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Mainspring Energy Comments on Staff Workshops on Bulk Grid Connection & Distribution Connection 23-IEPR-04 & 23-IEPR-05

Additional submitted attachment is included below.

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May 30, 2023

California Energy Commission
Docket Unit, MS-4
Docket No. 22-RENEW-01
715 P Street
Sacramento, California 95814

Re: *Accelerating Bulk Grid Connection and Accelerating Distribution Grid Connection*
(23-IEPR-04 & 23-IEPR-05)

Mainspring Energy, Inc., ("Mainspring") files these comments in response to the California Energy Commission's Commissioner Workshops on Clean Energy Interconnection – Bulk Grid ("bulk grid workshop") and Electric Distribution Grid ("distribution grid workshop", and collectively "interconnection workshops"), held on May 4th and May 9th, 2023, respectively. Please note that these comments address both the bulk power and electric distribution system workshops simultaneously.

About Mainspring

Driven by its vision of the affordable, reliable, net-zero carbon grid of the future, Mainspring has developed and commercialized a new power generation technology —the linear generator— delivering local power that is dispatchable and can be powered using a range of fuels. Mainspring's linear generator offers a unique and highly flexible capacity and energy solution that simultaneously addresses the critical need of reducing greenhouse gas and criteria pollutant emissions, while also bolstering grid reliability and resilience.

Modular and scalable, Mainspring's linear generators can be deployed near load, either customer- or grid-sited. Full dispatchability and virtually no limits on daily starts/stops also allows linear generators to consistently follow load while also firming renewables, thereby facilitating the continued rapid adoption of renewable energy. Our local linear generators add resilience and real capacity to the grid while also providing enhanced flexibility to help avoid renewable curtailment.[1]

[1] For additional information on technical specifications and performance benefits, visit https://www.mainspringenergy.com/technology/.

I. Executive Summary

Mainspring thanks the California Energy Commission ("Commission") for the opportunity to provide comments on the workshops identifying barriers and solutions to interconnection in the electric bulk grid and distribution systems. Through these comments we recommend:

- California's energy agencies must urgently reform and accelerate the interconnection process, or risk missing state climate and reliability goals;
- Clean energy resources that are able to operate as grid-independent microgrids should be allowed to continue grid-parallel operation after interconnection;
- Linear generators offer a meaningful tool to reduce transmission and distribution ("T&D") costs while meeting California's climate and reliability goals.

II. Comments on the Workshops

A. California's Energy Agencies Must Urgently Reform and Accelerate the Interconnection Process, or Risk Missing State Climate and Reliability Goals

Mainspring applauds the Commission for convening two fulsome, engaging workshops coalescing a range of perspectives to discuss the immense challenge the current interconnection process poses for the rapid deployment of clean energy resources. Presentations and discussions across the two workshops duly demonstrated that accelerating and simplifying the interconnection process is fundamental to achieving California's aggressive climate goals while also maintaining a reliable electric grid. The impact interconnection challenges have is not decreasing; rather, California's energy agencies found that the state will need to bring 6 GW of new clean resources online every single year through 2045, which will further stretch an already strained interconnection process.[2] The breadth of these challenges is significant, and there are no simple solutions to fixing interconnection queues or rapidly building infrastructure in California. Nonetheless, reforming this process is essential not only to meet California's policy and reliability goals, but also due to the rapidly transforming market for clean energy assets across customer segments. The onset of electrification introduces another challenging hurdle; electric vehicle adoption is already two years ahead of schedule, and leading organizations throughout the state continue to procure zero-emission vehicles prodigiously.[3,4] An enormous amount of new capacity is needed to power these resources, which must be sited where demand dictates and be brought online extremely rapidly, necessitating an accelerated interconnection process.

Mainspring is relieved to see broad recognition of this central challenge. It was particularly positive to see the interagency participation during the workshops, in the form of dialogue across the California Energy Commission, California Public Utilities Commission ("CPUC"), and the California Independent System Operator ("CAISO"), alongside a wide range of utilities, developers, environmental advocates, and other key stakeholders, as collaboration is intrinsic to reforming interconnection. Many experts opined on the challenges of and potential solutions to the current state of interconnection throughout the workshops, and a number of useful solutions were proposed. Nonetheless, while it was heartening to see the conversation progress over the course of the two workshops, California's agencies must act decisively to ensure the road ahead does not remain mired in its current state. In collaboration with industry

