MODELLING AND COMPARISON OF CONTROLLED ENVIRONMENT AGRICULTURE SPACES USING BUILDING PERFORMANCE SIMULATION TOOLS

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ABSTRACT

Controlled Environment Agriculture (CEA) shows great potential in northern climates for year-round crop production, which can be implemented using stand-alone agricultural buildings (greenhouses, plant factories, container farms) or building-integrated agriculture (BIA) (rooftop greenhouses, BIA spaces with electric and/or natural lighting). Several factors can affect the performances of CEA spaces, which can be assessed using numerical models. Recently, Building Performance Simulation (BPS) tools have been used to assess the performances of different type of CEA spaces. In this presentation, a numerical modelling approach that includes crop growth is detailed and applied to a greenhouse and a container farm. The obtained results are then used to compare the energy consumption, the peak electricity demand, and the associated greenhouse gas (GHG) emissions of both spaces.