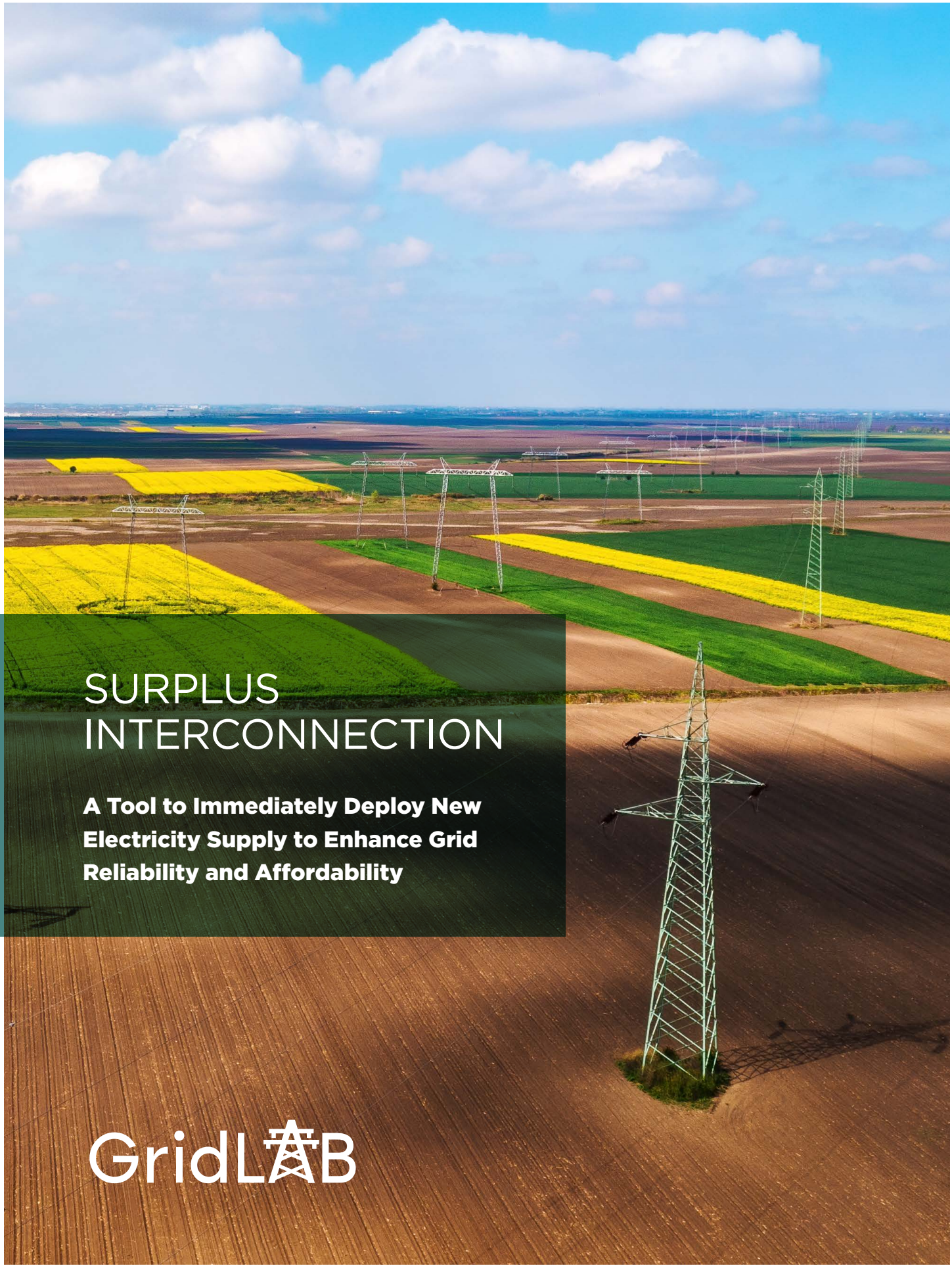
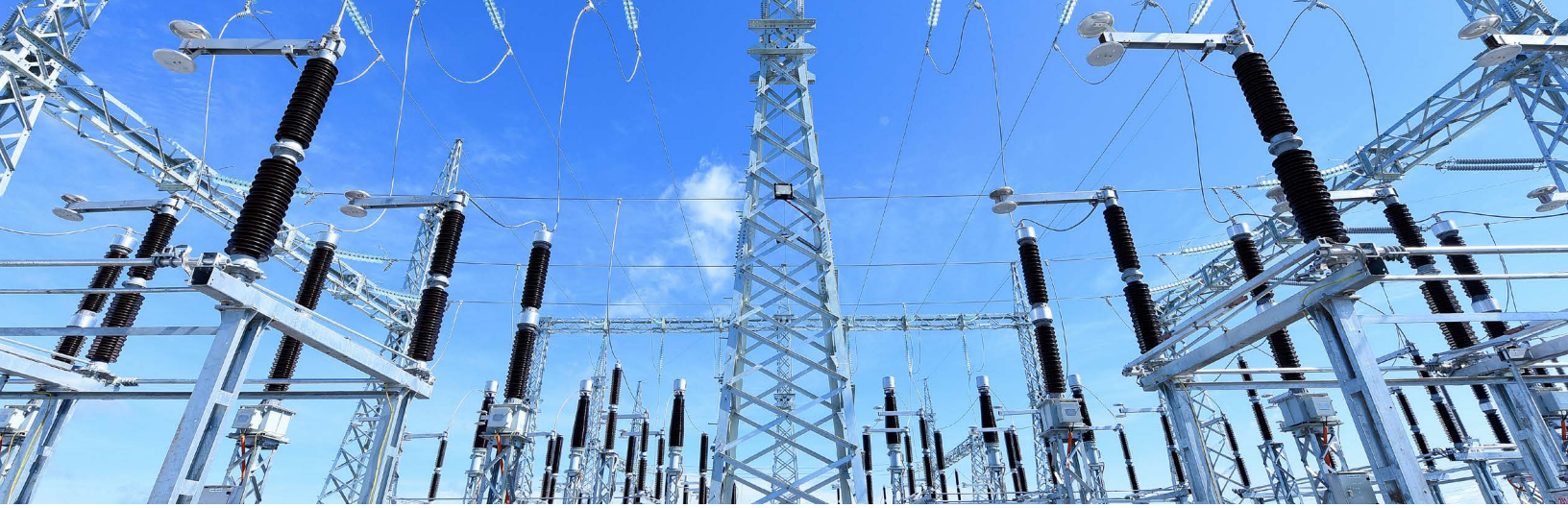


