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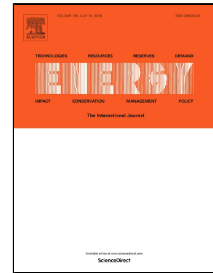
Improving wind power integration by a novel short-term dispatch model based on free heat storage and exhaust heat recycling

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# Improving wind power integration by a novel short-term dispatch model based on free heat storage and exhaust heat recycling

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## Abstract

Many wind farms in northern China have faced a worrying phenomenon “wind curtailment” during the heating seasons. The limited operating flexibility of combined heat and power (CHP) units is one of the major barriers to integrating wind energy. In this study, wind power integration is enhanced by using the free heat storage of the primary district heating network (DHN) and introducing extra heat pumps (HPs). A novel short-term dispatch model is proposed to minimize the total primary energy consumption (TPEC) of the district energy system (DES). After necessary linearization processes, the unit commitment problem can be solved efficiently and analytically by the interior point method. A test DES that contains a real large-scale DHN is utilized to verify the feasibility of the proposed dispatch model. In case studies, comparisons are made to evaluate the improvement of wind power integration and TPEC reduction under different operating scenarios. The results show that both heat storage utilization and electric HP introduction can reduce wind curtailment considerably, however, exhaust heat recycling has a better performance. In addition, using the existing heat storage of the primary DHN could reduce the TPEC of DES further even if electric HPs have already been used.

## Keywords

Combined heat and power; Exhaust heat recycling; Free heat storage; Short-term dispatch model; Wind power integration

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