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## Point-Of-Use Batteries for Commercial Buildings

*Additional submitted attachment is included below.*

November 21, 2022

California Energy Commission
Request for Information
Clean Energy Resources for Reliability
Docket #21-ESR-01

To whom it may concern,

Thank you for the opportunity to reply to your Request for Information regarding **Clean Energy Resources for Reliability**.

## Regarding Table 1: Supply Resources and Table 3: Supply/Demand Resources, Energy Storage (short duration, less than 8 hours)

I write to bring to your attention a new battery system product that is being adopted by several companies around the world including my company, August Berres.

The system enables battery storage at the point of use. August Berres is using it to provide power for office workstations. By using a point-of-use battery system, we eliminate all the unclean, unsightly, and dangerous cord and wire clutter that presently plagues most offices.

We are successfully replacing all 120V power connections with battery power for a wide range of devices.

We power laptops, second and third monitors, wireless phone charging, task lighting, 5G wireless hotspots, sit-stand mechanisms, personal printers, and UVC disinfection

lights. The battery packs are portable, and you can use them outdoors, at a coffee shop, or anywhere you choose to work.

A user with a laptop, second monitor, sit-stand desk, and wireless phone charger will typically realize at least 6 hours of operation before it is necessary to swap the portable battery.

We are the first in commercial office space and know of at least one other company in California that is exploring the same approach for commercial retail displays. We are also aware of three additional companies in other countries that are adopting the technology. Likely, there will be many other manufacturers in the next few years that do the same.

In its current system configuration, the batteries are charged in separate charging stations connected to the AC grid through an AC-to-DC power supply. These function similarly to the “brick” that accompanies most laptops. The battery technology is Lithium-ion, cells that are also used in the automotive, power tool, and home and garden industries.

The charging systems can be attached to readily available timer devices and charging can occur during off-peak hours. The system uses “slow charging” to extend the life cycle of the batteries. With one 20 amp circuit, we simultaneously charge 24 200Wh batteries in 9 off-peak hours.

We believe that local or building DC microgrids will eventually be a reality as a DC-powered office building is projected to use 1/3 less power than an AC-powered office. When this occurs, we will make a slight redesign of the charging product to eliminate the AC-to-DC power supplies.

Said another way, an AC-powered building needs 50% more rooftop solar panels to deliver the same power at the workstation level than a DC-powered building that eliminates transformers and inverters.

With our customers, we are finding valuable secondary energy benefits. Monitors are the primary consumers of power in an office workstation. We notice that specifiers are carefully selecting low-wattage monitors (usually rated at 15-30 watts) to reduce the frequency of battery swaps.

Most choose not to select power-hungry monitors designed for gaming applications. Monitors with sizes from 21 to 29 inches (16:9 aspect ratio) are typically selected, however some are also using curved monitors and the ergonomically friendly, low-profile wide monitors (21:9 aspect ratio).

# Regarding Table 4: Qualitative Attributes to Assess Resources

The following are comments regarding certain attributes relevant to the resource from Table 4.

### Readiness-Technical readiness and maturity

The point-of-use battery system used by August Berres is in production and meets all the necessary certifications for almost every country in the world. It was field-tested in 2021 and launched formally in April of 2022. The internal Lithium-ion battery cells have been on the market for several years. All the technology involved has previously been used elsewhere.

### Permitting-Ease of permitting processes (e.g., local, CEEQA) required to implement the resource

Since the product is built around a low-voltage DC power design, there are no permits required.

### Supply Chain-Efficiency and effectiveness of manufacturing and supply chains to support implementation of the resource

The final assembly and configuration of products is done in the USA in Michigan. Certain electrical and electronic components are made in China and inventoried in Virginia as well as the UK.

Between the Tier 1 and key Tier 2 suppliers, there is approximately 250,000 square feet of manufacturing space available for production.

August Berres is confident of available supply and will be offering customers shipping 10 days after receipt of order commencing on January 1, 2023.

## Customer Acceptance-Operator and end-user acceptance of the technical aspects and value proposition of the resource.

Besides the energy saving aspects of point-of-use batteries, there are several other value propositions. The value proposition that resonates most with customers is the ability to eliminate 120V wiring. The customer groups that are the most receptive are Architects and Facilities Managers.

This bodes well for the ability to scale the deployment of the product as these customer categories typically work on large projects or for large organizations.

Planning offices with 120V power is tedious and costly. Space planners must determine exact layouts. In a world where hybrid work policies are becoming more commonplace, planners face uncertainty. It is hard to predict how many people will occupy offices. If you assume a high number, there is a tendency to overbuild facilities. If you assume a small number, the facility may not be adequate.

Often, planners find themselves creating layouts several times to satisfy the needs of an organization. Once a plan is completed, electrical permits must be secured, and contractors hired. Breaker boxes, breakers, conduit, wire, power drops, under-carpet wiring, and carpet tiles must be installed. Then final inspections and approvals must occur before occupancy.

Organizations find this to be a tedious, painful, wasteful, and costly process. And it does little for energy efficiency. Battery-powered workstations can be mobile and layouts easily reconfigurable. They simplify the planning process. In many cases, the savings from eliminating 120V wiring is greater than the cost of an August Berres workstation.