SURPLUS INTERCONNECTION

A Tool to Immediately Deploy New Electricity Supply to Enhance Grid Reliability and Affordability

GridLAB



WHY SURPLUS SERVICE?

One of the pressing challenges of the clean energy transition is that the process of getting needed new sources of electricity supply online is being stymied by a combination of multi-year delays in the interconnection study process, supply chain constraints, and siting and permitting challenges. Over 1.4 million megawatts (MW) of new clean energy resources are trying to connect to the grid,[1] but ineffective interconnection processes that average over four years to connect new supply to the grid are turning that flood of market interest into a trickle of new operational resources. Immediate solutions are needed to address this crisis. Consumer costs for electricity will increase and grid reliability will be threatened if generators retire, load growth accelerates, and commensurate new resources are not rapidly connected to the system.

While regulators and grid operators are struggling to right the ship, interconnection and transmission reforms will take several more years before new electricity supplies can freely enter the grid and we see electricity prices come down. Surplus Interconnection, which allows new sources of electricity supply to connect to the grid at the site of an already existing supply resource using the interconnection service already allotted to that resource, offers a path to add new resources without the costly delays of the standard interconnection process. But while this solution already has regulatory and policy support, it has not been fully implemented.

While a surplus interconnection market is beginning to take hold in some regions, researchers at the Goldman School of Public Policy at the University of California, Berkeley have found that current deployment rates remain far short of surplus interconnection's technical potential. As outlined in an upcoming study,[2] there may be the opportunity to connect over 850,000 MWs of new generation at existing generation sites across the country. By reusing existing generator interconnections, energy suppliers can provide lower costs and improved reliability for the grid.

This raises the question: what prevents surplus interconnection from realizing this potential? In conjunction with the upcoming technical potential study, GridLab is conducting an analysis of the barriers to surplus interconnection service, as well as potential solutions. In advance of the publication of that analysis, this Policy Brief outlines some hypotheses regarding this Policy Brief outlines some hypotheses regarding those potential barriers and solutions. It presents initial recommendations, not definitive conclusions, to spur discussion and further inquiry into this important topic.

