University of Windsor
Faculty of Engineering

Home Insulation System

Assignment 1: Project Problem Description

Section: 4

Project Team: 11

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Problem Description

One consumer product that can be modified or improved to address two of the United Nations Sustainable Development Goals (SDG) is a home insulation system. By insulating the home, the user can reduce their energy consumption and save on winter heating costs. The product material helps to reduce emissions and promote sustainable development goals such as clean energy and climate action. Additionally, the insulation system can be designed to use sustainable materials such as recycled insulation, helping to promote responsible consumption and production goal. With a few minor modifications, this product can help to improve life during the winter months in Canada while also helping to promote sustainable development goals.

Problem Solution

Reducing energy usage in homes and ensuring comfort during cold weather can be achieved through effective home insulation. One solution is a house wrap, which prevents wind from entering the home when installed on the wall sheathing. In Canada, insulating materials sold have an RSI value or R-value, which measures the material's resistance to heat loss and effectiveness as insulation. The Canadian construction market supplies a wide range of insulating products, including fibreglass, mineral wool, cellulose fibre, expanded polystyrene, extruded polystyrene, rigid fibreglass, polyisocyanurate, pulverised cellulose, polystyrene, and polyurethane. Building codes in different regions require compliance with thermal or acoustic insulation standards. The use of modern insulation materials has the potential to provide comfort in both new and older constructions [1].

Geographical Scope

There are three key issues to consider with regard to geographical scope. First, for a home insulation material project in Canada, the deployment location could be the entire of Canada which solves the need for cost-effectiveness and energy efficiency. Insulation is critical for maintaining indoor temperatures and reducing energy consumption. Second, the availability of funding and incentives for energy-efficient projects, which could influence the deployment location and more extensive customer engagement. For example, if government programs or rebates are available in certain regions/provinces, this could make those areas more attractive for deployment and encourage customers. Lastly, the deployment location could also be based on a robust construction industry and a demand for energy-efficient buildings. For example, cities with a high population growth rate, such as Vancouver or Toronto, could be targeted for deployment as there is a greater demand for new, energy-efficient homes and buildings.

Relation to Sustainable Development Goals by United Nations

Home insulation materials are an essential component in promoting sustainable building practices and reducing the built environment's impact on the environment [2]. By reducing energy consumption in buildings, insulation materials play an essential role in achieving the sustainable development goals of clean energy and climate action.

Proper insulation helps to maintain a stable indoor temperature, which reduces the need for heating and cooling systems to work as hard. This material leads to a reduction in energy consumption and greenhouse gas emissions. For example, insulating a building's walls, roof, and floor can reduce heat loss by up to 70%, making the building much more energy-efficient. This results in lower energy bills for the occupants and a reduced carbon footprint, helping to mitigate the effects of climate change.

In addition to reducing energy consumption, home insulation materials also improve indoor air quality by reducing the number of pollutants that enter the building. It is because poorly insulated buildings are more likely to experience air leaks, which allow outside air to enter and potentially bring in pollutants. By sealing these air leaks and improving the overall insulation of the building, the indoor air quality is improved, making the living environment healthier for its occupants.

Furthermore, home insulation materials also contribute to the circular economy, as they are typically made from renewable resources such as cellulose, fibreglass, or recycled materials. It reduces the dependence on finite resources and promotes sustainable materials. Additionally, the durability and long lifespan of insulation materials make them a sustainable choice, as they can last for many years without needing to be replaced.

Overview of United Nations Sustainable Development Goals 7 & 13

The SDG 7 - Affordable & Clean Energy aims to:

- provide affordable and clean energy for all;
- extend access to electricity and clean cooking fuel universally (around 789 million people have no access to energy, and roughly 2.8 billion people lack access to clean cooking) [3];
- increase the share of renewable energy in the global energy mix (currently 11%) [4];
- improve financial flows, global cooperation, technology exchange, and infrastructure research and development.

The SDG 13 - Climate Action aims to:

- strengthen efforts to combat climate change, including by enhancing international cooperation;
- integrate climate change measures into national policies, strategies, and planning [5];
- improve education, awareness, and human and institutional capacity on climate change mitigation, adaptation, impact reduction, and early warning [6][7];
- enhance scientific knowledge, technologies, innovations, and practices to address climate change;
- increase investment in and access to financial resources and technology transfer to support action on climate change;
- encourage the participation of all relevant stakeholders, including civil society, the private sector, and local communities, in addressing and responding to climate change.

Conclusion

In conclusion, using home insulation materials is essential in achieving the sustainable development goals of clean energy and climate action. By reducing energy consumption, improving indoor air quality, and promoting sustainable materials, insulation materials play a crucial role in building a more sustainable future.

References

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