

# 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

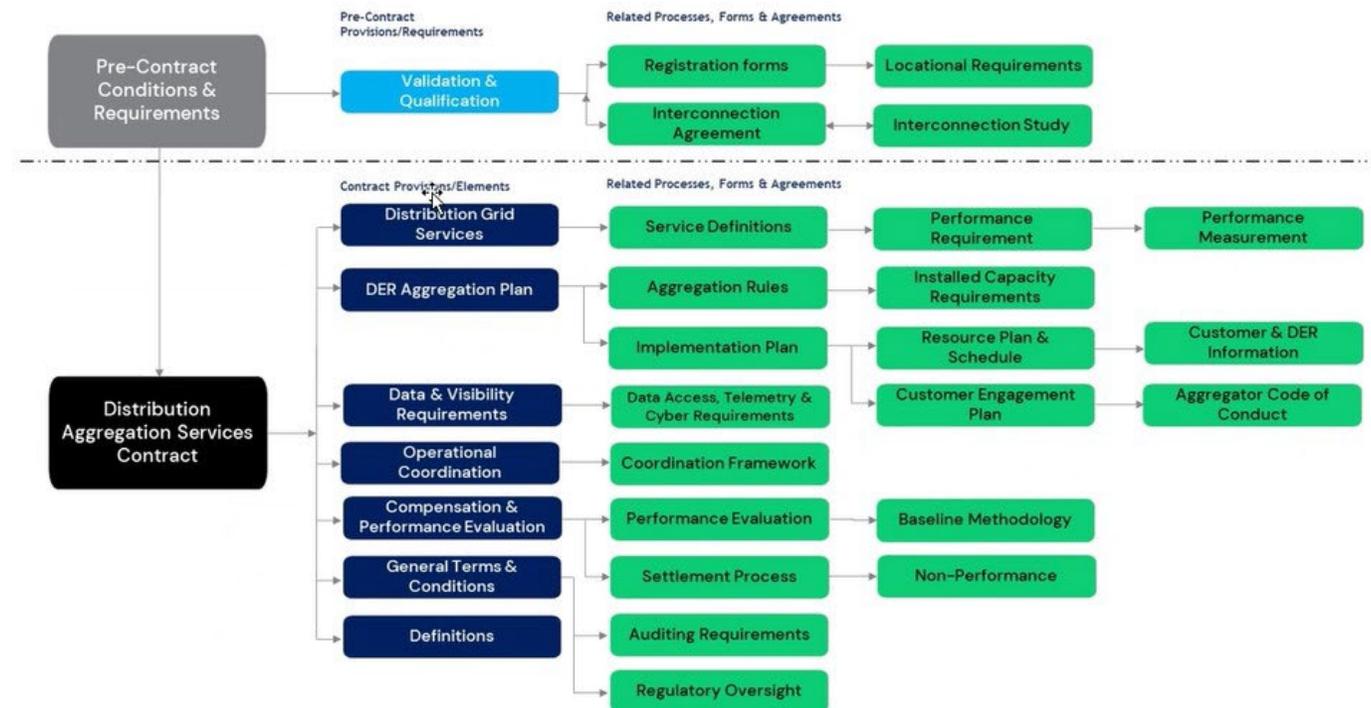
And many more . . .

# #1 Issue Discussed: State Governance/Oversight of Aggregator

## 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

## Distribution Aggregation Services Contract Structure



# Collaboration Must Increase

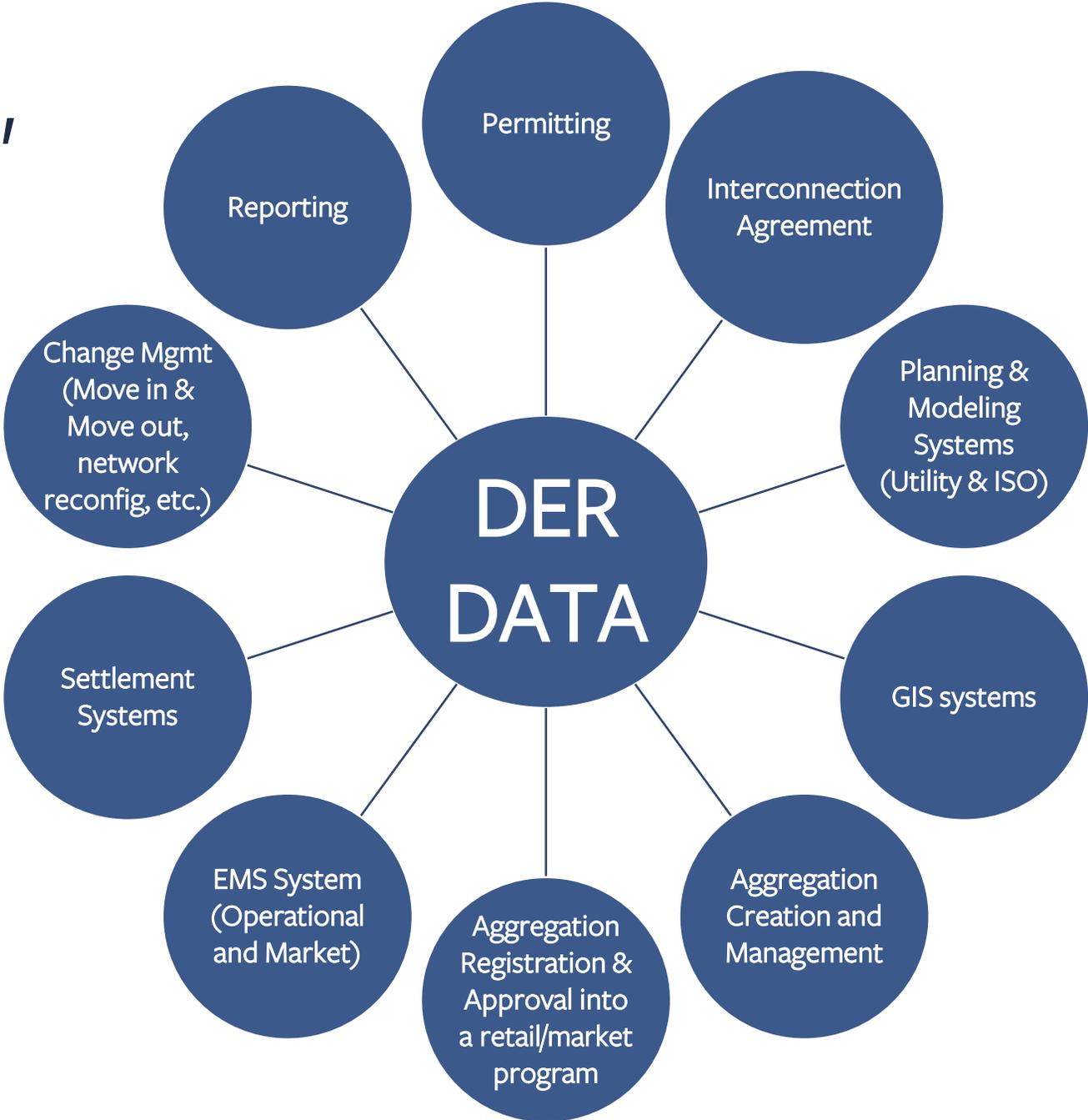
HOW STANDARDS PROLIFERATE:  
(SEE: A/C CHARGERS, CHARACTER ENCODINGS, INSTANT MESSAGING, ETC.)

