THE IMPACT OF NEW LEGISLATION ON GROWTH IN THE ENERGY STORAGE SECTOR

A White Paper

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THE IMPACT OF NEW ENERGY STORAGE SOLUTIONS

Improved energy storage technology is and has been a key element in the adoption of renewable energy, with improved battery technology, wind and solar come closer to replacing fossil fuel-burning baseload power plants, and a variety of other issues with the power grid.

A CHANGING LANDSCAPE

New legislation of 2022 is accelerating the adoption of energy storage. The Inflation Reduction Act of 2022 (IRA) and the Bipartisan Infrastructure Law (BIL) bring renewed focus and incentives to energy storage solutions. What does the new legislation mean for the growth of energy storage markets?

THE RISING TIDE OF ENERGY STORAGE

An acceleration of renewable energy adoption, from automotive technology to power grid management is dependent on progress in one area: energy storage systems. Energy storage technology (previously referred to as a "battery") is and has been a key element in the rise of electric vehicles. It is also creating a path for renewable energy like wind and solar to replace fossil fuel burning baseload power plants, and address a variety of other issues with the power grid. There is a critical need for energy storage innovation, and the IRA and the BIL, are continuing to spark that innovation.

ENERGY STORAGE

There are a number of uses for energy storage systems. They include:

- Utility scale
  - Utility-scale energy storage systems are attached to the power grid and provide a power output at the same level as a generating facility– at least for a period of time.[1] But that's only part of the advantages utilities could enjoy with additional storage capacity (more about that later).
- Commercial/industrial scale
  - Manufacturers see energy storage as ultimately a cost reduction opportunity, with systems able to shave peak usage.
- Residential scale
  - More homeowners are looking to add energy storage to weather power outages.
- Mobile
  - Up until recently, the main driver of energy storage technology was innovation from the automotive industry fully embracing an EV future.

Energy storage technology has been moving toward longer-lasting, quick recharging but most importantly, higher capacity. While improved energy storage technology has had and will have an impact on all areas of energy storage use from EVs to the grid, the use that gets the biggest bump from the IRA is utility-level storage.

TECHNOLOGIES

Battery technology is an ongoing area of innovation in the energy storage system sector. The most prevalent technology centers around Lithium ion or lithium ion phosphate. Both of these technologies have been in the refinement stage for some time. Lithium ion was the first battery to make headway in the automotive field. Still, these technologies continue to struggle with heat issues in the case of Lithium ion batteries and lower voltage for Lithium ion phosphate batteries.

Because of the changes to the available tax incentives, a new wave of battery technologies are pushing ahead [2] They include:

- Vanadium redox battery

This technology is providing hope that utility-scale batteries can be made more cheaply, and in the case of the Vanadium redox battery, a much longer useful life.

- Lithium Ion Alternatives

A number of projects are ongoing to find more sustainable materials than Lithium Ion. They include zinc-air, sodium-sulfur, aluminum ion, magnesium ion, nickel-zinc, and silicon-based batteries.

40%

The goal of the IRA is to reduce carbon emissions by 40% by 2030. Battery Energy Storage Systems (BESS) are part of the solution.

WHAT'S IN USE

- BESS is in a state of technological innovation, but it is the smaller incremental changes that have brought utility-scale installation from small pilot projects to large-scale installations.

- There are a variety of BESS available today[3]:

  - Batteries
    - This is no more or less than what has been the primary energy storage system since the first rechargeable battery was introduced in 1859[4].

  - Pumped Hydro
    - Pumped Hydro is currently the most prevalent utility-scale energy storage system in the United States. It uses the flow of water created between one reservoir and another reservoir at a lower elevation.

  - Flywheels
    - Flywheels are used for energy storage from vehicles to data centers, and quite often as uninterruptible power supplies (UPS).

  - Compressed Air
    - Proponents of compressed air energy storage suggest it takes less real estate than Pumped Hydro, with the ability to store energy for fairly long periods.

  - Thermal energy storage
    - Seen as utility peak shaving technology, Thermal Energy Storage (TES) [5] is also used as a more efficient energy source for heating and cooling systems.

