

1547-2018 Update



GET IT
DONE!

Adoption of IEEE 1547-2018/UL 1741 SB is continuing at an accelerating pace in North America. For example:

- Washington, DC adopted 1547-2018 in 2022, subject to the availability of certified products;
- Hawaii started accepting only UL 1741 SB-certified inverters in February of 2023;
- Massachusetts started requiring UL 1741 SB in 2023, and ISO New England is likely to follow Massachusetts;
- Maryland requires UL 1741 SB starting January 2024;
- New York and Philadelphia have adopted 1547-2018;
- Texas has started the IEEE 1547-2018 adoption process;
- And the industry is rapidly completing certification of UL 1741 SB inverters, with over 100 specific inverters certified as of July 2023.

FERC Order 2222

Four primary categories for successful implementation

1. Legislative/Regulatory to enable (On-going for next several years)
 - Includes things like permitting (SolarAPP+), standards adoption (1547-2018) and interconnection process/administration (PowerClerk) and many more (metering, telemetry, governance of aggregators, dual registration, etc.)
 - Phased/Tiered – MO LBNL report is a great framework to consider implementation
2. DER Administration, Data Sharing and Retail/Market enrollment for DER Aggregations – DER Registry (Needed now)
3. DER Operational Coordination – NREL PRECISE (Needed in a couple of years for most areas) –
4. Settlement (Needed in a couple of years for most areas)

Reframing how we think about FERC 2222

2222 is a mammoth opportunity for our industry – Not a burden

- By having all of industry attack this issue simultaneously, we have the unique opportunity to develop collaborative solutions at a much lower cost than 3000+ utilities doing it ad hoc.
- We see 4 primary opportunities in this 2222 implementation process
 1. Non-Profit DER Registry is first example. Estimated savings to industry \$20-\$40 billion in next 10 years.
 2. CIM-inspired data structures could lead to another \$100B of savings by recognizing that DERs are the new player and if CIM APIs exist from registry to all other CIM structures (and thus utility systems). The onus shifts from the utility industry to the vendor industry to create CIM APIs to known data structures. This would lead to the elimination all software integration costs to enable DERs to the grid and market as well drive a broader implementation of CIM with the same benefits to all other utility system interfaces. (UK example and DOE project) This fundamentally speeds up the innovation cycle across our entire industry.
 3. Meter/Settlement if done 'Right' could lead to another \$75B of savings and simplify 2222 implementation for meter data sharing and settlement
 4. Common Communication Systems – Consumers are paying for multiple overlapping networks for Gas, Water and Electric communication systems for AMI and operations. Isn't it time for these utilities to work together on one shared cost infrastructure? Isn't it time for utilities across your state to work together on a combined solution for all?

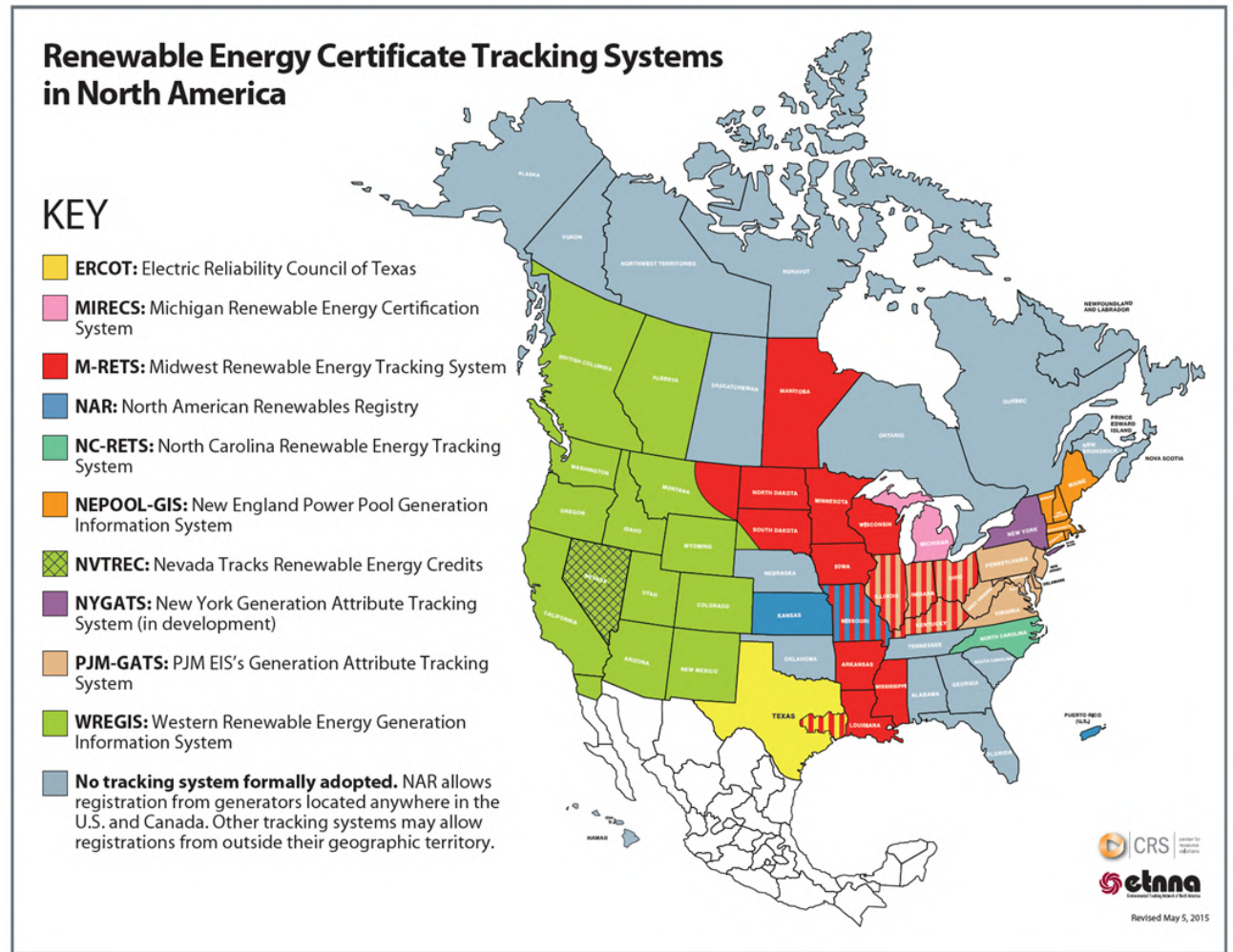
A step in the right direction – Partial Collaboration with REC Tracking Systems

Dozens of REC tracking programs initially. 11 made it to the mainstream

Many states forced to use multiple systems across different ISO's.

The Non-Profit DER Registry is an opportunity to fully collaborate. Allowing us to skip over years of ad hoc development, implementation and confusion.

In addition, AI will soon give us enormous power to marshal DER resources. But that can only happen efficiently if the data is accurate, and consistent/normalized across multiple systems. The resulting ecosystem would provide the requisite situational awareness that otherwise eludes multiple parties that need it.



Meter/Settlement Savings Example

Smart Meter Texas did it wrong! They made a 'mirror' and doubled costs by having utilities continue storing data and also creating a second 'open data repository'.

Ontario did it RIGHT! Distribution utilities manage their meters and head end collection systems, but the ISO runs the only data repository.

Dramatic cost reduction in compute, storage and personnel/outourcing costs in Ontario's structure. Provides fair access to data based on RERRA approval.

2222 sets the stage for states to do this "Right" versus the way it has always been done.



Need Regulatory Leadership

- History of the world – Heavily regulated industries rely on policy direction/innovation, not industry innovation. Nothing is going to change without regulatory vision to require the change.
- DERs (especially EVs) currently present major challenges (and opportunities!) to existing utility business and regulatory models.
- **Implementation of 2222 is the single biggest opportunity of ‘our lifetime’** for meaningful impact across the entire industry to lower cost, improve resiliency and take advantage of these new clean energy resources called DERs.
- Opportunity for collaboration vs ad hoc implementation could result in billions of dollars of savings for our industry and consumers vs. business as usual.
- But it will come down to state commissions directing these actions and your leadership is paramount in the next 3 years.
- And, by the way, every software vendor will fight to do it their way and keep their ‘cash cow’ utility business intact. And, every utility will provide the million reasons they need their own dedicated system because they are ‘unique’.

Collaborative Non-Profit DER Registry Briefing

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Collaborative UTILITY
SOLUTIONS

EMPOWERING THE ENERGY TRANSITION

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Deliver a national collaborative DER registration system, saving billions of dollars for our industry and customers

Implement standardized and secure data exchanges, enabling information sharing and easing regulatory reporting.

**Empower the Energy Transition
Through
Simplification and Collaboration**

Automated DER & DERA policy enforcement and approvals for both retail programs and market products

Provide leadership and education from board and industry experts, preparing everyone for a DER enabled future

What is our purpose at Collaborative Utility Solutions (CUS) and Creation Energy (CE)?

The very foundation of the entire electricity model is shifting from a central station generation model to a distributed generation model. To successfully transition to this model and benefit customers *and* the grid, we must effectively collaborate across all industry segments and stakeholders. Therefore, our goal for CUS and CE is:

EMPOWERING THE ENERGY TRANSITION

The core of our mission – *to advance and support the electric industry by developing, enhancing access to, and enabling data and technology regarding Distributed Energy Resources to support a clean energy future.*

DERs Are Not Well Understood

- Many view DERs as a problem instead of a potential solution.
- Use Cases for DER applications in grid and markets are limited and inconsistent across the world.
- Standards (IEEE 1547-2018, UL 1741 SA & SB and IEEE 2800) are not being adopted consistently. Therefore, the industry does not have a common frame of reference for Use Case development of these resources, and this leads to 'inadequate' resources continuing to be deployed into our grid systems.
- Terminology not 'standard' – What's a DER (Who's definition? Market, Reliability or other?) NERC U-DER and R-DER not mainstream yet.
- Expected penetration rates for DERs vary widely based on the vendor, utility, ISO, or agency model. This is creating inconsistent 'urgency' to adequately characterize and integrate DERs into the grid and markets.
- Regions like Australia, Germany, Ireland, California and Texas that have high penetrations of DERs/IBRs have experienced cascading outages and have identified a Registry as the key component to help resolve issues.

DER Initiatives Around the World

Immense amount of activity you should be aware of to eliminate redundancy

FERC

- 2222 Ruling and ISO DER Working Groups (Dozens of State Regulatory dockets opened)
- RM22-12 DER Data and Modeling
- First Use Policy
- 719 Removal of Opt-out Discussions

DOE

- Joint Project with NARUC on DER data needs
- DER Services list/matrix
- Grid Codes for DERs

Australia

- Inverter potential replacement
- Implementation of first DER Registry
- Instantaneous Renewable Energy over 90%, moving to 100%, grid implications

EU

- Registry Standard

DER Initiatives Around the World (cont)

Immense amount of activity you should be aware of to eliminate redundancy

NARUC

- Joint Initiative with DOE on DER data
- Joint Initiative with NASEO DER Integration and Compensation (DERIC)**

NAESB

- 2023 WEQ Plan

NERC

- RM22-12 Interaction with existing SAR processes on DER Data needs for reliability
- The *Reliability Guideline: Modeling DER in Dynamic Load Models*, published in December 2016.
- The *Reliability Guideline: Distributed Energy Resource Modeling*, published in September 2017.
- The *Reliability Guideline: Parameterization of the DER_A Model*, published in September 2019.
- Cyber Security for Distributed Energy Resources and DER Aggregators published in December 2022.
- SPIDERWG

IEA

- Unlocking the Potential of Distributed Energy Resources

DOE OE – Distribution Transformation Project

- Aggregator Code of Conduct
- Contractual Mechanism to resolve Governance/Oversight Issues without Legislative process

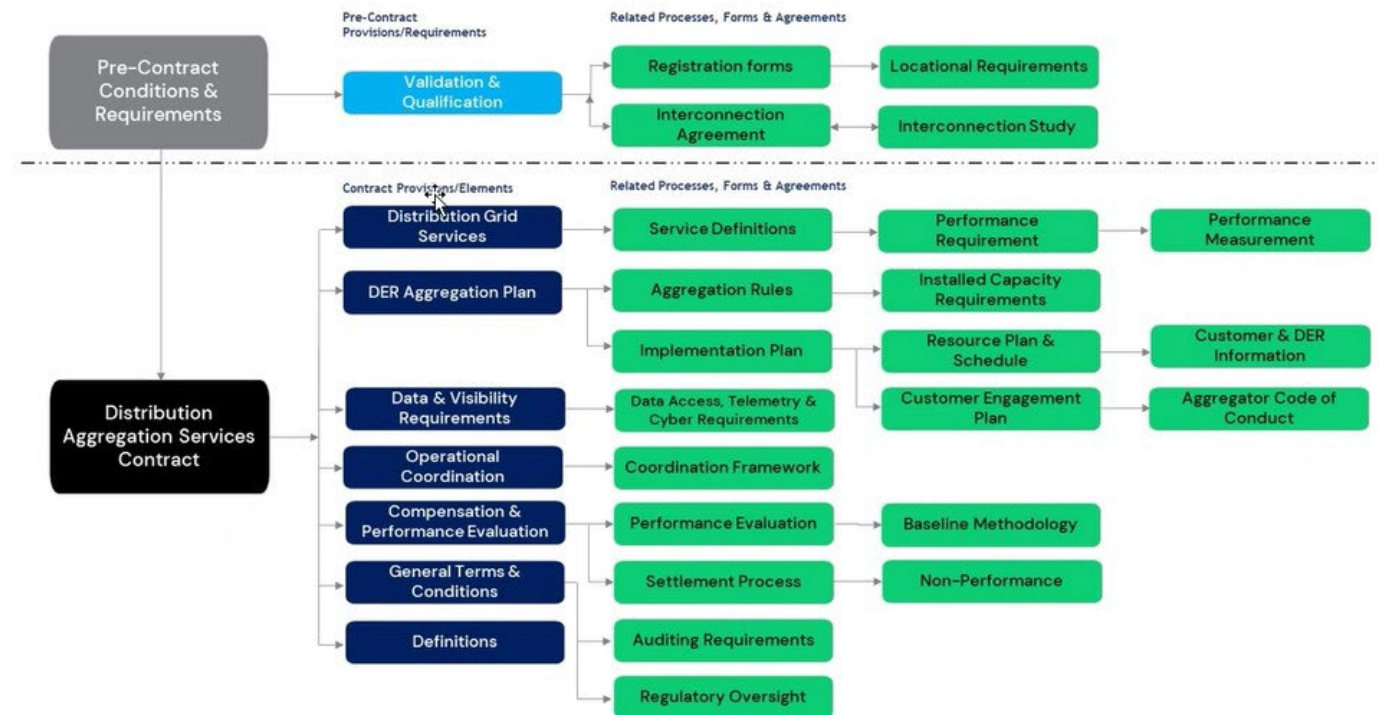
And many more . . .

#1 Issue Discussed: State Governance/Oversight of Aggregator

Distribution Aggregation Services Contract Structure

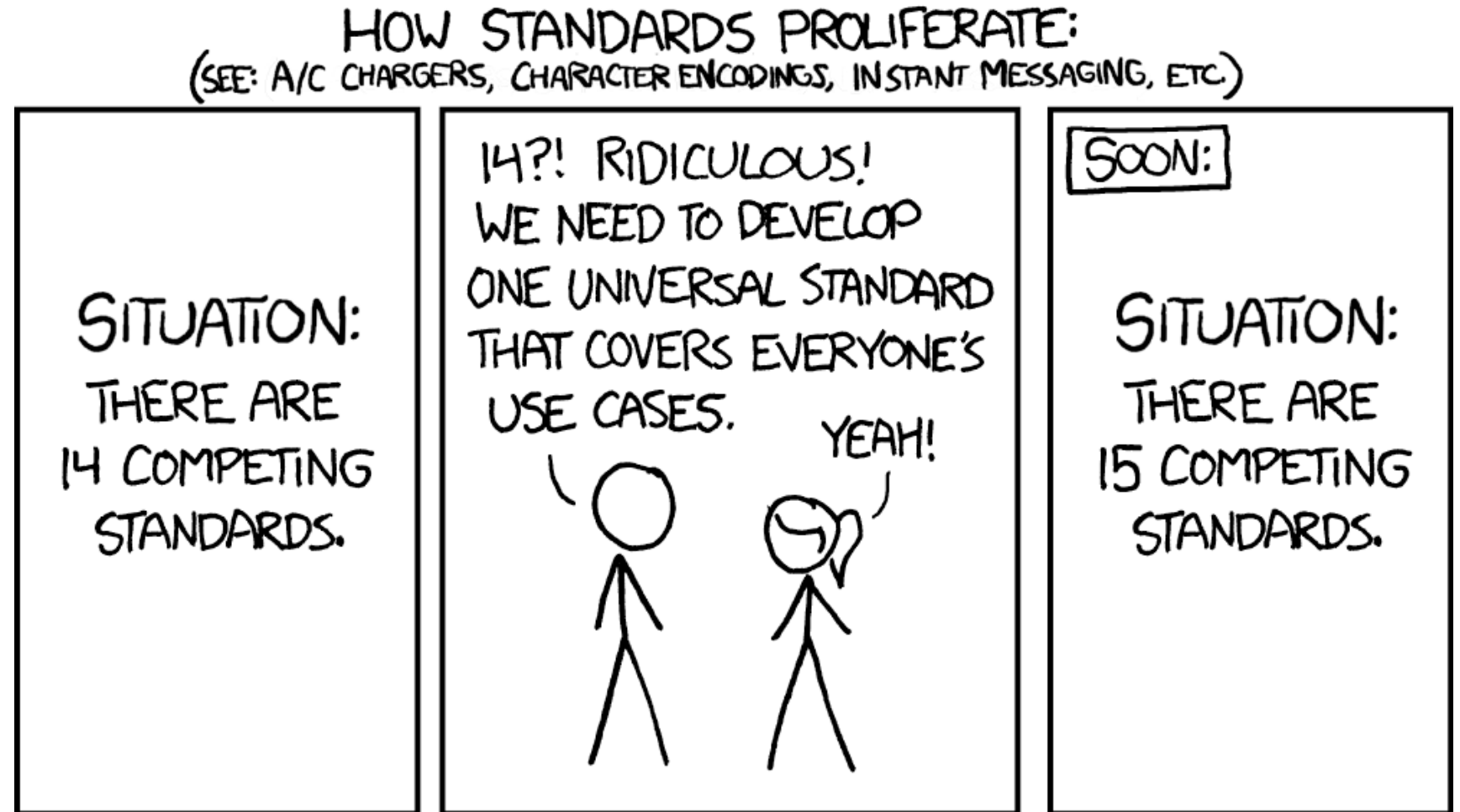
MO LBNL Report 'Tiered Approach'

- Tier 1 – Bi-lateral Contract/Code of Conduct
- Tier 2 – Aggregator as 'public utility' with Commission defined scope of regulation
- Tier 3 – Legislation/Regulation



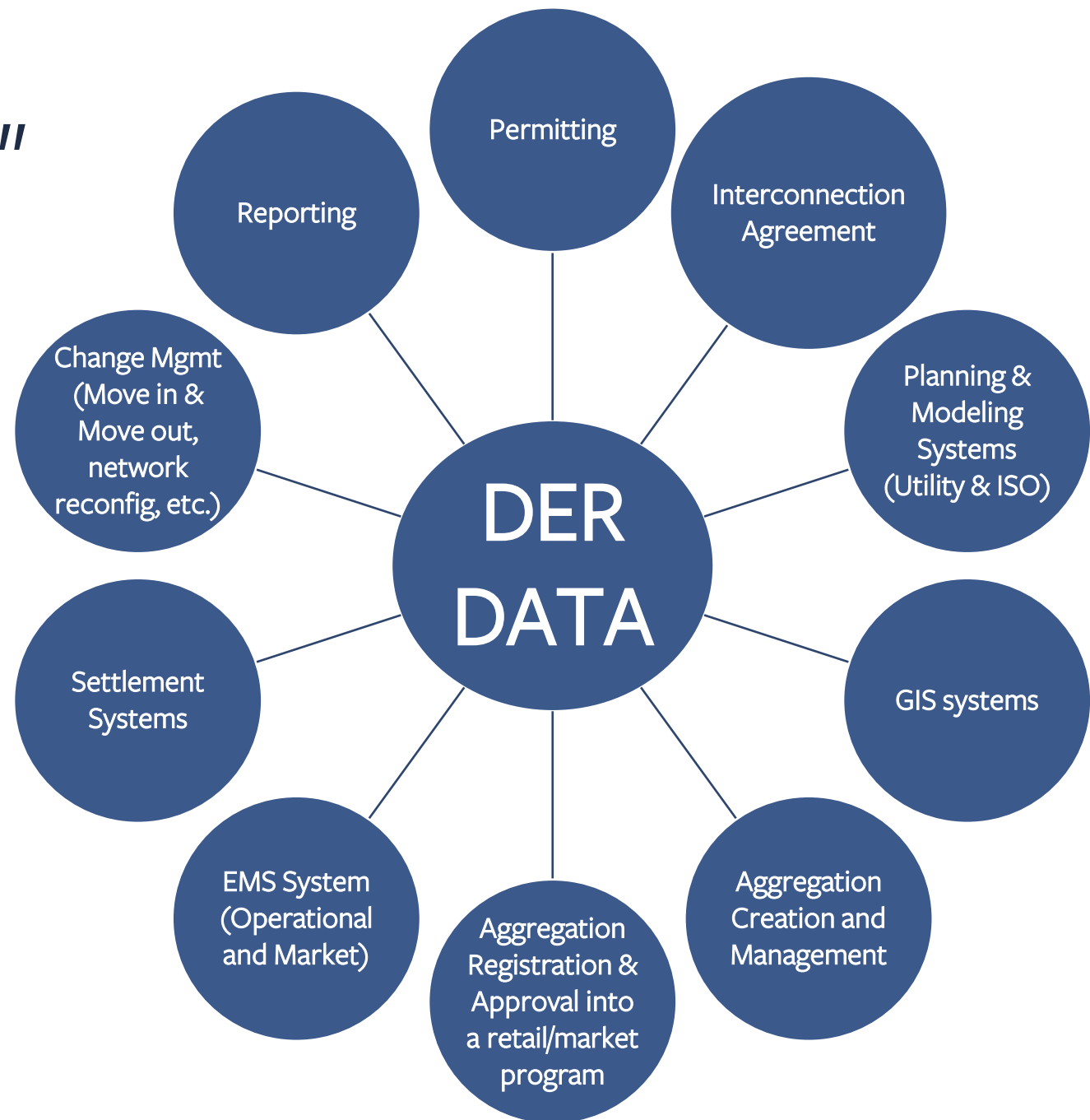
Collaboration Must Increase

We have the opportunity to get in front of this and simplify through collaboration



DER Data "Uses"

Isolated Efforts by any single group or function create barriers to successfully enable DERs



What's in a Registry and Why?



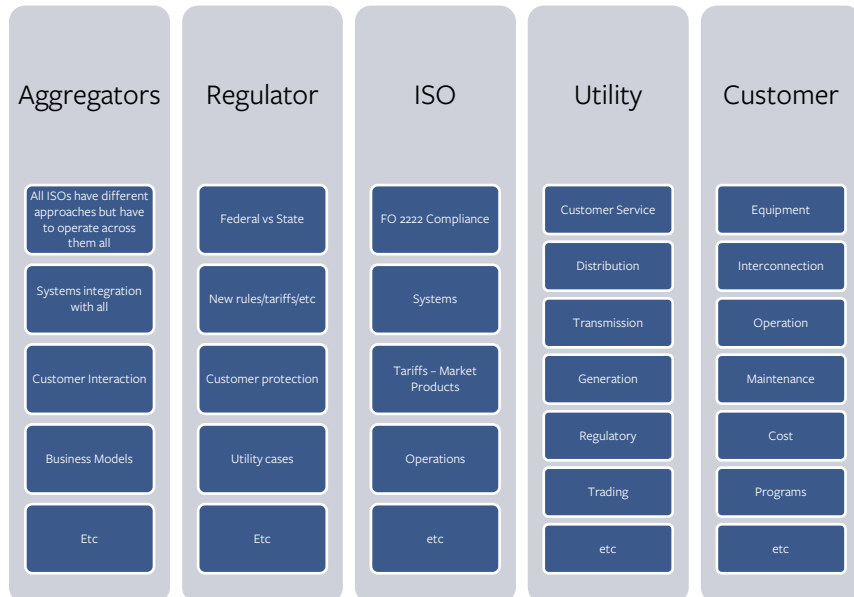
Process must be 'physics based' not 'policy based'. Can't be hung up by naming conventions, market structures, and corporate structures. What is the core data required to enable DERs to make it all work?

REQUIREMENTS

- Requirements pouring in by the dozens/hundreds
- Each major group and their subgroups have their own concepts

Pre-Competitive DER Registry

The Base Data Set required for all stakeholders.