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?



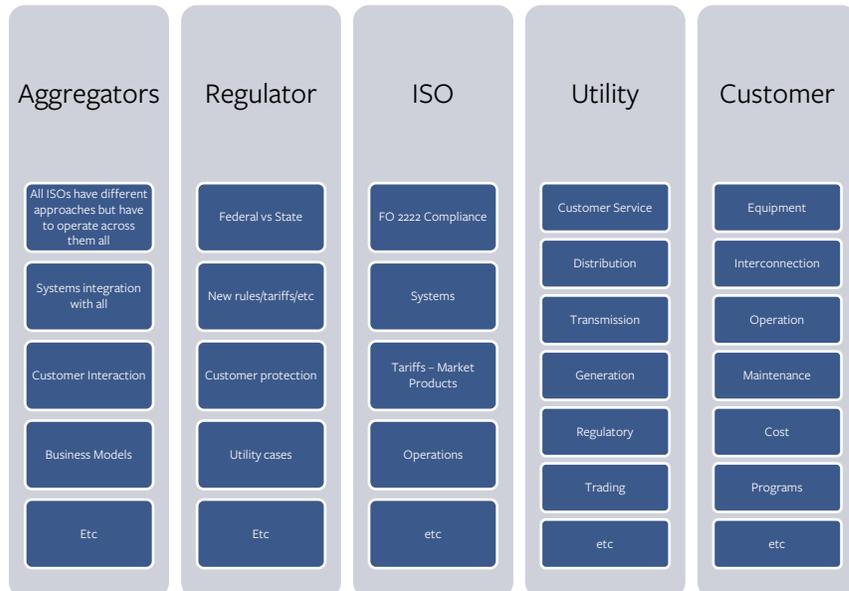
Process must be 'physics based' not 'policy based'. Can't be hung up by naming conventions, market structures, and corporate structures. What is the core data required to enable DERs to make it all work?

