GSC
GLOBAL SILICONES COUNCIL

SILICONES

Improving Energy Efficiency and Facilitating a Transition to a Carbon Neutral Economy

WHAT ARE SILICONES?

Silicone is a generic term referring to a class of synthetic polymers that are based on a framework of alternating silicon and oxygen (siloxane) bonds with at least one organic group attached to the silicon atom via a direct carbon-silicon bond. The Si-O backbone engenders the unique physical and chemical properties of silicones. Silicones can be made to resist moisture, chemicals, heat, cold, and ultraviolet radiation. Silicones display a host of unique properties that can lubricate, seal, bond, release, defoam, spread, and encapsulate. Because of these and other properties, silicone polymers are utilized in thousands of products in applications such as construction, consumer products, electronics, energy, healthcare, and transportation. The use of silicones reduces primary energy demand and facilitates the transition to renewable energy.

SILICONES SUSTAINABILITY IN ACTION

Increasing energy efficiency and contributing to lower carbon emissions

Contributing to increased energy efficiency

- A recent Global Silicones Council life cycle assessment study shows that the use of silicone products can help save on average 14 times the amount of greenhouse gases required for production and end of life treatment of these products

Reducing primary energy demand

- Total net abatement of GHG emissions realized from the use of silicone products is within the range of 42 Mt to 71 Mt of CO_2e per year

Avoiding the need for fossil and non-renewable energy sources

- The use of silicones leads to reduced consumption of fossil fuels and enables savings in heating energy while supporting the transition to renewable energies

AUTOMOTIVE

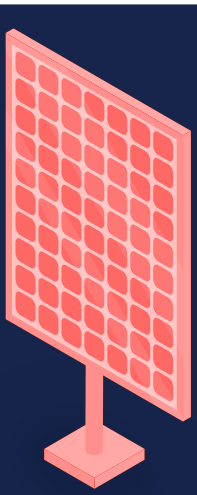
· The use of silicones helps reduce weight for passenger vehicles. Lower vehicle weight results in increased fuel efficiency and lower emissions of various pollutants, primarily CO2. Overall, the reduction of primary energy demand (fuel) due to the use of silicones for an average passenger car is about 5%

· Silicones are also used in the production of green tires. Green tires have less rolling resistance due to the addition of silicones and precipitated silica. The use of silicones in green tires helps to reduce the rolling resistance and fuel consumption resulting in less CO_2 emissions. Rolling resistance can account for up to 30% of a vehicle's fuel consumption and a quarter of its CO_2 emissions

By using silicone materials for sealing and bonding in batteries and energy storage, the electric insulation is considerably increased compared to alternatives. Silicone solutions for battery packs and modules in electric vehicles increase the energy density. As a result, a higher energy efficiency can be achieved as the primary energy demand decreases for the application. Silicone materials used in batteries for EVs help support the renewable energy transition.

SOLAR ENERGY

By converting solar energy into electricity, photovoltaics is one of the key technologies that offer a sustainable solution to meet this demand. By using silicone materials in photovoltaic systems, the production of renewable electricity is supported.



CONSTRUCTION

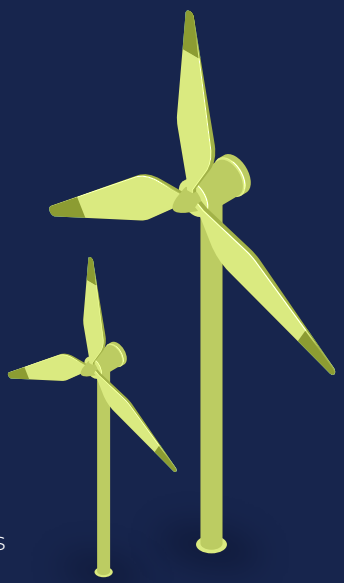
· Silicone sealants help make buildings energy efficient by preventing humidity and hot or cold air from coming through joints and cracks. Applying silicone resin emulsion paints to an unprotected building façade can reduce heat loss by up to 40%

· Material savings in the production phase and energy efficiency in the use phase are among the most important objectives in sustainable building design. New high performance silicone adhesive solutions allow slimmer connections and profile sections, which results in significant material savings and reduces energy use and CO_2 emissions

· LED lights, which contain silicone, use 90% less energy than conventional lighting

WIND ENERGY

· A wind turbine with silicone lubrication produces 8 % more energy than a wind turbine with synthetic oil. Silicone lubricants reduce friction in wind turbine components (gearboxes, hydraulic circuits and brakes) improving energy efficiency and reducing wear and tear in components. This results in an annual benefit of 2.370 MWh/a through the use of silicones.



· Silicones are also used as adhesives to bond the rotor blades. By improving durability and strength alongside low weight, silicones have facilitated larger wind turbines with greater energy potential. The average blades manufactured between 1980 and 1990 were 17 metres across and generated 75KW of energy. In 2019, the average rotor diameter size was around 129 metres with one rotor 132 metres in diameter and a rated power 3,465KW. This requires higher performing components, including stronger bonds on the blades themselves.