1 Rand, Joseph, Nick Manderlink, Will Gorman, Ryan H Wiser, Joachim Seel, Julie Mulvaney Kemp, Seongeun Jeong, and Fritz Kahrl."Queued Up: 2024 Edition, Characteristics of Power Plants Seeking Transmission Interconnection As of the End of 2023." (2024). https://emp.lbl.gov/publications/queued-2024-edition-characteristics

2 Paliwal, Umed, Emilia Chojkiewicz, Nikit Abhyankar, Amol Phadke. "Leveraging existing fossil interconnection can rapidly and cost-effectively integrate over 1000 GW of renewables (Working Paper)." (2024). https://gspp.berkeley.edu/research-and-impact/centers/cepp/working-papers

WHAT IS SURPLUS INTERCONNECTION SERVICE?

Surplus Interconnection allows new electricity supply resources, including solar, wind, and energy storage resources, to connect using the same grid infrastructure that serves already existing generators. Sharing existing infrastructure bypasses the often lengthy standard interconnection queue process, potentially cutting years off project development timelines. To minimize the reliability impacts to the grid and speed the interconnection study process, surplus service is limited such that the combined output of the existing generator and the new units, operating together, cannot exceed the output allocated to the existing supply resource. Most grid operators also condition surplus service on not requiring any new network upgrades. This allows for the addition of batteries to existing solar facilities or solar, wind and/or energy storage to existing low-capacity factor fossil resources without triggering the need for lengthy studies, or network upgrades that may entail supply chain-constrained equipment such as transformers. Surplus interconnection thus enables emissions reductions while enhancing reliability because it provides new clean energy to the system while still enabling the incumbent generation to operate at critical times of grid stress. At the same time, new resources connected through surplus interconnection may inject power onto the grid when the incumbent plant is unavailable or uneconomic.

Importantly, the Federal Energy Regulatory Commission (FERC) already requires transmission providers to offer surplus interconnection service. Order No. 845, issued in 2018, established a framework for implementation. Some utilities, including Regional Transmission Organizations/Independent System Operators (RTOs/ISOs), have successfully used surplus interconnection to bring new resources online. These surplus interconnection processes are poised to expand as market participants establish the contractual structures required to make surplus interconnection service successful and gain familiarity with the opportunity it presents. Other utilities and RTOs, however, have adopted rules or policies that have explicitly or effectively banned the practice, eliminating the opportunity for these resources to reach customers.

WHY IS SURPLUS INTERCONNECTION SERVICE IMPORTANT?

Surplus interconnection service offers several advantages for electric system operations and cost savings, including:

- **Improved Grid Reliability**
  Grid operators across the country are confronting challenges in ensuring reliability as they face retiring fossil plans, load growth due to an expanding manufacturing sector, electrification of transportation and heating, rising demand from data centers and other tech users, and clogged interconnection queues that are preventing new resources from coming online as rapidly as necessary to serve that new demand. Surplus interconnection service brings new resources onto the system without the delay associated with the standard interconnection queue.

- **Lower Consumer Electricity Rates**
  The same factors threatening grid reliability are also causing energy and capacity costs, as well as the cost of renewable energy credits, to surge. Making new supply available on an expedited basis would help counteract the recent spike in prices. This is particularly true in parts of the country that have decreased the "accredited" value of clean energy resources, where the rapid addition of energy storage to already existing facilities could put significant downward pressure on rates.

- **Lower Infrastructure Costs**
  By using existing interconnection and transmission infrastructure, surplus interconnection minimizes the need for new transmission buildout. This translates into cost savings for both developers and consumers.

- **Cost Savings for Power Plant Owners**
  Using renewable energy instead of fossil fuels can result in net savings for power plant owners during renewable energy production hours. Fossil fuel generators allowing new resources to connect using their surplus interconnection capacity can still help to ensure reliability by providing power when needed.

TWO SOLAR PROJECTS IN KANSAS

One 42 MW solar project in Harper County utilized surplus interconnection service and incurred just $30k in interconnection costs and was able to come online in less than three years. Conversely, a 103.5 MW solar project in neighboring Sumner County that went through the standard interconnection process incurred a cost of nearly $35 million and remains in the queue after seven years.

- **Economic Benefits for Local Communities**
  Clean energy investments facilitated by surplus interconnection service can create jobs and tax revenue for communities undergoing an energy transition.

- **Rapid Deployment of Clean Energy**
  Because surplus interconnection service relies on taking advantage of "headroom" at locations where an electricity supply resource has already completed the interconnection process, new clean energy resource can come online as fast as the construction, siting and permitting processes allow, with a minimum of necessary studies. This allows clean energy developers to bypass the long wait times associated with standard interconnection processes.

