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Malta's comments on SB 100 scenarios workshop

Additional submitted attachment is included below.

November 14, 2023

Agency: California Energy Commission (CEC)
Docket No.: 23-SB-100
Subject: SB 100 Analytical Framework
Email: docket@energy.ca.gov

Re: Malta's comments on Joint Agency SB 100 Analytical Framework October 31, 2023 Workshop

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Dear California Energy Commission (CEC) staff and Joint Agency leaders,

Malta, Inc. (Malta) appreciates the opportunity to submit these comments following the Senate Bill (SB) 100 Analytical Framework Workshop held on October 31, 2023. In these comments, Malta provides our feedback and recommendations on the proposed analytical framework and scenarios for the 2025 SB 100 Report, which will establish a critical vision and roadmap of the various pathways to achieving 100% zero-carbon electricity by 2045.

Formed in August 2018, Malta is a privately held company that was spun out from X (Alphabet's "moonshot factory", formerly known as Google X) and that offers a long-duration pumped heat energy storage (PHES) system, providing energy storage capacity from 8 hours to 8 days. Malta's PHES system consists of commercially-available and proven technologies and equipment, with the innovation coming from the integration of these components. Malta's PHES technology combines and integrates various technologies commercially available today with a high degree of maturity from the power plant as well as the oil and gas industry and integrates them into a new high-temperature heat pump storage system as one of the few synchronous long-duration energy storage (LDES) technologies commercially available today.

I. INTRODUCTION & SUMMARY.

Malta appreciates this opportunity to comment on the proposed SB 100 analytical framework and scenarios, which will provide important insights on policies and actions needed to reach long-term decarbonization goals. Malta is generally supportive of the framework but offers the following comments and recommendations as the CEC staff refines the analytical framework and scenarios and subsequently develops the inputs and assumptions for the next round of SB 100 modeling:

- Reliability modeling should produce outputs that provide insights into the frequency, nature, and duration of loss-of-load events and risks.

- With a new model to be used in the state's planning processes, more detailed documentation should be provided on the model's capabilities, limits, and optimization engine.

- The Joint Agencies should leverage the CEC's LDES studies as a starting point for setting LDES minimum adoption levels and develop intra-day and multi-day LDES modules in the "Increased LDES" and "Combustion Retirement" Scenarios.

- The California Independent System Operator (CAISO) Local Capacity Technical Studies should inform the duration characteristics for the minimum adoption of LDES resources.

Additionally, in terms of next steps, Malta recommends that the Joint Agencies continue to engage stakeholders through workshops and smaller working groups to share more details on each of the scenarios and inputs/assumptions, after receiving comments in response to the October 31, 2023 workshop. Many details are still lacking and could benefit from refinement in collaboration with stakeholders.

II. MODELING APPROACH AND PROCESS.

Malta is generally supportive of the proposed modeling approach and process as presented at the workshop, though we encourage the Joint Agencies to share more detailed documentation on how the modeling and iteration process will be conducted. In conducting the reliability modeling, Malta recommends that the outputs not only include loss of load expectation (LOLE) but also produce metrics for expected unserved energy (EUE) and loss of load hours (LOLH). In doing so, grid planners, procurement entities, and suppliers will have more detailed insight into the nature of the reliability shortfalls and risks, as well as the attributes of resources to procure. To date, LOLE-based capacity shortfalls have been addressed by the manual addition of "perfect capacity" resources, which does not provide clear insights into the resource types that could actually be procured to address the need, especially considering no resource type is perfect. By employing EUE and LOLH metrics in addition to LOLE, it will better inform the type of resources that, in the case of energy storage, may differ by timing and duration of capacity services and seasonality of available renewable generation, among other potential factors. Such approaches would also better align with the slice-of-day (SOD) model used for the Resource Adequacy (RA) Program.

Furthermore, in moving from the RESOLVE model to the REGEN model, Malta seeks further documentation and clarification on the mechanics and characteristics of the new modeling tool, which will be used for the first time by the Joint Agencies. In our review of available documentation,[1] there are questions regarding the variation of the model used, such as the temporal granularity. Depending on the variation, the REGEN model uses either "segments" that presumably take a sample-day approach akin to the RESOLVE model or an 8,760-hour approach – parameters that could greatly influence the final results. For example, without an 8,760-hour approach, LDES resources with cycling and dispatch horizons across multiple days could be overlooked for the services that they could provide. Other key considerations should also be clarified, including the storage dispatch engine and whether and how attributes beyond load balancing will be modeled. In the workshop, Vice Chair Gunda raised the question of whether huge differences should be expected

[1] US-REGEN Documentation:
https://us-regen-docs.epri.com/v2021a/approach/overview.html#major-variations-of-us-regen

in using a different model, and staff responded that they are still unclear but expects similar results given similar inputs and assumptions. Unless the underlying differences are understood and publicly documented, stakeholders will be less able to interpret the modeling results and outputs.

