

DER Enablement Roadmap Development

June 3, 2021



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DER Enablement and Capabilities

Goals & Objectives for PSE's Draft DER Roadmap

Project Goal

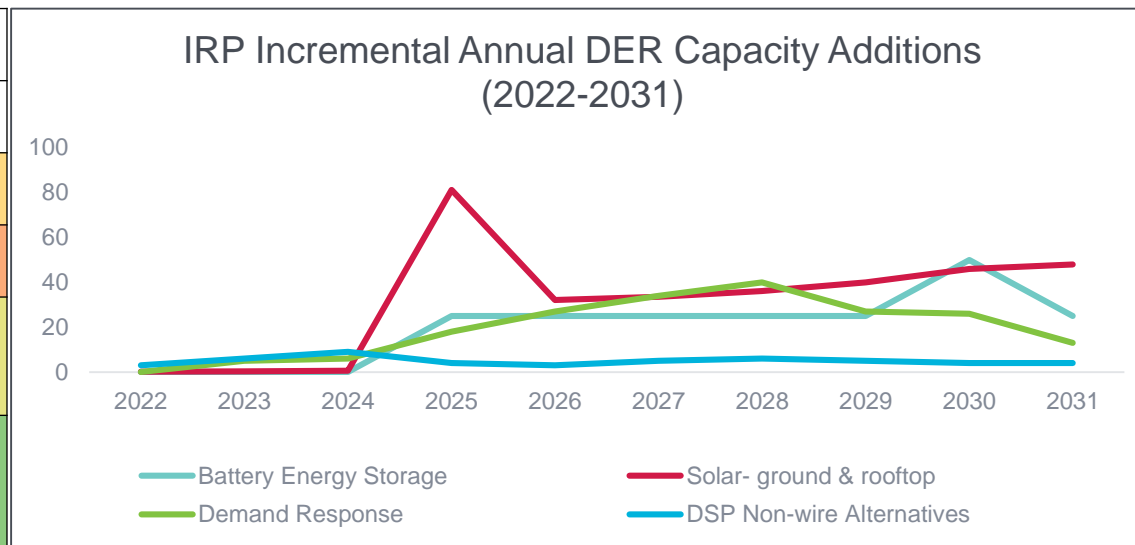
Establish a 10-year **DER Roadmap** that illustrates the sequencing of key activities necessary to design, launch, and scale PSE's desired DER portfolio in support of IRP/CEAP targets

Roadmap Benefits

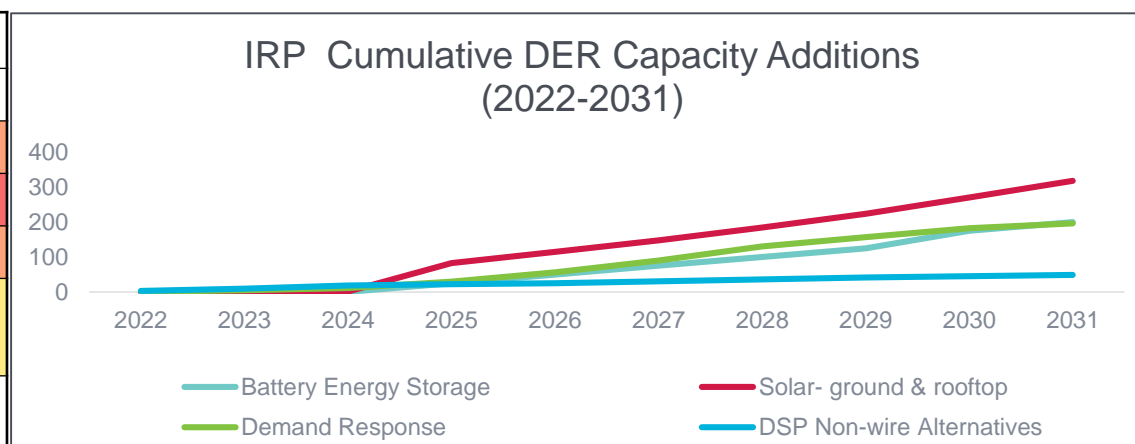
- Mobilize the various customer, operations, strategy, and IT functions to prepare for the ramp up **multiple** programs over the 4-year period and ensure the capacity benefit is realized in the timeframe expected.
- **Identify synergies** between DER program concepts to drive cost-efficiencies within technical and operational resource needs.
- **Prioritize key customer engagement and enablement functions** that will drive a positive customer experience and contribute to successful program participation.

