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December 8, 2023

VIA ELECTRONIC MAIL

Luly E. Massaro, Commission Clerk
Rhode Island Public Utilities Commission
89 Jefferson Boulevard
Warwick, RI 02888

**RE: Docket No. 22-56-EL-The Narragansett Electric Company d/b/a Rhode Island Energy
Grid Modernization Plan (GMP)
Response to Data Request – PUC Set 1**

Dear Ms. Massaro:

On behalf of The Narragansett Electric Company d/b/a Rhode Island Energy (“Rhode Island Energy” or the “Company”), enclosed please find a revised PDF version of the table included on page 6 to Attachment PUC 1-1 and a full version of the response to data request PUC 1-1 from the Public Utilities Commission’s First Set of Data Requests, inclusive of the replacement page, in the above referenced matter.¹

Thank you for your time and attention to this matter. If you have any questions, please contact Jennifer Brooks Hutchinson at 401-316-7429.

Very truly yours,

A handwritten signature in blue ink, appearing to read "Jennifer Brooks Hutchinson", with a long horizontal line extending to the right.

Jennifer Brooks Hutchinson


Enclosures

cc: Docket No. 22-56-EL Service List
John Bell, Division
Leo Wold, Esq.

¹ Per communication from Commission counsel on October 4, 2021, the Company is submitting an electronic version of this filing followed by hard copies filed with the Clerk within 24 hours of the electronic filing.

CERTIFICATE OF SERVICE

I certify that a copy of the within documents was forwarded by e-mail to the Service List in the above docket on the 8th day of December, 2023.


Adam M. Ramos, Esq.

The Narragansett Electric Company d/b/a Rhode Island Energy
Docket No. 22-56-EL Grid Modernization Plan (GMP)
Service list updated 11/16/2023

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PUC 1-1

Request:

On page 37 of the Company's Supplemental Testimony, the witnesses state: "The Company's implementation of a grid modernization investment strategy, however, is limited by its ability to recover costs for the limited set of upfront, fixed-cost investments required by a grid modernization investment strategy." (emphasis added)

On page 44, of the Company's Supplemental Testimony, the witnesses state: The Company proposes to distinguish between investments with fixed costs (e.g., ADMS) and investments that are scalable (e.g., advanced reclosers). By distinguishing between these two types of investments, the PUC and parties can more clearly discuss how the size of the portfolio of electric distribution system issues affects the benefit-cost assessment of alternative investment strategies.

Specifically, for a single electric distribution system issue or a sufficiently small portfolio of electric distribution system issues, the fixed costs of underlying investments required for solutions derived from a grid modernization investment strategy will render an unfavorable benefit-cost assessment relative to a traditional investment strategy. However, the incremental benefits at the relatively low incremental cost of scalable solutions derived from a grid modernization investment strategy led to the insight that a grid modernization strategy is cost-effective relative to a traditional investment strategy.

Another distinction is the difference between an investment that is a pre-requisite and an investment that is not a pre-requisite. For example, ADMS Basic is a pre-requisite for FLISR. This distinction may be helpful in understanding the dynamics within the benefit cost assessment because a pre-requisite investment may have a relatively high cost with low benefit on its own but enable scalable solutions that have low cost and high benefit when considered together.

- a. Please identify which investments that were included in the Grid Modernization Plan and also in the previously proposed FY 2024 Grid Modernization subcategory are the "limited set of upfront, fixed-cost investments" referenced in the testimony.
- b. Please identify which investments that were included in the Grid Modernization Plan and also in the previously proposed FY 2024 Grid Modernization subcategory are scalable as referenced in the testimony.

