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ONYX POWER LLC's Response to CEC RFI on Behind-the-meter Renewable Back-up

Additional submitted attachment is included below.

October 5, 2022

California Energy Commission
715 P Street
Sacramento, CA 95814

Re: BTM Renewable Backup RFI Response

Dear California Energy Commission,

ONYX POWER ("ONYX") - a designer and manufacturer of quiet, rugged, mobile, renewable power equipment as a replacement for dangerous small gas and diesel generators – is pleased to provide responses to this request for information (RFI) from the California Energy Commission (CEC) regarding Behind-the-Meter Renewable Backup technologies and solutions.

Our mission is to enable clean power access anywhere, and our focus is to provide direct solutions for critical power outages to those most in need: communities impacted by natural disasters. The company's product line includes the ONYX Rhino, a 4,000W rugged, mobile power system that recharges from the grid or solar while delivering both 120V and 240V – a first in the light-industrial mobile clean power industry. The company also manufactures the ONYX Manta, a 550W rugged, mobile solar array designed to recharge the ONYX Rhino and other portable battery systems during off grid use or power outages.

The unique and innovative capabilities of the ONYX Rhino earned ONYX POWER, GRID Alternatives and the University of California Riverside a **joint funding award from the California Energy Commission** as part of the Mobile Renewable Backup Generation GFO-20-310 to deploy **thirty-two (32) ONYX Rhinos** in 2022 to the **three tribal communities** of Blue Lake Rancheria, Soboba Band of Luiseño Indians, and La Jolla Band of Luiseño Indians for energy resilience during power outages caused by wildfires, storms and other natural disasters. ONYX brings this background and experience to bear in responding this RFI.

ONYX has copied the CEC's questions below in *italics* and has responded where appropriate in **bold**:

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1. *What are key barriers to behind the meter (BTM) zero-emission renewable backup for critical loads? Is the lack of standardized solutions a primary barrier for permitting and interconnection?*

   These are barriers, yes – the lack of standardized connection solutions is the primary challenge. There are differences in interconnection requirements in addition to delays and slowness in the Rule 21 process. Utilities in the also tend be averse to new types of transfer switches and equipment that connects at the customer panel. This presents challenges since much of the newer, renewable options available for BTM back up power are "smarter" than gas generators and require different than typical transfer switches to work.

   For existing homes and main electrical panels, installing a critical load subpanel requires a physical selection and hardwiring of the critical load circuits. This is effectively a "permanent" selection and cannot easily be changed. This is especially challenging if future electrical upgrades to the home are made and the circuits are directed to different

appliances (e.g. switching from gas to induction stove, switching from gas to heat pump water heater, adding 220V EV charger, etc.)

2. *What are the current opportunities for standardizing design of how BTM backup systems interconnect with the distribution grid while enhancing safety and managing operational constraints?*

Requiring all transfer switches to be neutral switching and break-before-make type and simplifying and standardizing the utility Rule 21 application process for these types of connections is maybe the biggest area of opportunity for the deployment of any BTM back-up systems, renewable or otherwise. Allowing installations of the circuit without needing to approve the equipment connected to it since the utility and AHJ should only care about the supporting BTM infrastructure, not the hardware), and enforcing a universal inlet connection plug (e.g. NEMA L14-30) all serve to streamline this process. Additionally, the California utilities should allow other back-up power connection solutions that are acceptable in other states / utilities, such as meter collars and interconnect breakers, but are often disallowed by large California utilities.

