DOCKETED	
Docket Number:	23-IEPR-01
Project Title:	General Scope
TN #:	253467
Document Title:	Mainspring Energy Comments on Draft 2023 Integrated Energy Policy Report
Description:	N/A
Filer:	System
Organization:	Mainspring Energy
Submitter Role:	Public
Submission Date:	12/1/2023 4:11:25 PM
Docketed Date:	12/1/2023

Comment Received From: Mainspring Energy
Submitted On: 12/1/2023
Docket Number: 23-IEPR-01

Mainspring Energy Comments on Draft 2023 Integrated Energy Policy Report

Additional submitted attachment is included below.

Mainspring Energy
3601 Haven Avenue
Menlo Park, CA 94025
mainspringenergy.com

December 1, 2023

California Energy Commission
Docket Unit, MS-4
Docket No. 23-ERDD-01
715 P Street
Sacramento, California 95814

Re: *Draft 2023 Integrated Energy Policy Report (23-IEPR-01)*

Mainspring Energy, Inc. ("Mainspring") hereby submits these comments on the Draft 2023 Integrated Energy Policy Report ("Draft IEPR") published on November 8, 2023.

<u>About Mainspring</u>

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 fuel-flexible. Mainspring's linear generator offers a unique non-combustion 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. Mainspring's inverter-based technology offers a full range of valuable grid benefits including fast (and unlimited daily) starts/stops, a wide dispatch range from minimum to maximum load, quick ramping, and in many cases on-site fuel storage which allows linear generators to firm renewables for short or extended periods of time, thereby facilitating the continued rapid adoption of a reliable renewable energy grid. Our locally-sited linear generators add capacity and resilience to the grid while also providing enhanced flexibility to help avoid renewable curtailment. Finally, by virtue of their modular size (20.5' x 8.5' x 9.5'), linear generators are space- and land-efficient and can be sited in load pockets – deferring expensive transmission & distribution investment.

I. Executive Summary

Mainspring thanks the California Energy Commission ("Commission") for the opportunity to provide comments on the Draft IEPR. Through these comments we assert:

- Efforts to rapidly deploy generating capacity necessarily must explicitly value fuel-flexible generation in the shift away from fossil fuels;

- Hydrogen –alongside other zero- and low-carbon fuels including clean ammonia and biogas– are an essential means of providing clean firm power for California's future grid;
- Locally-sited generating capacity accelerates adoption of, and provides essential resilience to, medium- and heavy-duty electric vehicles;
- Mainspring commends the Draft IEPR for focusing on interconnection issues and recommending improvements.

II. Introduction

Mainspring applauds the Draft IEPR's inclusion of specific recommendations California's energy agencies can take to provide adequate support to the transition to a grid of the future. Dispatchable, fuel-flexible, clean firm power is an essential part of that transition. Such resources, including Mainspring's linear generator, can be categorized as distributed energy resources ("DERs").[1] Adequate treatment of, and support for, clean firm DERs is especially important in meeting many of the goals, objectives, and targets outlined in the Draft IEPR. These comments provide recommendations for the Draft IEPR that should be considered and addressed in order to support clean firm DER resources.

III. Discussion

A. Efforts to Rapidly Deploy Generating Capacity Necessarily Must Explicitly Value Fuel-Flexible Generation in the Shift Away from Fossil Fuels

The Draft IEPR rightly recognizes that, "Rapidly electrifying large segments of the world's fourth largest economy while decarbonizing electricity supply will require sustained, record-breaking deployment of clean energy resources. Clean energy resources include grid-scale renewable generation and storage, as well as distributed energy resources (DERs) like rooftop solar and flexible loads like electric vehicle (EV) chargers…"[2] In making the progress necessary to achieve these appropriately ambitious goals, resource diversity, both technological and geographical, generally lowers total resource costs. It further underscores that, "Commercialization of cost competitive zero-carbon firm technologies could reduce overall system costs and decrease gas capacity retention."[3] Greater adoption of linear generators contributes to diversification of resources – especially considering the fuel-flexibility inherent in Mainspring's linear generator technology and the ability of these modular units to be easily located where needed.

The fuel-flexibility of Mainspring's linear generators provides essential benefits to both grid operators and end-use customers. The Draft IEPR notes that, "State agencies, gas utilities, electric utilities, local governments, and the private sector are advancing decarbonization efforts such as development of low-carbon fuels (including clean and renewable hydrogen), electrification, and renewable energy."[4] Linear generators can run on readily-available fuels today, such as renewable natural gas and biogas, and can transition to other low- or zero- carbon fuels (e.g., clean hydrogen and ammonia) as these become available – a reality much closer to realization with the recent announcement of $1.2 billion in funding for the Alliance for Renewable Clean Hydrogen Energy Systems ("ARCHES") hydrogen hub proposal in California. No hardware changes are required for a linear generator to switch fuels, enabling a smooth

[1] Mainspring's linear generator also has attributes consistent with multiple categorizations of resources, such as long-duration energy storage, back-up generation, behind-the-meter generation, renewable firming, electric vehicle charging infrastructure, and utility scale generation.
[2] Draft IEPR, p. 13.
[3] 2021 SB 100 Joint Agency Report at 103.
[4] Draft IEPR, p. 11–12.

transition to a zero-carbon retail electric supply. The ability to fuel-switch should be accounted for in CEC, California Public Utilities Commission ("CPUC"), California Air Resources Board ("CARB") and California Independent Service Operator ("CAISO") programs, models, and definitions. This can be achieved by, for example, enabling a resource to change its emission profile over time and assigning a higher resilience value to fuel flexible technologies when modeling resource profiles.

