Collaborative Utility Solutions

A non-profit 501(c)(6) organization

The Need for Industry Collaboration

A DER Registry managed by a non-profit company to enable DERs to more efficiently, effectively, and rapidly deliver support to grid and market operations for a clean, distributed energy future

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DER REGISTRY OVERVIEW

WHITE PAPER

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INTRODUCTION

There are two foundational issues that must be overcome for the electric industry to integrate Distributed Energy Resources (DERs) efficiently and effectively into grid and market operations: Information and Collaboration. First, there is no single system that enables the appropriate stakeholders in the energy value chain visibility into the appropriate set of information to know where DERs are, what they are, what they can do, or who owns them. While a distribution utility interconnection process may expose this information to the utility and consumer, it does not provide this information to ISOs, Aggregators, regulators or other stakeholders. Consumers are purchasing DERs, providers are installing them, distribution utilities are interconnecting them, and then grid operators are forced to deal with resources they cannot control, monitor, or even know where they are and yet they are expected to continue to reliably operate the grid. No one in the energy value chain is operating with a single point of truth for a DER. This severely limits the electric grid operators' (both Distribution and ISO/Transmission) ability to effectively integrate DERs. Second, collaboration in our industry faces daunting obstacles. The electric industry has fractured into completely different market structures. It has further fractured utility operations into separated generation, transmission, and distribution entities, thereby creating 'silos' of operation that suboptimize decisions based on their structure rather than the overall needs of our national electric system. We must have more effective collaboration in our industry to effectively integrate DERs into the grid and markets and lower the cost of this significant effort for the entire industry.

As a society, we have committed to addressing climate change. This effort is no longer a special interest activity. It is mainstream, discussed every day, and has made its way to the corporate boardrooms attempting to fully integrate Environmental, Social, and Corporate Governance (ESG) structures that will positively impact the planet we live on. This reality, combined with the fact the electric grid is experiencing significantly more outages than it has in over 50 years, has created the perfect storm for significant investment in DERs at home and business premises.

Fortunately, in the past few years, technology, standards, and policy have come of age to allow us to help solve these challenging issues. Unfortunately, the electric industry is very complex and very few have a clear understanding of the entire energy ecosystem spanning legislative, regulatory, grid operations, markets, and consumer interaction. So rather than focus on the 'big picture' and collaborate towards a set of shared objectives, we instinctively isolate the discussions to single 'silos' of expertise, understanding, or interest. This has consistently moved us down a path of sub-optimized policies, practices, and solutions. The implications DERs will have on the electric industry are immense if there is not significantly increased collaboration. Countries like Australia, with high penetration rates of DERs, have shown us clearly how not to proceed. We must step back and seek a national framework that can much more effectively incorporate DERs into our grid and markets at much lower cost and for much more effective use, regardless of the current politics of electricity in any jurisdiction. There is too much at stake for our country's electric and environmental future to get this wrong. For a more detailed understanding of the need for this national initiative, we encourage you to see a comprehensive review in this paper written by the Energy Systems Integration Group (ESIG). "The Transition to a High-DER Electricity System: Creating a National Initiative on DER Integration for the United States."

BACKGROUND

The electric industry now faces a world where DERs are becoming more cost effective every year and consumers have become increasingly interested in helping solve environmental issues. Consumers have also become concerned about ensuring reliable electric service to meet their needs and are investing for additional energy security. They are willing to use their disposable income to help achieve a more secure and sustainable energy future. These trends and the resulting deployment of DERs are adding significant layers of complexity to an already complex grid. Instead of 'simply' having to manage the flow of electricity from source to load, now it is possible for any consumer premise to become an energy source when the sun rises and the solar panels start generating, and just as rapidly turn back into a load when the clouds shade the solar panels or the sun sets. The complexity this is creating in the industry is rapidly reaching a point that requires a Ph.D. in electrical engineering to engage effectively in the conversation.

To make matters worse, the electric industry in the United States is incredibly fragmented and structured in a variety of ways – from fully regulated and vertically integrated to completely unbundled with competitive customer choice, and everything in between. These variable structures are spread across 3000+ utilities governed by state commissions, city governments, community boards, the Federal Energy Regulatory Commission (FERC), the North American Electric Reliability Council (NERC), and dozens of other environmental, air quality, land management, and other agencies/groups. This creates an environment of 'custom solutions' because each utility feels its situation is so unique that no other system or solution could possibly meet its needs effectively. This causes an electric industry participant to seek out one specific solution for itself instead of working broadly with all participants to create and use a common system. All these assumptions are wrong when it comes to DERs. We are in a position today where can work together and create a pre-competitive, foundational system for DER enablement, the DER Registry, in a common, non-profit, shared-cost manner that will save utilities and their customers billions of dollars as we continue to transition to an energy future with significant DER penetrations on our grid.