3. *If the CEC issues a solicitation in this research space, should there be carve outs for specific technologies or technology bundles targeting specific performance metrics (e.g., separate groups each targeting a technology such as critical load panels, switchgears, and multi-mode inverters)? How should technologies be bundled, and what metrics should be targeted?*

Suggested Requirements bundle for modular BTM ZE power systems:

- **Single unit with dual 120V and 240V output, so both normal 120V loads can be powered as well as 240V output via standard L14-30 connection to connect directly into home transfer switch for critical load back-up power at the home-level**
- **Plug-and-play expandable energy capacity or paralleling capability to allow double, triple, quadruple the duration of back-up power coverage**
- **Recharging from both 120V and renewables (e.g. PV) for maximum flexibility**
- **Weatherized for outdoor use, minimum IP54 rating**
- **Industry standard outlets, inlets and terminals for AC and DC connections (I.e. non-proprietary designs specific to one OEM)**

4. *If the solicitation included multiple groups, how should those groups be structured? Some examples below:*

    a. *Multiple-group solicitation:*

        i. *One group for Applied Research and Development (ARD) projects that would pilot emerging technology in a controlled environment and engage with stakeholders, including CBOs and municipalities*

        No comment

        ii. *Another group for Technology Deployment and Demonstration (TDD) projects that would roll-out and implement technology mature enough to seek rapid-deployment for near-term benefits.*

        Recommend there should be a heavy emphasis on TDD since the technology exists today and rapid deployment is the key to serving CA

communities. Recommend a MORBUG "Phase 2" solicitation to vastly expand statewide deployment for previously awarded and successful MORBUG "Phase 1" projects and approaches. CA communities will benefit from rapid scaling of tested and proven "Phase 1" MORBUGs solutions.

b. *Multiple-group solicitation in which each group is defined by a particular site characteristic or use case. Examples could include: urban and rural, residential and commercial, various climate zones.*

Recommend that tribal, rural, low income, disadvantaged received priority and specific call-outs since these communities are at highest risk and have the least resources.

5. *EPIC 4 Initiative 15 mentions specific potential research areas for BTM ackup technologies, listed below. What is the current state of the each technology, and what research and design considerations are required to advance the technology and market readiness of each?*

Mobile integrated inverter and battery systems exist today and are funded by the CEC's MORBUG grant program. Developing a standardized, easy-to-install, transfer switch system, such as meter collars, that are acceptable to all the state's utilities would help with the deployment of all such technologies, whether permanent or mobile. Meter collars and similar easy-to-install technologies likewise enable plug-and play simplicity of connection by battery systems with 220/240V output via L14-30 connection.

6. *What is the current Technology Readiness Level (TRL), or state of technology, for meter collars (i.e., electrical equipment that plug-in directly between a meter and its meter socket) that streamline the integration of solar PV, battery energy storage, electric vehicle charging, and other DERs?*

Modular BTM zero-emissions power systems that can directly plug into a meter collar could be demonstrated as part of a TDD solicitation, such as MORBUG "Phase 2." Look to the CEC's MORBUG program for potential eligible technologies that can output 240V via L14-30 connector into a meter collar.

7. *Would integrating multi-mode inverters and islanding functions into critical load panels increase system reliability and ease installation while reducing overall system costs and complexity? What design considerations, technology development, and performance metrics are necessary to achieve this?*

Integrating inverters into load panels is likely to increase system costs and decrease flexibility for customers by locking them in to fully integrated systems and not being able to procure pieces of it at a time. Modular, universally adaptable components enable customers to build as they go and accommodate renters who may want to own part of their energy security but may need to take it with them in the future. Lastly, integrating inverters into critical load panels would lock and freeze technology development for the life of the load panel, not benefitting from advances in inverter power output, safety and other performance characteristics. Offboard inverters integrated within the BTM ZE mobile power sources allow consumers and ratepayers to benefit from the ongoing advances in inverter technology and reduction in costs over time.

8. *What would be the most strategic form of implementation for the next generation of critical/smart load panels?*

California has over 14 million units of existing housing stock. Installing dedicated pre-wired load panels inside existing structures is potentially invasive, expensive, and locks in circuit selection without a customer's ability to choose or change critical loads at a later date. Technology exists today that allows customers to island from the grid and then self-select which loads they want to keep operating, but many utilities do not accept the installation of these switches. Prioritization should be placed on making these technologies ubiquitous to enable back up for California's older homes. New home construction codes should require similar types of isolation devices, meter collar or similar solutions, 220/240V inlet power plugs, readiness for black start power from mobile batteries, and an ability to connect mobile batteries to existing rooftop solar so that the required solar installations on new homes are capable, at a minimum, of providing islanded power when grid outages occur.