The 2021 Draft IRP outlines aggressive DER capacity additions

Incremental										
	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031
Battery Energy Storage	0	0	0	25	25	25	25	25	50	25
Solar- ground & rooftop	0.2	0.4	0.7	81.2	32.1	33.6	36.1	40	46	48
Demand Response	0	5	6	18	27	34	40	27	26	13
DSP Non-wire Alternatives	3	6	9	4	3	5	6	5	4	4

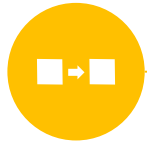


Cumulative										
	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031
Battery Energy Storage	0	0	0	25	50	75	100	125	175	200
Solar- ground & rooftop	0.2	0.6	1.3	82.5	114.6	148.2	184.3	224.3	270.3	318.3
Demand Response	0	5	11	29	56	90	130	157	183	196
DSP Non-wire Alternatives	3	9	18	22	25	30	36	41	45	49
Cumulative DER Totals	3	15	30	159	246	343	450	547	673	763



There are two key dimensions of PSE's 10-year DER roadmap

DER Concept Sequencing



Develop requirements for each generic DER concept to provide an understanding of potential program timelines and how these concepts can be prioritized to meet IRP targets.

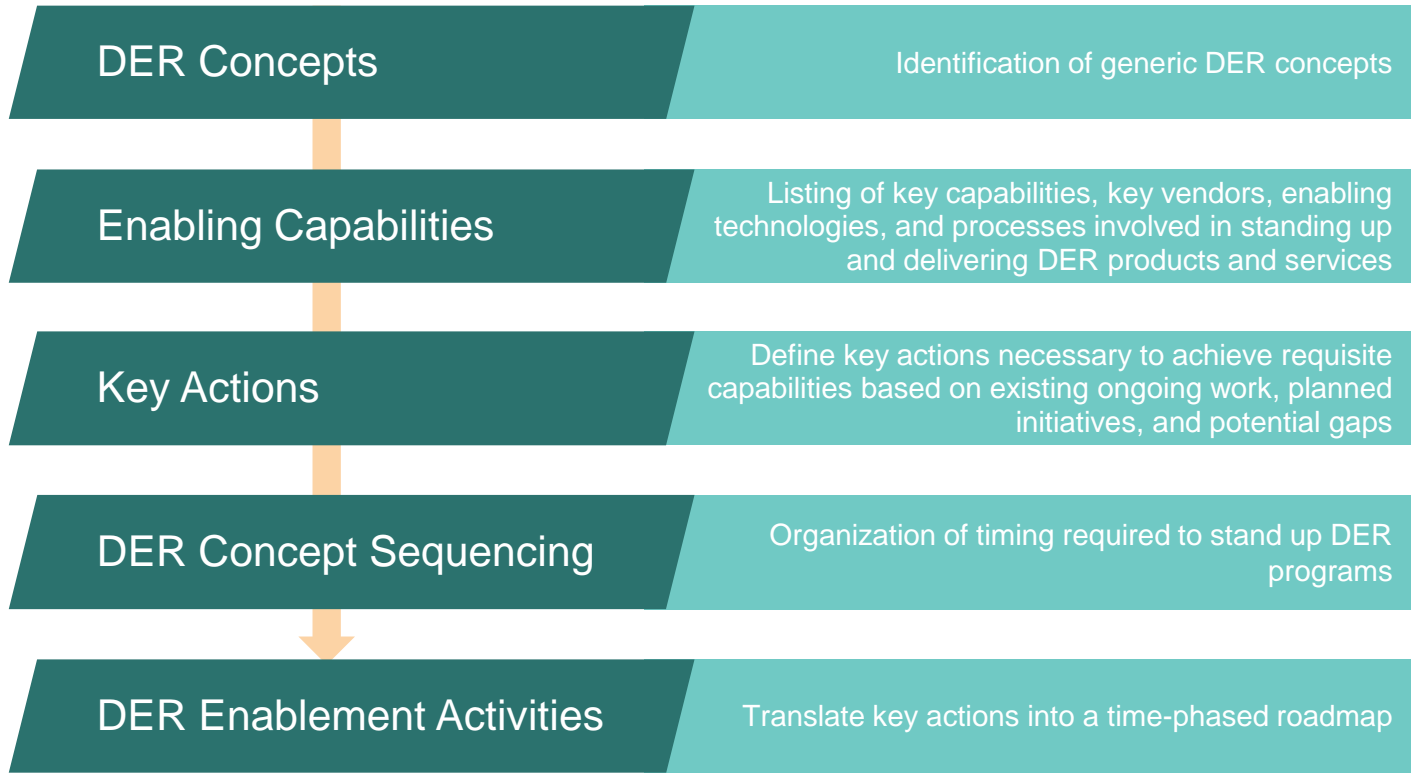
DER Enablement



Identify key activities to achieve enabling DER capabilities (e.g., technology platforms, internal capabilities, and processes)

