Storage is key to the solar industry

Chip Palombini

Chip Palombini, Director of Energy Storage at Dynapower Company, LLC, Vermont US, was full of enthusiasm when PES caught up with him. Customers value their complete energy storage solutions, which they deploy world wide to commercial and utility-scale companies.

PES: Welcome to PES Solar/PV magazine, it's great to talk with you. would you like to begin by explaining a little about the background of Dynapower and the importance of the solar/PV industry to you?

Chip Palombini: Dynapower is a fifty-five year old power electronics company, headquartered in Burlington, Vermont, with equipment installed worldwide. Over the last decade independent power producers [IPP], utilities, solar developers, and integrators have been relying on Dynapower to design, build, and deploy more than 425 MW of energy storage inverters for projects ranging from 100 kW microgrids to 40 MW. We've been fortunate to be involved in a number of groundbreaking solar plus storage projects including the United States first utility-scale solar plus storage installation with Green Mountain Power in Rutland, Vermont. We worked with Tesla, and what was then Solar City, to help the island of Tua in American Samoa transition from diesel power to 100% solar power 24/7. Most recently we commercially deployed the industry's first

DC-DC converters for utility-scale solar plus storage with installations with two of the United States largest IPPs.

Customers come to us for our technical capabilities and our flexible scope ranging from inverters to integrated systems. These customers value our expertise, bankability, responsiveness, and flexibility

As solar plus storage continues to grow, we recognize the need for reliable technologies that enable cost effective pairing of solar with battery energy storage. That recognition led to our much-heralded DC-DC converters which we were able to take from concept to reality in a very short period of time.

To date, we've deployed our UL listed DC-DC converters in solar plus storage applications and recently launched an OEM partner program. The OEM partner program gives central inverter manufacturers immediate access to Dynapower's patent-pending DC coupling technology. Dynapower is particularly proud to be at the forefront of driving solar plus storage innovation. Our view is solar plus storage is of tremendous value to our customers as well as the growth of our business.

PES: We have been hearing a lot recently concerning DC-DC converters and would like to know more. How do they differ from previous models and what are the benefits to the customer/end user?

CP: Dynapower deployed our first-generation DC-DC converter as part of a solar plus storage installation several years ago at an island resort. We took learnings from that project as well as those from several hybrid solar plus storage projects Dynapower designed and built to develop our DPS line of DC-DC converters. Since our first DPS was deployed as part of a utility-scale solar plus storage project in late 2017, the response has been tremendous. The industry really recognizes the economic advantages that DC-coupled solar plus storage presents.

Customers use Dynapower's DC converters to increase PV energy generation, and revenue, of utility-scale installations while also reducing the cost to couple energy storage alongside solar. In the United States DC-coupled solar plus storage systems are also eligible for significant tax incentives that deepen the economic benefits of DC-coupled solar plus storage. The National Renewable Energy Lab in the United States recently released a report showing the DC-coupled approach is the most economically advantageous for solar plus storage.

PES: Are there any financial implications either short term or in the long run?

CP: There are several financial implications. In the short term, DC-coupled solar plus storage is less expensive and more efficient than AC-coupled storage. DC-coupled storage eliminates the need for several costly pieces of equipment including transformers and switchgear. For example, in a 20MW installation that we recently modelled for a customer the DC-coupled solution saved them over a million dollars in installation costs compared to an AC-coupled approach. These are significant savings that only can be achieved through the DC-coupled solution. In the United States, DC-coupled utility scale solar plus storage systems are eligible for valuable ITC tax incentives making the economics even more compelling to owners.

When you examine the lifetime of the installation, the financial implications of DC coupled storage are significant as well. The DC-coupled solution is more efficient than AC-coupled solar plus storage — 89.2% compared to 86.2% (for PV to battery to grid).

DC-coupled solar plus storage also allows the installation owner to harvest more energy from their installation through clipping recapture and low voltage harvest. Both of these value streams can only be achieved through DC-coupled solar plus storage.

By adding storage to a utility-scale installation, PV energy can be turned into a dispatchable asset to be deployed when most valuable to the owner — a tremendous financial opportunity for the installation owner over the lifetime of the installation.

