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Mainspring Energy Comments on Industrial Decarbonization and Improvements to Grid Operations Workshop

Additional submitted attachment is included below.

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April 26, 2023

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

Re: *Industrial Decarbonization and Improvements to Grid Operations Workshop*
(23-ERDD-04)

Mainspring Energy, Inc., ("Mainspring") files these comments in response to the California Energy Commission's Industrial Decarbonization and Improvements to Grid Operations Workshop ("workshop") held on April 11, 2023.

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 enhancing 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]

I. Executive Summary

Mainspring thanks the Commission for the opportunity to provide comments on the Industrial Decarbonization and Improvement of Grid Operations ("INDIGO") workshop. Through these comments we recommend:

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

- Linear generators should be explicitly delineated as a technology to achieve industrial decarbonization;
- Fuel and operational flexibility, especially in the form of resources able to generate electricity from hydrogen, biofuels, and other clean fuels, are key attributes in achieving industrial decarbonization.

II. Comments on the Potential Solicitation

A. Linear Generators Should be Explicitly Delineated as a Technology to Achieve Industrial Decarbonization

Mainspring has developed and commercialized a new category of power generation, the linear generator, that delivers dispatchable, fuel-flexible electric power at low cost. Mainspring's linear generator offers a unique and highly flexible energy and capacity expansion solution that simultaneously addresses the critical need for greenhouse gas and criteria pollutant emissions reductions while maintaining reliability and resilience.

Linear generators are a clean firm resource that can increase reliability in grid-constrained locations by providing primary power, backup power, and complementing existing and forthcoming deployment of renewable energy through firming variable generation. Linear generators also provide demand response and peak load reduction, to rapidly provide 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 easily transition to low- or zero-carbon fuels (e.g. clean hydrogen and ammonia) as they become available. This fuel flexibility requires no hardware changes to the generators themselves, enabling a smooth transition to a zero-carbon future. Moreover, by using two moving parts, no lubricants, and avoiding reliance on scarce materials, linear generators represent a functional, reliable resource.

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. 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.

Mainspring's products are UL-listed and have been operating at numerous sites throughout California, including at grocery stores, cold storage facilities, landfills, and food distribution centers, as well as part of multi-resource microgrids. Further, linear generators are already improving air quality and providing resilient localized power to increase reliability where it is needed most, with nearly one third of deployed units already serving disadvantaged communities. Given linear generators' ability to provide significant benefits to the electrical grid, maximize reduction of greenhouse gas emissions, and reduce air pollution in under-resourced communities, the Commission should recognize linear generators as a distinct technology for any forthcoming INDIGO programs and solicitations.

This technology has already been recognized by the CEC in a number of settings, including the Clean Energy Reliability Investment Plan.[2] 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

[2] California Energy Commission, "Clean Energy Reliability Investment Plan", p. 16. March 2, 2023.

Support programs. Mainspring appreciates the Commission acknowledging linear generators as a resource in a number of proceedings and programs, and looks forward to continuing to deploy our technology to meet local needs and state climate and resilience goals.

B. Fuel and Operational Flexibility, Especially in the Form of Resources Able to Generate Electricity from Hydrogen, Biofuels, and Other Clean Fuels, are Key Attributes in Achieving Industrial Decarbonization

Mainspring is pleased to see the Commission pursuing industrial decarbonization through the deployment of advanced technologies. Both fuel and operational flexibility should be highly valued in evaluating and scoring projects that would significantly benefit the electric grid, and reduce GHG emissions.

1. Fuel Flexibility

The ability to use multiple fuel sources in the same technology without the need for hardware changes (i.e. fuel flexibility) should be recognized in evaluating and scoring potential INDIGO projects (as applicable to fuel-based technologies). Particularly in light of the recent proliferation of diesel and gasoline-powered backup generators, it is essential that the Commission appropriately value fuel-flexible technologies to prevent energy users from purchasing single-fuel resources that become stranded assets as technology, as well as energy, environmental (including air quality) regulations advance. Fuel-flexible technologies –particularly those that are operationally flexible as well (i.e., dispatchable)– represent the most prudent investment of taxpayer and ratepayer dollars, enabling operators to continue utilizing resources as cleaner fuels become available and as resiliency issues require, thereby maximizing cost-effectiveness. This is especially valuable as production of clean hydrogen ramps up (which the Commission is actively pursuing) as a means to increase and store renewable energy production. It is critical that the Commission appropriately value technologies able to use these fuels to enable California's evolution toward a cleaner grid.

2. Operational Flexibility

The Commission should value the ability of generation resources to start and stop quickly, and vary power output (load follow) to meet demand and firm renewables (i.e., operational flexibility). Mainspring urges the Commission to incorporate operationally flexible technologies that are capable of providing value on both the supply and demand sides (e.g. a single resource that can provide both primary power and demand response). A critical barrier to the effective deployment of operationally flexible resources is the narrow (and potentially anachronistic) use cases under which these resources are often studied and evaluated. Appraising generation resources on multidimensional value (i.e. value stacking), rather than solely on a single dimension (e.g. backup power, black start capability, etc.), enables and incentivizes new and innovative sources of clean firm power to provide as much value as possible, while also representing the most prudent use of taxpayer and ratepayer funds to drive improvements in both emissions and grid solvency.

Linear generators present one of the best options for customers and utilities to complement their variable renewables with an option that can be available at any time to meet the needs of the customer, without a significant land use requirement. Mainspring strongly recommends the Commission consider value stacking on both the supply and demand side when evaluating grants by incenting technologies that simultaneously provide multiple values (e.g. primary power, onsite solar firming, peak load reduction, and demand response) towards meeting INDIGO's goals of driving significant benefits to the electrical grid, maximizing reduction of greenhouse gas emissions, and reducing air pollution in under-resourced communities. California has established aggressive targets to combat the climate crisis and clean firm

power resources are essential to ensuring that greenhouse gas emissions reductions can be achieved without sacrificing affordability, year-round reliability, and multi-day resilience.

III. Conclusion

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

Sincerely,

/s/ Serj Berelson

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