Together these lenses will provide a holistic view of the **key actions and timelines needed** to stand up DER programs to meet CETA targets

The approach to identifying DER enablement

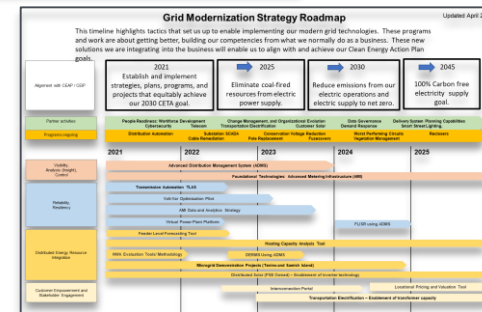


DER Capabilities Mapping

Category	Capability	Key Vendor	Market/Service Area
Regulatory Planning & Compliance	Load-based	ABB Energy Storage Systems	Delaware, Puerto Rico
	Net Metering	ABB Energy Storage Systems	Delaware, Puerto Rico
	Net Metering	ABB Energy Storage Systems	Delaware, Puerto Rico
	Net Metering	ABB Energy Storage Systems	Delaware, Puerto Rico
	Net Metering	ABB Energy Storage Systems	Delaware, Puerto Rico
	Net Metering	ABB Energy Storage Systems	Delaware, Puerto Rico
	Net Metering	ABB Energy Storage Systems	Delaware, Puerto Rico
	Net Metering	ABB Energy Storage Systems	Delaware, Puerto Rico
	Net Metering	ABB Energy Storage Systems	Delaware, Puerto Rico
	Net Metering	ABB Energy Storage Systems	Delaware, Puerto Rico
Product Development	Regulatory Planning & Approval		
	Procurement and Contracting		
	Product Management		
	Customer Engagement and Outreach		
	Site Management		
	Implementation		
	Management/Operations		
	Program Governance		

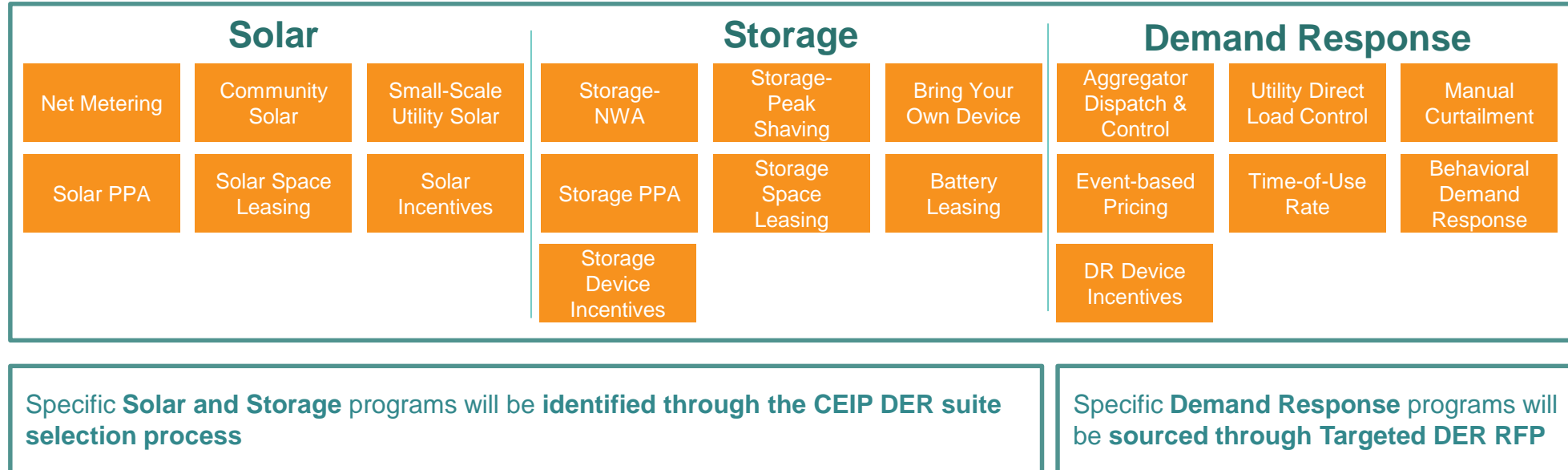
Development of DER Capabilities Matrix

Includes benchmarking and best practices from other utilities



Workshops and Existing Document Review

While the final CEIP DER portfolio is finalized, we used generic DER concepts to develop requirements and establish key CEIP enablers



