

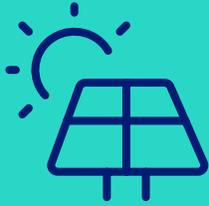


INCREASING THE ECONOMIC AND  
ENVIRONMENTAL BENEFITS OF SOLAR PV:

# A Solar-Plus-Storage Case Study

**CONVERGENT**

# Key Takeaways



## 1

More solar on the grid is necessary to reduce greenhouse gas emissions

## 2

Because solar is an intermittent resource, increasing solar generation presents challenges for utilities and grid operators

## 3

Battery storage paired with solar energy allows solar to be deployed whether or not the sun is shining

## 4

Battery storage paired with solar (solar-plus-storage) is essential to the future of the grid

## 5

Solar-plus-storage provides organizations with a way to reduce their electricity costs and carbon footprint *at the same time*

# Introduction: The Rise of Solar

Despite an increasing number of electric utilities across the U.S. adding more renewable generation capacity to their portfolios to meet RPS standards and advance their leadership role in global decarbonization efforts, solar power comprises only 3% of the U.S power supply.

Solar could provide up to 40% of the power supply by 2035 if current energy transition ambitions are met.

But there's a problem.

Stand-alone solar arrays are a "passive" resource, feeding the grid intermittently, some might even say indiscriminately, as the sun's rays are converted into electricity. Many utilities are finding this intermittency, or inconsistency, operationally and economically burdensome.

Solar-plus-storage is emerging as an elegant solution to these challenges, making solar power a more controllable, strategic, economical, and environmentally valuable asset. The first such deployment on the Eastern Seaboard, for a utility in PJM, highlights the many advantages solar-plus-storage holds for any utility ready to embrace technology to onboard more solar power.



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# The Situation: Unbridled Solar Power



**In the case of one PJM utility, their solar systems were feeding in too much power to the substation during shoulder months. In effect, the arrays were being too productive at times when power wasn't needed. Supply was outpacing demand.**

After purchasing two of these solar facilities from the original developer, Convergent Energy + Power (Convergent) stepped in with an innovative and cost-effective solution. The company retrofitted the two approximately 1 MW AC solar generation sites with powerful energy storage systems paired with 1 MW / 2 MWh utility-scale batteries. The batteries are operated by AI-enabled software – that not only ensures clean power is directed to the grid when it is most needed, but also when it is most valuable.

# The Solution: Solar-Plus-Storage Technology Expertise



Convergent immediately understood how adding energy storage to solar arrays can be a game changer.

First, in addition to “storing” the clean energy produced by the solar arrays in the battery storage systems, Convergent knew that enabling that power to be strategically dispatched, i.e., exactly when needed by the grid, would elevate the system’s worth.

Second, Convergent has over a decade of energy storage expertise, amplified by its deep understanding of the PJM marketplace (where it has operated energy storage assets since 2018). This knowledge helped the company optimize the dispatching of solar power to the grid. In particular,

the three different sets of demand charges that PJM levies on utilities had made clean power from the solar arrays more expensive than necessary.

Leveraging the predictive power of its proprietary asset management platform **PEAK IQ**<sup>®</sup>, Convergent deployed the solar-plus-storage asset as a strategic load-shaping tool. Using AI and machine learning, PEAK IQ draws on over 100 million datapoints to predict grid peaks, dispatching the battery when it is most needed and most cost-effective.

## GAINING PRECISION CONTROL OVER THE DISPATCHING OF SOLAR POWER INTO THE GRID CREATED MANY POSITIVE OUTCOMES:

1. Convergent’s solar-plus-storage system accurately forecasts peak demand, delivering 100% clean power to the grid exactly when needed, optimally balancing supply and demand.
2. Peak forecasting intelligence combined with energy marketplace knowledge ensures the dispatch of solar power to the grid when it provides the most economic value.
3. Optimal dispatching of solar power relieves congestion on the grid, reducing the need for additional peak infrastructure investment.
4. Combined, these solar and storage assets provide greater value to the utility—and community—than they would on their own.

# The Technology: Solar-Plus-Storage Facility 1

## 2 MW INTERCONNECTION

- 1.1 MW DC | 1 MW AC Solar PV
- AC Coupled with 1 MW | 2 MWh Battery Energy Storage System

## BATTERY INTEGRATOR

- IHI Terrasun

## BATTERY TECHNOLOGY

- Lithium Ion LFP batteries

## PV SYSTEM

- Deger Single Axis Active Tracking System- Ground Mount
- (3,318) Vikram Solar 340W PV Modules
- (15) Ginlong Solis 66 kW PV String Inverters



# The Technology: Solar-Plus-Storage Facility 2

## 2 MW INTERCONNECTION

- 1.4 MW DC | 1 MW AC Solar PV
- AC Coupled with 1 MW | 2 MWh Battery System

## BATTERY INTEGRATOR

- IHI Terrasun

## BATTERY TECHNOLOGY

- Lithium Ion LFP batteries

## PV SYSTEM

- Deger Single Axis Active Tracking System- Ground Mount
- (3,980) Vikram Solar 340W PV Modules
- (15) Ginlong Solis 66 kW PV String Inverters



# The Future: A Starring Role for Solar-Plus-Storage

With federal, state, and local governments actively championing – and regulating – a renewables-driven economy, and more and more utilities and businesses pledging to become carbon neutral, the future is bright for clean power. However, achieving these renewable energy goals will not only require new ways to generate renewable energy, but to store it.

Solar-plus-storage is playing an increasingly significant role in the clean energy transition by leveraging the environmental and financial benefits of storage and allowing solar to be stored and dispatched at the most strategic times.

On that note, Convergent is currently developing three more solar-plus-storage facilities for the same PJM utility, managing both the solar and storage builds. The facilities are projected to come online by the end of 2021.



The sheer volume of solar power coming onto the grid is staggering, but its intermittency remains problematic, making it a raw asset in need of further refinement. Solar-plus-storage solutions mark an important new chapter in intelligently managing this important asset – storing it and precisely dispatching it when needed – to maximize environmental and economic benefit.

**JOHANNES RITTERSHAUSEN**  
CEO, Convergent Energy + Power

# Why Partner with Convergent

- 
- ✓ One of the first developers of battery storage nationwide
  - ✓ Over a decade of expertise delivering innovative applications for energy storage and solar-plus-storage assets
  - ✓ Over 250 MW / 500 MWh of storage and storage-plus-solar capacity operating or under construction
  - ✓ Over \$350M in capital committed to energy storage-led assets
  - ✓ 100% of utility permitted projects completed
  - ✓ Approximately 600 active energy storage projects totaling more than \$3.6bn in projected Capital Expenditure (CapEx)
  - ✓ Demonstrated knowledge of best-in-class storage technologies and relationships with “Tier 1” suppliers
  - ✓ A long-term partner (versus a project flipper) with a track record of operating assets

## ABOUT CONVERGENT

Convergent Energy + Power (Convergent) is the most dependable provider of energy storage solutions in North America. Convergent has over a decade of experience financing and managing all aspects of the energy storage development cycle to help customers reduce electricity costs and increase reliability. The company’s commercial, industrial, and utility-scale assets yield seven-figure savings from day one while advancing the clean energy transition. Convergent’s proprietary asset management platform, PEAK IQ® leverages machine learning and deep market knowledge to optimize asset performance and maximize value. With over \$350M in capital committed, Convergent is the leading independent owner and operator of energy storage and solar-plus-storage solutions. For more information, visit [convergentep.com](https://convergentep.com) or follow us on [LinkedIn](#) or [Twitter](#).

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