9. *What is the current state of technology for portable battery storage systems that can serve as a direct replacement for portable diesel generators?*

    a. *What design considerations or modifications are necessary to allow the portable battery storage system to charge directly from the rooftop solar PV during a local grid outage with plug-and-play functionality?*

    The technology is commercially available today (TRL 8+) and in deployment via the CEC MORBUG program. Reference project recipient GRID Alternatives working with ONYX POWER and UC Riverside to serve three tribal communities in California with a combination of mobile batteries, mobile solar, and selectively installed transfer switches for flexible and on-demand whole home/building back-up as determined by the communities.

11. *What BTM renewable backup power technology is mature enough to move forward from pilot-scale (ARD) to technology demonstration-scale (TDD)?*

The ONYX Rhino and ONYX Manta are actively in use in the MORBUG project (supplied to GRID Alternatives as prime awardee). The ONYX Rhino and ONYX Manta are commercially available and ready to move to expanded statewide TDD (e.g. MORBUG "Phase 2").

12. *What applications or use cases might be the best fit or highest priority for achieving easily replicable solutions with maximum impact? For example:*

    a. *Multifamily housing and community centers.* **Yes, community centers.**

    b. *Emergency facilities in wildfire-prone areas.* **Yes**

    c. *Manufactured homes.* **Yes**

    d. *Critical loads in common areas affected by Public Safety Power Shutoffs.* **Yes**

    e. *Homes in under-resourced communities with outages higher than the utility average and/or that are subject to extreme heat conditions.* **Yes**

13. *What are the most significant barriers (technical, cost, design, permitting, etc.) to integrating BTM backup power in the various sectors (e.g., residential, rural) and use cases mentioned above? What unknowns can be illuminated through research? Please be as specific and concise as possible in your response.*

Please see responses above for further details.

14. *What factors need to be considered when deploying BTM generation at different climate zones and environments? How might technology solutions vary depending on the climate zones in which they are sited? What research is needed for modular, standardized BTM generation equipment to address the unique needs of California's various climate zones?*

BTM ZE products should be rugged and designed for outdoor use during rain and other inclement weather. These products should similarly be tested across multiple CA climate zones, even up to all 16 climate zones, to ensure proper environmental rigor.

15. *What are the most significant barriers to integrating BTM zero-emission backup power in under-resourced communities? What technology solutions or research areas could overcome these barriers?*

The most under-resourced communities are low-income, tribal, rural, and disadvantaged. These different communities face unique challenges and will need different types of project-based solutions. The Top barriers are the following:

- **Lack of awareness by the LIDAC and Tribal communities that BTM ZE solutions exist today, especially those funded by the CEC under the MORBUG program**
- **Lack of training and education to LIDAC and Tribal communities on the use of BTM ZE solutions versus generators.**
- **Non-existent rebates and incentives for the purchase of BTM ZE solutions; e.g.**
  - **SGIP applies to grid-tied batteries only, not mobile batteries**
  - **SCE offers higher ($200-600) rebates for gas and diesel generators versus portable battery electric ($150); thus, incentivizing fossil fuel use**
  - **Rebate eligible equipment lists for utility programs, such as SCE above, not including CEC-funded technologies from the MORBUG program**
- **Non-existent rebates for the rental of BTM ZE solutions on an as-needed basis**
- **Non-existent rebates for transfer switches, critical load subpanels, meter collars, and related "back-up power ready" home infrastructure.**
- **Inconsistent utility allowance for meter collar installations, such as Generlink and others, which could enable consistent, efficient, whole home back-up power readiness for any property with a meter.**
- **Potential lack of awareness by California and local Office of Emergency Services that BTM ZE power solutions exist today that could be deployed to communities during outages.**

ONYX POWER appreciates the opportunity to respond to this RFI and looks forward to working with the CEC in the future to advance the deployment of BTM renewable backup systems,

Best regards,

Aaron R Dyer
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