- These Generic DER concepts spanning three key categories of DERs
- These concepts capture with the following characteristics:
 - **Customer-facing vs. Non-customer-facing**
 - **Customer-sited vs. Utility-sited**
 - **Technology-specific considerations for resource types**

Our approach consisted of examining both individual program activities as well as broader portfolio-level enablers

Program/Product Level Design Considerations

- Detailed product design
- Tariffs and program terms & conditions
- Marketing & outreach plan
- Customer enrollment channels & processes
- Customer care plans & processes
- Asset management
- Procurement & vendor management
- Product management
- Dispatch process



Identify key requirements and complexity

Portfolio Level Enablers

- Marketing & Outreach Strategy
- Customer Care Strategy
- Asset Management Strategy
- Procurement & Vendor Management Strategy
- Portfolio & Project/Product Management Strategy
- Dispatch & Operations strategy
- Key technology Enablers (VPP, CRM, etc.)



Identify common enablers and synergies to maximize PSE value and customer engagement

DER Concept Sequencing



Introduction



DER Concept Sequencing



DER Enablement and Capabilities

When building the 10-year DER Roadmap, we engaged key stakeholders and reviewed materials to understand planned initiatives and existing timelines

Capabilities Workshops

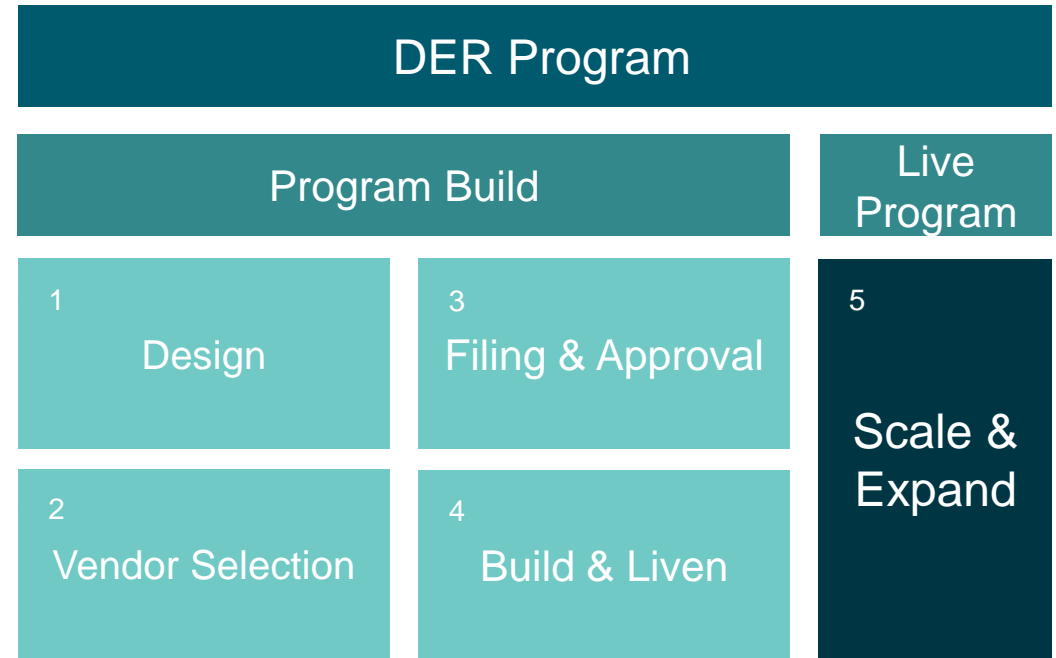
- **IT/Grid Modernization**
- **Enrollment & Interconnection**
- **Product Development & Regulatory Analysis**
- **Operations & Dispatch**

Key Documents

- 2021 Integrated Resource Plan
- Grid Modernization Roadmap
- Product Development Roadmap
- All-Source RFP Objectives and Timelines
- DER RFP Objectives and Timelines