Dynapower has done many AC-coupled solar plus storage installations. We realize that DC-coupled solar plus storage is not always the optimal approach for coupling storage with utility-scale solar. That is why we've developed a solar plus storage calculator that allows Dynapower engineers

to take several inputs from the developer and model the topology which would be financially best for their installation. We've had developers who have created their own modelling tools and compared their results to ours. They've found the results to be almost identical which is pretty cool. This is a free service we offer to any developer exploring adding energy storage to their existing or new utility-scale PV installations.

PES: We know you have been developing DC-coupled, utility scale solar plus storage, who uses this type of storage ad what are the advantages?

CP: We find DC-coupled solar plus storage to be most advantageous for utility scale solar projects from 1,000 kW and larger. Given the large install base of utility-scale solar worldwide we specifically designed our DPS line to be applicable for both retrofits and new installations. We see our DPS converters as an opportunity for solar developers and utilities to align solar energy supply with load demand. Having the ability to dispatch the PV will increase revenue for project owners.

A great example of this was this summer when Green Mountain Power used the facility we designed and built with them in Rutland, Vermont to save their ratepayers over $500,000 by anticipating the summers peak demand and augmenting that need with stored battery energy. We've also heard from several large solar developers including Lightsource that most if not all of their installations moving forward will contain energy storage. The economics of DC-coupled solar plus storage are compelling for larger developers in particular — which is particularly exciting to us having pioneered bringing this to the market.

PES: Would you say that Dynapower's main focus is residential or larger scale utility products or are they both equally as important to you?

CP: We don't currently have products for residential storage. Dynapower's focus has been on utility scale and commercial and industrial solar plus storage. In addition to utility-scale solar plus storage, we see tremendous opportunity for commercial and industrial facilities to benefit from solar plus storage. With the addition of solar plus storage, businesses can not only reduce their electricity costs but ensure they have critical backup power for when the grid goes down. Power outages costs businesses tens of billions each year in losses from lost productivity to spoiled goods. This can be avoided with the addition of solar plus storage to commercial and industrial facilities.

PES: Customization seems to be a trend in our industry, how do you as a company respond to his?

CP: Customers have been coming to Dynapower for decades for custom power conversion solutions. We are very well versed in providing custom solutions. Dynapower will always work to serve this need, however, we see a tremendous opportunity to standardize solar plus storage particularly in utility scale applications. In standardizing, as an industry we can reduce the costs of solar plus storage, ramp up clean energy production, and rapidly increase deployments.

PES: Solar storage is an issue which has garnered more and more importance each year for a while now. Do you see any reason for this trend to slow down any time soon?

CP: Not at all. We only see solar plus storage ramping up based upon our sales pipeline and the clear economic advantages of solar plus storage. NREL agrees. Their report says by 2020 that solar plus storage economics will outpace standalone solar. We think there is a strong recognition for this future by the solar industry. Now it is a function of the correct technical solutions. That is why we've built tools for developers to not only size their solar installations for energy storage, but to help them choose the most financially advantageous option be it AC or DC-coupled.

PES: With the ever-growing importance of HSE in the work place, what measures or systems have you put in place to ensure the safety of the workers?

CP: Safety and quality go above all, the two go hand in hand. Our employees receive extensive safety and workplace training to keep them safe, happy, and productive. Additionally we ensure that our products are designed and tested to exceed the latest safety requirements.

PES: Where do you operate and where are your key markets and are there are any areas, geographically speaking, that you would like to work in?

CP: Headquarters in South Burlington, VT is our primary manufacturing and development facility. We also have R&D and service facilities in Union City, California as well as global contract manufacturing. Our footprint is global. We've been fortunate to deploy energy storage in over a dozen companies on virtually every continent including Antarctica. Our focus will continue to be global with a heavy emphasis on the Americas.

PES: With so much competition in the market what makes Dynapower stand out from the competition?

CP: Our technology, reliability, and bankability. As a fifty-five-year-old company with a complete product offering, 24x7 technical support, and diverse business portfolio that includes over 425MWs of energy storage deployed worldwide, we not only have the proven energy storage experience our customers can rely on, they know we will be there every step of the way from installation design to service for years to come.

PES: Looking to the rest of 2018 and beyond, what trends and/or changes are you anticipating in the market and why?

CP: Given our conversations with solar developers, Dynpower feels strongly that you'll see an acceleration of the deployment of solar plus storage worldwide. You'll see more markets opening up and the value streams deepening for solar plus storage. This is an exciting time for everyone in renewable energy, and Dynapower is particularly proud to be pioneering technology that makes the economics of solar plus storage more attractive to more and more solar developers and owners.

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