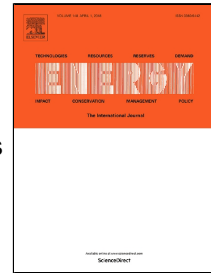


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Energy Performance and Operation Characteristics of Distributed Energy Systems with District Cooling Systems in Subtropical Areas Under Different Control Strategies



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1 **Energy Performance and Operation Characteristics of Distributed Energy Systems**  
2 **with District Cooling Systems in Subtropical Areas Under Different Control**  
3 **Strategies**

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13 **Abstract**

14 Distributed energy systems have been attracting increasing attention due to high  
15 efficiency and environmental friendliness. In subtropical and high density urban areas,  
16 district cooling system is regarded as an efficient alternative for cooling and  
17 dehumidification. Distributed energy systems integrated with district cooling systems  
18 (DES&DCSs) are supposed to be efficient energy supply options. However, the energy  
19 performance of such integrated systems is not sufficiently studied yet. To provide energy  
20 planning suggestions in these areas, this paper aims to investigate the energy performance  
21 of DES&DCSs under different control methods in detail. Annual hourly measurements of  
22 cooling and electricity loads of a campus are used. The energy performance of the  
23 DES&DCS is evaluated and compared with DCS and individual cooling systems which  
24 totally depend on the grid. The operation characteristics of the DES&DCS under four  
25 control strategies are analysed, as well as the impacts on the grid. Results show that the  
26 DES&DCS can be energy efficient in subtropical and high density areas. The energy  
27 saving is more than 10% and can be up to 19%. The control strategy following the  
28 cooling or electricity demand requiring more primary energy is recommended due to  
29 higher energy saving and more beneficial to the grid.

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