The activities covered under the Draft IEPR should also account for the cost savings associated with fuel switching. Investing in fuel flexible resources in the near-term will minimize replacement capital expenditure ("CAPEX") costs while ensuring uninterrupted power supply during the transition to meeting a 100 percent clean energy goal by 2045. Valuing fuel switching will allow timely adoption of renewable and zero-carbon fuels while continuing to rely on existing and already paid-for infrastructure – representing the most cost-effective investment for California ratepayers and taxpayers.

B. Hydrogen –Alongside Other Low- and Zero-Carbon Fuels Including Clean Ammonia and Biogas– are an Essential Means of Providing Clean Firm Power for California's Future Grid

The Draft IEPR notes "Adoption of clean and renewable electrolytic hydrogen for electric power applications should prioritize challenging applications such as long-duration storage that are challenging to accomplish with existing technologies."[5] Hydrogen, as well as hydrogen carriers such as ammonia, both of which can be utilized to provide long-duration energy storage, are essential building blocks for a clean, reliable grid. As the deployment of variable renewable energy generation increases in the form of solar and wind, these resources will need to be supplemented with dispatchable clean firm power in order to meet grid needs. This is rendered even more critical as extreme weather events become more volatile – forcing Californians to endure more frequent and longer grid outages. As the Draft IEPR captures, storing renewable energy in the form of hydrogen is a central means of ensuring a resilient, reliable energy system while meeting increasingly-stringent state climate goals. Clean hydrogen and ammonia can be used to supplement variable renewables across hours, days, weeks, and even seasons to mitigate both periods when solar and wind production are decreased (i.e. when the sun is not shining and wind is not blowing), as well as more damaging grid stresses.

Hydrogen is valuable across a wide range of applications, as demonstrated throughout the Draft IEPR – and especially in Chapter 2. Among the most important are commercial and industrial applications where high levels of reliability are of paramount importance (e.g. critical infrastructure such as medical facilities, cold storage facilities, data centers, etc.). These and similar facilities cannot afford long-duration outages; while a range of resources can provide short-term reliability, hydrogen is an essential tool for long-duration energy storage. This is further reinforced by California's efforts to electrify both buildings and transportation; during extended grid outages communities and businesses cannot afford to lose access to electric buses, garbage and drayage trucks, and freight movement that provide essential services. As electrification efforts take hold, communities relying on electrified infrastructure should not have to endure the status quo of being forced to rely on diesel backup generators that negatively impact air quality when the grid goes down.

Meeting state climate goals, local air quality requirements, and ensuring a resilient, reliable grid all require a form of long-duration renewable energy storage; clean hydrogen and ammonia are well-positioned to enable achievement across all these goals. Particularly in light of CARB's Advanced Clean Fleets Rule rule ("ACF Rule"), efforts to rapidly deploy fleet zero-emission vehicles ("ZEVs") at scale requires consideration of on-site clean resilience for use during grid outages; hydrogen-powered

[5] *Ibid.*, p. 73.

distributed generation is a useful tool to enable fleet operators to power fleets to continue serving their communities during outages. Finally, hydrogen can be made off-site and then transported to locations that need it (either by pipeline, rail, or truck), to either be used immediately or stored for future needs, thereby removing the constraints that hinder other forms of long-duration energy storage and enabling clean hydrogen and ammonia to be available wherever it is needed.

Biogas represents another essential opportunity to immediately utilize a low- and zero-carbon fuel to immediately decrease the carbon intensity of California's electricity generation fleet. In discussing the role of hydrogen, the Draft IEPR notes, "This analysis focused on clean and renewable hydrogen production via electrolysis and did not evaluate production from biomass gasification or reformation of biogas." Projects in the biogas sector (especially landfills, dairies, and wastewater treatment facilities) are particularly important in demonstrating the value of locally-sited clean dispatchable generation for a number of reasons. Many of these facilities produce much more fuel than can be used onsite (which is often flared when unused), representing a ready source of power that can be used to help meet peak demand on the system. While the production of hydrogen from biogenic feedstocks is a valuable pathway for the creation of hydrogen, biogas itself should be considered more broadly as a tool to generate electricity – especially given the criticality of the Draft IEPR's goal of increasing the volume of dispatchable generation from clean, renewable resources to maintain air quality and keep California on track to meet its climate goals. When linear generators use renewable fuels generated from organic waste –biogas, renewable natural gas, or hydrogen– they also help to comply with the requirements of SB 1383 (Lara, 2016) to reduce the most damaging climate pollutants known as Short-Lived Climate Pollutants. Utilizing biogas from these sources not only prevents biomethane from being flared, but directly utilizes it to generate renewable electricity for a range of uses – including EV charging, diesel backup generator replacement, and locally-sited distribution deferral.