## REQUIREMENTS

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

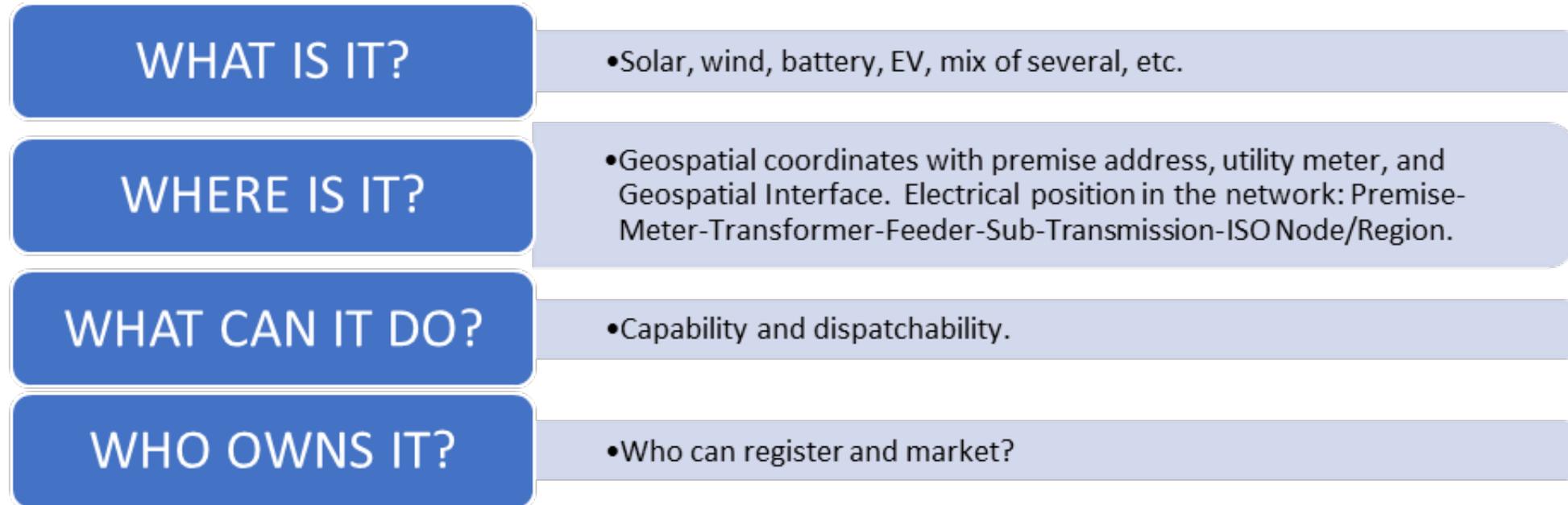
## Pre-Competitive DER Registry

The Base Data Set required for all stakeholders.



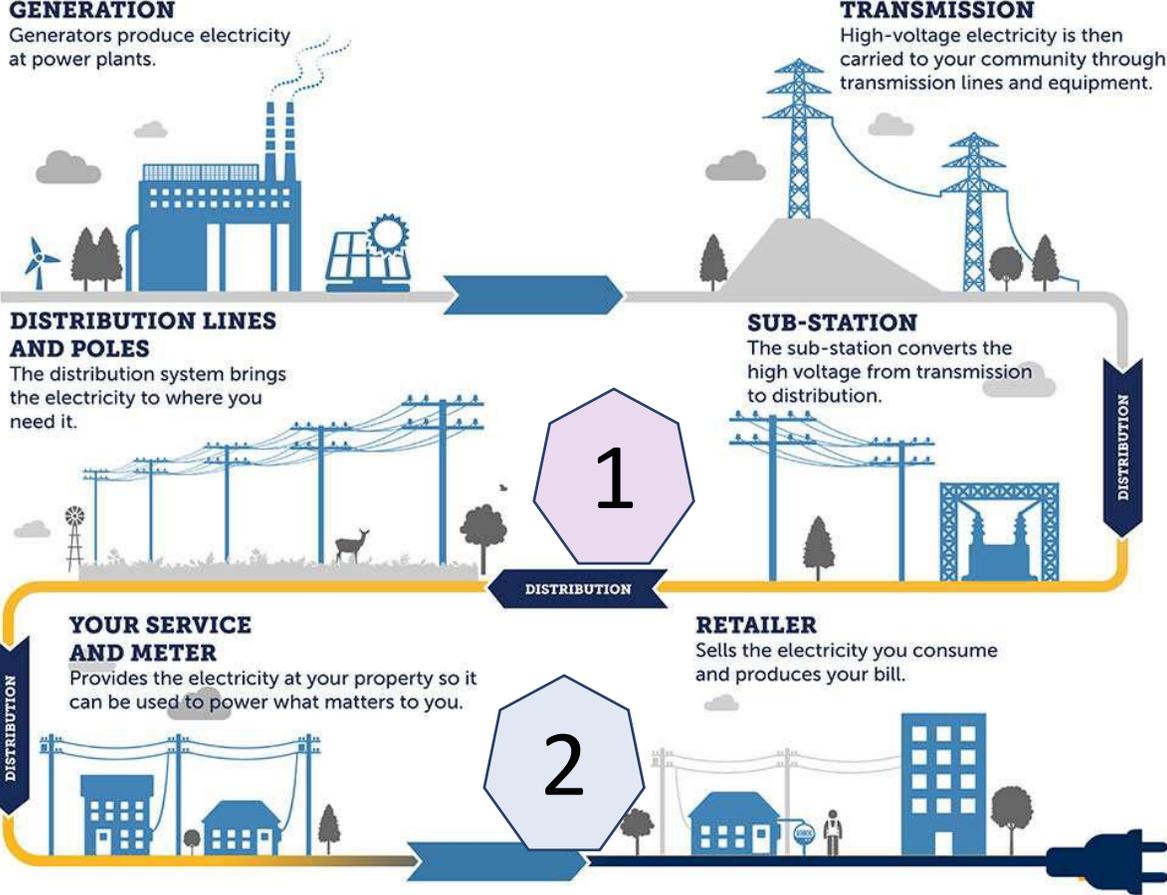
# Shared Data: Enabling DERs through Collaboration

