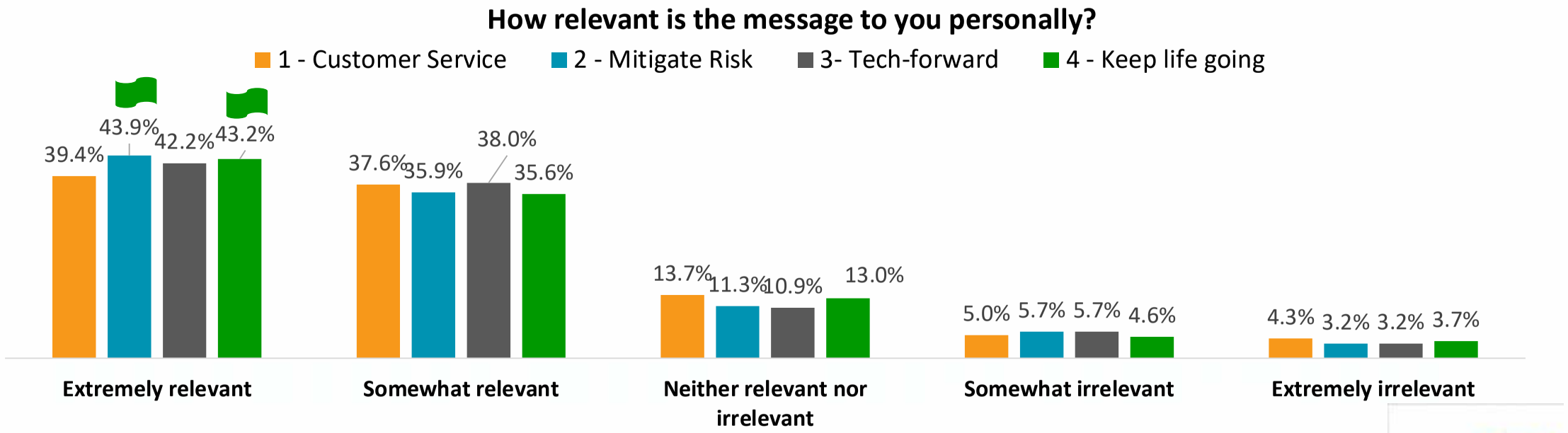
MESSAGE IMPORTANCE

- Aligned with PNM JD Power metrics on power quality and reliability – message two ‘Mitigate risk to energy reliability’ was perceived by respondents as extremely important more so than any other message approach.



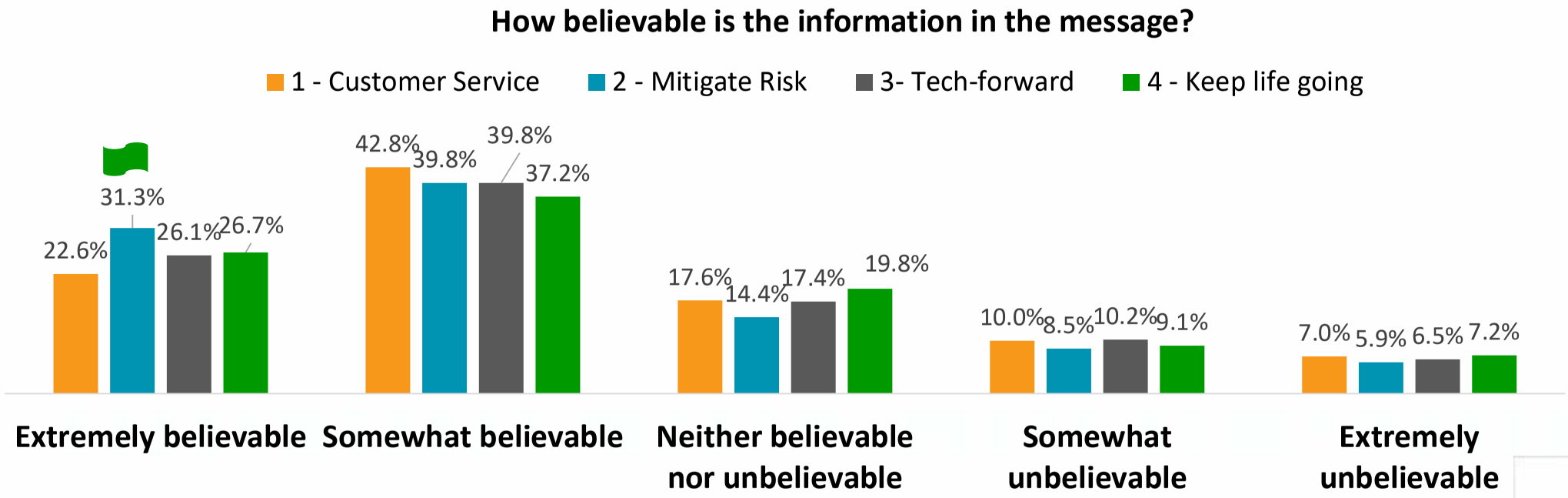
MESSAGE RELEVANCE

- Relevance had an overall high rating across all messages, second only to importance with messages two and four on reliability and keeping life going – the two most consistently positively rated messages rated more positively than message one on advanced metering and customer service.



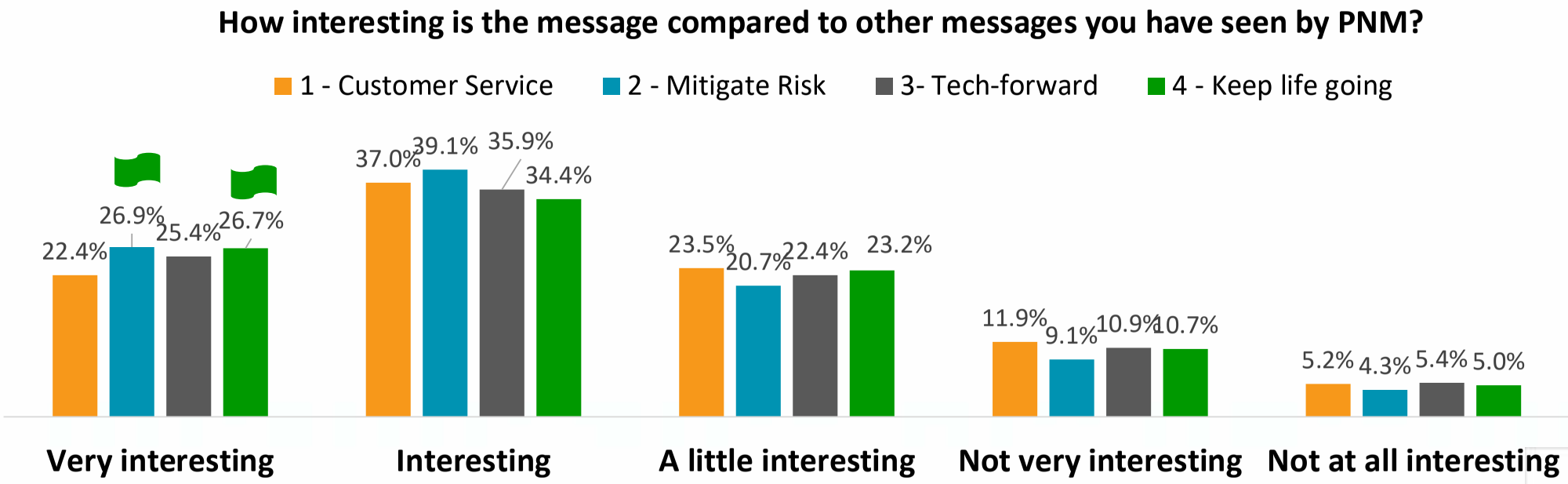
MESSAGE BELIEVABILITY

- Trust is an ongoing factor of customer satisfaction on multiple customer insights touchpoints for PNM. To strive to improve overall customer trust, message two in mitigating risk to energy reliability is most likely to enhance overall customer trust perceptions.



GAUGING MESSAGE INTEREST

- Visibility and recall may be lower, as interest sentiment was slightly lower across all message approaches in comparison to importance and relevance. In competing for attention, with many other channels, sources, and types of messages, all messages may struggle to generate awareness if not positioned appropriately.



KEY TAKEAWAY FROM PREFERRED MESSAGES

MESSAGE 1 – CUSTOMER SERVICE AND ADVANCED METER FOCUS

We're modernizing the grid not just to enhance customer service but to empower our customers.

Now is the time to update New Mexico's power grid. The benefits to customers are many, including shorter outages, timely electricity use and cost information, and easier access to clean energy with distributed energy resources. How will this happen? Advanced meters will improve reliability and help shorten outages, while providing customers with helpful information on pricing and program options. As we transition from large fossil fuel plants to renewable energy resources, modernizing the grid will help maximize efficiency, enhance system resilience and stability, and protect against outside threats.

MESSAGE 2 – MITIGATE RISK TO ENERGY RELIABILITY

Demand for energy is increasing. So are concerns about safety, cyber security and natural disasters. This is why we must modernize the grid now.

This past winter, according to energy operators, Texas was minutes away from a total grid failure that would have led to a statewide blackout for weeks. We can't let New Mexico be threatened by such a disaster. Modernizing New Mexico's grid will help ensure continued service, safety and power quality, and enhance system resilience to protect and recover from natural disasters and cyber terrorism threats. Modernization will also help shorten outages, provide customers with timely electricity use and cost information, and provide more efficient access to clean energy.

MESSAGE 3 – TECH-FORWARD: LOOKING TO THE FUTURE

The grid we have now can't power us up tomorrow.

Transforming the grid to power the future. Electricity has powered technology over the past century. It's time for technology to return the favor as we modernize the power grid. Grid modernization benefits customers in many ways including advanced meters for improved access to energy information, using closer-to-home, distributed clean energy resources as we transition from large fossil fuel plants, and addressing climate change impacts and other threats to energy reliability, resilience, and stability.

MESSAGE 4 – KEEP LIFE GOING

Smart, clean, reliable energy optimized for your life.

At PNM, we know that you want to be confident that you and your family have safe, reliable, and affordable clean energy now and in the future. But the future presents us with challenges. Due to the acceleration of climate change and high-impact natural disasters, increased cyber security threats, and the rapid economic growth taking place in New Mexico, the grid we have today needs to be modernized. It needs to be more secure and more resilient than ever before. We get it. We've been keeping the lights on for over 100 years. This is why we must modernize our grid now, so that New Mexicans like you have the energy they need when they need it for generations to come.

SURVEY OBJECTIVES AND METHODOLOGY

RESEARCH OBJECTIVES AND APPROACH

Research Background and Objectives

As PNM prepares for external stakeholder outreach on its grid modernization plan, it is critical to understand the message that best resonates with PNM customers. Swell Marketing Group LLC was engaged to conduct message testing research focused on the following objectives:

- Establish the most effective overall grid modernization messaging that resonates with customers by testing 4 concepts.
- Understand the key phrases or sentences of the messaging that appeal to customers.
- Determine if there are components of the preferred message that may require a closer evaluation prior to implementation.
  - Potentially determine if a combination of two or more message concepts would be most effective.

Methodology

- Research instrument developed using rank order and messages were presented in a random order to avoid order bias.
- Survey deployed by email, and then analysis conducted upon survey closure.
- Through these efforts, Swell led PNM in synthesizing critical customer insights and designing optimal messaging that will most effectively create awareness and understanding of grid modernization efforts amongst PNM customers.

PNM Grid Modernization Customer Insights

Findings and insights from May 2022 survey and focus groups

Developed for PNM

E Source
POWERING WHAT'S NEXT

July 6, 2022

Table of contents

Survey and focus group timeline

Date	Activity	Supplemental deliverable
5/17/22 - 5/23/22	Online survey fielded	N/A
5/20/22 - 6/15/22	Recruited for focus groups	N/A
5/25/2022	**Residential focus group** • 4 participants • Solar segment	• Audio recording • Transcription

5/31/22	**Business focus group**
	• 3 participants
	  • Wine/liquor retailer
	  • Gym
	  • Scaffolding company
		• Audio recording
		• Transcription

6/16/22	**Residential focus group** • 2 participants • Potential to opt-out of smart meter	• Audio recording • Transcription
6/17/22	**Residential focus group** • 2 participants • Potential to opt-out of smart meter	• Audio recording • Transcription

Survey response details

- Residential response:
  - Sent: 13,436
  - Started: 741
  - Complete: 539
  - Response rate: 4%
  - Completion rate: 73%
- Business
  - Sent: 13,892
  - Started: 421
  - Complete: 275
  - Response rate: 2%
  - Completion rate: 65%

	Segment	Response counts
	Residential (total)	**539**
Household income	<$50,000k	133
	$50,000-$99,999	136
	$100,000 and up	138
Age	18-34	37[a]
	35-44	59
	45-54	80
	55-64	115
	65 and up	211

	Segment	Response counts
	Business (total)	**275**
Years as a customer	10 years or less	93
	More than 10 years	162
Average monthly bill	Less than $199	128
	$200 or more	141

Key findings

Residential and small business customers' perceptions and concerns about grid modernization are generally aligned with each other.

Households and businesses have low familiarity with the term 'grid modernization.'

When defined, most customers believe it's 'very' or 'extremely' important that PNM 'modernize the grid.'

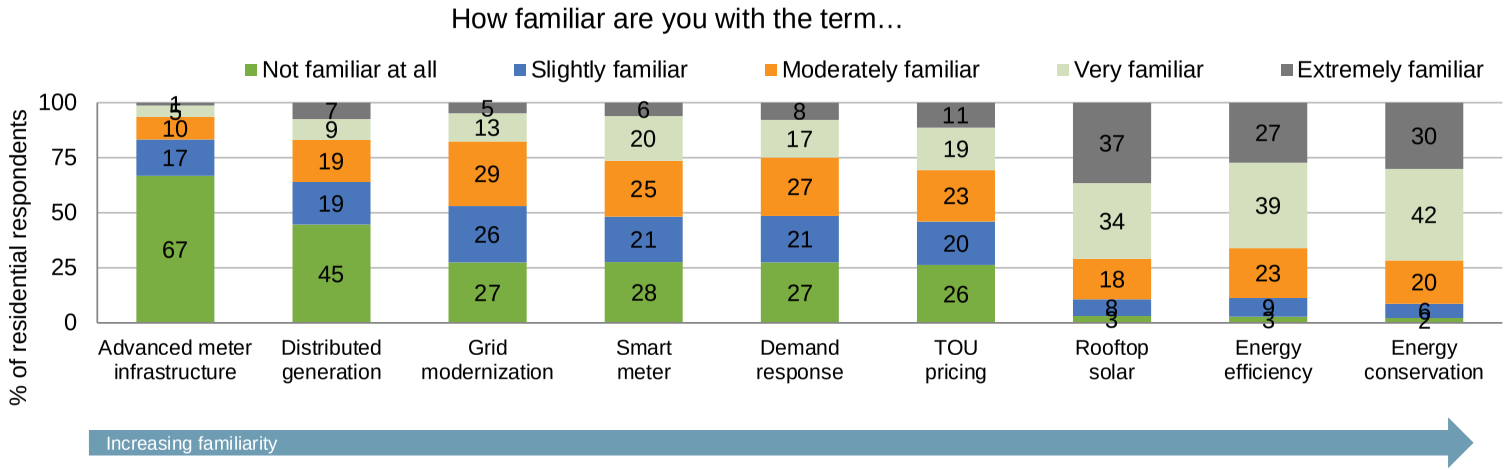
Preventing cyber-attacks, mitigating outages, and sustainable energy are top benefits of grid modernization.

Expansion of energy efficiency and conservation programs ranked highest among grid mod-enabled services.

2/3 of residential customers and 3/4 of nonresidential customers are concerned grid modernization will increase their bill.

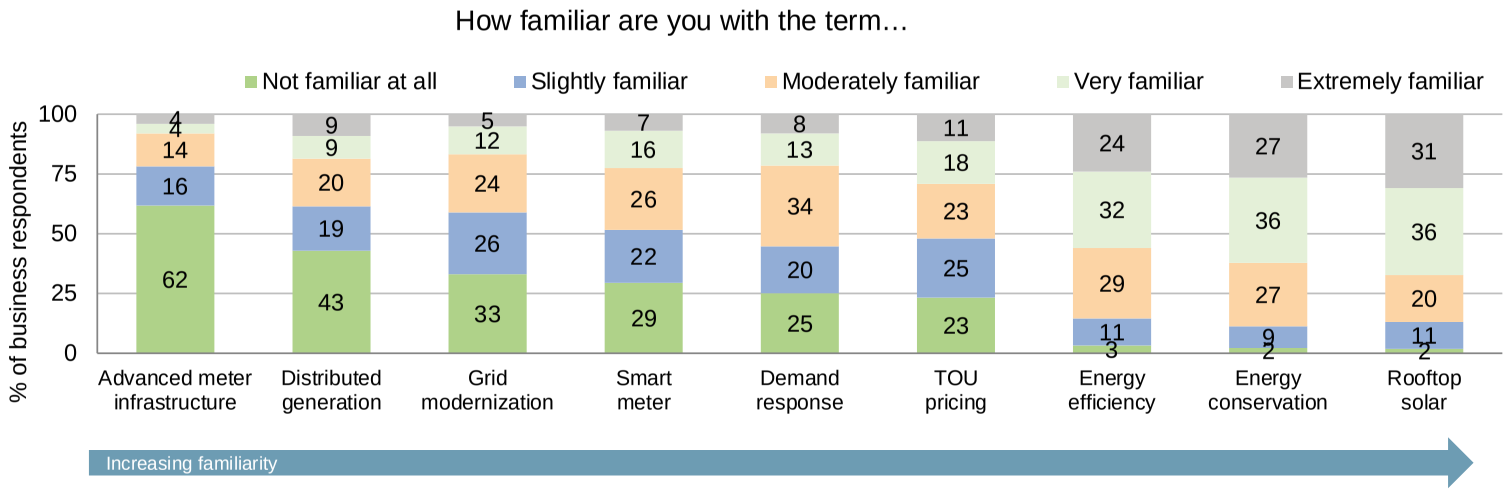
About 5% of households and 11% of businesses are very concerned about electromagnetic sensitivity.

Overall, household familiarity with terms like AMI, distributed generation, grid modernization, smart meter, demand response, and TOU is low.



© E Source. **Base:** n = 539. **Questions:** Q1. How familiar are you with the term grid modernization? Q2. How familiar are you with the term smart meters? Q3. How familiar are you with the term advanced metering infrastructure (AMI)? Q4. How familiar are you with the term energy efficiency? Q5. How familiar are you with the term energy conservation? Q6. How familiar are you with the term demand response? Q7. How familiar are you with the term rooftop solar? Q8. How familiar are you with the term distributed generation? Q9. How familiar are you with the term time of use electricity pricing?

Business customer familiarity with terms mirrors residential customers.



© E Source. **Base:** n = 275. **Questions:** Q1. How familiar are you with the term grid modernization? Q2. How familiar are you with the term smart meters? Q3. How familiar are you with the term advanced metering infrastructure (AMI)? Q4. How familiar are you with the term energy efficiency? Q5. How familiar are you with the term energy conservation? Q6. How familiar are you with the term demand response? Q7. How familiar are you with the term rooftop solar? Q8. How familiar are you with the term distributed generation? Q9. How familiar are you with the term time of use electricity pricing?

Focus group feedback: Focus group participants used common language to define ‘grid modernization.’ However, many conflated ‘grid modernization’ with renewable generation.

1 

The power generation changes from where it is now to something a little more greener and sustainable. And not only that, I would hope that grid modernization means that there will be fewer instances of outages and fewer instances where the power demands are such that sometimes there's like you hear in large cities, you get things like rolling blackouts. That would at least be my hope.

2 

Things like safety and security associated with the power grid. And again like that idea of sustainability and better technology associated with the delivery of electricity

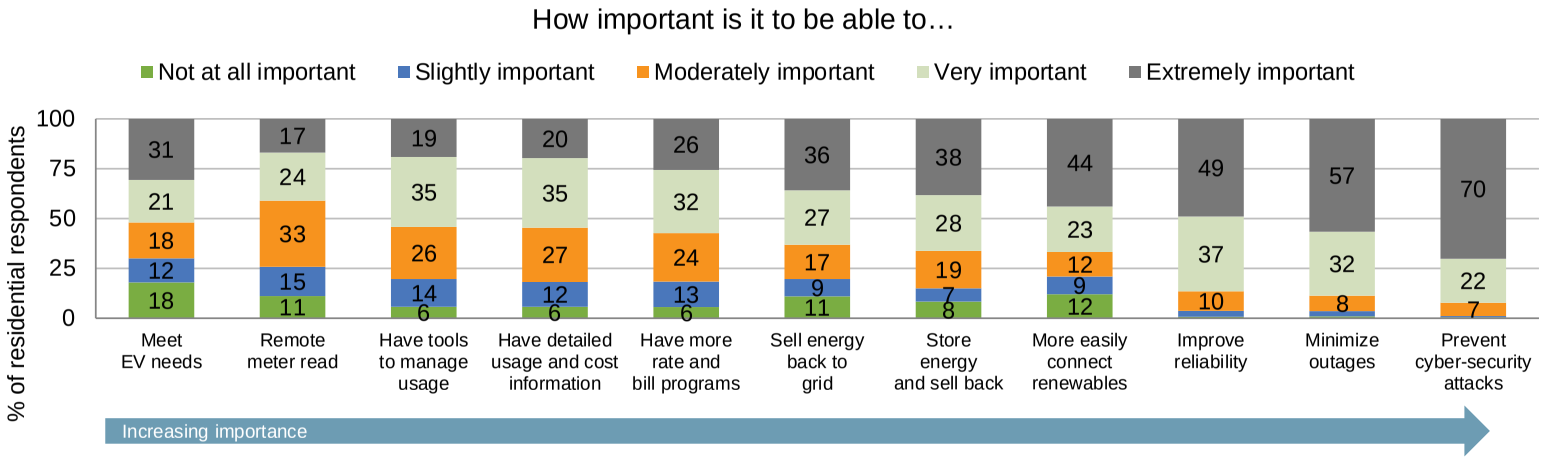
3 

For me personally, that's basically updating maybe the way you guys process and you know, checking our energy use, maybe doing it remotely

4 

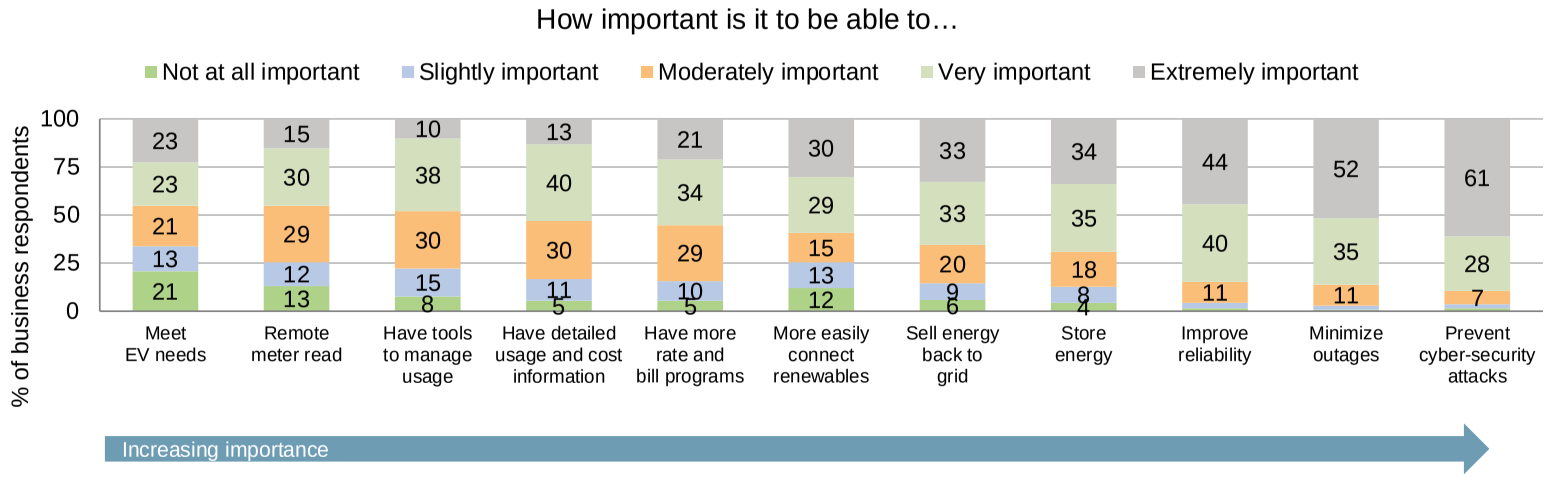
Grid modernization as I understand it, as you guys look at it, is using solar and wind.

Residential customers ranked preventing cyber-attacks and minimizing outages as the top benefits of grid modernization. There's a rift in importance of meeting EVs needs.



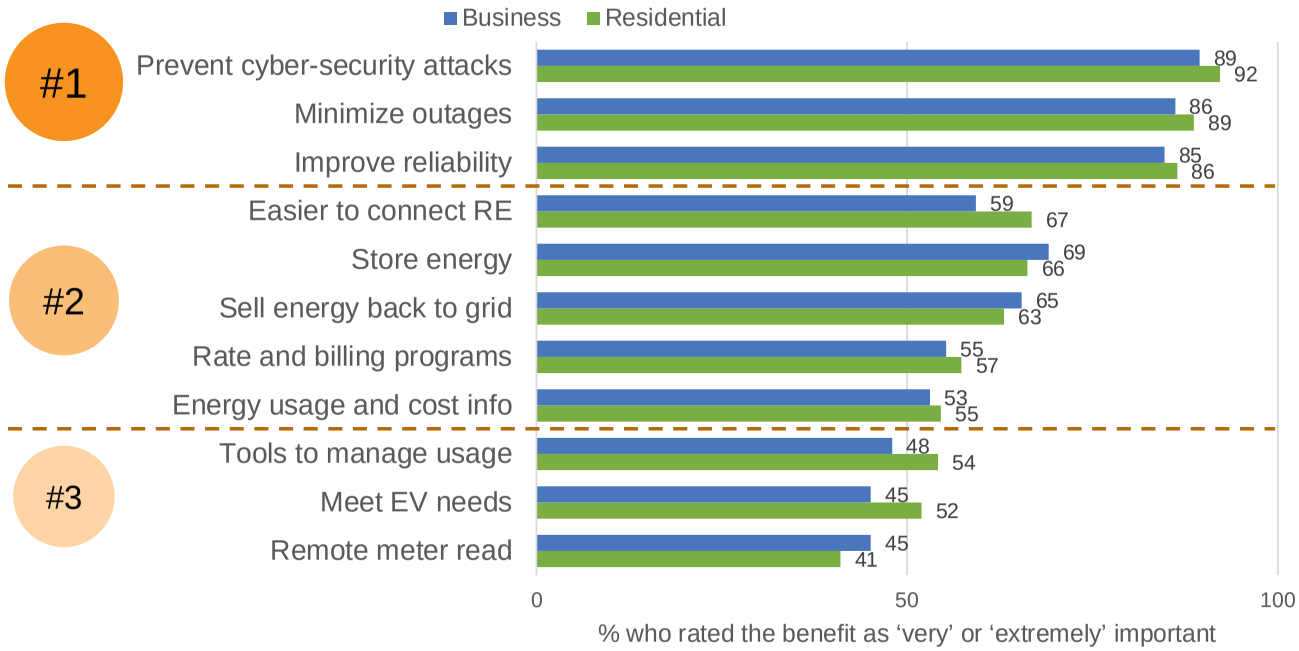
© E Source. **Base:** n = 539. **Question:** This section asks about how important potential benefits of grid modernization are to you. Q13. How important is it to Reduce greenhouse gas emissions by making it easier to connect renewable energy sources? Q15. How important is it to increase opportunities to sell energy back to the grid (e.g., power generated by solar panels)? Q16. How important is to provide opportunities for customers to store energy, use it later, or sell energy back to the grid? Q17. How important is it to meet the requirements for more electric vehicles (EVs)? Q18. How important is it to minimize electricity disruptions or outages? Q19. How important is it to improve electricity reliability and quality of service? Q20. How important is it to improve the ability to detect and prevent cyber-security attacks that could disrupt electricity service?

Similarly, business customers also ranked preventing cyber-attacks and minimizing outages as the top benefits of grid modernization. Like with residential, there's a divide on 'meeting EVs needs.'