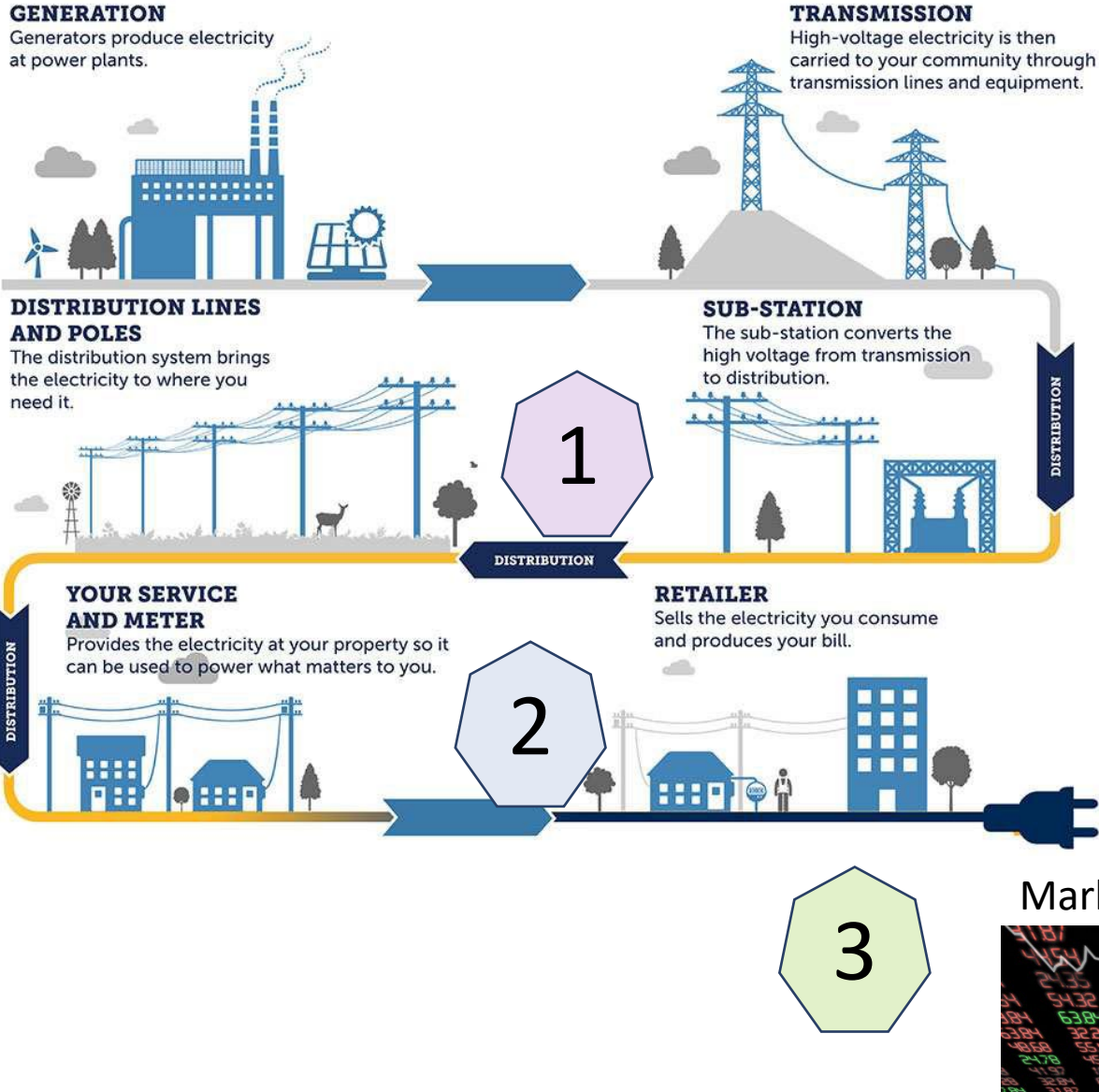
Shared Data: Enabling DERs through Collaboration

To meet the challenges before it, the industry must know:

WHAT IS IT?	•Solar, wind, battery, EV, mix of several, etc.
WHERE IS IT?	•Geospatial coordinates with premise address, utility meter, and Geospatial Interface. Electrical position in the network: Premise-Meter-Transformer-Feeder-Sub-Transmission-ISO Node/Region.
WHAT CAN IT DO?	•Capability and dispatchability.
WHO OWNS IT?	•Who can register and market?

All stakeholders (Utilities, ISOs, Aggregators, Scheduling Coordinators, Competitive Retail Electric providers, etc.) must have fair and equal access to the data they need based on appropriate regulatory authority oversight which determines which data elements in a registry are available to each stakeholder.

Three Key Interfaces of Data Exchange for DER



Interface	System Description	Business Description
1	EHV/Bulk Electric System interface to Distribution System at the Substation	ISO/RTO operations and planning interface to Distribution Utilities at the Substation
2	Distribution System interface to Premise at the Meter	Utility/Retailer interface to Consumer at the meter
3	Market Systems	DER Interface to Market and Utility Programs

The Registry must be built with CIM in mind

“déjà vu all over again”
– Yogi Berra

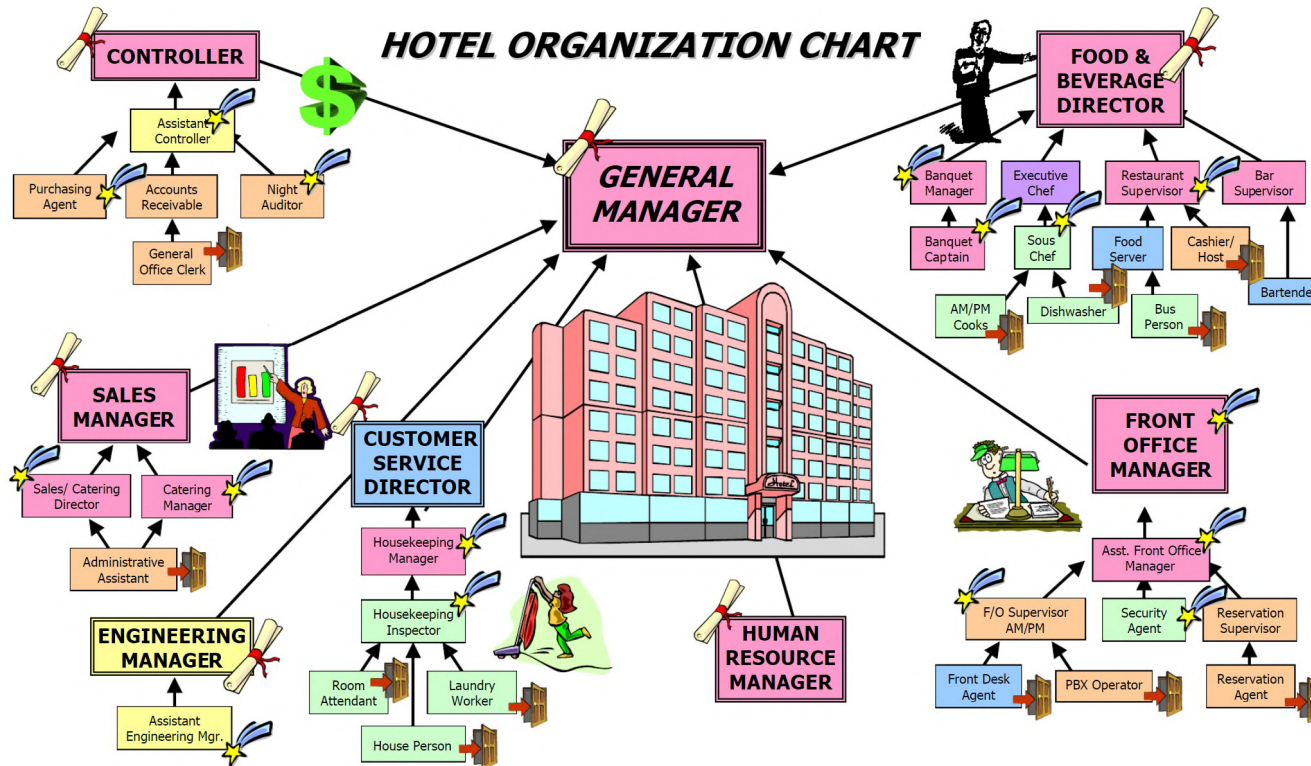
Solving the same exact problem but for millions of generators instead of a few thousand. Will it take us another decade?

The Common Information Model (CIM) was developed as an open standard for representing power system components. CIM was originally developed by EPRI in North America and is now a series of standards under the International Electrotechnical Commission (IEC)

This format has been adopted by the major EMS vendors.

Solving the ‘DER Interface’ is the exact same issue, just for millions of small generators vs tens of thousands of big generators.

Why Share Data and Who Makes the Call?



- Makes perfect sense to all of us that the General Manager would want to see all of the data from all groups, right?
- Does it make sense that the Hilton CEO would want to see data from all hotels?
- Does it make sense that key suppliers would have access to some of the data?
- Now think of each hotel like a power plant:
 - Anyone here go through the process of getting groups to share data at a plant? Or across all plants?
 - Or getting different silos of your utility to share data or plan for a common system?
- Now think of DERs, not personally from where you sit in a part of an organization, but from the overall grid reliability, safety, affordability and sustainability. If you sit in a DSO, you may not want to share your information, but if you sit at NERC or an ISO, you know that you also need that information for overall grid reliability.

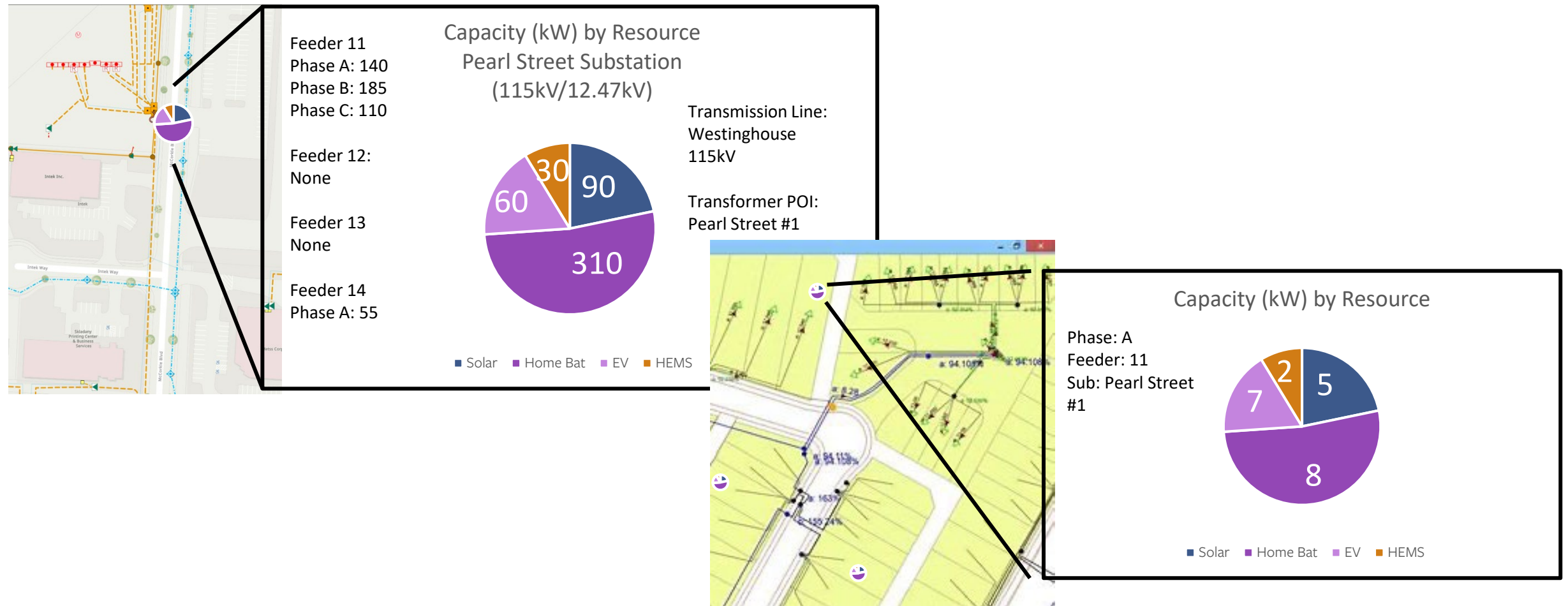
Data Access

Data Access to the information in the DER Record is determined by each appropriate regulatory authority. The Registry allows this dynamic ability for each regulatory authority to define who shall have access to each data element in the Registry.

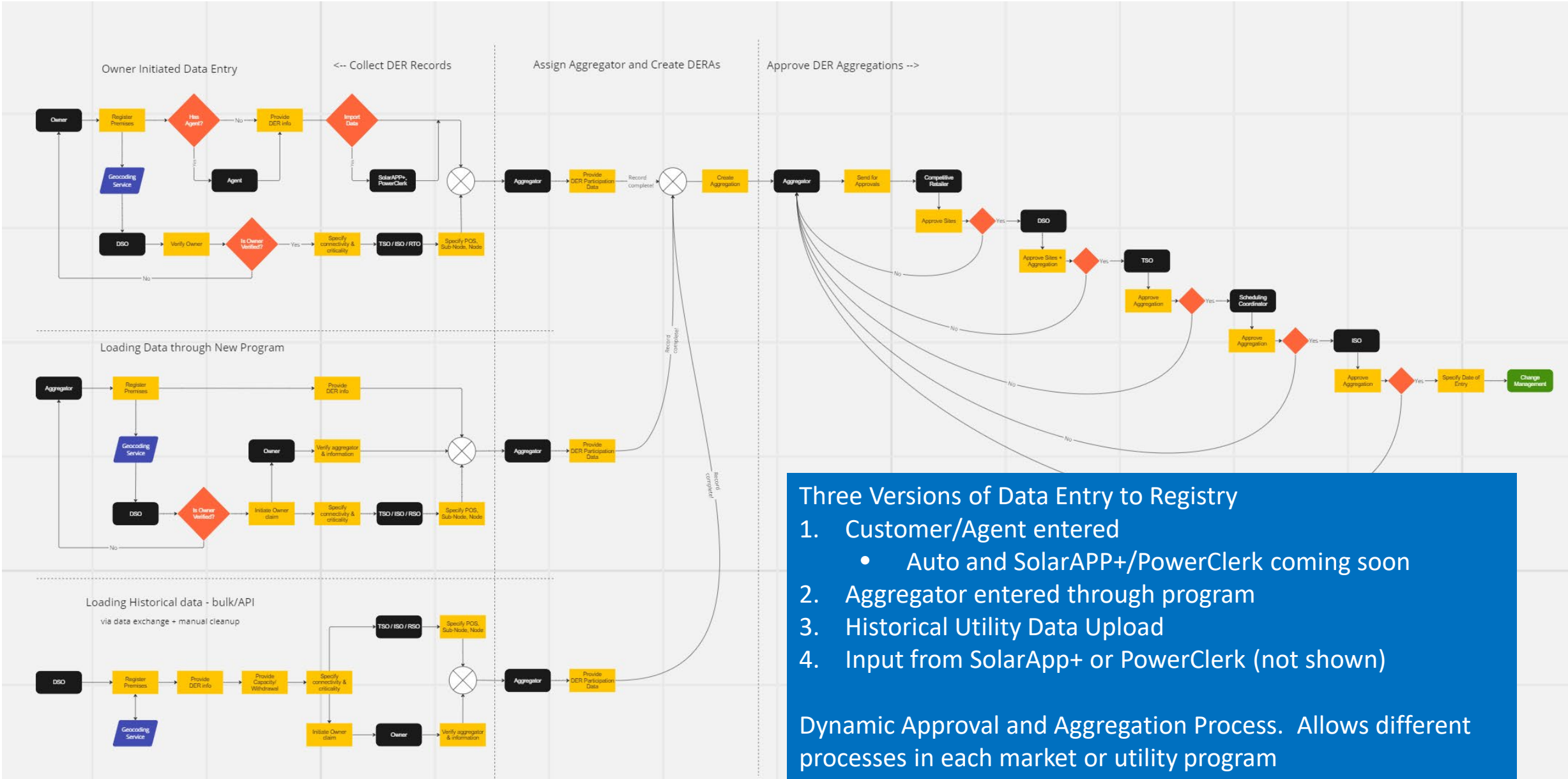
WHO HAS ACCESS TO THE DATA? (Each Regulatory Authority to define)										DER RESOURCE RECORD CREATION		
Sched Coord	Comp Retail Supplier	Equip Mfg	Aggregator	Regulatory Authority	ISO/RTO	TSO	DSO	Owner Agent	DER Owner	*REQUIRED DATA		DER Registry
										Entered by:		Field Description
										DER OWNER INFO		
	X		X	X			X	X	X	DER Owner*		First Name (As it appears on utility bill)
	X		X	X			X	X	X	DER Owner*		Last Name (As it appears on utility bill)
	X		X	X			X	X	X	DER Owner*		Address 1 (As it appears on utility bill)
	X		X	X			X	X	X	DER Owner*		Address 2 (As it appears on utility bill)
	X	X	X	X			X	X	X	DER Owner*		City
	X	X	X	X			X	X	X	DER Owner*		State
	X		X	X			X	X	X	DER Owner*		Zip
	X		X	X			X	X	X	DER Owner*		Phone Number (premise)
										DER Owner*		Phone Number (mobile)
	X		X	X			X	X	X	DER Owner*		Email
X	X		X	X	X	X	X	X	X	ESRI*		GPS Coordinates
	X		X	X			X		X	DER Owner*		Utility Account Number
X	X	X	X	X	X	X	X	X	X	DER Owner*	pick list	Distribution Utility Service Provider
X	X		X	X	X		X	X	X	DER Owner*	Y/N	Do you have a Competitive Retail Supplier (CRS)?
X	X		X	X	X		X	X	X	DER Owner*	pick list	Pick your CRS
X	X		X	X	X		X	X	X	DER Owner*	Y/N	Do you have an Aggregator?
X	X		X	X	X		X	X	X	DER Owner*	pick list	Pick your Aggregator
				X				X	X	DER Owner*	Y/N	Allow Agent to enter DER Info?
	X			X				X	X	DER Owner*	pick list	Pick your Agent
				X				X	X	DER Owner*	Y/N	Want info from equip mfg?
										DER Owner*	Y/N	Do you have a different aggregator for Demand Response?
										DER Owner*	pick list	Pick your DR Aggregator
X	X		X	X	X		X	X	X	Registry		Premise Unique ID
X	X		X	X	X		X	X	X	Registry		Aggregate DER Unique ID for premise
X	X	X	X	X	X	X	X	X	X	Registry		Date entered into registry
										SOLAR INFO		
X	X	X	X	X	X	X	X	X	X	Registry		Date Entered into Registry
X	X		X	X	X	X	X	X	X	Registry		Solar Unique Identifier
	X	X	X	X			X	X	X	DER Owner or Agent	pick list	Panel Manufacturer Name
	X	X	X	X			X	X	X	DER Owner or Agent	pick list	Panel Model Number
	X	X	X	X			X	X	X	DER Owner or Agent	pick list	Nameplate Capacity of Panel
	X	X	X	X			X	X	X	DER Owner or Agent		Number of Panels

GIS capability is needed for visualization

Different stakeholders will have different views, but this graphical interface allows rapid incorporation into grid planning and operational tools through CIM and Esri tools out of the box without custom interface.



DER Data Collection and DER Aggregation Administration

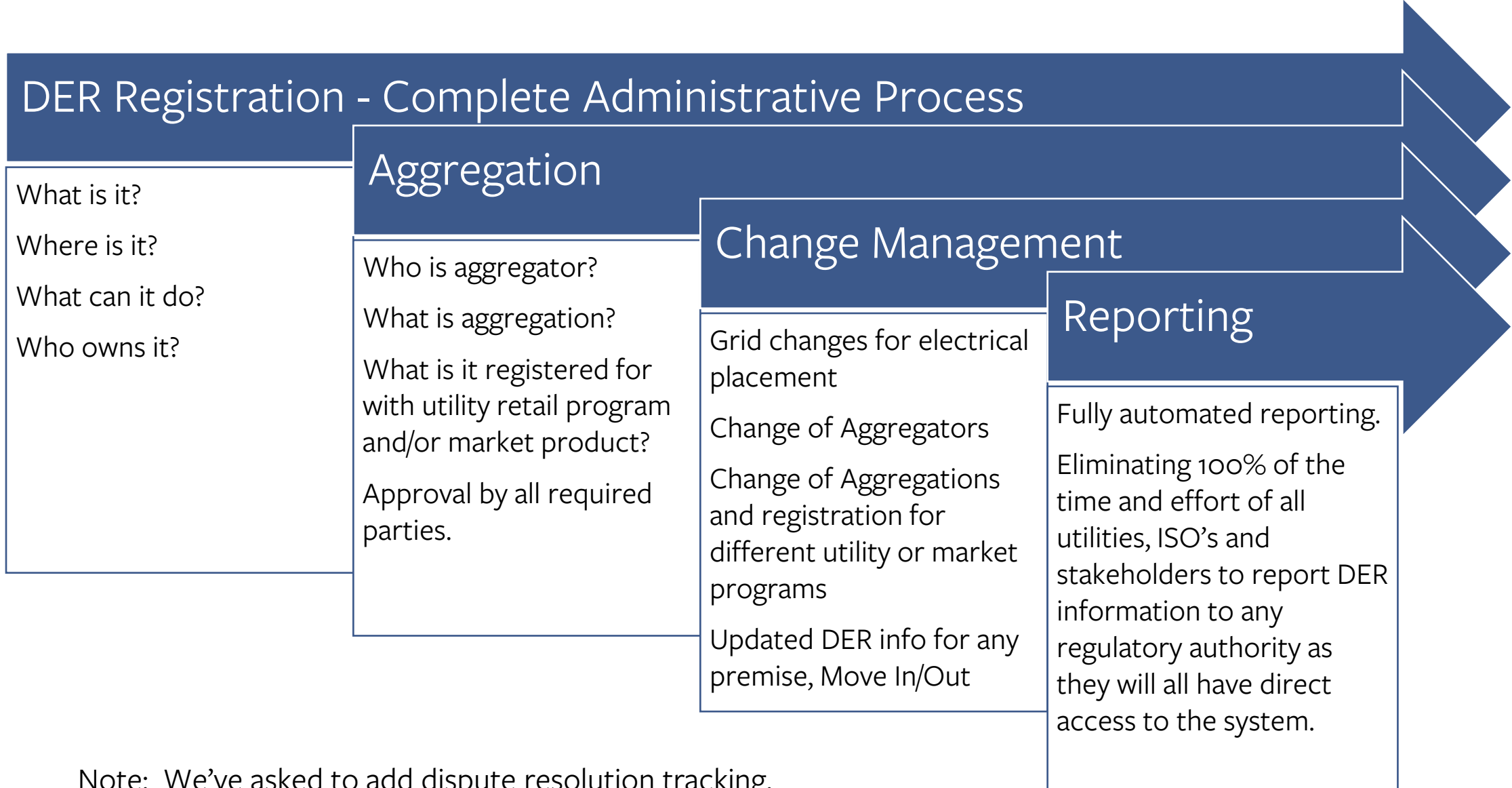


Three Versions of Data Entry to Registry

1. Customer/Agent entered
 - Auto and SolarAPP+/PowerClerk coming soon
2. Aggregator entered through program
3. Historical Utility Data Upload
4. Input from SolarApp+ or PowerClerk (not shown)

Dynamic Approval and Aggregation Process. Allows different processes in each market or utility program

DER Registry: End to End Solution



Note: We've asked to add dispute resolution tracking.

Two ways to develop a DER Registry

Business as Usual – For Profit

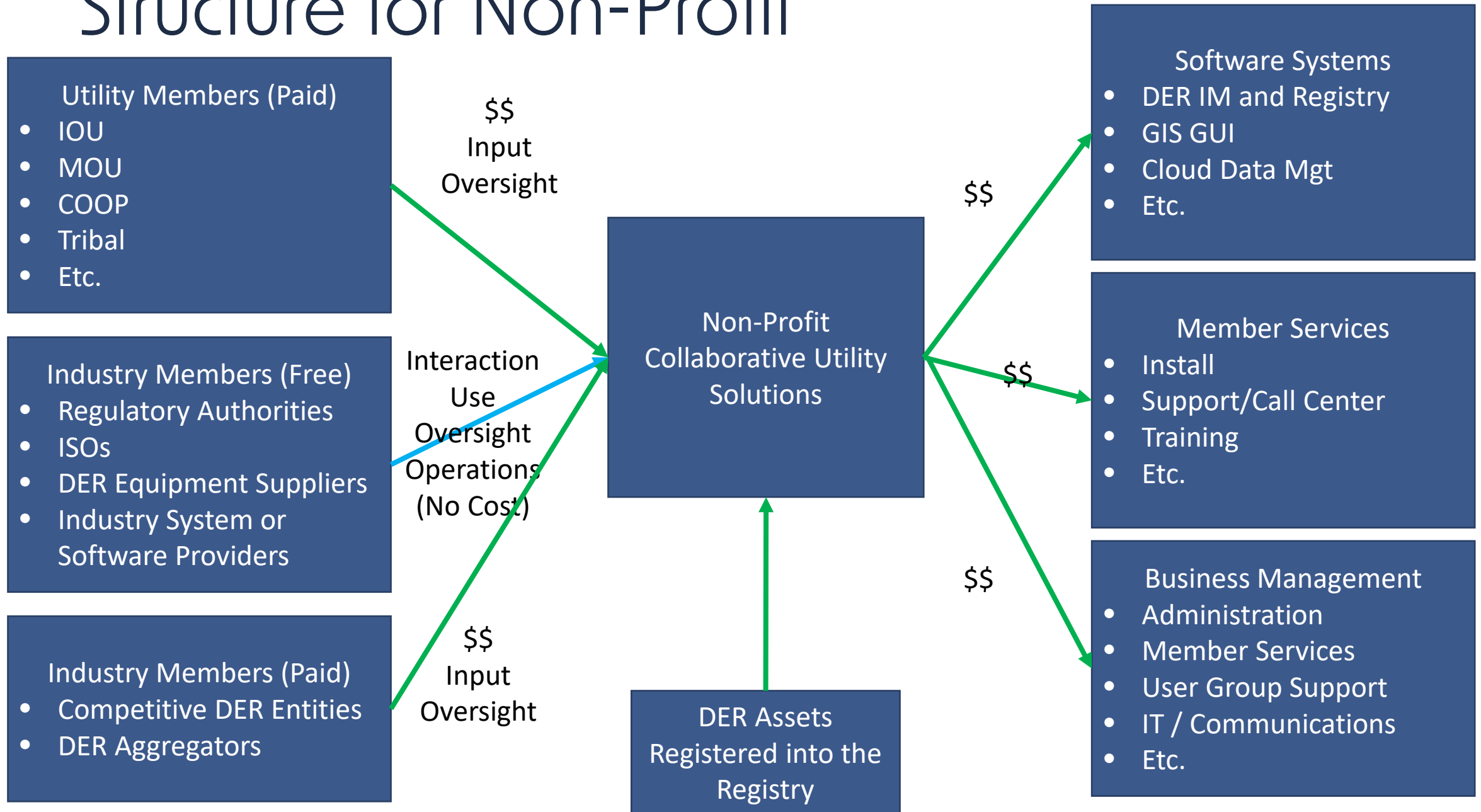
- Multiple Vendors/Platforms with no common requirements or control
- 3000+ Utility/ISO RFP processes, requirements and customizations
- Estimated at \$20-\$40 Billion in cost over 10+ years for utility adoption and implementation
- Proprietary Data structures requiring integration cost to any other system
- Cost continually escalate over time
- Barrier to entry for customers/aggregators requiring multiple integrations across multiple jurisdictions and organizations

Collaborative Non-Profit

- Single common platform with member defined requirements/control
- Collaborative requirements and developed for consistent use and application
- **<1% of cost** for full deployment to all utilities and ISOs in a few years
- CIM based platform to eliminate software integration to existing utility/ISO systems
- Costs continually decline with scale
- Rapid market entry for any resource as any aggregator or consumer has a single, known interface to the market/utility/ISO

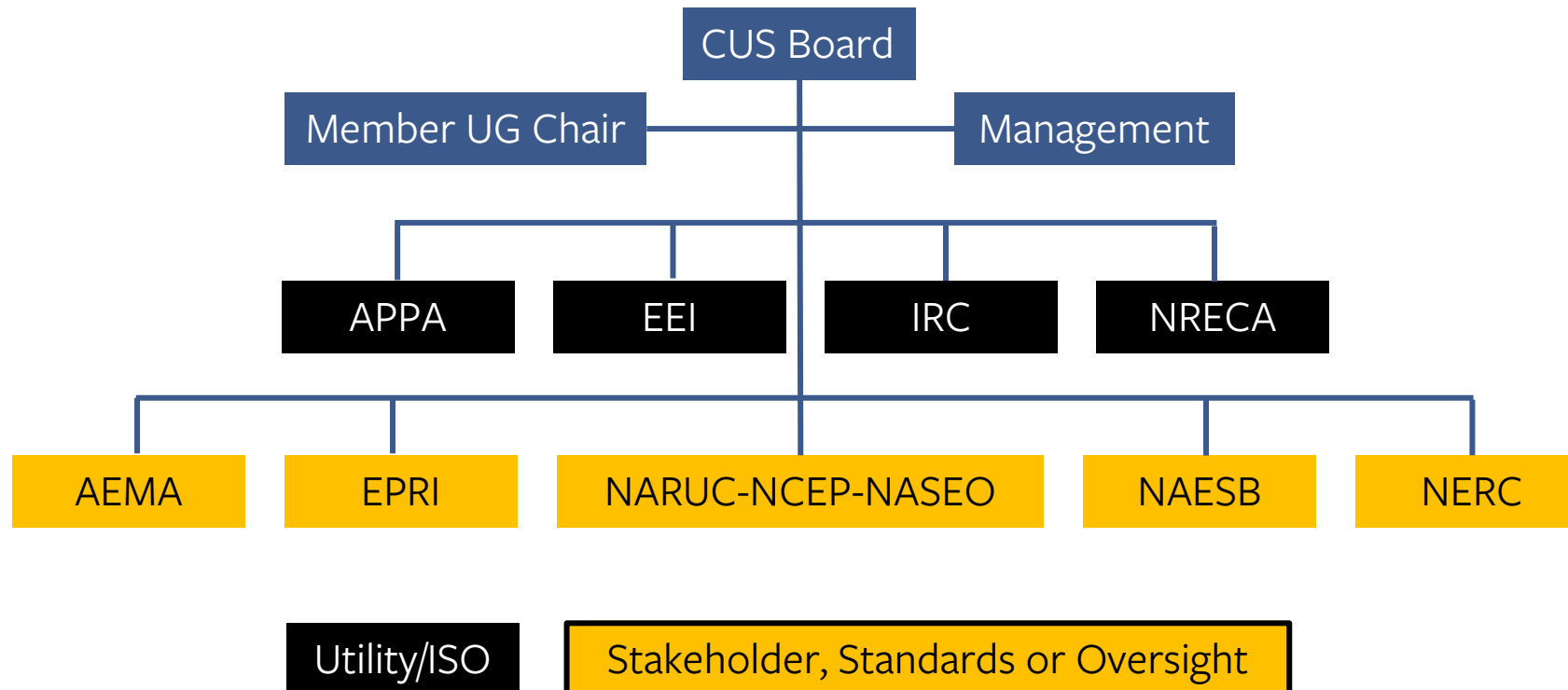
Collaboration is not always possible but enabling DERs through collaborative efforts vs 'business as usual' is possible and has multi-billion-dollar implications for the cost of energy.