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



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

Market/Program



# The Registry must be built with CIM in mind

“déjà vu all over again”  
– Yogi Berra

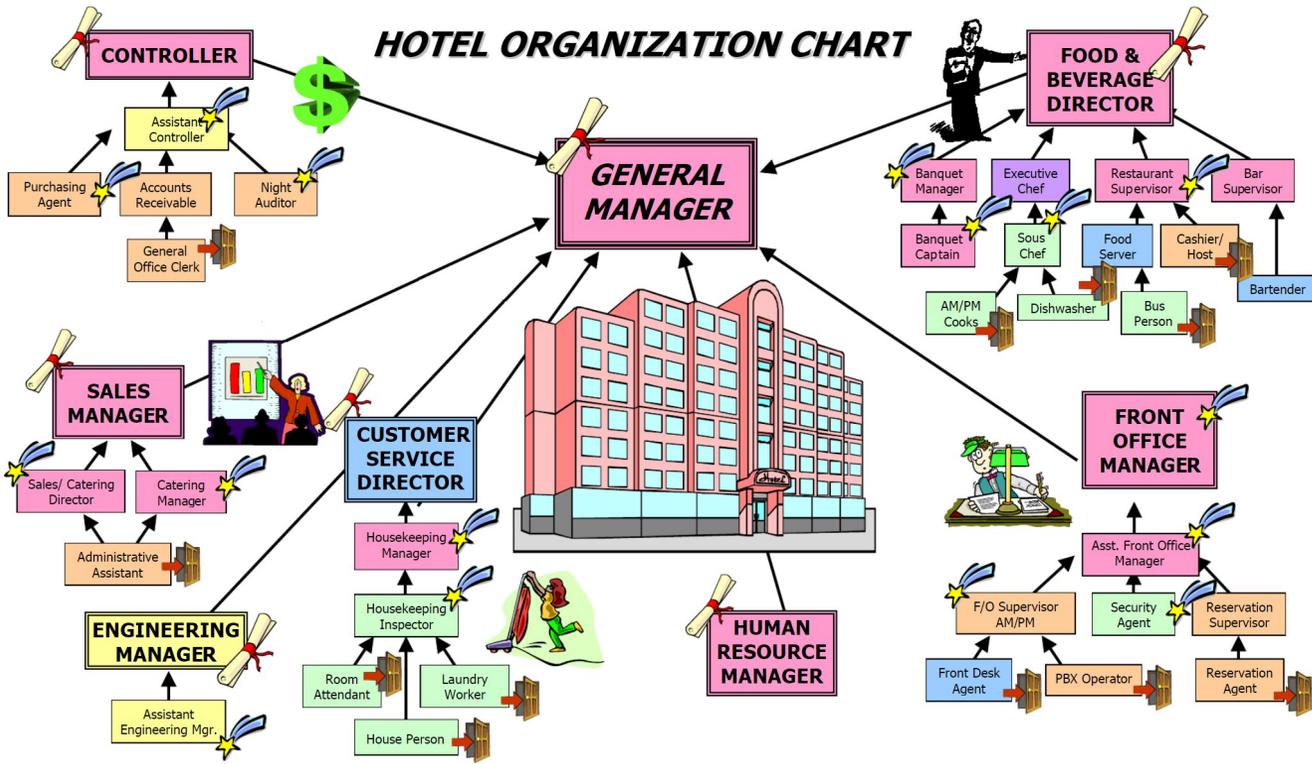
Solving the same exact problem but for millions of generators instead of a few thousand. Will it take us another decade?

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.

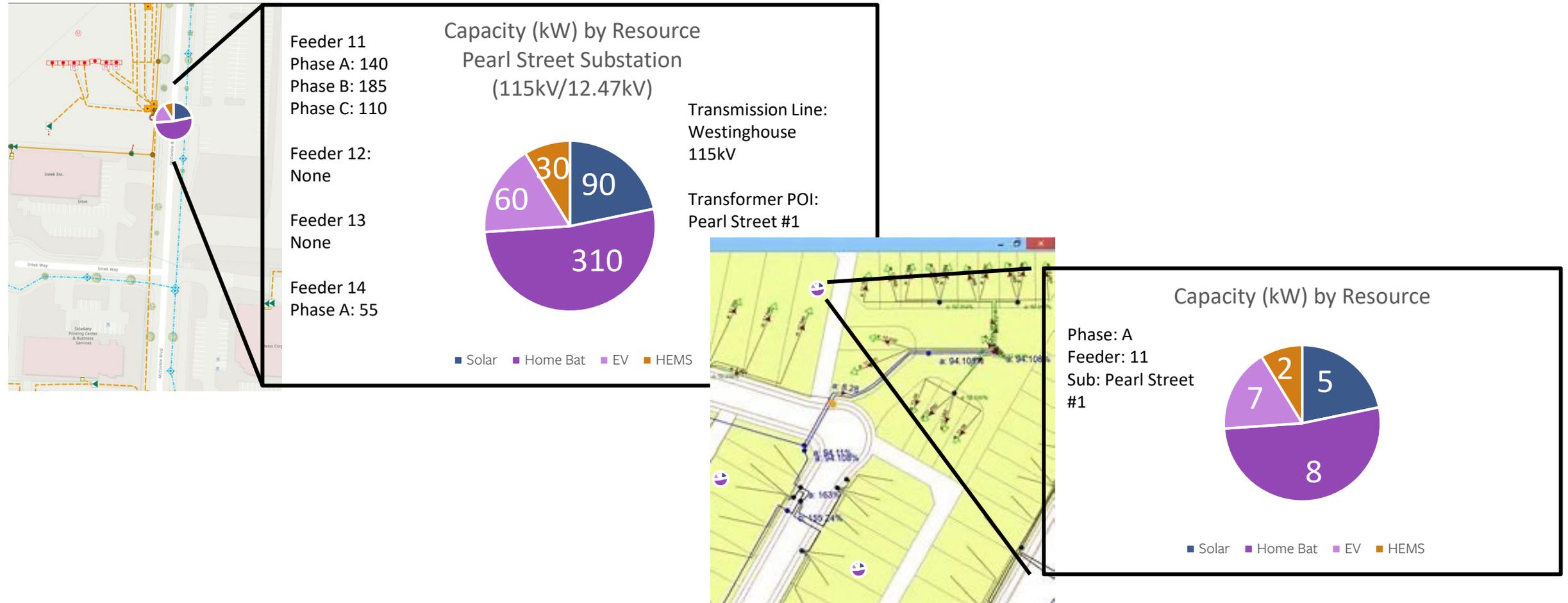
# Data Access

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.