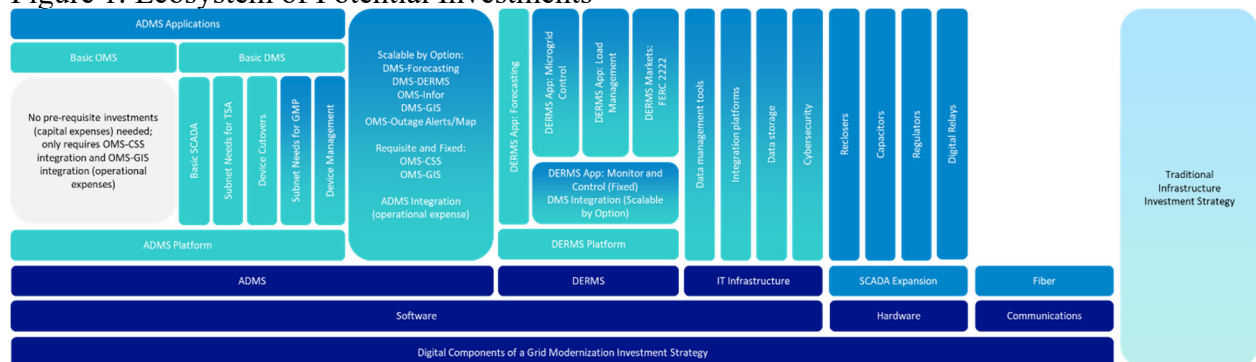
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- c. For each category of investments (fixed versus scalable) please provide the capital costs associated with those investments and the currently anticipated timing of need for those investments.
- d. For each investment identified in part a of this response, please explain the scalable solutions and functionalities enabled by the investment.
- e. For each investment identified in part b of this response, please explain how it relies on the fixed cost investment to provide the intended solutions. For each scalable investment, if there are multiple functionalities enabled by different fixed costs investments, please break that information out in the response.

Response:

Figure 1, below, illustrates both the fixed and scalable nature of grid modernization components as well as the linkages between investments in each category. Navy (■) indicates a category of investment, but not an investment itself (these categories aid in clarity of discussion). Teal (■) indicates fixed cost investments. Blue (■) indicates scalable investments, covering both investments that are scalable in volume and investments that are scalable in option. Some investments have fixed cost and scalable components; these are shaded in teal-blue (■). An investment that is directly below another investment in the same category is a pre-requisite investment that is necessary to derive value. An investment that is directly above another investment depends at least in part on the investment below it to provide value. Please note that fixed cost investments may or may not be pre-requisite investments; scalable investments may or may not be pre-requisite investments. Please refer to the Technical Appendix in Attachment PUC 1-1 for a further description of the categories in Figure 1.

Figure 1. Ecosystem of Potential Investments



Notes: Figure 1 shows the full landscape of investments, with focus on details of grid modernization investments

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- (a) In the supplemental testimony, the witnesses used the phrase “limited set of upfront, fixed-cost investments” to refer generally to the base software platforms (i.e., ADMS and DERMS, and associated IT Infrastructure) needed for solutions derived from a grid modernization investment strategy.

More comprehensively and specifically, grid modernization investments that either are upfront fixed costs (colored teal in Figure 1) or have upfront fixed cost components (shaded teal-blue in Figure 1) include: ADMS Platform, Basic SCADA, Subnet Needs for TSA, Device Cutovers, fixed cost component of Subnet Needs for GMP, fixed cost component of Device Management, Basic OMS, Basic DMS, fixed cost component of ADMS Integration, DERMS Platform, DERMS App: Forecasting, fixed cost components of DERMS App: Monitor and Control, fixed cost components of DERMS App: Microgrid Control, fixed cost components of DERMS App: Load Management, fixed cost components of DERMS Markets: FERC 2222, fixed cost components of Data Management Tools, fixed cost components of Integration Platforms, fixed cost components of Data Storage, and fixed cost components of Cybersecurity.

- (b) In the supplemental testimony, the witnesses used the phrase “scalable” to refer generally to hardware and communications components that are needed for solutions derived from a grid modernization investment strategy. Please note that scalable can refer to investments that are scalable in volume (e.g., 10 reclosers or 100 reclosers) or scalable in option (e.g., whether or not to add a particular ADMS Application).

More comprehensively and specifically, grid Modernization investments that either are scalable (colored blue in Figure 1) or have scalable components (shaded teal-blue in Figure 1) include scalable components of Subnet Needs for GMP, scalable components of Device Management, ADMS Applications, scalable components of ADMS Integration, scalable components of DERMS App: Monitor and Control, scalable components of DERMS App: Microgrid Control, scalable components of DERMS App: Load Management, scalable components of DERMS Markets: FERC 2222, scalable components of Data Management Tools, scalable components of Integration Platforms, scalable components of Data Storage, scalable components of Cybersecurity, SCADA Expansion, Reclosers, Capacitors, Regulators, Digital Relays, DER Monitor/Manage Hardware, and Fiber.

(c) Figure 2, below, summarizes the capital costs for each category of investment (denoted by fixed cost or scalable) and the approximate proposed pacing of those investments.