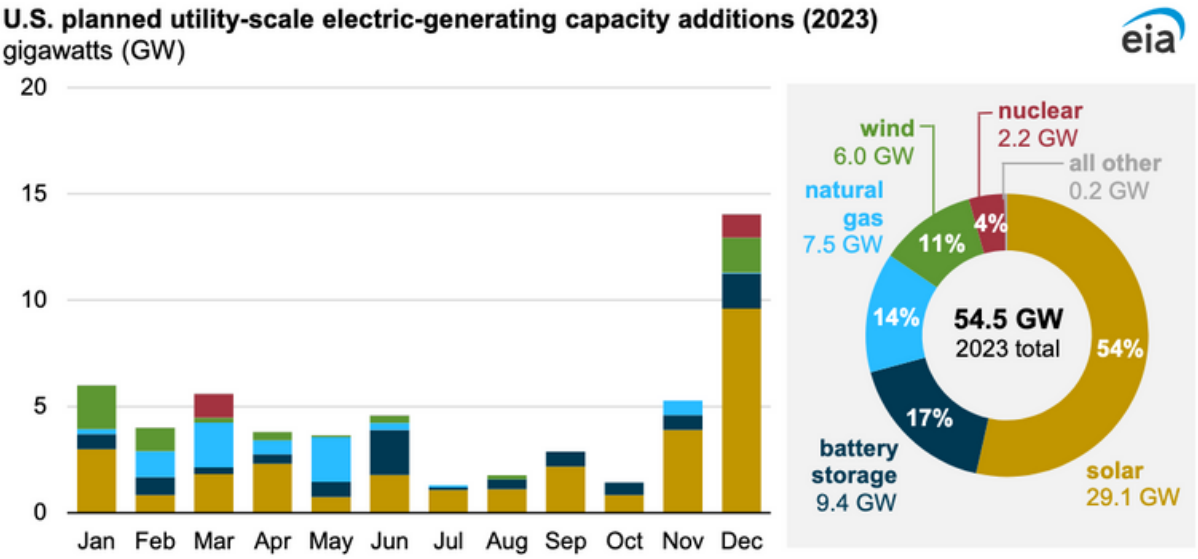
  - Hydrogen storage
    - Hydrogen storage is seen as an up-and-coming energy storage system, with the major hold-up being hydrogen production and transportation.

THE IRA AND ENERGY STORAGE

The IRA has three major objectives; reduce the U.S. deficit, allow Medicare to negotiate drug prices, as well provide approximately $391 billion to reduce carbon emissions. That's the "Energy Security and Climate Change" part of the act. Through tax incentives, grants, low-interest loans, and other programs the goal is to reduce carbon emissions by 40% by 2030.

There has been a lot of buzz in the media about what the IRA does for solar and wind development in the U.S. Incentive programs that had lapsed or were about to lapse were given new life–at least 10 years of new life. Arguably the most significant change the IRA imposes, however, is not directly tied to wind and solar, but rather to energy storage.[6] For those businesses in that sector or thinking about entering the market, it is not only new incentives leading the charge, it's a change in language that is spurring the use of current energy storage technologies and supporting efforts to find, develop and bring to market new technologies.

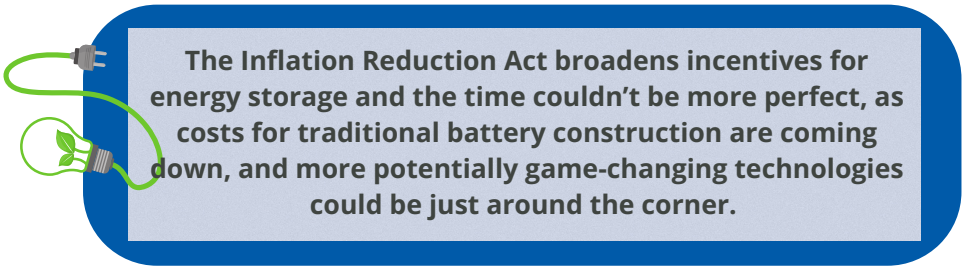
Inflation Reduction Act of 2022 spurs energy storage technology



Source: U.S. Energy Information Administration (February 6, 2023).

THE IRA AND ENERGY STORAGE

Up until the IRA took effect, tax credits for manufacturers and consumers only applied to energy storage systems attached to a renewable energy source. Standalone energy storage systems, or those attached to the power grid were not afforded the same level of incentives that wind and solar had been enjoying. The IRA removes that restriction from U.S. tax law, and that alone is driving new growth in the sector that, according to a number of industry experts, is expected to expand dramatically over the next ten years. And yet, this new opportunity to incentivize the industry to develop standalone energy storage technologies is only part of the positive impact. Costs to manufacture wind, solar, and energy storage systems in some areas are dropping significantly.