[2] California Energy Commission & California Public Utilities Commission, "Joint Agency Reliability Planning Assessment SB 846 Quarterly Report and AB 205 Report", February 2023.
[3] Office of the Governor of California, "California Surpasses 1.5 Million ZEVs Goal Two Years Ahead of Schedule". April 21, 2023. https://www.gov.ca.gov/2023/04/21/california-surpasses-1-5-million-zevs-goal-two-years-ahead-of-schedule/
[4] California Energy Commission, "Total Medium- & Heavy-Duty ZEVs end of 2022 Q2". https://www.energy.ca.gov/data-reports/energy-almanac/zero-emission-vehicle-and-infrastructure-statistics/medium-and-heavy

stakeholders from the private and nonprofit sectors, the Energy Commission, the CPUC, and CAISO should continue to proactively work to reduce interconnection barriers on both the bulk grid and distribution side wherever possible, including by reducing interconnection study times and siting and permitting delays for much-needed infrastructure investments. Additional funding, streamlined review processes, and fostering increased staffing levels are all within the agencies' purview to reform interconnection. As acknowledged in the workshops, sweeping changes to interconnection are needed to achieve the clean grid California's agencies, environmental advocates, and clean energy businesses are working towards.

B. Clean Energy Resources that are Able to Operate as Grid-Independent Microgrids Should be Allowed to Continue Grid-Parallel Operation after Interconnection

On both the bulk grid and the distribution grid, a wide range of ready-to-deploy clean energy projects are held up in an interconnection queue despite their potential to offer valuable capacity, energy, and resilience. Mainspring strongly urges the Commission, the CPUC, and CAISO to develop a requirement that any clean energy project awaiting interconnection is allowed to operate as a grid-independent microgrid at the project site prior to interconnection, and be allowed to continue grid-parallel operation following interconnection. As demonstrated throughout the workshop presentations, clean energy projects often sit idle for years before interconnection can take place – despite being technically ready to provide meaningful local value. Furthermore, the volume of even current interconnection requests significantly outstrips the transmission capacity of the grid. It is essential that California's energy agencies make use of an enormous and growing pool of capable resources as the interconnection process is improved by siting resources locally to help reduce the total need for T&D infrastructure.

A key illustrative example is the mass adoption of light-, medium-, and heavy-duty EVs, which require a sizable amount of additional capacity in order to meet the significant load EVs represent – at a time when even our current grid strains to meet even existing demand. Currently, the timeline to interconnect these projects is multiple years, driven by supply chain constraints arising from the period needed to manufacture and deliver new appurtenant equipment such as switchgear and transformers necessary to serve this new load, the volume of interconnection applications utilities are receiving, and other factors. However, California cannot afford to wait for supply chain issues to be resolved, nor the interconnection process itself to be reformed, as the rapid adoption of EVs continues and accelerates. This is especially true for medium- and heavy-duty EVs that need significant additions in charging capacity (which require multiple megawatts for each charging station) and are often replacing diesel-powered trucks located in disadvantaged communities. Solutions in the form of distributed clean energy resources are available to immediately power EV charging stations that can operate as grid-independent microgrids before utility interconnection, and then serve as clean resilience and flexible load after utility interconnection takes place. Prior to utility interconnection, microgrids can provide immediate power to get charging infrastructure up and running, accelerating the timeline for vehicle electrification while front-loading the impact of improved air quality for disadvantaged and under-resourced communities. After interconnection, microgrids provide much-needed clean and resilient capacity to the grid while displacing the need for polluting diesel backup generators for use during extreme weather and grid events. Without clean resilience, basic services provided by the growing number of EVs come to a halt when there are grid outages.

Enabling clean energy resources to operate as microgrids prior to utility interconnection provides material benefits to the grid and local communities, which remain valuable once interconnection has taken place. Reforming the interconnection process will take time, but that should not preclude viable projects from providing localized value until interconnection has occurred. Mainspring urges California's energy agencies to unlock the full potential of clean energy resources both prior to and after interconnection.