Figure 2. Capital Cost Schedule

	FY25	FY26	FY27	FY28	FY29	FY30	FY31	FY32	Total CapEx FY25-42	Potential Cost Recovery Avenue
Software										
ADMS and DERMS	\$0.6M	\$1.9M	\$1.9M	\$1.9M	\$4.8M	\$0.3M	\$0.3M	\$0.3M	\$12.7M	TSA Agreement, Rate Case, IJA Funding
IT Infrastructure	\$1.6M	\$2.1M	\$3.1M	\$4.4M	\$4.9M	\$0.8M	-	-	\$16.7M	
Hardware										
Reclosers	\$13.5- 17.4M	\$14.3- 25.3M	\$19.0- 25.8M	\$20.3- 26.4M	\$18.4- 27.0M	\$6.9- 18.9M	\$0-8.2M	-	\$112.6- 128.9M	Electric ISR, IJA Funding
Capacitors	\$0.4	\$3.3- 3.5M	\$4.6- 5.0M	\$4.3- 4.6M	\$4.4- 4.8M	\$4.5- 4.8M	-	-	\$21.5-23.1M	
Regulators	-	\$0.6- 1.0M	\$0.8- 1.3M	\$0.9- 1.4M	\$0.9- 1.4M	\$1.0- 1.5M	\$0.7- 1.0M	-	\$5.0-7.6M	
Digital Relays	\$1.4- 2.0M	\$1.2- 2.8M	\$4.8- 5.2M	\$5.6- 5.9M	\$2.9- 3.7M	\$3.0- 3.6M	\$0-2.2M	\$0-0.7M	\$21.5-23.6M	
DER Monitor/Manage Hardware	-	-	\$2.4M	\$3.6M	\$4.0M	\$4.0	\$4.0	\$8.0M	\$106.4M	
Communications										
Fiber	\$0.2M	\$0-11.4M	\$0-16.0M	\$0-25.9M	\$0-23.3M	\$0-8.2M	\$0-8.2M	-	\$0.2-93.0M	Pending Study
Total CapEx	\$17.6- 22.1M	\$23.4- 48.0M	\$36.6- 60.7M	\$41.0- 74.1M	\$40.3- 73.9M	\$20.5- 42.1M	\$5.0- 23.9M	\$8.3- 9.0M	\$296.6- 412.0M	

Notes: Please note that only capital expenses are shown (operational expenses are not included). Ranges are provided for the scalable investments to indicate lower and upper bounds of capital expenses as those scalable investments are right-sized based on actual electric grid conditions. The column at the far right adds potential cost recovery mechanism; this column represents an update in the Company’s consideration of cost recovery avenues informed by discussions that have occurred since the Grid Modernization Plan was filed in December 2022. Please refer to the technical appendix in Attachment PUC 1-1 for a more precise cost schedule.

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For parts (d) and (e): please note that fixed cost is not synonymous with pre-requisite investment (i.e., a fixed cost investment may not be required for scalable solutions or scalable functionalities). These responses explain both the linkages between fixed cost and scalable investments as well as pre-requisite investments. Please see the Technical Appendix provided in Attachment PUC 1-1 to this response for further discussion of linkages between investments and standalone versus incremental value.

(d) The ADMS Platform, Basic OMS, Basic DMS, and associated pre-requisite investments provide their own standalone value and enable scalable solutions (i.e., ADMS Applications).

- ADMS Platform – pre-requisite investment for Basic SCADA, Subnet Needs for TSA, Device Cutovers, Subnet Needs for GMP, Device Management, Basic OMS, Basic DMS, ADMS Applications
- Basic SCADA – pre-requisite investment for Basic DMS and ADMS Applications
- Subnet Needs for TSA – pre-requisite investment for Basic DMS and ADMS Applications
- Device Cutovers – pre-requisite investment for Basic DMS and ADMS Applications
- Subnet Needs for GMP – pre-requisite investment for Basic DMS and ADMS Applications
- Device Management – pre-requisite investment for Basic DMS and ADMS Applications
- Basic OMS – pre-requisite investment for ADMS Applications
- Basic DMS – pre-requisite investment for ADMS Applications
- ADMS Integration – pre-requisite investment for Basic OMS and ADMS Applications

The DERMS Platform and DERMS App: Monitor and Control provide their own standalone value and enable scalable functionality (i.e., real time operating envelopes) and scalable solutions (i.e., DERMS App: Microgrid Control and DERMS Apps: Load Management, DERMS Markets: FERC 2222).

