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Renewable Energies and Enhanced Energy Efficiencies: Mitigation/Adaptation Measures to Climate Change Impacts on Cyprus and in the Eastern Mediterranean

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The Eastern Mediterranean in general and Cyprus in particular are considered "hot spots" of future climate change. This will become manifest through an increase in the number and duration of drought events and extended hot-spells. The need to cope with the impacts of climate change will lead to enhanced requirements for cooling of private and public housing and growing demands for potable water derived from seawater desalination. This in turn will cause increasing pressures on electricity production and will result in additional strain on the energy sector in the region.

For Cyprus, 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 petroleum 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 about 9.9 Mill. t of CO2, the total allowance according to EU regulations lies at 5.5 Mill. t.

The current building stock on Cyprus lacks basic measures for energy efficiency. This is particularly noteworthy with regard to insufficient insulation of buildings, which causes significant amounts of energy to be expanded for cooling.

In light of these facts, an increased use of renewable energies and measures to enhance energy efficiencies in the built environment constitute important elements of a stringent and effective mitigation/adaptation strategy to climate change.

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 renewable electricity potential of app. 20 to 23 TWh/yr when concentrated solar power (CSP) technology is employed.

With regard to enhanced energy efficiency in buildings, new and innovative materials will have to be introduced. This includes advanced materials based on nanotechnology aimed to increase reflectivity and decrease heat absorption of external walls in order to reduce heat uptake by the building and thereby reduce cooling loads.

This paper will give more detail on possible mitigation/adaptation strategies to climate change and will explore their possible synergistic potentials. While focusing on Cyprus, the conclusions will be readily applicable to neighboring countries in the Eastern Mediterranean.