



Green Hydrogen Production in MENA and its Export to Western Europe: Techno-Economic Assessment

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Introduction

The worldwide energy system stands at the threshold of a new era that will transform MENA energy economics. According to the motto "from dependence to diversification" and pushed by decarbonisation policies and low-carbon technology advancements, many natural hydrocarbon producers and exporters MENA countries are conscious about the potential impact of the global energy transformation, and they are undertaking similar economic reforms strategies towards less dependency on natural resources and more diversified economy. All the mentioned examples of the economic diversification strategies and key targets of MENA oil-exporting countries are showing the preparation for the post-oil era and are targeting less dependency on natural hydrocarbon resources, since oil rents will certainly decline over the next few decades. But given the depth and complexity of these topics, this work will restrict to only one example, which is the green hydrogen and its business development opportunities, then according the experts this could be an adequate alternative for many MENA countries to lay the foundation for a sustainable decarbonized economic growth and to ensure their continued major role in the world energy. The crude oil and natural gas reserves are ensuring for the MENA region its key strategic importance in the world economy. It is not that easy to replace in short-term the contribution of the gigantic crude oil and natural gas production figures to the GDP by small and medium-sized enterprises or even multinational corporations' revenues. Using systematically and increasingly renewable energies appear as a reasonable solution to reduce expensive and polluting refined liquid hydrocarbon products and free up oil production capacity and to ensure a better allocation of natural gas for the applications and end users that create the most value for the economies. The economic diversification strategies could enhance the MENA region's position as a major exporter and swing producer for the world and could also answer to the strongly increasing energy

demand in those countries. The population in MENA is growing very fast while the use of energy still highly inefficient in different application areas, due to low insulation quality of buildings to inefficiencies of cooling and heating technologies. The MENA region has amongst the world's best solar irradiance, which is a favourable condition for the deployment of renewable energy via solar power systems in both its technologies forms: solar photovoltaics and concentrated solar thermal.

The solar energy generation has a significance for the energy transition of the MENA hydrocarbon-driven economies. It is one of the global hotspots, and certainly one of the big growth areas within a global context. This potential has been early recognized by the European countries and DESERTEC large-scale initiative was an example, that aims to supply the EU-MENA region with sustainable, renewable, and low-cost electricity. In this paper a techno-economic analysis of green hydrogen production in MENA and its export to Western Europe will be carried out and different geopolitical scenarios will be taken into consideration*

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