Approach and assumptions for DER concept sequencing

1. Program design typically takes 6-12 months
2. Activities were sequenced for generic DER concepts beginning with vendor selection enabled by the All-Source and Targeted DER RFPs, except in the case of existing programs
3. Regulatory Filings and Approvals for programs were assumed to take roughly 6 months
4. Asset build/deployment was assumed to take ~9 months for non-customer facing programs, 12 months for customer-facing programs, and longer in cases where asset development was deemed particularly complex
5. Enhancements and improvement are made to live programs on a continual basis to scale and optimize delivery of effective capacity contributing to CETA goals



DER concepts were ordered with the intention of getting programs live as quickly as possible

DER Enablement and Capabilities



Introduction



DER Concept Sequencing



DER Enablement and Capabilities

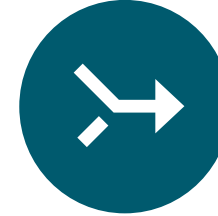
We have identified 10 key areas of DER capabilities



Planning & Engineering



Product Management



Interconnection



Product Development



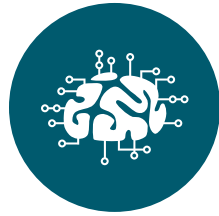
Customer Engagement & Enrollment



Operations & Dispatch



Regulatory Planning & Approval



Data Management



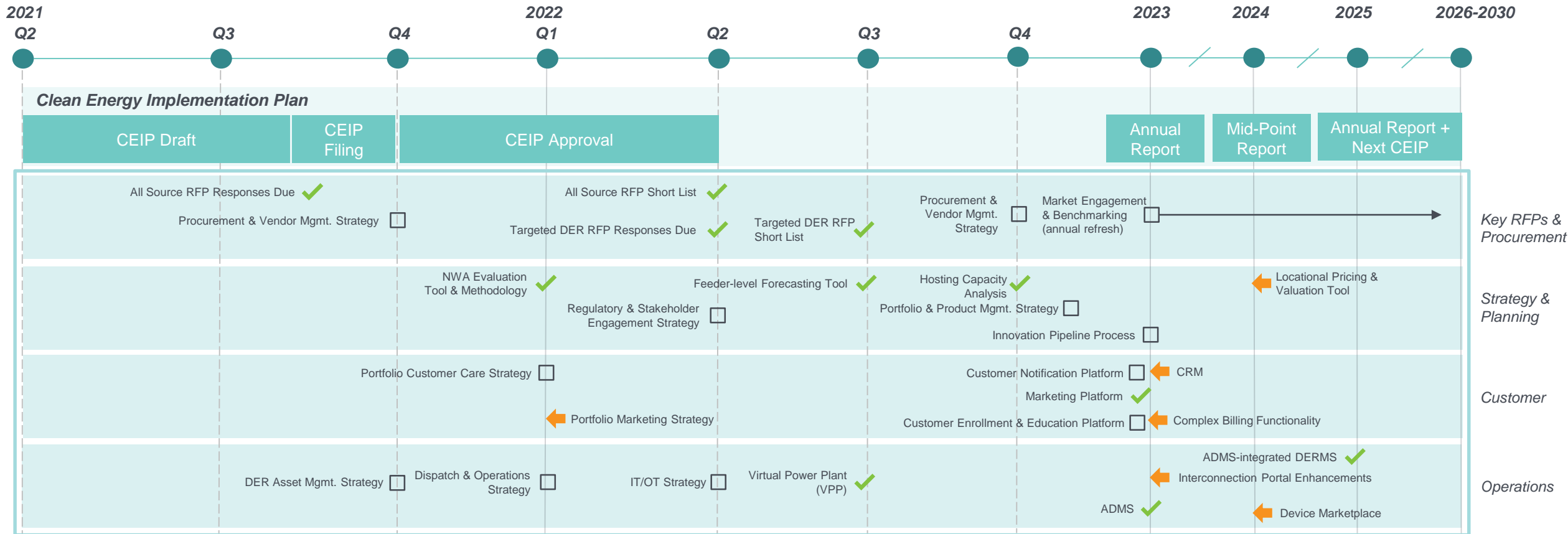
Program Governance



Procurement & Contracting

Each of these ten key areas are comprised of several sub-capabilities and mapped to the relevant enablers

PSE DER Key Enablement Activities



Program Build
 Live Program
 ✓ Key Enablement Milestone
 ← Key Enablement Milestone (timing changed from existing PSE roadmaps)
 Key Enablement Milestone (new)

Key Milestone Updates for DER Enablement – Strategy, Planning & Procurement (1/2)

