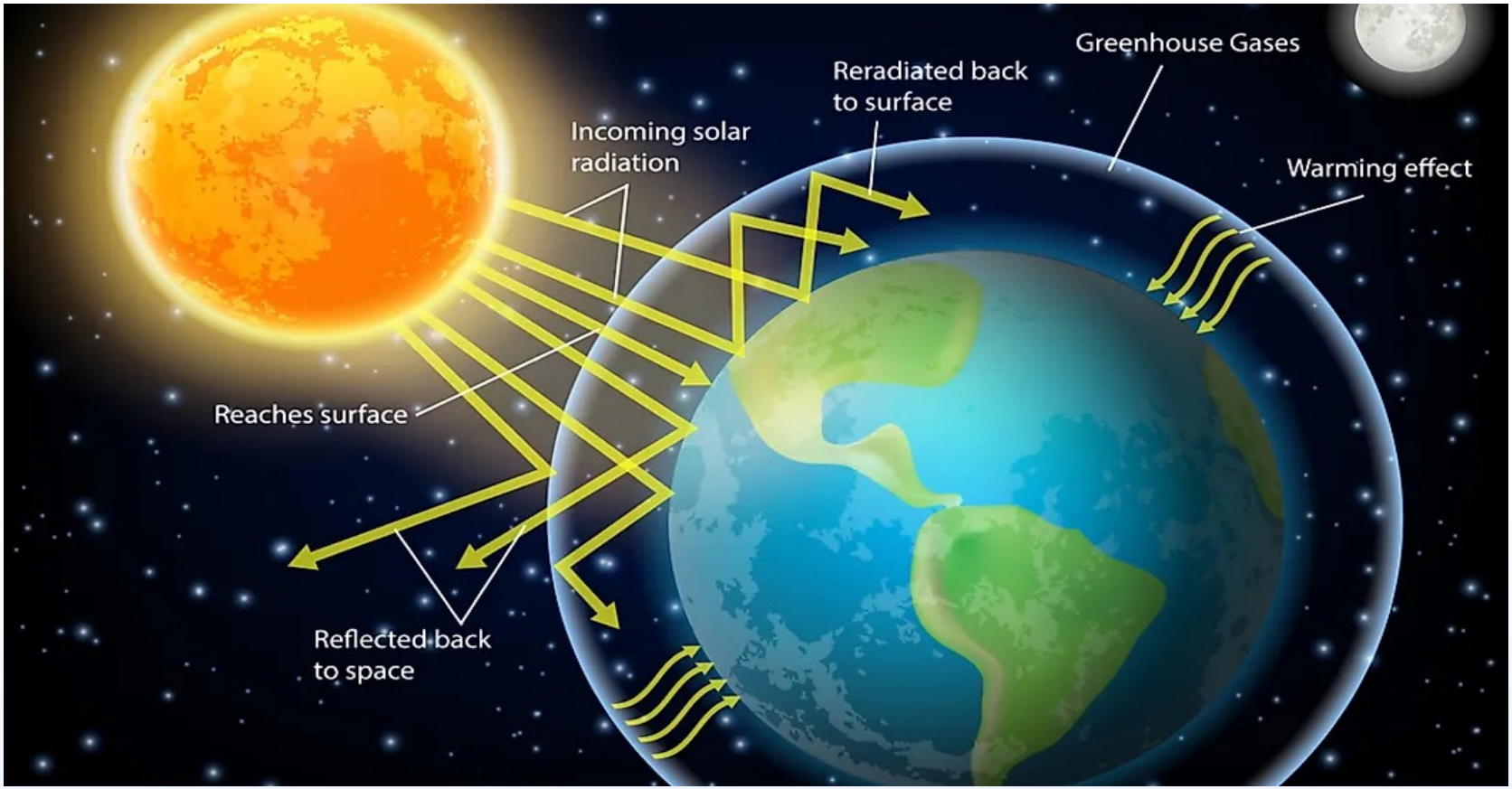
High Albedo Solutions HAS Technology

Energy, Food and Water management optimization in the transition to zero carbon using HAS technology

WATERGY International Group

The earth-sun energy system



Urban City and Land Use

- Studies of a city's "urban fabric" indicate that about 60 percent of urban surfaces are covered by roofs or pavements. About 20 to 25 percent are roofs and 30 to 45 percent are pavements.