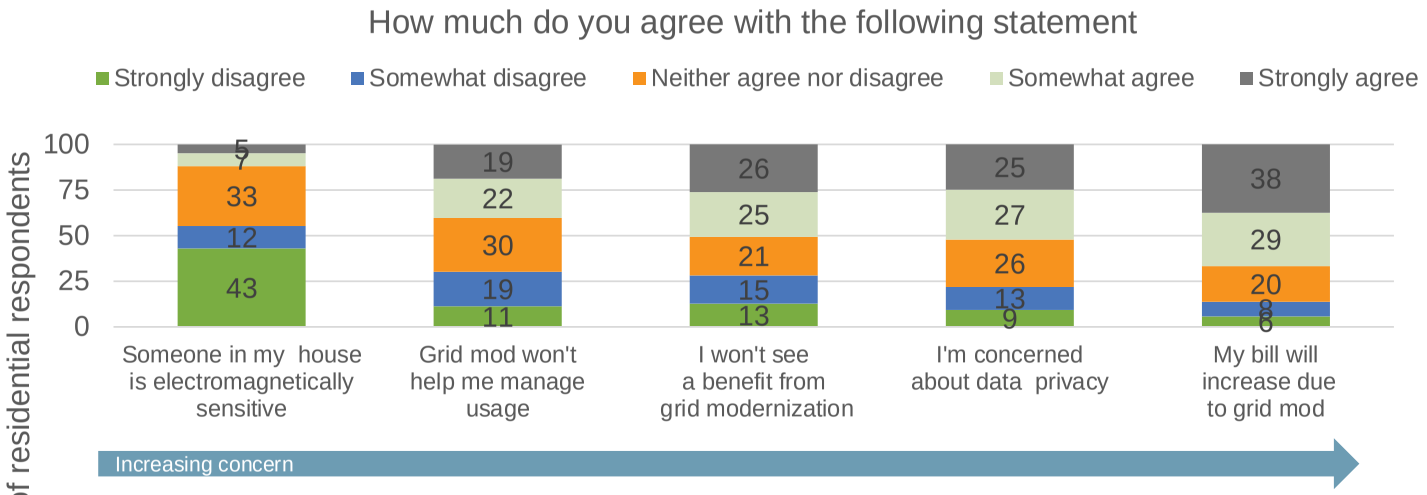


© E Source. **Base:** n = 275. **Question:** This section asks about how important potential benefits of grid modernization are to you. Q13. How important is it to Reduce greenhouse gas emissions by making it easier to connect renewable energy sources? Q15. How important is it to increase opportunities to sell energy back to the grid (e.g., power generated by solar panels)? Q16. How important is to provide opportunities for customers to store energy, use it later, or sell energy back to the grid? Q17. How important is it to meet the requirements for more electric vehicles (EVs)? Q18. How important is it to minimize electricity disruptions or outages? Q19. How important is it to improve electricity reliability and quality of service? Q20. How important is it to improve the ability to detect and prevent cyber-security attacks that could disrupt electricity service?

Side-by-side comparison of the importance of benefits of grid modernization

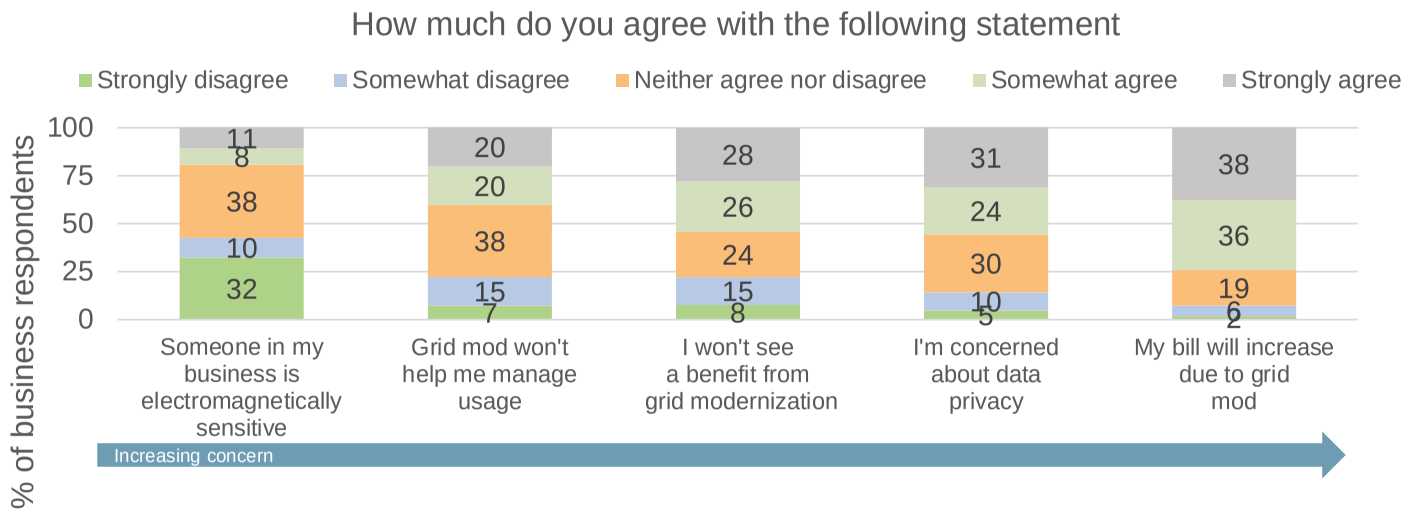


Among concerns, bill increase was the primary worry. 67% of residential customers are strongly or somewhat concerned about bill impacts due to grid modernization



© E Source. **Base:** n = 539. **Question:** This next section describes potential concerns to grid modernization. Please indicate how much you agree with each statement. Q22 I'm concerned about the privacy of my data due to grid modernization. Q23 I'm concerned my electric bill will increase due to grid modernization. Q24 I'm concerned I won't see a benefit from grid modernization. Q25 I'm concerned grid modernization won't help me manage my household's energy use. Q26 I'm electromagnetically sensitive or someone else in my household is and that makes me concerned about grid modernization.

Like residential customers, most business customers are worried that their bill will increase due to grid modernization



© E Source. **Base:** n = 275. **Question:** This next section describes potential concerns to grid modernization. Please indicate how much you agree with each statement. Q22 I'm concerned about the privacy of my data due to grid modernization. Q23 I'm concerned my electric bill will increase due to grid modernization. Q24 I'm concerned I won't see a benefit from grid modernization. Q25 I'm concerned grid modernization won't help me manage my business's energy use. Q26 I'm electromagnetically sensitive or someone else in my business is and that makes me concerned about grid modernization.

Focus group feedback: Focus group participants provided more context around their concerns about bill impacts.

1 

The cost is huge. That is a huge concern. Like Susan, I'm relatively able to deal with it. But there's people out there that can't. And I mean like right now, we're on a Water Association that went from $30 a month to $65 a month. Just to be connected… double water rates. I really worry about a lot of people out here in this area because of that.

2 

I mean New Mexico is a relatively poor state. The cost of utilities, to a lot of people is something to be very concerned about. I don't know how many, people got behind on their bills during the pandemic, but if PNM has to absorb the total costs of modernization, obviously that's going to be passed on to the customers. And there's a certain ceiling in that a number of people are not able to afford.

3 

Well, I would say that the rates, the rates need to stay down. As much as possible. I think that a lot of the modernization that people are talking about and probably in this state and other states actually cost more than the status quo that we've been using. I'm still, I think that the resources that we already have and that we've been using for years are fine. And I think trying to move to other types of call it green energy, I don't I kind of think that's a two edged sword. I think that we need to rely on what we've got and very, very slowly modernized, but only modernized to the extent that we can keep the rates down.

Focus group feedback: Another concern was that PNM would use meters to control household energy use. Participants were worried that the meters would enable unauthorized control over their energy use.

1 

[Meters] do a lot more than that. From what I understand if you have smart appliances for instance, they interface with smart appliances in your house as well. I think there is the ability then for the power company to switch it off remotely and so they can control your power. I've seen in other instances where people that use too much power, they're able to brown them out or cut off their power. I don't like that. There's just too much control out of out of the hands of the individual. I like a more passive system.

2 

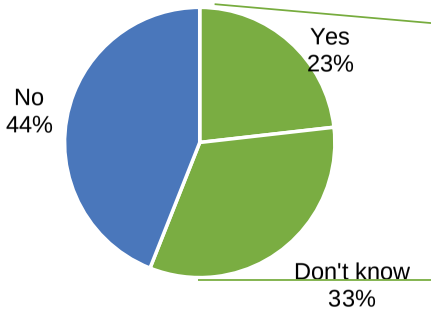
Being able to balance things and what not that those peak times that I think that's great. My concern on that is on a consumer side, you know, how do you know who's in control of that and those kinds of things [like controlling and balancing the power grid] ?

3 

There's just a lot of capabilities that [a smart meter] has [in addition to] just being able to read it from our computer someplace. And I just think people need to realize that. Now as long as there's good people in control, it's grand. But if there's not good people in control, not so good.

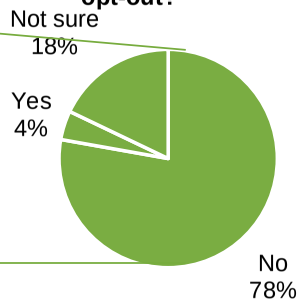
Most residential customers would not opt-out of a smart meter. Of those who'd consider opting-out, most would not pay to do so.

Residents: Would you opt-out of a smart meter?



© E Source. **Base:** n = 539. **Question:** The benefits of grid modernization are enabled by advanced metering infrastructure (AMI). AMI uses a low-power radio frequency communications network to connect with a meter for a maximum of 90 seconds per day. All AMI equipment operate in compliance with state and federal communication standards. The signal strength is comparable to a cordless telephone. Common household items like cell phones, baby monitors, and Wi-Fi routers emit more radio frequency energy than AMI meters. Q43 Given this description, would you consider opting-out of having an AMI meter?

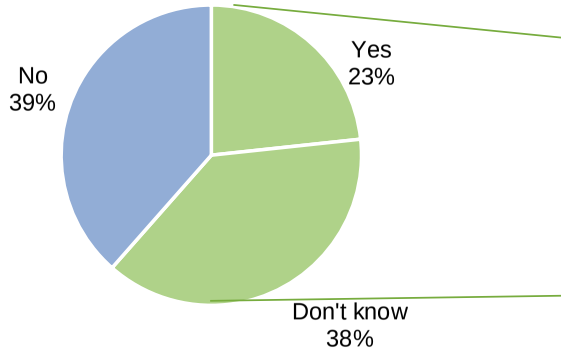
Residents who would opt-out or who don't know: Would you pay $20-$30/month to opt-out?



© E Source. **Base:** n = 302. **Question:** Q44 Choosing not to have an AMI meter creates additional costs for PNM to manually read your meter. Would you be willing to pay an additional monthly meter reading charge of $20-$30 to opt-out of an AMI meter?

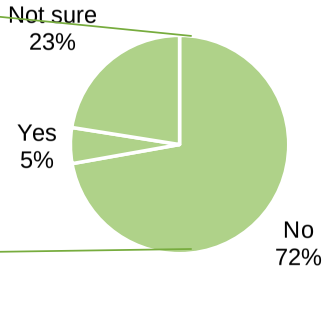
Business customers follow a similar opt-out trend as residential customers.

Businesses: Would you opt-out of a smart meter?



© E Source. **Base:** n = 275. **Question:** The benefits of grid modernization are enabled by advanced metering infrastructure (AMI). AMI uses a low-power radio frequency communications network to connect with a meter for a maximum of 90 seconds per day. All AMI equipment operate in compliance with state and federal communication standards. The signal strength is comparable to a cordless telephone. Common household items like cell phones, baby monitors, and Wi-Fi routers emit more radio frequency energy than AMI meters. Q43 Given this description, would you consider opting-out of having an AMI meter?

Businesses who would opt-out or don't know: Would you pay $20-$30/month to opt-out?



© E Source. **Base:** n = 47. **Question:** Q44 Choosing not to have an AMI meter creates additional costs for PNM to manually read your meter. Would you be willing to pay an additional monthly meter reading charge of $20-$30 to opt-out of an AMI meter?

Key residential differences by demographics

Age

Compared to other age groups, generally, those 65 and older…

Rank protecting privacy and data attributes *lower* than other age groups, particularly those 18-35. (However, the SSN is the most important personal data to protect to all ages.)

Are less interested in tools, information, and services to manage and monitor energy usage, particularly when compared to 18-35.

Income

Compared to other income groups, households with incomes of <$50k are…

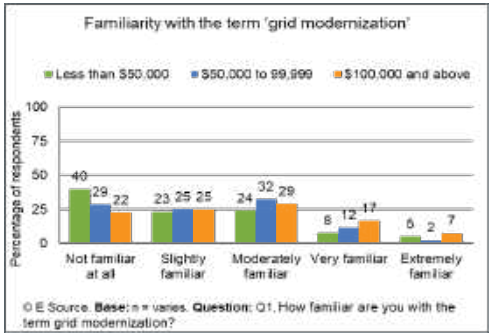
Less familiar with energy terms (though AMI is unfamiliar to all).

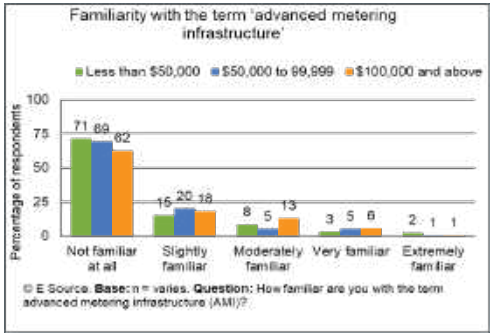
Less likely to think it's important to modernize the grid.

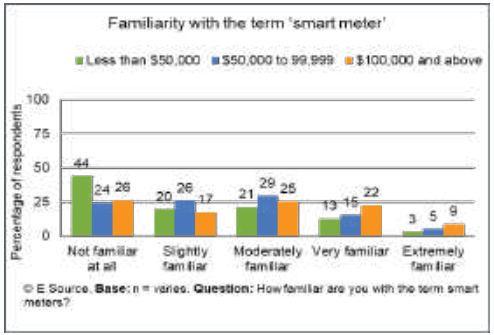
More concerned that they won't see a benefit and their bill will increase due to grid modernization.

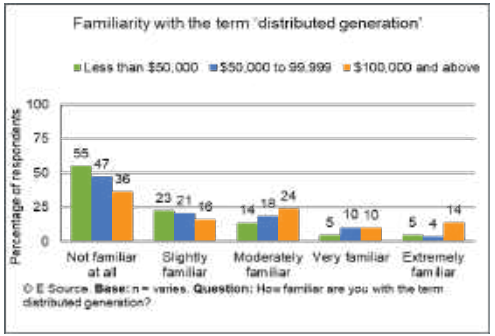
More interested in programs like pick-a-due-date and prepay.

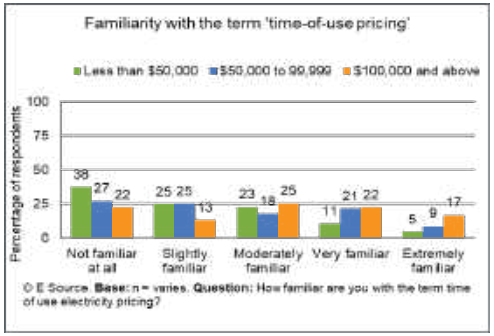
As household income decreases, familiarity with terms decreases. Regardless of income, most are unfamiliar with the term ‘advance metering infrastructure’

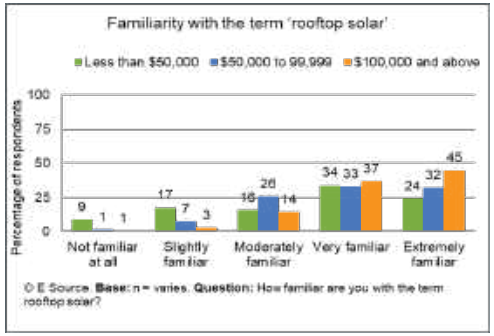




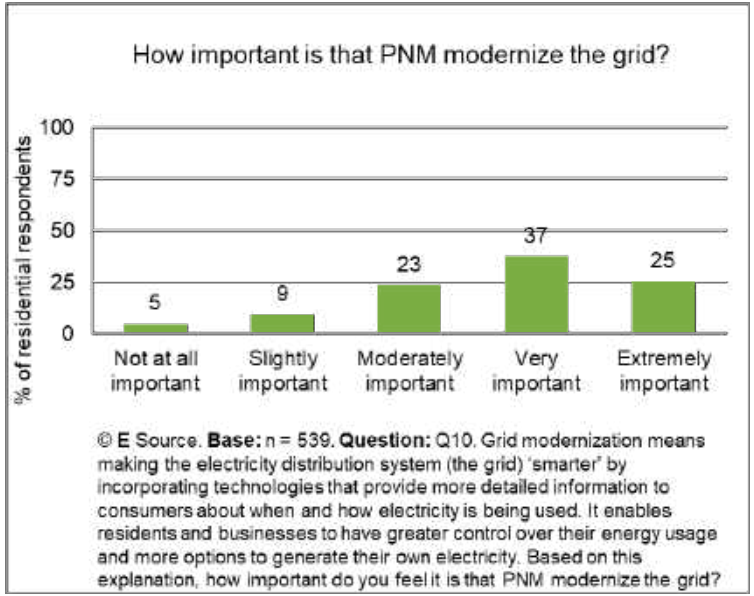




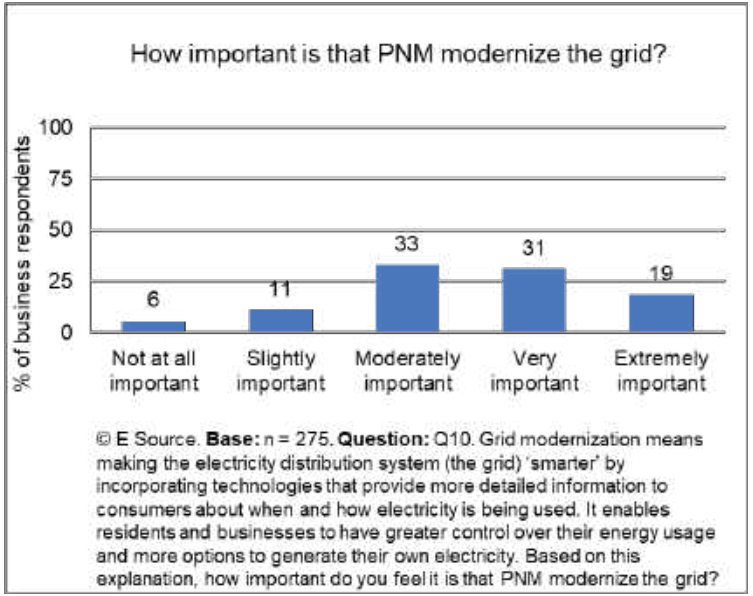




Once ‘grid modernization’ is defined, nearly 2/3 of residential customers and ½ of business customers believe it is ‘very’ or ‘extremely’ important that PNM modernize the grid

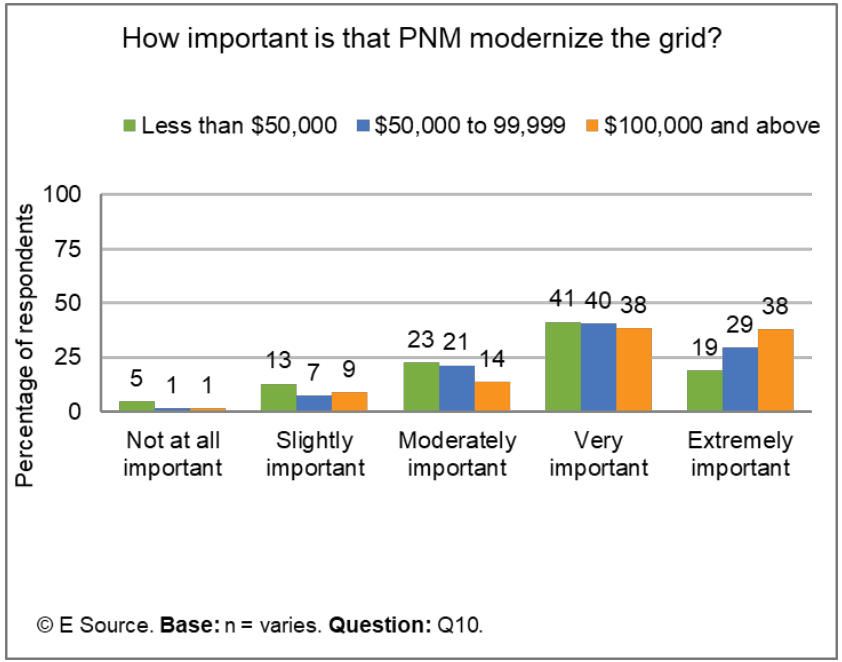


© E Source. **Base:** n = 539. **Question:** Q10. Grid modernization means making the electricity distribution system (the grid) ‘smarter’ by incorporating technologies that provide more detailed information to consumers about when and how electricity is being used. It enables residents and businesses to have greater control over their energy usage and more options to generate their own electricity. Based on this explanation, how important do you feel it is that PNM modernize the grid?



© E Source. **Base:** n = 275. **Question:** Q10. Grid modernization means making the electricity distribution system (the grid) ‘smarter’ by incorporating technologies that provide more detailed information to consumers about when and how electricity is being used. It enables residents and businesses to have greater control over their energy usage and more options to generate their own electricity. Based on this explanation, how important do you feel it is that PNM modernize the grid?

As household income decreases, the importance of modernizing the grid also decreases.



Key nonresidential differences by firmographics

Years as a customer

Generally, those who have been a customer 10 or more years…

Are more likely to be concerned that their bill will increase due to grid modernization and that it won't help them manage their energy usage than those who have been customers less than 10 years.

Are less likely to be interested in billing programs like choose-your-due-date than businesses who have been customers less than 10 years.

Average monthly bill

Those with average monthly bills over $200…

Are more likely to want to reduce greenhouse gas emissions by connecting renewables to the grid to the grid than those whose average bill is less than $200 a month…

Are more interested in green power options than those whose average bill is less than $200 a month

Nonresidential data tables

Table of contents

Nonresidential results

Familiarity with energy terms

How familiar are you with the term grid modernization?				
		Frequency	Percent	Cumulative Percent
	Not familiar at all	91	33.1	33.1
	Slightly familiar	71	25.8	58.9
	Moderately familiar	67	24.4	83.3
	Very familiar	32	11.6	94.9
	Extremely familiar	14	5.1	100.0
	Total	275	100.0	

Grid mod Grid modernization means making the electricity distribution system (the grid) 'smarter' by incorporating technologies that provide more detailed information to consumers about when and how electricity is being used. It enables residents and businesses to have greater control over their energy usage and more options to generate their own electricity. **Based on this explanation, how important do you feel it is that PNM modernize the grid?**				
		Frequency	Percent	Cumulative Percent
	Not at all important	16	5.8	5.8
	Slightly important	31	11.3	17.1
	Moderately important	91	33.1	50.2
	Very important	86	31.3	81.5
	Extremely important	51	18.5	100.0
	Total	275	100.0	

Familiarity with energy terms

How familiar are you with the term advanced metering infrastructure (AMI)?				
		Frequency	Percent	Cumulative Percent
	Not familiar at all	170	61.8	61.8
	Slightly familiar	45	16.4	78.2
	Moderately familiar	38	13.8	92.0
	Very familiar	11	4.0	96.0
	Extremely familiar	11	4.0	100.0
	Total	275	100.0	

How familiar are you with the term smart meters?				
		Frequency	Percent	Cumulative Percent
	Not familiar at all	81	29.5	29.5
	Slightly familiar	61	22.2	51.6
	Moderately familiar	71	25.8	77.5
	Very familiar	43	15.6	93.1
	Extremely familiar	19	6.9	100.0
	Total	275	100.0	

Familiarity with energy terms

How familiar are you with the term energy conservation?				
		Frequency	Percent	Cumulative Percent
	Not familiar at all	6	2.2	2.2
	Slightly familiar	25	9.1	11.3
	Moderately familiar	73	26.5	37.8
	Very familiar	98	35.6	73.5
	Extremely familiar	73	26.5	100.0
	Total	275	100.0	

How familiar are you with the term energy efficiency?				
		Frequency	Percent	Cumulative Percent
	Not familiar at all	9	3.3	3.3
	Slightly familiar	31	11.3	14.5
	Moderately familiar	81	29.5	44.0
	Very familiar	88	32.0	76.0
	Extremely familiar	66	24.0	100.0
	Total	275	100.0	

Familiarity with energy terms

How familiar are you with the term demand response?				
		Frequency	Percent	Cumulative Percent
	Not familiar at all	69	25.1	25.1
	Slightly familiar	54	19.6	44.7
	Moderately familiar	93	33.8	78.5
	Very familiar	37	13.5	92.0
	Extremely familiar	22	8.0	100.0
	Total	275	100.0	

How familiar are you with the term rooftop solar?				
		Frequency	Percent	Cumulative Percent
	Not familiar at all	5	1.8	1.8
	Slightly familiar	31	11.3	13.1
	Moderately familiar	54	19.6	32.7
	Very familiar	100	36.4	69.1
	Extremely familiar	85	30.9	100.0
	Total	275	100.0	

Familiarity with energy terms

How familiar are you with the term distributed generation?				
		Frequency	Percent	Cumulative Percent
	Not familiar at all	118	42.9	42.9
	Slightly familiar	51	18.5	61.5
	Moderately familiar	55	20.0	81.5
	Very familiar	26	9.5	90.9
	Extremely familiar	25	9.1	100.0
	Total	275	100.0	

How familiar are you with the term time of use electricity pricing?				
		Frequency	Percent	Cumulative Percent
	Not familiar at all	64	23.3	23.3
	Slightly familiar	68	24.7	48.0
	Moderately familiar	63	22.9	70.9
	Very familiar	49	17.8	88.7
	Extremely familiar	31	11.3	100.0
	Total	275	100.0	

Familiarity with energy terms

How important is it to...Have better tools and programs that help you manage your usage?				
		Frequency	Percent	Cumulative Percent
	Not at all important	21	7.6	7.6
	Slightly important	40	14.5	22.2
	Moderately important	82	29.8	52.0
	Very important	104	37.8	89.8
	Extremely important	28	10.2	100.0
	Total	275	100.0	

How important is it to... Receive timely energy usage and cost information?				
		Frequency	Percent	Cumulative Percent
	Not at all important	15	5.5	5.5
	Slightly important	31	11.3	16.7
	Moderately important	83	30.2	46.9
	Very important	110	40.0	86.9
	Extremely important	36	13.1	100.0
	Total	275	100.0	

Importance of potential grid modernization benefits

How important is it to...Reduce greenhouse gas emissions by making it easier to connect renewable energy sources?				
		Frequency	Percent	Cumulative Percent
	Not at all important	33	12.0	12.0
	Slightly important	37	13.5	25.5
	Moderately important	42	15.3	40.7
	Very important	80	29.1	69.8
	Extremely important	83	30.2	100.0
	Total	275	100.0	

How important is it to... Have a range of rate and billing programs that help you save money or control your bill?				
		Frequency	Percent	Cumulative Percent
	Not at all important	15	5.5	5.5
	Slightly important	28	10.2	15.6
	Moderately important	80	29.1	44.7
	Very important	94	34.2	78.9
	Extremely important	58	21.1	100.0
	Total	275	100.0	

Importance of potential grid modernization benefits

How important is it to... Increase opportunities to sell energy back to the grid (e.g., power generated by solar panels)?				
		Frequency	Percent	Cumulative Percent
	Not at all important	16	5.8	5.8
	Slightly important	24	8.7	14.5
	Moderately important	55	20.0	34.5
	Very important	90	32.7	67.3
	Extremely important	90	32.7	100.0
	Total	275	100.0	

How important is it to... Provide opportunities for customers to store energy, use it later, or sell energy back to the grid?				
		Frequency	Percent	Cumulative Percent
	Not at all important	12	4.4	4.4
	Slightly important	23	8.4	12.7
	Moderately important	50	18.2	30.9
	Very important	97	35.3	66.2
	Extremely important	93	33.8	100.0
	Total	275	100.0	

Importance of potential grid modernization benefits

How important is it to... Meet the requirements for more electric vehicles (EVs)?				
		Frequency	Percent	Cumulative Percent
	Not at all important	57	20.7	20.7
	Slightly important	36	13.1	33.8
	Moderately important	58	21.1	54.9
	Very important	62	22.5	77.5
	Extremely important	62	22.5	100.0
	Total	275	100.0	

How important is it to... Minimize electricity disruptions or outages?				
		Frequency	Percent	Cumulative Percent
	Not at all important	2	.7	.7
	Slightly important	6	2.2	2.9
	Moderately important	30	10.9	13.8
	Very important	95	34.5	48.4
	Extremely important	142	51.6	100.0
	Total	275	100.0	

Importance of potential grid modernization benefits

How important is it to... Improve electricity reliability and quality of service?				
		Frequency	Percent	Cumulative Percent
	Not at all important	4	1.5	1.5
	Slightly important	8	2.9	4.4
	Moderately important	30	10.9	15.3
	Very important	111	40.4	55.6
	Extremely important	122	44.4	100.0
	Total	275	100.0	

How important is it to... Improve the ability to detect and prevent cyber-security attacks that could disrupt electricity service?				
		Frequency	Percent	Cumulative Percent
	Not at all important	4	1.5	1.5
	Slightly important	6	2.2	3.6
	Moderately important	19	6.9	10.5
	Very important	78	28.4	38.9
	Extremely important	168	61.1	100.0
	Total	275	100.0	

Importance of potential grid modernization benefits

How important is it to...Have the ability to remotely read and turn on or turn off meters?				
		Frequency	Percent	Cumulative Percent
	Not at all important	36	13.1	13.1
	Slightly important	34	12.4	25.5
	Moderately important	81	29.5	54.9
	Very important	82	29.8	84.7
	Extremely important	42	15.3	100.0
	Total	275	100.0	

Concerns about grid modernization

I'm concerned my electric bill will increase due to grid modernization.				
		Frequency	Percent	Cumulative Percent
	Strongly disagree	5	1.8	1.8
	Somewhat disagree	15	5.5	7.3
	Neither agree nor disagree	51	18.5	25.8
	Somewhat agree	100	36.4	62.2
	Strongly agree	104	37.8	100.0
	Total	275	100.0	

I'm concerned about the privacy of my data due to grid modernization.				
		Frequency	Percent	Cumulative Percent
	Strongly disagree	13	4.7	4.7
	Somewhat disagree	26	9.5	14.2
	Neither agree nor disagree	83	30.2	44.4
	Somewhat agree	67	24.4	68.7
	Strongly agree	86	31.3	100.0
	Total	275	100.0	

Concerns about grid modernization

Business results

I'm concerned grid modernization won't help me manage my business's energy use.				
		Frequency	Percent	Cumulative Percent
	Strongly disagree	20	7.3	7.3
	Somewhat disagree	41	14.9	22.2
	Neither agree nor disagree	103	37.5	59.6
	Somewhat agree	55	20.0	79.6
	Strongly agree	56	20.4	100.0
	Total	275	100.0	

