Group 11 - Efficient Home Insulation_ Reduce Your Energy Bills and Carbon Footprint.pdf

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Submission date: 14-Mar-2023 01:26PM (UTC-0400)

Submission ID: 2037139879

File name: Group_11_-_Efficient_Home_Insulation__Reduce_Your_Energy_Bills_and_Carbon_Footprint.pdf (80.3K)

Word count: 993

Character count: 5598

Efficient Home Insulation: Reduce Your Energy Bills and Carbon Footprint

I. Introduction

Due to Canada's cold climate, insulation is critical for homeowners as it reduces energy consumption, costs, and greenhouse gas emissions [1], [2]. Inefficient home insulation often arises from outdated or poorly installed insulation materials, leading to energy waste that impacts climate change. This report proposes a solution to address the issue of inefficient home insulation and promote sustainable development goals (SDGs) in Canada.

II. Problem Description

Poor insulating materials lead to energy waste and impact climate change. Notably, fibreglass and mineral wool have several issues that can lead to energy consumption and high heating costs. For instance, fibreglass insulation can lose up to 40% of its insulating ability when exposed to moisture [3], a common issue in areas with high humidity levels. Mineral wool can also lose up to 30% of its insulating ability due to inadequate installation or gaps between insulation batts [4].

III. Problem Solution

Expanded polystyrene (EPS), extruded polystyrene (XPS), and polyurethane foam (PUF) are insulation materials that provide improved insulation and are more resistant to moisture and air leakage. For instance, EPS has a thermal resistance (R-value) of 3.6 per inch [5], which is higher than fibreglass insulation. With an even greater R-value of 5 per inch, XPS is an ideal choice for colder regions. Insulation made of PUF may close cracks and stop air leaks, improving insulation and energy efficiency.

Using EPS, XPS, and PUF materials can save energy expenditures and heating bills for Canadian homeowners while simultaneously advancing goals for sustainability [6]. Homeowners can increase comfort and energy efficiency by utilising insulation materials with higher R-values and improved moisture resistance, which is beneficial for both new and old homes.

IV. Geographical Scope

Due to the unique needs and challenges caused by Canada’s cold climate, the specific geographical scope of our project is Canada. The harsh winter weather leads to high energy consumption and heating costs, making efficient home insulation a critical need for Canadian homeowners. Additionally, Canada has established building codes and standards that mandate specific levels of insulation for homes [7], [8], making it an ideal market for improved home insulation systems. By focusing on the Canadian market, it is possible to provide targeted solutions to the specific insulation needs of Canadian homes and help Canadian homeowners reduce their energy consumption and costs while promoting SDGs.

V. SDGs

The home insulation system outlined in the present study addresses the UN’s SDGs of clean energy and climate action [9], [10]. By reducing energy consumption and promoting the use of sustainable materials, such as recycled insulation, the product proposed in this study can help to reduce carbon emissions and support responsible consumption and production [11]. Moreover, the project's focus on promoting sustainable development aligns with the UN's broader goals of ensuring a sustainable future for all.

VI. Conclusion

The solutions to inefficient home insulation in Canada outline in this proposal promote the use of EPS, XPS, and PUF materials that meet the thermal or acoustic insulation standards required by building codes in different regions. It is also vital to develop specific improvements to existing insulation materials by promoting the use of sustainable and recycled materials, reducing carbon emissions, and promoting responsible consumption and production.

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