



Emerging Technologies

How ISOs and RTOs can create a more nimble, robust bulk electricity system

Across North America, policies are transforming the electricity system's supply mix and fundamental roles at every level of the production chain. The member organizations of North America's ISO/RTO Council (IRC) are at the forefront of these changes, and increasingly, a crucial success factor behind their implementation.

More than 80 percent of North America's wind and solar capacity lies in regions served by IRC members. The reasons for this may be varied, but the overall trend is undeniable: The reliable integration of renewables into North America's electricity system has, in no small part, depended on the efforts of the IRC membership. The ongoing effectiveness of renewable technologies, however, will depend directly on the electricity system's capacity to accommodate them.

The IRC Emerging Technologies Task Force (ETTF) examined the deployment of emerging technologies across North American IRC regions to identify where technological deployment intersects with operational and policy considerations. Their research yielded three imperatives necessary to ensure the continued reliability and efficiency of the bulk electricity system as the penetration of emerging technologies continue to

expand. Those identified priorities are as follows:

- 1. Renewable supply and integration:** Many breakthroughs are being made in technologies such as renewable generation, grid-scale energy storage and microgrids, but is there enough cohesive innovation happening to integrate disparate components into the overall electricity system?
- 2. Greater situational awareness:** Several technological options are presenting themselves, but are they being exploited to their maximum potential, and will they be enough to maintain adequate awareness over a changing system?
- 3. Controlling an increasingly distributed electricity system:** As distributed energy resources (DER) increasingly connect to the distribution system, their aggregate impact on the bulk electricity system is already evident. To what extent should operation of DERs be controlled or influenced by the bulk system operator, and what should that relationship look like? What technologies will best assist that framework?



WHO IS THE IRC?

The IRC consists of nine North American Independent System Operators (ISO) and Regional Transmission Organizations (RTO) who serve two-thirds of the United States' electricity consumers and more than half of Canada's. The IRC and its committees assemble representatives from each ISO/RTO to keep the lights on by instantaneously matching power generation and demand and ensure access to affordable, reliable and sustainable power via wholesale energy markets.

The IRC's Positions Regarding:

Renewable Supply and Integration

The operating characteristics of renewable resources challenge the electricity system's ability to accommodate increasing levels of intermittent generating capacity. To manage the variability of supply and renewable integration enabled by emerging technologies, the IRC:

- Supports policies and positions recognizing the electricity system's ability to accommodate large amounts of renewables and realizing their growing potential.
- Is agnostic to specific technologies that may facilitate renewable integration; though, it supports policies that accommodate emerging renewable integration technologies.
- Recommends avoiding early technological lock-in. A suitable policy environment is required to ensure new technologies and approaches continue to be developed, tested and applied to renewable integration.
- Supports the pursuit of continentwide consensus regarding the extent to which renewable integration will be achieved through regional or interregional trade.

Situational Awareness

A more distributed, less predictable electricity system raises the standard regarding data necessary for ISO/RTOs to meet their responsibilities, and yet IRC members lack consistent, reliable DER-related data in their respective service territories. The IRC thinks:

- Data should not constrain situational awareness arrangements across the transmission/distribution interface — particularly regarding data transfers.
- ISO/RTOs should have access to basic, static DER data series in their service territories. Location, size and technological capabilities are examples of critical, reliable data IRC members need to formulate a strategy to manage an increasingly distributed electricity system.
- A general operational data framework should be developed, where increasingly comprehensive operational data from the distribution system is provided as DER penetrations reach different thresholds. This framework should be flexible enough to accommodate local differences in policy, roles and structural arrangements across North America.

Controlling an Increasingly Distributed Electricity System

In 2016, the U.S. Federal Energy Regulatory Commission issued a Notice of Proposed Rulemaking (NOPR), which may require wholesale markets to accommodate energy storage and DERs. This potentially significant regulatory development could set the stage for a more formalized framework to address a challenge that IRC members have recognized for some time: How will system operators harness the capabilities and manage the risks that intermittent DER growth presents? The IRC:

- Recognizes the need for a coordinating influence to help ensure reliability in a high-DER future.
- Will continue to facilitate dialogue regarding the means by which DERs and the bulk electricity system can mutually benefit one other.
- Thinks consideration should be given by jurisdictions with Distribution System Operators (DSO) to require such entities to conform to standards that allow safe interaction between DSOs, nonutility actors and the bulk electricity system.
- Supports policies that ensure if distribution-level variability poses risk to system reliability, ISO/RTOs have appropriate authority over DERs or may otherwise mitigate their impact on the bulk electricity system.