Structure for Non-Profit



CUS Board Structure

- The Board of Directors is designed to be comprised of non-profit organizations that represent the segments of the electric industry and set standards for, or have oversight of, the members.
- Through their user group, members will suggest, define, and prioritize changes/enhancements to the Registry. User group chair sits on the Board and will present changes/enhancements to the Board for approval.



Registry Roll-Out

- Announced November 1, 2022, in partnership with Esri.
- Final Testing with current industry supporters in 2023.
- Product Launch
 - ISOs/Regulatory Authorities/Equipment vendors have free access to the Registry
 - All U.S. utilities have free access to 'DER data collection' tool as of March 2023 as Limited Utility Members
- Full Members will have access to the complete suite of tools in the Registry
 - Mapping/Analysis
 - API Integration to existing systems
 - Program Coordination/Approval Process for DER enablement
 - Reporting
 - Etc.

What's coming

- API with PowerClerk to support interconnection process management
 - Shared data structure to allow the registry, permitting and the interconnection process to eliminate redundant customer entry
- API with SolarAPP+ for DER data input
 - If SolarAPP+ used to permit the DER, the data is automatically available to the registry (and PowerClerk) so customers do not have to re-enter
- Fully automated discovery and registration of equipment
 - Reduce errors in data entry and simplify process of registration and interconnection. Validation of previously entered data.
- Future API Collaboration with GIS/CIS/ADMS/DERMS/EMS systems
 - Cross-functional Lab effort with PNNL, ORNL, NREL culminating in CIM based API's for all industry CIMs across Markets/G/T/D/Customer.
 - Continuing work with FERC/NERC on RM22-12 and MOD32

Demo

- Beginning in March, CUS will be announcing two dates each month to provide Demo's of the registry and answer any questions

Deliver a national collaborative DER registration system, saving billions of dollars for our industry and customers

Implement standardized and secure data exchanges, enabling information sharing and easing regulatory reporting.

**Empower the Energy Transition
Through
Simplification and Collaboration**

Automated DER & DERA policy enforcement and approvals for both retail and market programs

Provide leadership and education from board and industry experts, preparing everyone for a DER enabled future

Thank You!!

- We want to thank the immense number of people and organizations that have given their time and energy to bring this Collaborative, Non-Profit DER Registry to life and serve our industry.
- And Thank You for making the time to be with us today to learn about the Registry and its purpose to serve our industry.

Q&A

- Let's deal with the first two questions

“What's the catch?”

“Why do ISO's get it for free?”

501(c)6 – Open book financials and Industry run board and user group so simply put, ‘no catch’.

If we charged ISO's, they would just have to charge their utility members and we'd be stacking costs on utilities.

Appendix

MANAGEMENT BIOS

CHRIS HICKMAN

Chris has three decades of utility industry experience ranging from power generation to regulation to end-use customer services and technologies. He has helped companies envision the future of the industry and how their company is successful in that future. By leveraging new technologies and a vast network, Chris' career has been focused on creating opportunities to help improve the energy industry.

Chris has been a frequent contributor at a variety of utility industry events and leadership conferences, as well as having spoken before Congress, the Federal Energy Regulatory Commission (FERC), state commissions and other influential policy groups. He has served on the boards of the IEEE Power Engineering Society, the GridWise Alliance, and Avistar (an unregulated subsidiary of PNM), along with several non-profit organizations and as a member of the DOE regulatory assistance project team, helping provide a utility industry perspective to state and federal regulators regarding current policy issues. He has also helped 13 countries around the world to develop their national energy policy to enable Distributed Energy Resources.



EDUCATION

BSEE & MSEE, Electric
Utility Management
Program, New Mexico
State University

MBA in Policy and Planning,
University of New Mexico

RICHARD BEESON

Before starting his most recent ventures, Richard was CTO of OSIsoft, where he spent over 30 years creating, developing, and designing enterprise software for process industries resulting in products like the PI System, Asset Framework, and others, that actively serves the worlds power industries. In addition to his executive roles driving strategy, technology and business success, Richard has been active in numerous industry group such as Industrial Internet Consortium and Linux Foundation and has served on panels and presented on a diverse range of technical and strategic topics.

Today Richard is focused on helping realize a more sustainable, equitable and healthy future for all people through companies like [Mr. Dewie's](#) Cashew Creamery, through continuing investments in technology and through ongoing research and development driving the realization of the value of operational information.



EDUCATION

Bachelor of Science
Chemical Engineering
University of California
at Berkeley

MICHAEL JEWELL

Licensed by the State Bar of Texas since 1989, Michael has advised and represented telecommunications and energy clients, including companies and organizations focused on solar, wind, energy storage, and transmission issues, as well as large industrial consumers, energy brokers, and retail electric providers, before the Public Utility Commission of Texas, Electric Reliability Council of Texas, and the Texas Legislature. Michael also has been engaged in the Texas legislative arena working both in and out of the Capital for more than 35 years.

Michael is a frequent speaker before the Gulf Coast Power Association and at legal conferences, is a member of the Board of Directors of the Conservative Energy Network and is member of the Advisory Board of Conservative Texans for Energy Innovation.



EDUCATION

B.A. In Plan II
Concentration in ME,
German, and Computer
Programing
University of Texas Austin

J.D.
University of Texas Law
School Austin

Support Slides

Agenda

Who we are and why we exist

DERs use in the grid and markets

Fundamental 'Gap' identified – need for a collaborative tool

The importance of Data Sharing and CIM

Overview of Collaborative Utility Solutions Non-Profit DER Registry and savings for industry

Industry Availability and Roll-out for Non-Profit DER Registry

FERC Order 2222

Four primary categories for successful implementation

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 - Phased/Tiered – MO LBNL report
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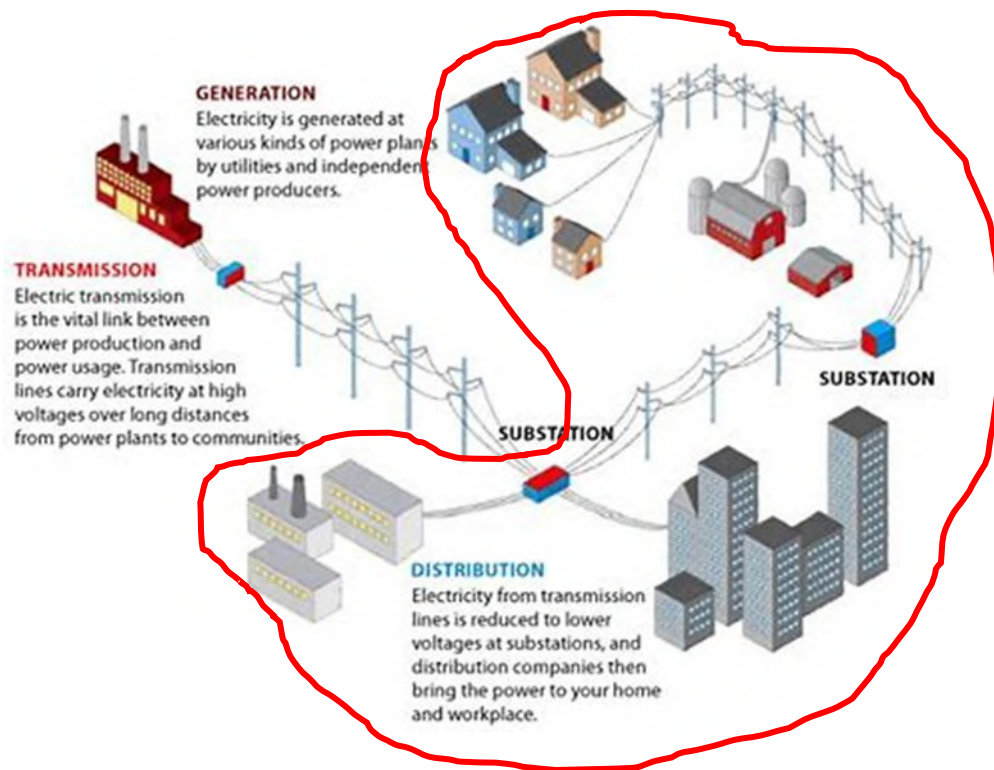
A fundamental 'Gap' has been identified

Collaborations for standards, policy and structure exist, but **we do not have a 'Tools' collaboration** to produce collaborative solutions for the industry.

- The electric industry has fragmented significantly into silos based on utility ownership (IOU/MOU/Co-op/etc.) and structure (G/T/D/ISO/IPP/Competitive/etc.) over the past few decades.
- DERs around the world are being implemented haphazardly without consistent frameworks to optimize their participation in grid and markets.
- Markets around the world have clearly documented the need for a registry (Australia, Ireland, Germany, California, etc.), but each has approached this process without a non-profit collaborative structure. This creates conflicts and 'data hoarding'.
- In all cases, one fundamental need is very clear: There must be a collaborative DER registry as a predicate for all stakeholders to allow effective grid and market adoption for these resources going forward.

Simplified Need Defined

Bulk System grid operators (ISOs/RTOs/Control Area Authorities) are forced to 'guess' what is going to happen each day because they have no insight on resources embedded in the distribution system.



Distribution Companies provide “Net Load” to the grid operator. For example, Net Load might be 100MW for the red circle area. However, the actual load might be 130MW with 30MW of solar. With no visibility to these DERs, the grid operator is scrambling for an extra 30MW of supply when the sun goes behind a cloud.

Planning & Operation of a Power System

- It is not possible to plan or operate a power system reliably without this baseline information of what resources are connected to the system.
- We would never allow a 3000 MW nuclear plant to connect without knowing this information and fully integrating their operation and control via CIM to the ISO EMS.
- DERs are 'sneaking up on us.' For example, according to ERCOT, there already are about 3500MW of registered and unregistered DERs on the Texas grid now. One California event and the two Odessa, TX outages are pointed out in the NERC reliability reports and are directly tied to IBRs and their performance.
- An ISO or Utility is unable to effectively do its job to plan and operate the grid without this information.

DER Registry Service Security

- Committed to Security (Security Development Lifecycle)
 - Development starts with and maintains clearly defined security and privacy requirements
 - SDL best practices
- Committed to Privacy Rights (CPRA Compliance)
 - California Privacy Rights Act (US based closely aligned to GDPR) compliance
 - Additionally, will follow any requirements for any applicable regulatory authority
- Committed to Government Compliance (FedRAMP Authorization)
 - Best practices for cloud service providers
- Service and Organization Committed to Zero Trust Architecture
 - Every level of service is based on zero trust NIST recommendations and evolving best practices – no assumed rights across any boundary

Takeaways

- Eliminates the administrative burden for DER implementation and takes years out of the process for effective implementation
- Saves billions of dollars for the industry (in a non-profit structure)
- Data sharing and data governance for DERs is defined state by state in a secure, reliable fashion with no 'data hoarding' or 'data isolation' of any necessary market participant. NERC reliability data included.
- Eliminates issues of 'double counting' and allows 'highest and best use' of DERs for reliability, security and sustainability
- Eliminates burden of reporting for all energy value chain stakeholders
- Not specific to the registry, but PLEASE adopt 1547-2018 in your state – Do not keep allowing 'dumb energy bricks' to be added to your grid

DERs done 'right' – A few Use Cases

DERs are creating significant issues on the grid worldwide largely due to how they are being incorporated with no operational visibility and control. However, if DERs are incorporated with Utility/ISO visibility and control, they **CAN** solve many different problems like power factor and phase balance. Solving these problems will dramatically reduce planned infrastructure costs for distribution and transmission network upgrades, billions of dollars for future grid investment.

1. Correct Power Factor to Unity on each feeder.
2. Correct Phase Balance
 - DERs can help solve phase balance issues on the distribution grid. This has been proven through actual deployments to reduce feeder and customer losses by more than 40%. This creates significant EE effects and extends the life of every electrical device on the grid.
3. Significantly Reduce Technical Losses on the Grid (EE). With appropriate four-quadrant inverter specification (1547-2018), it is possible to 'dial' watts and vars from each DER. This has been proven through actual deployments to reduce feeder and customer losses by 6-12%. They can also be used to help balance the three phases, another 30%-40% in technical losses on feeders. Correcting Power Factor and Phase Balance creates significant EE effects and extends the life of every electrical device connected to the grid. It also creates 'new' capacity for additional electrification.
4. Mitigate ramps
 - Morning and afternoon ramps with solar are creating significant issues that active DER control can mitigate/eliminate. (Duck Curve)

DERs done 'right' – A few Use Cases (cont)

5. “Head room capacity” for EVs
 - Through targeted deployment, it is possible to create capacity on each feeder for the electrification of transportation (EVs) without costly feeder reconductors and substation upgrades. Deploy DERs to defer, or eliminate planned feeder or substation upgrades.
6. Wholesale portfolio use (Energy/Capacity/Ancillary Services in Markets and IRP outside)
 - While DERs could be used for distribution purposes 90%-95% of the 8760 hours, they also can be aggregated for 5%-10% of the hours of the year to lower the cost of the wholesale power portfolio each day through net load adjustments and for hedging offsets, reduced reserve margin requirements, 4 CP mitigation, spinning reserves, non-spinning reserves, and grid emergency services like UFLS and UVLS first stage performance.
 - Day of/Day Ahead use for loss of units or other grid anomalies.
 - Utility Scale Renewable Balancing – DER Storage to balance and optimize use of utility scale renewables.
7. Reliability and Resiliency
 - Improve Volt/VAR management on each feeder.
 - Minimize, and eliminate over time, VAR transport on the bulk electric grid. This will dramatically improve stability margins in grid operation and support ‘inertia/system strength’.
 - Provision community reliability and resiliency for major weather (ice, tornado, etc.) events for critical care customers, police/fire/emergency response, community centers, etc.
 - If critical care/emergency response are supported with DERs, utility crews can address the larger outages sooner rather than reserving a significant number of crews for these types of customers.

The Importance of Information Sharing

Information sharing has and does work. But it works because the parties see that the benefits (better protection, detection and response) outweigh the risks. History also teaches, however, that information sharing tends to work best when those involved trust each other to respect informal and sometimes formal agreements (e.g., non-disclosure agreements) on information use and disclosure.

-Scott Charney

DER and DER Aggregation Administration

- Approval process by any market or utility program will require sign off by the necessary industry entities for the DER and/or DER Aggregation. In the US, this will include entities such as Competitive Retail Suppliers, DSOs, TSOs, Scheduling Coordinators, and the ISO/RTO for ISO/RTO-based programs.
- These names may be different by market. Competitive Retail Supplier could be a Retail Electric Provider in another market. A Scheduling Coordinator could be a Qualified Scheduling Entity.
- For each market or utility program, the registry must capture the approval/rejection of an individual DER or DER aggregation by the appropriate entities.
- Registry includes a dynamic Administration Engine for DER and DER Aggregation Administration/Approval.

Reporting

- ‘Standard’ DER reports by:
 - Utility
 - ISO
 - Geographic area (city, county, state, country)
 - Aggregator
- ‘Custom’ Reports as defined by Members
 - History, Trending, etc.
- Tools for agencies like EIA to have access to the data for reporting
- Fully automated to eliminate time and cost requirements for all stakeholders (Utilities/ISO’s/Aggregators/Regulators/etc.) to develop and deliver data and reports

The Registry must be built with CIM in mind

- The Common Information Model (CIM) is an abstract information model that provides data understanding through the identification of common features or attributes for different objects and how those objects are related to each other within a utility enterprise.
- This enhanced data understanding supports the exchange of data models and messages and increases the ability to integrate applications both within the enterprise and with trading partners.
- These trends go beyond exchange or updates of network models to the exchange of specific dynamic data within transactional messages in a real-time environment.
- Using industry CIM eliminates custom and costly interfaces.

CIM Interface Reference Model

For the electric industry to be able to effectively operate millions of pieces of equipment from hundreds of vendors, the CIM reference model must be utilized to be able to exchange key data without custom, costly software interfaces.

CIM is the electric utility industry's version of "Plug-N-Play"

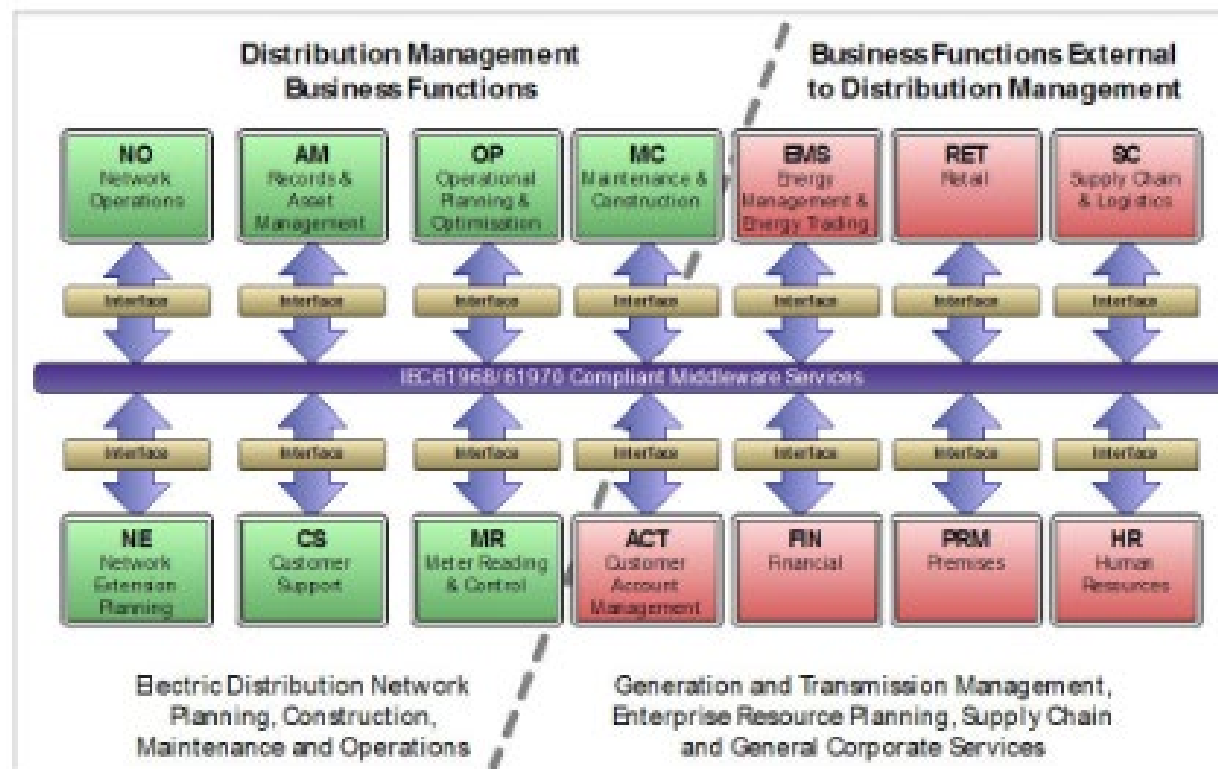
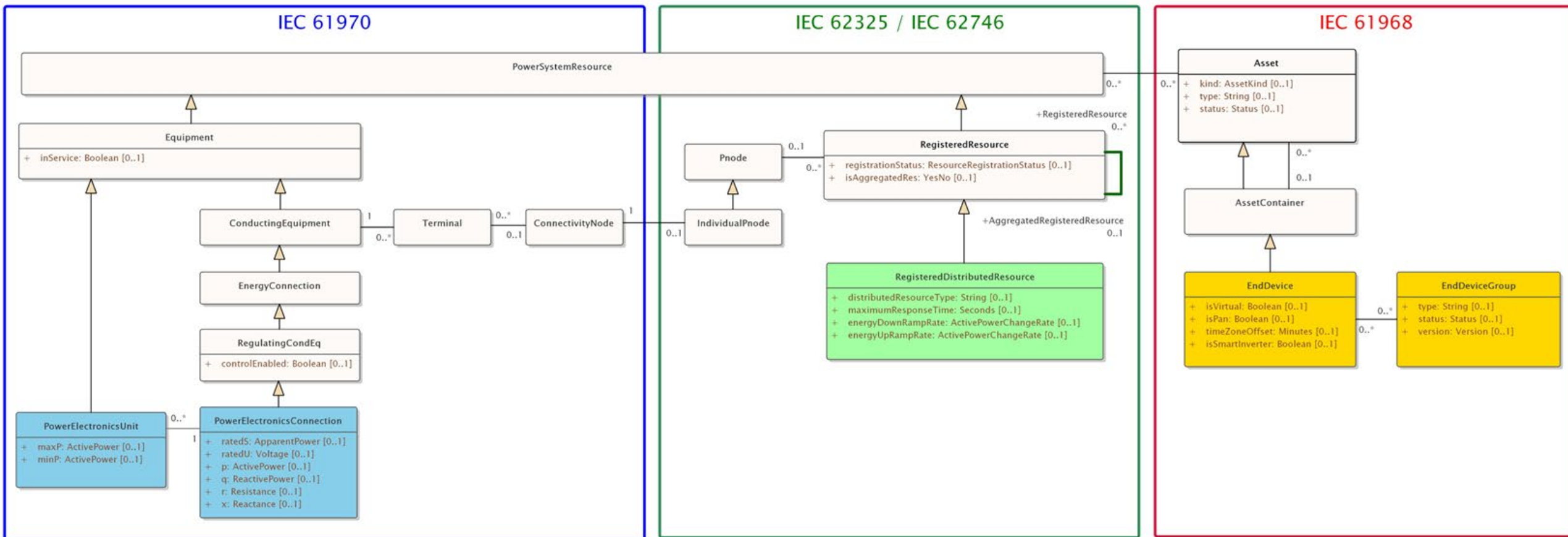


Figure 6-1
IEC61968-1 Interface Reference Model

CIM



Collaborative Non-Profit DER Registry Briefing

Creating, Managing, Enrolling and Approval of an
Aggregation

CHRIS.HICKMAN@CUSLN.ORG



Collaborative UTILITY
SOLUTIONS

Overview

- This presentation is designed to show the ability of the Non-Profit DER Registry to allow aggregations to be created (and managed going forward) as well as the enrollment and approval process for utility programs and ISO market products.

The Process

- If you think of an aggregation like a virtual backpack that an aggregator fills up with sites, there is a process to define what it is in that backpack.
- First, you need to uniquely identify that backpack.
- Second, you need to establish the program (utility/retail) and/or the product (ISO) that you will desire the aggregation to be entered into and for what time period.
- Third, you start adding sites. But in this process, the system needs to make sure that the site isn't already in aggregation for a competing program/product in the same time period to ensure no conflicts exist and a 'valid' aggregation is created.
- Fourth, once the aggregation is valid, it must begin the process of enrollment and approval according to the rules of the utility/state/ISO.
- Fifth, once approved, it will be ready for the utility/ISO to utilize
- Notification to appropriate participants and transparent tracking/logging must be available through this entire process

Definition still required

- There will be an evolution to this process as each utility/ISO defines their program/product rules, their required approval process, their add/delete sites rules for an aggregation, etc.