- DERMS Platform – pre-requisite investment for DERMS App: Forecasting, DERMS App: Monitor and Control, DERMS App: Microgrid Control, DERMS App: Load Management, DERMS Markets: FERC 2222
- DERMS App: Forecasting – not a pre-requisite investment

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- DERMS App: Monitor and Control – pre-requisite investment for DERMS App: Microgrid Control, DERMS App: Load Management, DERMS Markets: FERC 2222; provides standalone value and incremental value when paired with DER Monitor/Manage Hardware
- DERMS App: Microgrid Control – not a pre-requisite investment
- DERMS App: Load Management – not a pre-requisite investment
- DERMS Markets: FERC 2222 – not a pre-requisite investment

IT Infrastructure investments each provide their own standalone value and enable scalable functionality (i.e., Data Management Tools, Integration Platforms, Data Storage, and Cybersecurity all fit for purpose) and scalable solutions (i.e., ADMS, DERMS, and Hardware).

- Data Management Tools – not a pre-requisite investment
- Integration Platforms – not a pre-requisite investment
- Data Storage – not a pre-requisite investment
- Cybersecurity – not a pre-requisite investment

Although the IT Infrastructure investments are not identified as pre-requisite investments, as described further in the Technical Appendix, they all are essential co-investments to many other investments.

(e) The following list summarizes the pre-requisite investments needed for each investment noted as scalable in part (b).

- Subnet Needs for GMP – requires hardware investments that have subnet needs and requires the ADMS Platform to be housed
- Device Management – requires devices to manage
- ADMS Applications – requires Basic OMS and Basic DMS (and their pre-requisites) to operate (akin to an app on your phone requiring the phone to have the operating system installed for the app to work); some ADMS Applications also require hardware in the field, with incremental hardware providing incremental value
- ADMS Integration – requires Basic OMS and Basic DMS to have something to integrate
- DERMS App: Monitor and Control – requires DERMS Platform to be housed

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- DERMS App: Microgrid Control – requires DERMS App: Monitor and Control for operating envelopes to apply to microgrid control
- DERMS App: Load Management – requires DERMS App: Monitor and Control for operating envelopes to apply to load management
- DERMS Markets: FERC 2222 – requires DERMS App: Monitor and Control for operating envelopes to guide wholesale participation
- Data Management Tools – requires data that needs to be managed
- Integration Platforms – requires systems that need to be integrated
- Data Storage – requires data that needs to be stored
- Cybersecurity – requires systems that need to be protected
- SCADA Expansion – requires hardware that needs to communicate
- Reclosers – requires SCADA Expansion to communicate
- Capacitors – requires SCADA Expansion to communicate
- Regulators – requires SCADA Expansion to communicate
- Digital Relays – requires SCADA Expansion to communicate
- DER Monitor/Manage Hardware – requires SCADA Expansion to communicate and requires DERMS: Monitor and Control to provide value
- Fiber – requires applications that require secure and reliable communications that do not have other lower-cost alternative solutions

Technical Appendix

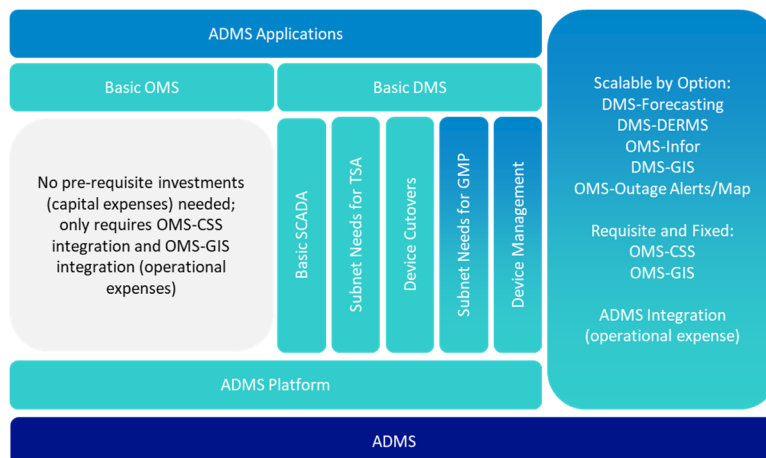
The following sections further describe the categories in Figure 1 in the Company’s response: (from left to right) ADMS, DERMS, IT Infrastructure, Hardware, Communications, Traditional Investments.