  Akbari, H. Rosenfeld, A., & Menon, S., (2009). Global cooling: Increasing world-wide urban albedos to offset CO2. Climatic Change 94 (3-4), 275-286

- … within 50 years an estimated 80 percent of the world's population will live in an urban area.

  . Crutzen, P. J. (2004). New directions: The growing urban heat and pollution "island" effect – impact on chemistry and climate. Atmospheric Environment, 38 (21), 3539-3540.

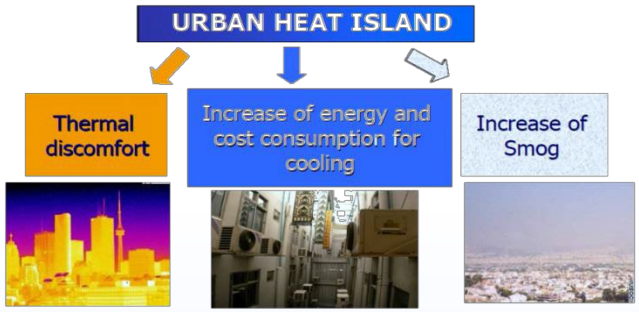
➢ **Replacing and upgrading roofs and pavements with more reflective materials could reverse this warming, turning urban surfaces into assets instead of burdens**. Vegetated roofs, permeable pavements, and shade trees are other cooling strategies that are complementary with high solar reflective roofs and pavements

Impact of UHI on energy consumption

Energy Use

- **Higher urban temperatures mean:**

- Peak electricity demand increases up to 5% for every 1ºC increase in summer temperatures.
- Higher temperatures result in higher electricity bills.
- For large cities, this higher demand is 5 to 10% higher to offset heat island effects.
- Peak load use of electricity is higher, placing pressure on the power grid and greater demand for additional power plants.



