

## **Attachment 1**

### **Technical Support Document: Potential Increase in Electricity Demand from Added Charging Requirements for Zero-Emission Small Off-Road Equipment under Proposed Amendments to the Small Off-Road Engine Regulations**

November 12, 2021

Prepared by staff of the Monitoring and Laboratory Division,  
California Air Resources Board

## I. Background

On October 9, 2021, Assembly Bill (AB) 1346, introduced by Assemblymember Berman, was signed into law. AB 1346 created Health and Safety Code section 43018.11 and requires the California Air Resources Board (CARB) to adopt cost-effective and technologically feasible regulations by July 1, 2022, to prohibit engine exhaust and evaporative emissions from new small off-road engines (SORE) produced on or after January 1, 2024, or as soon as the Board determines is feasible, whichever is later. The bill states that in determining technological feasibility, the Board shall consider, among other items, "Increased demand for electricity from added charging requirements for more zero-emission small off-road equipment." The transition of SORE equipment to zero-emission equipment (ZEE) will create a need for electricity for residential and professional users to charge the batteries used in their small off-road equipment.

AB 1346 was signed into law after the Initial Statement of Reasons (Staff Report) for the Proposed Amendments to the Small Off-Road Engine regulations (Proposed Amendments) had been finalized for public release. The Staff Report does not include a detailed analysis of the potential for increased demand for electricity from added charging requirements for more zero-emission small off-road equipment, as required by AB 1346. This Technical Support Document serves to support the rulemaking and comply with this requirement of AB 1346.

## II. Methodology

Demand for electricity was calculated based on analysis done for the Standardized Regulatory Impact Assessment (SRIA), a revised version of which was published on September 20, 2021.<sup>1</sup> In SRIA, the power of each equipment type included in the analysis is based on representative model data from manufacturers, reported on sales websites and through direct contact with manufacturers. The average load factor for each equipment type from the SORE2020 model was multiplied by the power, if the reported power did not already have a load factor applied.<sup>2</sup>

The analysis combined these data with an estimated mean use rate based on data from the Social Science Research Center at California State University, Fullerton survey regarding small off-road equipment ownership to estimate annual electricity consumption by ZEE.<sup>3</sup> SORE equipment and ZEE were assumed to have the same load

---

<sup>1</sup> CARB. 2021. Amendments to the Small Off-Road Engine Exhaust and Evaporative Emission Regulations Standardized Regulatory Impact Assessment (SRIA). Prepared by the staff of the Monitoring and Laboratory Division. September 20, 2021.

<sup>2</sup> CARB. 2020. 2020 Emissions Model for Small Off-Road Engines – SORE2020. Report prepared by staff of the CARB Air Quality Planning and Science Division. September 2020.

<sup>3</sup> CSUF SSRC. 2019. Survey of Small Off-Road Engines (SORE) Operating within California: Results from Surveys with Four Statewide Populations. May 15, 2019. Prepared by the Social Science Research Center (SSRC) at California State University, Fullerton (CSUF), for CARB and the California Environmental Protection Agency, under CARB Agreement 16MLD011.

factor and usage rate. SRIA Tables C-8 and C-9 provide the resulting annual energy consumption for current residential- and professional-grade ZEE. Total electricity consumption was calculated by multiplying annual consumption per equipment unit by the total population of equipment of each type in a given year under the Proposed Amendments and the Baseline Scenario and adding the electricity consumption for all equipment types.

Total electricity consumption for ZEE was then compared to statewide electricity consumption data from the California Energy Commission (CEC). The most recent historical year for which statewide consumption is available is 2020.<sup>4</sup> CEC also published projected electricity consumption for years 2020 through 2030 as part of its 2020 Integrated Energy Policy Report. The “mid electricity demand” forecast was chosen to match the choice of forecast gasoline and electricity prices used in SRIA.<sup>5</sup> Projections for the year 2030 were used for comparison for years 2030 through 2043. Electricity consumption will likely be higher from 2031 through 2043 than in 2030, since consumption is projected to increase each year through 2030.

