

EXHIBIT F

Carbon Debt Analysis

I. Introduction

This exhibit analyzes the total amount of greenhouse gas (“GHG”) emissions, or carbon footprint, of the 0.999MW solar generation project (“Project”) located at 250 Carter Street, Manchester, Connecticut including all aspects of the project over its twenty (20) year life span.

II. Electricity Generated from Project

The Project will produce about 2,150 MWh of electricity during its first year of operation. In total, using the industry standard degradation value of 0.5%, the Project will produce roughly 40,997 MWh of electricity during its lifespan.

III. GHG Emissions of Project

According to the National Renewable Energy Laboratory (“NREL”), solar PV projects on average produce 43 grams of carbon dioxide equivalent per kilowatt-hour (“g CO₂e/kWh”) of electricity produced. *See Life Cycle Greenhouse Gas Emissions from Electricity Generation: Update*, National Renewable Energy Laboratory, p.3 (Sept. 2021). This is a cradle-to-grave average, accumulating all factors from resource extraction and construction to decommissioning and recycling. Using this average, the Project will produce roughly 1,763 metric tons of CO₂e during its 20-year life span.

IV. Comparing Project GHG Emissions to Natural Gas

The Project will most likely replace natural gas because natural gas is the largest energy resource in the State, making up 56% of Connecticut’s energy resource mix. (Solar power is 0.6% of the State’s energy resource mix.) *See Emission & Generation Resource Integrated Database (“eGRID”): Data Explorer*, US Environmental Protection Agency (“EPA”), <https://www.epa.gov/egrid/data-explorer> (last updated on Sept. 26, 2023). The U.S. Environmental Protection Agency states that the CO₂e emission rate for natural gas in Connecticut was 821.72lb/MWh in 2021, meaning that for every megawatt hour of electricity produced by natural gas, there were 821.72 pounds of CO₂e emitted. *Id.* At this rate, the average natural gas generator needs to emit 15,281 metric tons of CO₂e to produce the same amount of electricity as the Project (40,997 MWh). In other words, constructing the Project will create an 88.5% reduction in CO₂e emissions because the Project would only produce 1,763 metric tons of CO₂e versus the 15,749 metric tons from natural gas.

This reduction increases to 91% under a cradle-to-grave analysis. When including resource extraction, construction, decommissioning, and the entire project life cycle, an equally sized natural gas generator emits an additional 4,644 metric tons of CO₂e for a total of 19,925 metric tons of CO₂e. *See Life Cycle Greenhouse Gas Emissions from Electricity Generation: Update*, NREL, p.3 (Sept. 2021). The images below portray the GHG equivalencies of the Project, provided by using the US Environmental Protection Agency’s (EPA) Greenhouse Gas Equivalencies Calculator. *See Greenhouse Gas Equivalencies Calculator*, US Environmental Protection Agency, <https://www.epa.gov/energy/greenhouse-gas-equivalencies-calculator> (last updated July 2023). Again, the Project replaces about 18,162 metric tons of CO₂e, and in doing so, replaces the equivalent amount of CO₂e from the following:

18,162 Metric Tons of Carbon Dioxide (CO₂) equivalent

This is equivalent to greenhouse gas emissions from:

4,042 gasoline-powered passenger vehicles driven for one year ?



46,559,173 miles driven by an average gasoline-powered passenger vehicle ?



This is equivalent to CO₂ emissions from:

2,043,659 gallons of gasoline consumed ?



1,784,086 gallons of diesel consumed ?



20,344,227 pounds of coal burned ?



240 tanker trucks' worth of gasoline ?



This is equivalent to greenhouse gas emissions avoided by:

6,284 tons of waste recycled instead of landfilled ?



898 garbage trucks of waste recycled instead of landfilled ?



This is equivalent to carbon sequestered by:

300,310 tree seedlings grown for 10 years ?



21,659 acres of U.S. forests in one year ?



V. Conclusion

Overall, the net amount of GHG emissions avoided through solar production vastly outweigh the GHG emitted during the initial construction or eventual decommission of the Project, especially when compared to natural gas, the current largest source of electricity generation in Connecticut. This Project would emit roughly 1/10th of the CO₂e produced by an equivalent natural gas plant. In other words, a natural gas plant would emit over 11 times the CO₂e levels as the proposed Project to generate the same amount of electricity. As the EPA GHG Equivalencies Calculator illustrates, this reduction of CO₂e is equal to over 20 million pounds of coal, 4,000 gas-powered vehicles, and preserving almost 22,000 acres of US forests. This Project would replace natural gas production in Connecticut and reduce approximately 18,200 metric tons of CO₂e in the process.