High Solar Reflective Materials

- High Solar Reflectance or Albedo
- High Infrared Emittance

Less Heat Absorption

Faster Heat Release

Lower Surface Heat Built UP

Less Heat Penetrates the Buildings

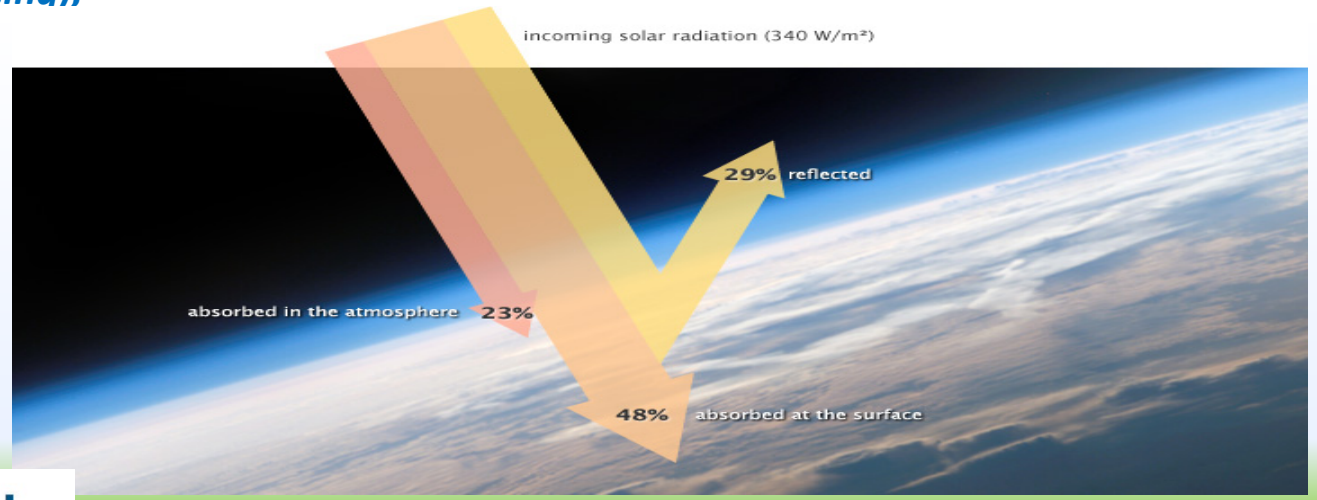
Lower Air Temperature

Improved Thermal Comfort

Improved Ambient Air Quality

Implementation of HAS technology on buildings and infrastructures

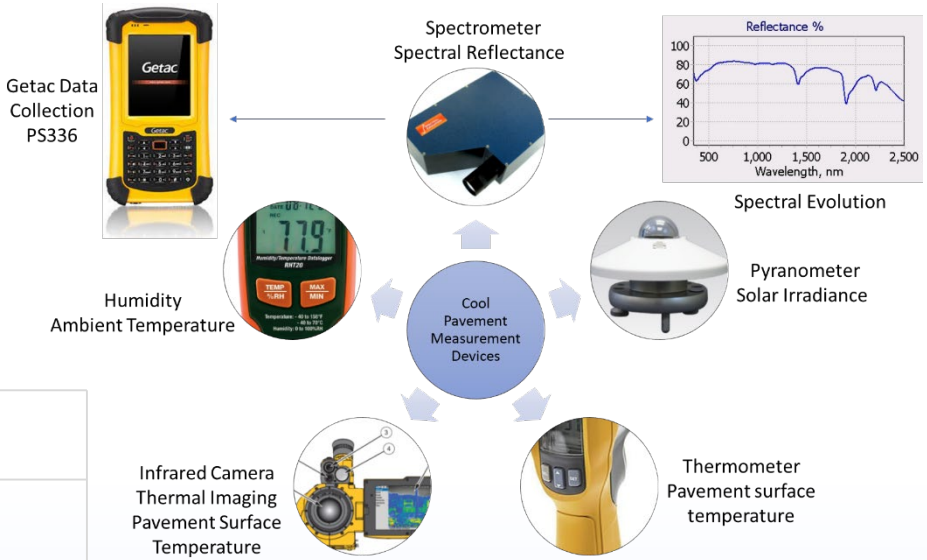
Reduction of energy consumption for cooling up to 32%
CO2 production reduction due to energy efficiency and carbon footprint compensation due to Albedo (radiative forcina).

