Abstract – Climate change & Albedo

Climate change is happening, and it is starting to show in temperature, sea level and extreme weather conditions, etc. Amongst many other factors, the albedo effect could be one of the important factors affecting the climate change.

Albedo is the percentage of solar energy reflected from the surface of the Earth back into space, and can be referred to as reflectivity or whiteness. A white surface such as snow can have an albedo of up to 100%, whereas a black surface can have an albedo close to 0%. The whiter the surface, the higher the albedo and the more sunlight is reflected back into space. Also, the material and structure of the surface affects the albedo. Water is for example not so reflective, and will absorb much of the sunlight, while ice reflects more than water.

The solar energy that is not reflected to space by clouds or surfaces on the Earth with high albedo, is absorbed by the surface it hits, and warms it up. The average albedo of the Earth is around 37%, which results in an absorption of heat around 63% of the incoming solar energy. The reality of these percentages is more complex, as clouds both can act as reflectors of incoming and outgoing energy, but here it will be kept simple.

The overall result of the albedo effect on the earth with these percentages is a general increase of temperature. This makes the albedo effect part of a positive feedback mechanism, where the temperature increases, more ice melts, the Earths average albedo drops, more solar energy is absorbed and the temperature increases further.

One way to stop this cycle could be to increase the average albedo coefficient of the Earth, which a current project called “White Roof Project” is trying to do. It is a smart way of using the Earths own mechanisms to restore balance and sustainability and to change climate change.