III. MINIMUM ADOPTION LEVELS.

Malta strongly supports the Joint Agencies' proposed scenario framework, which will inform various strategies to achieve the state's 100% clean electricity by 2045 goal, including compliance with High Electrification scenarios across all cases. With more than 80% of the nameplate capacity between 2020 and 2023 coming from solar and battery storage resources, it is prudent for the Joint Agencies to look at scenarios involving resource diversification in order to maintain reliability across all hours, months, and seasons, mitigate deployment and consolidation risks, and consider cost efficiencies from a more diverse portfolio (*e.g.*, less overbuild and congestion). In particular, Malta is interested in the "Increased LDES" and the "Combustion Retirement" scenarios.

As Malta understands it, each of these resource-specific scenarios to assess diversity benefits will exogenously incorporate some minimum adoption of the resource type. Fortunately, the CEC has commissioned LDES studies to several contractors under the Electric Program Investment Charge (EPIC) Program, which has shed light on the role of LDES to address a number of future grid needs and use cases, including complete combustion retirement, system reliability through renewable droughts, and zero-carbon microgrids.[2] As a starting point, the scenario framework should, with certain modifications, incorporate the quantities and characteristics of the LDES selected in the EPIC project, which range from 11 GW of LDES in the SB 100 Economic Retirement Scenario and 22 GW in the Complete Gas Retirement Scenario. Considering this effort will use new modeling tools, it will have the added benefit of serving as reference benchmarks of the E3 modeling tool used in the current California Public Utilities Commission (CPUC) Integrated Resource Planning (IRP) proceeding.

In terms of modifications, since LDES is a diverse class of technologies with varying levels of minimum durations, roundtrip efficiencies, and cost structures, Malta recommends that the Joint Agencies create two modules for intra-day and multi-day LDES resources, similar to what was done by the Department of Energy (DOE)[3] and informed by the cost and performance metrics provided by the LDES Council, an organization representing the broadest cross-section of this resource class who could partner with the Joint Agencies to provide this information. Without having to model every technology type, these modules could set a minimum duration (*e.g.*, 10 hours and 20 hours) for these two LDES modules and allow for the incremental duration beyond these quantities to be selectable parameters by the capacity expansion model (*e.g.*, extending to 30, 48, 72, and 100 hours), given that most LDES technologies generally have the advantage of small marginal costs to extend duration. As such, the Joint Agencies will understand the benefits and balance of intra-day and

[2] "Staff Workshop on Long Duration Energy Storage Analysis." CEC. 9 May 2023: https://www.energy.ca.gov/event/workshop/2023-05/staff-workshop-long-duration-energy-storage-analysis
[3] *See* Appendix 2 of Pathways to Commercial Liftoff: Long Duration Energy Storage. DOE. March 2023: https://liftoff.energy.gov/wp-content/uploads/2023/03/20230320-Liftoff-LDES-vPUB.pdf

multi-day LDES resources, with the duration levels and trends over time being optimizable. If the use of modules and optimizable durations are not possible, the Joint Agencies should hold further discussions on the appropriate balance of each LDES technology or resource type.

In the Combustion Retirement Scenario, while supportive, Malta believes that more information and discussion is needed since it is not clear how the Joint Agencies will determine in advance the balance of different resource types (*i.e.*, DERs, offshore wind, LDES, hydrogen fuel cells) in setting minimum adoption levels. Depending on the combination, there is a level of substitutability among the resource types in some cases and complementary benefits in other cases. For LDES resources, some minimum adoption level between 11 and 22 GW should be considered.

IV. LOCAL RELIABILITY.

Malta supports incorporating local reliability modeling in this round of the SB 100 analysis. Since a good portion of gas resources provide local resource adequacy, the Combustion Retirement Scenario may not be achievable without consideration of local grid contingencies and charging requirements. Rather than separately modeling local reliability in SB 100's system-level analysis, there may be opportunities to incorporate constraints identified the CAISO's annual Local Capacity Technical Studies in terms of megawatts and discharge duration to replace existing local capacity resources at the same site.[4] For example, it could shape the characteristics of LDES resources (*i.e.*, minimum duration) when establishing the minimum adoption of LDES resources in either or both of the Increased LDES and Combustion Retirement Scenarios.

Furthermore, to the degree feasible, land-use considerations also play a role in the local reliability analysis since local capacity areas are likely too expensive or infeasible to overbuild renewables and battery storage or fit generation/storage technologies without efficient energy-land density (*i.e.*, kWh per square foot). Similar to land-use screens in place for solar and wind, similar screens would be ideally developed in optimizing generation and storage resources in local areas. At minimum, if such land-use screens cannot be developed, a qualitative assessment could be conducted to develop energy-land density metrics to inform combustion retirement planning and procurement guidance/actions.

V. CONCLUSION.

Malta thanks the CEC and the Joint Agencies for the opportunity to offer these comments and responses regarding the SB 100 analytical framework and scenarios. Please do not hesitate to reach out if you have questions or wish to discuss any of the comments or responses above.

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[4] *See* Table 3.1-3 of *2023 Local Capacity Technical Study: Final Report and Study Results*. CAISO. 28 April 2022: https://www.caiso.com/Documents/Final2023LocalCapacityTechnicalReport.pdf

Sincerely,

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November 14, 2023