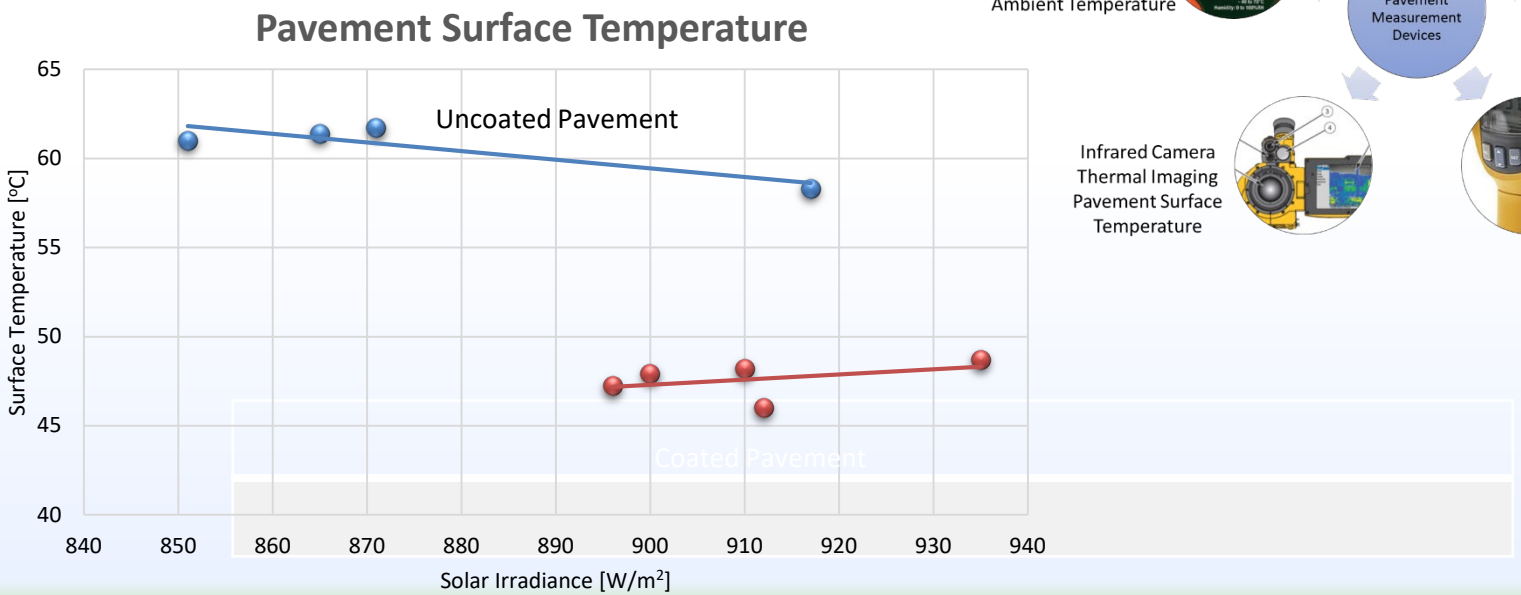


WATERGY International Group

HAS Cool Pavement Project

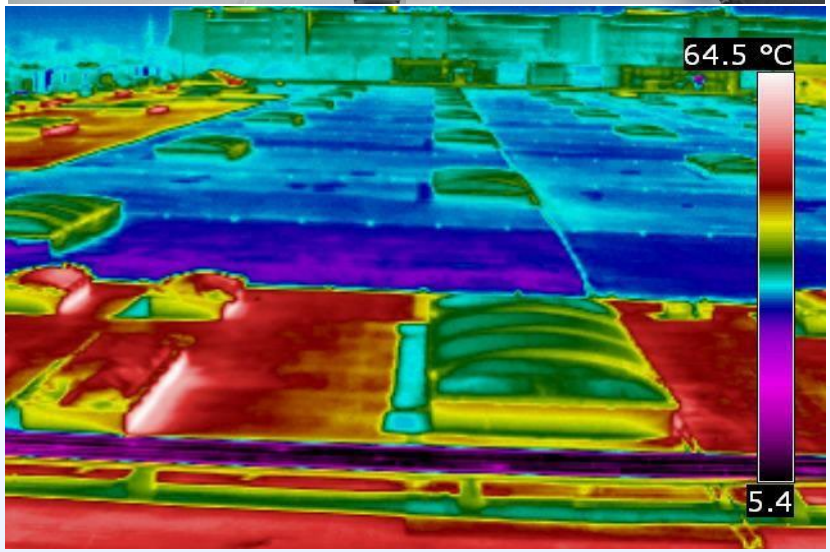
UoS & Ministry of Energy & Infrastructure





WATERGY International Group

HAS Roof application



Good morning,

I attach a table showing the weekly consumption in kWh for rooftop of Assago (DMMs measures ESAM).

1) Comparing 2011 with the average values 2006-2009, the reduction in consumption is 26%
2) Comparing the absorption ante-post CoolRoof, reducing consumption is 24%.

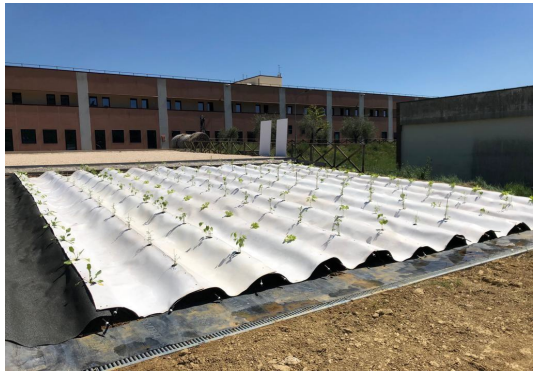
---> We are about 25% reduction in electricity consumption for air conditioning.

