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Climate Change and its Impact on the Energy Sector in the Eastern Mediterranean

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It is anticipated that the Eastern Mediterranean and Cyprus will be disproportionally and adversely affected by future climate change. Impacts of these changes include rising summer temperatures and decreasing annual precipitation thereby causing strains on the energy sector in the region. Increases in the frequency of heat waves and tropical nights will lead to rising demands for air-conditioning of private and public housing on the one hand and to growing water scarcity, which will have to be satisfied by additional seawater desalination, on the other, to name just two of the repercussions of climate change on energy demand.
Coping with these impacts will require additional electricity generation and will lead to enhanced energy demands. In the case of Cyprus, this will add to an already strained sector of the economy. The current electricity production is entirely based on fossil-fuel fired power plants. However, the use of conventional energy sources is clearly an undesirable option. It enhances the economic burden on energy consumers and at the same time increases Cyprus' dependency on external providers of hydrocarbon products. Moreover, it leads to growing emissions of carbon dioxide and thereby worsens Cyprus' already challenged greenhouse gas emission budget. While current emissions amount to app. 9.9 Mill. t of CO2, the total allowance according to EU regulations lies at 5.5 Mill. t.
Possible remedies, which will be relevant for other countries in the Eastern Mediterranean, as well include energy saving measures in the building sector and the use of renewable energy sources. With regard to sustainable building technologies, new and innovative building materials will have to be introduced. This includes advanced thermochromic materials based on nanotechnology techniques combined with phase change microcapsules, photochromic coatings able to present very high or low solar reflectance, chameleon coatings presenting very low emissivity and time varying reflectivity to the visible spectrum and multilayered coatings using nano-carbon tubes able to simulate any spectral performance in the visible spectrum, to name just a few.
The Eastern Mediterranean is among the most suitable location for the utilization of solar energy in Europe. A global direct normal irradiance of more than 1 800 kWh/m2 on Cyprus offers a renewably electricity potential of app. 20 to 23 TWh/yr when concentrated solar power (CSP) technology is employed. This paper will give more detail on possible adaptation strategies to climate change and will explore their possible synergistic potentials.