Radiant heating and cooling (RHC) systems are increasingly applied due to well-known technical advantages such as increased thermal comfort, space saving, and reduced energy use. The building sector is currently one of the largest consumers of fossil fuels; since there has been much concern on the energy use, many directives and legislations have been issued to deal with this problem. Although radiant systems provide remarkable energy savings, more effort is needed to fulfil the requirements stated by national and international standards and directives. Renewable Energy Sources (RES) are a suitable solution to tackle these issues, avoiding the use of finite fossil fuels and related geopolitical issues. Even though the ones commonly used in administrative and residential applications are mostly intermittent and have other limitations due to economical and regional variabilities, they provide temperature levels suitable for low temperature heating and high temperature cooling, which is a major characteristic of RHC systems.

Studies usually present solar panels and heat pumps (ground coupled, water-to-water, and air-to-water) coupled with radiant systems; however, this paper aims to analyse different combinations of radiant heating and cooling systems with renewable energy sources, in order to understand the limitations and possibilities. This study summarizes the recent trends in coupling RHC systems with RES, identifies the limitations and potential, and provides recommendations based on case studies. Results confirm that low temperature heating and high temperature cooling systems are a natural match for renewable energy sources, mainly due to the matching temperature levels required by RHC systems and provided by RES.