Many organizations change or desire to change their office layouts with varying frequencies. Each time they change, there is a cost for the reconfiguration of the electrical system. When organizations move, they typically leave all their electrical infrastructure behind. With battery power, all their investment can move with them.

Another value proposition is the inherent resilience of battery-powered workstations. Not every organization can afford the expense of diesel-powered back-up generating systems. Given the current situation, they simply tolerate power interruptions and planned shutdowns. With battery power, key workstations can continue to operate and the need for facility-wide backup generation can be obviated in many cases.

## Equity-Equity considerations such as impacts on low income and disadvantaged communities, and tribes.

There is a correlation between older commercial real estate and low income, disadvantaged communities, and tribes.

For many older buildings, the cost of electrical infrastructure upgrades makes retrofitting economically infeasible.

With battery-powered infrastructure, almost any building can be retrofitted to become a co-working facility. Add 5G hotspot technology and these can become secure facilities.

If a building has historical significance, it can be preserved without cutting through walls and floors for technological upgrades. As more jobs in the future require computer technology and skills, access to technical infrastructure can benefit underserved communities.

## Suggestions

Conventional wisdom for solar energy involves securing low-cost land, often hundreds of miles away from high usage metropolitan areas. Large arrays of solar panels are clustered together. The solar panels generate DC power. This can be stored in on-site batteries, but it ultimately goes through an inverter to create AC power.

The AC power is connected to the grid at a substation where a step-up transformer creates the higher voltages necessary for long-distance transmission. Near the points of use, the power is stepped down with a transformer to create local distribution. Near the entrance to a building, the power is stepped down again to create 120, 240, and/or 440 power.

Inside a building, the AC power is provided through outlets. All computer related devices employ either an internal or an external power supply that converts the AC power back to DC for use inside the devices.

Each of these steps (inverter, step up, transmission, step down, step down, power supply) results in wasted power as there are inefficiencies in all of them. Furthermore, the inefficiencies from power supplies and inverters that are indoors create heat that adds to the building's air-conditioning load.

Rooftop solar combined with battery storage and DC microgrids avoids these inefficiencies.

Point-of-use batteries also simplify the creation of building microgrids. Wires and cabling for DC power to every workstation are eliminated. The overall DC wiring design only needs to accommodate charging areas and DC-powered devices that do not have point-of-use battery capabilities.

Following are suggestions for actions that could be taken to encourage local and building microgrids:

1. **Create Awareness of the Benefits of Microgrids.** Public awareness campaigns regarding sustainability, resilience, and financial benefits could influence support and accelerate deployment.

   It is unlikely that the private utilities such as PG&E and California Edison or Community Choice Aggregators (CCA's) will fully endorse microgrids as they are typically installed "behind the meter". As such, they do not provide opportunities for a return on investment in power delivery infrastructure, nor do they generate revenue for power providers.

2. **Incorporate DC microgrids into the 2025 Building Energy Efficiency Standards.** The 2022 standards provide for combining rooftop solar and battery storage. The next iteration of the Building Energy Efficiency Standards should add building and/or local DC microgrids to the rules regarding local/building solar generation and battery storage.

3. **Harmonize CEC Standards for DC power with standards developed by the Emerge Alliance.** This prominent organization has been leading the DC powered building movement for several years. Their efforts give direction to DC power designers and engineers for product and facility development. To do otherwise would create confusion in the market and inhibit or delay the widespread implementation of microgrids. The CEC's participation and endorsement could give a boost to their efforts.

4. **Incorporate USB-C connection requirements for more devices in the 2025 Building Energy Efficiency Standards.** Starting in 2019, most laptop computers can be powered with USB-C connections. Additional products using this standard should be encouraged including devices such as monitors, personal printers, lighting, and wireless phone chargers.

   The EU has legislated that all handheld devices are Type C from 2024 and all laptops are Type C from 2026. Harmonization with the EU would be useful to avoid unnecessary product differences.

5. **Incorporate requirements for external power supplies on powered office products into the 2025 Building Energy Efficiency Standards.** Products with internal power supplies require 120V connection and cannot be powered with a DC microgrid unless an expensive, inefficient DC-to-AC inverter is incorporated into the system. If power supplies are external, more efficient DC-to-DC connections can be deployed.

   To reduce electronic waste, all devices such as televisions, PC's and other electronic goods should be designed with a replaceable cord set with an external power supply. Most laptops already have external power supplies and other devices should follow the practice.

   Power supplies are often the first component to fail in an electronic device. When power supplies fail, rather than discarding the entire appliance, you can replace the external power supply and the life of the device can be extended. The primary utility of the appliance can be sustained.

   The EU Sustainability Commission has been discussing this, but no legislation has yet been passed.

   This approach would also serve to accelerate the product development process as the certification processes for new products are reduced. Said another way, lower power consumption devices could come to the market sooner.

Sincerely,

Robert J Kroon

Robert J. Kroon
Founder and CEO
August Berres Corporation