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Title:

MEETING CALIFORNIA GREENHOUSE GAS EMISSION REDUCTION TARGETS WITH STATIONARY FUEL CELL SYSTEMS

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Abstract: (Your abstract must use **Normal style** and must fit in this box. Your abstract should be no longer than 300 words. The box will 'expand' over 2 pages as you add text/diagrams into it.)

We describe the role that stationary fuel cell systems (FCS) and different fuel cell types (SOFC, MCFC, PEMFC, PAFC) can play in meeting California's newly-legislated carbon dioxide (CO_2) emission reduction targets. As the 7th largest economy world-wide and the 12th largest greenhouse gas (GHG) emitter, California emits 22% of its emissions in the electric power sector. To comply with new legislation (The California Global Warming Solutions Act of 2006), the state must reduce its GHG emissions by 2010 to the 2000 levels, and by 2020 to the 1990 levels. Under the California Governor's Executive Order S-3-05, by 2050, the state must reduce its emissions to 80% lower than that of 1990 levels. Based on our analysis of complete historical CO_2 emission data, we quantify the expected reductions in CO_2 emissions with the introduction of stationary distributed FCS of different types. We generalize results for all world regions.

We quantify how stationary FCS can help meet California's CO_2 emission reduction targets. We identify complete historical data series for CO_2 emissions from electric power plants in California. Based on this complete baseline data, we describe historical changes in CO_2 emissions by region over time. We describe the best segments of the electricity sector to replace with FCS with the goal of reducing CO_2 emissions. We demonstrate this for different FCS types and for a given FCS design and control strategy. We evaluate the theoretical scenario of replacing large parts of the historical California grid with different types of FCS. We examine the hypothetical effect of replacing energy production from California power plants over a 15 year period (1990 to 2004) with that from FCS. We report the cumulative changes in CO_2 emissions over the 15 year period and identify the most appropriate market segments for installing FCS to mitigate climate change.

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