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Sahara trade winds to hydrogen: towards the development of large scale integrated sustainable energy systems

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Abstract

The trade winds that blow along the Atlantic coast from Morocco to Senegal represent one of the largest and most productive wind potentials available on earth. Because of the erratic nature of winds however, wind energy cannot be integrated locally on any significant scale unless a different, more integrated approach is considered. Because of the extremely limited, decentralized grid capacities of the countries located in the Saharan region ranging from a total of 30 MW in Chad to 280 MW in Senegal (Mauritania, Mali, and Niger being comprised in between), the author of the presentation is engaged in a broad ranging bottom-up capacity building strategy. The aim of this strategy is to develop integrated energy systems while enhancing local energy access alternatives relying on the region's knowledge centers, universities and industries where electrolysis applications can be relevant. Wind-electrolysis for the production of hydrogen enables large quantities of cheap generated wind electricity to be absorbed. This maximizes the renewable energy uptake in the weak grid infrastructures of the region. Creating synergies in enabling local industries to tap into widely available renewable energy sources, opens a realm of possibilities within the mining industries and the value added processing of raw minerals. The exports of these generate key incomes in regions most exposed to the consequences of climate change. Funded by NATO under mechanisms of the Mediterranean dialogue partnership, these project development activities are supporting an ambitious program aimed at tackling energy scarcity and sustainable development objectives through local synergies utilizing hydrogen energy technologies in centralized as well as decentralized remote applications. This combination is likely to take advantage of the significant breakthroughs expected to happen in the near future regarding hydrogen technologies particularly through its association with large sources of renewable energies. The reliance on the ability of public bodies such as universities and other institutions to concretize dynamic partnerships with the local private sector is key to the success of this program. While in its initial implementation phase this program coordinated by Sahara Wind Inc. is gaining momentum to highlight the possibilities for synergies that hydrogen technologies coupled with wind energy can provide when integrated to local industries.