Micro-grids and beyond for the Cement & Mineral Industries

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The energy transition is accelerating under the general public pressure to fight climate change and thanks to continuous reduction in price of renewable energy, energy storage and decarbonation technologies (transition from carbon to hydrogen, CO2 capture, clinker substitution in cement, 100% AF firing).

The key word here is transition, meaning keeping but improving on the existing assets and infrastructures, as opposed to a revolution.

With billions being invested in these issues certain convergences are surfacing. This presentation will provide some insight to these fast changes and how they affect or rather how the cement industry could take advantage of this irreversible movement.

A Microgrid is defined as the combination of decentralized electricity production (from renewable energy, heat recovery or fossil fuels) with energy storage (thermal, chemical, mechanical) that can be either grid connected and / or operating as an islanded system. Hydrogen is now an additional option for energy storage but could also be used as a substitution to carbon-based fuels, especially “green” hydrogen produce by electrolysis as for each m3 of hydrogen produced ½ m3 of oxygen is also produced that could boost the combustion of low grade alternative fuels and increase production.

The presentation provides details of an industrial microgrid with about 2 MWp, installed on the rooftops of selected industrial workshops; a hybrid storage system made of a lithium-ion battery of 500 kVA/500 kWh, a Vanadium redox flow battery of 500 kW/1700 kWh and a Zinc-Iron hybrid flow battery of 400 kW/1320 kWh and a hot sulfur/sodium battery 200 kW/1,200 kWhr.

Several case studies of economically viable projects from California (aggregate plants) will be presented in order to emphasize the specific nature of each project: some that are mostly driven by local electricity production, some that are purely energy storage, ... and how these projects are developed, financed and executed. The importance of the legal framework will be outlined.

Specificities of the North American market will be outlined, with its low electricity cost but high demand charges, abundance of cheap natural gas, absence of a CO2 federal policy, myriads of utilities and local policies ... that energy storage/green hydrogen could alleviate,
The conclusion will review the main technologies currently available both for energy efficiency and microgrids and propose ideas of development for the longer term.