Key Milestone	Functions	Programs Requiring Milestone	Scheduled Date	Proposed Date
Procurement & Vendor Management Strategy	<p>Sourcing of DER hardware, software, implementation contractors, and related services across the broader DER portfolio. Developing a strategy can help lay the groundwork for consistent communication and data management. By soliciting DERs across programs PSE may also benefit from volume negotiation for lower prices. Representative activities include:</p> <ul style="list-style-type: none"> • Prioritize business models that best suite PSE’s needs (e.g., performance guarantees, PPAs, shared savings) • Identify key roles and responsibilities for procurement, operation, maintenance, and decommissioning • Define key requirements for enabling technologies in line with industry best practices (cybersecurity requirements, communication protocols, operations & maintenance support) 	All programs	NA	Q4 2022
Market Engagement & Benchmarking	<p>PSE must engage both utility peers and the broader DER/aggregator marketplace to ensure PSE stays abreast of the latest market trends, best practices, and emerging needs/technologies to incorporate in PSE’s product portfolio and innovation activities. Representative activities include:</p> <ul style="list-style-type: none"> • Participation in key industry organizations (e.g., PLMA, SEPA, GridFWD) and conferences (e.g., DistribuTECH) • Identify emerging technologies, products, and vendors • Understand vendor capabilities and proven performance in the marketplace • Coordinate with vendors to improve alignment of products to PSE and customer needs 	All programs	NA	Annual Refresh
Portfolio & Product Management Strategy	<p>Managing a large portfolio of DER products brings unique challenges and requires intentional planning of how PSE will organize and operate the portfolio, including ensuring that products and programs are serving their intended purposes, contributing to PSE goals, and adjusted as needed to continue to meet targets and objectives. Representative activities include:</p> <ul style="list-style-type: none"> • Establish portfolio-level organization structure and management processes • Develop a year-over-year DER growth plan of launched products • Identify lessons learned across portfolio and identify operational synergies 	All programs	NA	Q4 2022
NWA Evaluation Tools & Methodology	<p>Develop, maintain, and update internal tools, methodologies, and processes for assessing poles and wires deferral opportunities informed by engineering considerations and various applicable benefit cost analyses. As PSE begins to conduct NWA analyses for all planned projects, PSE will need to efficiently evaluate technical and financial feasibility of alternatives solutions. Representative activities include:</p> <ul style="list-style-type: none"> • Develop a repeatable framework to evaluate the techno-economical potential of NWAs more quickly • Identify and clearly communicate problem statement to solutions vendors to improve alignment in RFP responses • Quantify costs and benefits for decision-making and negotiation with vendors • Update distribution planning and budget processes to incorporate NWA evaluations 	Energy storage-NWA	Q1 2022	No Change

Key Milestone Updates for DER Enablement – Strategy, Planning & Procurement (2/2)

Key Milestone	Functions	Programs Requiring Milestone	Scheduled Date	Proposed Date
Hosting Capacity Analysis	<p>Enhance and streamline PSE’s hosting capacity analysis (HCA) capabilities to better estimate amount of DERs that can be accommodated on distribution feeders without significant upgrades. Provides PSE confidence in its ability to safely interconnect large amounts of DERs without violating established limits (e.g., voltage, loading, protection). Attract DER development in designated areas of the grid and improve DER interconnection processing time. Representative activities include:</p> <ul style="list-style-type: none"> Enhance and streamline PSE’s HCA, focus on granularity, scalability, repeatability, and transparency Develop and publish HCA heat maps so that DER developers can plan their projects in response to grid needs 	All programs requiring device interconnection	2022	No Change
Innovation Pipeline Processes	<p>Formalized process for identification, selection, implementation, and management of key innovation projects. This enables PSE to:</p> <ul style="list-style-type: none"> Quickly identify and test/demonstrate emerging technologies necessary for new DER products/programs Collaborate with vendors to align products to better support the needs of PSE’s customers and business 	NA – Supports emerging products and subsequent CEIPs	NA	2023
Regulatory & Stakeholder Engagement Strategy	<p>Develop a portfolio-level strategy for engaging regulators and other key external stakeholders as PSE pursues development of the CEIP product portfolio. This strategy would outline the approach for filing & seeking approval of all products, establish processes to ensure coordinated outreach and tariff development/filing efforts across the entire portfolio, and provide strategic direction for individual product activities. A successful strategy could enable:</p> <ul style="list-style-type: none"> Quicker approvals from UTC, allowing PSE to launch products sooner Alignment with stakeholders to get buy-in and support of products 	All programs	NA	Q2 2022
Feeder Level Forecasting Tool	<p>Support T&D planning in understanding load growth and future capacity of DERs on feeders. This can enhance PSE’s feeder-level forecasting to better understand the impacts of new customer DERs (e.g., new EV load, intermittent DER supply). Representative benefits include:</p> <ul style="list-style-type: none"> More accurately forecast the growth of DERs on feeders and their grid impacts Identify emerging NWA opportunities Inform Distribution System Planning and DER locational benefits analysis 	All programs	Q3 2022	No Change
Locational Pricing & Valuation Tool	<p>This tool will enable PSE to quantify the value of location-specific costs and benefits and incorporate these into DER product compensation and business cases, which may enable PSE to recognize additional cost-effective use cases and increase the total value associated with various DER products. This will aid in competitive solicitation of NWAs and development of incentive payments that create positive value for all ratepayers</p>	NEM Successor, Energy storage-NWA; likely future storage and solar programs	2025	2024