C. Locally-Sited Generating Capacity Accelerates Adoption of, and Provides Essential Resilience to, Medium- and Heavy-Duty Electric Vehicles

Recent delays in the development of new clean capacity and the ongoing need to invest in older coastal power plants and diesel generation to ensure grid and local reliability make clear that California needs more options to meet state and local climate, air quality, and resilience goals. This is exemplified by the findings of the Joint Agency Reliability Planning Assessment, which highlights the need for up to 10,000 MW of additional capacity by the end of 2025.[6] As already discussed, it is essential that the Commission develop a diverse array of resources –including clean firm power– to ensure California's reliability needs are met while achieving the state's climate goals. This is particularly essential in meeting California's ambitious medium- and heavy-duty ("MDHD") ZEV deployment goals. Locally-sited generation, including linear generators, is essential in meeting these goals.

The increase in the volume of vehicles, charging infrastructure, and capacity needed to meet state ZEV goals is significant; the Commission has found MDHD ZEVs will require an "…about 109,000 depot chargers and 5,500 public chargers for 155,000 vehicles in 2030".[7] This represents an increase of 21,000% in just a nine-year period compared to the number of MDHD vehicles CALSTART determined as operational in California in 2021.[8] Electrifying the current MDHD fleet is particularly important as the majority of MDHD ZEVs will be replacing diesel-powered trucks operating in disadvantaged communities. The increase in MDHD fleet EVs necessitates a sizable amount of additional capacity at a time when our current grid

[6] Joint Agency Reliability Planning Assessment SB 846 Quarterly Report and AB 205 Report at 11. February 2023.
[7] California Energy Commission, "Assembly Bill 2127 Electric Vehicle Charging Infrastructure Second Assessment Staff Draft Report", p. 59. August 2023.
[8] *Ibid.*, p. 19.

strains to meet even existing demand. As demonstrated in the Draft IEPR, current utility timelines to install the capacity necessary to power and interconnect MDHD projects is multiple years, driven by supply chain constraints arising from the period needed to manufacture and deliver new appurtenant equipment (e.g. the switchgear and transformers necessary to serve this new load), the volume of interconnection applications utilities are receiving, and other factors.[9] However, California cannot afford to wait for supply chain issues to be resolved, nor the interconnection process itself to be reformed, in order to meet the ACF Rule as well as broader climate goals.

Deploying linear generators to immediately power EV charging stations enables fleet operators to meet CARB's ACF Rule (and California to meet its climate goals) and easily transition these generators to utilize hydrogen as a form of clean resilience. Linear generators can immediately power EV charging stations, operating as grid-independent microgrids before utility interconnection, and then serving as hydrogen-powered 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 and achievement of ACF Rule requirements, 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 during grid outages.

IV. Mainspring Commends the Draft IEPR for Focusing on Interconnection Issues and Recommending Improvements

The Draft IEPR underscores the reality that, "The Growing Number and Size of Projects Applying to Connect Overwhelm Existing Processes and Can Lack Adequate Capacity", and provides the key recommendation to, "Encourage strategies and technologies that allow more flexible service connections to the grid and maximize use of available infrastructure capacity"[10]. Mainspring agrees wholeheartedly that improving interconnection processes and timelines on both the transmission and distribution grids is essential – particularly given the significant load growth anticipated in the near future and the volume of resources needed to meet the state's growing capacity needs. As such, Mainspring applauds the Commission for highlighting this central impediment to the rapid deployment of clean energy resources. Allocating resources across agencies to address interconnection and permitting barriers is paramount in meeting state climate goals while building a resilient energy grid. This necessarily must include process improvements that increase both the volume of resources deployed and the speed with which they can actively bring their benefits to bear – a fact underscored by the significant focus on DERs and clean generation throughout the Draft IEPR. Interconnection improvements represent a foundational investment that will have knock-on effects in creating a more streamlined market for the full range of resources necessary to building the grid of the future.

V. Conclusion

Mainspring appreciates the opportunity to comment on this important report, and looks forward to collaborating in the future.

---

[9] Draft IEPR, p. 25.
[10] *Ibid.*, p. 4.

Sincerely,

/s/ Serj Berelson

Serj Berelson,
Senior Policy Manager, West
Mainspring Energy, Inc.
3601 Haven Avenue
Menlo Park, CA 94025
Email: serj.berelson@mainspringenergy.com