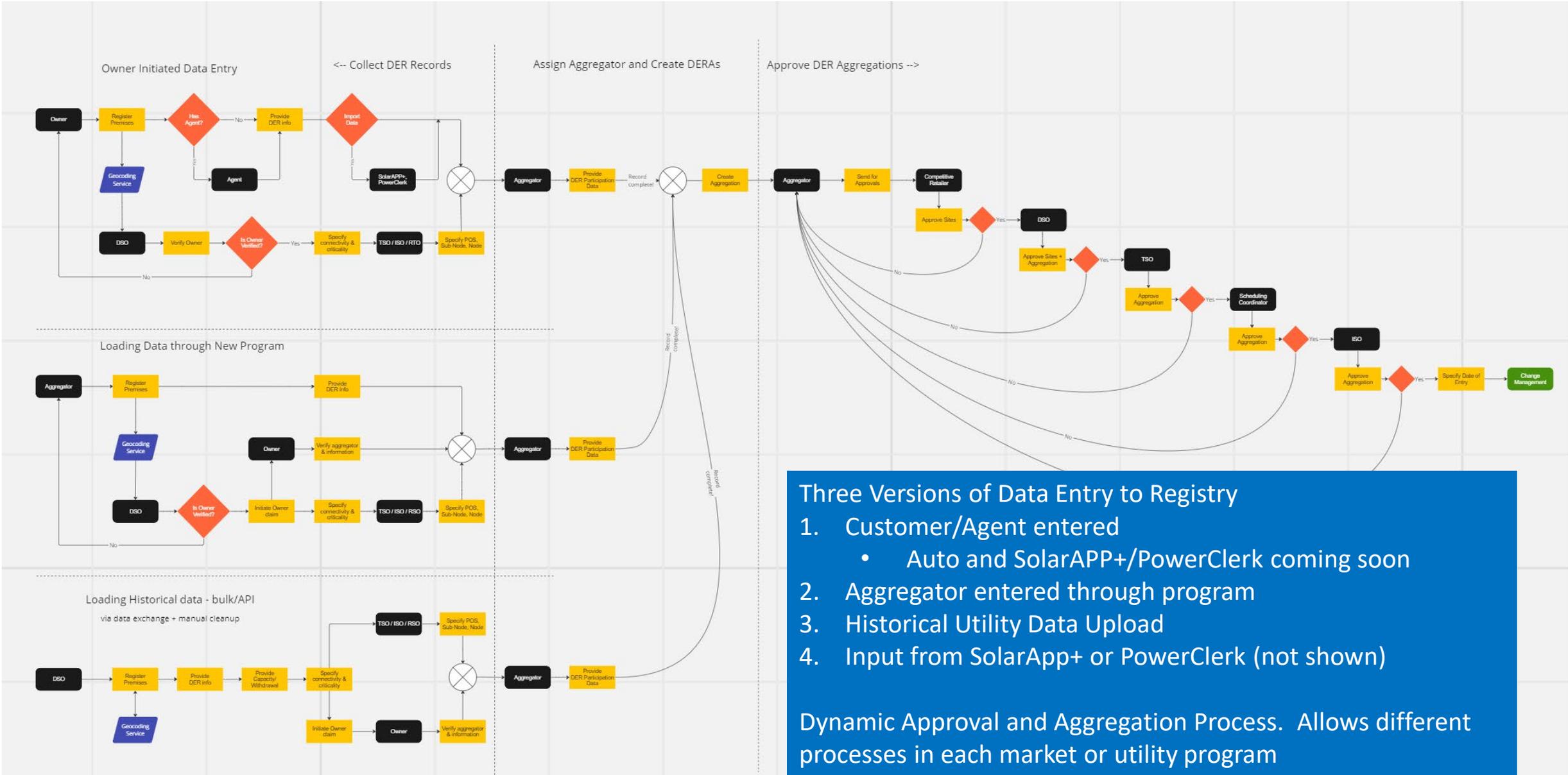
WHO HAS ACCESS TO THE DATA? (Each Regulatory Authority to define)										DER RESOURCE RECORD CREATION		
Sched Coord	Comp Retail Supplier	Equip Mfg	Aggregator	Regulatory Authority	ISO/RTO	TSO	DSO	Owner Agent	DER Owner	*REQUIRED DATA	DER Registry	Field Description
	X		X	X			X	X	X	DER Owner*		First Name (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	DER Owner*		City
	X	X	X	X			X	X	X	DER Owner*		State
	X	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?
X	X		X	X	X		X	X	X	DER Owner*	pick list	Pick your DR Aggregator
										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
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