THE COMMON FOUNDATION

There are four things everyone in the energy ecosystem must know about a DER for it to be effectively integrated into the grid/market: 1. What is the DER (solar, wind, battery, EV, etc.)? 2. Where is the DER? Both geographically and electrically. 3. What is the capability of the DER (communication, capacity, dispatchability, etc.)? 4. Who owns it (who can we talk to about it)? While there are many other aspects to aggregating, operating, and managing DERs, these fundamental few things are the necessary attributes of DERs that are required to integrate DERs into the grid and markets. As a result, everyone (customer, utility, ISO, regulator, market) must have a single point of truth for these core items. With this common interest, it makes much more sense to have a non-profit, shared-cost system that makes this information available to the stakeholders each state commission deems should have access to the information. If we do not do this, the industry will spend billions of dollars for competitive systems that are uniquely tailored to electric utilities and will not interface or talk to each other effectively, much less to the various stakeholder systems at issue as well.

THE SOLUTION

The electric industry and its stakeholders need to put aside differences and work collaboratively together to build a common DER Registry system. Consider the two different approaches to implement a DER registry in our industry in the United States: first, through the industry's 'business as usual' disaggregated and specific method; and second, through a 'non-profit,' shared-cost approach.

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
- Costs 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
- <$100 Million in 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 market/utility/ISO

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

In the 'business as usual' method, all the complexities discussed above come into play. (More than 3000 utilities . . .) Of the 3000, there are approximately 300-400 that are in markets and big enough to be required to meet the requirements of the landmark FERC Order 2222 that requires DERs to be able to participate in markets. This means the majority of these 3000 utilities are more likely to move slowly to respond to this Order and not engage in the discussion of DER integration to their grid and markets. Regardless of their inaction, customers will continue to purchase and install DERs everywhere. People will be buying more EVs, deploying more roof-top solar, and installing more batteries and back-up generation. Perhaps the best statement offered to date of why all electric utilities must address these issues now is "DERs are sneaking up on us. We would never allow a 3000MW nuclear plant to interconnect to the system without detailed planning, integration and operation, and yet we now have more than 3500MW of DERs on the grid in one state that have not been planned for in an integrated fashion." So those that hear the call to action now will define their specific technical requirements for a DER registry, bid those requirements, and have a contractor build those requirements into a software system. The odds that these systems, designed in isolation by multiple vendors, will be able to integrate to one another, or to the ISO, aggregators, and other stakeholders in a cost-effective manner is zero. In fact, many will likely be designed without consideration of the plug-n-play standard of the IEC Common Information Model (CIM) that our utility grid systems absolutely rely on to be cost effective and reliable. They will each have different data structures with completely different data sets and attempt to include both pre-competitive and competitive data as each utility/ISO attempts to solve every problem they see for themselves relating to DERs instead of the finding those issues that are common to the entire industry.

It is estimated that this 'business-as-usual' method will cost the industry **$20-$40 billion** just in the creation of these disparate systems. Billions more will spent to integrate and improve them over time as we work to understand how we can most effectively utilize these new resources on our grid and in our markets. The burden for DER enablement in this model, just for a fully integrated registry alone, is billions of dollars. Many would say that it a conservative estimate when you consider how many utility systems are affected by DERs. And this is just the cost of implementation, not long-term operation & management of all these disparate systems which will be hundreds of millions of dollars each year.

The alternative to the 'business-as-usual' method is to build a non-profit, pre-competitive DER registry that can be implemented by each state and their utilities but is done collaboratively with shared costs. This creates a collaborative registry that is designed and built once (no multiple overlapping systems) and then constantly improved with all stakeholders' input for the benefit of all. This will cost less than one half of one percent of the cost of "business-as-usual" to implement for our entire country. With a collaborative system, all existing utility and ISO systems can now have a standard, CIM-based interface to the DER Registry that does not require software integration. Instead, data exchange is securely enabled through the CIM 'plug-n-play' standard our industry already utilizes. This will allow all ISOs, utilities, customers, aggregators, their regulatory authorities and other industry stakeholders to share a common view and understanding of the DER resources of concern to them. And the annual costs to continually improve and maintain the system will be less than one percent of the costs of disparate systems.

Implementing this collaborative DER registry will rapidly enable consumer DERs and competitive DER offerings where available and speed the effective integration of DERs into our grid and market systems for the industry, regardless of market structure. It will enable utilities and new players to create applications to utilize and optimize DERs instead of putting time and money into simply gaining access to the base data. It also will support effective interconnection processes and a multitude of other supporting activities across the industry, reducing those costs as well. It will eliminate a decade of confusion and consternation between consumers, utilities, markets, and competitive DER suppliers, while providing the foundation to ensure we can move more quickly towards a clean energy economy. With this structure in place, DERs can begin to be used to solve problems instead of creating them, and the cost burden to consumers in the US will be far less than the cost of doing it through 'business as usual'.

