

High-Albedo Surfaces for CO₂ Compensation: Technical and Economic Opportunities through the RF-Meter Methodology

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ABSTRACT

High-albedo surfaces represent an innovative and complementary strategy for climate change mitigation, based on increasing the solar reflectance of terrestrial surfaces and consequently reducing radiative forcing. This approach makes it possible to translate the climate benefit produced by the lower amount of energy absorbed by the Earth system into an equivalent CO₂ compensation, opening new technical and economic perspectives for widespread applications on roofs, pavements, urban infrastructures, and agricultural surfaces. A key element is the RF-meter methodology, which enables a measurable, traceable, and verifiable assessment of the CO₂ compensation achieved through reflective surfaces. By integrating ground-based measurements, astronomical calculations of solar radiation, satellite data, and time-dependent monitoring, the method accounts for weather variability, seasonality, material degradation, and the real performance of the intervention. This approach overcomes the limitations of purely theoretical assessments and provides a solid technical basis for the potential certification of climate benefits. The potential economic impacts are significant. International recognition of CO₂ compensation through albedo enhancement could foster the creation of a new category of carbon credits, making low-cost, scalable interventions applicable in urban, agricultural, and infrastructural contexts economically valuable. This could generate new investment opportunities, public-private partnerships, additional revenues for local authorities and communities, as well as climate finance mechanisms accessible even to territories with limited industrial capacity.

JEL Codes:

Keywords: High-Albedo, CO₂, RF-meter methodology.