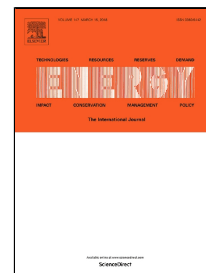


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# Introduction of new decentralised renewable heat supply in an existing district heating system

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## ABSTRACT

The effects of new heat pump and solar collector capacity in an existing district heating system are investigated by using Helsinki as a case study. Existing heat supply consists of combined heat and power plants, boilers and large-scale heat pumps. Also, the potential benefit of low distribution temperatures is evaluated. Both an outdoor temperature dependent supply temperature between 80-110 °C and a constant supply temperature of 65 °C are considered for distribution.

EnergyPro modelling tool is utilised, providing information on optimal operation of heat supply. Changes in heat supply are studied with emissions of the system and techno-economic performance of the new heat sources evaluated.

Results indicate that CHP based heat production is set to decrease 68-73 % by 2030. Heat pumps represent the most interesting option for heat supply with good performance on all economic, emissions and energy efficiency viewpoints. Low temperature distribution improves the performance of the system by 4 % in both costs and as emission reductions compared to normal distribution temperatures.

## KEYWORDS

District heating; heat pumps; solar collectors; combined heat and power; low temperature distribution; energy system modelling

## 1. INTRODUCTION

Heating and cooling related energy consumption within European Union (EU) had a share of 49 % in total final energy use in 2012 with renewable energy sources (RES) providing 18 % of the demand [1]. Reducing energy consumption and emissions of heating and cooling in buildings is one of the key issues if a low carbon energy system is to be achieved.

European Commission (EC) has already set a vision of decarbonising buildings sector. The actions to achieve this are renovation of old building stock, efforts on energy efficiency and renewable energy supported by decarbonised electricity production and district heating (DH).

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