I'm concerned I won't see a benefit from grid modernization.				
		Frequency	Percent	Cumulative Percent
	Strongly disagree	21	7.6	7.6
	Somewhat disagree	40	14.5	22.2
	Neither agree nor disagree	65	23.6	45.8
	Somewhat agree	72	26.2	72.0
	Strongly agree	77	28.0	100.0
	Total	275	100.0	

E Source

Concerns about grid modernization

I'm electromagnetically sensitive or someone else in my business is and that makes me concerned about grid modernization.					
		Frequency	Percent	Valid Percent	Cumulative Percent
	Strongly disagree	89	32.4	32.4	32.4
	Somewhat disagree	28	10.2	10.2	42.5
	Neither agree nor disagree	105	38.2	38.2	80.7
	Somewhat agree	23	8.4	8.4	89.1
	Strongly agree	30	10.9	10.9	100.0
	Total	275	100.0	100.0	

Data security and privacy

Please indicate how important protecting contact information is to you.				
		Frequency	Percent	Cumulative Percent
	Not at all important	2	.7	.7
	Slightly important	12	4.4	5.1
	Moderately important	27	9.8	14.9
	Very important	70	25.5	40.4
	Extremely important	164	59.6	100.0
	Total	275	100.0	

Please indicate how important protecting payment information is to you.				
		Frequency	Percent	Cumulative Percent
	Not at all important	3	1.1	1.1
	Slightly important	11	4.0	5.1
	Moderately important	35	12.7	17.8
	Very important	80	29.1	46.9
	Extremely important	146	53.1	100.0
	Total	275	100.0	

Data security and privacy

Please indicate how important protecting your social security number is to you.				
		Frequency	Percent	Cumulative Percent
	Not at all important	1	.4	.4
	Slightly important	1	.4	.7
	Moderately important	10	3.6	4.4
	Very important	22	8.0	12.4
	Extremely important	241	87.6	100.0
	Total	275	100.0	

Please indicate how important protecting electricity usage data is to you.				
		Frequency	Percent	Cumulative Percent
	Not at all important	12	4.4	4.4
	Slightly important	24	8.7	13.1
	Moderately important	70	25.5	38.5
	Very important	79	28.7	67.3
	Extremely important	90	32.7	100.0
	Total	275	100.0	

Data security and privacy

Please indicate how important protecting business attributes like equipment, appliances, or occupancy is to you.				
		Frequency	Percent	Cumulative Percent
	Not at all important	3	1.1	1.1
	Slightly important	13	4.7	5.8
	Moderately important	43	15.6	21.5
	Very important	85	30.9	52.4
	Extremely important	131	47.6	100.0
	Total	275	100.0	

Usefulness of energy information and services

How useful would technology that would automatically isolate/turn off appliances or equipment be to you?				
		Frequency	Percent	Cumulative Percent
	Not at all useful	59	21.5	21.5
	Slightly useful	43	15.6	37.1
	Moderately useful	87	31.6	68.7
	Very useful	57	20.7	89.5
	Extremely useful	29	10.5	100.0
	Total	275	100.0	

How useful would customized tools and guidance to help manage energy use be to you?				
		Frequency	Percent	Cumulative Percent
	Not at all useful	19	6.9	6.9
	Slightly useful	38	13.8	20.7
	Moderately useful	111	40.4	61.1
	Very useful	84	30.5	91.6
	Extremely useful	23	8.4	100.0
	Total	275	100.0	

Usefulness of energy information and services

How useful would a more detailed breakdown of your electricity bill by appliance, device, or equipment be to you?				
		Frequency	Percent	Cumulative Percent
	Not at all useful	41	14.9	14.9
	Slightly useful	47	17.1	32.0
	Moderately useful	81	29.5	61.5
	Very useful	64	23.3	84.7
	Extremely useful	42	15.3	100.0
	Total	275	100.0	

How useful would information on how your energy consumption compares to other businesses be to you?				
		Frequency	Percent	Cumulative Percent
	Not at all useful	59	21.5	21.5
	Slightly useful	56	20.4	41.8
	Moderately useful	88	32.0	73.8
	Very useful	52	18.9	92.7
	Extremely useful	20	7.3	100.0
	Total	275	100.0	

Usefulness of energy information and services

How useful would more options to purchase green power be to you?				
		Frequency	Percent	Cumulative Percent
	Not at all useful	48	17.5	17.5
	Slightly useful	43	15.6	33.1
	Moderately useful	66	24.0	57.1
	Very useful	66	24.0	81.1
	Extremely useful	52	18.9	100.0
	Total	275	100.0	

How useful would bill payment programs, like choose-your-own-due-date or pre-pay be to you?				
		Frequency	Percent	Cumulative Percent
	Not at all useful	43	15.6	15.6
	Slightly useful	70	25.5	41.1
	Moderately useful	84	30.5	71.6
	Very useful	40	14.5	86.2
	Extremely useful	38	13.8	100.0
	Total	275	100.0	

Usefulness of energy information and services

How useful would apps that would allow you to monitor and manage your appliances/devices remotely on your smartphone be to you?

		Frequency	Percent	Cumulative Percent
	Not at all useful	59	21.5	21.5
	Slightly useful	52	18.9	40.4
	Moderately useful	81	29.5	69.8
	Very useful	50	18.2	88.0
	Extremely useful	33	12.0	100.0
	Total	275	100.0	

How useful would expansion of energy efficiency or energy conservation programs be to you?

		Frequency	Percent	Cumulative Percent
	Not at all useful	22	8.0	8.0
	Slightly useful	47	17.1	25.1
	Moderately useful	83	30.2	55.3
	Very useful	71	25.8	81.1
	Extremely useful	52	18.9	100.0
	Total	275	100.0	

Smart meters

AMI uses a low-power radio frequency communications network to connect with a meter for a maximum of 90 seconds per day. All AMI equipment operate in compliance with state and federal communication standards. The signal strength is comparable to a cordless telephone. Common household items like cell phones, baby monitors, and Wi-Fi routers emit more radio frequency energy than AMI meters. Given this description, would you consider opting-out of having an AMI meter?

		Frequency	Percent	Cumulative Percent
	No	106	38.5	61.8
	Yes	64	23.3	23.3
	Don't know	105	38.2	100.0
	Total	275	100.0	

The following question was only asked of those who said that they would opt-out of a smart meter or were unsure.

Choosing not to have an AMI meter creates additional costs for PNM to manually read your meter. Would your business be willing to pay an additional monthly meter reading charge of $20-$30 to opt-out of an AMI meter?

		Frequency	Percent	Cumulative Percent
	Yes	9	5.3	5.3
	No	122	72.2	77.5
	I'm not sure	38	22.5	100.0
	Total	169	100.0	

Firmographics

How long has your business been a PNM customer?

		Frequency	Percent	Cumulative Percent
	Less than one year	15	5.5	5.5
	1 year	10	3.6	9.1
	2 to 5 years	33	12.0	21.1
	6 to 10 years	35	12.7	33.8
	Longer than 10 years	162	58.9	92.7
	Don't know	20	7.3	100.0
	Total	275	100.0	

On average, how much is your monthly PNM utility bill?

		Frequency	Percent	Cumulative Percent
	Less than $199	128	46.5	46.5
	$200 to $499	91	33.1	79.6
	$500 to $999	30	10.9	90.5
	$1,000 to $4,999	18	6.5	97.1
	$5,000 to $9,999	2	.7	97.8
	Don't know	6	2.2	100.0
	Total	275	100.0	

Firmographics

Which of the following best describes your primary role or responsibility? (Select one.) - Selected Choice

		Frequency	Percent	Cumulative Percent
	Energy management	2	.7	.7
	Facility management or engineering	5	1.8	2.5
	Operations	20	7.3	9.8
	Finance/accounting	39	14.2	24.0
	Executive/business strategy	15	5.5	29.5
	Business owner	160	58.2	87.6
	Sales	2	.7	88.4
	Other (please specify):	32	11.6	100.0
	Total	275	100.0	

What is your preferred language to speak, read, and write? - Selected Choice

		Frequency	Percent	Cumulative Percent
	English	272	98.9	98.9
	Spanish	3	1.1	100.0
	Total	275	100.0	

How many employees does your business have at the location where you work?

		Frequency	Percent	Cumulative Percent
	Fewer than 25	206	75.5	75.5
	5 to 49	44	16.1	91.6
	50 to 99	7	2.6	94.1
	100 to 199	2	.7	94.9
	200 to 499	1	.4	95.2
	500 to 749	1	.4	95.6
	Don't know	12	4.4	100.0
	Total	273	100.0	

Firmographics

Which of the following statements best describes the way energy-related decisions are typically made at your business?

		Frequency	Valid Percent	Cumulative Percent
	I make energy decisions	165	60.4	60.4
	I am part of team that makes energy decisions	64	23.4	83.9
	Someone else locally makes energy decisions	12	4.4	88.3
	Energy decisions are made at a corporate headquarters	5	1.8	90.1
	Decisions are made another way	11	4.0	94.1
	Don't know	16	5.9	100.0
	Total	273	100.0	

Which of the following describes the ownership of your business? Select all that apply.

	Responses	
	N	Percent
Women-owned	81	26.8%
Minority-owned	40	13.2%
Veteran-owned	26	8.6%
Other (please specify):	28	9.3%
None of the above	63	20.9%
Prefer not to say	56	18.5%
Don't know	8	2.6%
Total	302	100.0%

Residential data tables

Table of contents

Nonresidential results

Familiarity with energy terms

Residential results

How familiar are you with the term grid modernization?				
		Frequency	Percent	Cumulative Percent
	Not familiar at all	148	27.5	27.5
	Slightly familiar	138	25.6	53.1
	Moderately familiar	158	29.3	82.4
	Very familiar	69	12.8	95.2
	Extremely familiar	26	4.8	100.0
	Total	539	100.0	

Grid mod Grid modernization means making the electricity distribution system (the grid) 'smarter' by incorporating technologies that provide more detailed information to consumers about when and how electricity is being used. It enables residents and businesses to have greater control over their energy usage and more options to generate their own electricity. **Based on this explanation, how important do you feel it is that PNM modernize the grid?**				
		Frequency	Percent	Cumulative Percent
	Not at all important	25	4.6	4.6
	Slightly important	49	9.1	13.7
	Moderately important	126	23.4	37.1
	Very important	202	37.5	74.6
	Extremely important	137	25.4	100.0
	Total	539	100.0	

Familiarity with energy terms

Residential results

How familiar are you with the term advanced metering infrastructure (AMI)?				
		Frequency	Percent	Cumulative Percent
	Not familiar at all	360	66.8	66.8
	Slightly familiar	89	16.5	83.3
	Moderately familiar	55	10.2	93.5
	Very familiar	28	5.2	98.7
	Extremely familiar	7	1.3	100.0
	Total	539	100.0	

How familiar are you with the term smart meters?				
		Frequency	Percent	Cumulative Percent
	Not familiar at all	149	27.6	27.6
	Slightly familiar	111	20.6	48.2
	Moderately familiar	137	25.4	73.7
	Very familiar	109	20.2	93.9
	Extremely familiar	33	6.1	100.0
	Total	539	100.0	

Familiarity with energy terms

Residential results

How familiar are you with the term energy efficiency?				
		Frequency	Percent	Cumulative Percent
	Not familiar at all	15	2.8	2.8
	Slightly familiar	46	8.5	11.3
	Moderately familiar	122	22.6	34.0
	Very familiar	209	38.8	72.7
	Extremely familiar	147	27.3	100.0
	Total	539	100.0	

How familiar are you with the term energy conservation?				
		Frequency	Percent	Cumulative Percent
	Not familiar at all	12	2.2	2.2
	Slightly familiar	35	6.5	8.7
	Moderately familiar	106	19.7	28.4
	Very familiar	224	41.6	69.9
	Extremely familiar	162	30.1	100.0
	Total	539	100.0	

Familiarity with energy terms

Residential results

How familiar are you with the term demand response?				
		Frequency	Percent	Cumulative Percent
	Not familiar at all	148	27.5	27.5
	Slightly familiar	114	21.2	48.6
	Moderately familiar	143	26.5	75.1
	Very familiar	92	17.1	92.2
	Extremely familiar	42	7.8	100.0
	Total	539	100.0	

How familiar are you with the term time of use electricity pricing?				
		Frequency	Percent	Cumulative Percent
	Not familiar at all	142	26.3	26.3
	Slightly familiar	106	19.7	46.0
	Moderately familiar	126	23.4	69.4
	Very familiar	104	19.3	88.7
	Extremely familiar	61	11.3	100.0
	Total	539	100.0	

Familiarity with energy terms

Residential results

How familiar are you with the term distributed generation?				
		Frequency	Percent	Cumulative Percent
	Not familiar at all	241	44.7	44.7
	Slightly familiar	104	19.3	64.0
	Moderately familiar	103	19.1	83.1
	Very familiar	51	9.5	92.6
	Extremely familiar	40	7.4	100.0
	Total	539	100.0	

How familiar are you with the term rooftop solar?				
		Frequency	Percent	Cumulative Percent
	Not familiar at all	17	3.2	3.2
	Slightly familiar	41	7.6	10.8
	Moderately familiar	99	18.4	29.1
	Very familiar	185	34.3	63.5
	Extremely familiar	197	36.5	100.0
	Total	539	100.0	

Importance of potential grid modernization benefits

Residential results

How important is it to...Improve electricity reliability and quality of service?				
		Frequency	Percent	Cumulative Percent
	Not at all important	4	.7	.7
	Slightly important	16	3.0	3.7
	Moderately important	53	9.8	13.5
	Very important	202	37.5	51.0
	Extremely important	264	49.0	100.0
	Total	539	100.0	

How important is it to... Improve the ability to detect and prevent cyber-security attacks that could disrupt electricity service?				
		Frequency	Percent	Cumulative Percent
	Not at all important	2	.4	.4
	Slightly important	4	.7	1.1
	Moderately important	36	6.7	7.8
	Very important	119	22.1	29.9
	Extremely important	378	70.1	100.0
	Total	539	100.0	

Importance of potential grid modernization benefits

How important is it to... Have better tools and programs that help you manage your usage?				
		Frequency	Percent	Cumulative Percent
	Not at all important	31	5.8	5.8
	Slightly important	75	13.9	19.7
	Moderately important	141	26.2	45.8
	Very important	189	35.1	80.9
	Extremely important	103	19.1	100.0
	Total	539	100.0	

How important is it to...Receive timely energy usage and cost information?				
		Frequency	Percent	Cumulative Percent
	Not at all important	31	5.8	5.8
	Slightly important	67	12.4	18.2
	Moderately important	147	27.3	45.5
	Very important	188	34.9	80.3
	Extremely important	106	19.7	100.0
	Total	539	100.0	

Importance of potential grid modernization benefits

How important is it to...Reduce greenhouse gas emissions by making it easier to connect renewable energy sources?				
		Frequency	Percent	Cumulative Percent
	Not at all important	65	12.1	12.1
	Slightly important	48	8.9	21.0
	Moderately important	66	12.2	33.2
	Very important	123	22.8	56.0
	Extremely important	237	44.0	100.0
	Total	539	100.0	

How important is it to... Have a range of rate and billing programs that help you save money or control your bill?				
		Frequency	Percent	Cumulative Percent
	Not at all important	30	5.6	5.6
	Slightly important	69	12.8	18.4
	Moderately important	131	24.3	42.7
	Very important	171	31.7	74.4
	Extremely important	138	25.6	100.0
	Total	539	100.0	

Importance of potential grid modernization benefits

How important is it to...Increase opportunities to sell energy back to the grid (e.g., power generated by solar panels)?				
		Frequency	Percent	Cumulative Percent
	Not at all important	59	10.9	10.9
	Slightly important	47	8.7	19.7
	Moderately important	93	17.3	36.9
	Very important	147	27.3	64.2
	Extremely important	193	35.8	100.0
	Total	539	100.0	

How important is it to...Provide opportunities for customers to store energy, use it later, or sell energy back to the grid?				
		Frequency	Percent	Cumulative Percent
	Not at all important	45	8.3	8.3
	Slightly important	36	6.7	15.0
	Moderately important	101	18.7	33.8
	Very important	151	28.0	61.8
	Extremely important	206	38.2	100.0
	Total	539	100.0	

Importance of potential grid modernization benefits

How important is it to...Meet the requirements for more electric vehicles (EVs)?				
		Frequency	Percent	Cumulative Percent
	Not at all important	97	18.0	18.0
	Slightly important	65	12.1	30.1
	Moderately important	97	18.0	48.1
	Very important	115	21.3	69.4
	Extremely important	165	30.6	100.0
	Total	539	100.0	

How important is it to...Minimize electricity disruptions or outages?				
		Frequency	Percent	Cumulative Percent
	Not at all important	5	.9	.9
	Slightly important	14	2.6	3.5
	Moderately important	42	7.8	11.3
	Very important	173	32.1	43.4
	Extremely important	305	56.6	100.0
	Total	539	100.0	

Importance of potential grid modernizatio

Residential results

How important is it to...Have the ability to remotely read and turn on or turn off meters?				
		Frequency	Percent	Cumulative Percent
	Not at all important	60	11.1	11.1
	Slightly important	79	14.7	25.8
	Moderately important	179	33.2	59.0
	Very important	130	24.1	83.1
	Extremely important	91	16.9	100.0
	Total	539	100.0	

E Source

Concerns about grid modernization

Residential results

I'm concerned about the privacy of my data due to grid modernization.

		Frequency	Percent	Cumulative Percent
	Strongly disagree	50	9.3	9.3
	Somewhat disagree	68	12.6	21.9
	Neither agree nor disagree	140	26.0	47.9
	Somewhat agree	147	27.3	75.1
	Strongly agree	134	24.9	100.0
	Total	539	100.0	

I'm concerned my electric bill will increase due to grid modernization.

		Frequency	Percent	Cumulative Percent
	Strongly disagree	31	5.8	5.8
	Somewhat disagree	43	8.0	13.7
	Neither agree nor disagree	105	19.5	33.2
	Somewhat agree	158	29.3	62.5
	Strongly agree	202	37.5	100.0
	Total	539	100.0	

Concerns about grid modernization

Residential results

I'm concerned I won't see a benefit from grid modernization.				
		Frequency	Percent	Cumulative Percent
	Strongly disagree	69	12.8	12.8
	Somewhat disagree	83	15.4	28.2
	Neither agree nor disagree	114	21.2	49.4
	Somewhat agree	132	24.5	73.8
	Strongly agree	141	26.2	100.0
	Total	539	100.0	

I'm concerned grid modernization won't help me manage my household's energy use.				
		Frequency	Percent	Cumulative Percent
	Strongly disagree	61	11.3	11.3
	Somewhat disagree	102	18.9	30.2
	Neither agree nor disagree	159	29.5	59.7
	Somewhat agree	116	21.5	81.3
	Strongly agree	101	18.7	100.0
	Total	539	100.0	

Concerns about grid modernization

Residential results

I'm electromagnetically sensitive or someone else in my household is and that makes me concerned about grid modernization.

		Frequency	Percent	Cumulative Percent
	Strongly disagree	232	43.0	43.0
	Somewhat disagree	66	12.2	55.3
	Neither agree nor disagree	177	32.8	88.1
	Somewhat agree	38	7.1	95.2
	Strongly agree	26	4.8	100.0
	Total	539	100.0	

Data security and privacy

Residential results

Please indicate how important protecting payment information is to you.				
		Frequency	Percent	Cumulative Percent
	Not at all important	16	3.0	3.0
	Slightly important	18	3.3	6.3
	Moderately important	67	12.4	18.7
	Very important	147	27.3	46.0
	Extremely important	291	54.0	100.0
	Total	539	100.0	

Please indicate how important protecting contact information is to you.				
		Frequency	Percent	Cumulative Percent
	Not at all important	5	.9	.9
	Slightly important	14	2.6	3.5
	Moderately important	54	10.0	13.5
	Very important	150	27.8	41.4
	Extremely important	316	58.6	100.0
	Total	539	100.0	

Data security and privacy

Residential results

Please indicate how important protecting household attributes like equipment, appliances, or occupancy is to you.				
		Frequency	Percent	Cumulative Percent
	Not at all important	16	3.0	3.0
	Slightly important	26	4.8	7.8
	Moderately important	85	15.8	23.6
	Very important	160	29.7	53.2
	Extremely important	252	46.8	100.0
	Total	539	100.0	

Please indicate how important protecting electricity usage data is to you.				
		Frequency	Percent	Cumulative Percent
	Not at all important	33	6.1	6.1
	Slightly important	54	10.0	16.1
	Moderately important	144	26.7	42.9
	Very important	134	24.9	67.7
	Extremely important	174	32.3	100.0
	Total	539	100.0	

Data security and privacy

Please indicate how important protecting your social security number is to you.				
		Frequency	Percent	Cumulative Percent
	Not at all important	1	.2	.2
	Slightly important	3	.6	.7
	Moderately important	4	.7	1.5
	Very important	36	6.7	8.2
	Extremely important	495	91.8	100.0
	Total	539	100.0	

Usefulness of energy information and services

How useful would customized tools and guidance to help manage energy use be to you?				
		Frequency	Percent	Cumulative Percent
	Not at all useful	52	9.6	9.6
	Slightly useful	79	14.7	24.3
	Moderately useful	172	31.9	56.2
	Very useful	155	28.8	85.0
	Extremely useful	81	15.0	100.0
	Total	539	100.0	

How useful would technology that would automatically isolate/turn off appliances or equipment be to you?				
		Frequency	Percent	Cumulative Percent
	Not at all useful	123	22.8	22.8
	Slightly useful	97	18.0	40.8
	Moderately useful	138	25.6	66.4
	Very useful	103	19.1	85.5
	Extremely useful	78	14.5	100.0
	Total	539	100.0	

Usefulness of energy information and services

How useful would a more detailed breakdown of your electricity bill by appliance, device, or equipment be to you?

		Frequency	Percent	Cumulative Percent
	Not at all useful	79	14.7	14.7
	Slightly useful	93	17.3	31.9
	Moderately useful	129	23.9	55.8
	Very useful	145	26.9	82.7
	Extremely useful	93	17.3	100.0
	Total	539	100.0	

How useful would information on how your energy consumption compares to other households be to you?

		Frequency	Percent	Cumulative Percent
	Not at all useful	115	21.3	21.3
	Slightly useful	104	19.3	40.6
	Moderately useful	150	27.8	68.5
	Very useful	104	19.3	87.8
	Extremely useful	66	12.2	100.0
	Total	539	100.0	

Usefulness of energy information and services

How useful would more options to purchase green power be to you?				
		Frequency	Percent	Cumulative Percent
	Not at all useful	96	17.8	17.8
	Slightly useful	71	13.2	31.0
	Moderately useful	121	22.4	53.4
	Very useful	121	22.4	75.9
	Extremely useful	130	24.1	100.0
	Total	539	100.0	

How useful would bill payment programs, like choose-your-own-due-date or pre-pay be to you?				
		Frequency	Percent	Cumulative Percent
	Not at all useful	123	22.8	22.8
	Slightly useful	125	23.2	46.0
	Moderately useful	123	22.8	68.8
	Very useful	82	15.2	84.0
	Extremely useful	86	16.0	100.0
	Total	539	100.0	

Usefulness of energy information and services

How useful would apps that would allow you to monitor and manage your appliances/devices remotely on your smartphone be to you?

		Frequency	Percent	Cumulative Percent
	Not at all useful	145	26.9	26.9
	Slightly useful	104	19.3	46.2
	Moderately useful	109	20.2	66.4
	Very useful	105	19.5	85.9
	Extremely useful	76	14.1	100.0
	Total	539	100.0	

How useful would expansion of energy efficiency or energy conservation programs be to you?

		Frequency	Percent	Cumulative Percent
	Not at all useful	59	10.9	10.9
	Slightly useful	65	12.1	23.0
	Moderately useful	128	23.7	46.8
	Very useful	159	29.5	76.3
	Extremely useful	128	23.7	100.0
	Total	539	100.0	

Smart meters

Residential results

AMI uses a low-power radio frequency communications network to connect with a meter for a maximum of 90 seconds per day. All AMI equipment operate in compliance with state and federal communication standards. The signal strength is comparable to a cordless telephone. Common household items like cell phones, baby monitors, and Wi-Fi routers emit more radio frequency energy than AMI meters. Given this description, would you consider opting-out of having an AMI meter?

		Frequency	Percent	Cumulative Percent
	No	237	44.0	44.0
	Yes	125	23.2	67.2
	Don't know	177	32.8	100
	Total	539	100.0	

The following question was only asked of those who said that they would opt-out of a smart meter or were unsure.

Choosing not to have an AMI meter creates additional costs for PNM to manually read your meter. Would your business be willing to pay an additional monthly meter reading charge of $20-$30 to opt-out of an AMI meter?

		Frequency	Percent	Cumulative Percent
	Yes	13	2.4	4.3
	No	235	43.6	82.1
	I'm not sure	54	10.0	100.0
	Total			

PNM Exhibit JAR-4
Page 73 of 115

E Source

Demographics

Which gender do you most identify with?

		Frequency	Percent	Cumulative Percent
Valid	Female	257	47.7	47.7
	Male	253	46.9	94.6
	Self-identify (please specify):	5	.9	95.5
	Prefer not to say	24	4.5	100.0
	Total	539	100.0	

What is your preferred language to speak, read, and write?

		Frequency	Percent	Cumulative Percent
Valid	English	532	98.7	98.7
	Spanish	6	1.1	99.8
	Other (please specify):	1	.2	100.0
	Total	539	100.0	

What is your age range?

		Frequency	Percent	Cumulative Percent
	18 - 24	3	.6	.6
	25 - 34	34	6.3	6.9
	35 - 44	59	10.9	17.8
	45 - 54	80	14.8	32.7
	55 - 64	115	21.3	54.0
	65 or older	211	39.1	93.1
	Prefer not to say	37	6.9	100.0
	Total	539	100.0	

Demographics

How long have you been a customer of PNM?

		Frequency	Percent	Cumulative Percent
	Less than one year	11	2.0	2.0
	1 year	19	3.5	5.6
	2 to 5 years	90	16.7	22.3
	6 to 10 years	68	12.6	34.9
	Longer than 10 years	350	64.9	99.8
	Don't know	1	.2	100.0
	Total	539	100.0	

How much is your average monthly PNM utility bill?

