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The lunacy of Green Hydrogen

Considering during spring winter and fall, hundreds of gigawatt hours of carbon free generation are being curtailed and transferred to neighboring States. The enormous cost of curtailments and payment contribute to making electric service California one of the most expensive in the nation. There are thousands of boilers that burn natural gas to generate steam or hot water. Facilities with these "hard to decarbonize" boilers could inexpensively utilize green electricity to offset some if not all of curtailed and exported green electricity as there is presently plenty of spare grid capacity during non-summer months. Heating elements are commercially available with numerous suppliers.

Electricity for electrolysis that produces hydrogen is 70% efficiency or less. Utilizing hydrogen in boilers is no more than 78% efficient in boilers and 20 to 30% efficient in either gas turbine or linear generation of electricity. Elect resistance generation of steam is nearly 100% efficient.

Dumping otherwise curtailed or exported renewable electricity is a zero cost, far more expeditious and certainly more efficient alternative of spending $billions on green hydrogen and its needed infrastructure to accommodate the generation, storage and transfer of hydrogen, California could reduce hundreds of thousands of mTonsCO2 within a few short years if not earlier. In lieu of paying neighboring States upwards of 10c/kwhr to take over produced electricity and paying solar farms to curtail, the State could realize hundreds of thousands of CO2 mTons reduction by merely offering facilities with boilers zero cost electricity during periods of solar curtailment and export, which also corresponds to periods of low electrical demand.

Boiler owners and operators would realize a substantial ROI and quick paybacks by investing in electrification of a portion of the their boiler capacity with electric resistance elements. While electric elements provide only 3416btu/kw-hr, resistance heating design is ideally suited to quickly ramp or shut off which if remotely control via grid operators could substantial grid support benefits. Given that the electric to btu value is typically insignificant as compared to the overall btu requirement needed of boilers, and that most facilities have grid connected loads that are a small fraction that needed to fully electrify a boiler, the turning on and off of electric elements poses little or no consequence to a typical boiler operation. Nevertheless, electric resistance heating directly reduces carbon emissions. The use of the 839,000 megawatt hours of curtailed renewable solar generation alone in the month of April 2024 could had reduced CO2 emissions by over 152,000 mtons.

Reduce carbon now not later!