C. Linear Generators Offer a Meaningful Tool to Reduce Transmission and Distribution Costs While Meeting California's Climate and Reliability Goals

Mainspring has developed and commercialized a new category of power generation, the linear generator, that delivers dispatchable, fuel-flexible electric power at low cost. As a modular and scalable technology, Mainspring's linear generators can be deployed in load pockets as a flexible capacity expansion solution with the ability to immediately generate electricity from a range of renewable fuels – including both 100% hydrogen and ammonia. Linear generators are capable of operating with the same operational efficiency as the cleanest fuel cells, while offering unparalleled fuel flexibility. Linear generators are fully dispatchable with fast start/stop and full load tracking capabilities from zero to full power output. They can quickly ramp up to satisfy demand spikes (or backfill tripped generation) on the grid, and can quickly ramp down to increase access for renewable overgeneration. Mainspring's linear generator addresses the critical need for greenhouse gas and criteria pollutant emissions reductions while maintaining reliability and resilience, which was demonstrated in the presentation provided by Henrik Larson in the distribution grid workshop as an integral part of the solution Prologis is deploying.[5]

As demonstrated well in Mr. Larson's presentation, Linear generators are a clean firm resource that accelerate vehicle electrification in the interim period before utility service upgrades can take place. Deploying linear generators enables rapid energization of EV charging infrastructure, immediately improving air quality (especially when replacing diesel trucks), while providing grid-independent microgrids. After utility interconnection, linear generators also provide demand response and peak load reduction, while adding valuable capacity to the grid, to rapidly drive locational and temporal value without significant transmission line additions. An essential facet of the value linear generators provide is fuel-flexibility: they can run on conventional fuels that are readily available now –including biogas– and seamlessly transition to zero-carbon fuels (e.g. clean hydrogen and ammonia) as they become available. This fuel flexibility requires no hardware changes to the generators themselves, accelerating the transition to a zero-carbon future.

The linear generator technology is modular, scalable and can be strategically deployed to meet the needs of California's energy supply, whether at a local level for a single customer or for an entire community. Linear generators may serve a large commercial customer's backup generation need (thereby avoiding diesel-fueled backup), represent a facet of a multi-resource microgrid, or provide a utility-scale solution to alleviate congestion constraints and add local resiliency; this modal flexibility coupled with sophisticated reclosing schemes enables linear generators to provide meaningful value to local load, as well as to the distribution and bulk grids. Further, full dispatchability allows linear generators to consistently match power output with the specific energy need, while integrating with, and firming, variable renewables such as solar and wind – thereby supporting the continued rapid adoption of renewable energy while bolstering resilience and avoiding unnecessary curtailment. This power-dense resource makes efficient use of space, enabling significant amounts of generation capacity while using small amounts of land, which overcomes a key land use challenge illustrated in the presentation given by Michael Colvin of the Environmental Defense Fund.[6]

Mainspring's products are UL-listed and have been operating at numerous sites throughout California and across the country. Applications include grocery stores, cold storage facilities, landfills, manufacturing, and food distribution centers, as well as being deployed as part of multi-resource microgrids. Further, linear generators are already improving air quality and providing resilient localized

[5] Larson, Henrik, Prologis. "Prologis at-a-Glance". May 9, 2023. Available at: https://efiling.energy.ca.gov/GetDocument.aspx?tn=250070&DocumentContentId=84788

[6] Michael Colvin, Environmental Defense Fund. "Growing the Grid - A Plan to Accelerate California's Clean Energy Transition". May 4, 2023. Available at: https://efiling.energy.ca.gov/GetDocument.aspx?tn=249974&DocumentContentId=84704

power to increase reliability where it is needed most, with nearly one third of deployed units already serving disadvantaged communities. Linear generators provide significant benefits to the electrical grid, maximize reduction of greenhouse gas emissions, and reduce air pollution in under-resourced communities, both behind- and in front-of-the-meter

This technology has already been recognized by the CEC in a number of settings, including the Clean Energy Reliability Investment Plan.[7] In addition to that report, linear generators have also been recognized in a study by the CEC for its application as a combined heat and power facility, as well as being a resource capable of participating in the Distributed Electricity Backup Asset and Demand Side Grid Support programs. Moreover, the CPUC has recognized linear generators as an eligible technology for participation in its Self Generation Incentive Program ("SGIP").[8] Mainspring appreciates the Commission and CPUC acknowledging linear generators as a resource in a number of proceedings and programs, and looks forward to continuing to deploy our technology to help California meet its climate and resilience goals.

III. Conclusion

Mainspring appreciates the opportunity to comment on these important workshops, and looks forward to continuing to collaborate in the future.

Sincerely,

/s/ Serj Berelson

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[7] California Energy Commission, "Clean Energy Reliability Investment Plan", p. 16. March 2, 2023.
[8] California Public Utilities Commission, "Self-Generation Incentive Program Handbook ". October 28, 2022. Available at: https://www.cpuc.ca.gov/-/media/cpuc-website/divisions/energy-division/documents/self-generation-incentive-program/2022-sgip-handbook-v4.pdf