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# 1 THE POTENTIAL ENERGY SAVINGS FROM RESIDENTIAL 2 PASSIVE SOLAR DESIGN IN CANADA

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## 8 **Keywords**

9 Passive Solar, Energy Modeling, Calibrated Simulation, Residential

## 10 **Abstract**

11 This study assesses the potential energy savings from passive solar design for new  
12 Canadian single-family dwellings across eight representative climate and population zones  
13 - Vancouver, Prince George, Yellowknife, Edmonton, Winnipeg, Toronto, Ottawa and  
14 Halifax. Eight passive solar design scenarios applied to two house designs were analyzed  
15 in terms of (i) reducing annual HVAC energy consumption and (ii) solar heating fraction.  
16 A calibrated model of the Canadian Centre for Housing Technology Twin Houses was  
17 developed using EnergyPlus and provided the simulation platform for this research. The  
18 results show that with basic passive solar design measures, solar gains contribute a  
19 considerable fraction of a typical single-family dwellings heating requirements in cold  
20 climates such as Canada (21 to 32%) with optimized passive solar designs attaining  
21 significant higher percentages (32 to 74%). This is generally higher than other similar  
22 studies. Based on the results very large solar fractions can be achieved with optimized  
23 passive solar design. The results of this study have relevance to individual building design  
24 as well as planning decisions regarding density and urban design.

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