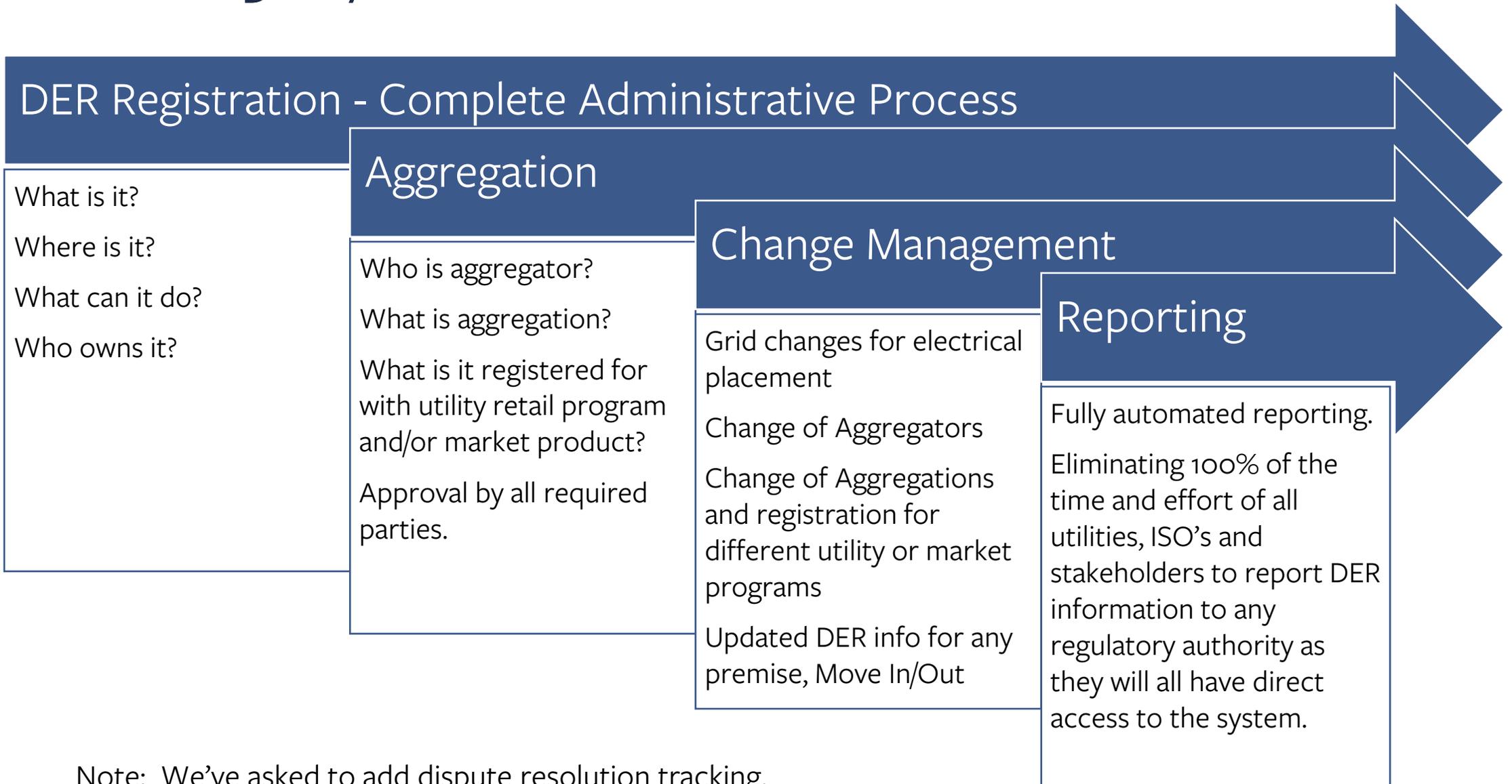


**Three Versions of Data Entry to Registry**

- Customer/Agent entered
  - Auto and SolarAPP+/PowerClerk coming soon
- Aggregator entered through program
- Historical Utility Data Upload
- 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

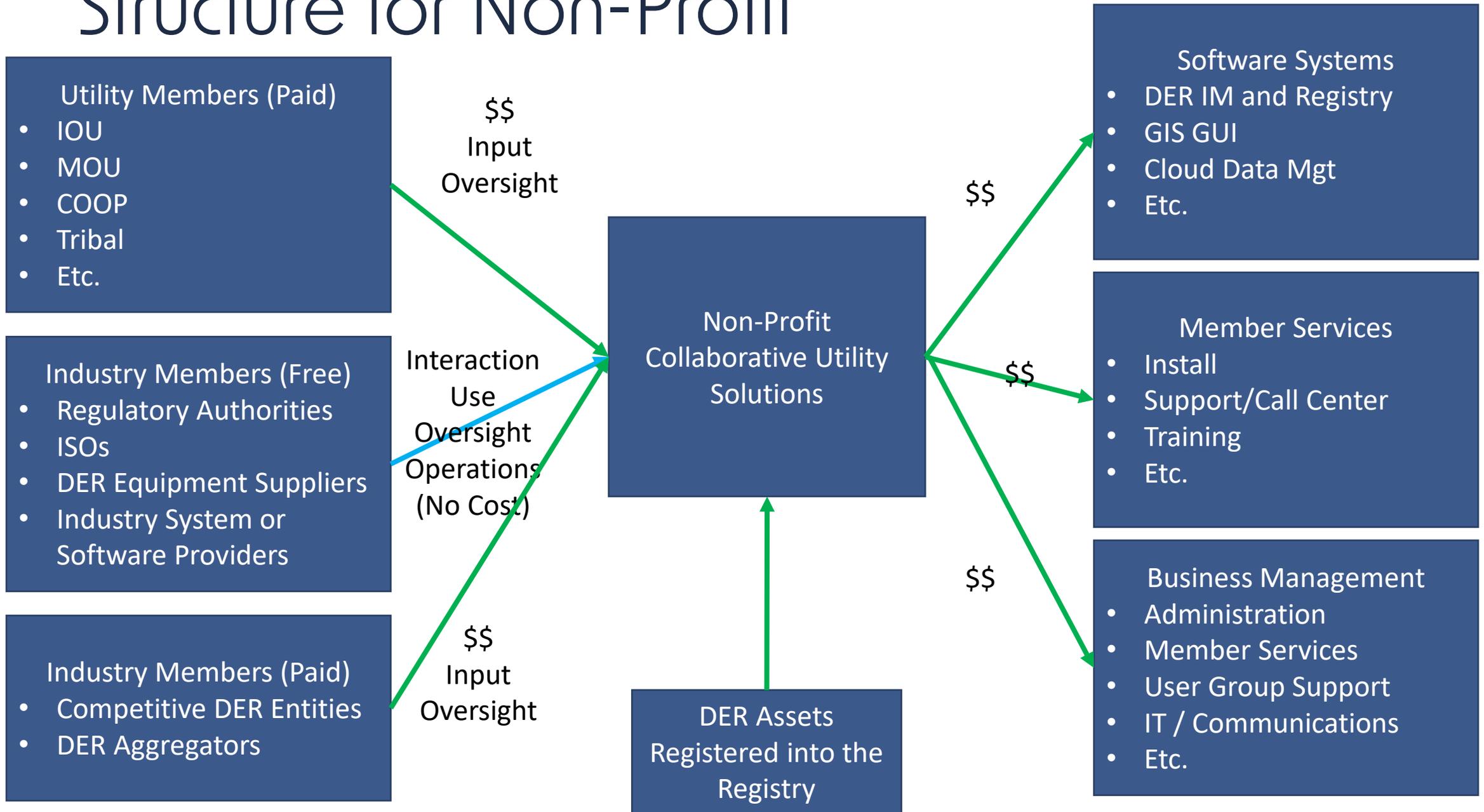
- Multiple Vendors/Platforms with no common requirements or control
- 3000+ Utility/ISO RFP processes, requirements and customizations
- Estimated at \$20-\$40 Billion in cost over 10+ years for utility adoption and implementation
- Proprietary Data structures requiring integration cost to any other 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

