

White Paper
Thermal Insulation Coating
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Executive Summary

Energy consumption is increasing faster than population growth.

As more developing countries seek to improve their standard of living, so more energy will be consumed.

Increased energy consumption increases the levels of Carbon Dioxide emitted into the atmosphere, thereby adding to the greenhouse effect.

The end of fossil fuels may happen at the end of the 21st Century.

Renewable energy is still developing so we must all find ways to improve energy efficiency.

Blocksil, a coatings innovator, has a new product called Therma-Light[®] which can save energy, both directly and indirectly.

Therma-Light can be used as a spray coating or as an additive to building plaster, thus making it an attractive proposition worldwide.

Therma-Light is water based, is not classed as either environmentally or physically hazardous and is safe for international transport.

Business Challenge

Amongst the many challenges facing the world in the early 21st Century is that of energy consumption and, by association, energy efficiency.

Between the years 1900 and 2000 the world's population grew from some 1.5 billion to 6.1 billion ¹, an increase of over 300%.

In the same time period global primary energy consumption increased from approximately 11,000 TWh (TeraWatt hours) to approximately 108,000 TWh ², an increase of nearly 900%.

Thus global energy consumption has increased three times faster than the population. And energy consumption doesn't just grow with population growth – as living standards around the world increase so does energy consumption.

In 2015 it was reported ³ that 18% of total global energy use is provided by electricity. Around 40% of this electricity is still generated by coal, while just over 20% comes from renewable energy sources.

Renewable energy sources are being developed and their efficiency improved on an ongoing basis. There is some belief that by the middle of the century, some 40% of the world's electricity could be powered by renewable energy sources ⁴. But that still leaves a huge amount of energy creation from non-renewable sources, which, by their very definition, have a finite lifespan.

By calculating the amount of fossil fuel consumed and taking into account known reserves ⁵, one could suggest that fossil fuels will run out before the end of this century.

Clearly there is a large and immediate need to make our current energy creation and consumption more efficient.

How can Blocksil, a UK based coatings innovator, help?

Solution

As a coatings innovator, our philosophy is to create simplicity from complexity.

If we accept that the population of the world and its energy demands will continue to grow and that the finite energy sources will be exhausted this century, then we have an obligation to do everything we can to develop systems and processes to make ourselves more energy efficient.

Blocksil has taken this challenge onboard and has developed a thermal insulation coating. We call it Therma-Light.

The coating improves energy insulation efficiency and reduces energy costs with a low thermal conductivity of only 0.032 W/mK. This figure is equivalent to most conventional insulation products but with the added benefit that the coating does not take up moisture. An issue with conventional insulation products of the fibrous variety is that if they get wet, their thermal efficiency plummets. And Therma-Light provides personal protection to the ASTM 1057 skin touch test.

The Therma-Light coating acts as a thermal barrier, protecting interior temperatures against cold, hot and humid exterior temperatures, and vice versa.

A liquid, the coating is typically sprayed onto parts needing insulating though could be brushed on.

Typical components that could be coated include process pipework (hot and cold), storage, mixing and pressure vessels, heat exchangers and air conditioning units, and boilers and refrigerators. It is further possible to overpaint the Therma-Light should the component need identification marking.

Therma-Light can also be used as a liquid additive to plaster prior to application on a wall. The addition of Therma-Light would reduce cracking of the plaster during curing through its inbuilt flexibility which in turn would mean fewer man hours to carry out the plastering.

It would also improve the wall's ability to retain internal heat and keep out external heat, so reducing the levels of central heating or air conditioning. Air conditioning and refrigeration is a big user of energy, whether household, commercial or industrial.

Three-quarters of all homes in the United States of America have air conditioners ⁶. Air conditioners use about 6% of all the electricity produced in the United States, at an annual cost of about \$29 billion to homeowners. As a result, roughly 117 million metric tons of Carbon Dioxide are released into the air each year.

For plaster, Therma-Light would mostly replace the water in the plaster mix, so use of Therma-Light would be very straightforward and application of the plaster would still be by trowel.

This ability to be used within something as common and as simple as building plaster makes Therma-Light unique. It also enables Therma-Light to be used worldwide with no training, so making it ideal for developing countries to benefit from Therma-Light treated plaster's energy saving properties.

Target Markets

Industries that could use Therma-Light and help reduce their energy consumption include:

- Aerospace
- Automotive – commercial and private vehicles
- Buildings – commercial, industrial and domestic
- Construction
- Oil & gas – on and off shore
- Railway
- Utilities

Countries that could use Therma-Light - worldwide.

Benefits

- Can be overpainted
- Easy to use
- Excellent thermal conductivity
- Huge range of potential applications
- Quick drying
- Time saving

- Unlimited overcoating of the Therma-Light when used as a coating
- Very lightweight
- Very low Volatile Organic Compound (VOC) levels
- Water based
- White or light grey in colour, so ideal for plaster or overpainting
- Worldwide uses

Technical Specifications

- Apply as a coating by specialist spray equipment or by brush
- Eggshell finish when used as a coating
- Maximum thickness as a coating is 30mm
- Minimum thickness needed as a coating is 3mm
- Not classified as an environmental hazard
- Not classified as a physical hazard
- Not covered by international regulations on the transport of dangerous goods
- Not flammable
- Nominal 84% volume solids
- Specific gravity of approximately 0.5 kg/l
- Thermal conductivity of 0.032 W/mK
- Theoretical coverage of 0.84 square metres per litre at 1mm thickness

Summary

By using Therma-Light both our clients and the world at large will benefit from improved energy saving.

The lightweight nature and lack of transport restrictions mean that every country in the world can take delivery of Therma-Light at minimal transport cost.

For specific industry applications, where Therma-Light is applied as a coating, the energy savings will sometimes be perhaps less obvious. For example, if Therma-Light is used as thermal insulation within a passenger aircraft, its lightweight nature would mean there would be reduced fuel usage (every kilogram of weight typically requires five kilograms of fuel) which in turn means a reduction in fossil fuel usage and hence a reduction in Carbon Dioxide emissions.

Therma-Light is truly a coating or additive that can help reduce global energy usage both directly and indirectly.

References

- 1 World Population Growth, Max Roser and Esteban Ortiz-Ospina.
- 2 Energy Transitions: Global and National Perspectives, Vaclav Smil 2017.
- 3 Shell Sustainability Report 2015.
- 4 International Energy Agency.
- 5 CIA World Factbook.
- 6 US Department of Energy.