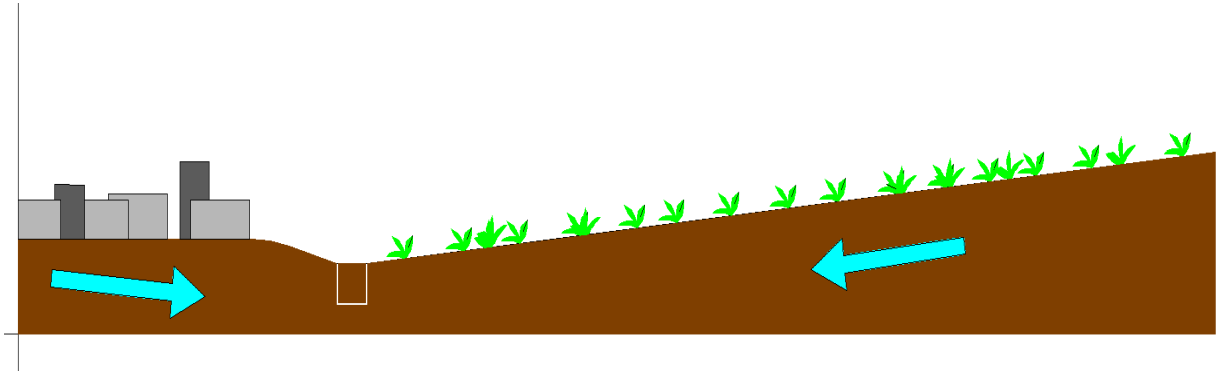
The data are interesting, because it does not consider the added benefit of reducing consumption refrigeration food.
regards,

	2006	2007	2008	2009	2011
lunedì 27 giugno 2011					
27 giu - 4 lug			41.707	41.569	46.215
lunedì 11 luglio 2011					41.692
lunedì 18 luglio 2011					40.565
lunedì 25 luglio 2011					30.069
lunedì 1 agosto 2011					30.871
lunedì 8 agosto 2011					36.963
lunedì 15 agosto 2011					26.651
lunedì 22 agosto 2011		44.573	46.783		34.985
lunedì 29 agosto 2011				47.627	40.968
lunedì 5 settembre 2011					31.215
5-12 settembre					30.492
12-19 settembre	39.917	40.808			32.447

Carrefour
Giovanni PIANO
Energy Manager
Phone +39 0248252460
Fax +39 0248252720
giovanni.piano@carrefour.com
Direzione Acquisti Non Merci
Via Caldera, 21
20153 Milano
Italy

Use of HAS technology in agriculture



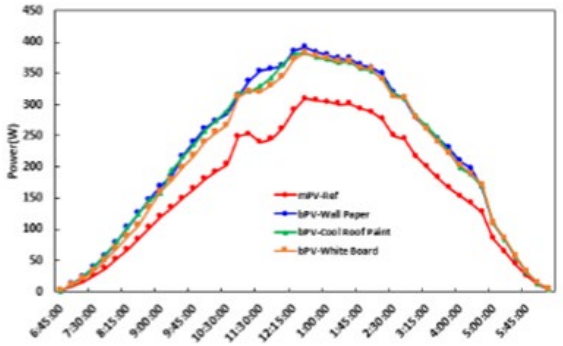


1. **Rainwater collection**(thanks to the preparation of the land and the tank underground)
2. **Mulch membrane:** to avoid water evaporation, weed growth and pesticide use
3. **Albedo** effect: retro-reflection of solar radiation

Bi-facial photovoltaic panels integration with HAS technology used in agriculture