Key Milestone Updates for DER Enablement – Customer (1/2)

Key Milestone	Functions	Programs Requiring Milestone	Scheduled Date	Proposed Date
Portfolio Customer Care Strategy	<p>Establishing a comprehensive strategy outlining an approach for managing customer inquiries, educating customers & driving program enrollment, and resolving customer issues/concerns across the DER product portfolio. This will be critical to maintaining positive experiences as PSE begins to offer many new options for customers. Representative items addressed in this strategy would include:</p> <ul style="list-style-type: none"> • Insourcing vs outsourcing of customer care activities • Identify resource expansion and training needs of Energy Advisors team, CSRs, and other impacted groups • Approach for identifying & offering program recommendations • Approach for resolving key customer issues, such as increased bills 	All customer-facing programs	NA	Q1 2022
Portfolio Marketing Strategy	<p>Effective customer outreach will be critical for PSE to achieve the volume of enrollment needed for CEIP goals. With a greater number of DER products, new challenges may emerge in “overloading” customers with too many marketing communications. A portfolio marketing strategy can yield synergies and cost savings for marketing efforts. Representative activities include:</p> <ul style="list-style-type: none"> • Develop strategy & approach for customer targeting: Which customers will be marketed to for which products? • Establish process for scheduling & coordinating outreach and ad-buys across the portfolio • Identify key branding & messaging themes to be incorporated by all products • Identify opportunities for cross-promotion between products • Develop centralized source for customer data (e.g., leads, interests, enrolled customers) 	All customer-facing programs	Q4 2022	Q3 2022
Customer Relationship Management (CRM) Platform	<p>As PSE's portfolio grows both in the number of product options and total customer participation, a CRM platform can provide critical support to facilitate lead generation and managing program enrollment & customer support. Key functions include:</p> <ul style="list-style-type: none"> • Marketing communication tracking & sales process management • Visibility into customer communications, enrolled products, devices in the home, and other data to improve customer support & product recommendations 	All customer-facing programs	2025	2023

Key Milestone Updates for DER Enablement – Customer (2/2)

Key Milestone	Functions	Programs Requiring Milestone	Scheduled Date	Proposed Date
Marketing Platform	Informed by the strategies above, establishing a marketing platform will enable more data-driven marketing approaches, resulting in increased program participation per dollar spent. Key functions of this platform would include: <ul style="list-style-type: none"> Customer Propensity to Participate analytics: identifying the customers most likely to participate in various products Next-Best Action Recommendations: Based on a customer's history and goals, what product(s) should be recommended to them? 	All customer-facing programs	2023	No Change
Customer Enrollment & Education Portal	With more customer program choices, a centralized landing page will help customers learn about the range of programs available, increasing cross-sell opportunities, and easily navigate to educational content and tools for each program, such as savings calculators. Additionally, a centralized landing page for the full portfolio allows PSE to leverage common marketing across the portfolio, rather than targeting each product's marketing to stand-alone web pages.	All customer-facing programs	NA	2023
Customer Notification Platform	Many DER products require PSE to communicate with customers as part of the program design. These products require a messaging platform to store customer communication preferences and to notify customers of events or other key program information. Additionally, PSE may choose to provide customers the option to opt out of an event, requiring 2-way communications.	All customer-facing programs	NA	2023
Complex Billing Functionality	Many DER products will require implementing billing system changes, including some which will require the support of entirely new rate structures such as Critical Peak Pricing (CPP), Peak Time Rebates (PTR), and Real-Time Pricing (RTP). PSE can achieve cost and time savings when implementing new products by pursuing strategic upgrades/releases which enable multiple DER programs with common required billing functionality (e.g., fixed monthly payments, event-based compensation).	All customer-facing programs	2025	2023
Device Marketplace	Many peer utilities have successfully utilized a utility-branded web portal which enables customers to shop for devices or services related to participation in a DER program directly from the utility website. These portals can support increased program adoption while also improving customer experiences by streamlining enrollment processes.	All device incentive and bring-your-own device programs	NA	2024

