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Hydrogen Uses for Higher Efficiency and Lower Emissions

Recommendations for R&D Topics for 2021-22:
1. Industrial Boilers â€“ Natural Gas Fired: Use Hythane (10-20% Hydrogen in methane) for increasing efficiency and lowering emissions, using oxy-combustion or partial oxy-combustion.
2. Dual Fuel Electric and Gas Fired: Integrate natural gas fired industrial systems with excess power from renewables, such as solar and wind, and thus reduce natural gas use and associated emissions.
3. Waste Heat Utilization from Natural Gas Systems: Develop and demonstrate hybrid systems to upgrade waste heat to higher value hydrogen and electricity with CO2 capture.
4. Hybrid Energy Cycles: Increase efficiency of industrial operations by developing hybrid energy cycles to reduce natural gas use and reduce emissions. An example will be engine and fuel cell hybrids with a variety of configurations.
5. Waste Feedstock Characterization: Characterize industrial wastes in terms of solid, liquid and gaseous as a feedstock for additional Green H2 and RNG - thereby reducing natural gas use and emissions.
Policy Input: Production of methane and hydrogen from solid biomass waste is classified as Green. However, production of hydrogen from industrial gaseous waste streams does not currently qualify as Green. Today, the hydrogen from these waste streams is underutilized or wasted. Please evaluate this emerging option for meeting CA State mandates.
Strategy Suggestion for CECâ€™s Natural Gas Program: Coordinate procurements with DOE-AMO, DOE-FE, etc.

Additional submitted attachment is included below.

T2M Global

Public Comments in response to CEC Workshop on January 29th 2021 "FY 2021-2022 Proposed Natural Gas Research Initiatives"

From: T2M Global, Pinakin Patel, ppatel@t2mglobal.com, and Ludwig Lipp, llipp@t2mglobal.com, Burbank, CA 91501

Comment Title: **Hydrogen Uses for Higher Efficiency and Lower Emissions**

Role in This Proceeding: Public

Recommendations for R&D Topics for 2021-22:

1. **Industrial Boilers – Natural Gas Fired:** Use Hythane (10-20% Hydrogen in methane) for increasing efficiency and lowering emissions, using oxy-combustion or partial oxy-combustion.

2. **Dual Fuel Electric and Gas Fired:** Integrate natural gas fired industrial systems with excess power from renewables, such as solar and wind, and thus reduce natural gas use and associated emissions.

3. **Waste Heat Utilization from Natural Gas Systems:** Develop and demonstrate hybrid systems to upgrade waste heat to higher value hydrogen and electricity with CO_2 capture.

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