ADMS

Excerpted in Figure 3, below: ADMS is composed of a portfolio of capital expenses (shown on the left, above and including the ADMS Platform) and operational expenses (shown on the right). The ADMS Platform is akin to an empty container that is a fixed cost pre-requisite investment but has no value of its own.

The ADMS Platform contains two distinct systems – Basic OMS and Basic DMS – each of which is its own fixed cost investment, provides value on its own, and provides incremental value in combination. Basic OMS is a fixed cost investment in and of itself; Basic OMS does not require any pre-requisite investments that are capital expenses but does require integration (operational expense) with two existing systems – GIS and CSS – to function. Basic DMS does require a set of fixed cost pre-requisite investments to provide value, some of which provide value on their own. Basic SCADA is the data required by DMS to control and monitor devices. Subnet Needs for TSA is the system by which data is ingested; this investment covers only data ingestion from existing hardware (pole top devices) in the field. Device Cutovers is the investment that transitions devices from current systems to DMS. Subnet Needs for GMP is the system by which incremental data from incremental hardware (pole top devices) is ingested; this investment is shown as a partially fixed cost (to represent some continued level of hardware deployment) and partially scalable (to represent that this investment scales as the volume of hardware deployed scales). Similarly, Device Management is a partially fixed cost, partially scalable investment to manage hardware in the field. Basic SCADA, Subnet Needs for TSA, Device Cutovers, Subnet Needs for GMP, and Device Management are all necessary pre-requisite investments for Basic DMS, a fixed cost software investment.

Figure 3. ADMS



Basic OMS and Basic DMS provide value on their own: these software systems improve administrative efficiency and outage restoration. Basic OMS and Basic DMS (and their constituent pre-requisite investments) are required for ADMS Applications. ADMS Applications are scalable by option: the Company may choose to invest in the applications with the most relevance and value for operations, customers, and the electric system. Some ADMS Applications require only Basic DMS as a pre-requisite investment (e.g., DMS App: Power Flow). One ADMS Application requires both Basic OMS and Basic DMS as pre-requisite investments (i.e., ADMS App: Adaptive Load Shed).¹ Note that some ADMS Applications require some hardware components as co-investments to derive value; for example, DMS App: FLISR requires some nominal amount of Reclosers to provide value, and incremental Reclosers lead to incremental FLISR value.²

The ADMS Platform, up through the ADMS Applications, only requires operational expenses to integrate Basic OMS with GIS and CSS systems and AMI. Additional integration can add incremental value and is therefore depicted as scalable by option within the ADMS Integration box on the right. ADMS also requires essential co-investment in IT Infrastructure.³ ADMS does not require DERMS to provide value.

DERMS

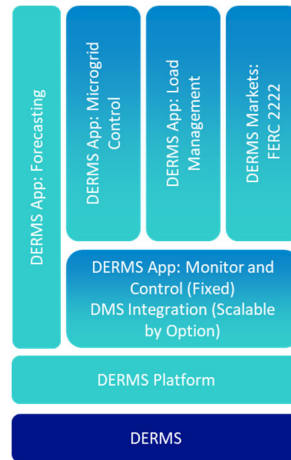
Excerpted in Figure 4, below: DERMS is a category of investment that includes the DERMS Platform, DERMS App: Forecasting, DERMS App: Monitor and Control, DERMS App: Microgrid Control, DERMS App: Load Management, and DERMS Markets: FERC 2222.

¹ Some ADMS Applications require other ADMS Applications as pre-requisite investments, some benefit from but do not require other ADMS Applications, and some stand alone. Rhode Island Energy has not included that detail within this data response but is open to participating in a technical session with the Commission and other parties at the appropriate time to discuss these details, as determined by the Commission.

² See the section on Hardware for more information. Rhode Island Energy is open to participating in a technical session with the Commission and other parties at the appropriate time to discuss further, as determined by the Commission.

³ See the section on IT Infrastructure for more information.