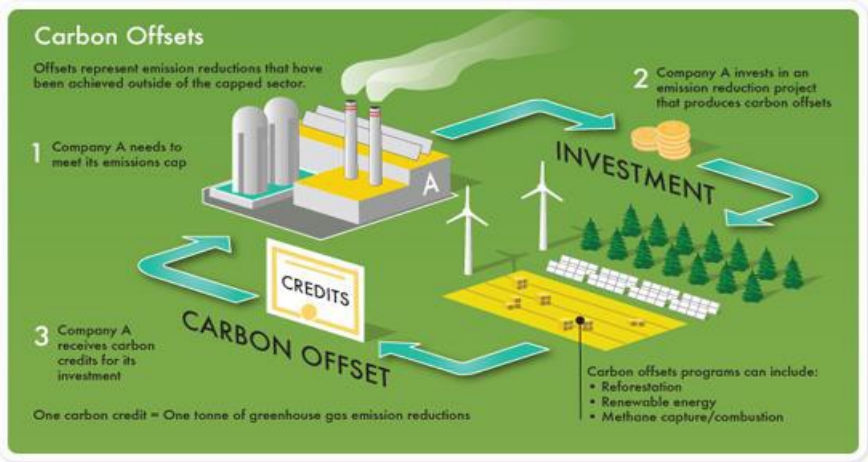
PV Generation Comparison

Description	Power	Improvement
Unit	W	%
mPV-Ref	164.19	-
bPV – Wallpaper	218.39	33.01
bPV - Cool Paint	215.55	31.28
bPV - White board	210.33	28.10

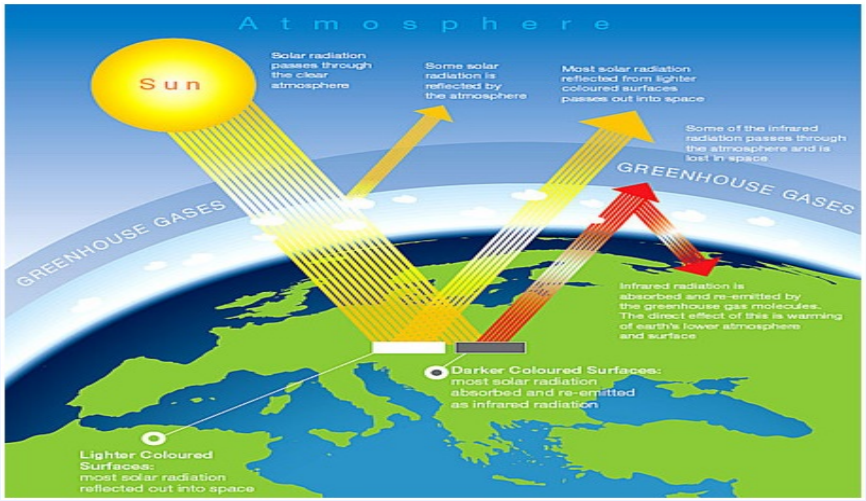


WATERGY International Group

Today Carbon offset scheme do not include HAS technologies



But Accordingly with IPCC 7th report RF synoptic: Increasing terrestrial albedo Global warming get mitigated.



WATERGY International Group

A Novel Measurement-Based Method for Assessing Global Warming Mitigation via High-Albedo Solutions has been developed from the collaboration between Universita' di Perugia (CIRIAF) and University of Sharjah

