

# Impact on the environment and sustainability

**GEOLUX**<sup>®</sup> is a specialist engineered material with a 30-year service life, designed to increase the bifacial energy yield through increasing the front and rear-incident irradiance by increasing the natural albedo of the ground. **GEOLUX** can increase the ground albedo to approximately 75%, offering significant increases in yield and a reduction in the Levelized Cost of Energy (LCOE). One common concern is whether **GEOLUX** will have a negative impact upon the environment, and whether it is a sustainable form of increasing the energy gain.



#### Does GEOLUX harm the ground?

**No. GEOLUX** is an engineered material evolved from the **GSE**<sup>\*</sup> geomembrane family that was initially designed over 40 years ago for environmental protection applications, including containing aggressive chemicals to protect the groundwater from the run-off from the exploitation of mines, waste management, and petrochemicals, as well as to impound water or as structural barriers.

It is used extensively around the world for this purpose and is common practice to be included as a critical component

of such a system. **GEOLUX** is made in co-extruded layers each containing three core ingredients; 96–97% Polyethylene resin, 2–3% carbon black to protect from UV radiation and approximately 1% antioxidants to slow down the oxidation process of the geomembranes. The top skin of **GEOLUX** replaces carbon black with a high concentration of UV packaged Titanium Dioxide to create the brilliant white reflective finish. This manufacturing process creates a monolithic material where the skins cannot be peeled from the core, thus highly durable and robust. **GEOLUX** is not water soluble and so is not harmful to the ground water or soil.



Further to this the Forschungsgesellschaft für Straßenund Verkehrswesen (Research Society for Roads and Transportation) publish the M Geok E, a German manual for the use of Geosynthetics in Earthworks in Road Construction. One requirement within this is to determine that the geosynthetic is harmless to the environment.

Some Geosynthetics may contain additives, such as processing aids and additives (finishes, stabilizers, color pigments) that can be water-soluble and leach out of the material. These substances in particular are the reason for the proof of environmental harmlessness required in the M Geok E [FGSV-535] and the EAG-EDT [DGGT-2005]. A 2 mm geomembrane, similar in composition to **GEOLUX**, was tested according to these requirements, with the conclusion of the test report stating that "The review of the individual parameters has shown that the representative product tested can be classified as environmentally harmless in the sense of the M Geok E."

**GSE** Geomembrane has also been tested by the Australian Water Quality Centre to be tested to AS/NZS 4020:2005 Testing of products for use in contact with drinking water.

This tested for Taste of Water, appearance of Water, growth of Aquatic Micro-organisms, cytotoxic activity of water extract, mutagenic activity of water extract, and extraction of Metals, all of which passed when tested. The results presented demonstrated compliance of the HDPE Geomembrane to AS/NZS 4020.

#### Will the material break down over time?

**No.** Solmax has examples of White Reflective geomembranes that have been exposed for thirty years. One example is the Bingham Canyon Mine Spring Runoff Pond in the mountains above Salt Lake City, Utah which was installed in 1994 with the photo shown above taken in 2021. Utah has a hot and arid climate and demonstrates no sign of degradation, and that the reflective skin will be present for the duration of the service-life of the project.

For further details on durability, see our Long-term performance Technical Note.

### What do you do with GEOLUX upon closure of the PV plant?





Dismantling of GEOLUX



Storage

**GEOLUX** can be reused or fully recycled. Solmax is committed to being a responsible industry leader, driving positive change, and contributing to a more sustainable future. We will actively promote the principles of the circular economy by incorporating recycled materials into our products, everywhere and anywhere regulations allow, and encouraging the reuse and recycling of geosynthetics at the end of their life wherever possible.

Solmax has collaborated with stakeholders to develop effective recycling and recovery systems. This includes partnering with companies that can effectively clean geosynthetic products and regrind and clean materials that have been removed from the site.

## Can the soil recover after removing GEOLUX?

**Yes.** Light does not pass through **GEOLUX**, which gives significant benefits to the annual weed maintenance beneath the solar panels. It is unlikely given the 30-year service-life of PV plants that the ground will need to be reinstated, and rather redeveloped as a new renewable plant due to the ever-increasing global population and trend towards decarbonizing the planet. However, consideration should be given to the site following completion of the scheme, and whether it could be reinstated if necessary.

As previously discussed, **GEOLUX** does not leach chemicals into the ground, is a completely inert material, and is deemed safe to contain drinking water. As such it is very likely that the only remediation necessary may be to reseed upon removal of the **GEOLUX**. However, in the following example where after two years **GEOLUX** was lifted and the ground left exposed for three months, it shows clearly that the ground started to regenerate naturally.

**GEOLUX** will prevent weeds growing beneath it, however this would be a temporary impact and upon removal and decommissioning of the site there would be no long-term detrimental impact.



process





Transport to factory

Production of geosynthetics

The recycled granulate is then sent back to Solmax to be used in the production of future materials. Presently, the technical aspects of recycling geosynthetics and the availability of such systems vary by region and application.

Further to the knowledge that **GEOLUX** can be recycled, there is also the potential for it to be reused on future solar projects. Samples of **GEOLUX** can be sent back to Solmax for testing, and should the results show a suitable level of antioxidants present, it may be possible to determine the potential remaining service-life. If this is deemed sufficient it would be possible to utilize portable rewinding apparatus to roll up the **GEOLUX** and transport to the next site.