Figure 4. DERMS



The DERMS Platform is akin to an empty container in which to store the other investments; the DERMS Platform is a fixed cost pre-requisite investment that provides no value on its own. The DERMS App: Forecasting is a fixed cost investment that provides value on its own: detailed and accurate forecasting of distributed energy resources. DERMS App: Monitor and Control is also a fixed cost investment that provides value on its own: day ahead operating envelopes for distributed energy resources. DERMS App: Monitor and Control has a component that is scalable by option; integration with Basic DMS provides the incremental value of real-time adjustment of operating envelopes.

DERMS App: Microgrid Control requires DERMS App: Monitor and Control as a pre-requisite investment. DERMS App: Microgrid Control has a fixed cost component representing the initial set up for the first microgrid application, and a scalable by volume component that represents application-specific calibration as microgrids arise. Note that expansion of communications systems is a necessary co-investment as DERMS App: Microgrid Control scales. DERMS App: Load Management and DERMS Markets: FERC 2222 are similar in nature. Note that DERMS Markets: FERC 2222, which represents Rhode Island Energy's compliance with the FERC 2222 order to allow customers to participate in wholesale markets, requires both the DERMS Platform and the DERMS App: Monitor and Control as pre-requisite investments. Incremental value is gained from co-investment in DERMS App: Microgrid Control and DERMS App: Load Management.

DERMS also requires essential co-investment in IT Infrastructure.⁴ DERMS does not require ADMS or Hardware to provide value. DERMS App: Monitor and Control provides standalone value and incremental value when paired with DER Monitor/Manage Hardware.

⁴ See the section on IT Infrastructure for more information.

IT Infrastructure

Excerpted in Figure 5, below: IT Infrastructure is a category consisting of four essential co-investments that all contain a fixed cost element and are scalable by volume and by option. These investments – Data Management Tools, Integration Platforms, Data Storage, and Cybersecurity – while not pre-requisites in the sense that these investments are necessary to provide value for other investments, all are critically necessary with the Company’s current system and as investments in other categories are made. For that reason, IT investments are deemed essential co-investments. For example, Rhode Island Energy has existing Cybersecurity for its systems. As investments are made in new systems and applications, Cybersecurity will need to extend to those new systems and applications to protect them. Likewise, Data Storage serves the data used today. As more hardware is placed in the field, and more data becomes available, Data Storage solutions will need to scale. This scaling by volume may be chunky. To use an analogy, one can invest in a thumb drive for some incremental data storage or invest in an external hard drive to provide more incremental data storage, but it is not possible to invest in data storage for each single bit of data.

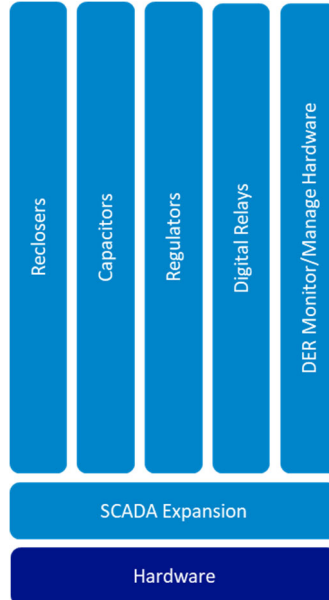
Figure 5. IT Infrastructure



Hardware

Excerpted in Figure 6, below: Hardware is the category of investments that contains pole top devices (i.e., Reclosers, Regulators, and Capacitors), Digital Relays, and DER Monitor/Manage Hardware. These devices all require SCADA Expansion as a pre-requisite investment; the Company must expand its communications network to be able to communicate with these pieces of hardware. SCADA Expansion is scalable by volume based on the number of hardware devices installed. Reclosers, Regulators, Capacitors, Digital Relays, and DER Monitor/Manage are all scalable by volume and also provide incremental value on their own.

Figure 6. Hardware



Communications

Communications is comprised solely of fiber, which is a scalable investment and is not a pre-requisite investment for any other investment. Rather, fiber provides incremental value (i.e., secure and reliable communications) dependent on each specific application.

Traditional Investments

Both a grid modernization investment strategy and a traditional investment strategy include investments in traditional infrastructure, such as poles, wires, substations, and transformers. These investments are scalable in volume (e.g., extending service to a new neighborhood) and in size (e.g., reconductoring a circuit to accommodate increases in load). The scale of traditional investments is expected to be smaller under a grid modernization investment strategy than under a traditional investment strategy.⁵

⁵ Please refer to the supplemental testimony of Castro, Constable, and Gill for further discussion of these investment strategies and their tradeoffs.