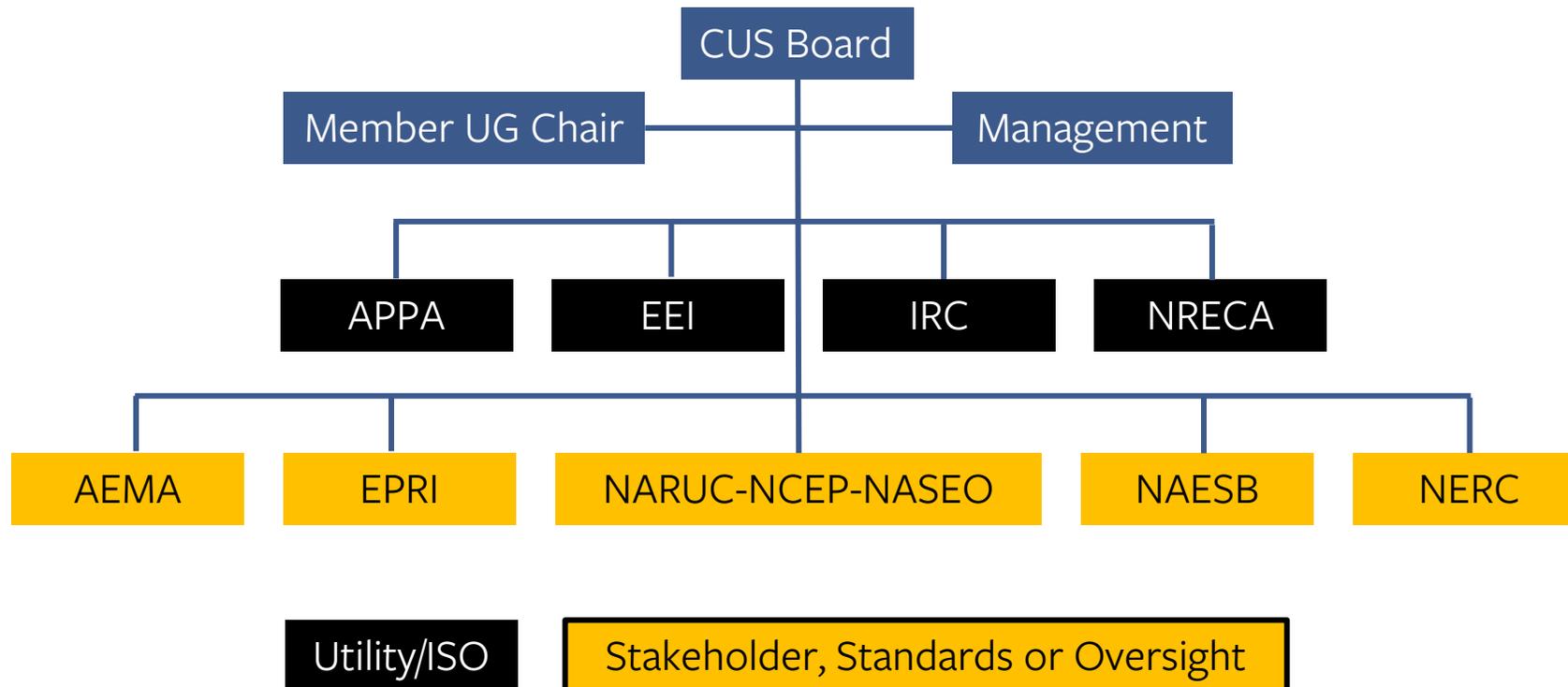
Collaboration is not always possible but enabling DERs through collaborative efforts vs 'business as usual' is possible and has multi-billion-dollar implications for the cost of energy.