### **III. Results and Conclusions**

Table 1 shows the estimated annual increase in electricity consumption as a result of the Proposed Amendments along with the total projected electricity consumption statewide from CEC. As more residential and professional users begin to use ZEE instead of SORE equipment, the demand for electricity is expected to increase. In 2035, under the Proposed Amendments, 93 percent of small off-road equipment subject to the SORE regulations would be ZEE, and there would be a 463 GWh increase in electricity consumption above the Baseline Scenario. This would amount to a 0.15 percent increase in the projected statewide electricity consumption for the year 2035. By 2043, when 99 percent of small off-road equipment subject to the SORE regulations would be ZEE, the increase in consumption would be 581 GWh above the Baseline Scenario, which is 0.18 percent of the projected statewide consumption for the year. Compared to historical electricity consumption the predicted 2043 increase in electricity consumption under the Proposed Amendments (581 GWh) equates to 0.21 percent of total statewide electricity consumption in 2020 (279,510 GWh). Because the estimated 2043 increase in demand for electricity from added charging requirements for more zero-emission small off-road equipment is a fraction of a percent of the statewide electricity consumption in 2020, CARB staff concludes it is

---

<sup>4</sup> CEC. 2021. California Energy Consumption Database: Electricity Consumption by County (GWh) in 2020. Microsoft Excel spreadsheet report downloaded on November 8, 2021, from the CEC online database available at: <http://www.ecdms.energy.ca.gov/>.

<sup>5</sup> CEC. 2021. TN 236983 California Energy Demand Forecast Update, 2020 - 2030 Baseline Forecast - Mid Demand Case for the State Planning Area, Corrected February 2021. Microsoft Excel spreadsheet report downloaded on November 3, 2021, from the CEC website available at: <https://efiling.energy.ca.gov/Lists/DocketLog.aspx?docketnumber=20-IEPR-03>.

technologically feasible that the increase in electricity demand due to the Proposed Amendments can be met by the current electricity infrastructure.

Based on these calculations, staff has determined that the Proposed Amendments are technologically feasible with respect to increased electricity demand from added charging requirements for more zero-emission small off-road equipment.

**Table 1. Annual statewide electricity consumption under the Baseline Scenario and the estimated increase in consumption under the Proposed Amendments.**

Year	Projected statewide electricity consumption <sup>6</sup> (GWh) under Baseline Scenario	Estimated increase in electricity consumption (GWh) under the Proposed Amendments	Estimated increase in electricity consumption under the Proposed Amendments as a percent of baseline statewide consumption
2023	290,951	0	0.00%
2024	296,266	21	0.01%
2025	300,233	57	0.02%
2026	303,975	96	0.03%
2027	307,223	134	0.04%
2028	310,499	174	0.06%
2029	313,795	224	0.07%
2030	317,217	274	0.09%
2031	317,217	320	0.10%
2032	317,217	362	0.11%
2033	317,217	400	0.13%
2034	317,217	433	0.14%
2035	317,217	463	0.15%
2036	317,217	488	0.15%
2037	317,217	509	0.16%
2038	317,217	527	0.17%
2039	317,217	542	0.17%
2040	317,217	554	0.17%
2041	317,217	564	0.18%
2042	317,217	573	0.18%
2043	317,217	581	0.18%

---

<sup>6</sup> Total projected electricity consumption from: CEC. 2021. TN 236983 California Energy Demand Forecast Update, 2020 - 2030 Baseline Forecast - Mid Demand Case for the State Planning Area, Corrected February 2021. Microsoft Excel spreadsheet report downloaded on November 3, 2021, from the CEC website available at: <https://efiling.energy.ca.gov/Lists/DocketLog.aspx?docketnumber=20-IEPR-03>.