Creating an Aggregation

- Aggregator is asked to name and describe the Aggregation
- Registry also assigns a unique identifier to the aggregation

DER
Registry

Home

Sites Map View

Approved Aggregations

Aggregations Pending DSO

Aggregations Pending Approval

Rejected Aggregations

New Sites

Site Data Entry

| Create New Aggregation

Manage Aggregations

Organization Management

Create New Aggregation

Please provide a name and description for your new aggregation

Aggregation Name *

Aggregation 3

Description of aggregation *

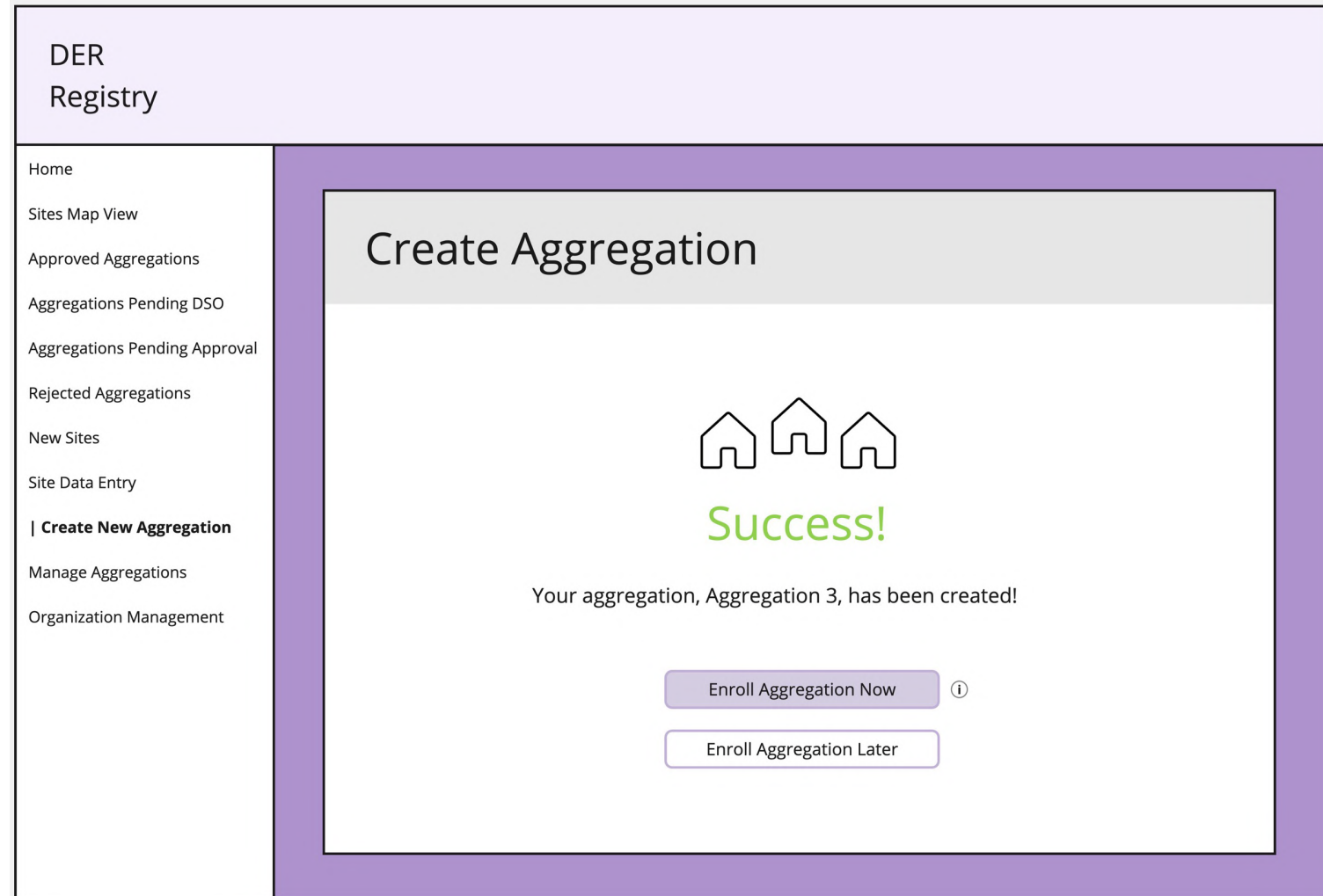
A really great aggregation

< back

Create Aggregation

Creating an Aggregation (cont)

- Confirmation screen that the aggregation has been created and is now ready to be enrolled in a utility program or market product
- Asks user if they would like to enroll this aggregation into a utility program or market product now or later



Enroll an Aggregation

- Registry is designed to allow ‘dual registration’ and incorporate the rules/policy of DSO/ISO/Market to ensure no ‘dual compensation’
- A site may be dual registered – It may participate in both a utility retail program and an ISO market product
- Therefore, a site may be included in two different aggregations to allow dual participation.
- A DSO utility retail program cannot include sites from outside of their service territory. In other words, only sites within the DSO utility service area may be included in an aggregation for a DSO utility retail program.
- An ISO market program could conceivably have many different sites from many different DSOs. Therefore, the aggregation for the ISO market product must be able to include sites that are constrained to a single aggregation in a DSO program. ISO may have additional rules to constrain aggregations to one market node, etc.
- However, a site may NEVER participate in more than **ONE** DSO utility program and **ONE** ISO market product.

DSO/ISO engagement process

- This section describes the engagement process for both DSO (utility retail program) and ISO (market product) aggregation development so an aggregation is ready to be entered into the formal enrollment and approval process
- We refer to all utility retail programs for aggregations as “Programs”
- We refer all ISO market products for aggregations as “Products”

Enroll an Aggregation

- Registry is designed to allow 'dual registration'
- An aggregation may be enrolled in both a retail utility program and a market product
- A site may be used for ONE utility program and ONE market product

The screenshot shows a web application interface for the DER Registry. The top header is 'DER Registry'. A left sidebar contains a list of navigation links: Home, Sites Map View, Approved Aggregations, Aggregations Pending DSO, Aggregations Pending Approval, Rejected Aggregations, New Sites, Site Data Entry, Create New Aggregation, **| Manage Aggregations**, and Organization Management. The main content area is titled 'Aggregation Enrollment'. It contains the instruction 'Please select how you would like to enroll Aggregation 3' and a 'Select option *' label. Below this are two radio button options: 'DSO Utility Program' and 'ISO Market Product'. At the bottom right of the form are two buttons: 'Cancel' and 'Continue'.

Enroll an Aggregation into DSO program

- Aggregation has been selected to enroll in a DSO retail utility program
- CUS works with the utilities to develop a pick list of available programs

DER
Registry

Home

Sites Map View

Approved Aggregations

Aggregations Pending DSO

Aggregations Pending Approval

Rejected Aggregations

New Sites

Site Data Entry

Create New Aggregation

| **Manage Aggregations**

Organization Management

Aggregation Enrollment

You have selected to enroll your aggregation in a **DSO Utility Program**

Select **DSO Utility Program** Option *

☐ Program A

☐ Program B

☐ Program C

< back

Continue

Enroll an Aggregation into DSO Program (cont.)

- Each program will have specific rules for when an aggregation can begin participation and when participation is concluded and registry will provide guidance
- Aggregator requests start and end date for participation
- This allows aggregator to create as many aggregation enrollments as they would like so they are all ready for entry into the approval process at the appropriate time.

The screenshot shows a web interface for the DER Registry. On the left is a sidebar menu with the following items: Home, Sites Map View, Approved Aggregations, Aggregations Pending DSO, Aggregations Pending Approval, Rejected Aggregations, New Sites, Site Data Entry, Create New Aggregation, | Manage Aggregations (highlighted), and Organization Management. The main content area is titled 'Aggregation Enrollment'. It contains two date input fields: 'Begin Date for DSO Utility Program participation *' with the value 'October 1, 2023', and 'End Date for DSO Utility Program participation *' with the value 'September 30, 2024'. At the bottom right of the form are two buttons: '< back' and 'Continue'.

Enroll an Aggregation into DSO Program (cont.)

- Lists sites that individual owners have assigned to aggregator
- Sites filtered by the enrollment choice and begin/end date
- They select sites from the list for this aggregation enrollment
- All sites shown, but may be greyed out and not selectable if conflicts exist for site

DER Registry

Home

Sites Map View

Approved Aggregations

Aggregations Pending DSO

Aggregations Pending Approval

Rejected Aggregations

New Sites

Site Data Entry

| Create New Aggregation

Manage Aggregations

Organization Management








Aggregation Enrollment

Enrollment choice: **DSO Utility Program A**

Begin Date for participation: **October 1, 2023**

End Date for participation: **September 30, 2024**

Please select the sites that you wish to include in this aggregation enrollment

	^ DSO Name	^ Owner Name	^ Address	^ Site Capacity	DERs
<input checked="" type="checkbox"/>	Bright Peak	Jane Bee	1513 Meisch Ct Naperville, IL 60563	8 kW	  
<input checked="" type="checkbox"/>	Bright Peak	John MacDonald	20 Bauer Road Naperville, IL 60563	12 kW	 
<input type="checkbox"/>	Bright Peak	Claire Voyant	516 Ticonderoga Lane Naperville, IL 60563	6 kW	 

Cancel

Continue

Enroll an Aggregation into DSO Program (cont.)

- Confirmation screen of the sites they have selected to add to this enrollment of the aggregation

DER Registry

Home

Sites Map View

Approved Aggregations

Aggregations Pending DSO

Aggregations Pending Approval

Rejected Aggregations

New Sites

Site Data Entry

| Create New Aggregation

Manage Aggregations

Organization Management

Aggregation Enrollment






Enrollment choice: **DSO Utility Program A**

Begin Date for participation: **October 1, 2023**

End Date for participation: **September 30, 2024**

Please **confirm** that these are the **2** sites that you wish to include in this aggregation

Total Capacity of Sites: 20 kW

^ DSO Name	^ Owner Name	^ Address	^ Site Capacity	DERs
Bright Peak	Jane Bee	1513 Meisch Ct Naperville, IL 60563	8 kW	  
Bright Peak	John MacDonald	20 Bauer Road Naperville, IL 60563	12 kW	 

< back

confirm

Enroll an Aggregation into DSO Program (cont.)

- Each program will require additional specific data entry for enrollment.
- This may include capacity, energy, etc. of the aggregation as required by program
- CUS will work with each utility to enter these requirements for each program

DER Registry

Home

Sites Map View

Approved Aggregations

Aggregations Pending DSO

Aggregations Pending Approval

Rejected Aggregations

New Sites

Site Data Entry

Create New Aggregation

| Manage Aggregations

Organization Management

Aggregation Enrollment

Important!! The Capacity of Aggregation being enrolled cannot exceed the Total Capacity of Sites in Aggregation

Based on the sites you have selected for this enrollment, your capacity limit is **20 kW**

Capacity of Aggregation being registered (kW) *

< back

Continue

Enroll an Aggregation into DSO Program (cont.)

- Registry requires confirmation of utility program 'terms and conditions' and provides a link to these rules
- CUS works with each utility to provide appropriate links

DER
Registry

Home

Sites Map View

Approved Aggregations

Aggregations Pending DSO

Aggregations Pending Approval

Rejected Aggregations

New Sites

Site Data Entry

Create New Aggregation

| **Manage Aggregations**

Organization Management

Aggregation Enrollment

Please review your information and accept the terms of your selected enrollment

Aggregation Name: **Aggregation 3**

Enrollment choice: **DSO Utility Program A**

Capacity of Aggregation: **20 kW**

Begin Date for participation: **October 1, 2023**

End Date for participation: **September 30, 2024**

[Terms and Conditions](#) brightpeak.com/der-programs/program-a

☒ I have read and agree to the terms and conditions for DSO Utility Program A *

< back

Continue

Enroll an Aggregation into DSO Program (cont.)

- Confirmation Screen that Aggregation has completed necessary information for enrollment
- Asks user if they would like to submit this aggregation for necessary approvals now or later

DER Registry

Home

Sites Map View

Approved Aggregations

Aggregations Pending DSO

Aggregations Pending Approval

Rejected Aggregations

New Sites


Site Data Entry

Create New Aggregation

| **Manage Aggregations**

Organization Management

Aggregation Enrollment


Success!
We have saved your aggregation enrollment preferences

Submit for Approval ①

Save for Later

Enroll an Aggregation into ISO product

- Registry is designed to allow 'dual registration'
- An aggregation may be enrolled in both a retail utility program and a market product
- A site may be used for ONE utility program and ONE market product

The screenshot shows a web application interface for the DER Registry. The top navigation bar is light purple and contains the text 'DER Registry'. A left sidebar is white with a purple border and lists the following menu items: 'Home', 'Sites Map View', 'Approved Aggregations', 'Aggregations Pending DSO', 'Aggregations Pending Approval', 'Rejected Aggregations', 'New Sites', 'Site Data Entry', 'Create New Aggregation', '| Manage Aggregations' (highlighted with a vertical bar), and 'Organization Management'. The main content area has a purple border and a light purple header titled 'Aggregation Enrollment'. Below the header, the text reads 'Please select how you would like to enroll Aggregation 3'. Underneath is a label 'Select option *' followed by a white box containing two radio button options: 'DSO Utility Program' and 'ISO Market Product'. At the bottom right of the form are two buttons: 'Cancel' and 'Continue'.

Enroll an Aggregation into ISO product

- Aggregation has been selected to enroll in an ISO market product
- CUS works with the ISOs to develop a pick list of available products

DER
Registry

Home

Sites Map View

Approved Aggregations

Aggregations Pending DSO

Aggregations Pending Approval

Rejected Aggregations

New Sites

Site Data Entry

Create New Aggregation

| **Manage Aggregations**

Organization Management

Aggregation Enrollment

You have selected to enroll your aggregation in a **ISO Market Product**

Select **ISO Market Product** Option *

☐ Product 1

☐ Product 2

☐ Product 3

< back

Continue

Enroll an Aggregation into ISO Product (cont.)

- Each product will require additional specific data entry for enrollment
- This may include date to be registered, capacity, energy, etc.
- CUS will work with each ISO to establish these requirements for each product
- This allows aggregator to create as many aggregation enrollments as they would like so they are all ready for entry into the approval process at the appropriate time.

DER Registry

Home

Sites Map View

Approved Aggregations

Aggregations Pending DSO

Aggregations Pending Approval

Rejected Aggregations

New Sites

Site Data Entry

Create New Aggregation

| Manage Aggregations

Organization Management

Aggregation Enrollment

Begin Date for ISO Market Product participation *

October 1, 2024

End Date for ISO Market Product participation *

September 30, 2025

< back

Continue

Enroll an Aggregation into ISO Program (cont.)

- Lists sites that individual owners have assigned to aggregator
- Sites filtered by the enrollment choice and begin/end date
- They select sites from the list for this aggregation enrollment
- All sites shown, but may be greyed out and not selectable if conflicts exist for site

DER Registry

Home

Sites Map View

Approved Aggregations

Aggregations Pending DSO

Aggregations Pending Approval

Rejected Aggregations

New Sites

Site Data Entry

| Create New Aggregation

Manage Aggregations

Organization Management








Aggregation Enrollment

Enrollment choice: **ISO Market Product 1**

Begin Date for participation: **October 1, 2024**

End Date for participation: **September 30, 2025**

Please select the sites that you wish to include in this aggregation enrollment

	^ DSO Name	^ Owner Name	^ Address	^ Site Capacity	DERs
<input checked="" type="checkbox"/>	Bright Peak	Jane Bee	1513 Meisch Ct Naperville, IL 60563	8 kW	  
<input checked="" type="checkbox"/>	Bright Peak	John MacDonald	20 Bauer Road Naperville, IL 60563	12 kW	 
<input type="checkbox"/>	Bright Peak	Claire Voyant	516 Ticonderoga Lane Naperville, IL 60563	6 kW	 

Cancel

Continue

Enroll an Aggregation into ISO Program (cont.)

- Confirmation screen of the sites they have selected to add to this enrollment of the aggregation

DER Registry

Home

Sites Map View

Approved Aggregations

Aggregations Pending DSO

Aggregations Pending Approval

Rejected Aggregations

New Sites

Site Data Entry

| Create New Aggregation

Manage Aggregations

Organization Management

Aggregation Enrollment






Enrollment choice: **ISO Market Product 1**

Begin Date for participation: **October 1, 2024**

End Date for participation: **September 30, 2025**

Please **confirm** that these are the **2** sites that you wish to include in this aggregation

Total Capacity of Sites: 20 kW

^ DSO Name	^ Owner Name	^ Address	^ Site Capacity	DERs
Bright Peak	Jane Bee	1513 Meisch Ct Naperville, IL 60563	8 kW	  
Bright Peak	John MacDonald	20 Bauer Road Naperville, IL 60563	12 kW	 

< back

confirm

Enroll an Aggregation into ISO Product (cont.)

- Each product will require additional specific data entry for enrollment
- This may include capacity, energy, etc. of the aggregation as required by product
- CUS will work with each ISO to enter these requirements for each program

DER Registry

Home

Sites Map View

Approved Aggregations

Aggregations Pending DSO

Aggregations Pending Approval

Rejected Aggregations

New Sites

Site Data Entry

Create New Aggregation

| **Manage Aggregations**

Organization Management

Enroll Aggregation

Please enter the following data required for the **ISO Market Product**

Capacity of Aggregation being registered (kW) *

Important!! The Capacity of Aggregation being registered cannot exceed the Total Capacity of Sites in Aggregation (20 kW)

< back

Continue

Enroll an Aggregation into ISO Product (cont.)

- Registry requires confirmation of ISO product 'terms and conditions' and provides a link to these rules
- CUS works with each ISO to provide appropriate links

DER
Registry

Home

Sites Map View

Approved Aggregations

Aggregations Pending DSO

Aggregations Pending Approval

Rejected Aggregations

New Sites

Site Data Entry

Create New Aggregation

| **Manage Aggregations**

Organization Management

Aggregation Enrollment

Please review your information and accept the terms of your selected enrollment

Aggregation Name: **Aggregation 3**

Enrollment choice: **ISO Market Product 1**

Capacity of Aggregation: **20 kW**

Begin Date for participation: **October 1, 2024**

End Date for participation: **September 30, 2025**

[Terms and Conditions](#) myISO.com/iso-products/product-1

☒ I have read and agree to the terms and conditions for ISO Market Product 1 *

< back

Continue

Enroll an Aggregation into DSO Program (cont.)

- Confirmation Screen that Aggregation has completed necessary information for enrollment
- Asks user if they would like to submit this aggregation for necessary approvals now or later

The screenshot shows a web interface for the DER Registry. On the left is a sidebar menu with the following items: Home, Sites Map View, Approved Aggregations, Aggregations Pending DSO, Aggregations Pending Approval, Rejected Aggregations, New Sites, Site Data Entry, Create New Aggregation, | Manage Aggregations (highlighted), and Organization Management. The main content area is titled 'Aggregation Enrollment' and features three house icons above the word 'Success!' in green. Below this, a message states 'We have saved your aggregation enrollment preferences'. At the bottom, there are two buttons: 'Submit for Approval' (with an information icon) and 'Save for Later'.

DER Registry

Home

Sites Map View

Approved Aggregations

Aggregations Pending DSO

Aggregations Pending Approval

Rejected Aggregations

New Sites


Site Data Entry

Create New Aggregation

| **Manage Aggregations**

Organization Management

Aggregation Enrollment



Success!

We have saved your aggregation enrollment preferences

[Submit for Approval](#) ⓘ

[Save for Later](#)

Manage Aggregations Created

- Aggregator has ability to manage/modify all aggregations created
- Once an aggregation has an enrollment of sites, Aggregator can submit into the required approval process.
- Note: Rules for add/deletion of sites to existing aggregation are not yet developed. Per program or product rules, we expect some changes for existing aggregations that are already enrolled may require the aggregation to be submitted into approval process again and some changes may not require aggregation to move through the entire approval process again.

Manage Aggregations

- Provides Aggregator list of current aggregations
- Clicking on an aggregation allows Aggregator to view/modify aggregation and enrollments

DER Registry

Home

Sites Map View

Approved Aggregations

Aggregations Pending DSO

Aggregations Pending Approval

Rejected Aggregations

New Sites

Site Data Entry

Create New Aggregation

| Manage Aggregations

Organization Management

Manage Aggregations

Please click on aggregation to review details

^ Aggregation	^ Enrollments	^ Capacity of Aggregation
Aggregation 3	0	0 kW
Aggregation 2	2	125 kW
Aggregation 1	1	110 kW

Manage Aggregations

- Once an aggregation is clicked on, all information for the aggregation is shown and can be edited
- A log of all actions related to this aggregation is shown
- This aggregation has **not** yet been enrolled and approved in any programs or products. Aggregator can select and submit it into approval process.

DER
Registry

Home

Sites Map View

Approved Aggregations

Aggregations Pending DSO

Aggregations Pending Approval

Rejected Aggregations

New Sites

Site Data Entry

Create New Aggregation

| Manage Aggregations

Organization Management

Manage Aggregation

Overview:

Aggregation Name: **Aggregation 3**

Description: **A really great aggregation**

Date Created: **August 1, 2023**

! This Aggregation is not enrolled in any products or programs.

To add sites to this aggregation, you must first select a product or program to enroll in

Enroll Aggregation

History Log:

Event	Contributer	Time
Aggregation created	Aggro Gators Administrator	August 1, 2023

Manage Aggregations (cont)

- Display list of aggregations for aggregator with current status information.
- Once an aggregation is clicked on, all information for the aggregation is shown and can be edited (next slide)
- A log of all actions related to this aggregation is shown
- An aggregation **with enrollments** will show the enrollments and their status.

DER Registry

Home

Sites Map View

Approved Aggregations

Aggregations Pending DSO

Aggregations Pending Approval

Rejected Aggregations

New Sites

Site Data Entry

Create New Aggregation

| Manage Aggregations

Organization Management

Manage Aggregation

Overview:

Aggregation Name: **Aggregation 3**

Description: **A really great aggregation**

Date Created: **August 1, 2023**

Enrollments

ID	Status	Enrollment	Option	Begin Date	End Date
01	Not submitted	DSO Utility Program	A	Oct 2, 2023	Sep 30, 2024
02	Pending TSO	ISO Utility Product	1	Oct 1, 2024	Sep 30, 2025

History Log:

Event	Contributer	Time
Aggregation enrolled	Aggro Gators Administrator	August 3, 2023
Aggregation enrolled	Aggro Gators Administrator	August 3, 2023
Aggregation created	Aggro Gators Administrator	August 1, 2023

Manage Aggregations (cont)

- Once an aggregation enrollment is clicked on, all information for the enrollment is shown and can be edited
- Aggregation sites that have been selected for this enrollment are shown
- A log of all actions related to this aggregation enrollment is shown
- Aggregator is notified if enrollment has not been submitted for approval yet

DER Registry

Home

Sites Map View

Approved Aggregations

Aggregations Pending DSO

Aggregations Pending Approval

Rejected Aggregations

New Sites

Site Data Entry

Create New Aggregation

Manage Aggregations

Organization Management

Manage Aggregation Enrollment

Overview:

Aggregation Name: Aggregation 3

Description: A really great aggregation

Enrollment Choice: DSO Utility Program A

Begin Date of Participation: October 1, 2023

End Date of Participation: October 1, 2024

Available Capacity of Aggregation: 20 kW

Requested Capacity of Aggregation: 20 kW

This enrollment has not been submitted for approval






Clicking the button below will submit aggregation to your program or product of choice for approval

Submit for Approval

Sites

Add Sites

Remove Sites

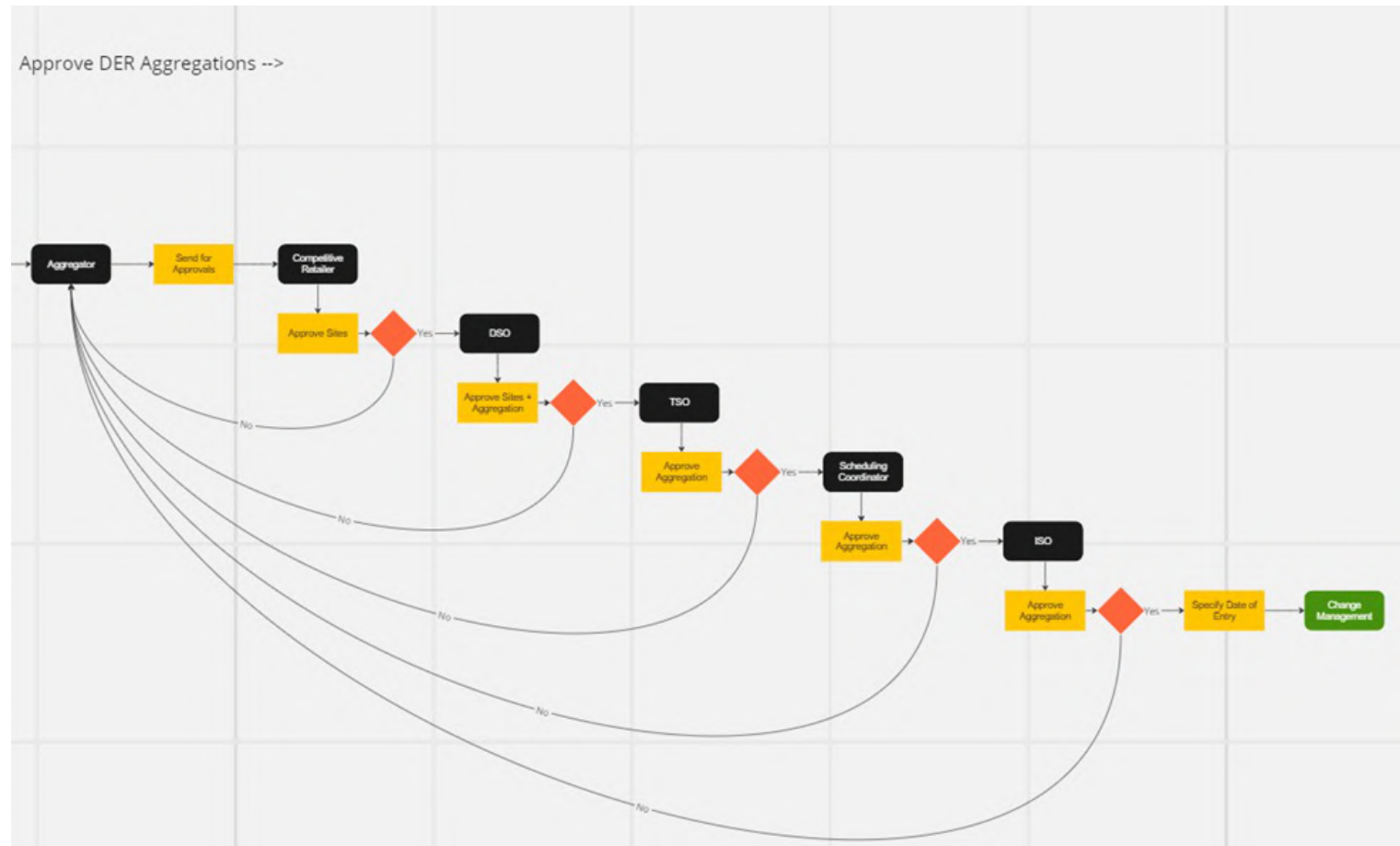
Status	DSO Name	Owner Name	Address	Site Capacity	DERs
Committed	Bright Peak	Jane Bee	1513 Meisch Ct Naperville, IL 60563	8 kW	  
Pending	Bright Peak	John MacDonald	20 Bauer Road Naperville, IL 60563	12 kW	 

History Log:

Event	Contributer	Time
Enrollment created	Aggro Gators Administrator	August 1, 2023

Approval Process

- Each Utility or ISO will have a defined approval process. The process flow describes a variety of potential personas that could be required in this process
- CUS will work with each utility and ISO to implement their required approval process
- Date/Time/Login captured for each persona in approval process
- Each persona has ability to track where aggregation is in the approval process
- Can 'time-bound' each approver if required



Approval of an Aggregation by DSO

- DSO View of DER Registry
- Provides list of aggregations pending their approval

DER Registry

Home

All Sites

Unverified Sites

DSO Data Entry

Approved Sites

Sites Map View

Rejected Sites

Approved Aggregations

| Aggregations Pending DSO

Aggregations Pending Approval

Rejected Aggregations

Bulk Data Upload

Organization Management

Aggregations Pending DSO Approval

Please click on aggregation to review details

Aggregation	Aggregator	Requested Start	Requested End	Capacity of Aggregation
Aggregation 3	Aggro Gators	October 1, 2023	September 30, 2024	20 kW
Aggregation 2	Aggro Gators	January 1, 2024	December 31, 2024	125 kW
Aggregation 1	Agg Inc	January 1, 2024	December 31, 2024	110 kW

Approval of an Aggregation by DSO (cont.)