		Frequency	Percent	Cumulative Percent
	Less than $50	126	23.4	23.4
	$50 to $99	205	38.0	61.4
	$100 to $149	103	19.1	80.5
	$150 to $199	58	10.8	91.3
	$200 to $249	21	3.9	95.2
	$250 to $399	6	1.1	96.3
	$400 or more	5	.9	97.2
	Don't know	15	2.8	100.0
	Total	539	100.0	

Demographics

Which of the following best describes the total annual income of all members of your household before taxes in 2021?				
		Frequency	Percent	Cumulative Percent
	Less than $15,000	26	4.8	4.8
	$15,000 to $24,999	28	5.2	10.0
	$25,000 to $34,999	45	8.3	18.4
	$35,000 to $49,999	34	6.3	24.7
	$50,000 to $74,999	78	14.5	39.1
	$75,000 to $99,999	58	10.8	49.9
	$100,000 to $149,999	72	13.4	63.3
	$150,000 to 199,999	33	6.1	69.4
	$200,000 or more	33	6.1	75.5
	Prefer not to say	132	24.5	100.0
	Total	539	100.0	

Demographics

What is the highest level of education you have completed?				
		Frequency	Percent	Cumulative Percent
	Less than high school	4	.7	.7
	High school diploma	25	4.6	5.4
	Some college	83	15.4	20.8
	Trade or technical school	36	6.7	27.5
	College graduate	190	35.3	62.7
	Graduate degree	176	32.7	95.4
	Prefer not to say	25	4.6	100.0
	Total	539	100.0	

Demographics

Do you rent or own your home?				
		Frequency	Percent	Cumulative Percent
	Rent or lease	81	15.0	15.0
	Own	439	81.4	96.5
	Other (please specify):	1	.2	96.7
	Prefer not to say	18	3.3	100.0
	Total	539	100.0	

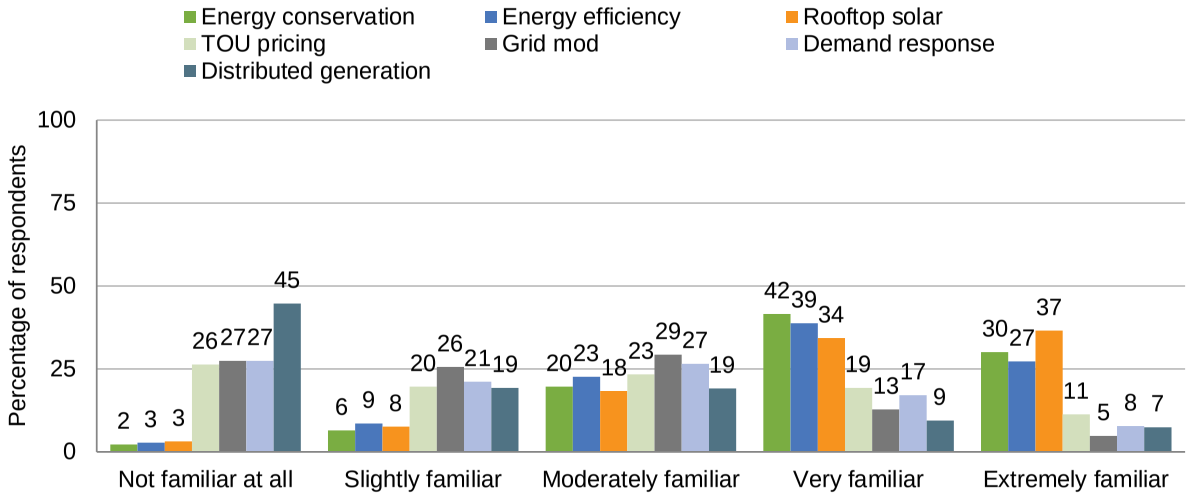
Which of these best describes your residence type?				
		Frequency	Percent	Cumulative Percent
	Single-family home	456	84.6	84.6
	Two-household building (duplex)	14	2.6	87.2
	Multiunit building (apartment complex)	37	6.9	94.1
	Mobile home	13	2.4	96.5
	Other (please specify):	8	1.5	98.0
	Prefer not to say	11	2.0	100.0
	Total	539	100.0	

Demographics

Please rate your consideration of purchasing or leasing an all-electric vehicle.				
		Frequency	Percent	Cumulative Percent
	I'm not considering	309	57.3	57.3
	I'm considering, but haven't started researching options	135	25.0	82.4
	I'm considering and have started researching options	71	13.2	95.5
	I already own or lease an electric vehicle	24	4.5	100.0
	Total	539	100.0	

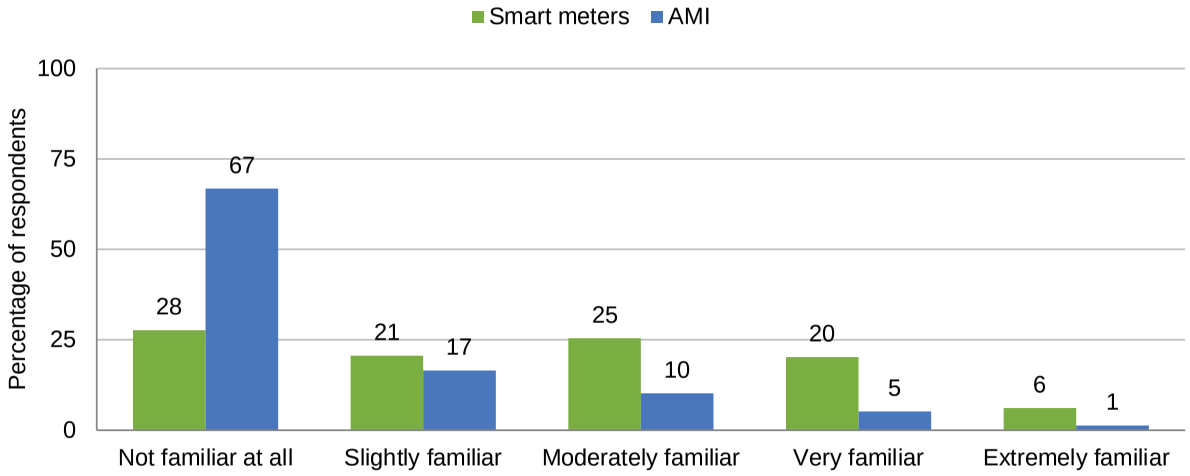
Supplemental residential data: Visualizations by key demographics

Familiarity with energy terminology (overall)



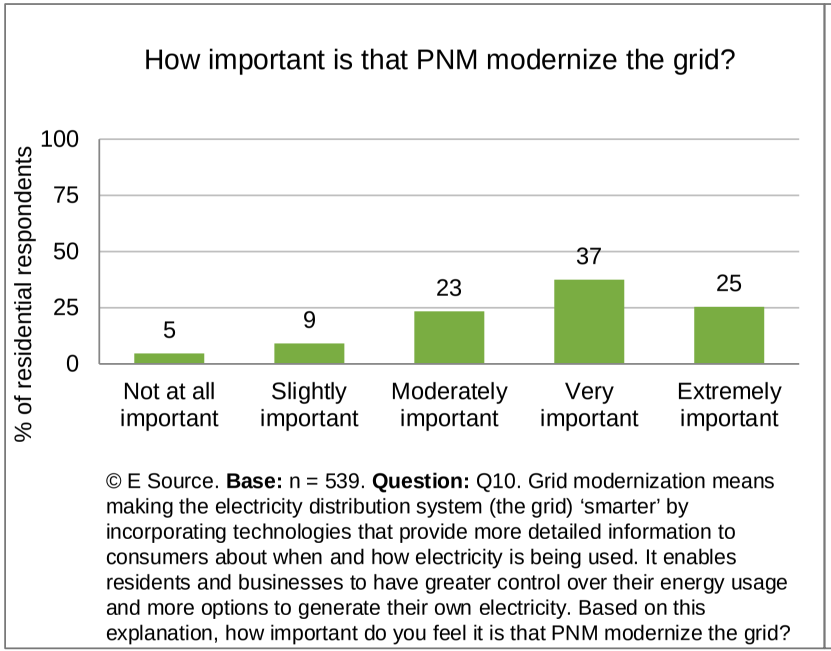
© E Source. **Base:** n = 539. **Questions:** Q1. How familiar are you with the term grid modernization? Q4. How familiar are you with the term energy efficiency? Q5. How familiar are you with the term energy conservation? Q6. How familiar are you with the term demand response? Q7. How familiar are you with the term rooftop solar? Q8. How familiar are you with the term distributed generation? Q9. How familiar are you with the term time of use electricity pricing?

Familiarity with energy terminology: ‘Smart meters’ vs ‘advanced metering infrastructure’ (overall)

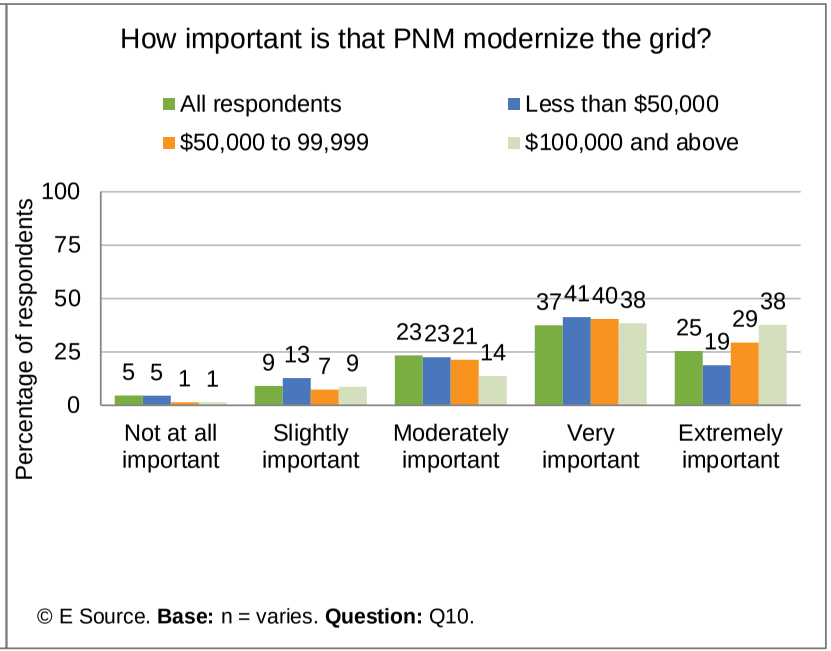


© E Source. **Base:** n = 539. **Questions:** Q2. How familiar are you with the term smart meters? Q3. How familiar are you with the term advanced metering infrastructure (AMI)?

Importance to modernize the grid, by INCOME

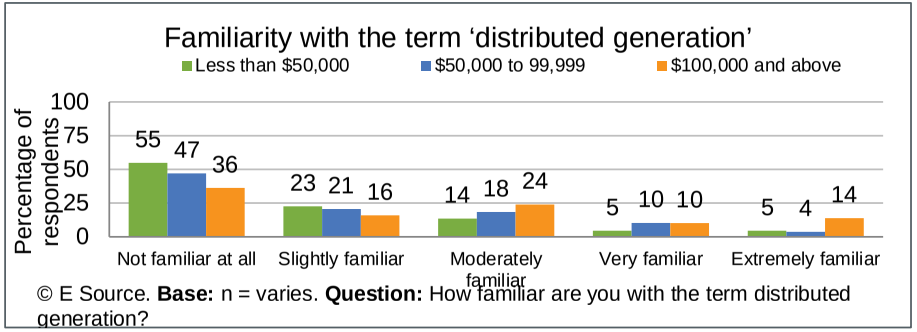


© E Source. **Base:** n = 539. **Question:** Q10. Grid modernization means making the electricity distribution system (the grid) 'smarter' by incorporating technologies that provide more detailed information to consumers about when and how electricity is being used. It enables residents and businesses to have greater control over their energy usage and more options to generate their own electricity. Based on this explanation, how important do you feel it is that PNM modernize the grid?

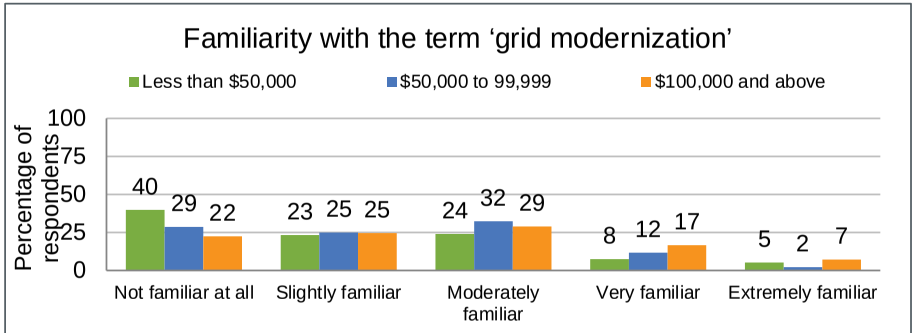


© E Source. **Base:** n = varies. **Question:** Q10.

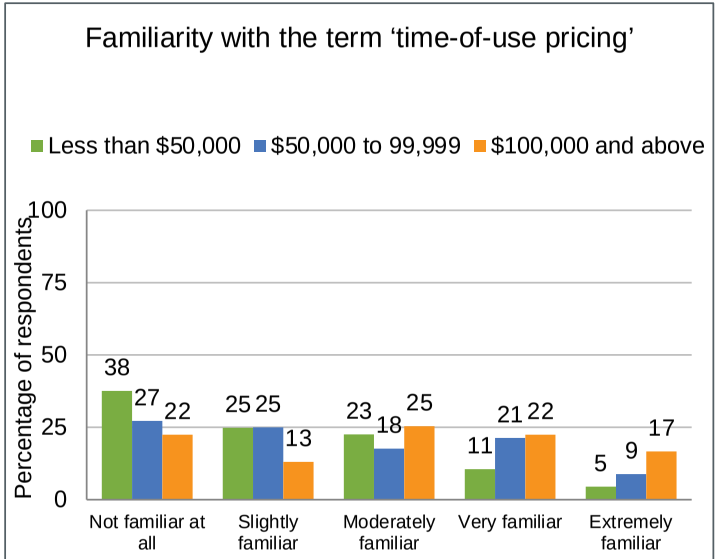
Residential familiarity with terms, by income



© E Source. **Base:** n = varies. **Question:** How familiar are you with the term distributed generation?

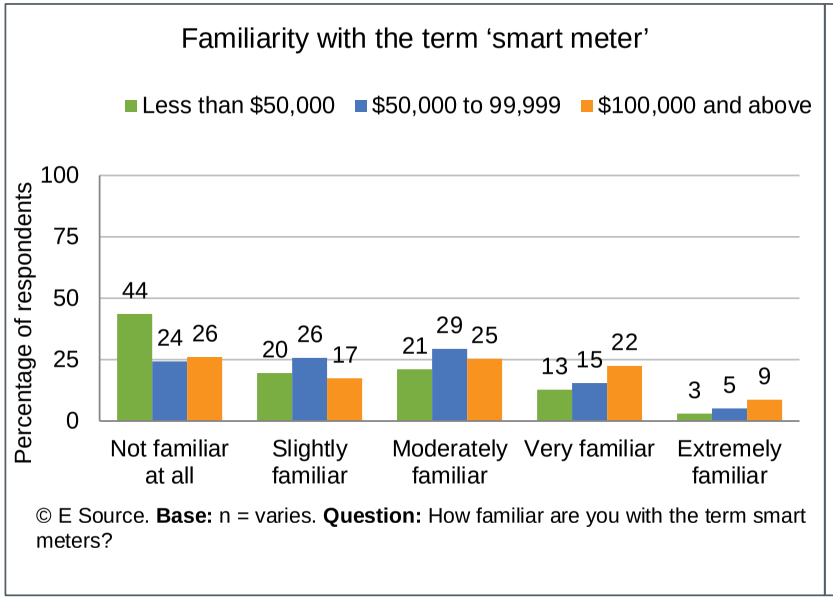


© E Source. **Base:** n = varies. **Question:** Q1. How familiar are you with the term grid

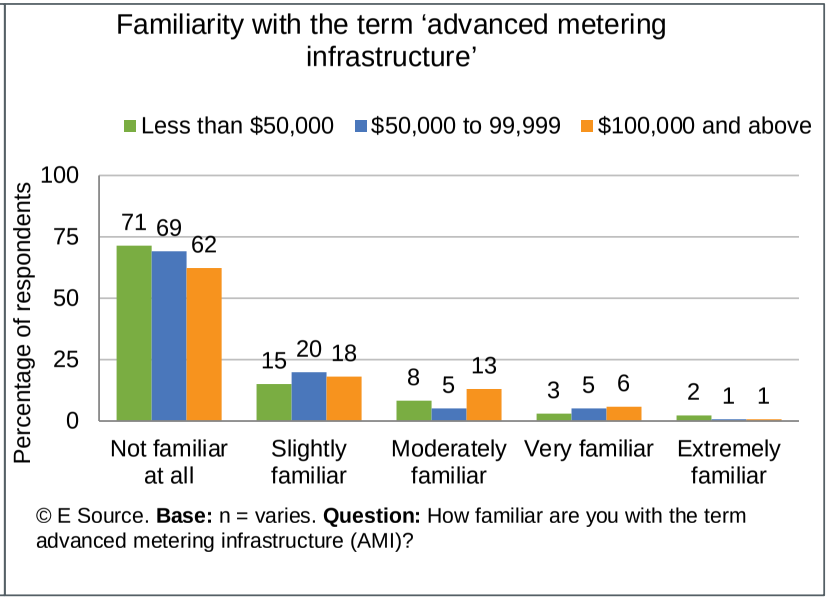


© E Source. **Base:** n = varies. **Question:** How familiar are you with the term time of use electricity pricing?

Residential familiarity with terms, by income

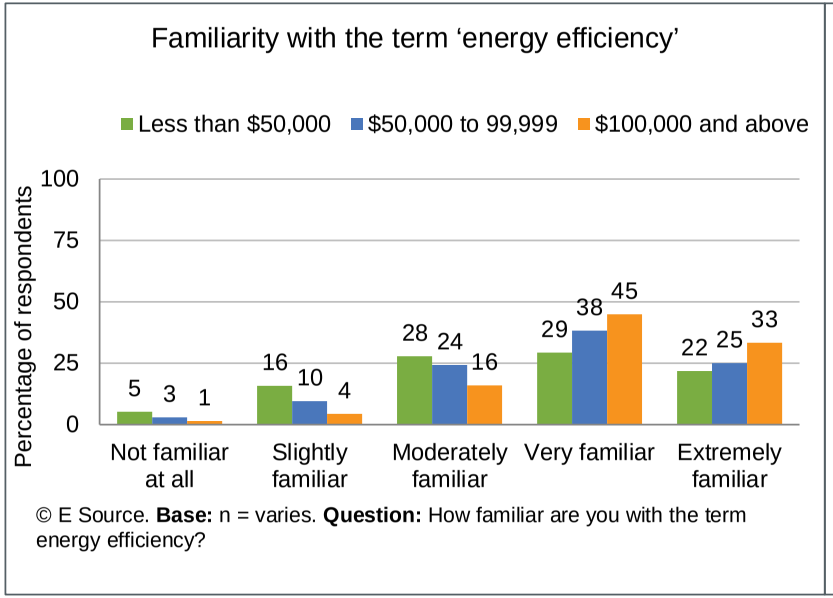


© E Source. **Base:** n = varies. **Question:** How familiar are you with the term smart meters?

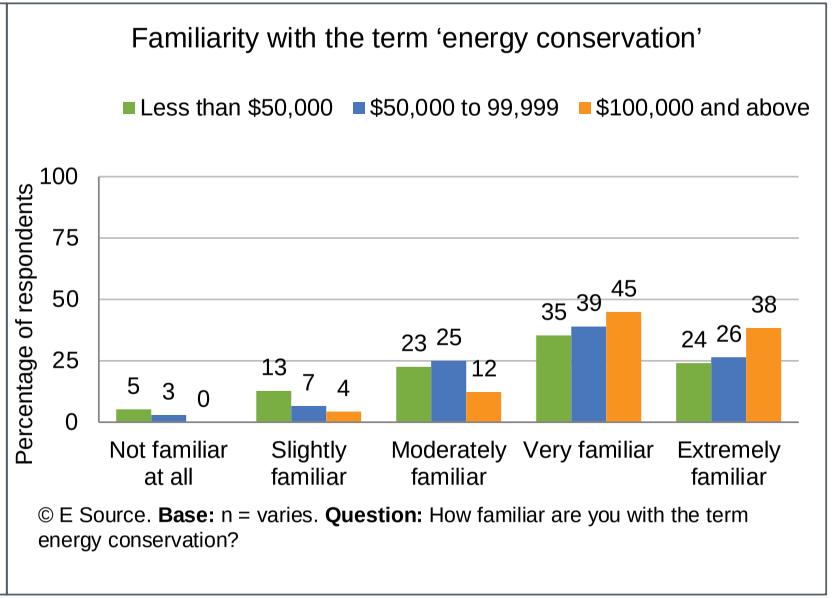


© E Source. **Base:** n = varies. **Question:** How familiar are you with the term advanced metering infrastructure (AMI)?

Residential familiarity with terms, by income

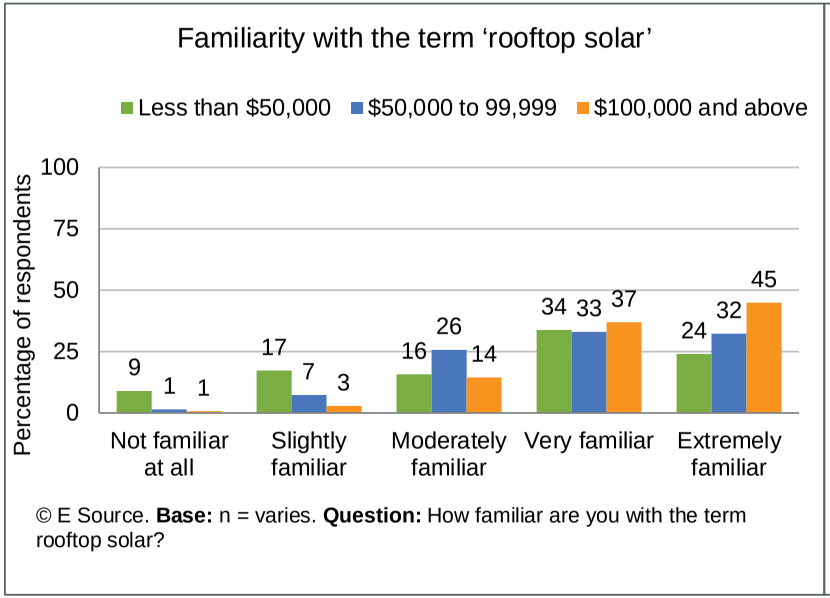


© E Source. **Base:** n = varies. **Question:** How familiar are you with the term energy efficiency?

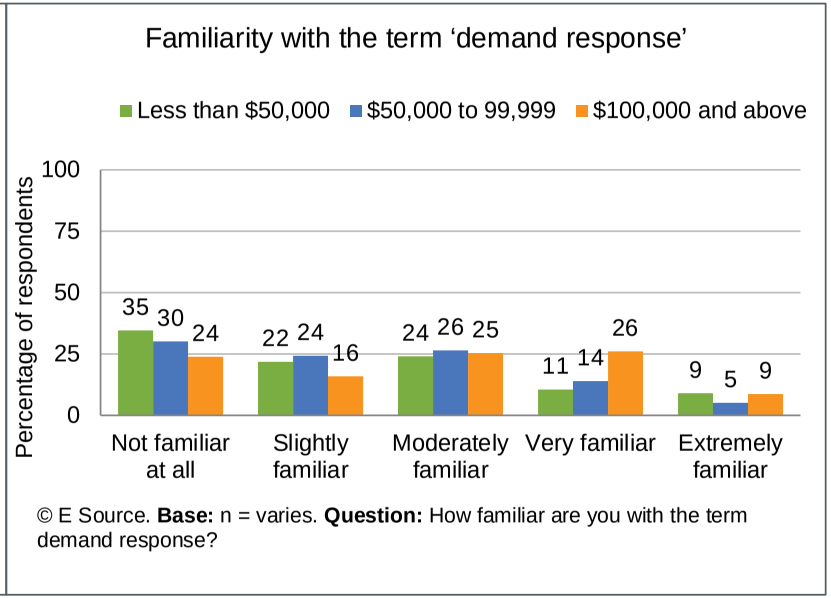


© E Source. **Base:** n = varies. **Question:** How familiar are you with the term energy conservation?

Residential familiarity with terms, by income

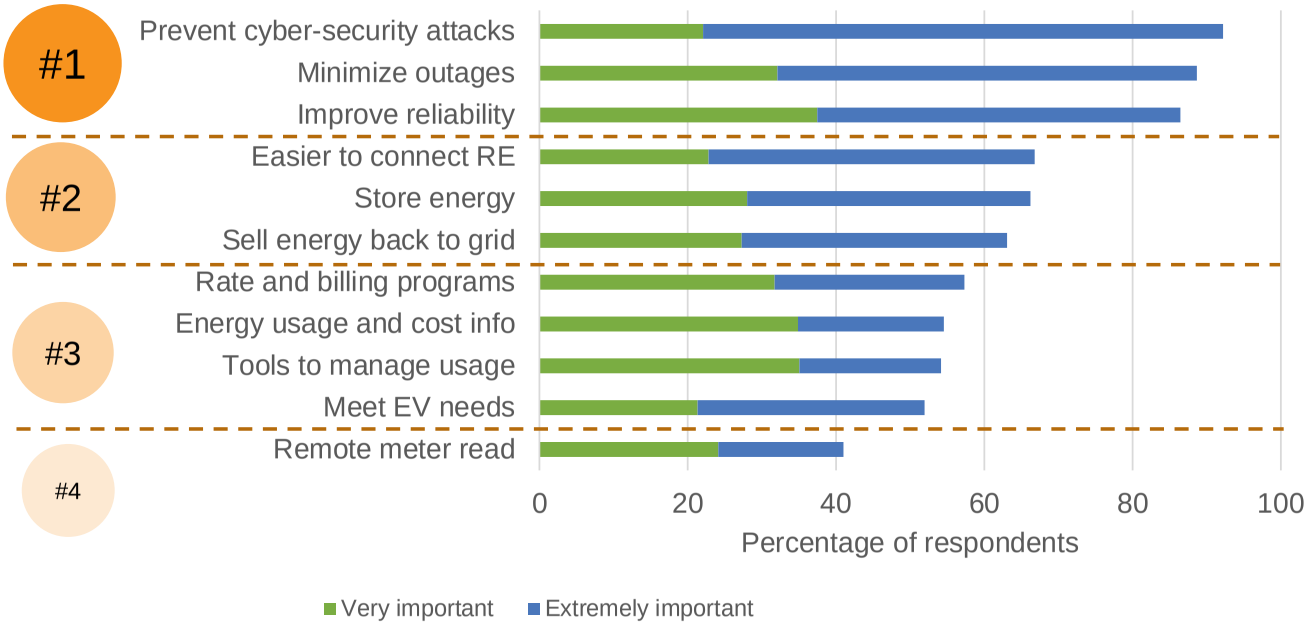


© E Source. **Base:** n = varies. **Question:** How familiar are you with the term rooftop solar?

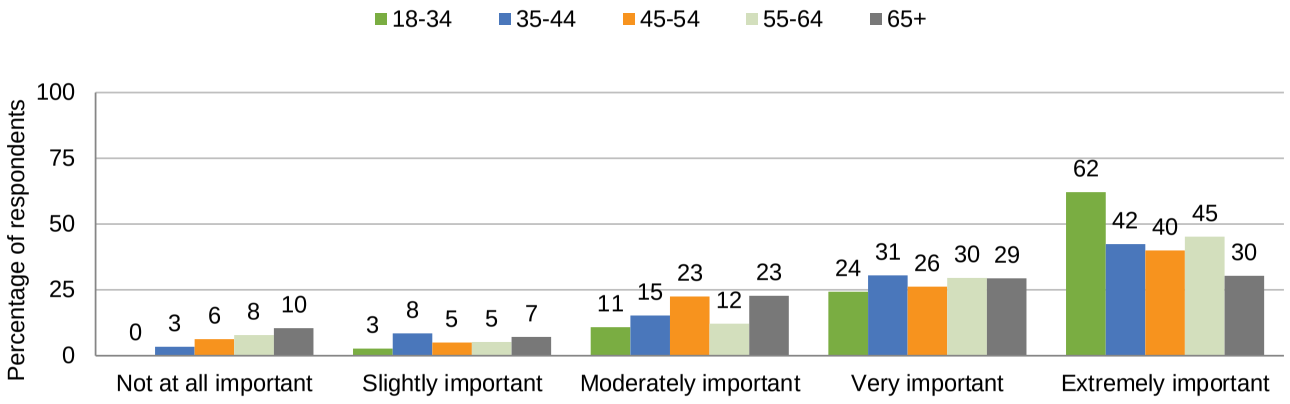


© E Source. **Base:** n = varies. **Question:** How familiar are you with the term demand response?

Importance of grid modernization benefits (overall)

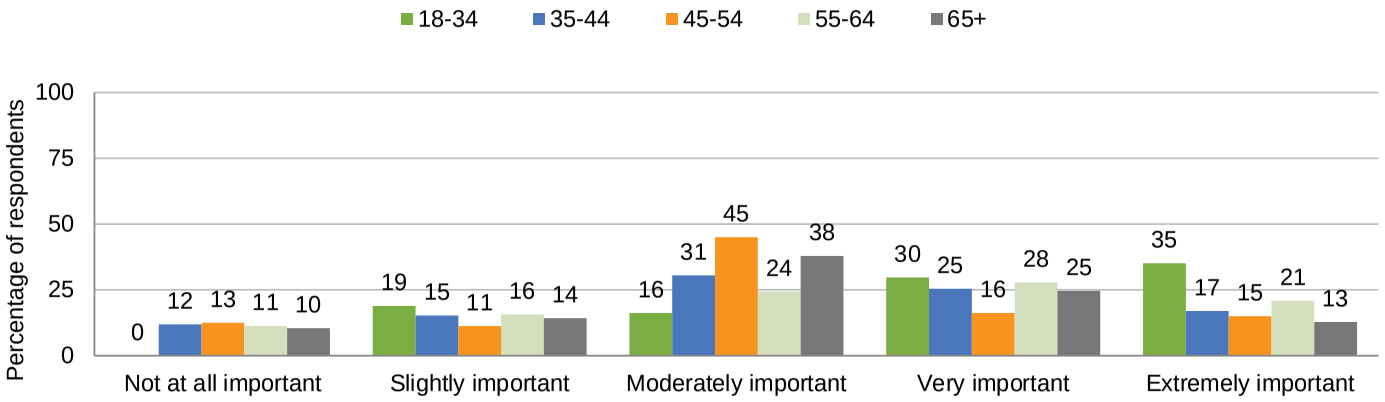


Importance of benefits by AGE: Increase energy storage opportunities



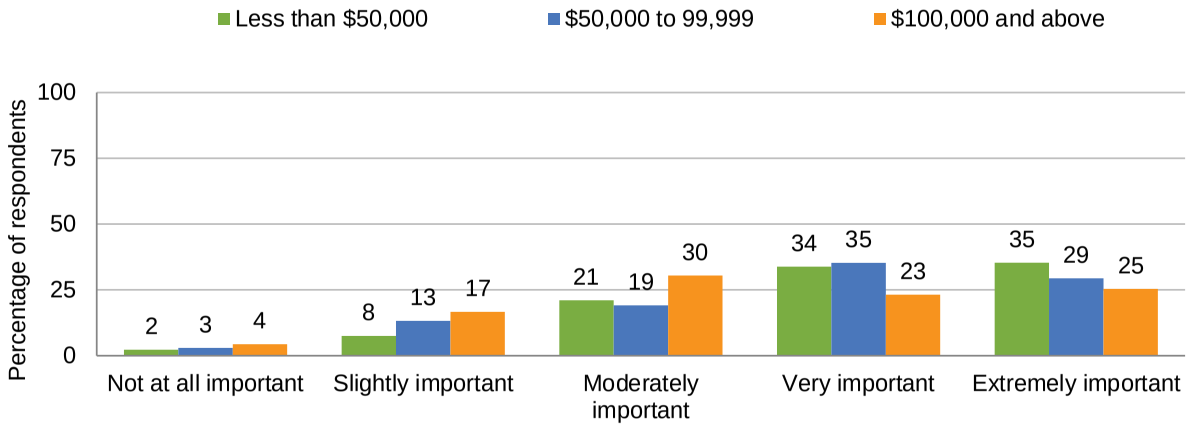
© E Source. **Base:** n = varies. **Question:** Q16. How important is to provide opportunities for customers to store energy, use it later, or sell energy back to the grid?