Key Milestone Updates for DER Enablement – Operations (1/2)

Key Milestone	Functions	Programs Requiring Milestone	Scheduled Date	Proposed Date
Asset Management Strategy	<p>Development of comprehensive approach to PSE-owned DER resource awareness, management and optimization, training (including safety and fire standards), and maintenance. Due to the highly specialized nature of DER devices, PSE will likely need to acquire or augment their team with new skillsets to support DER installation & maintenance activities. Representative activities include:</p> <ul style="list-style-type: none"> • Develop standard operating and maintenance procedures • Assess internal capabilities and resource availability, develop approach to acquire necessary skills and resources • Develop DER asset data strategy (data, systems, governance, validation) 	All programs that are FOTM and/or feature PSE device control in any way	NA	Q4 2021
Dispatch & Operations Strategy	<p>PSE can leverage DERs for a variety of grid services. Establishing clear processes for determining when and where dispatch is needed and how events will be managed is critical to ensuring DER resource availability when called upon. Initial applications may be focused on DR events but use cases can be expanded (e.g., Energy Imbalance Market Participation) in the future based on feasibility and benefit. To maximize the benefits of DERS, PSE should develop the mechanisms to dispatch DERs to provide both local and system-wide benefits.</p>	All programs that are FOTM and/or feature PSE device control in any way	NA	Q1 2022
Virtual Power Plant (VPP)	<p>Enables dispatch, monitoring, and forecasting of DERs prior to DERMS being available through ADMS. The VPP can be used for both FTM and BTM DERs and enables the aggregation of different technologies and vendors into one platform for visibility and control.</p>	All DER programs requiring active device management	Q3 2022	No Change

Key Milestone Updates for DER Enablement – Operations (2/2)

Key Milestone	Functions	Programs Requiring Milestone	Scheduled Date	Proposed Date
Interconnection Portal Enhancements	<p>Enhancements to PSE’s interconnection portal and processes can reduce the time it takes to review, approve, and live a DER, helping to achieve the aggressive growth of DERs needed to meet IRP requirements. Representative activities include:</p> <ul style="list-style-type: none"> • Application workflow management for FOTM and BTM solar and storage resource interconnection • Extend workflow management to larger interconnection • Integrate automated HCA into PSE’s DER interconnection process to improve processing throughput • Improve interconnection and billing/payment functions for systems over 100 kW • Ensure mapping of interconnected assets • Extend functionality of net metering for multi-family housing • Streamline FTM interconnection process • Automate reviews 	All solar and storage programs with assets above certain capacity thresholds	2024	2023
DER IT/OT Strategy	<p>The DER portfolio will rely on a complex and highly interconnected network of IT/OT systems, including external 3rd parties, in order to deliver grid services which may be critical to maintaining reliability. Establishing a guiding strategy for deployment and ongoing maintenance of this infrastructure early in the product development process will enable a more effective and coordinated rollout. Key items addressed in this strategy could include:</p> <ul style="list-style-type: none"> • Long-term deployment roadmap for enabling technologies, integrated and aligned with other enterprise initiatives • Ongoing support strategy, including any required SLAs or other contractual obligations which need to be included for aggregators/3rd parties. 	All programs	NA	Q2 2022
Advanced Distribution Management System (ADMS)	The ADMS platform will enable many key areas of functionality to help manage the real-time operations of the distribution grid. To maximize the value of ADMS and ensure an accurate model of the grid following high DER penetration, it will be critical that DER are modeled & forecasted in ADMS.		2023	No Change
ADMS-integrated DER Management Systems (DERMS)	Building on the functionality provided by a VPP, an ADMS integrated DERMS will continue to provide monitoring, forecasting, and dispatch capabilities for DER, but now integrates these capabilities with the ADMS’ real time grid modeling & management, enabling ADMS to have full visibility into DER and control over DER, where applicable.		2025	No Change