THE IMPORTANCE OF CIM

Where you personally sit in an organization drives your perception. If you are in the steam group at a power plant, you know your job and you look at your data and see no need to share that data with others. However, the power plant manager wants the engineering group to see all data from all groups. The vice president of power plants wants all plants to share all data. The industry wants to share data across all power plants. This need translates directly to DERs. A utility may feel there is no need to share this data with the ISO or regulator. The ISO may feel there is no need to share with aggregators or competitive retail suppliers, etc. However, if you were responsible for the overall planning and operation of the entire grid, you would clearly want all data available to the stakeholders that can help optimize and incorporate DERs into the grid and market. To do this effectively, the DER Registry must recognize the importance of the Common Information Model in our industry.

Standard	Modeling Focus
IEC 61970	Information exchange among systems directly involved with operation and planning of the overall interconnected electric grid which rely on power system network models to analyze the behavior of the entire interconnected grid at all voltage levels. This often involves interactions between systems at various different participants in the grid (that is, RTO, TSO, DSO, microgrid, generator, consumer).
IEC 61968	Information exchange among systems supporting business functions that support power system operations, maintenance and customer support. This includes major business functions such as asset management, work management, meter data management, customer information, geographic information systems and engineering design.
IEC 62325	Information exchange among systems directly involved with electricity market business processes such as transmission capacity allocation, forecasting, bidding, contracts, clearing and settlement.

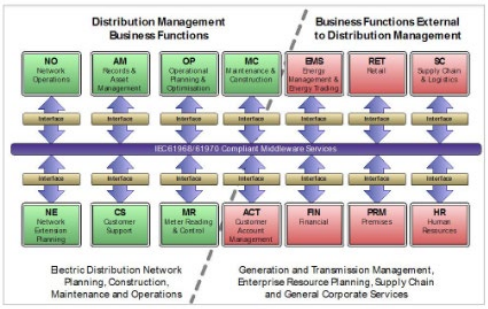
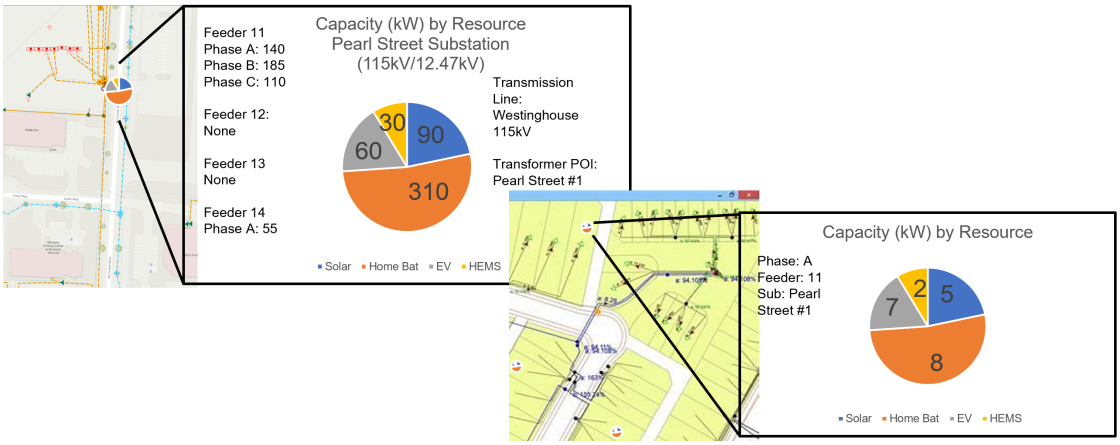


Figure 6-1
IEC61968-1 Interface Reference Model

The electric industry systems for Energy Management, GIS, Outage Management, Customers, Markets and many others rely on CIM to be able to effectively share data. DER data will be required across many different systems and requires ties to each of the three CIMs shown above in the diagram on the left. Using CIM for the DER Registry allows for the 'plug-n-play' interaction with different utility systems shown on the right. This significantly reduces the cost of software interfaces while allowing the DER Registry to provide the right data to the right systems seamlessly. And with the powerful tools of Esri, the DERs can be presented to stakeholders individually, by geographic territories or by electrical connectivity summaries.



Finally, it is important to recognize there are differences across our industry. Each regulatory authority will have the ability to make its own decisions on which stakeholders have access to each data element in the registry. In addition, the registry has a dynamic administrative function to allow customers to designate an aggregator, aggregators to designate their aggregations, and each necessary stakeholder has the ability to approve the individual DER or the overall DER Aggregation in accordance with the requirements of the utility program or ISO Market.

Visit CUSLN.ORG and join us in the collaborative effort to enable DERs more efficiently and effectively to our grid and markets, save billions of dollars for the electric industry, and leap past a decade of confusion by enabling a collaborative DER Registry. It is easy to find a reason to isolate and focus only our own specific needs. However, DERs represent the perfect opportunity for the industry to look beyond our individual needs and collaborate for the greater good of our entire electricity system and the environment.