Why energy storage is a hot topic and favored in the IRA

The United States (and many other countries) have put strong goals in place for carbon emission reduction and achieving Net Zero goals in the next century. Certainly that spells more renewable energy, but also the systems that will help intermittent sources fit into the nation's power scheme. Energy storage is an integral part of these Net Zero goals. And that means at every level of renewable energy generation.

Up until recently, it was the cost of utility-scale energy storage systems that has slowed development and integration. While costs for manufacturing renewable energy technologies are starting to decline, the power industry is still looking for other ways to utilize smaller batteries in the larger grid. Distributed energy systems (smaller more efficient generation that are meant to provide power to a smaller area) and the use of smart charging electric vehicles (EVs) have provided more options.

In terms of cost, the current trend for utility-level energy storage systems is quite impressive. Estimates suggest that the cost of utility-level energy storage will drop continuously, and significantly with up to a 40 percent drop in costs by 2030. It should be noted that the battery costs are dropping. Other costs associated with an energy storage system, such as DC inverters and battery management systems (BMS) are on the way up.

THE MAIN USES OF ENERGY STORAGE AT THE UTILITY LEVEL:

Reduced renewable curtailment

Currently, when demand does not require generation from renewable energy systems or because of grid congestion, the power it generates cannot get to where it is needed, the system will be curtailed. It's the most prevalent reason behind a wind farm where turbines are not spinning even on windy days. With a BESS, that generated energy is stored until there is a need, or grid congestion has cleared.

Renewable capacity firming

Similar to the curtailment situation, capacity firming can take a renewable source such as solar from intermittent status (electricity is generated only when the sun is shining) into the realm of a baseload power source (always there, day or night) by storing solar-generated energy and using that energy storage resource to provide the same level of power output when the solar output is diminished (a cloudy day) or absent altogether (night time).
Frequency Regulation

Dispatchable Generation

When electricity demands go up suddenly there is an imbalance created. Traditionally, grid operators have kept power plants running longer than necessary or at inefficient capacity levels to make sure there is no dip in power frequency. Energy storage systems, used for this purpose have the advantage of being available in seconds, rather than minutes or even hours.

Flexible Ramping

Traditional power plants increase or reduce their output depending on energy usage. Usage goes down overnight, rises again through the morning hours, peaks around noon, and then drops through the evening hours. Power plants ramp or ramp down depending on need. With the advent of solar power, power plants are producing less during the day, but face a steep ramp up when the sun goes down. Energy storage systems can reduce how steep that incline would be.

CONTINUED...THE MAIN USES OF ENERGY STORAGE AT THE UTILITY LEVEL:

Black start services

Electricity generating plants need electricity when the plant is not operational for all other operations as well as startup. Smaller diesel or fuel oil generators have been used traditionally for this requirement, but an energy storage system works even better.

Transmission and distribution congestion relief

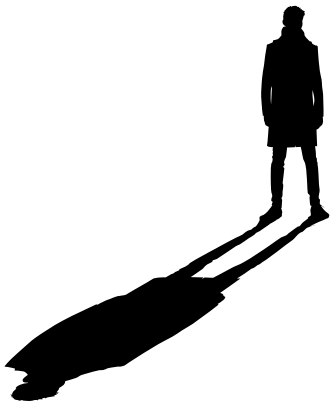
Electricity transmission lines can move only so much electricity. When a piece of the grid is at capacity, and more electricity is needed in one area, sometimes the generating plant is on the "wrong side" of that congested area of the grid. Grid operators have to call on more expensive (and often dirtier) power generation to meet the need. It is a lot cheaper and better for the environment to locate energy storage systems in strategic areas to avoid congestion issues.

Energy shifting and capacity investment deferral

When electricity usage spikes for a short period of time, grid operators use small generation assets called peaker plants to provide that short boost. Utility-scale batteries can replace those peaker plants, and extend the time before additional full-size plants or peakers are required.

This last group contains the one use most people think of, but is the least prominent today; shifting the time of day electricity is available from intermittent sources. The two primary examples of intermittent sources are solar and wind power. Energy storage systems can be charged when the renewables are in operation and then release that power when solar and wind systems are not generating. This is considered the best way (at the moment) to allow renewable energy sources to be used for baseload generation.

HOW THE IRA HELPS ENERGY STORAGE COME OUT FROM THE SHADOWS



The approach the IRA takes to increasing the use of renewable energy in the U.S. is multifaceted. All renewable energy technologies benefit from the IRA either in new or expanded tax credits, and that is no different for energy storage systems. There are three things that will help the energy storage field to expand.