- Clicking on an Aggregation in prior slide provides a detailed overview of the aggregation
- May also view all of the sites in the aggregation in a map view
- CUS will work with utility for list of 'reasons' an aggregation may be rejected
- A DSO can reject a single site in an aggregation or the entire aggregation

The screenshot shows the 'DER Registry' interface with a sidebar menu on the left containing: Home, All Sites, Unverified Sites, DSO Data Entry, Approved Sites, Sites Map View, Rejected Sites, Approved Aggregations, | Aggregations Pending DSO, Aggregations Pending Approval, Rejected Aggregations, Bulk Data Upload, and Organization Management.

The main content area is titled 'Review Aggregation Enrollment' and includes the following information:

Please review information below and either accept or reject this aggregation

Overview:

- Aggregation Name: **Aggregation 3**
- Date Created: **August 1, 2023**
- Begin Date of Participation: **October 1, 2023**
- End Date of Participation: **September 30, 2024**
- Enrollment Choice: **DSO Utility Program A**
- Available Capacity of Aggregation: **20 kW**
- Requested Capacity of Aggregation: **20 kW**

Sites Included in Aggregation

100024	Bright Peak	Jane Bee	1513 Meisch Ct Naperville, IL 60563	8 kW	☀️🔌
100025	Bright Peak	John MacDonald	20 Bauer Road Naperville, IL 60563	12 kW	☀️🔌

At the bottom of the review area are three buttons: 'Reject' (red), 'Conditional Approval' (blue), and 'Approve' (green). Colored arrows originate from these buttons and point to three separate modal windows on the right:

- The 'Approve' button (green arrow) points to a 'Success!' modal with the message: 'You have approved <Aggregation name>'.
- The 'Conditional Approval' button (blue arrow) points to a 'Conditionally Approve Aggregation Enrollment?' modal. It asks for conditions and includes a text input field and 'Cancel' and 'Approve' buttons.
- The 'Reject' button (red arrow) points to a 'Reject Aggregation Enrollment?' modal. It asks for a reason for rejection and includes a text input field and 'Cancel' and 'Reject' buttons.

Approval of an Aggregation by ISO

- ISO View of DER Registry
- Provides list of aggregations pending their approval

DER Registry				
Home				
All Sites				
Unverified Sites				
ISO Data Entry				
Approved Sites				
Sites Map View				
Rejected Sites				
Approved Aggregations				
Aggregations Pending ISO				
Aggregations Pending Approval				
Rejected Aggregations				
Organization Management				

Aggregations Pending ISO Approval

Please click on aggregation to review details

Aggregation	Aggregator	Requested Start	Requested End	Capacity of Aggregation
Aggregation 3	Aggro Gators	October 1, 2024	September 30, 2025	20 kW
Aggregation 2	Aggro Gators	January 1, 2024	December 31, 2024	125 kW
Aggregation 1	Agg Inc	January 1, 2024	December 31, 2024	110 kW

Approval of an Aggregation by ISO (cont)

- Clicking on an Aggregation in prior slide provides a detailed overview of the aggregation
- May also view all of the sites in the aggregation in a map view
- CUS will work with ISO for list of 'reasons' an aggregation may be rejected
- An ISO can reject only the entire aggregation, not a single site in an aggregation

The screenshot shows the 'DER Registry' interface. On the left is a sidebar with navigation links: Home, All Sites, Unverified Sites, DSO Data Entry, Approved Sites, Sites Map View, Rejected Sites, Approved Aggregations, | Aggregations Pending DSO, Aggregations Pending Approval, Rejected Aggregations, Bulk Data Upload, and Organization Management. The main content area is titled 'Review Aggregation Enrollment' and contains the following information:

Please review information below and either accept or reject this aggregation

Overview:

Aggregation Name: **Aggregation 3**
Date Created: **August 1, 2023**
Begin Date of Participation: **October 1, 2024**
End Date of Participation: **October 1, 2025**
Enrollment Choice: **ISO Utility Product 2**
Available Capacity of Aggregation: **20 kW**
Requested Capacity of Aggregation: **20 kW**

Sites Included in Aggregation

100024	Bright Peak	Jane Bee	1513 Meisch Ct Naperville, IL 60563	8 kW	☀️🔌
100025	Bright Peak	John MacDonald	20 Bauer Road Naperville, IL 60563	12 kW	☀️🔌

At the bottom of the main content area are three buttons: 'Reject', 'Conditional Approval', and 'Approve'. Colored arrows indicate the workflow from these buttons to the right-hand side of the interface:

- A green arrow points from the 'Approve' button to a 'Success!' modal box with the text: 'You have approved <Aggregation name>'.
- A blue arrow points from the 'Conditional Approval' button to a 'Conditionally Approve Aggregation Enrollment?' modal box. This box contains the text: 'To continue, please provide the condition(s) required for this aggregation enrollment to be approved:' and a text input field labeled 'Approval condition(s): *'. It has 'Cancel' and 'Approve' buttons.
- A red arrow points from the 'Reject' button to a 'Reject Aggregation Enrollment?' modal box. This box contains the text: 'To continue, please provide a reason for this decision:' and a text input field labeled 'Reason for rejection: *'. It has 'Cancel' and 'Reject' buttons.

Notifications and Tracking

- Once an Aggregation is submitted into the approval process, the Aggregator can track where the aggregation is currently at in the approval process with each required persona
- Everyone in the approval process chain is notified a new aggregation has been submitted and they have the ability to preview anything that is coming their way.
- Tracking screen shows date/time each persona received and approved/rejected
- A rejection requires Aggregator to resubmit for approval after fixing any required parameters for the aggregation
- Conditional Approval requires aggregator to accept condition, and make any required changes to aggregation, before it continues forward in the approval process.
- The registry has the ability to provide notifications for required deadlines for approval if there is a defined clock for the review
- The registry will provide notification to the aggregator and premise owner via their portal when their aggregation or site has been approved into a utility program or market product

Collaborative Non-Profit DER Registry Briefing

DER Data Entry and Management

CHRIS.HICKMAN@CUSLN.ORG



Collaborative UTILITY
SOLUTIONS

EMPOWERING THE ENERGY TRANSITION

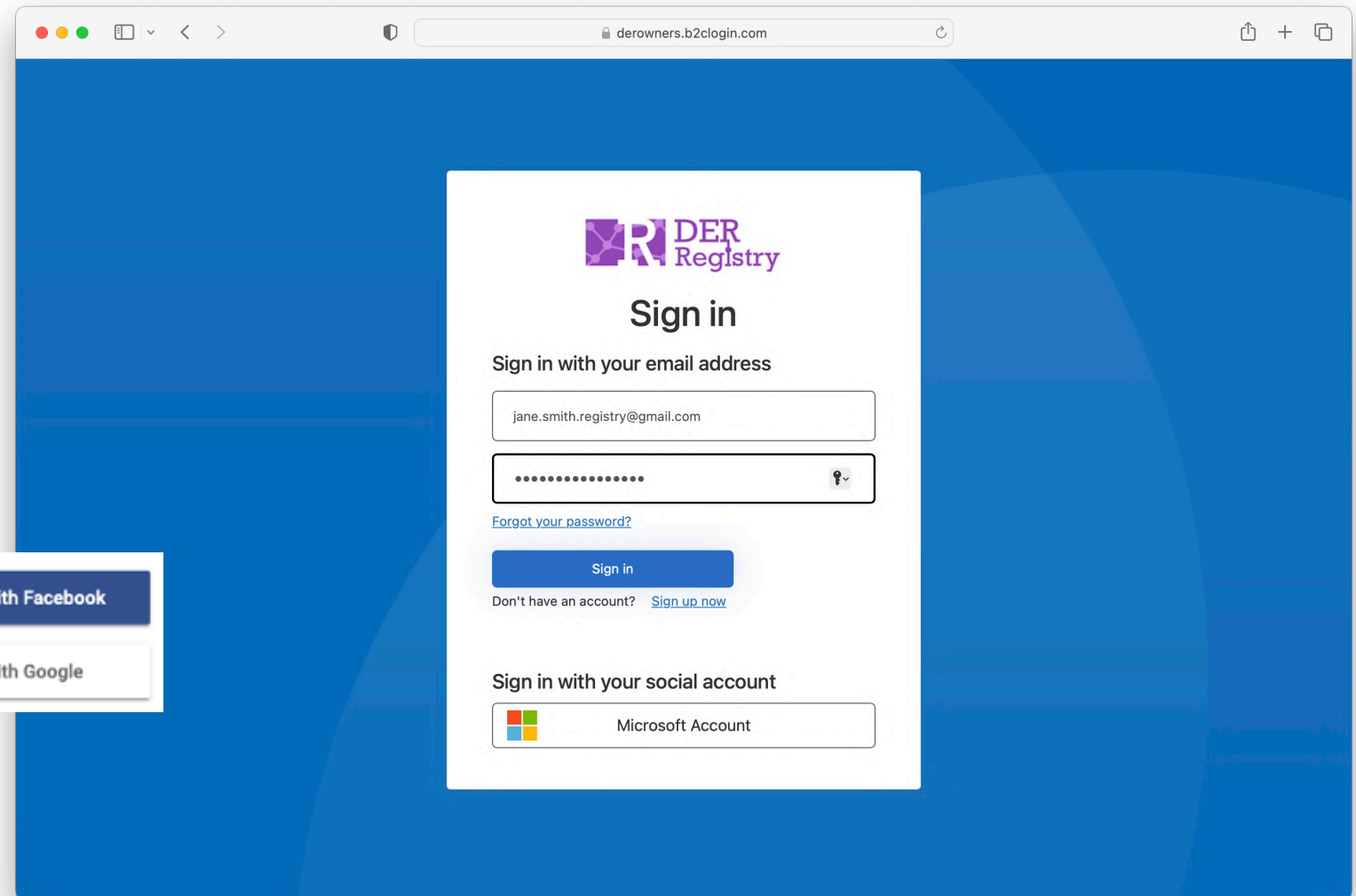
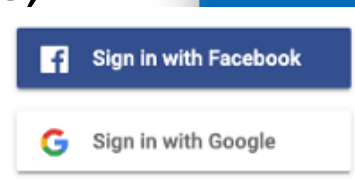
Copyright © 2023 CUS

Overview

This presentation is designed to show the ability of the Non-Profit DER Registry for DER Data Entry and Management

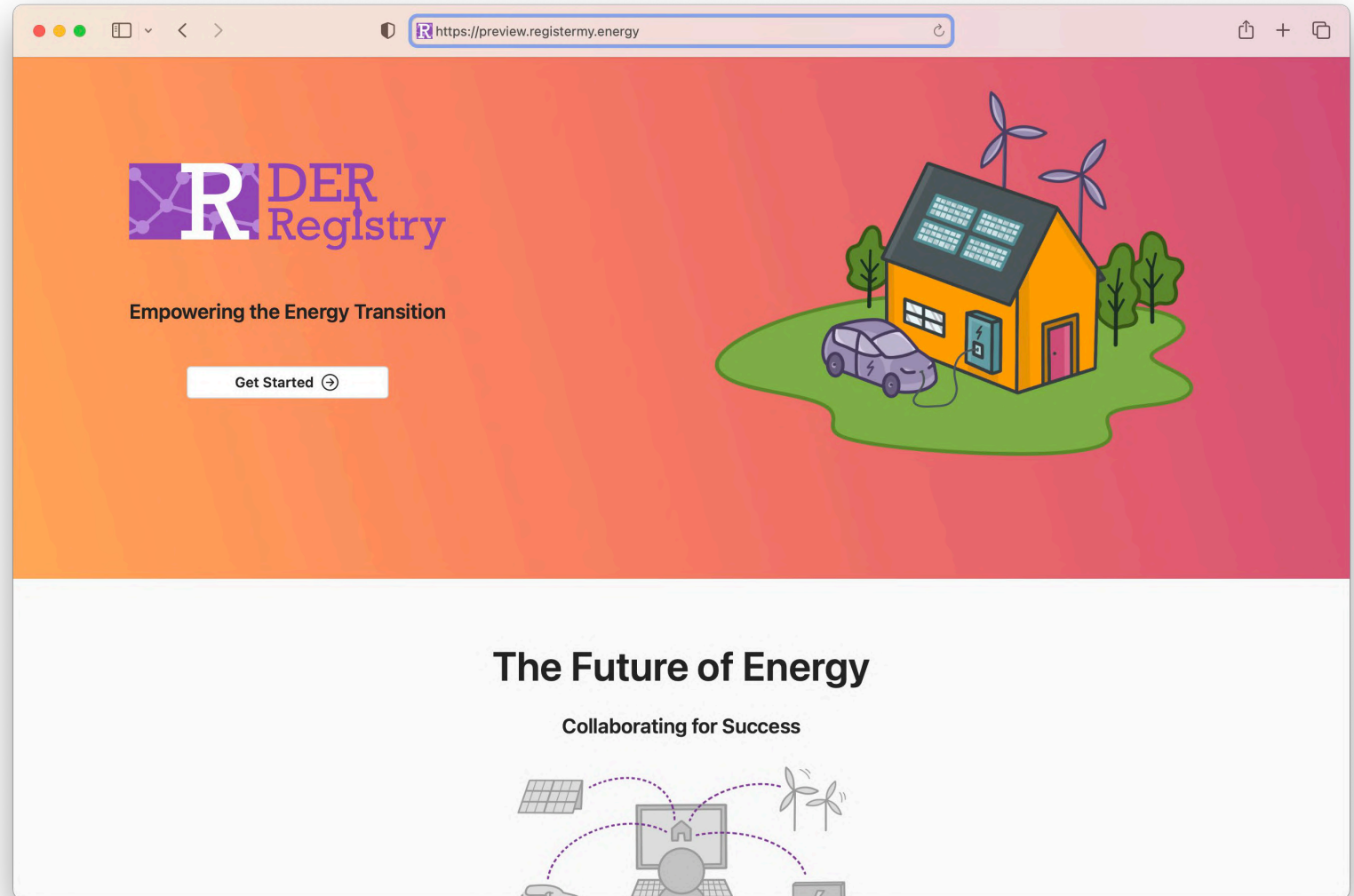
Owner Log in

- Homeowner signs on to the system to create an account
- Authentication provided via their social accounts (Microsoft already set up. Facebook, Google, etc. coming soon!)



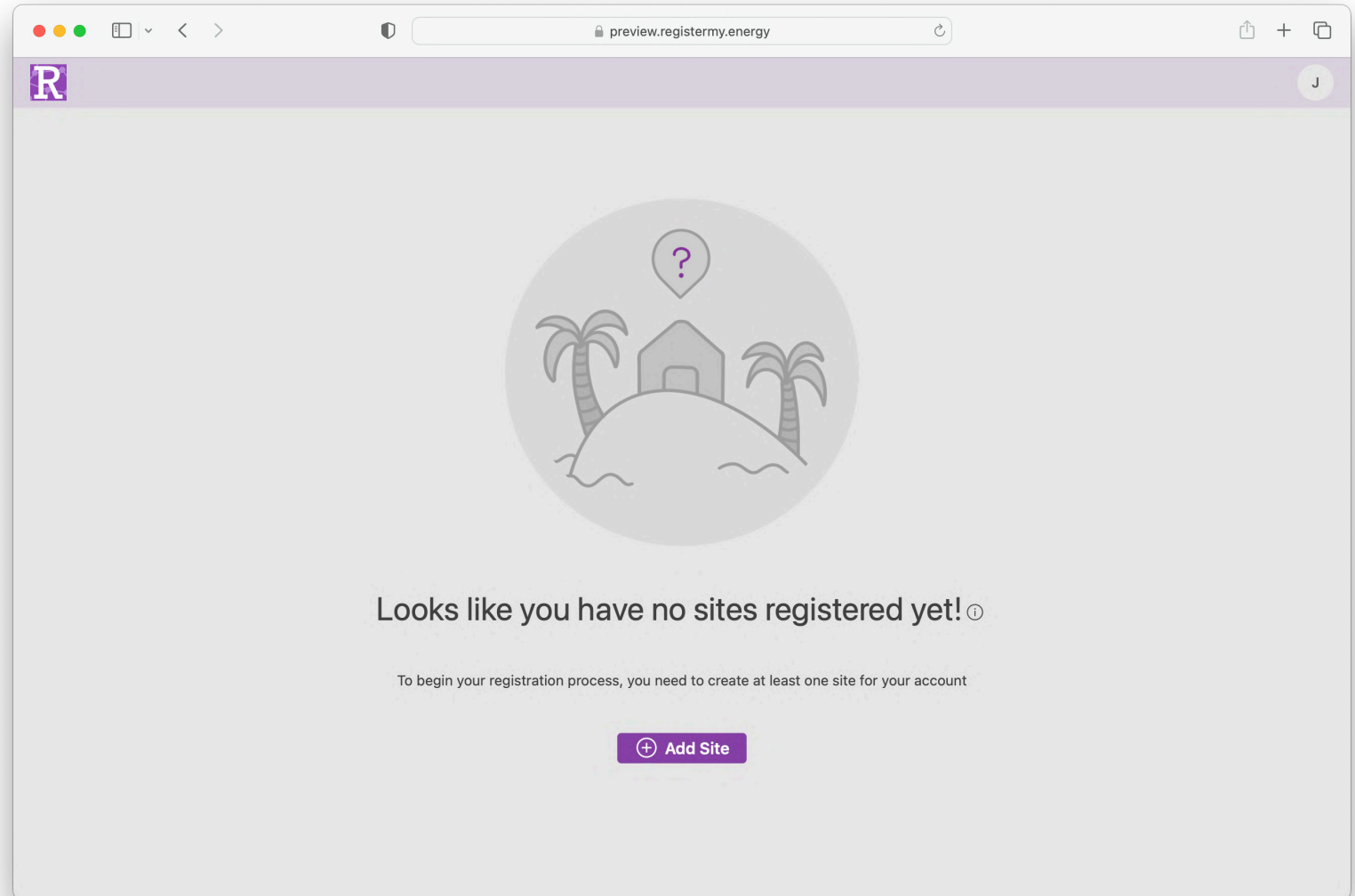
Owner Log in

- After signing in you are ready to “Get Started”



No Sites

- When a homeowner first signs in, they have not established a site to place DERs. Step 1 is to add their site.
- Owners may have multiple sites



Register Site

- Contact information and distribution utility account service address

The screenshot shows a web browser window with the URL `preview.registermy.energy`. The page features a purple header with a logo 'R' and a user profile icon 'J'. Below the header is a progress bar with five steps, where step 1 is highlighted. The main content area is titled 'Register Your Site' and includes a 'Site Information' section. A note states: 'Important: Please use matching account holder and service address (not mailing address) as specified on your utility bill.' The form is divided into two main sections: 'Account Holder Contact Information' and 'Account Service Address'. The first section contains three fields: 'Account Holder Name *', 'Account Holder Phone Number *' (with a placeholder '(xxx) xxx-xxxx'), and 'Account Holder Email' (with a placeholder 'jane.smith.registry@gmail.com'). The second section contains two fields: 'Address Line 1 *' and 'Address Line 2'.

Register Your Site

1 2 3 4 5

Site Information

Important: Please use matching account holder and service address (not mailing address) as specified on your utility bill.

Account Holder Contact Information

Account Holder Name *

Account Holder Phone Number *

(xxx) xxx-xxxx

Account Holder Email

jane.smith.registry@gmail.com

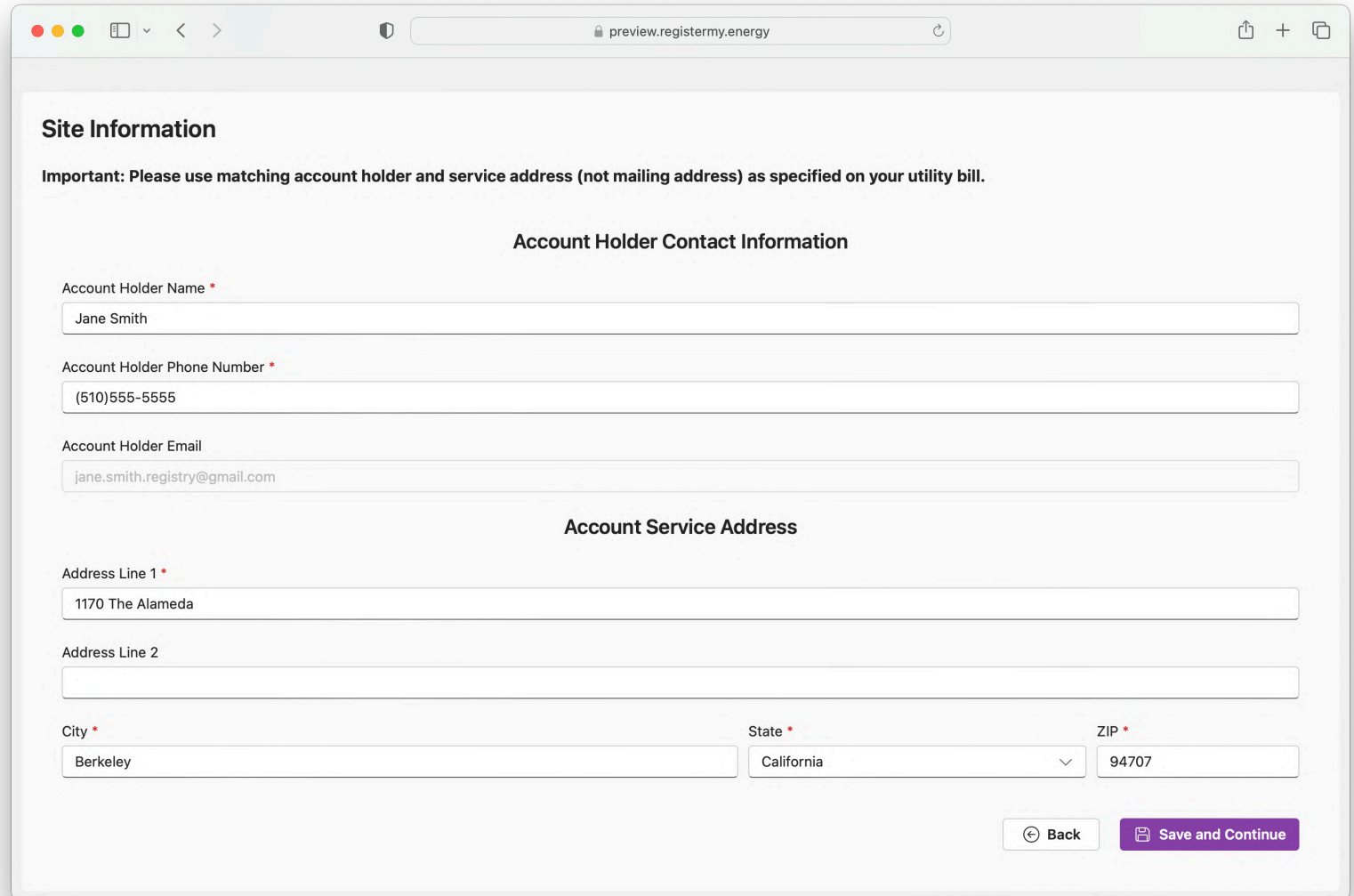
Account Service Address

Address Line 1 *

Address Line 2

Register Site

- Contact information and distribution utility account service address - completed



The screenshot shows a web browser window with the URL `preview.registermy.energy`. The page is titled "Site Information" and includes a note: "Important: Please use matching account holder and service address (not mailing address) as specified on your utility bill." The form is divided into two main sections: "Account Holder Contact Information" and "Account Service Address".

Account Holder Contact Information

- Account Holder Name *:
- Account Holder Phone Number *:
- Account Holder Email:

Account Service Address

- Address Line 1 *:
- Address Line 2:
- City *:
- State *:
- ZIP *:

At the bottom right, there are two buttons: "Back" and "Save and Continue".

Register Site

- Select your electric distribution utility and provide account number

The screenshot shows a web browser window with the URL `preview.registermy.energy`. The page features a purple header with a logo 'R' and a user icon 'J'. A progress bar at the top indicates five steps, with step 2, 'Utility Serving Site', currently active. The form is titled 'Utility' and contains two main input fields. The first is a dropdown menu for 'Electric utility that serves this property? *' with 'Bright Peak Energy' selected and a hint 'Start typing to match known companies'. The second is a text input for 'Account number? *' containing '1234567' with a hint 'Account number found on you utility bill'. At the bottom right, there are 'Back' and 'Save and Continue' buttons.