Importance of benefits by AGE: Remote meter read, remote turn on/off



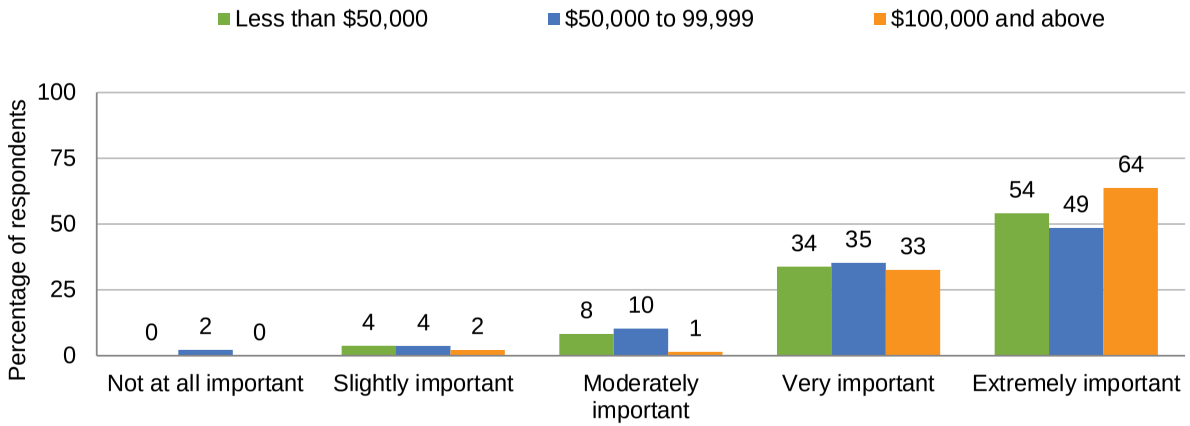
© E Source. **Base:** n = varies. **Question:** Q16. How important is to provide opportunities for customers to store energy, use it later, or sell energy back to the grid?

Importance of benefits by INCOME: Tools to help save money or control bill



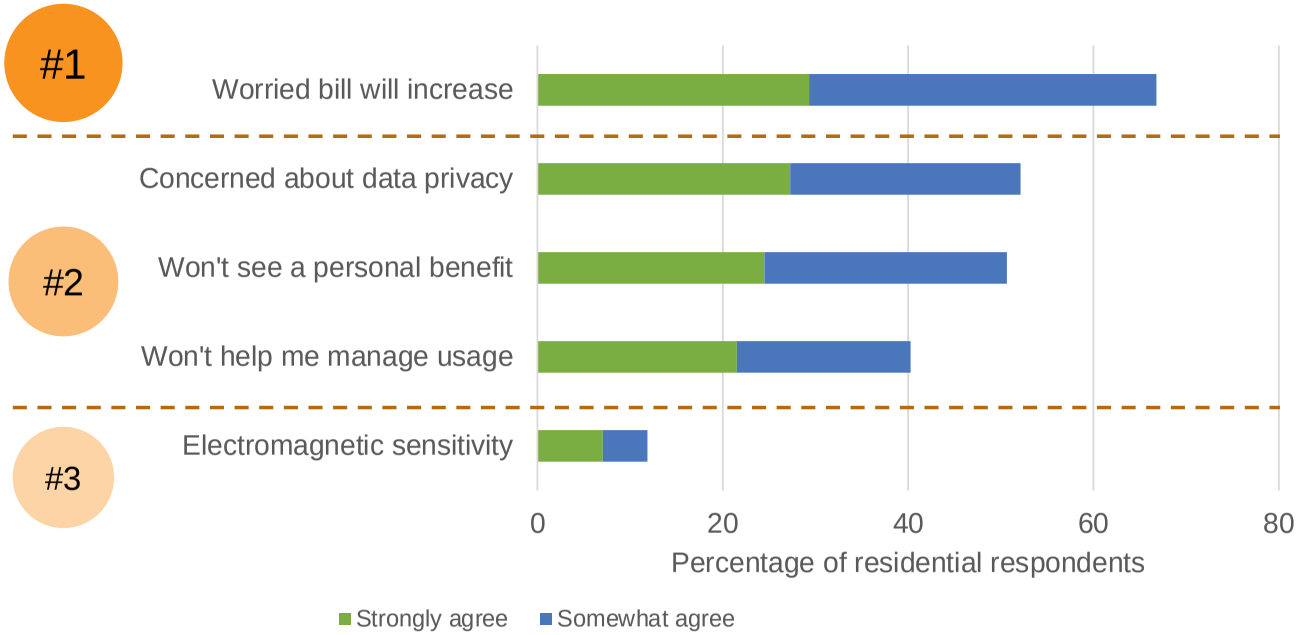
© E Source. **Base:** n = varies. **Question:** Q14. How important is to have a range of rate and billing programs that help you save money or control your bill?

Importance of benefits by INCOME: Minimize electricity disruptions or outages

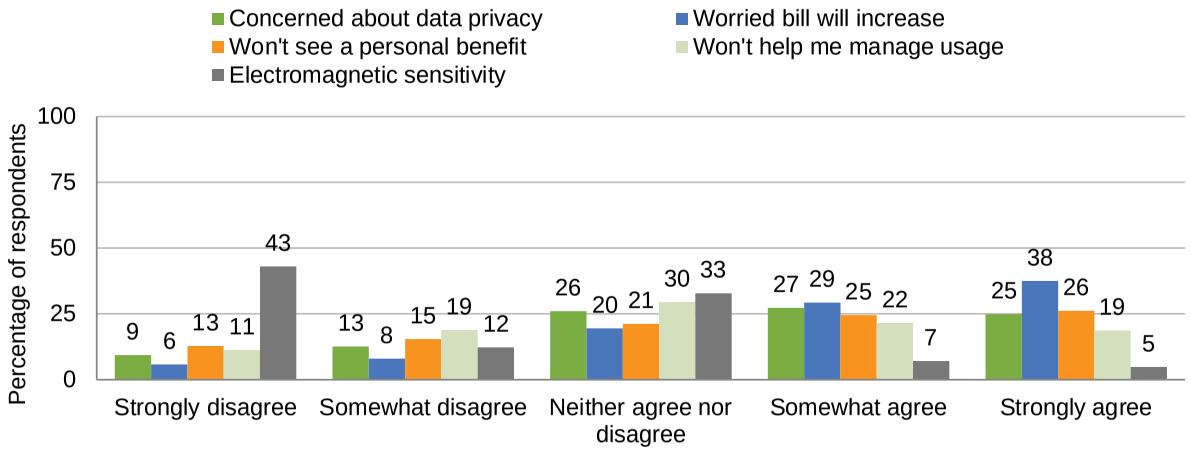


© E Source. **Base:** n = varies. **Question:** Q18. How important is it to minimize electricity disruptions or outages?

Concerns about grid modernization (overall)

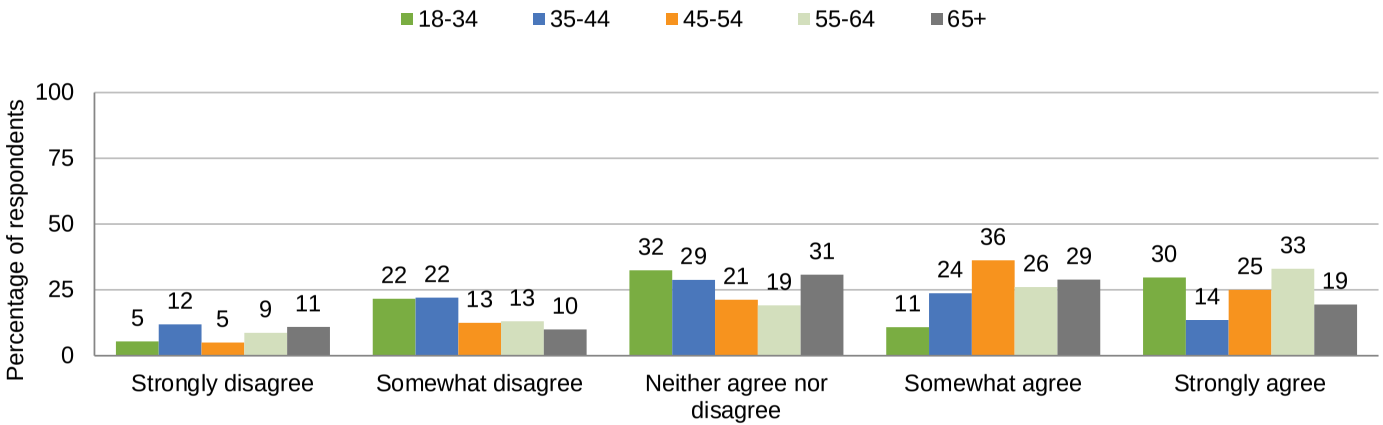


Concerns about grid modernization (overall)



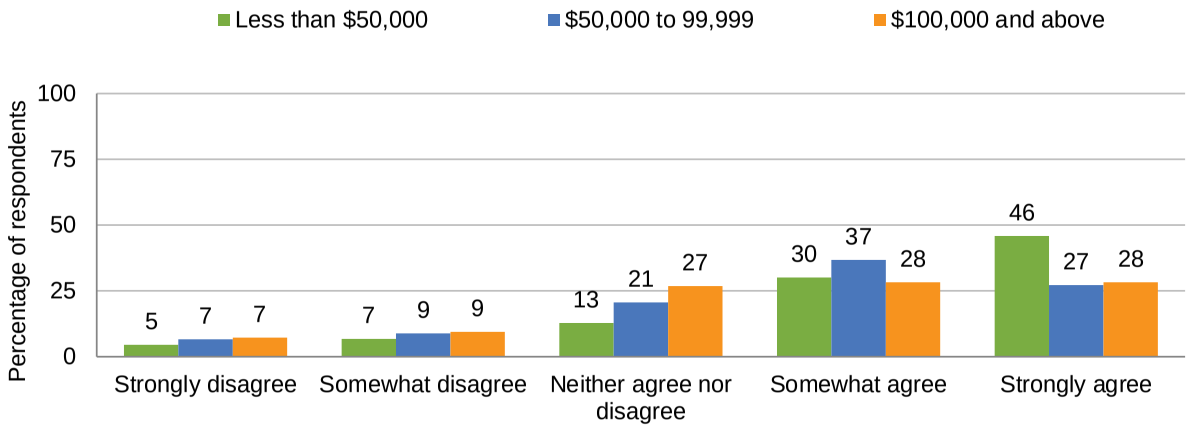
© E Source. **Base:** n = 539. **Questions:** This next section describes potential concerns to grid modernization. Please indicate how much you agree with each statement. Q22. I'm concerned about the privacy of my data due to grid modernization. Q23 I'm concerned my electric bill will increase due to grid modernization. Q24. I'm concerned I won't see a benefit from grid modernization. Q25. I'm concerned grid modernization won't help me manage my household's energy use. Q26. I'm electromagnetically sensitive or someone else in my household is and that makes me concerned about grid modernization.

Concerns by AGE: Concerned about data privacy



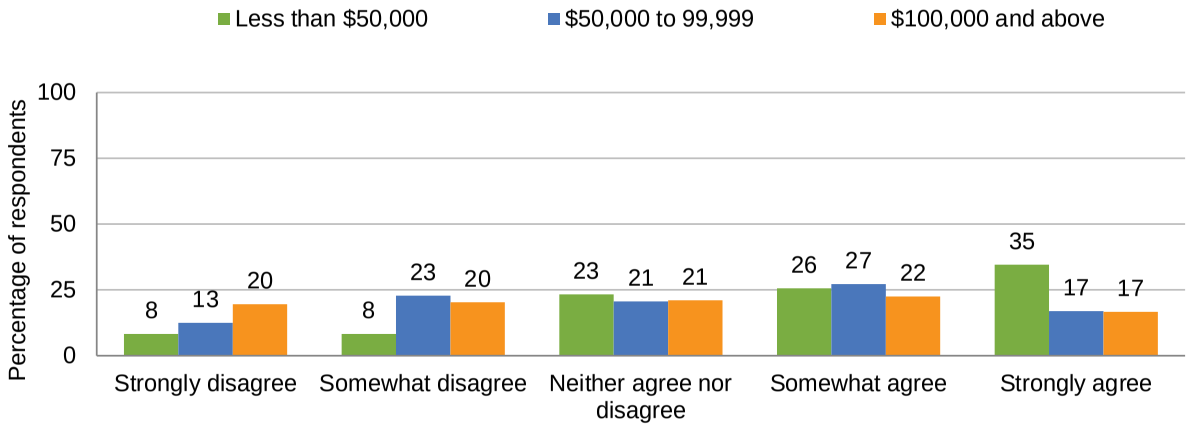
© E Source. **Base:** n = varies. **Question:** I'm concerned about the privacy of my data due to grid modernization.

Concerns by INCOME: Concerned my bill will increase



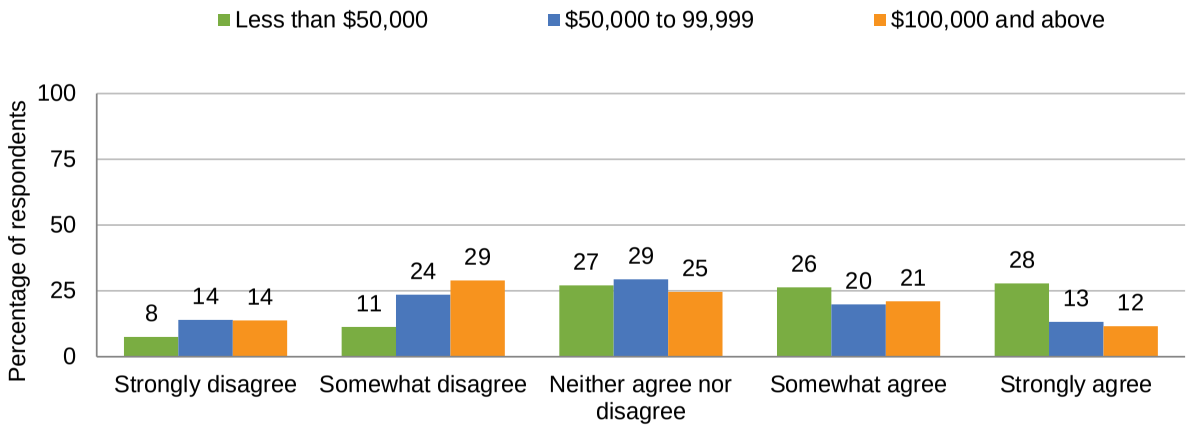
© E Source. **Base:** n = varies. **Question:** Q23 I'm concerned my electric bill will increase due to grid modernization.

Concerns by INCOME: Concerned I won't see a benefit from grid modernization



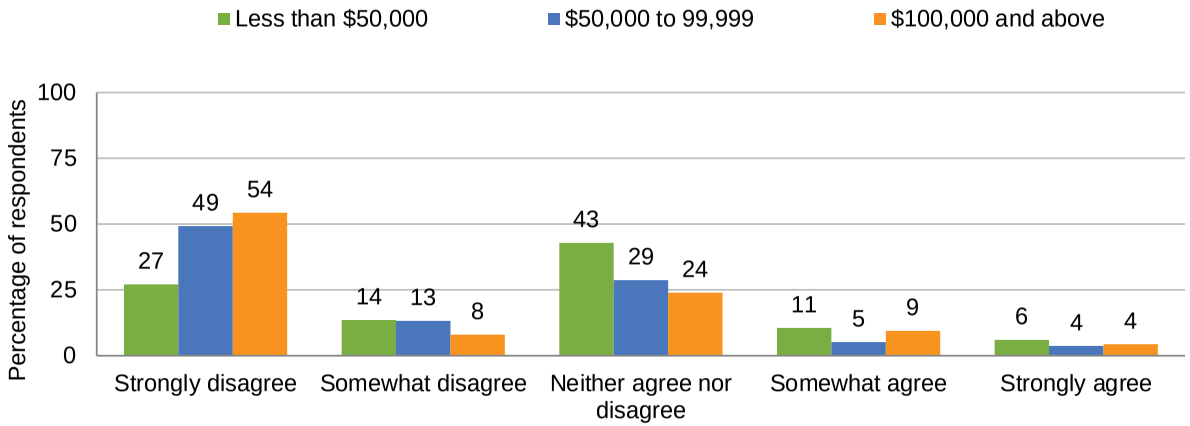
© E Source. **Base:** n = varies. **Question:** Q24 I'm concerned I won't see a benefit from grid modernization.

Concerns by INCOME: Concerned grid modernization won't help me manage energy usage



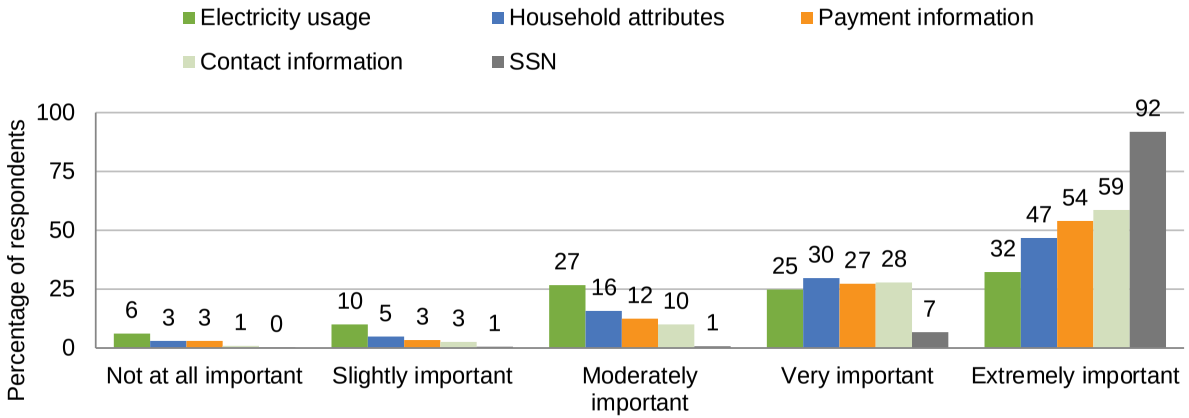
© E Source. **Base:** n = varies. **Question:** Q25. I'm concerned grid modernization won't help me manage my household's energy use.

Concerns by INCOME: Electromagnetic sensitivity



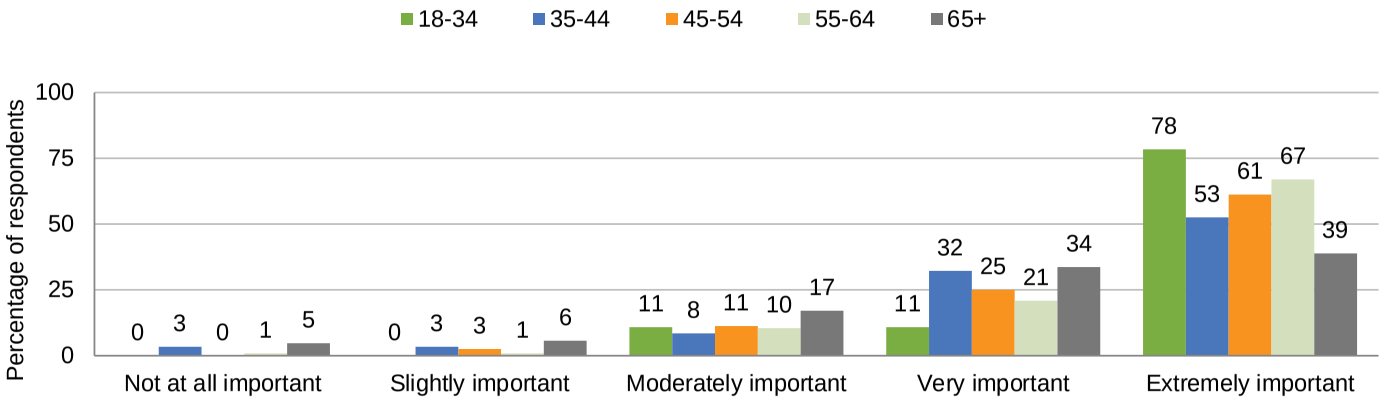
© E Source. **Base:** n = varies. **Question:** Q26. I'm electromagnetically sensitive or someone else in my household is and that makes me concerned about grid modernization.

Protecting privacy and personal data (overall)



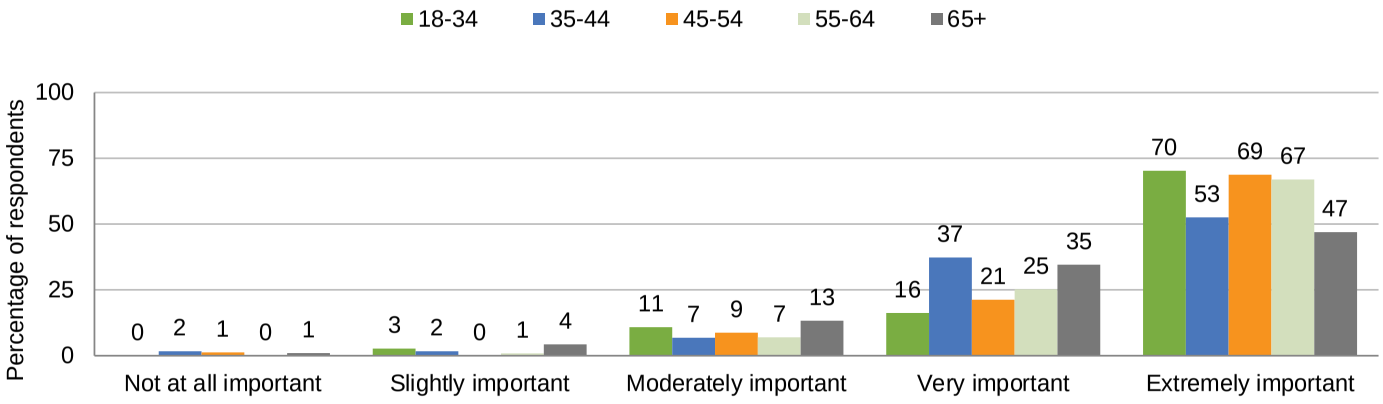
© E Source. **Base:** n = 539. **Questions:** Protecting the privacy of customer data, including the consumption data collected by advanced meters, is a top priority for PNM. Understanding how important data is to you will help PNM better communicate its security and privacy measures. Q30 Please indicate how important protecting payment information is to you. Q31 Please indicate how important protecting contact information is to you. Q32 Please indicate how important protecting household attributes like equipment, appliances, or occupancy is to you. Q33 Please indicate how important protecting electricity usage data is to you. Q34 Please indicate how important protecting your social security number is to you.

By age: Protect payment information



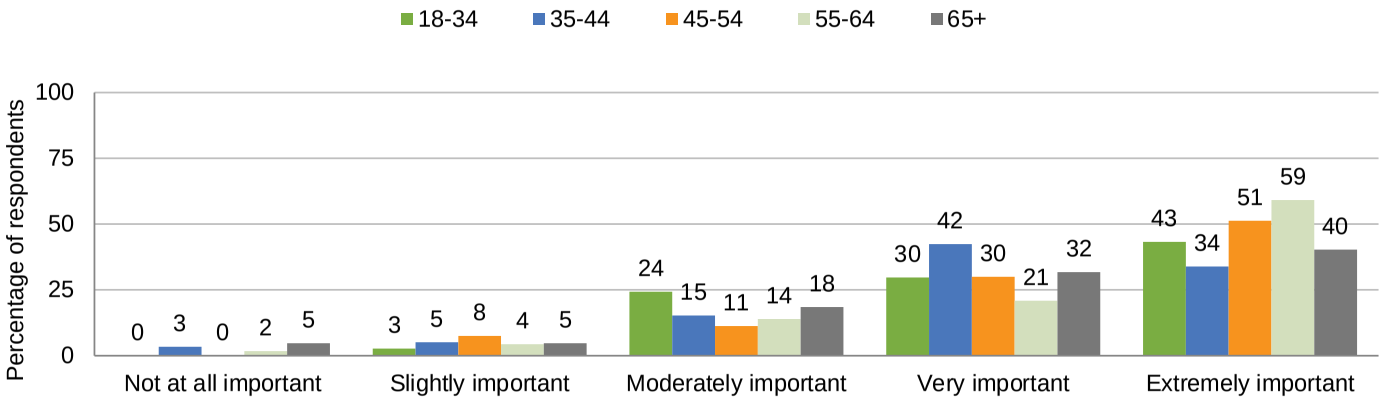
© E Source. **Base:** n = varies. **Question:** Please indicate how important protecting payment information is to you.

By age: Protect contact information



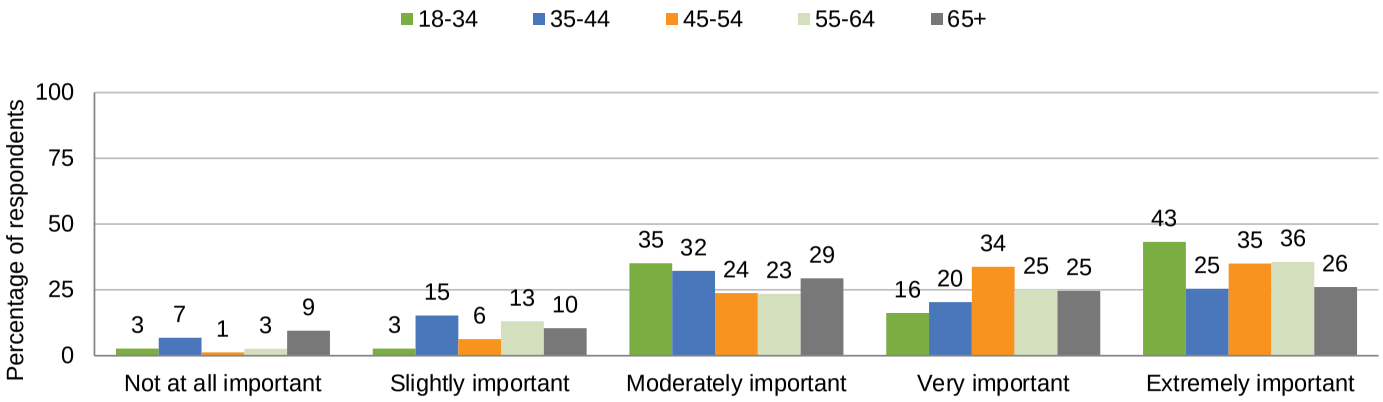
© E Source. **Base:** n = varies. **Question:** Please indicate how important protecting contact information is to you.

By age: Protect household attributes



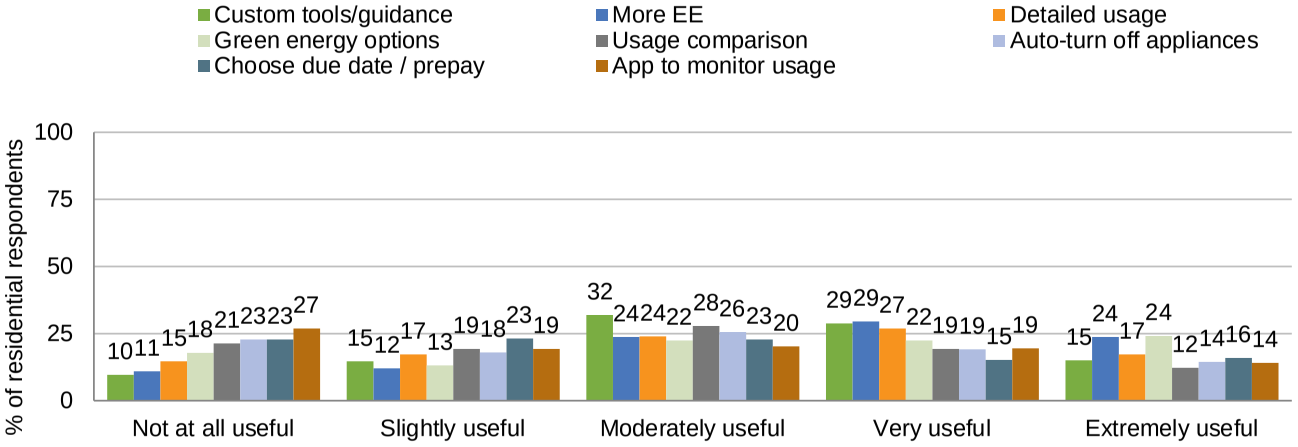
© E Source. **Base:** n = varies. **Question:** Please indicate how important protecting household attributes like equipment, appliances, or occupancy is to you.

By age: Protect electricity usage



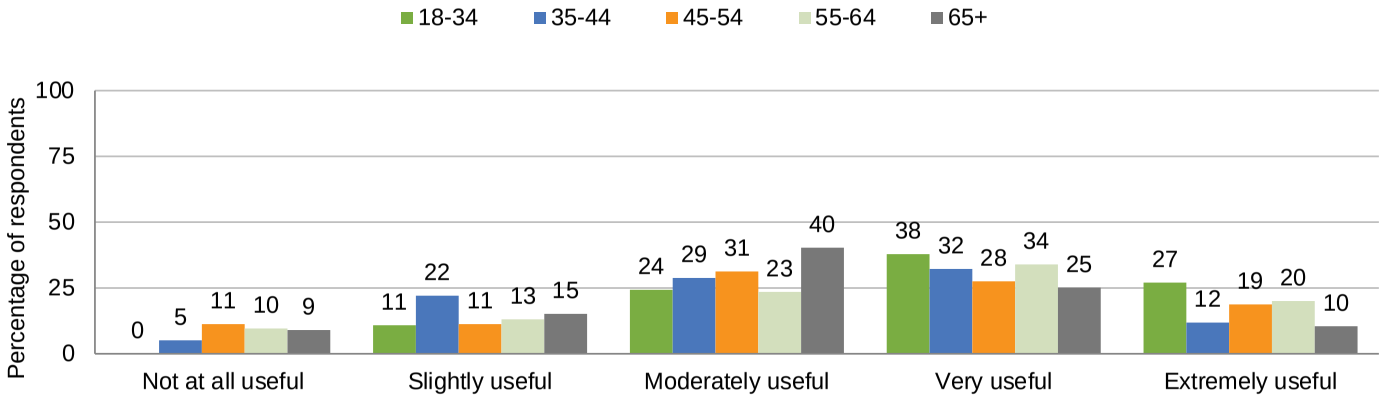
© E Source. **Base:** n = varies. **Question:** Please indicate how important protecting household attributes like equipment, appliances, or occupancy is to you.

