

Insulation Paint

By Gunter Pauli

This article introduces a creative approach to painting inner and outer walls as one of the 100 innovations that shape "The Blue Economy". This article is part of a broad effort to stimulate entrepreneurship, competitiveness and employment.

The Market

The world market for insulation materials reached in 2009 just under 37 billion dollars. Demand is expected to grow annually with 4.6 percent until 2014. The Chinese market is advancing at the highest pace of all nations with 8.2 percent expansion of sales per annum, increasing to 24 billion Yuan, or 3.6 billion dollars in 2010. The US market continues to increase with a healthy 7.4 percent growth in sales to 7.1 billion in the same year. The European market, which had already invested heavily in insulation thanks to government tax incentive programs over the past decades, is rather flat.

The two leading insulation products on the market, foam plastics and fiberglass represent 75 percent of worldwide sales. However, the fastest growing new product is cellulose derived insulation. Numerous start-up companies like Termoträ in Sweden started over two decades ago to recycle waste cellulose from the pulp and paper industry, converting the short fibers that do not meet the minimum size for paper making into a natural and dry insulator that is easy to install. Whereas the production and material cost of the insulation is always a key factor influencing its competitive position on the market, the ultimate price is determined by the cost of installation. Industry invests in reducing labor input, increasingly opting for prefabricated insulation.

The insulation value of materials differs greatly. Thermal resistance is measured as the R-value, expressed as the thickness of the material divided by the material conductivity. The most efficient insulation on the market is the Barrier Ultra R, produced by Glacier Bay which at R-50, has ten times the insulation value of polyurethane foam. It is made with aerogel, a gel where the liquid has been replaced by a gas. Actually the performance is so well documented and convincing, that the makers offer a full 25 year warranty.

The Innovation

The search for new, healthy and sustainable insulation material has brought numerous innovations to the market recently. Since fiberglass permits molds to proliferate, and spray-in foams could be off-gassing chemicals for years, the quest for new materials even put recycled denim jeans as an insulator on the market. Cotton batts made from old jeans perform as good as fiberglass. Fire retardants used in insulation represent a critical component (See Case 16) in steering the industry towards health and sustainability. However, the major challenge faced by insulation materials of all types is their bulkiness. The material requires large volumes of space, thus limiting its applicability.

Tatsujiro Ishiko, President of Nissin Sangyo Corporation observed the development of highly efficient insulation materials based on silica (ceramics) by the Japan Aerospace Exploration Agency (JAXA), the equivalent to NASA from the United States. Scientists blent different shapes of micron sized beads of silica (80%) with a traditional paint (20%), makes them float on top creating an innovation from "space" at competitive material and labor costs. Painting both the inside and outside with this "bead paint" improves insulation. The outside reflects solar heat, and the inside prevents loss of cooled air. In the winter the reverse happens: these silica-beads spread as paint prevent the chill to come inside, while it prevents the loss of the warmth to the outside. Ishiko-san licensed the technology for commercialization beyond the aerospace industry from JAXA and created the brand name Gaina.

Ishiko-san noted that the cool air from AC-equipment quickly creates a cold cover all over the painted inside, improving the sensory temperature which is calculated as the temperature on the wall and temperature of the air divided by two. We often neglect that the energy is predominantly consumed exchanging heat or coolness over the walls. If the sensory temperature could drop one degree in the summer, or raise one degree in the winter, then according the scientific research of the Tokyo Electric Power Corporation (TEPCO), one degree temperature difference is equivalent to 10 percent energy savings. This innovation, based on simple physics permits to convert paint into an easily applied insulation material, turning it into a multi-functional product. This is one of the core principles of The Blue Economy.

The First Cash Flow

The first successful application is in housing and construction industry. This double envelop saves 30 percent energy in the summer and 20 percent in the winter, basically eliminating the need for insulation material. It all comes down to choosing a smart type of paint. While the paint, originally manufactured in Japan was more expensive than the standard on the market, a new production facility soon to come on stream will drive the cost of production down offering a unique selling proposition to home owners who basically get their insulation while painting the house.

The Opportunity

One of the breakthroughs of this innovation is that a thin layer of paint applied by a brush, or a paint spray competes with inches of insulation material. This opens up many opportunities for energy savings in sectors where space has been a limiting factor. Major shipping companies applied the innovative paint to the deck. Since the beads are made of silica, it is resistant to ultraviolet (UV) radiation, which extends the effectiveness of both the paint and the insulation. The fuel efficiency of cars and buses improves thanks to the application of the GAINA©, the newly branded insulation paint that reduces the accumulation of heat in the summer. Perhaps the greatest savings are achieved by the reefer containers and refrigerator trucks. The immediate distribution of the heating or cooling through the layer of minute beads also prevents dew condensation, which is a major cause of mold growth. The Todaiji Temple, one of Japan's precious World Heritage sites recognized by UNESCO, applies the paint to save energy and to protect its treasures from molds.

While the durability has only been proven up to ten years, the advent of multi-functional products that save energy, resists UV, prevents dew, insulate sound, and absorbs odor makes it a competitive product. After all we should not forget that this water based coating also serves as a paint, providing 52 different colors to brighten up our living environment. This portfolio of multiple benefits creates a new opportunity for entrepreneurs who may have wondered how to take on the market leaders of the paint and insulation industries. Entrepreneurs with access to these markets can now take on industrial leaders in both markets at the same time. David cannot only take on Goliath, he can take on two Goliaths simultaneously. An opportunity that is not often viable in a market economy for aspiring entrepreneurs.

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The Blue Economy

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... Further information on the 100 innovations at www.theblueeconomy.org

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