Register Your Site

1 2 3 4 5

Utility Serving Site

Utility

Electric utility that serves this property? *

Bright Peak Energy

Start typing to match known companies

Account number? *

1234567

Account number found on you utility bill

Back Save and Continue

Register Site

- Confirm your site information

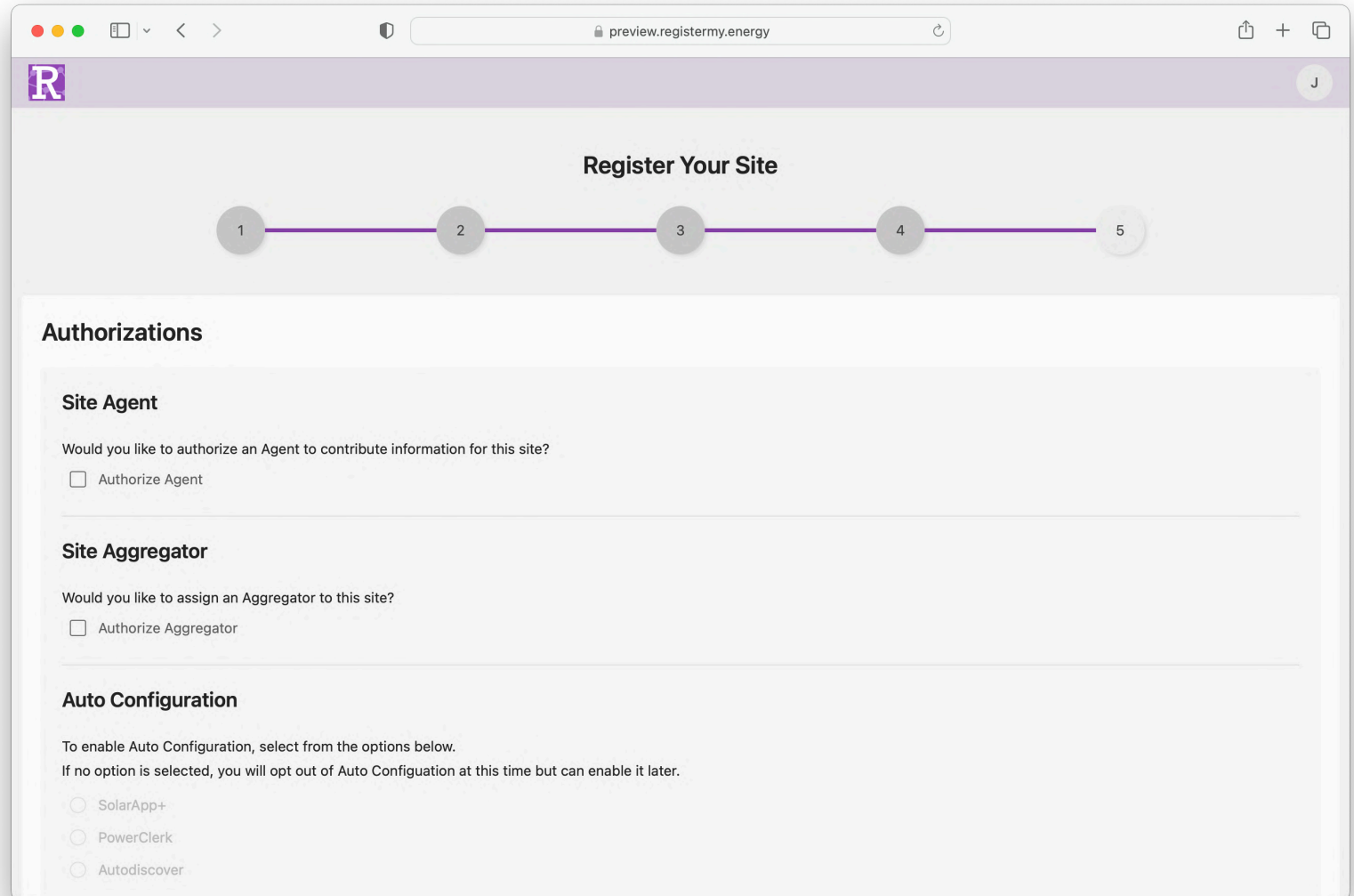
The screenshot shows a web browser window with the URL `preview.registermy.energy`. The page title is "Register Your Site". A progress bar at the top indicates five steps, with the third step being the current one. The main heading is "Confirm Site Account and Service Information". Below this, there is a section titled "Site Information:" with a home icon and an "Edit" button. The form contains the following fields:

Account Holder:	Jane Smith (510)555-5555
Account Number:	1234567
Service Provider:	Bright Peak Energy
Service Address:	1170 The Alameda Berkeley, California 94707

Below the form, there is a blue box with a checked checkbox and the text: "I certify that I am the owner or authorized representative of this site. The electric utility provider for this site may validate my address and account information, and may contact me regarding the distributed energy resources (DERs) being registered for this location." At the bottom right, there are two buttons: "Back" and "Confirm and Continue".

Register Site

- Once an owner has established their site, they may select an agent (solar/battery/etc. installer) to enter their DER information, select an aggregator and, if applicable, allow the registry to Auto populate their DER settings via their permit through SolarApp+, PowerClerk or Auto discover equipment on their site.



The screenshot shows a web browser window with the address bar displaying 'preview.registermy.energy'. The page has a purple header with a white 'R' logo on the left and a user icon 'J' on the right. The main heading is 'Register Your Site'. Below the heading is a progress bar with five numbered steps (1-5), where step 3 is currently active. The form is divided into three sections: 'Authorizations', 'Site Agent', and 'Site Aggregator'. The 'Site Agent' section asks 'Would you like to authorize an Agent to contribute information for this site?' with an unchecked checkbox labeled 'Authorize Agent'. The 'Site Aggregator' section asks 'Would you like to assign an Aggregator to this site?' with an unchecked checkbox labeled 'Authorize Aggregator'. The 'Auto Configuration' section has a heading and two lines of text: 'To enable Auto Configuration, select from the options below.' and 'If no option is selected, you will opt out of Auto Configuration at this time but can enable it later.' Below this text are three radio button options: 'SolarApp+', 'PowerClerk', and 'Autodiscover', all of which are currently unselected.

Register Your Site

1 2 3 4 5

Authorizations

Site Agent

Would you like to authorize an Agent to contribute information for this site?

☐ Authorize Agent

Site Aggregator

Would you like to assign an Aggregator to this site?

☐ Authorize Aggregator

Auto Configuration

To enable Auto Configuration, select from the options below.

If no option is selected, you will opt out of Auto Configuration at this time but can enable it later.

☐ SolarApp+

☐ PowerClerk

☐ Autodiscover

Register Site

- Authorizations - completed

Authorizations

Site Agent

Would you like to authorize an Agent to contribute information for this site?

☐ Authorize Agent

Site Aggregator

Would you like to assign an Aggregator to this site?

☒ Authorize Aggregator

Aggro Gators LLC

Start typing to match known aggregators

Auto Configuration

To enable Auto Configuration, select from the options below.
If no option is selected, you will opt out of Auto Configuration at this time but can enable it later.

☐ SolarApp+

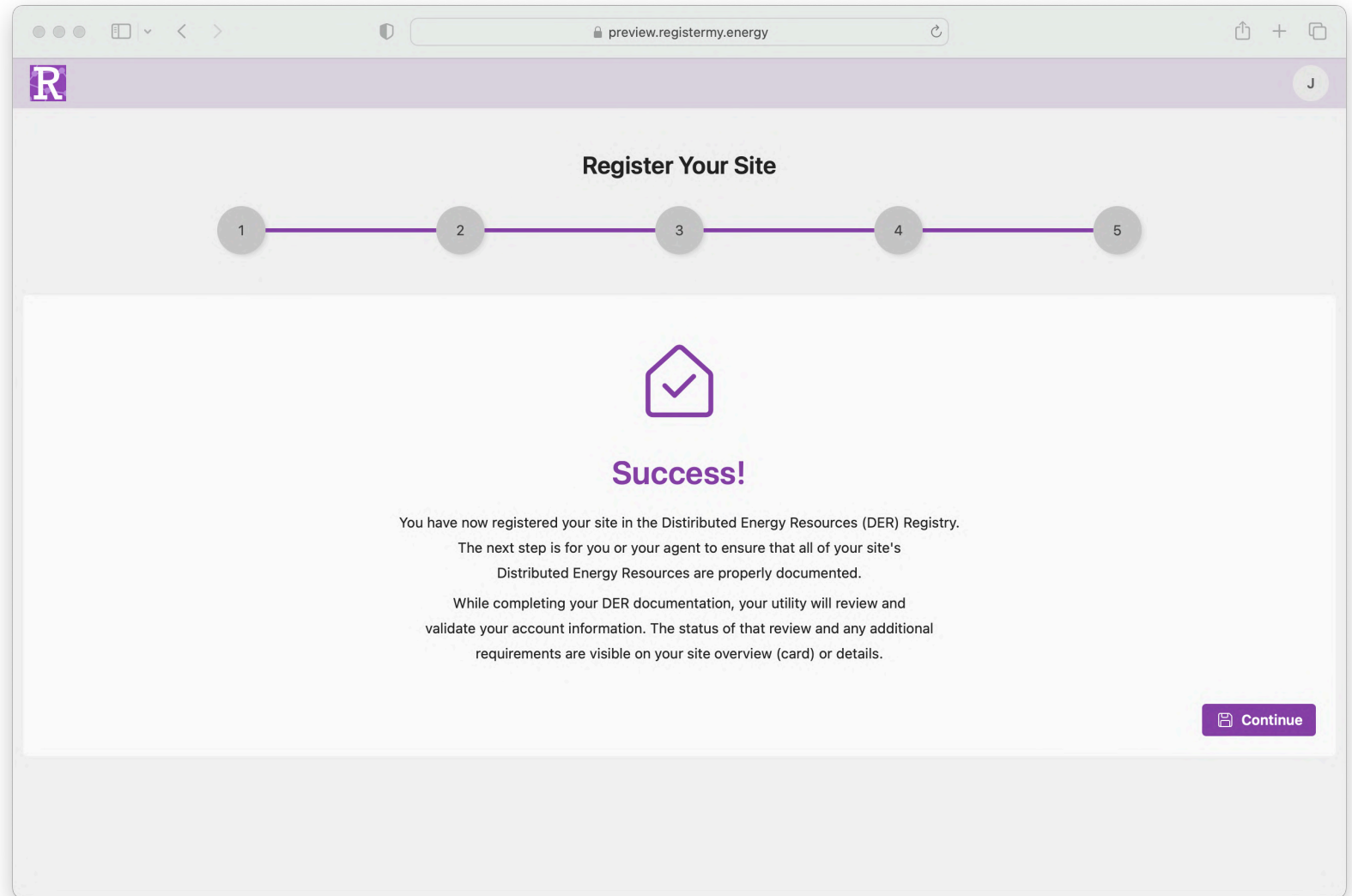
☐ PowerClerk

☐ Autodiscover

Back Save and Continue

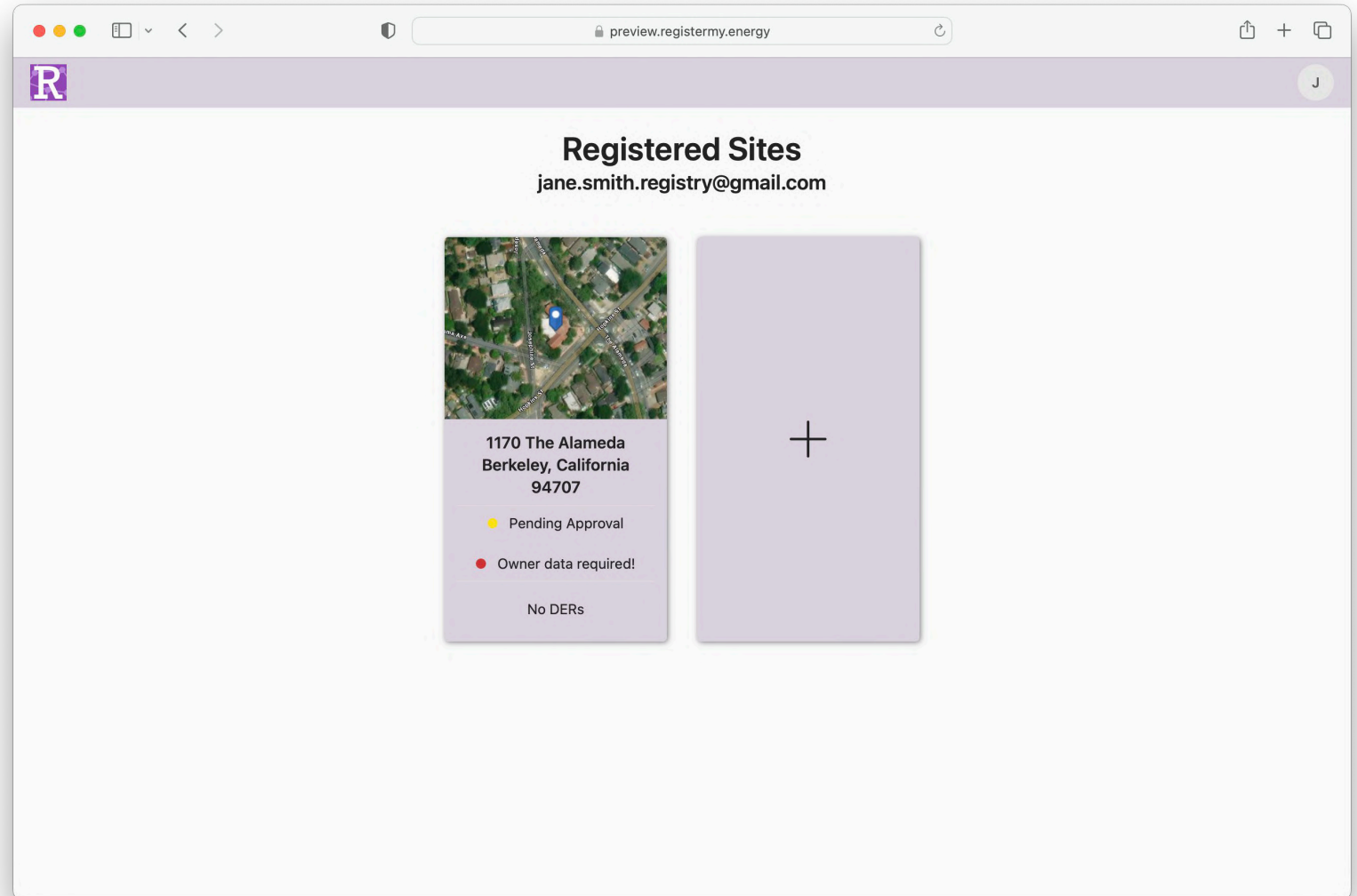
Register Site

- Site successfully created



Registered Sites

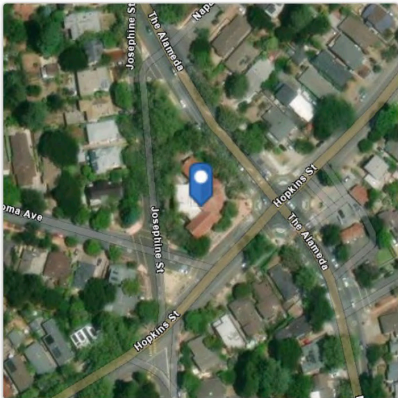
- Site has been successfully created and is now visible on dashboard



Site Details

- No DERs have been added yet, so there is a notification indicating that “The DERs collection needs data”

The screenshot shows a web browser window with the URL `preview.registermy.energy`. The page title is "Site Record" for the email `jane.smith.registry@gmail.com`. Below the title, there are navigation links for "Back" and "Add DER". The main content area is titled "Overview" and shows the address "1170 The Alameda, Berkeley California 94707". On the left, there is a map of the area with a blue location pin. On the right, there is a table of site details.

Site Record	
jane.smith.registry@gmail.com	
Back Add DER	
Overview 1170 The Alameda, Berkeley California 94707	
	
Status	● Pending Approval
Action Items	The DERs collection needs data
Account Holder Name ⓘ	Jane Smith
Account Holder Phone ⓘ	(510)555-5555
Account Number ⓘ	1234567
Distribution Utility ⓘ	Bright Peak Energy
Interconnection Agreement ⓘ	Not Specified
Proof of Insurance ⓘ	Not Specified

Site Details

- No DERs have been added yet, so there is an additional notification in the DERs section indicating that owner or agent needs to add data

Assignments
Authorizations and Delegations

Edit Assignments

Agent ⓘ	Not Specified
Aggregator ⓘ	Aggro Gators
Retail Electric Provider ⓘ	Not Specified

Distributed Energy Resources (DERs)
DER Assets in Site

Add DER ▾ Auto Configuration ▾

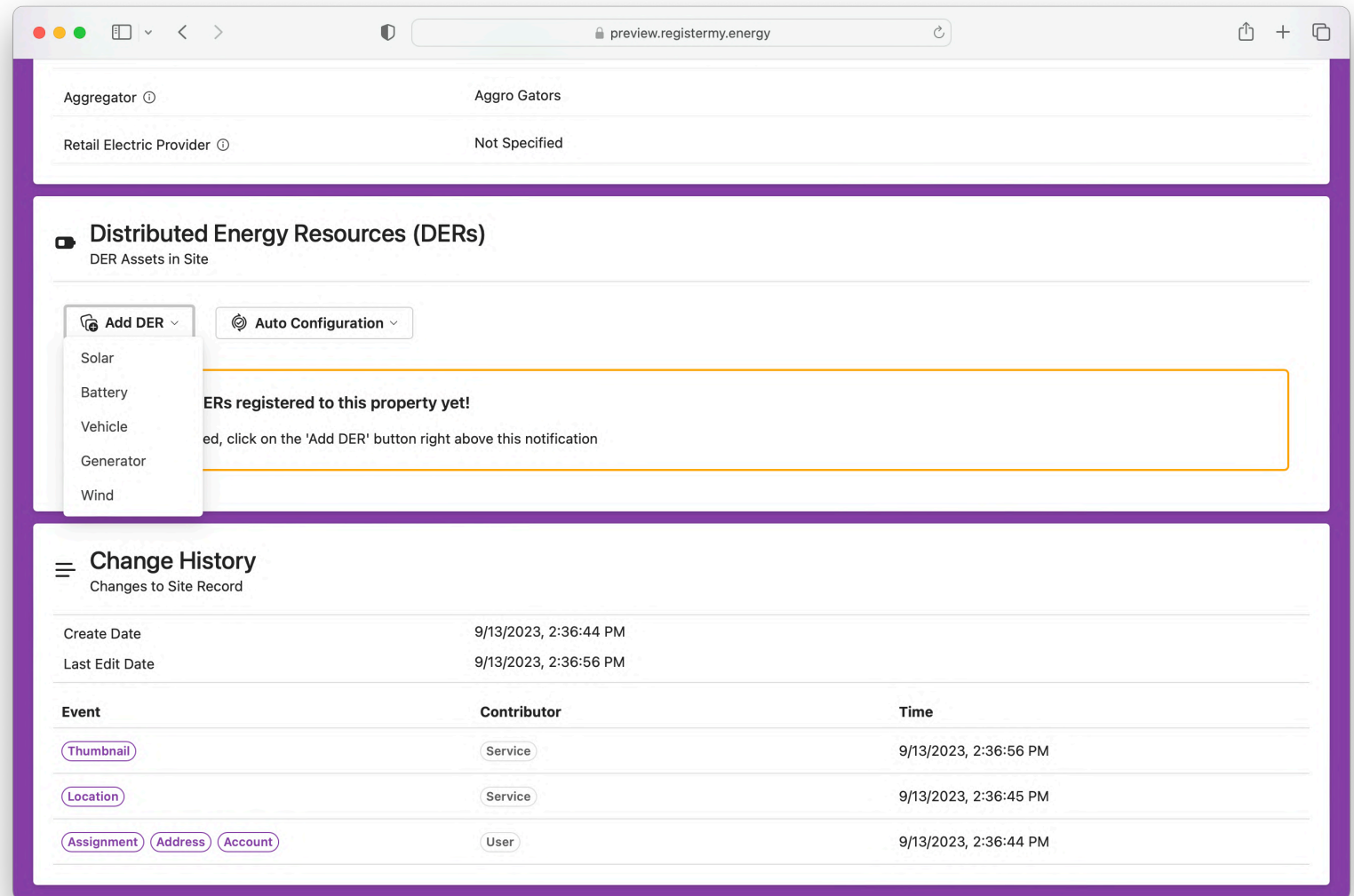
You have no DERs registered to this property yet!
Hint: to get started, click on the 'Add DER' button right above this notification

Change History
Changes to Site Record

Create Date	9/13/2023, 2:36:44 PM
Last Edit Date	9/13/2023, 2:36:56 PM

Add DER

- Owner/agent can add a new DER from the site detail view



Add Solar Array

- Some fields can be edited by an owner/agent, but others need to be added by other parties after the owner/agent completes DER data entry (DSO, Aggregator, ISO, etc.)

preview.registermy.energy

Add Solar Array

Configure your energy resource by completing the form and saving

Solar DER

Nickname ⓘ	Not Specified		
Time of Entry ⓘ	Not Specified		
Total Controllable Capacity ⓘ	Not Specified		
Communication Standards ⓘ	Not Specified		
CIM Asset Type ⓘ	Not Specified		
Installer ⓘ	Not Specified		
Meter ID ⓘ	Not Specified		
Number of Panels ⓘ	Not Specified		

Panel

Model Information ⓘ	Brand ⓘ	Not Specified		
	Model ⓘ	Not Specified		
Nameplate Capacity (kWh) ⓘ	Not Specified			

Add Solar Array

- Add nickname for DER being entered

The screenshot shows a web browser window at `preview.registermy.energy` displaying the 'Add Solar Array' form. The form is titled 'Add Solar Array' with a subtitle 'Configure your energy resource by completing the form and saving'. It is divided into three main sections: 'Solar DER', 'Panel', and 'Inverter'.

Solar DER Section:

Field	Value	Action
Nickname	Garage Solar Panel	✓ ✕
Time of Entry	Not Specified	
Total Controllable Capacity	Not Specified	
Communication Standards	Not Specified	
CIM Asset Type	Not Specified	
Installer	Not Specified	✎ ✕
Meter ID	Not Specified	✎ ✕
Number of Panels	Not Specified	✎ ✕

Panel Section:

Field	Value	Action
Model Information	Brand: Not Specified	✎ ✕
	Model: Not Specified	
Nameplate Capacity (kWh)	Not Specified	✎ ✕

Inverter Section:

The 'Inverter' section is currently empty.

Background Interface:

The background shows the 'Distributed Energy Resources' section with a message: 'You have no DERs registered to this property. Hint: to get started, click on the 'Add DER' button.' Below this is a 'Change History' section with filters for 'Event' (Thumbnail, Location, Assignment, Address, Account).

Add Solar Array

- Select panel brand

preview.registermy.energy

Add Solar Array

Configure your energy resource by completing the form and saving

Number of Panels ⓘ Not Specified

Panel

Model Information ⓘ Brand ⓘ ma

Nameplate Capacity (kWh) ⓘ Not Specified

Inverter

Model Information ⓘ Brand ⓘ

Quick Disconnect

Model Information ⓘ Brand ⓘ Not Specified

Model ⓘ Not Specified

Other Brand

MAR SOLAR PANEL IMALATI VE ELEKTRIK
URT. DAG. PRJ. HIZ. SAN. VE TIC. A.S.

Rare Manufacturing

Amerisolar-Worldwide Energy and
Manufacturing USA Co., Ltd

Applied Materials

Maxeon Solar Technologies Ltd.

Not Specified

Cancel Save

Add Solar Array

- Select panel model

preview.registermy.energy

Add Solar Array

Configure your energy resource by completing the form and saving

Number of Panels ⓘ Not Specified

Panel

Model Information ⓘ

Brand ⓘ MAR SOLAR PANEL IMALATI VE ELEKTRIK URT. DAG. PI ✓

Model ⓘ 26

Nameplate Capacity (kWh) ⓘ Not Specified

Inverter

Model Information ⓘ

Brand ⓘ

Model ⓘ

Quick Disconnect

Model Information ⓘ

Brand ⓘ Not Specified

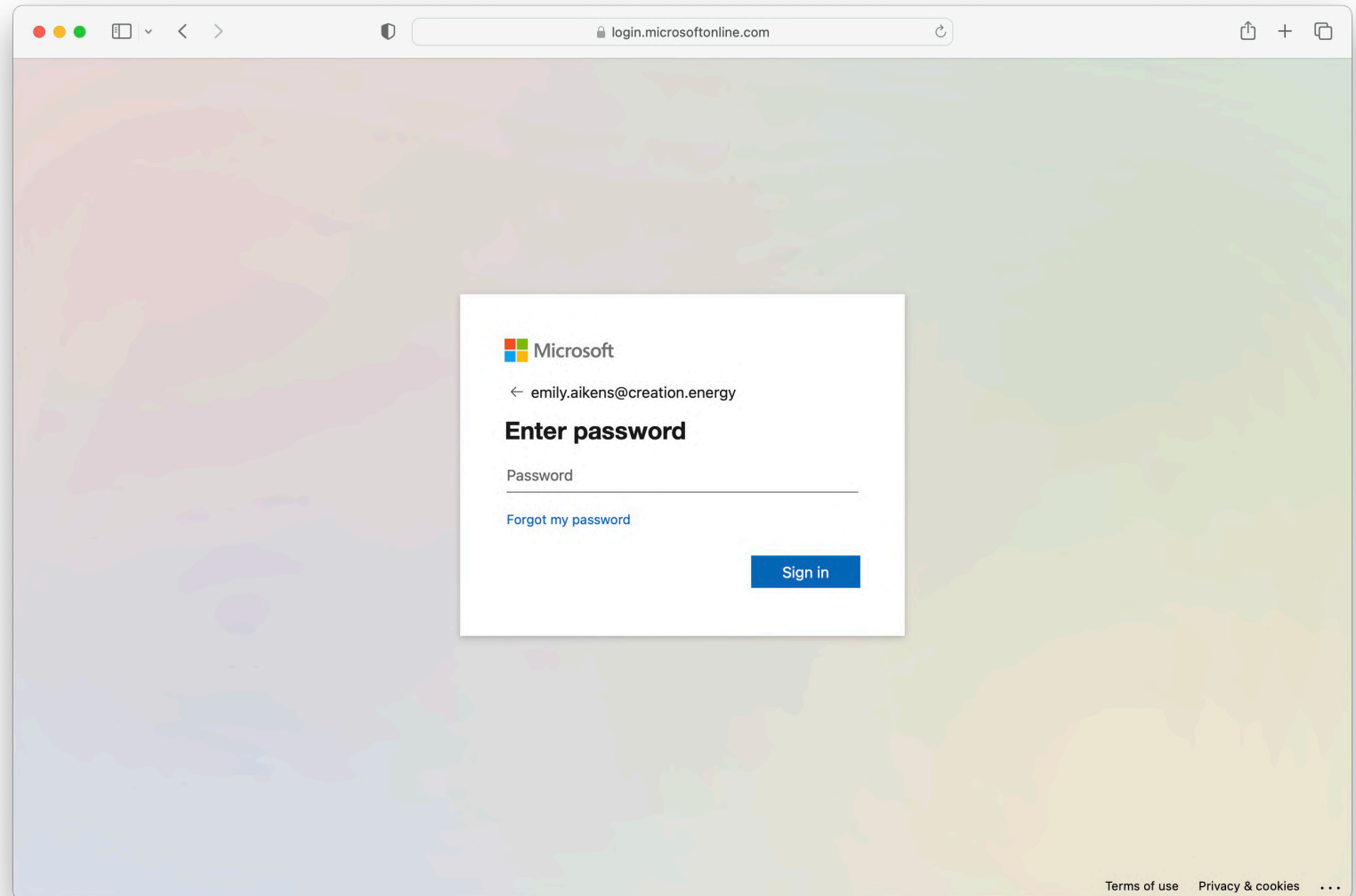
Model ⓘ Not Specified

Other Model

- 265 W, 60 cell polycrystalline module, white backsheet, silver frame
- 260 W, 60 cell polycrystalline module, white backsheet, silver frame
- 275 W, 60 cell polycrystalline module, white backsheet, silver frame
- 290 W, 60 cell monocrystalline module, white backsheet, silver frame
- 270 W, 60 cell polycrystalline module, white backsheet, silver frame

Registry Login for "Industry" Members

- Aggregators, DSOs, ISOs etc. log in through a different registry portal



Add Solar Array

- Select inverter brand and model

The screenshot shows a web browser window at `preview.registermy.energy` displaying the 'Add Solar Array' form. The form is titled 'Add Solar Array' with a subtitle 'Configure your energy resource by completing the form and saving'. It includes a sidebar on the left with navigation options like 'Aggregator', 'Retail Electric Provider', 'Distributed Energy Resources', and 'Change History'. The main form area contains several sections: 'Nameplate Capacity (kWh)' set to 'Not Specified', an 'Inverter' section with 'Brand' set to 'First Solar, Inc.' and 'Model' set to 'Other Model', and a 'Quick Disconnect' section with 'Brand' and 'Model' both set to 'Not Specified'. The form also includes an 'Apply' button, a 'Cancel' button, and a 'Save' button.