Usefulness of energy information / services (summary)



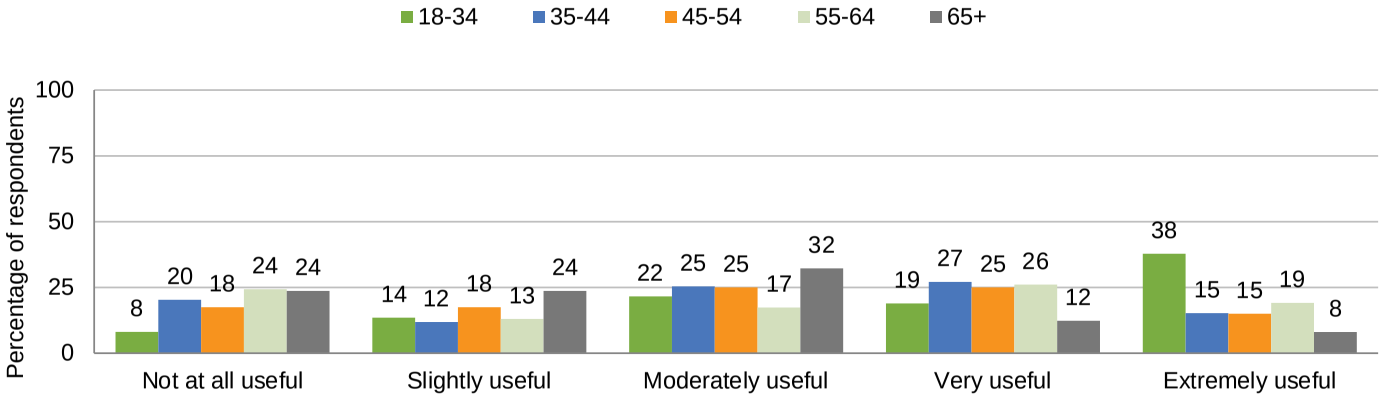
© E Source. **Base:** n = 539. **Questions:** The following questions describe energy information and services that can be enabled by modernizing the grid. Please indicate how useful each type of information or service is to you. Q35 How useful would customized tools and guidance to help manage energy use be to you? Q36 How useful would technology that would automatically isolate/turn off appliances or equipment be to you? Q38 How useful would information on how your energy consumption compares to other households be to you? Q39 How useful would more options to purchase green power be to you? Q40 How useful would bill payment programs, like choose-your-own-due-date or pre-pay be to you? Q41 How useful would apps that would allow you to monitor and manage your appliances/devices remotely on your smartphone be to you? Q42 How useful would expansion of energy efficiency or energy conservation programs be to you?

Usefulness by AGE: Customized tools and guidance



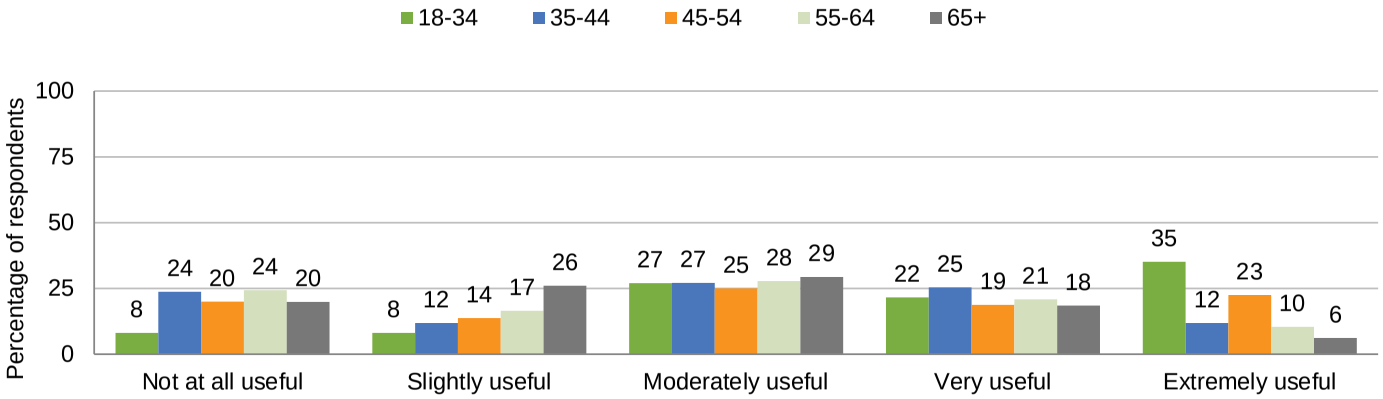
© E Source. **Base:** n = varies. **Question:** How useful would customized tools and guidance to help manage energy use be to you?

Usefulness by AGE: Automatically isolate/turn off appliances or equipment



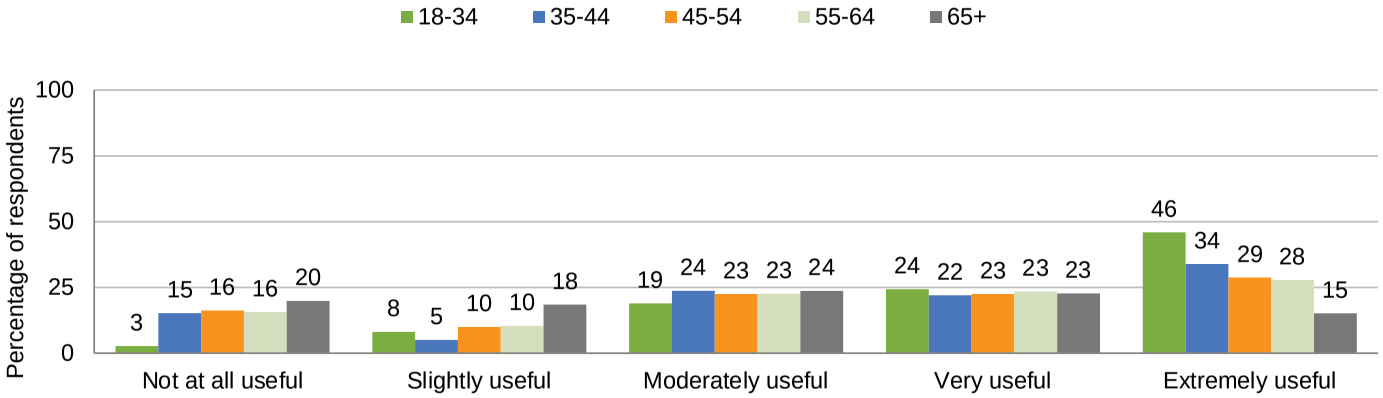
© E Source. **Base:** n = varies. **Question:** How useful would technology that would automatically isolate/turn off appliances or equipment be to you?

Usefulness by AGE: Usage comparisons to others



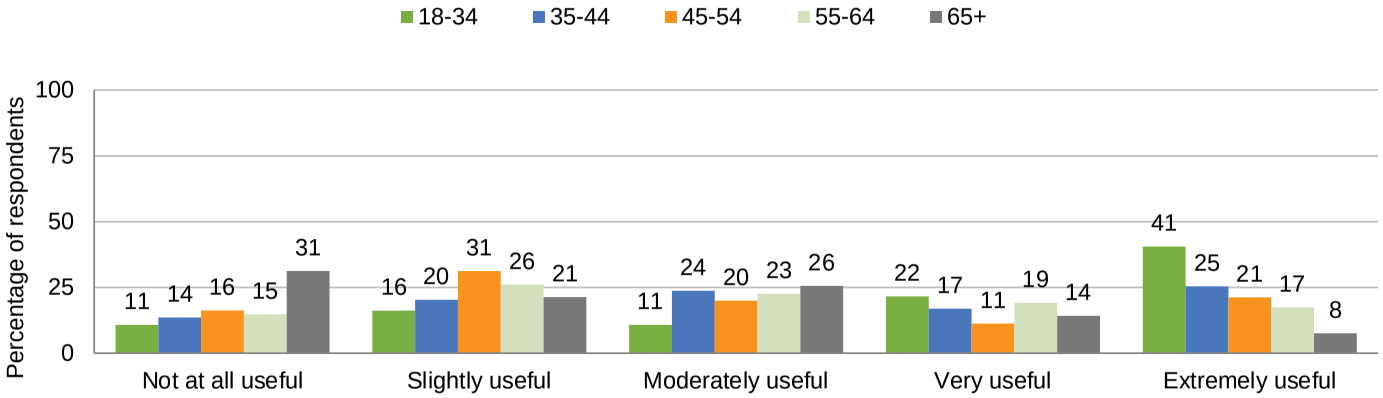
© E Source. **Base:** n = varies. **Question:** How useful would information on how your energy consumption compares to other households be to you?

Usefulness by AGE: Green energy options



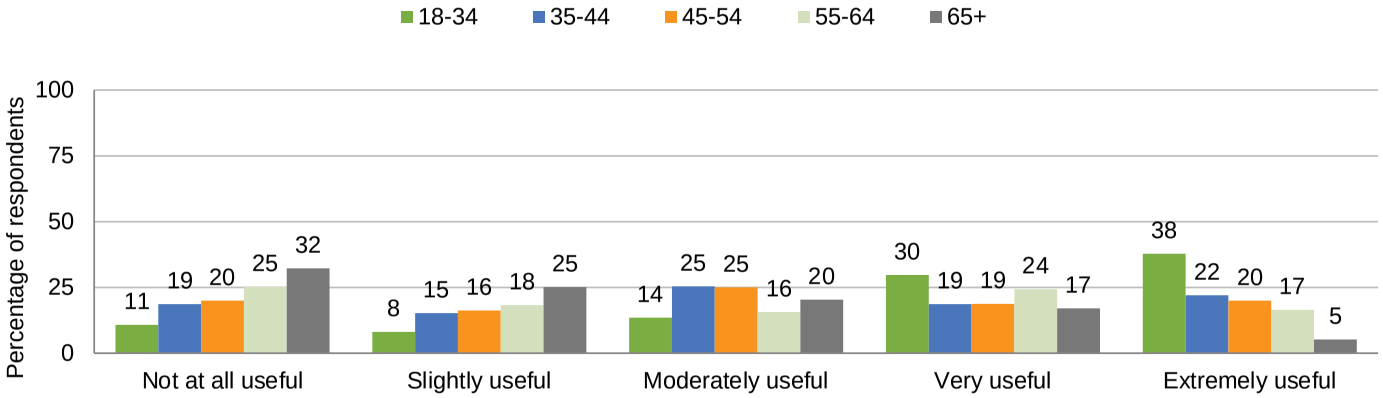
© E Source. **Base:** n = varies. **Question:** How useful would more options to purchase green power be to you?

Usefulness by AGE: Bill payment programs like choose your due date or prepay



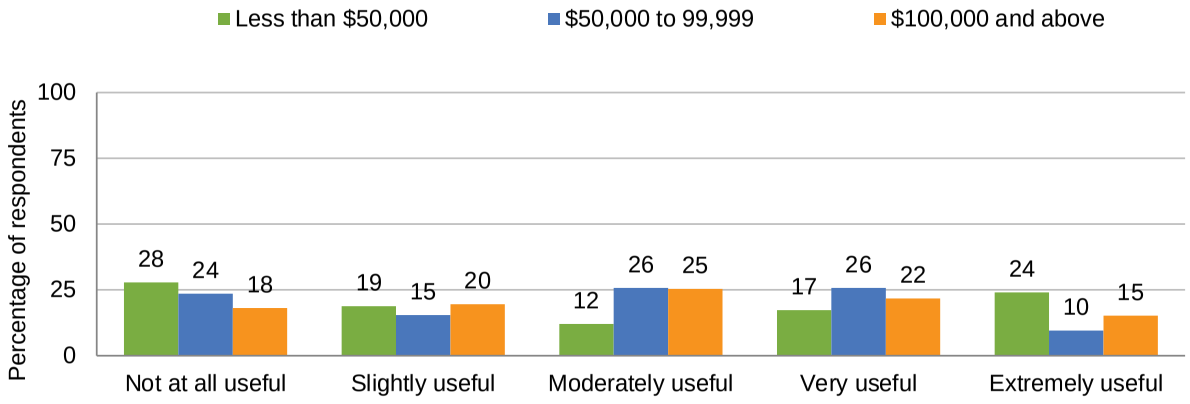
© E Source. **Base:** n = varies. **Question:** How useful would bill payment programs, like choose-your-own-due-date or pre-pay be to you?

Usefulness by AGE: Monitor and manage appliances on your smartphone



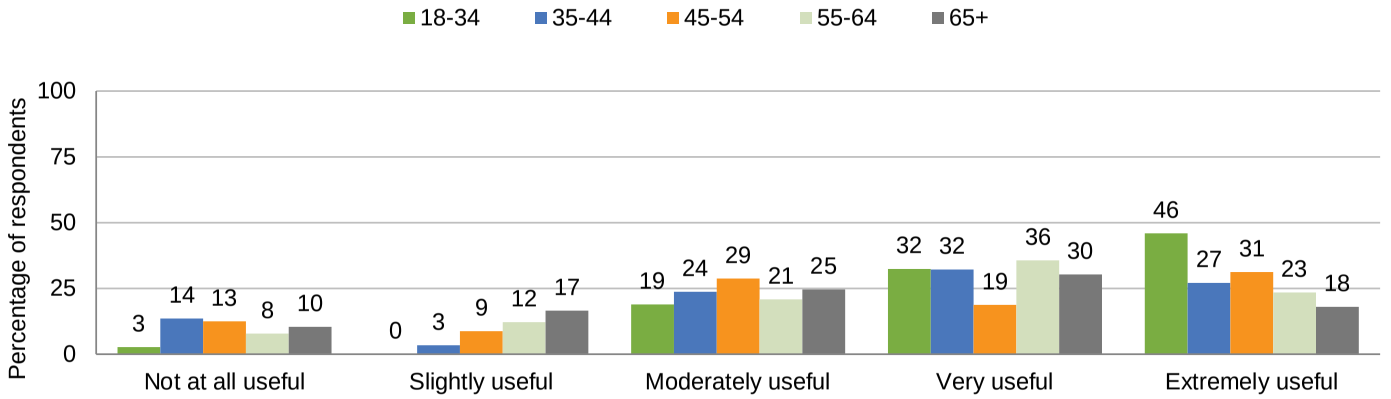
© E Source. **Base:** n = varies. **Question:** How useful would apps that would allow you to monitor and manage your appliances/devices remotely on your smartphone be to you?

Usefulness by INCOME: Monitor and manage appliances on your smartphone



© E Source. **Base:** n = varies. **Question:** How useful would apps that would allow you to monitor and manage your appliances/devices remotely on your smartphone be to you?

Usefulness by AGE: Expansion of EE and conservation programs



© E Source. **Base:** n = varies. **Question:** How useful would expansion of energy efficiency or energy conservation programs be to you?

Thank you.

For more information about the study or focus groups

Melanie Wemple

Senior Managing Director, Management Consulting

E Source

303.345.9149

Melanie_wemple@esource.com

Brought to you by DeFG
Customer Insights & Advisory Firm

Why Every Utility Should Be Offering Prepay Energy

Landis + Gyr 2022 Exchange Conference
Orlando, FL

Presentation by Jamie Wimberly
May 18th, 2022

About DEFG

DEFG is a research and advisory firm with a core expertise in customer strategy, experience and operations in the utility sector. We serve many of the largest utilities in North America and provide support on all aspects of our clients' relationships with their customers.

Founded in 2003, DEFG is widely recognized for its progressive vision on customer experience and thought leadership to ensure that service to low-income and vulnerable customers continues to improve.

Our areas of expertise include:

- Customer Strategy, Operations and Experience
- Payment Strategy and Customer Solutions
- Operational Support and Strategy
- Low Income
- Clean Energy

Why Prepay, Why Now?

The utility sector faces a growing debt crisis.
Prepay has proven to be an extremely effective tool to help customers stay current on their bills, save money by saving energy, pay down any debt *and remain highly satisfied.*
For this reason, we expect 2022 to be a banner year for expanding existing prepay programs and implementing new ones.
And by the way, consumer interest in prepay energy, regardless of income, is at an all-time high. Younger customers in particular love prepay energy.

Prepay Energy Working Group Overview

In 2022, DEFG's Prepay Energy Working Group (PEWG) will mark its 13th year as the industry's leading forum for the exploration of prepaid energy service offerings and other enhanced transactions enabled by smart grid.

The PEWG continues to grow because its members value the extensive and actionable research agenda and the record of accomplishments.

- Participants include energy utilities and suppliers, metering and software vendors, and other public stakeholders. Together they cover a broad spectrum of perspectives and experiences
- The PEWG conducts research across *7 tracks*:
  1. **Regulatory Issues**
  2. **Consumer / Market Research**
  3. **Energy Conservation Impact Assessment**
  4. **Business / Operational Applications**
  5. **PEWG Creative and Communications**
  6. **Enhanced Transaction Research**
  7. **Payment Arrangements and Customer Arrearages**

- Prepaid energy service is a catalyst for a discussion about the need for innovative and “smart” consumer offerings and the need to bring the rulebook into the 21st century

Current PEWG Member Roster

PNM Exhibit JAR-5
Page 5 of 24

What is Prepay Energy?

Prepay energy is a voluntary bill pay option for consumers to pay ahead for energy consumption in the future. Some consumers appreciate the convenience and flexibility of the option. Others appreciate an alternative to security deposits or payment arrangements.

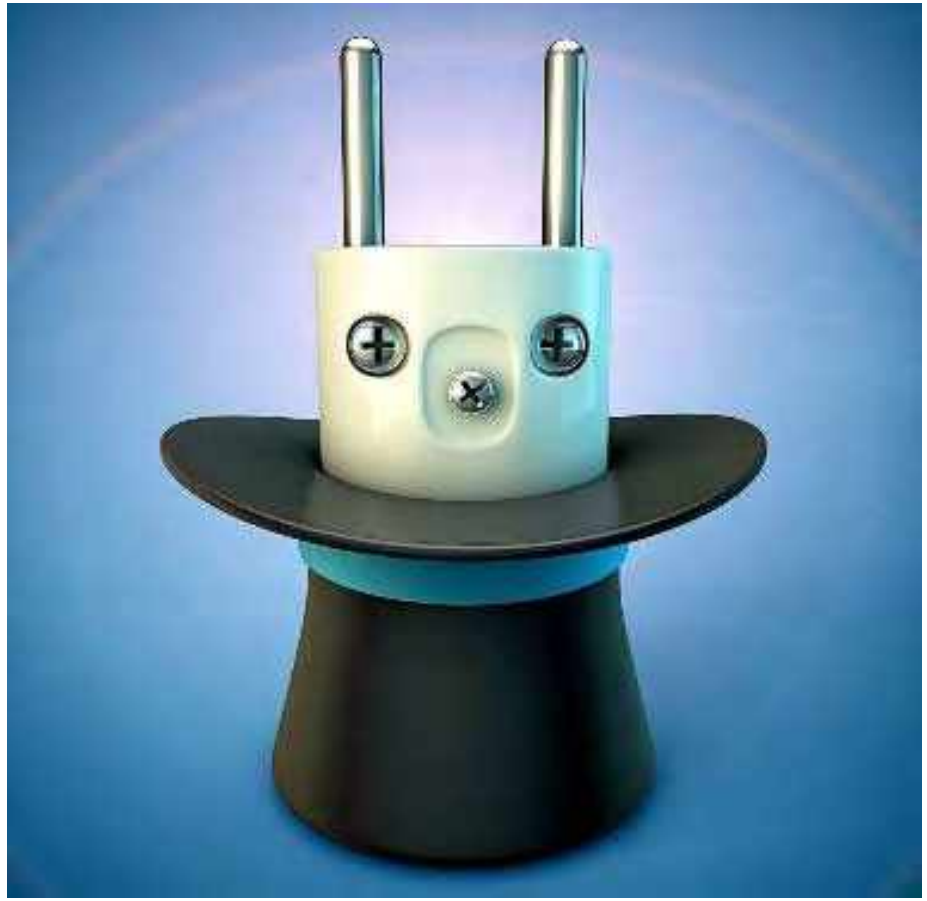
Once consumers begin using prepay energy, they tend to drop their energy consumption significantly.

The Magic Wand

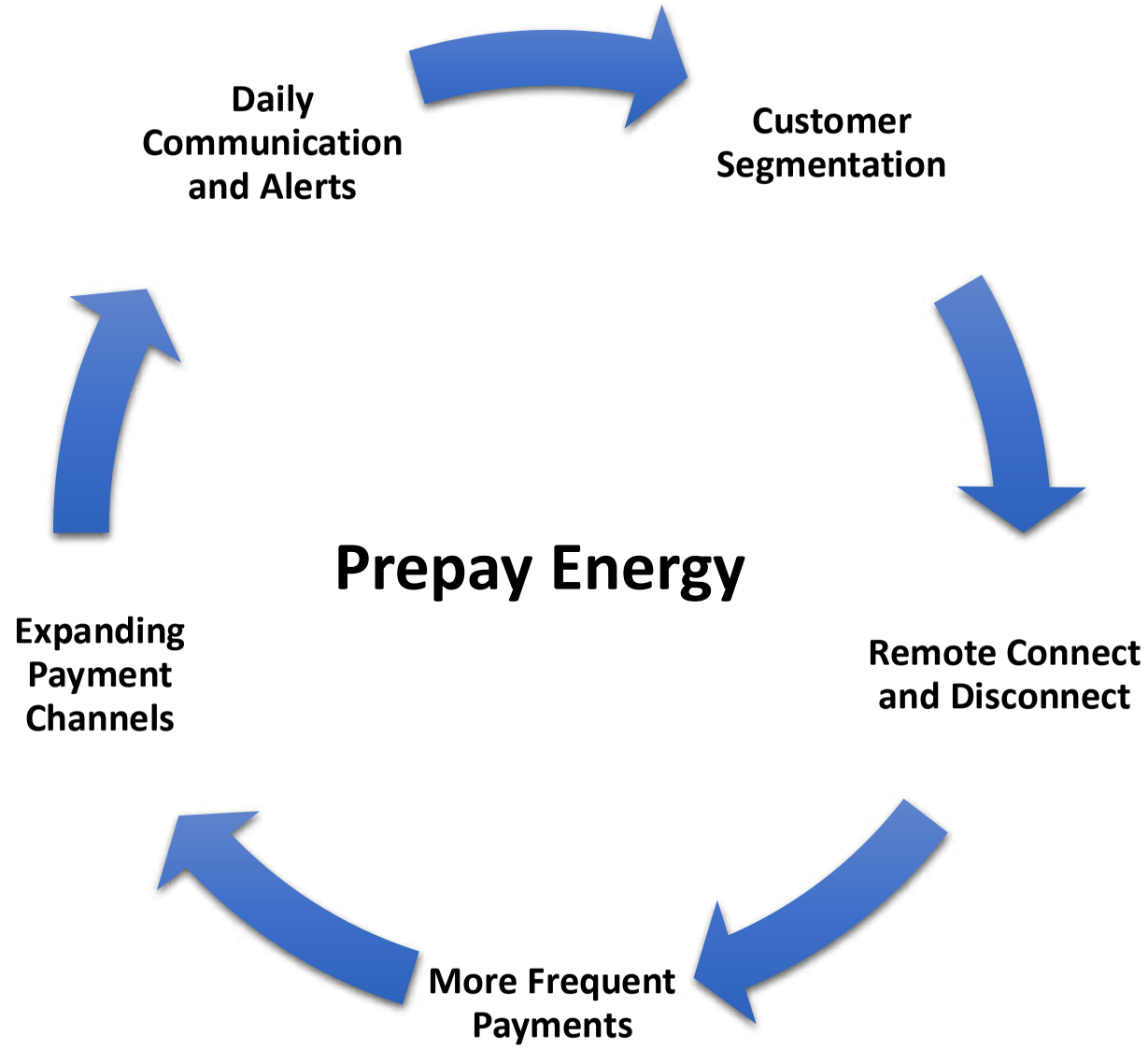
What if we could wave a magic wand that would allow utilities to:

1) Hit all the mandated DSM targets for the year, reducing energy consumption by 7 – 12%
2) Raise customer sat by 10 points or more (translating to a bump in ROE according to JD Powers)
3) Dramatically reduce customer costs, and perhaps eliminate bad debt

The magic is here … with prepay energy!



Data Driving Prepay Energy



Example: Duke Energy Report

Findings from progress report (Docket No. 2015-136-E) to the Public Service. Commission of South Carolina, "Duke Energy Carolinas Prepaid Advantage Pilot Learnings Report."

- **80%** The % reporting *a positive effect on overall satisfaction with Duke Energy*.
- **8.5%** The estimated *percentage of energy savings*.
- **50%** The % giving the program a *perfect 10 customer satisfaction score*.
- **59%** The % of participants who *believe they used less energy*.
- **78%** The % *customers have paid off their deferred balance* while participating in the program.
- **82%** The *total amount a deferred balance paid off* while on the program.
- **0.6** The *average number of disconnections per customer* while on the program.
- Coastal Conservation League (CCL) and the Southern Alliance for Clean Energy (SACE) "believed that this type of customer program *has the ability to operate as an energy efficiency program, and supports this type of prepay program being EE given research shows the potential for significant energy savings*…"

Baltimore Gas & Electric
Summary of Program Results

Total Addressable Market
47% of customers income >4X poverty level and only 44% had arrearages before entering program

Customer Satisfaction
96% of currently enrolled customers somewhat or very satisfied with the program.

Energy Efficiency
Customers reduced their energy usage by 2.6% to 4%, based on use of gas or electric heat.

Customer Savings
Customers saved between $106 and $120 based on use of gas or electric heat.

Control
78% of currently enrolled customers report improved control.

Debt Management
78% reported program helped them pay off arrearages; average balances declined $159 to $196 based on use of gas or electric heat

Service Disconnection
68% of customers with arrearages report the program helped them avoid or reduce the length of disconnection

Payment Arrangements
Customers entering into payment arrangements declined from 24% the year before the program to 3% after joining

Prepay Account Projections for USA

+347,000

- Currently, there are 347,077 customers on a voluntary prepay offering accounted for in the PEWG database

+200,000

- An estimated 150,000 to 250,000 customers use prepay electric services in the competitive retail electric market in Texas

+50,000

- An estimated 50,000 more may be served by electric cooperatives or municipal utilities throughout the US (not in database)

+100,000

- Continued movement from pilot to full scale implementation with readily achievable 5% penetration, increasing penetration as marketing techniques improve, growth in competitive markets

---

= ~700,000 total within 5 years

Who Is Adopting Prepay Energy?

Prepay energy requires a segmented view of the utility customer base.
As such, prepay is not for everyone.

The customer segments that are most likely to enroll in prepay energy are:

1) **Wealthy customers** using prepay to manage remote assets, e.g., rental property, or people, e.g., kids at school

2) **Millennials** looking for a payment option that allows for "pay as you go" and is aligned with mobile payments

3) **Credit-challenged customers** who adopt prepay energy as an alternative to cash security deposits

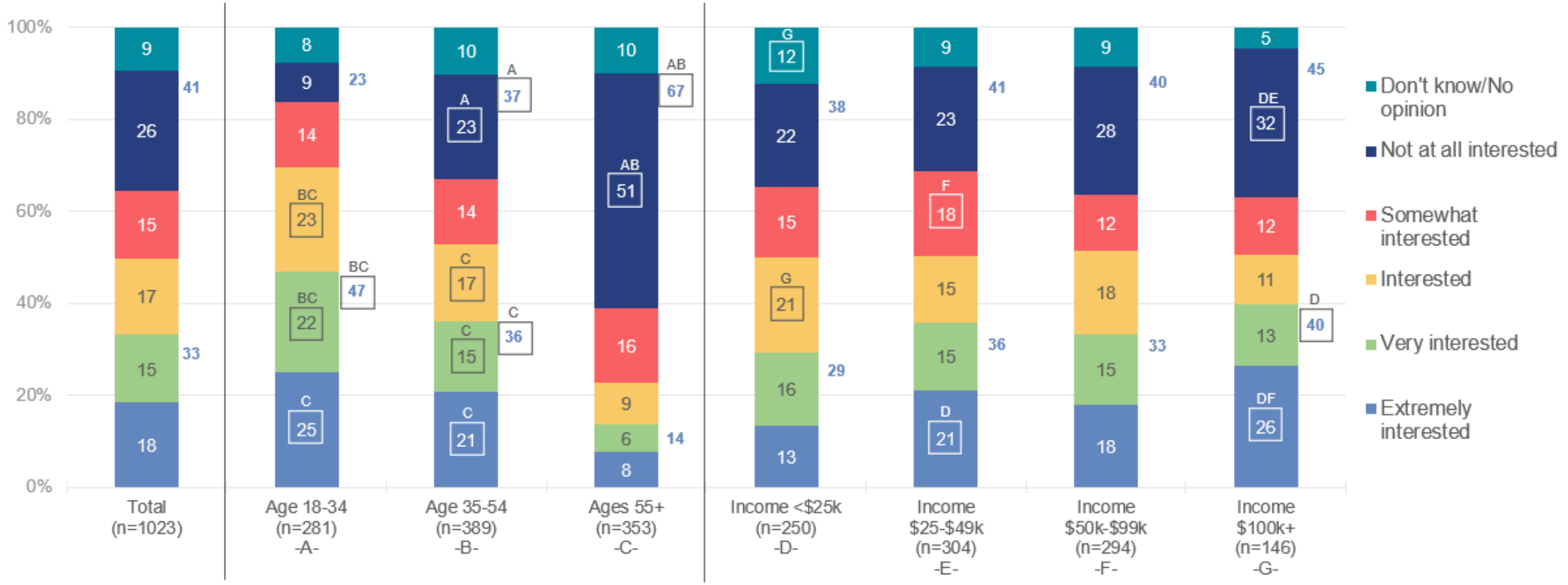
4) **Immigrants** who have come from unbanked or underbanked countries who are very used to prepay

5) **Customers with debt** who are looking for an alternative to allow for a small portion of payments to go towards debt while keeping the lights on

Why Are Customers Adopting Prepay?