SUCCESSFUL IMPLEMENTATION OF SURPLUS INTERCONNECTION SERVICE

Surplus interconnection service has been successfully implemented across several different regions:

- **MISO**
  The Midcontinent Independent System Operator (MISO) region allows surplus interconnection service to be used where it does not trigger new network upgrades. As of July 25, 2024, MISO has 4,000 MW of capacity in its surplus interconnection queue, with 11 projects going through the study process and 30 more pending. Projects using surplus interconnection service in MISO include projects in jurisdictions as diverse as Indiana, Minnesota, and Texas.

- **SPP**
  The Southwest Power Pool (SPP) has also seen successful use of surplus interconnection service, particularly with solar projects. SPP's approach has expanded their surplus interconnection service process to allow requests even when certain types of network upgrades are needed, so long as there are no material adverse impacts on the cost or timing of other requests pending in the standard interconnection queue.

- **Non-RTO West**
  Several utilities in the Western Interconnection have implemented surplus interconnection processes based on FERC Order No. 845. For example, Xcel Energy has added solar to a retiring coal plant in Pueblo, CO, and to existing gas units in New Mexico and Texas. Pacificorp has an established Surplus Interconnection Service queue with over 3,900 MW of proposed interconnection (mostly energy storage systems and solar).

Despite these examples, the use of surplus interconnection service is still in its infancy. Currently, the quantity of resources requesting surplus interconnection service in MISO (one of the most mature surplus interconnection markets) is just 1 percent of the resources pursuing interconnection via MISO's standard interconnection queue process. This is far less than the technical potential for surplus service.

BARRIERS TO SURPLUS INTERCONNECTION SERVICE

- **Relies on Commercial Incentives of Incumbent Generators**

  FERC's current framework relies on the commercial incentives for the legacy rights holders to share their interconnection rights. Doing so may rely on common ownership of the existing and new electricity supply resources, and/or shared services agreements that articulate each supplier's rights to the facilities and dictate the terms of those services, including payment to the incumbent. Because surplus interconnection service is relatively new and FERC did not dictate terms for a *pro forma* agreement, projects also have to negotiate bespoke agreements with the transmission provider reflecting the commercial arrangement between the generators, which entails significant transaction costs.

- **Restrictive Study Processes**

  Most utilities allow the addition of solar and wind to existing facilities as part of their surplus interconnection process. However, PJM categorically rejects requests to add an inverter-based resource (i.e., wind or solar) to an existing inverter-based resource. PJM's stated rationale for this prohibition is that the service could theoretically impact short circuit capability limits, steady-state thermal and voltage limits, or dynamic system stability and response, even if the impact is minimal and does not overload transmission facilities. PJM's study rules effectively prohibit the use of batteries in surplus interconnection situations, and prohibit the simultaneous operations of the new resource using surplus service together with the incumbent generator, even where the combined operation is at or below the interconnection capacity that was previously studied for the incumbent generator. This stands in marked contrast to other grid operators such as SPP and MISO, which allow surplus interconnection where the request does not require new transmission upgrades.

- **Surplus Interconnection Service is Tied to Continued Operation of the Existing Electricity Supply Resource**

  Surplus interconnection service is by definition tied to the continued existence of the original customer's interconnection service. FERC allows surplus interconnection service to be continued for a limited period not to exceed one year following the retirement and permanent cessation of commercial operation of the original interconnection customer's generating facility, but thereafter a facility using surplus interconnection service needs a different interconnection service mechanism to deliver its services to the grid. Planning for that continued interconnection service to match with the cessation of surplus interconnection service may be difficult given the uncertainty and delays currently seen in the standard interconnection queue processes.

POLICY RECOMMENDATIONS TO SUPPORT SURPLUS INTERCONNECTION SERVICE

Federal Leadership

- **Ensure Surplus Interconnection Service Rules are Workable and Consistent**
  FERC has the opportunity to unlock significant amounts of new generation capacity by requiring all utilities to provide a minimum level of surplus interconnection service, as envisioned in Order No. 845. This is particularly true in PJM, where surplus interconnection rules are significantly more restrictive than in the rest of the country and where PJM has highlighted the need for more generation resources to be hooked up to the grid. If PJM does not reconsider its approach to surplus interconnection service of its own accord, one option may be for FERC to reconsider its approval of PJM's Order No. 845 compliance filing given the mounting evidence that PJM's approach is effectively barring the use of surplus interconnection service across a wide range of circumstances. The surplus interconnection rules of other grid operators should also be assessed in cases where no surplus interconnection queue has emerged, and re-evaluated to ensure that the purpose of Order No. 845 is being fulfilled.