Mediterranean Area compensation rate
15÷20 m^2 = 1 ton CO_2

Sahel Area compensation rate
5÷6 m^2 = 1 ton CO_2

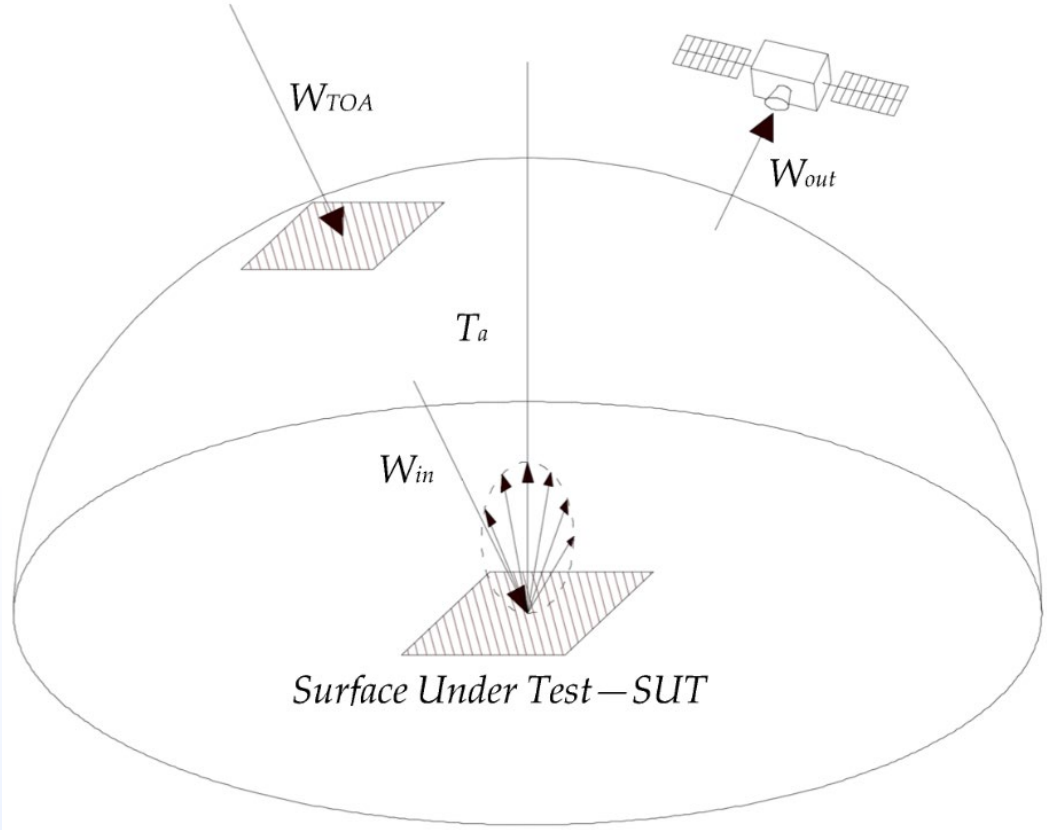
The method allow to calculate in real time and all over the world, the CO_2 compensated by the albedo generated by a surface using HAS technology through satellite measurement.

United Nations
Department of Economic and Social Affairs
Sustainable Development

The ALBEDO FOR AFRICA project became United Nations program on March 22, 2023

WATERGY International Group

Combined Ground and Satellite measurements to assess CO2 offset



WATERGY International Group

HAS technology integration with green energy production system

High reflective coating can boost energy production of photovoltaic panels

Integration of HAS technologies in parking using double-sided photovoltaic panels canopies

PROPOSED ROAD MAP

1) Recognition of CO_2 offset by high albedo applications as well as CO_2 reduction by novel energy efficiency solutions integrated with renewables;

2) Introduction of CO_2 offset mechanism into ETS.

3) Build up an Agency to monitor and control novel solutions efficacy by satellite sensing.

4) Manage the ETS market.

#isupportalbedo for a Zero Carbon cooler future

Albedo Control technologies could be proposed as a complementary strategy for GW mitigation in order to cope international commitments against Climate Changes.

Albedo Control may introduce three separate contributions:

- the direct contribution to the mitigation of global warming by reflecting out of the atmosphere the component of short wave radiation coming from the sun;
- the indirect contribution generated by the energy saving for reducing cooling requirements of buildings;
- the indirect contribution for mitigating the urban heat island phenomenon.

The CO2 compensation capacity of the albedo at Europe area location can be quantified in the range of 10 to 12 m^2 to offset 1 CO_{2eq} tons while at UAE locations has been quantified in the range of about 5 to 6 m^2 to offset 1 CO_{2eq} tons.
COP 28 for 2023 will be the proper contest where we want to propose to the international community the approval of the HAS technology as a Tradable Carbon Credit production system.

WATERGY International Group

Thank you