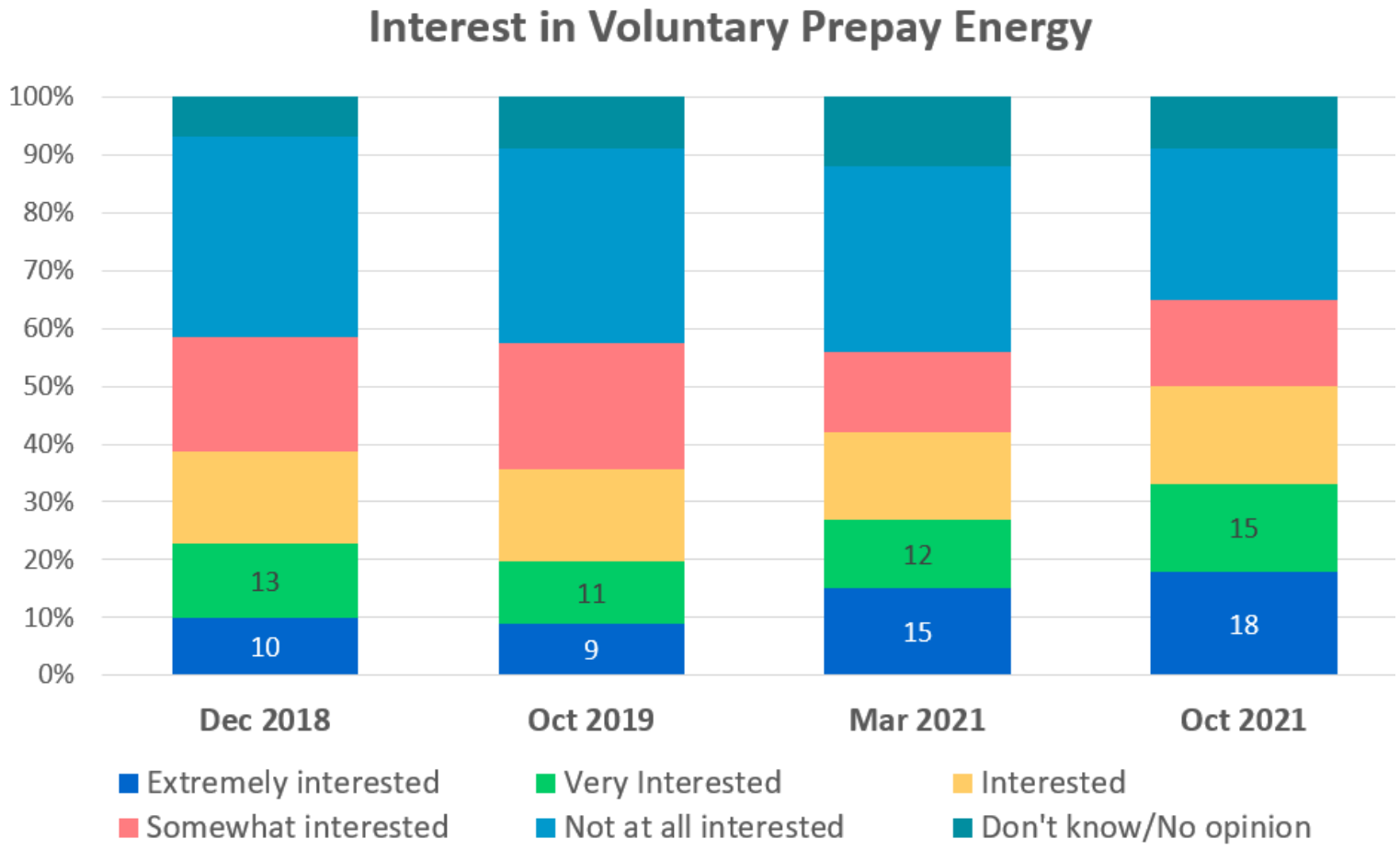
In addition to specific needs and applications aligned with segments, **convenience** and **control** are major customer drivers.

Customer Interest in Prepay Energy at All-Time High



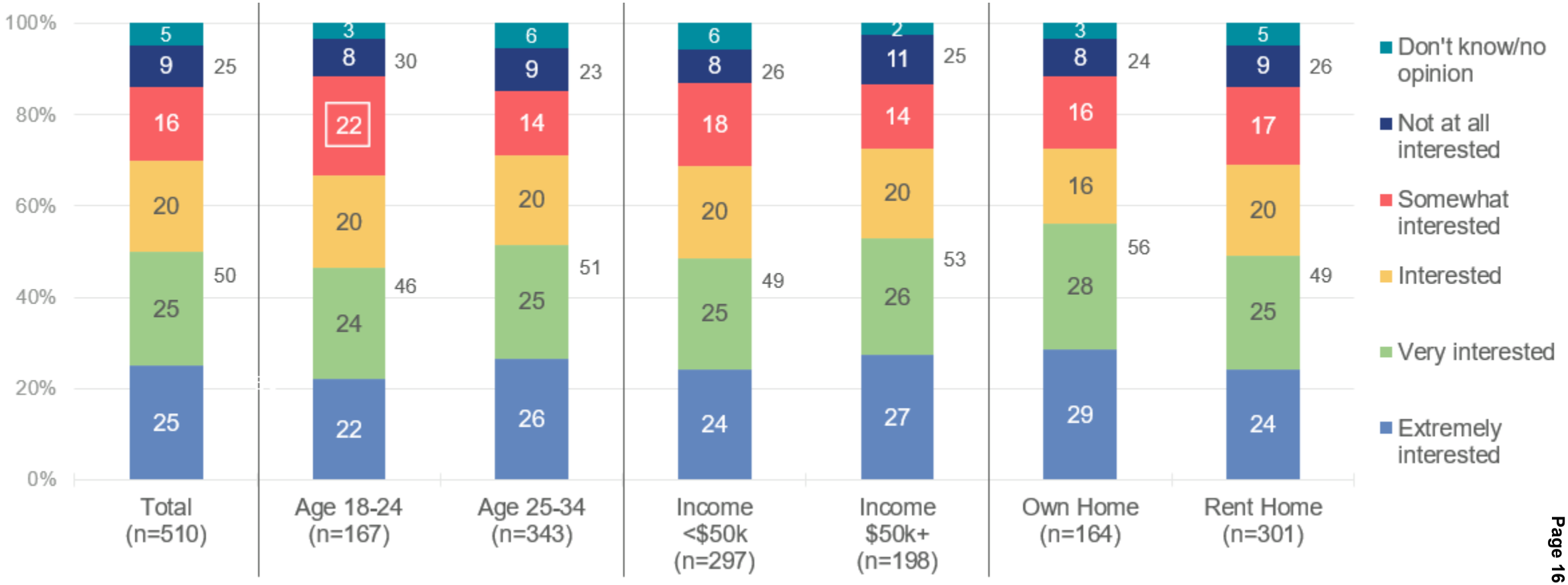
Base: Total Respondents. Q.9. A growing number of local utilities (electric and gas) or service providers are offering voluntary prepaid energy service to consumers. Under this option, you would choose to pay upfront anytime you wanted before you used the energy rather than paying your bill at the end of the month after you used the service. Reasons for possibly using prepaid energy would include to help manage your utility bill or avoiding unexpected high bills. You would always be able to check the balance remaining in your prepaid account. If your local utility or provider were to offer a voluntary prepaid option for consumers, how interested would you be?

Upward Trend Lines of Customer Interest in Prepay



A growing number of local utilities (electric and gas) or service providers are offering voluntary prepaid energy service to consumers. Under this option, you would choose to pay upfront anytime you wanted before you used the energy rather than paying your bill at the end of the month after you used the service. Reasons for possibly using prepaid energy would include to help manage your utility bill or avoiding unexpected high bills. You would always be able to check the balance remaining in your prepaid account. If your local utility or provider were to offer a voluntary prepaid option for consumers, how interested would you be?

Half of People Ages 18 to 34 Are Very or Extremely Interest in Voluntary Prepaid Energy Service



Base: Total Respondents. F6. A growing number of local electric utilities or service providers are offering voluntary prepaid energy service to consumers. Under this option, you would choose to pay upfront anytime you wanted before you used the energy rather than paying your bill at the end of the month after you used the service. Reasons for possibly using prepaid energy would include to help manage your utility bill or managing property that you may own or understanding roommate electric usage. You would always be able to check the balance remaining in your prepaid account. If your local utility or provider were to offer a voluntary prepaid option for consumers, how interested would you be?

Takeaways: Customer Interest in Prepay Energy at All-Time High

- Over 40 percent of Americans have used some type of prepay option and are very satisfied.
- Customer interest in a voluntary prepay energy option offered by their local utility is at all-time high. 50 percent of respondents indicated some level of interest, with 18 percent being extremely interested and 15 percent being very interested. The addressable prepay market is now at 33 percent.
- Customer interest in prepay energy jumped up by 25 percent from our last annual survey.
- There is even greater customer interest in prepay energy aligned with the prepay segments. Almost half of younger Americans (18 – 34) were either extremely or very interested.
- Customers are seeking alternatives to traditional payment arrangements.
- Connected to prepay energy, customer interest has also increased sharply for other payment channels and features, such as bar code, pay-by-day, and text-to-pay.

Saving Energy = Saving Money

- Prepay seems to create a greater level of awareness of cost and usage
- Certain action were taken by a high percentage to manage energy
- Customers choose prepay for budget management, control, and convenience
- Customers want information that relates to their household
- Customers prefer a mix of communication channels
- Customers prefer a mix of payment channels
- There were high levels of customer satisfaction across all income levels

What drives new behaviors?

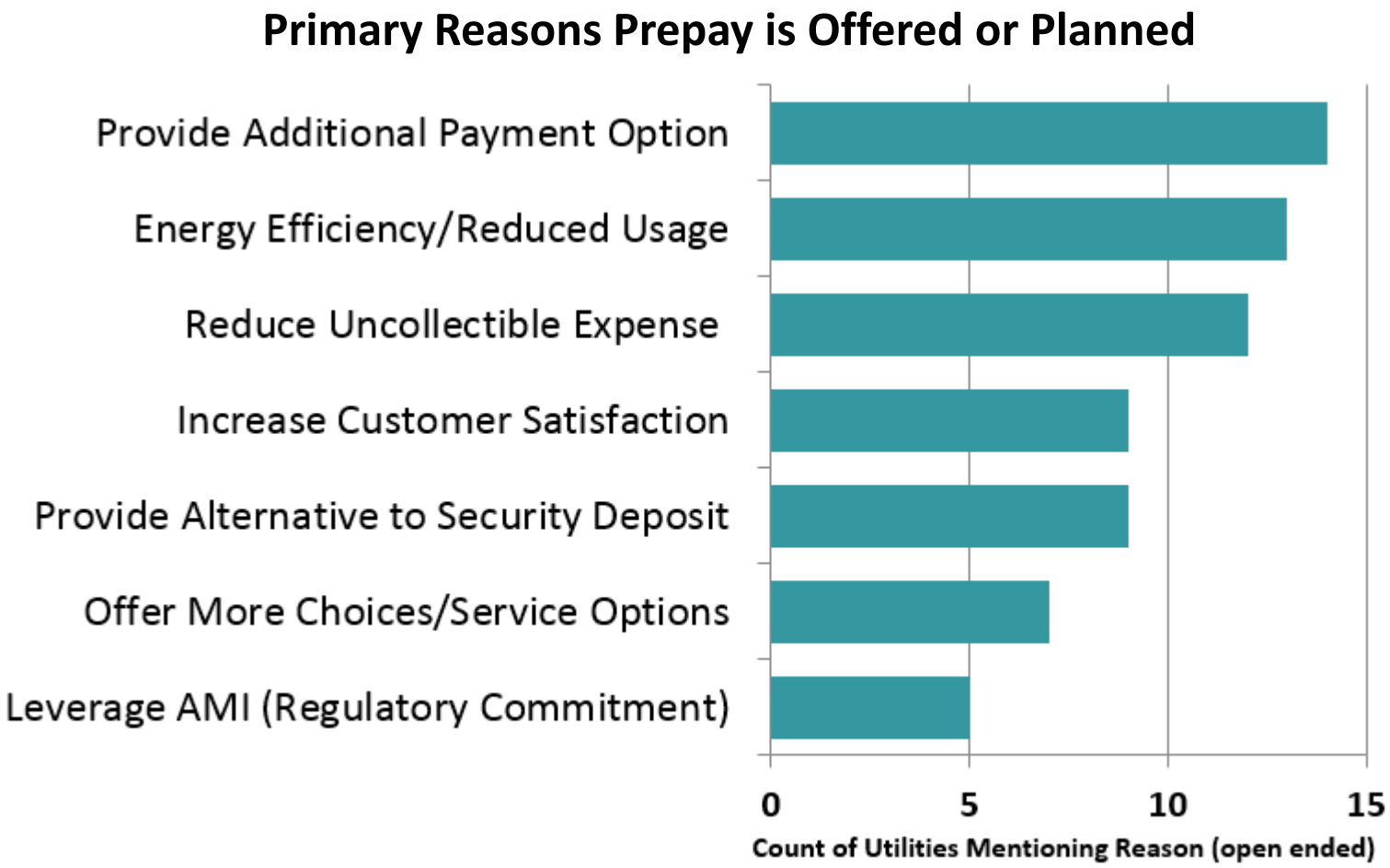
Prepay Drives Significant Energy Savings

Utility, Location	Report Year (Data Year)	Saving or Range	Authors / Source	Quality
Salt River Project, Arizona	2010 (2003-2006)	12%	EPRI	Limited
Oklahoma Electric Cooperative, Oklahoma	2013	10.4%	Michael Ozog, Integral Economics (DEFG)	Acceptable
Kentucky Association of Electric Cooperatives, Kentucky	2014	11.1%	Martin, W. M. (Masters Thesis)	Acceptable
Glacier Electric Cooperative, Montana; Peninsula Light Cooperative, Washington	2014	14%; 5.5%	Michael Ozog, Integral Economics (Northwest Energy Efficiency Alliance & DEFG)	Acceptable or limited
Arizona Public Service, Arizona	2015	7.50%	Arizona Public Service (APS)	Acceptable
Salt River Project, Arizona	2016 (2008-2009)	12%	Qiu, Y, B. Xing, and Y. D. Wang	Acceptable
Eskom, Cape Town, South Africa	2016	13%	Jack, B. K., and G. Smith (National Bureau of Economic Research)	Acceptable
TVA utilities, Tennessee	2016	5.6%; 6.7%; 5%; 6.9%; 11.7%; 6.8%	DNV GL (TVA)	Limited
Duke Energy Carolinas, South Carolina	2017	8.6% (not stat. signif.)	Duke Energy Carolinas (SC PSC Docket No. 2015-136-E)	Acceptable
Direct Energy (competitive retailer), Texas	2018	9.6%	Eryilmaz, D., and S. Gafford (The Electricity Journal 31 (3): 7–11)	Acceptable

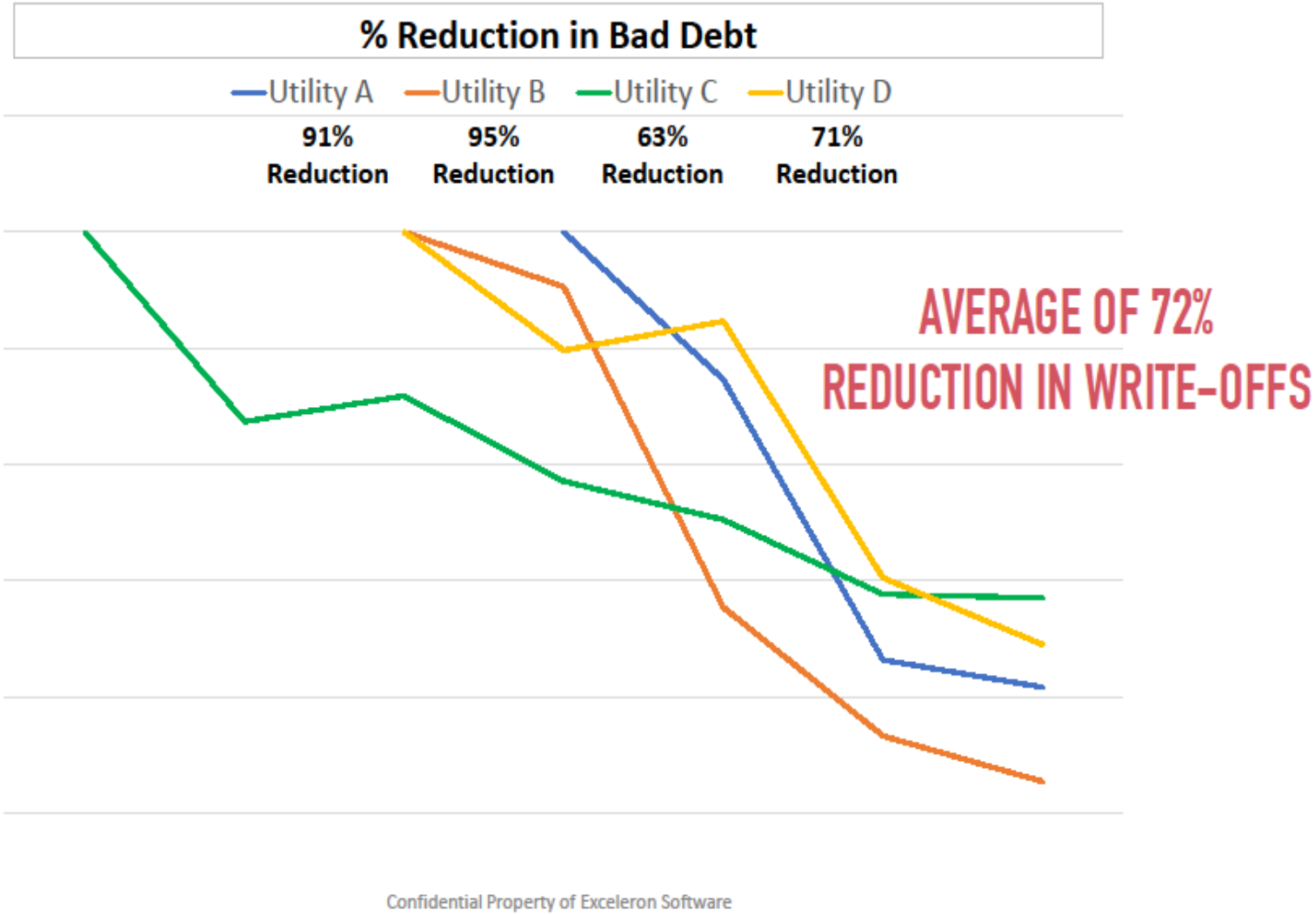
Source: Sussman, R., J. LeZaks, A. Drehobl, M. Kushler, A. Gilleo "Examining Potential for Prepay as an Energy Efficiency Program in Minnesota" Minnesota Department of Commerce, Division of Energy Resources, Conservation Applied Research and Development. Contract 137135. December 2018 Final Report. Prepared by American Council for an Energy-Efficient Economy and Seventhwave. (Adapted from Appendix E: Detailed Assessment of Evaluations)

Primary Reasons for Utility to Offer Prepay

Prepay addresses many business objectives (hybrid business case)

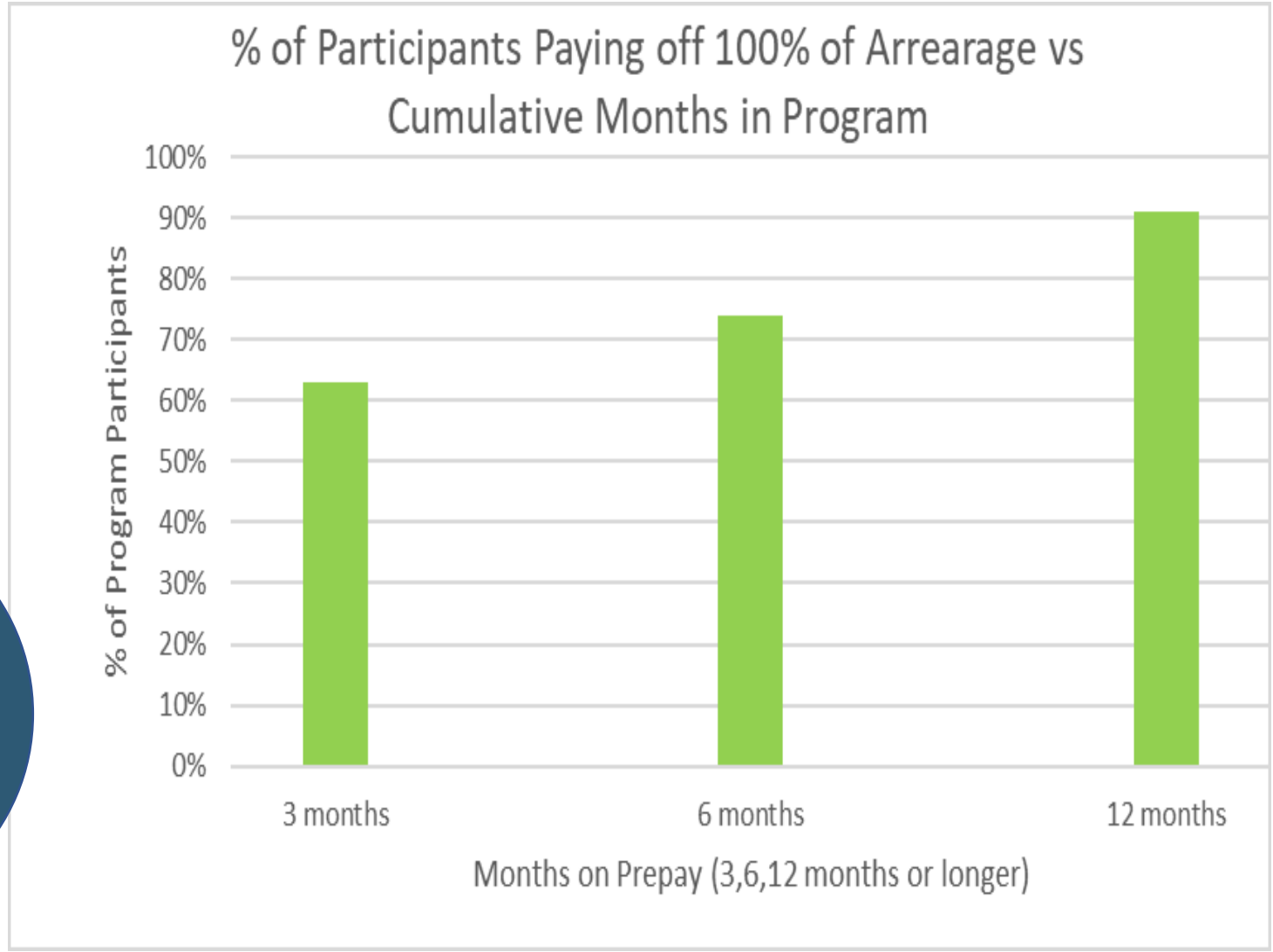


Prepay a Proven Solution to Reduce Write-Offs



Example from Exceleron, a prepay vendor

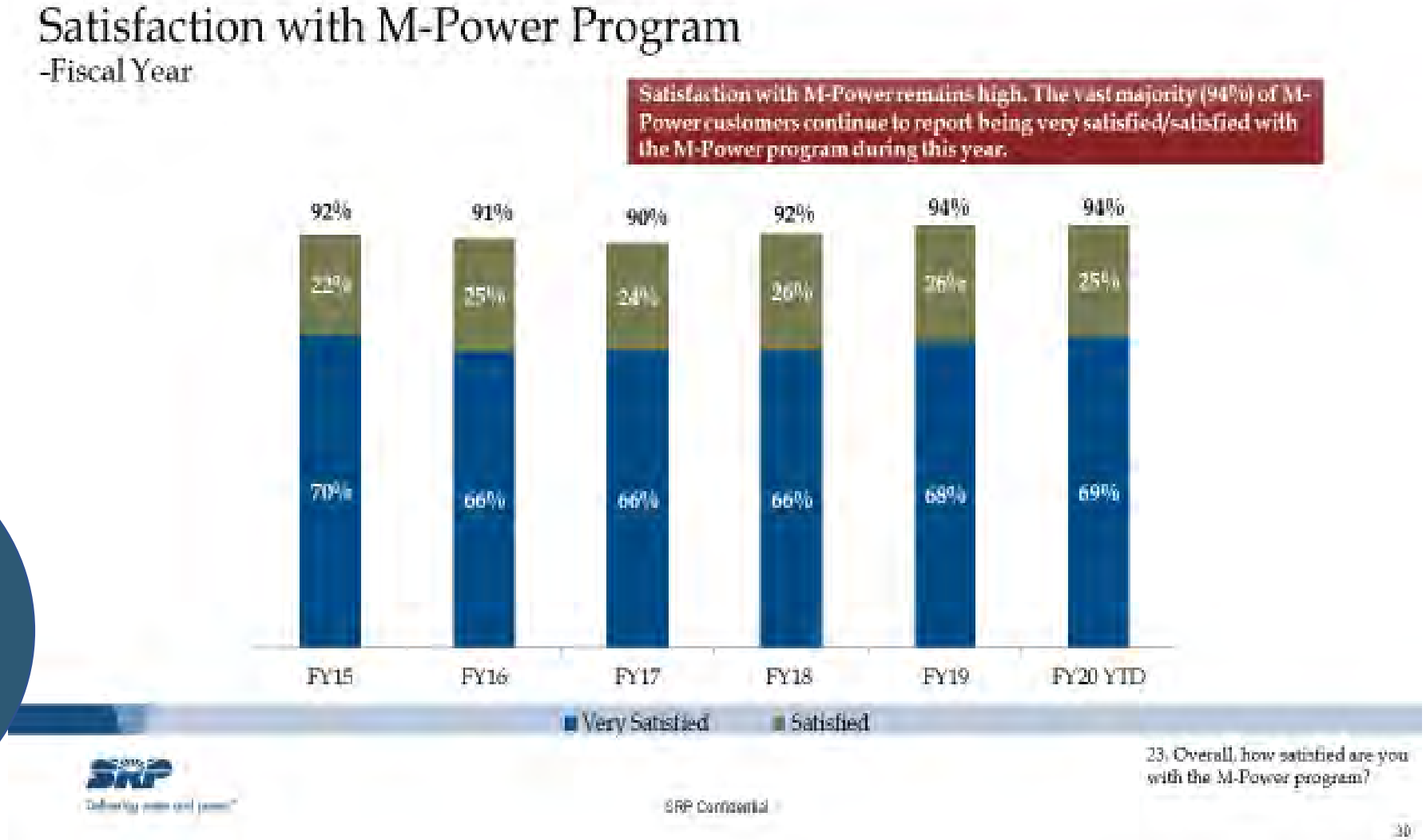
Prepay Leads to High Percent Paying Off Arrears



Example from PayGo, a prepay vendor

Even When Paying Down Debt, Prepay Customers Remain Highly Satisfied

Example from SRP



DEFG
Customer Insights & Advisory Firm

Contact:

Jamie Wimberly
CEO, DEFG
jwimberly@defgllc.com

GRID MODERNIZATION/AMI CUSTOMER EDUCATION AND COMMUNICATIONS PLAN

EXECUTIVE SUMMARY

PNM is pleased to provide this "Customer Education and Communication Plan" or "Communication Plan" in support of its Grid Modernization application which seeks approval for full-scale deployment of advanced metering infrastructure ("AMI" or "advanced meter" technology). PNM is focused on delivering a simplified customer experience, ensuring the benefits enabled by advanced meters are intuitive and the functionality easy to manage.

This Communication Plan presents a cost-effective, yet wide-reaching, customer education and communication plan for the advanced meter installation customer experience, including technology that will provide energy tools and information. It is a living document and subject to change, dependent upon New Mexico Public Regulation Commission ("NMPRC") approvals that will provide final decisions and clarity regarding specific details of AMI and grid modernization programs and initiatives for our New Mexico customers. This Communication Plan is also subject to change based on changes to meter installation schedules or timelines.

PNM plans to install approximately 580,000 advanced meters for its New Mexico electric customers over approximately three years.

STRATEGY & COMMUNICATION OBJECTIVES

Customer needs drive the PNM Grid Modernization Strategy. As such, the Communication Plan will reinforce the need for a modernized grid to advance customer goals for clean energy, greater control and convenience over usage, and state policy objectives to transition to a carbon-free energy grid. This customer needs-driven strategy will focus on:

Service enhancements

- Improve resilience and reliability of a larger renewable energy portfolio
- Improve service quality, better integrate customer-installed, distributed energy resources ("DER"), like rooftop solar
- Prepare for a rapidly growing number of electric vehicles

Customer empowerment

- Provide enhanced information about energy usage so that customers can make informed decisions about energy pricing, clean energy options, and electrification
- Provide more detailed usage data so that customers can better manage their energy bill

MESSAGE DEVELOPMENT AND MARKET RESEARCH

PNM has proactively gathered customer feedback throughout the grid modernization development process. PNM has conducted multiple market research studies to collect customer input and understand customers' relative knowledge of grid modernization and advanced metering. The findings guided PNM's development of a message framework using best practices from the industry and direct customer feedback. The message framework will be essential for successfully completing this plan and the overall transition to advanced meters. Market research lays the groundwork for message development, incorporating customer message testing, customer panels, focus groups, community meetings, and utility peer research.