- **Standardize Surplus Interconnection Processes Agreements**
  FERC may consider establishing standard *pro forma* agreements to facilitate surplus interconnection service, which it initially declined to do in Order No. 845, Given the evidence that surplus interconnection remains a niche product (or in PJM and other regions, a non-viable option) despite its enormous potential, FERC could act to set a baseline standard for the surplus interconnection product on a national basis. Alternatively, or in addition, a third party could provide a clearinghouse of example agreements highlighting models that first movers in this market have used to implement surplus interconnection.

ISO/RTOs and Utilities

- Each ISO/RTO or utility grid operator (in non-RTO regions) should, of its own accord, conduct expedited stakeholder processes designed to ensure a workable process for surplus interconnection, benchmarked against other regional market areas. These entities should look to make sure that their process (i) has reasonable study guidelines; (ii) provides certainty for developers of surplus interconnection generators if the host facility retires by providing a clear path to stand-alone interconnection service; and (iii) considers the potential benefits of adopting *pro forma* contractual documents and moves forward with this approach to the extent market participants indicate it would facilitate greater use of surplus interconnection service. In setting study guidelines, grid operators may look to the SPP process that has demonstrated that surplus interconnection can be accessed without impacting the standard interconnection queue even where certain network upgrades are required. Surplus interconnection service reform is already being discussed in the PJM stakeholder process but the prospects for reform remain unclear.

State Regulators

For States in Vertically Integrated Service Territories

State regulators should encourage or mandate utilities to explore surplus interconnection service opportunities during Integrated Resource Planning (IRP) processes. They should require utilities to consider surplus interconnection service as an option for procuring new resources through Requests for Proposals (RFPs). The capacity benefits of "blended" resources (complementary pairing of resources such as wind and solar) developed through surplus interconnection should be included in resource planning efforts.

For Regulators in Restructured States

Regulators should prioritize surplus interconnection projects in competitive clean energy procurements or provide additional incentives to generation owners that make surplus capacity available. States experiencing high prices or resource adequacy shortfalls and clogged interconnection queues may wish to hold expedited contracting opportunities for clean energy resources that can increase the resource adequacy value of the combined facilities as compared to the existing facility alone.

- **Educate Stakeholders**
  States can conduct outreach and education programs to inform stakeholders about the benefits and opportunities associated with Surplus interconnection service, especially to existing energy communities.

State Legislators

- **Address Siting Barriers**
  States can study and report the economic and environmental benefits of better use of existing interconnection points and potentially adopt rules that allow for expedited siting and permitting rules for surplus interconnection projects, particularly those that do not entail significant changes in land use, for example, adding batteries to an existing fossil or renewable resource.
- **Create commercial conversion pathways**
  Some legacy resources are becoming increasingly uneconomical, but many remain critical during periods of capacity need. States may consider financially encouraging owners of low-capacity facilities to monetize their interconnection while retaining the ability to operate as a capacity resource.
- **Workforce training**
  States can support training programs targeted at existing generation labor to reskill workers into operating new generation technologies. This training can be funded with community agreements from the new generating resources.

Local Government

- **Proactively plan for power plant conversions**
  Local governments can establish zoning rules that prioritize new energy development near existing infrastructure to reduce costs and construction impacts.

CONCLUSION

Surplus interconnection service presents a valuable opportunity to accelerate clean energy deployment, reduce costs, and improve grid reliability. By adopting supportive policies and addressing existing barriers, electric utility regulators can unlock the full potential of surplus interconnection service and facilitate a smooth transition to a more sustainable and resilient energy system.

ADDITIONAL RESOURCES

Leveraging existing fossil interconnection can rapidly and cost-effectively integrate over 1000 GW of renewables; UC Berkeley Goldman School, Working Paper, November 11, 2024

Clean Repowering: A Near Term, IRA-Powered Energy Transition Accelerant; RMI; January 16, 2024

No-Regrets Solutions for Accelerating Grid Interconnection; Synapse Energy Economics, Inc.; August 19, 2024

ReSISting a Resource Shortfall: Fixing PJM's Surplus Interconnection Service (SIS) to Enable Battery Storage; Gabel Associates Inc. September 17, 2024

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