# 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

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).
  - Phased/Tiered – MO LBNL report
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)

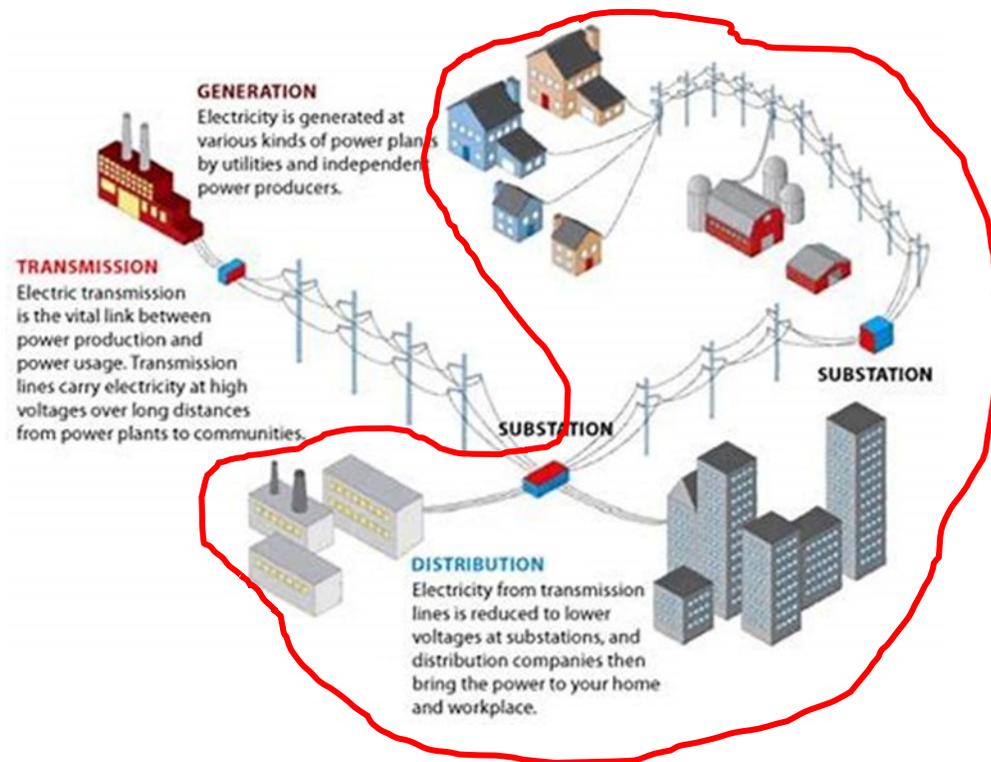
# A fundamental 'Gap' has been identified

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"

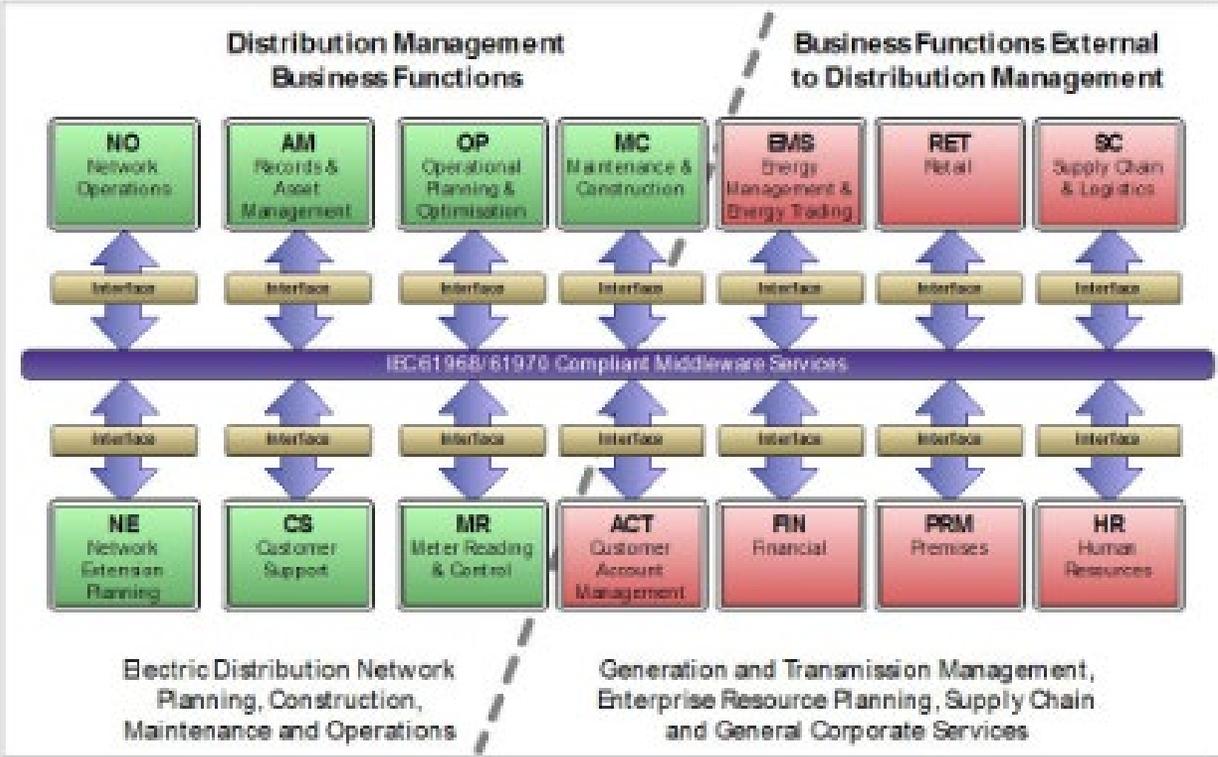


Figure 6-1  
IEC61968-1 Interface Reference Model

# CIM