PNM research studies to date include:

- PNM Advanced Meter Customer Sentiment Survey, 2019.
- PNM Grid Modernization Message Testing Survey & Report, October 2021.
- PNM Residential and Small Business Grid Modernization Insight Survey and Focus Groups, May 2022.

The objective of the research was to:

- Explore customers' current understanding of advanced meters.
- Understand the perceived benefits and drawbacks of advanced meters.
- Explore both positive and negative expectations consumers have about PNM moving customers to advanced meters.
- Explore reactions to different ways of describing advanced meters.
- Understand what barriers may arise and how to address them (pre or post-advanced meter installation).
- Understand how customers want to be communicated with about advanced meters (what they want to know, and how they want to receive the information).
- Identify any differences between younger (under age 45) and older customers (45+) on these topics.
- Identify any differences among household income levels and ethnicity.
- Business firmographics, including business size and industry.

Key findings indicate residential and business customers' perceptions and concerns about grid

modernization are generally aligned with each other.

- Households and businesses have low familiarity with the term 'grid modernization'.
- When defined, most customers believe it is 'very' or 'extremely' important that PNM modernize the grid.'
- The top benefits of grid modernization are preventing cyber-attacks, mitigating outages, and sustainable energy.
- Expansion of energy efficiency and conservation programs ranked highest among grid mod-enabled services.
- Two-thirds of residential and ¾ of nonresidential customers are concerned that grid modernization will increase their bills.
- About 5% of households and 11% of businesses are very concerned about electromagnetic sensitivity.

Understanding the Audience: While we will be raising awareness among all our PNM customers, AMI messages will ensure maximum effectiveness and tap into the benefits that customers care about the most.

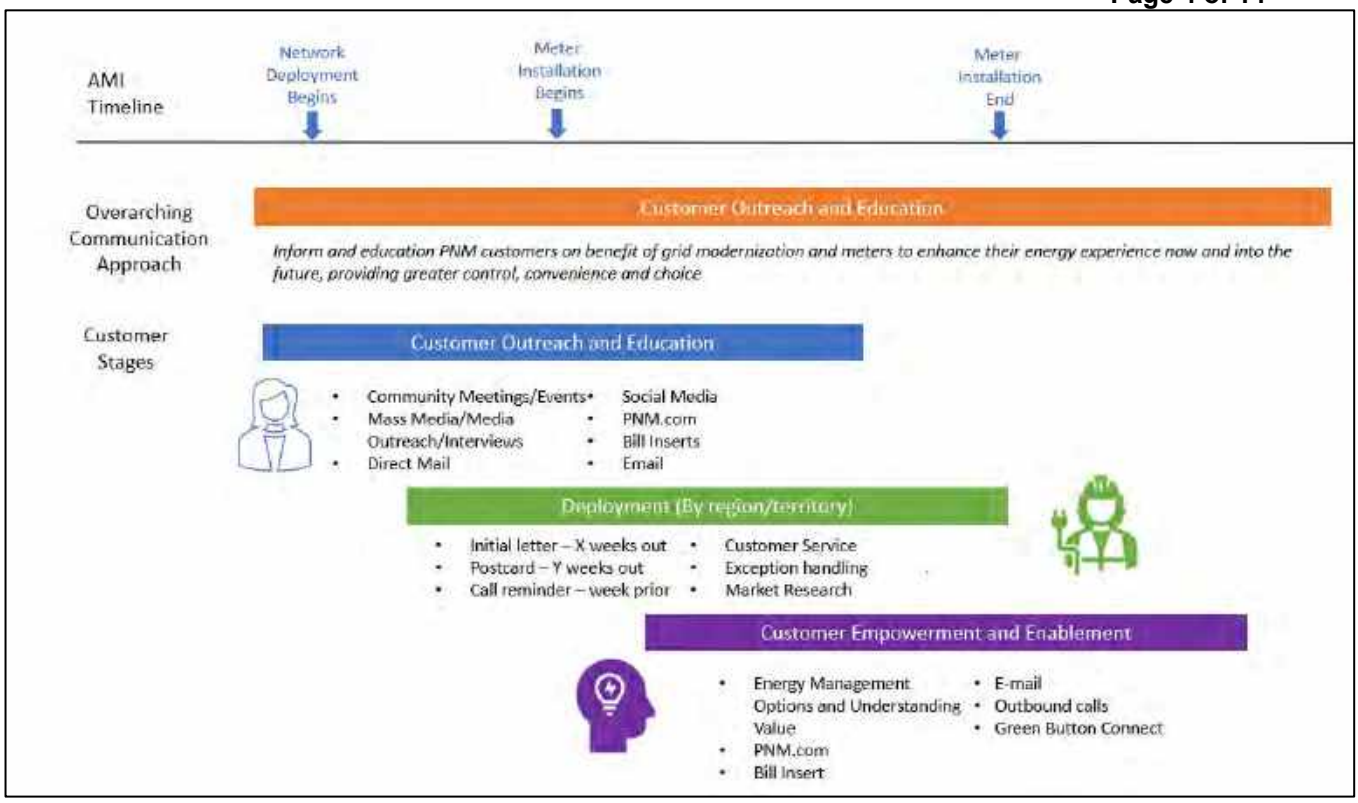
Language and Tone: Messages will be developed using simple, straightforward language and practical information that customers can easily understand and act upon that information. PNM will be working with advertising agencies to execute the customer communications and outreach plans.

Upon approval, future research/studies are planned to gain additional insights to help achieve the following objectives:

1. Monitor customers' awareness of advanced meters and overall engagement throughout all three phases.
2. Optimize communications throughout the customer engagement journey to prioritize customer transparency and help mitigate meter opt-outs.
3. Track customer satisfaction across all three engagement phases.
4. Identify customer attitudes and perspectives toward Time of Day ("TOD") pricing structures to assist with detailed design of future pricing plans and ensure maximum customer participation and benefits.
5. Gauge customer interest in potential new service offerings to inform future design and implementation.

CUSTOMER EDUCATION AND COMMUNICATION

As illustrated below, this phased approach will support the customer journey. It will include specific marketing strategies with defined messages, audiences, channels, and educational materials to generate customer awareness, increase customer acceptance of the technology and drive customer engagement. The materials will reach a diverse audience and be presented with customer-friendly messaging to allow for easily understandable text and images.



A key objective for all phases will be to maximize the number of customers accessing the benefits of the new advanced meters. However, customers may opt-out if they do not wish to receive these benefits. A customer may choose not to have a new advanced meter installed ("meter opt-out") or, when an advanced meter is installed, the customer may opt out of a future innovative rate/pricing plan ("rate opt-out"). Because new programs and rates will be introduced on a staggered basis after phased meter installation has occurred, most of the initial focus of this Communication Plan will be on limiting meter opt-outs. Limiting opt-outs will be the focus of the education gap year between meter deployment and new rates becoming effective.

Please note that new Time of Day Rates (“TOD”) and Time of Use rate plans will be included in PNM's general rate case.

Phase One - Awareness: An initial, wide-reaching effort to inform customers, employees, and community members about advanced meter rollouts and the overall benefits of grid modernization efforts.

Objectives during this phase include:

- Creating customer and stakeholder awareness about the overall benefits of the modernized grid.
- Explaining why the utility is making this investment, focusing on customer benefits.
- Engaging public officials, reporters, and others who can support the implementation process.
- Engaging opinion leaders and authoritative advocates.
- Measuring consumer awareness, understanding, and interest in having an advanced meter and access to associated benefits.
- Educating PNM employees with customer or stakeholder relationships, so they can fully and effectively discuss the benefits and specifics of the grid modernization initiative.

Phase Two - Deployment: Targeted customer outreach by installation community and/or geographic areas. Communications in this phase focus on the actual meter installation.

Objectives during this phase include:

- Educating PNM customers about new meter deployment, ensuring that customers understand the installation process.
- Conducting outreach and notifications about installation to affected customers on a rolling basis throughout the phased rollout.
- Providing communications that minimize confusion by anticipating and answering questions before customers ask them.
- Educating customers on the opt-out process and clearly outlining instructions and any associated costs.
- Measuring consumer awareness, understanding, interest, and participation in new customer programs associated with their advanced meters.

Phase Three - Customer Empowerment and Enablement: Targeted follow-up communication to customers who have had an advanced meter installed to ensure satisfaction with the process and to inform them about how to take advantage of advanced meter features.

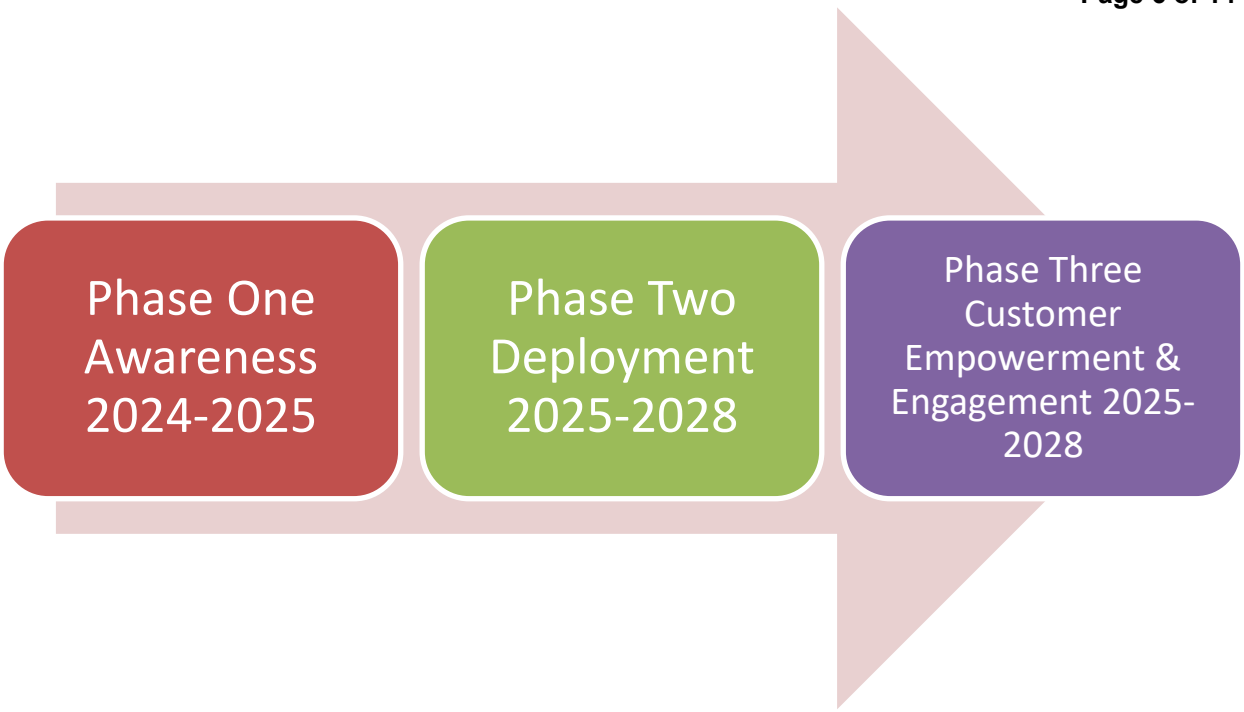
Objectives during this phase include:

- Educating customers about the Customer Energy Management Platform, which will allow customers to receive real-time energy demand consumption from the advanced meter, once enrolled on a device, such as a laptop, tablet, or mobile device.
- Educating and engaging customers with advanced meters installed about online tools and resources.
- Encouraging customers to view their energy use information online.
- Providing follow-up communications to customers about specific ways to use this information to manage their energy use.
- Continuing education to those who have not enrolled in the Customer Energy Management Platform about its benefits, which allows customers to receive their real-time energy demand consumption from their advanced meter.
- Making it easy for customers to select energy management tools and energy efficiency and conservation offerings available based on their personal preferences.
- Measuring consumer awareness, understanding, interest, participation, and satisfaction with advanced meters and associated features.

METER INSTALLATION & COMMUNICATIONS TIMELINE

The Communication Plan's first awareness campaigns are expected to launch before meter deployment, scheduled to begin in the second quarter of 2025, followed later in the year by communications to prepare customers for meter installations that will run throughout 2025-2028. The technology is expected to be ready in the fourth quarter of 2024 and tested by the time it launches in PNM's service territory in 2025.

The high-level customer communications timeline:



COMMUNICATION CHANNELS AND TACTICS

Consistent with the lessons learned from numerous utilities that have managed advanced meter deployments and grid modernization investments, the following are proposed communication channels and tactics focused on effectively reaching our target audiences.

Phase One – Awareness

Customer Opt-Out in Phase One

The goals for managing opt-out will vary based on the engagement phase. In Phase One: AMI Awareness, the aim will be to inform customers of program benefits and privacy information to minimize meter opt-out rates via direct mail, email, the PNM website, community meetings, advocacy groups, social media, paid media, and customer service support.

Customers will be able to opt out of AMI at any time. The opt-out process can occur through Customer Service support and/or neighborhood installers/representatives. If a customer calls the Customer Contact Center, the Customer Service Representative will ask to understand the reason for opting out and provide additional information as appropriate. The Customer Contact Center will communicate to the customer that future monthly reading fees will be charged, as well as a one-time opt-out charge, the amount of which is dependent on whether or not the AMI meter has been installed. PNM will send the customer the appropriate forms to officially confirm that they do not wish to participate in receiving an AMI meter, thereby foregoing future AMI benefits.

Phase Two – Deployment

Approach: Ninety-Sixty-Thirty Day Communications Plan

PNM will leverage the numerous mass market communication and education strategies utilized during Phase One: AMI Awareness as a foundation for focusing the message throughout Phase Two: Deployment. Targeted customer communications will be rolled out ninety, sixty, and thirty days before installation of the advanced meter and will be timed to PNM's meter installation schedule.

The Ninety-Sixty-Thirty Day Communications Plan is summarized below.

Ninety-Sixty-Thirty Day Communication Plan

90 days before deployment	60 days before deployment	30 days before deployment
Key Stakeholder Community Engagement	Customer Awareness	Direct Customer Outreach
• Enable AMI web presence • Jurisdictions/Account managers continue meeting with elected officials and local stakeholders • Fact sheets outlining key messages distributed to call centers and other customer-facing employees • Small business customer engagement • Community meetings • Targeted low-income, elderly, non-English speaking, and medical hardship customer outreach • Mass market outreach such as billboards, out-of-home advertising	• Customer mailings – Introductory Welcome Letter • Proactively contact local media and provide information along with town meetings • Radio, print, email, and online banner ads • Government Affairs continues meeting with elected officials and local stakeholders • Grid Mod Customer Micro-site based with strategic deployment Instructional videos	• Customer mailings and emails • Welcome brochure with a preview of new tools and options • Electronic calls to remind customers of upcoming meter installations • Doorknob hanger upon installation • Respond to media inquiries • Monitor paid and social media
Dates will adjust with meter deployment rollout		
Ad-hoc meetings and activities will be added as time and need permits for each deployment area		

Ninety Days Prior to Deployment

As regions are scheduled for AMI meter installation, PNM will build upon the ongoing education of, and engagement with, elected officials and community leaders from Phase One to begin direct and targeted education. Ninety days before deployment, PNM will enhance its community outreach by hosting town hall meetings, and PNM employees will increase their presence at local events. This type of outreach may include:

- Orchestrating meet-and-learn events at local venues with customers, local government officials, press, and external stakeholders. Events will take place at various times (*e.g.,* daytime, evening, weekday, weekend) to accommodate varied customer schedules.
- Developing targeted presentations focused on customer benefits.
- Providing customers with a "hands-on" experience with the new Customer Energy Management Platform and learning how to utilize it.

Audience	Messaging	Channels	Materials
• **Customers** • **Elected Officials** • **Community Leaders**	• Intro to Advanced Meters • Customer Benefits	• Website • Out-of-Home Ads • Social Media • Online/Print Ads • PNM.com	• Education Campaign • "Hands On" Experience • Instructional Videos

Additional Channels

Within this ninety-day engagement period, the PNM will continue to modify the web presence to include a timeline for the rollout of information for impacted areas. The website will provide contact information (such as toll-free phone numbers and email addresses) for subject matter experts ("SMEs") and representatives who can assist in answering customer questions.

PNM will launch a series of messages that provide customers with more specific information about the advanced meter rollout in their area. As part of this effort, PNM will begin deploying home and business advertising, email, and social media content.

Sixty Days Prior to Deployment

With proactive outreach, PNM will build customer awareness of advanced meter deployment through direct mail letters and emails with detailed information about the technology, benefits, and deployment process/timeline, with a call to action to drive customers to the PNM website approximately sixty days before deployment. In addition, PNM will clarify in these communications what PNM will be responsible for in the new meter replacement (*e.g.,* meter, wire to the point of attachment) and what conditions could prevent meter installation. Customers will be responsible for the same components they are currently responsible for (*e.g.,* meter box, meter channel, after-meter channel, cable).

Bill inserts, social media posts, and digital ads will also be activated with updates, timelines, and deep links to more detailed information on the web, as shown in the table below.

Audience	Messaging	Channels	Materials
• **Deployment Area**	• Deployment Process/Timeline	• Email	• FAQs

	• Customer Benefits	• Direct Mail/Bill Inserts • Community Meetings • Social Media • Digital Ads • Press Release • PNM.com	• Getting Started Guide • Welcome Brochure • Experience • Fact Sheet • Instructional Videos • Introduction Letters

These channels will be supplemented with print advertising and broadcast media to continue providing information and increasing program awareness. The goal is to reach as many customers and participants as possible so that knowledge of advanced meter deployment becomes commonplace among neighbors and friends. There will also be continued engagement with local stakeholders.

Outreach for commercial and industrial customers will primarily occur through account managers and leverage preferred communication channels. These communication channels will include direct conversations, the PNM business website, bill inserts, and emails, as illustrated in the table below.

C&I Outreach at Sixty Days

Audience	Messaging	Channels	Materials
• **C&I Customers**	• Deployment Process • Benefits	• Account Managers • Website • Bill Inserts • In-Person Training	• FAQs • Welcome Brochure • "Hands On" Experience • Instructional Videos

Thirty Days Prior to Deployment

Within thirty days of deployment, community leaders will be briefed on deployment status and provided with updated FAQs so that they have the most up-to-date information to prepare them for constituent questions and support the deployment. Ongoing communication will continue with customers to further reinforce both transparency of the process and customer awareness of AMI benefits. As PNM approaches deployment in regional areas, customers will receive collateral such as a welcome brochure, FAQs, data use and safeguard statements,[1] emails, and postcards. The messaging will build upon education and proactive outreach to emphasize AMI benefits and opportunities to give customers more insights and control over their usage.

PNM will provide press releases, respond to media inquiries, post reminders to social media, and proactively monitor and respond to social media comments.

Stakeholder and Customer Outreach at 30 Days

[1] PNM will adopt the U.S. Department of Energy's DataGuard Energy Data Price Program to address customer confidentiality and privacy concerns regarding AMI. *See* www.smartgrid.gov/data_guard.html.

Audience	Messaging	Channels	Materials
• **Community Leaders** • **Customers**	• Deployment Process • Benefits	• Website • Email • Social Media • Direct Mail • Mobile	• FAQs • Welcome Brochure • Data Use and Safeguard Statements • Welcome Brochure • "Hands On" Experience • Press Releases • Instructional Videos

Additional outreach targeting specific customers, such as the elderly, will be included in local newspapers and direct mail pieces. These channels will highlight ways and locations where at-risk customers can ask questions and receive answers about how the advanced meter deployment will directly affect them.

Audience	Messaging	Channels	Materials
• **Seniors**	• Deployment Process • Benefits	• Newspaper Ads • Direct Mail • Community Meetings • Senior Events • PNM.com	• FAQs • Data Use and Safeguard Statements • Welcome Brochure • "Hands On" Experience • Instructional Videos • Introduction Letter

Day of Meter Installation

On the day of meter installation, field workers will begin by attempting to contact the customer. During installation, the customer's service will be disconnected to provide a safe working environment for the technician, and the service will be reconnected after the new meter is installed.

Upon installation of the AMI meter, PNM will provide the customer with a doorknob hanger that confirms services have been performed and supports "Welcome Brochure" information. This information will also include the toll-free number for customers to call and website addresses if they have questions about their new electric meter and/or general questions about the AMI program.

If a customer meter cannot be upgraded, information will be left at the residence, including why installers could not upgrade the meter and any actions the customer may need to take. If the issue preventing installation could cause harm to the customer or dwelling, a PNM representative would not leave the property until service has been disconnected. PNM would then actively contact the customer to notify them of the issue and required steps to rectify the situation.

PNM will monitor all communications channels to ensure customers feel supported, informed, and comfortable with their new meter. Based on industry-leading practices, field workers will be equipped with FAQs, "Welcome Brochures", and meter completion doorknob hangers to support the customer

experience.

Customer Opt-out in Phase Two

If on the day of installation, the Customer chooses to opt out when the utility representative makes initial contact, the technician will not install the new electric meter at that location. The utility representative would contact a supervisor to hold installation, and PNM would then provide the customer with a form for submission to confirm their choice to not receive the new equipment, with an acknowledgment that the customer will incur future meter reading and one-time fees. PNM will aim to learn as much as possible from the customer during this time, including why they are choosing to opt out of receiving the new equipment and forgoing the opportunity to participate in future benefits. Receipt of customer feedback during this time can also inform future messaging and outreach strategies to help limit future meter opt-outs.

If the customer still chooses to opt out and submits the opt-out form back to PNM, PNM will follow up with a confirmation letter or email to the customer that clearly explains the new customer experience and specifically what the customer is responsible for moving forward (*i.e.,* payment of future meter reading fees).

Phase Three – Customer Engagement and Empowerment

Objectives

The objectives of Phase Three: Customer Engagement and Empowerment will be to:

- Provide access to a new online Customer Energy Management Platform.
- Educate customers early and often about the Customer Energy Management Platform and other tools and options available post-meter installation.
- Encourage customers to interact with Customer Energy Management Platform to understand energy usage better and modify energy consumption.
- Provide follow-up communications on new features to customers.

Summary of Key Activities for Both Digital and Non-Digital Delivery

As previously noted, PNM recognizes that not all customers will seek to engage digitally with the benefits enabled by advanced meters. Although the Customer Energy Management Platform is a digitally focused tool that supports the modern energy experience for customers, PNM will develop educational and engagement materials that ensure all customers are empowered and enabled with the correct information, insights, and opportunities to take action to manage usage and total energy costs.

PNM will develop various educational materials to reach customers through traditional and online channels. As PNM progresses through the Customer Engagement and Empowerment phase, PNM will utilize similar channels noted for Phase One and Phase Two (*e.g.,* fact sheets, welcome brochure, letters, etc.) Additional strategies planned for Phase Three include developing videos to educate customers to help them understand bill statements, creating a "Getting Started Guide" to provide step-by-step instructions and visuals for customers about the post-deployment experience (*e.g.,* the Customer Energy Management Platform), developing testimonials and case studies, and engaging with customers via social media (*e.g.,* Facebook, Twitter, YouTube). All educational materials will continue to be available in English and Spanish based on customer demographics. PNM will continue to get feedback throughout this phase on materials and channels to provide improvements and refinements.

PNM will develop a variety of educational materials to reach customers through traditional and online

channels. As PNM progresses through the Customer Engagement and Empowerment phase, PNM will utilize similar channels noted for Phase One and Phase Two (*e.g.,* fact sheets, welcome brochures, PNM.com). Additional strategies planned for Phase Three include developing videos to educate customers to help them understand bill statements, creating a "Getting Started Guide" to provide step-by-step instructions and visuals for customers about the post-deployment experience (*e.g.,* the Customer Energy Management Platform), developing testimonials and case studies, and engaging with customers via social media (*e.g.,* Facebook, Twitter, YouTube). All educational materials will continue to be available in English and Spanish based on customer demographics. PNM will continue to get feedback throughout this phase on materials and channels to provide improvements and refinements.

Approach

PNM will begin educating customers on the new post-deployment tools and services, including the Customer Energy Management Platform, beginning in Phase One with broad awareness, continuing through deployment in Phase Two, and reinforced in Phase Three upon meter installation. This will allow both the meter and the new tools and services it provides to be top of mind for customers to help enable their engagement. For example, PNM will auto-enroll customers in high electric and usage alerts based on customer-selected preferred communication methods and applicable laws. High usage alerts are a feature that will notify customers during a billing cycle if they are predicted to use substantially more energy than usual by the end of the billing cycle. Without advanced meters as the enabling technology, it is difficult to acquire this information and take action to manage energy usage. Educational material, both traditional and digital, describing these types of features as well as other aspects of the Customer Energy Manage Platform will be supplied on a frequent basis over the first four weeks following the installation of the advanced meter.

PNM will monitor customer utilization of these new tools and services, including the Customer Energy Management Platform, and will adjust messaging and channels by segment to drive increased utilization.

Stakeholder and Customer Outreach – Engagement and Empowerment

Audience	Messaging	Channels	Materials
• **Community Leaders** • **Customers**	• New Customer Programs & Services • Benefits • Customer Energy Management Platform	• Website • Email • Social Media • Direct Mail • Outbound Calls • Bill Insert	• FAQs • Welcome Brochure • Data Use and Safeguard Statements • Press Releases • Instructional Videos • Customer Testimonials

MITIGATING RISKS AND CHALLENGES

To manage expectations and address customer concerns, PNM recognizes the need to put ourselves in the place of our customers. This allows us to be fully prepared to anticipate and respond to situations that could affect customers, stakeholders, or the community during advanced meter deployment. We realize the introduction of new technology, logistics of the installations, and transition to using advanced meters will mean that we need to help customers manage through the change and help them use their data to

make decisions that will save energy and money.

Anticipating Key Issues

While individual customer issues will receive attention, we will also track issues on a broader scale. PNM will actively monitor sources where customer issues or concerns may originate including, but not limited to:

- Customer Contact Center (both residential and business inquiries)
- Inquiries to company executives, regional leaders, and front-line managers
- Inquiries to field and other employee personnel
- PNM's Key Account Management
- Media Relations
- NMPRC staff
- Letters, phone calls, social media posts, and emails from customers

Addressing Concerns

We will use existing processes and procedures for handling issues escalated through our Customer Care team. Our communication materials will attempt to address key issues and possible AMI concerns, including but not limited to:

- **Radio Frequency (RF) Emissions**: As advanced meters emit low levels of electro-magnetic radiation through their RF communications, PNM will educate customers to alleviate unfounded concerns around health impacts and interference with other wireless devices.
- **Privacy & Security:** PNM will assure customers that we take their data privacy seriously by providing information about our data privacy policies. We will also clearly outline steps to protect customers' energy use and personally identifiable information.
- **Accuracy:** Messages will also address the measurement accuracy of advanced meters, and let customers know how to contact us if they have billing questions related to their meter readings. Call center agents will be trained to answer questions and assist customers.
- **Deployment Expectations:** Communications will help make it easy for customers to properly identify our company employees and know what to expect when meter installers work at their homes or businesses. This communication includes special instructions for customers with medical conditions that may have equipment in their homes.
- **Opt-Out Policies:** PNM will address opt-out policies for advanced meter technology and let customers know the proper channels for inquiring about available alternatives.
- **Fixed and Low-Income Customers:** Customized communications will recognize and proactively address cost concerns among low-income households, seniors, and vulnerable customer populations. We will seek to engage community leaders, influencers, and representatives of these communities in developing and deploying our educational efforts. Messages will address how customers on fixed or limited budgets can take advantage of personal energy use information that may allow them to manage their energy costs better. Outreach will also focus on increasing these customers' participation rates in energy efficiency and conservation programs, and cross-marketing New Mexico's low-income assistance programs. Communication and education materials that could be customized for this segment of customers may include:
    - FAQs and fact sheets addressing their specific concerns and needs.
    - Talking points and scheduled briefings with consumer advocacy and nonprofit groups serving these populations.
    - Customized presentations for community area managers to share with their

constituents.

- Aggressive outreach to organizations serving seniors, low-income, and other vulnerable customer segments, with an emphasis on providing ready-to-use materials that can be distributed via their communication channels, online resources, events, meetings, and social media platforms.

- **Non-English-Speaking Customers:** The company's service area includes a diverse audience. Marketing collateral and communications will be created in Spanish whenever possible.

GCG#529861

BEFORE THE NEW MEXICO PUBLIC REGULATION COMMISSION

IN THE MATTER OF PUBLIC SERVICE COMPANY OF NEW MEXICO'S APPLICATION FOR AUTHORIZATION TO IMPLEMENT GRID MODERNIZATION COMPONENTS THAT INCLUDE ADVANCED METERING INFRASTRUCTURE AND APPLICATION TO RECOVER THE ASSOCIATED COSTS THROUGH A RIDER, ISSUANCE OF RELATED ACCOUNTING ORDERS, AND OTHER ASSOCIATED RELIEF	))))))))	**Case No. 22-00058-UT**

SELF AFFIRMATION

JULIE ROWEY, Vice President, Chief Customer Officer, PNMR Services Company, upon penalty of perjury under the laws of the State of New Mexico, affirm and state: I have read the foregoing **Direct Testimony of Julie Rowey** and it is true and correct based on my personal knowledge and belief.

DATED this 3rd day of October, 2022.

/s/ Julie Rowey____
JULIE ROWEY

GCG # 529840