- The IRA provides a number of new tax credits along with extending the life of some of the incentives that are already in place. For technologies such as wind and solar, the tax credits available top out at 30%. In the case of energy storage systems, tax credits have been extended and expanded, with tax credits reaching as high as 50 percent.

Tax credits as high as 50%

- Even more exciting for research development teams, is a change in the law that makes energy storage tax credits technology neutral. Many of the technologies discussed here were not in a position to take advantage of those tax incentives until the law was changed.

Credits now include energy storage

- Another aspect of the IRA that will impact all technologies and projects is tax credit mobility. Under the IRA, energy tax credits can be exchanged with an unrelated third party for cash.[7] This opens up new avenues for funding all of these systems.

Tax credit exchanges with 3rd parties

ENERGY COMMUNITIES AND FOSSIL FUEL RECOVERY

As stated before, the IRA contains significant changes to energy policy in the U.S. and is the first major step towards meeting carbon reduction goals. One of the more unique features of the IRA is the creation of Energy Communities, which take on some of the land or facilities left behind as the U.S. starts to turn off its fossil fuel-burning generation systems.

An Energy Community[8] is defined as 1) a brownfield site, 2) a census tract or any adjoining tract in which a coal mine closed after December 31, 1999, or a coal-fired electric power plant that was retired after December 31, 2009, and 3) an area that has (or at any time during the period beginning after December 31, 1999, had) significant employment or local tax revenue related to the extraction, processing, transport or storage of coal, oil or natural gas.

This part of the IRA could help to smooth the way for communities that had relied on the fossil fuel industry for so long.

WHAT COULD STAND IN THE WAY?

Much, in the same way, the Affordable Care Act was attacked and stripped after it became law, the Inflation Reduction Act is facing some significant pushback from lawmakers in the U.S. Congress[9] as well as from some corporate sectors. The act narrowly missed significant damage when U.S. House Speaker Kevin McCarthy placed parts of the Act on the chopping block during debt ceiling discussions earlier this year.

It's evident that the IRA may be in danger of being reduced or eliminated due to partisan politics. The attacks will most likely continue through the 2024 election cycle. Proponents are encouraged, in an indirect way, by the fact that the carbon reduction parts of the act are not even the most potentially polarizing portion of the Act. The IRA also includes provisions that allow Medicare to negotiate drug prices for the people on the program. It's that part of the Act that will most likely wind up in court[10] and in the process, provide some unexpected cover for the climate provisions in the Act.

Conclusion

The Inflation Reduction Act has reinvigorated many sectors of cleantech. Through new and renewed tax incentives, and changes in certain aspects of the tax incentive program, the Act promises to be one of the best ways to start addressing climate change. It gives the U.S. the opportunity to proactively replace fossil fuels with cleaner tech while promoting job growth and underserved populations.

Energy storage systems, based on the opportunities provided in the Act would appear to be a top priority in the search for climate solutions. These systems at the grid level no doubt have the opportunity to bring other renewable technologies along with a variety of synergistic applications. Energy storage systems further have the ability to drive new interest in distributed generation.

For cleantech companies, there are opportunities as well as challenges. A shifting customer base, a market ripe for new players, and a supply chain roller coaster ride, all in the midst of a recession have left the battlefield a little uneven for many companies. These companies need to find new ways to find and engage their customers, reduce their time to sale (historically bad in this area), and be heard above the growing field of competitors.

About the Author:

Jayne Burch has been providing comprehensive marketing expertise for over 24 years. As a Fractional CMO, Burch works to foster innovation while assisting her clients in reaching their marketing goals. Her commitment to supporting cleantech adoption, sustainable solutions, and climate recovery initiatives has positioned her as a thought leader in the field. For inquiries or further discussions on the content presented in this white paper, please contact Burch at Jayne@YourEssentialCMO.com

About Essential CMO:

Essential CMO is a fractional CMO company with a customer-centric, results-driven approach. Recognizing the urgent need for marketing leadership and high-level strategy, Essential CMO was launched in 2019 to provide companies in the cleantech sector with an innovative alternative to traditional C-Suite structures. We serve wind, solar, and other cleantech companies in the U.S. and Canada. With offices in Ann Arbor, Michigan, Essential CMO is owned by Marketing Monsoon, LLC, a full-stack marketing automation agency.

With corporate offices in Ann Arbor, Michigan we serve wind, solar, and other cleantech companies' digital needs in the U.S. and Canada. Essential CMO is owned by Marketing Monsoon, LLC.

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