Aggregator ⓘ

Retail Electric Provider ⓘ

Distributed Energy Resources
DER Assets in Site

Add DER ▼ Auto Configuration ▼

You have no DERs registered to this project
Hint: to get started, click on the 'Add DER' button

Change History
Changes to Site Record

Create Date

Last Edit Date

Event

Thumbnail

Location

Assignment Address Account

Add Solar Array
Configure your energy resource by completing the form and saving

Brand ⓘ MAK SOLAR PANEL IMALATI VE ELEKTRIK URU. DAG. PI

Model ⓘ 260 W, 60 cell polycrystalline module, white backsheet, ▼

Nameplate Capacity (kWh) ⓘ Not Specified

Inverter

Model Information ⓘ

Brand ⓘ First Solar, Inc. ✓

Model ⓘ Other Model

Please enter model information

Quick Disconnect

Model Information ⓘ

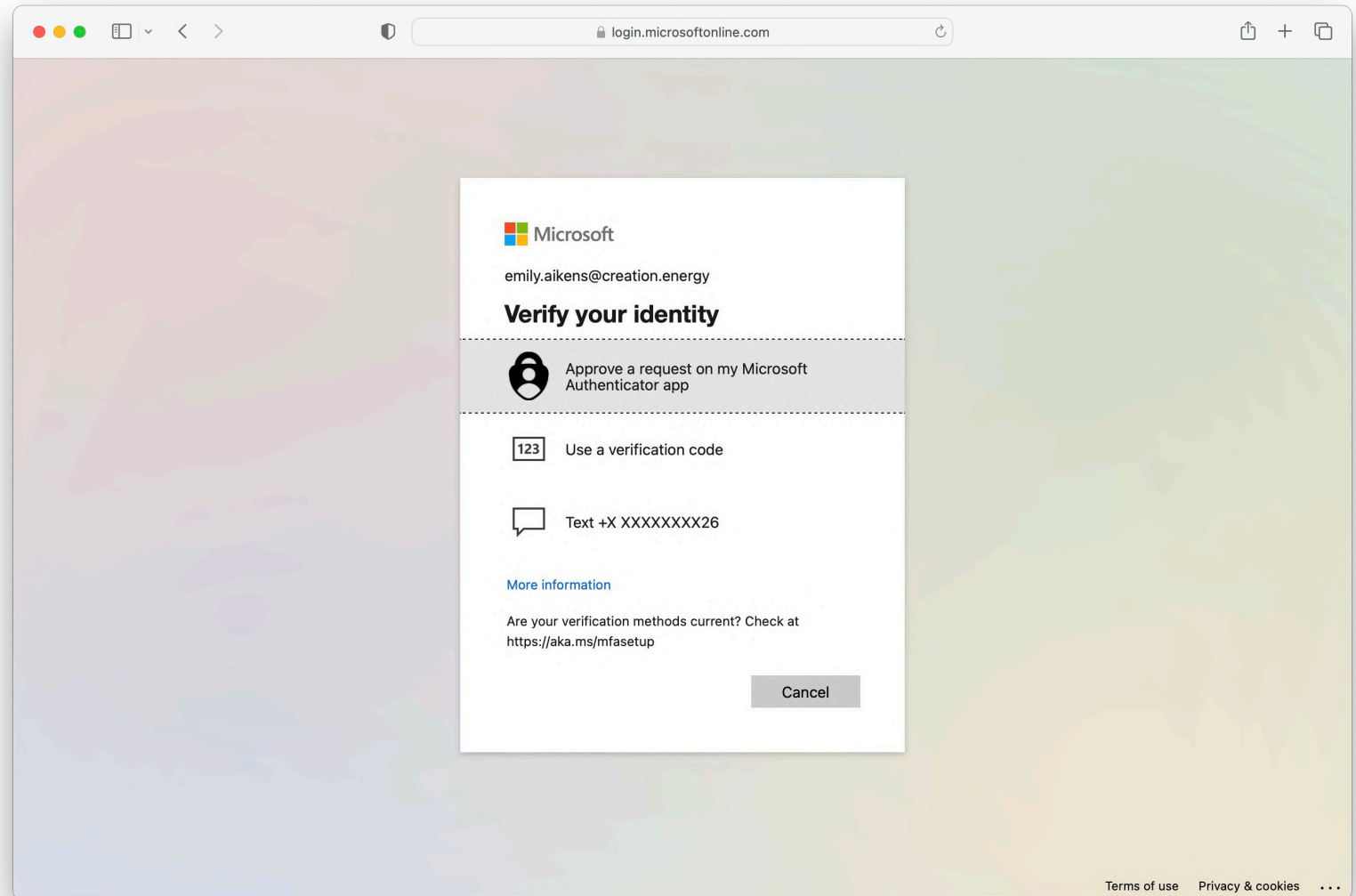
Brand ⓘ Not Specified

Model ⓘ Not Specified

< Cancel Save

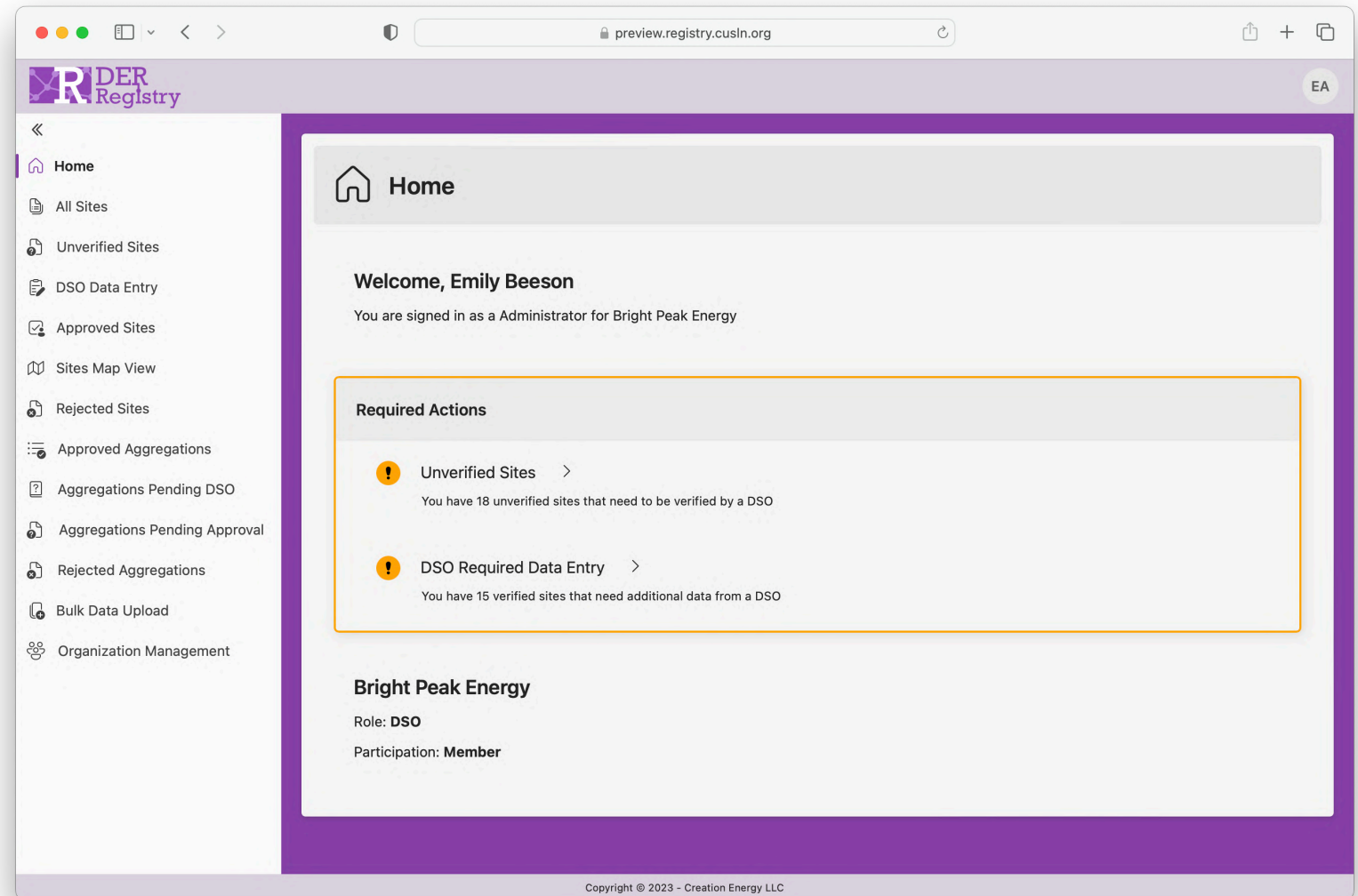
Registry Authentication

- Authentication is provided via their corporate credentials
- Company must be a Collaborative Solutions Member to allow their employees access



DSO Home

- When DSO logs in



DSO Unverified Sites

- DSO can access this view by clicking the notification on the home screen or selecting the “Unverified Sites” tab

The screenshot displays the DER Registry web application interface. The left sidebar contains a navigation menu with the following items: Home, All Sites, Unverified Sites (highlighted), DSO Data Entry, Approved Sites, Sites Map View, Rejected Sites, Approved Aggregations, Aggregations Pending DSO, Aggregations Pending Approval, Rejected Aggregations, Bulk Data Upload, and Organization Management. The main content area is titled 'Unverified Sites: Owner Verification' and includes a sub-header 'The sites below need to be verified by a DSO.' Below this, there are buttons for 'Verify', 'Reject', and 'Details'. A table lists 9 unverified sites with the following columns: Utility Account, Owner Name, Address, and DERs. The table data is as follows:

<input type="checkbox"/>	Utility Account	Owner Name	Address	DERs
<input type="checkbox"/>	1234567	Jane Smith	1170 The Alameda Berkeley, CA 94707	☀️
<input type="checkbox"/>	31415926536	Brandon Perry	9317 Livernois Houston, TX 77080	☀️
<input type="checkbox"/>	100025	First25 Last25	1513 Meisch Ct Naperville, IL 60563	☀️ 🚗 🚲 🚶
<input type="checkbox"/>	100024	First24 Last24	20 W Bauer Rd Naperville, IL 60563	☀️ 🚗 🚲 🚶
<input type="checkbox"/>	100023	First23 Last23	4 W Bauer Rd Naperville, IL 60563	☀️ 🚗 🚲 🚶
<input type="checkbox"/>	100022	First22 Last22	516 Ticonderoga Ln Naperville, IL 60563	☀️ 🚗 🚲 🚶
<input type="checkbox"/>	100021	First21 Last21	465 Menominee Ln Naperville, IL 60563	☀️ 🚗 🚲 🚶
<input type="checkbox"/>	100019	First19 Last19	560 Braemar Ave Naperville, IL 60563	☀️ 🚗 🚲 🚶

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DSO Unverified Sites

- DSO can select a site to view, verify or reject

The screenshot shows a web browser window with the URL `preview.registry.cusln.org`. The application is titled "DER Registry" and has a sidebar menu with the following items: Home, All Sites, Unverified Sites (selected), DSO Data Entry, Approved Sites, Sites Map View, Rejected Sites, Approved Aggregations, Aggregations Pending DSO, Aggregations Pending Approval, Rejected Aggregations, Bulk Data Upload, and Organization Management.

The main content area is titled "Unverified Sites: Owner Verification" and includes a sub-header "The sites below need to be verified by a DSO." Below this is a toolbar with "Verify", "Reject", and "Details" buttons. A table lists the unverified sites:

<input checked="" type="checkbox"/>	Utility Account	Owner Name	Address	DERs
<input checked="" type="checkbox"/>	1234567	Jane Smith	1170 The Alameda Berkeley, CA 94707	☀️
<input type="checkbox"/>	31415926536	Brandon Perry	9317 Livernois Houston, TX 77080	☀️
<input type="checkbox"/>	100025	First25 Last25	1513 Meisch Ct Naperville, IL 60563	☀️ 🚗 🚲
<input type="checkbox"/>	100024	First24 Last24	20 W Bauer Rd Naperville, IL 60563	☀️ 🚗 🚲
<input type="checkbox"/>	100023	First23 Last23	4 W Bauer Rd Naperville, IL 60563	☀️ 🚗 🚲
<input type="checkbox"/>	100022	First22 Last22	516 Ticonderoga Ln Naperville, IL 60563	☀️ 🚗 🚲
<input type="checkbox"/>	100021	First21 Last21	465 Menominee Ln Naperville, IL 60563	☀️ 🚗 🚲
<input type="checkbox"/>	100019	First19 Last19	560 Braemar Ave Naperville, IL 60563	☀️ 🚗 🚲

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DSO Unverified Site Details

- DSO can see site details and can verify or reject site

The screenshot displays the DER Registry web application interface. On the left is a sidebar menu with the following items: Home, All Sites, Unverified Sites (highlighted), DSO Data Entry, Approved Sites, Sites Map View, Rejected Sites, Approved Aggregations, Aggregations Pending DSO, Aggregations Pending Approval, Rejected Aggregations, Bulk Data Upload, and Organization Management. The main content area is titled 'Site Overview' with the subtitle 'Overview of site record'. A prominent orange-bordered box labeled 'Required Actions' contains a warning icon and the text 'Verify or Reject Site' and 'This site still needs to be verified by a DSO'. Below this are two purple buttons: 'Verify' and 'Reject'. The 'Site' section shows the following details:

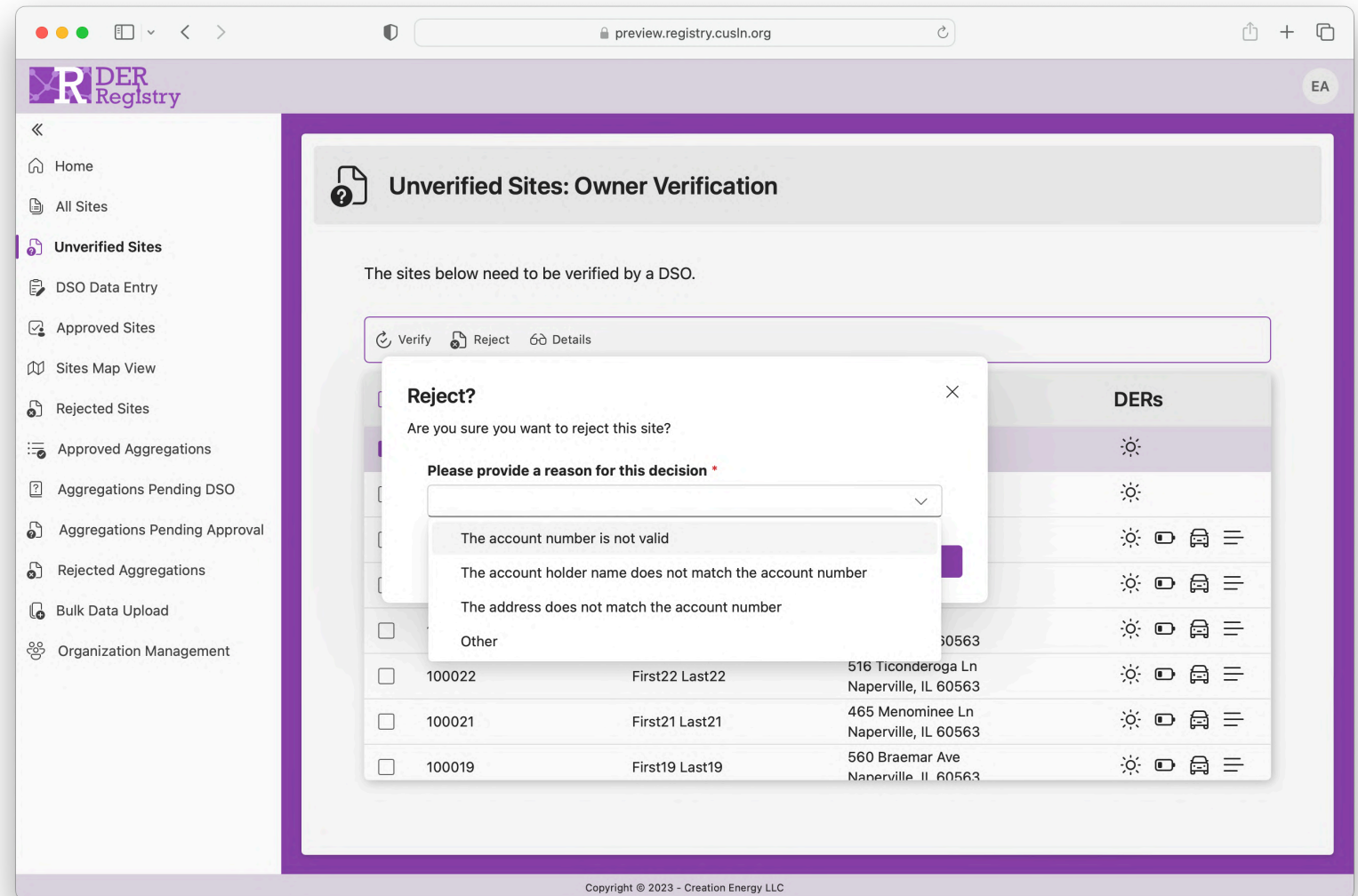
Site	
Version ⓘ	6
Created ⓘ	7/16/2023, 9:47:07 PM
Modified ⓘ	7/16/2023, 10:38:15 PM

The 'Modified By' section shows the following details:

Modified By	
ID ⓘ	Unknown Organization user
Organization ID ⓘ	Not Specified
Geographic Location ⓘ	-95.517877980842, 29.804975981733

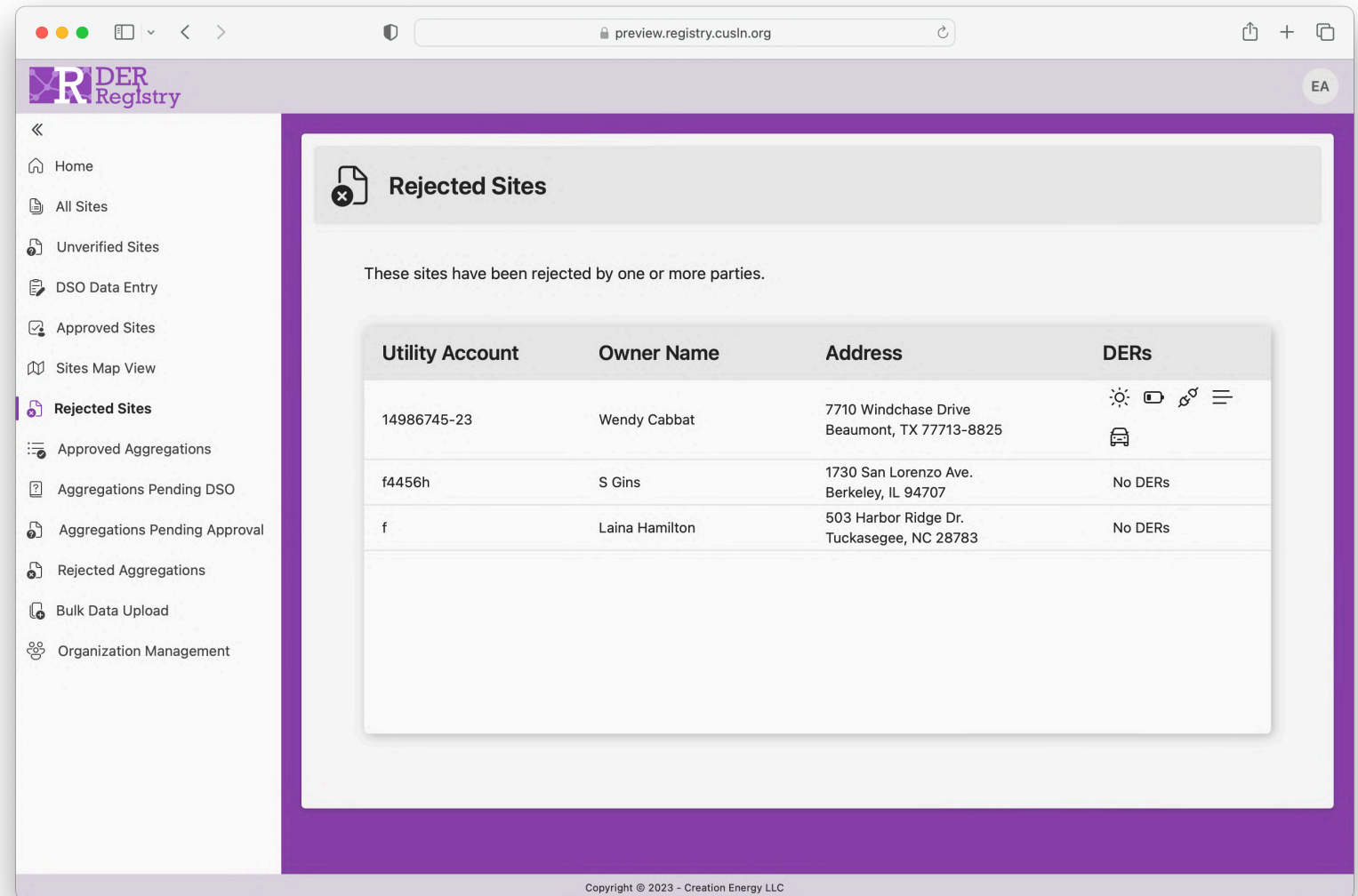
DSO Reject Site

- If DSO chooses to reject site, they must provide a reason
- CUS has a standard rejection list but can change or add additional reasons if DSO requests



DSO Reject Site

- Once a site is rejected, it can be seen in the "Rejected Sites" tab



DSO Reject Site

- Clicking on a site from the list of rejected sites shows the detail view. Notification on top shows the reason why the site was rejected.

The screenshot displays the 'DER Registry' interface. On the left is a sidebar with navigation links: Home, All Sites, Unverified Sites, DSO Data Entry, Approved Sites, Sites Map View, Rejected Sites (highlighted), Approved Aggregations, Aggregations Pending DSO, Aggregations Pending Approval, Rejected Aggregations, Bulk Data Upload, and Organization Management. The main content area is titled 'Site Overview' with the subtitle 'Overview of site record'. A red-bordered notification box at the top contains a red exclamation mark icon and the text: 'Rejected. The distribution utility rejected the site. Reason: The account number is not valid.' Below this, a table lists site details:

Site	
Version ⓘ	33
Created ⓘ	7/17/2023, 7:52:15 AM
Modified ⓘ	7/17/2023, 8:36:32 AM

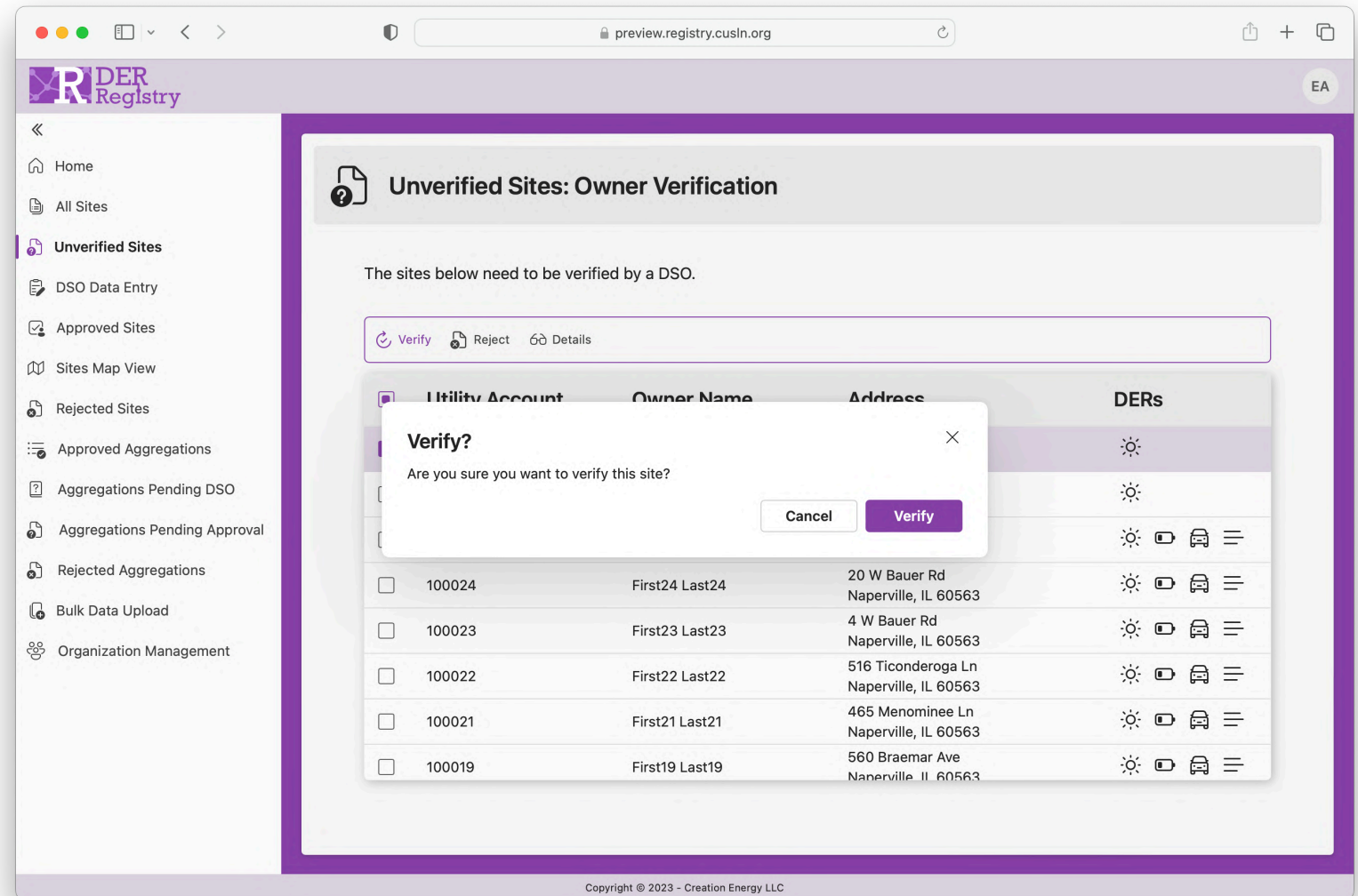
Below the table is a section titled 'Modified By' with the following details:

ID ⓘ	Unknown Organization user
Organization ID ⓘ	Not Specified
Geographic Location ⓘ	-94.18334496868, 30.10503897914
Thumbnail Image ⓘ	Show

At the bottom of the page is a section titled 'Assignments'.

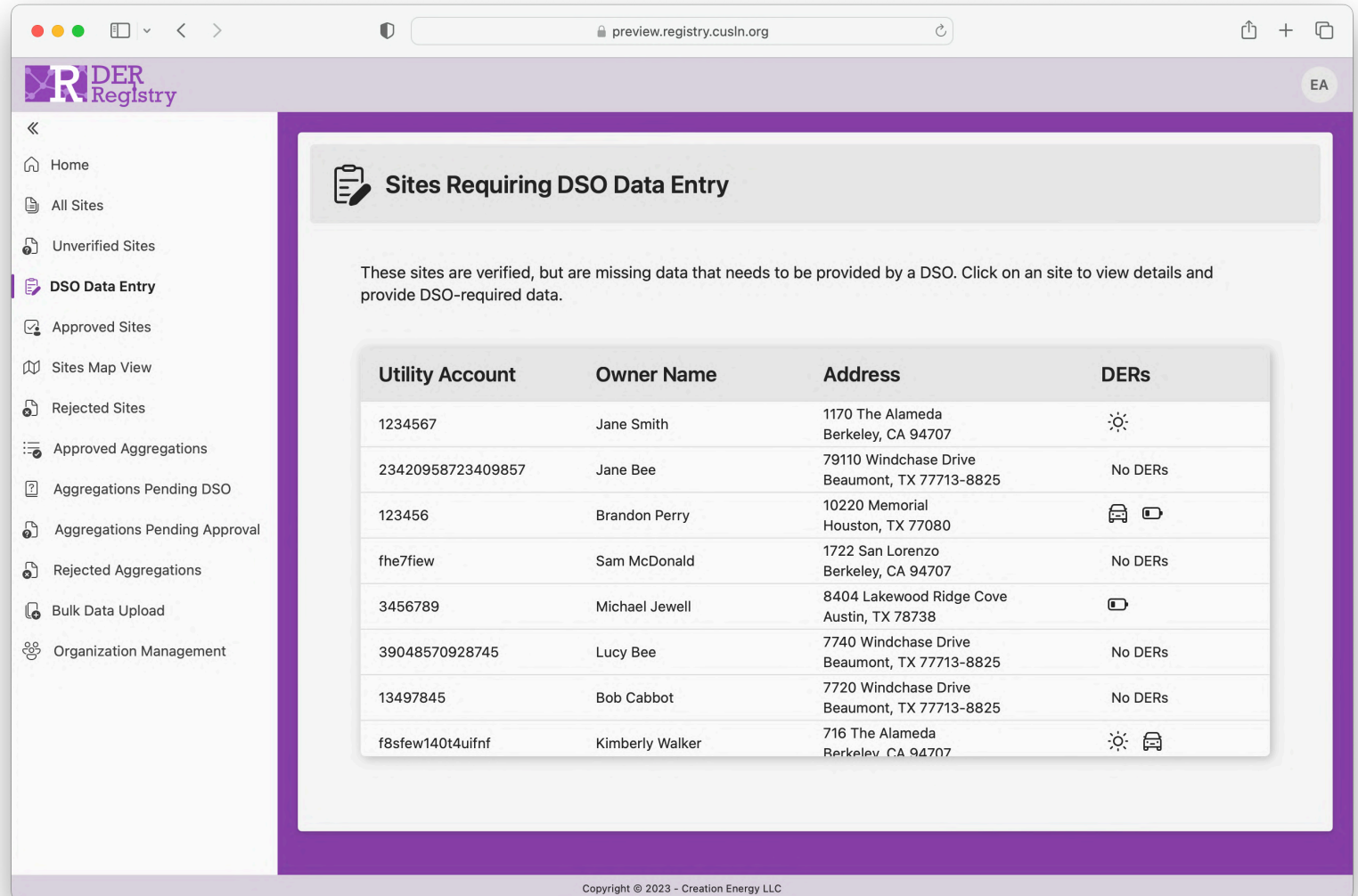
DSO Verify Site

- When a DSO accepts a site as verified with accurate account name, account number and address, they are asked to confirm their verification before this step is finalized



DSO Data Entry

- Once a site has been verified, it requires DSO to enter additional information.
- This view can be accessed from the notification on the home page or the “DSO Data Entry” tab



The screenshot shows a web browser window with the URL `preview.registry.cusln.org`. The page title is "DER Registry". The left sidebar contains a navigation menu with the following items: Home, All Sites, Unverified Sites, **DSO Data Entry** (highlighted), Approved Sites, Sites Map View, Rejected Sites, Approved Aggregations, Aggregations Pending DSO, Aggregations Pending Approval, Rejected Aggregations, Bulk Data Upload, and Organization Management. The main content area is titled "Sites Requiring DSO Data Entry" and includes a sub-header: "These sites are verified, but are missing data that needs to be provided by a DSO. Click on an site to view details and provide DSO-required data." Below this is a table with the following data:

Utility Account	Owner Name	Address	DERs
1234567	Jane Smith	1170 The Alameda Berkeley, CA 94707	☀️
23420958723409857	Jane Bee	79110 Windchase Drive Beaumont, TX 77713-8825	No DERs
123456	Brandon Perry	10220 Memorial Houston, TX 77080	🚗 🔋
fhe7fiew	Sam McDonald	1722 San Lorenzo Berkeley, CA 94707	No DERs
3456789	Michael Jewell	8404 Lakewood Ridge Cove Austin, TX 78738	🔋
39048570928745	Lucy Bee	7740 Windchase Drive Beaumont, TX 77713-8825	No DERs
13497845	Bob Cabbot	7720 Windchase Drive Beaumont, TX 77713-8825	No DERs
f8sfew140t4uifnf	Kimberly Walker	716 The Alameda Berkeley, CA 94707	☀️ 🚗

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DSO Data Entry

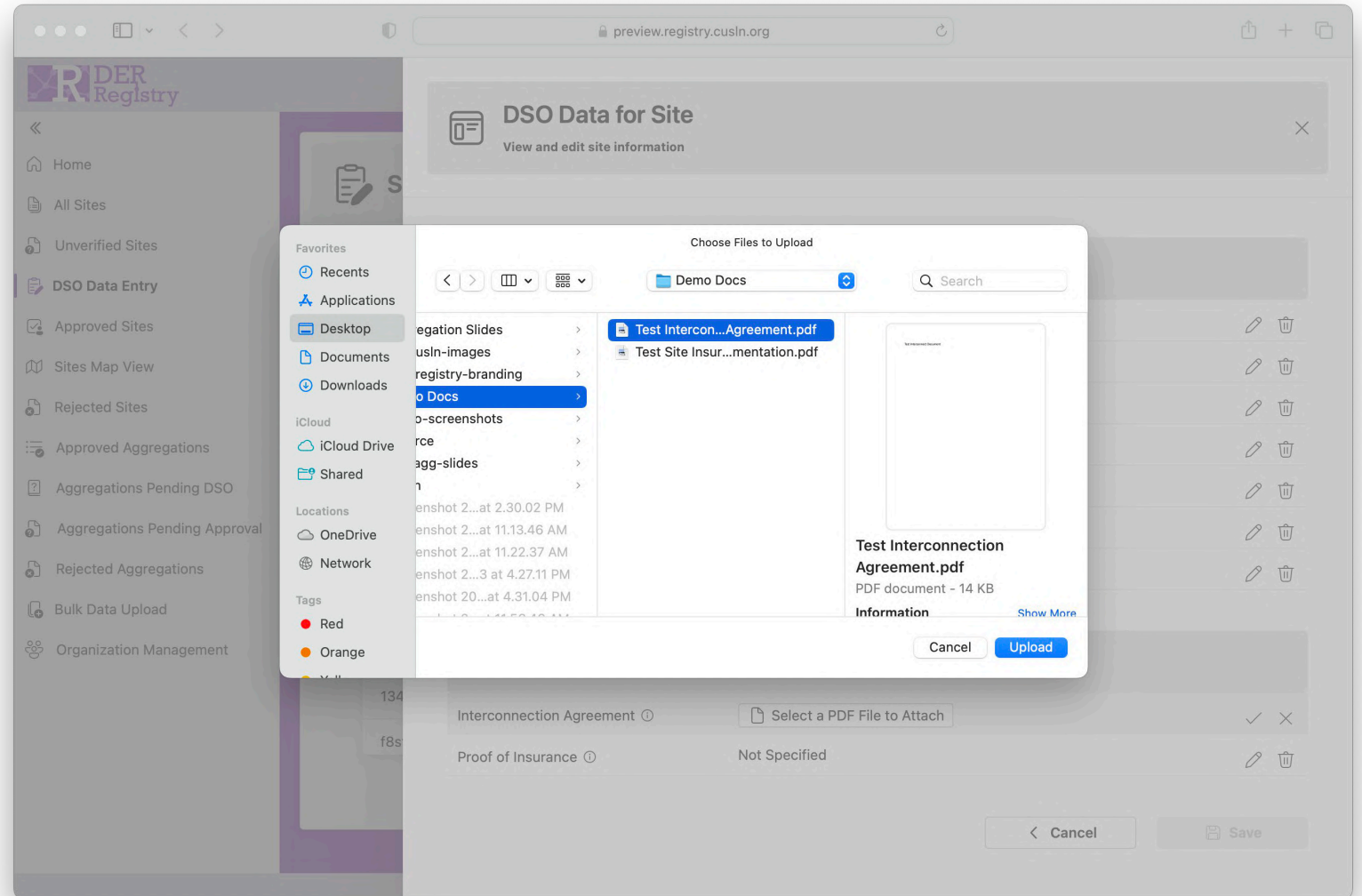
- When a site is selected, DSO can see site details and a notification bar that highlights required actions

The screenshot displays the DER Registry web application. On the left is a sidebar menu with options: Home, All Sites, Unverified Sites, **DSO Data Entry** (highlighted), Approved Sites, Sites Map View, Rejected Sites, Approved Aggregations, Aggregations Pending DSO, Aggregations Pending Approval, Rejected Aggregations, Bulk Data Upload, and Organization Management. The main content area is titled "DSO Data for Site" with a subtitle "View and edit site information". Below this is a "Required Actions" section with three items: "Missing DSO Data" (Fill out the missing fields in the site details below), "Missing Interconnection Agreement" (An interconnection Agreement needs to be uploaded for this site), and "Missing Proof of Insurance" (Proof of Insurance document(s) need to be uploaded for this site). At the bottom is the "Service Holder Address" section with fields for Address Line 1 (1170 The Alameda), Address Line 2, City (Berkeley), State (California), and ZIP Code (94707).

Service Holder Address	
Address Line 1 ⓘ	1170 The Alameda
Address Line 2 ⓘ	
City ⓘ	Berkeley
State ⓘ	California
ZIP Code ⓘ	94707

DSO Upload Documents

- One example of data that a DSO can enter: interconnection agreement



DSO Upload Documents

- Document is now uploaded and available to be viewed or downloaded

The screenshot shows a web browser window with the URL `preview.registry.cusln.org`. The main interface is the 'DER Registry' DSO Data Entry page. A modal titled 'DSO Data for Site' is open, allowing users to 'View and edit site information'. The modal contains two sections: 'Required Data' and 'Required Documents'.

Required Data

Phase on System ⓘ	Not Specified		
Distribution Point of Connection ⓘ	Not Specified		
Load Service Transformer ID ⓘ	Not Specified		
Feeder ⓘ	Not Specified		
Substation Transformer ⓘ	Not Specified		
Substation ⓘ	Not Specified		
Is Critical Care? ⓘ	Not Specified		

Required Documents

Interconnection Agreement ⓘ	Test Interconnection Agreement.pdf		
Proof of Insurance ⓘ	Not Specified		

At the bottom of the modal are two buttons: '< Cancel' and 'Save'.

Owner Site Updated

- Once a DSO uploads a document, it is visible to the owner as well, if applicable

The screenshot displays a web application interface for managing energy resources. The browser address bar shows 'preview.registermy.energy'. The interface is divided into three main sections: Account Holder Information, Assignments, and Distributed Energy Resources (DERs).

Account Holder Information:

Account Holder Name ⓘ	Jane Smith
Account Holder Phone ⓘ	(510)555-5555
Account Number ⓘ	1234567
Distribution Utility ⓘ	Bright Peak Energy
Interconnection Agreement ⓘ	Test Interconnection Agreement.pdf
Proof of Insurance ⓘ	Not Specified

Assignments
Authorizations and Delegations

[Edit Assignments](#)

Agent ⓘ	Not Specified
Aggregator ⓘ	Aggro Gators
Retail Electric Provider ⓘ	Not Specified

Distributed Energy Resources (DERs)
DER Assets in Site 1

[Add DER](#) [Auto Configuration](#)

DER Type	DER Nickname	DER Actions
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Owner Site Change History

- Any DSO updates are visible in the Change History log
- Contributor currently “user” but this can be customized to be more detailed to the login name/user that entered the data

The screenshot shows a web application interface for 'Distributed Energy Resources (DERs)'. The browser address bar shows 'preview.registermy.energy'. The interface has a purple header and a white main content area.

Distributed Energy Resources (DERs)
DER Assets in Site 1

Buttons: Add DER, Auto Configuration

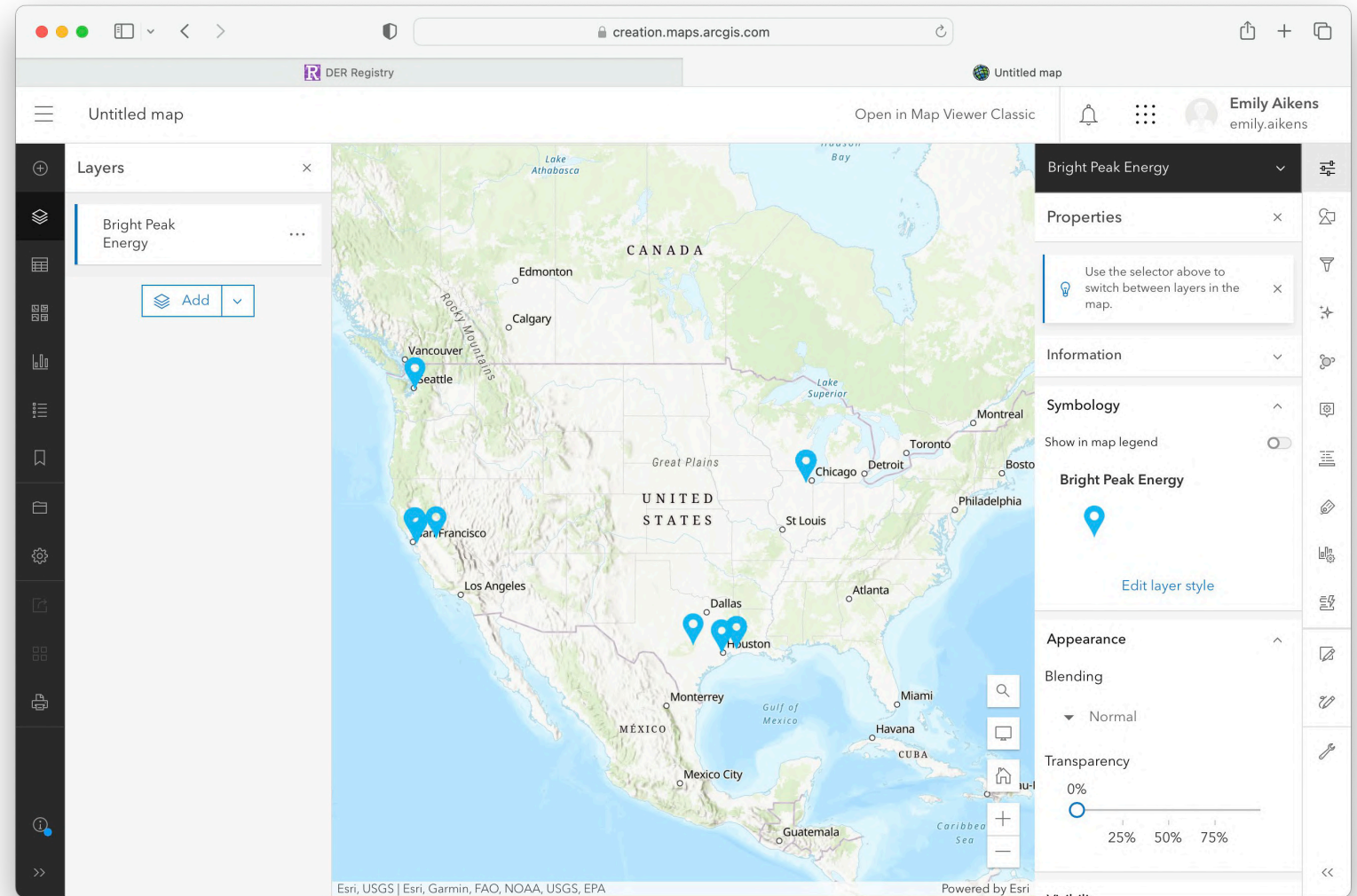
DER Type	DER Nickname	DER Actions
Solar	Garage Solar Panel	🔗 🗑️

Change History
Changes to Site Record

Event	Contributor	Time
Attachments	User	9/14/2023, 11:58:05 AM
DER	User	9/13/2023, 2:57:56 PM
DER	User	9/13/2023, 2:50:44 PM
Thumbnail	Service	9/13/2023, 2:36:56 PM
Location	Service	9/13/2023, 2:36:45 PM
Assignment Address Account	User	9/13/2023, 2:36:44 PM

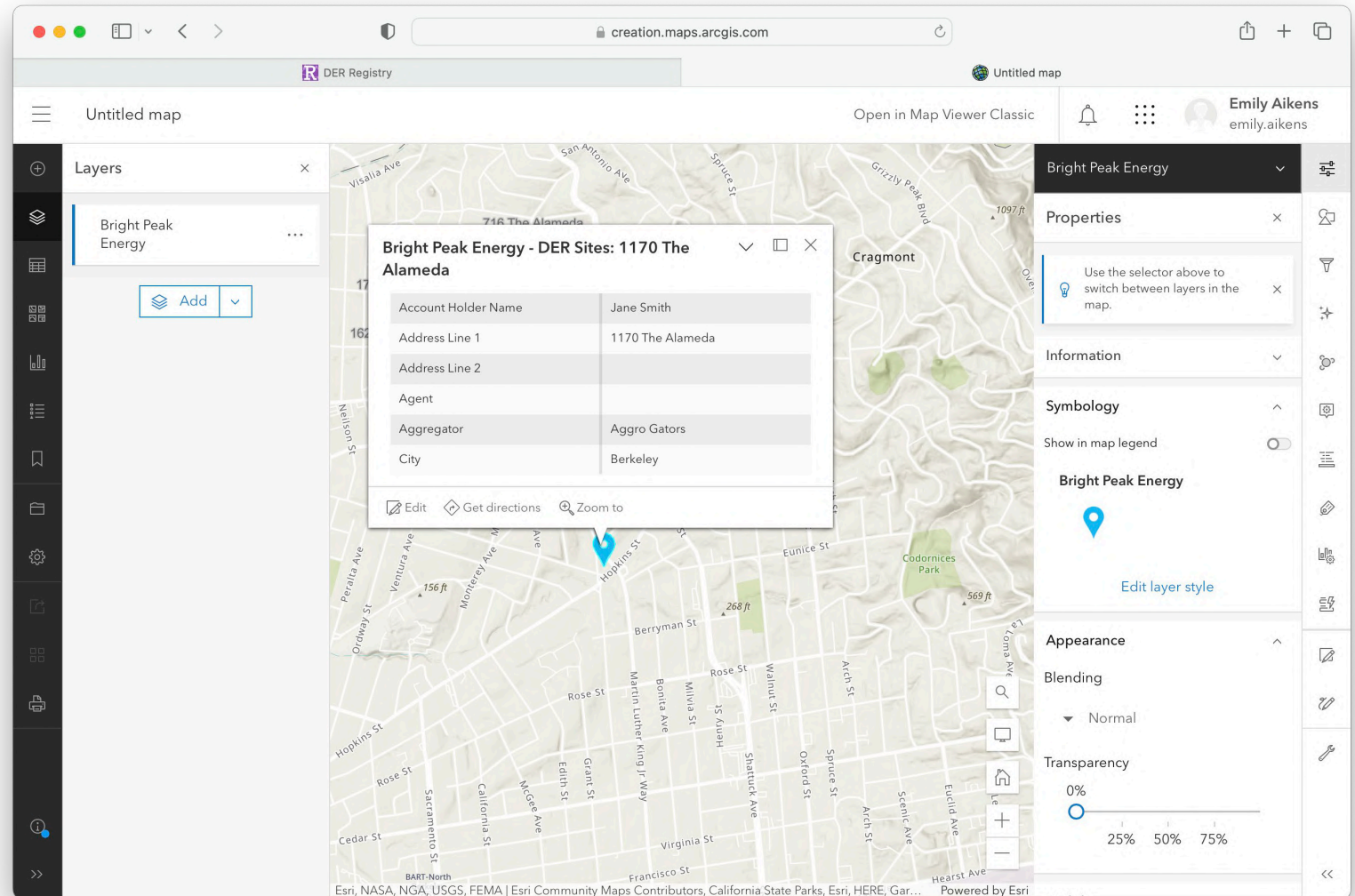
Map View

- Through our partnership with ESRI, all sites may be viewed in a map view.



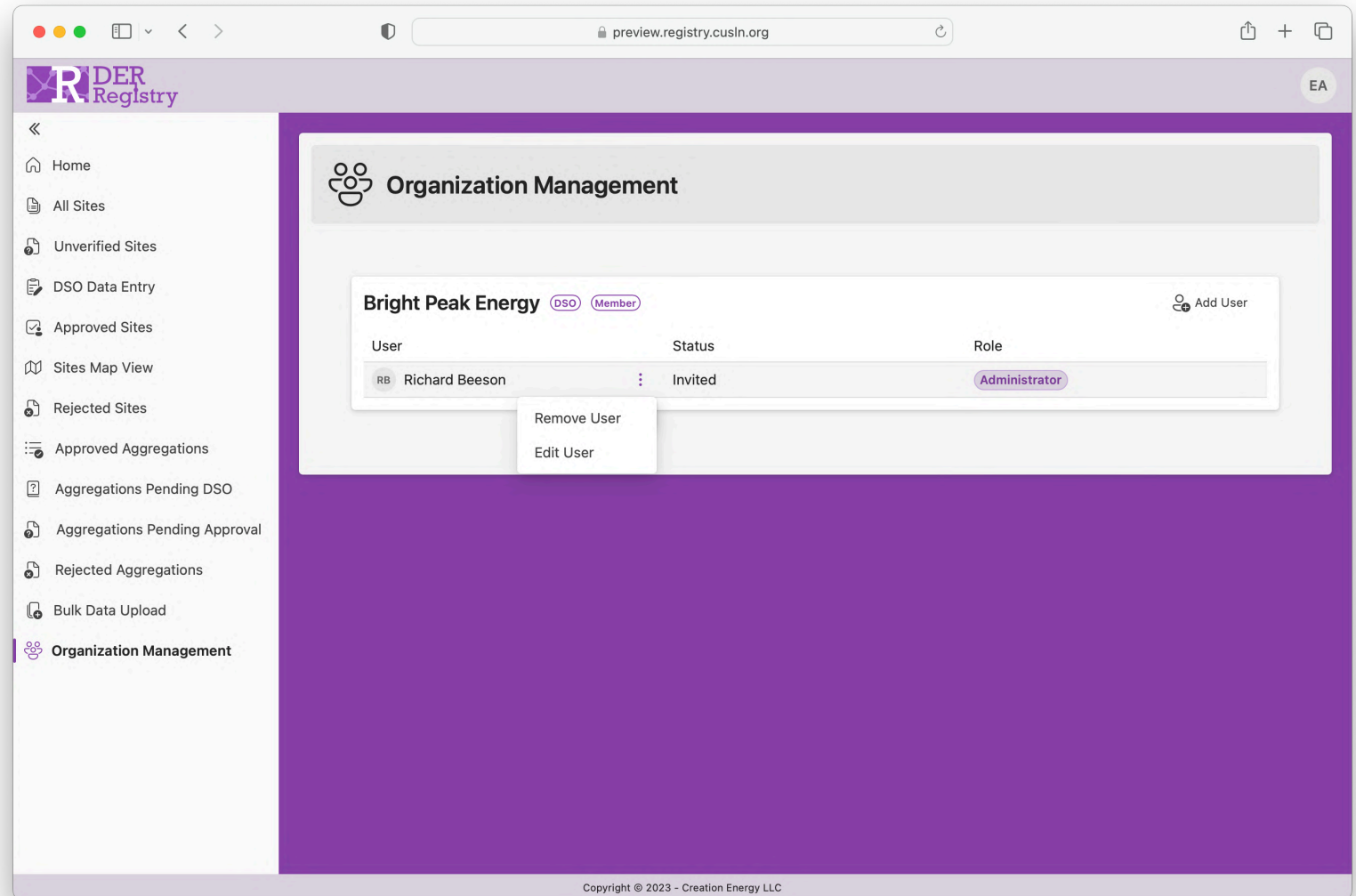
Map View

- Individual sites can be selected in the map view to provide details for the site



Organization Management

- The designated DSO admin for the member organization can add and delete members
- By utilizing corporate authentication in the registry, any employees who leave and no longer have an account will not be able to access the registry



Bulk Data Upload

- Tools exist that allow a DSO to upload all historical DER information into the registry
- If customer name and email information is included, CUS can work with the DSO for a custom welcome letter for their customers to create accounts to see/manage their DERs

