



**COP²⁸
UAE**



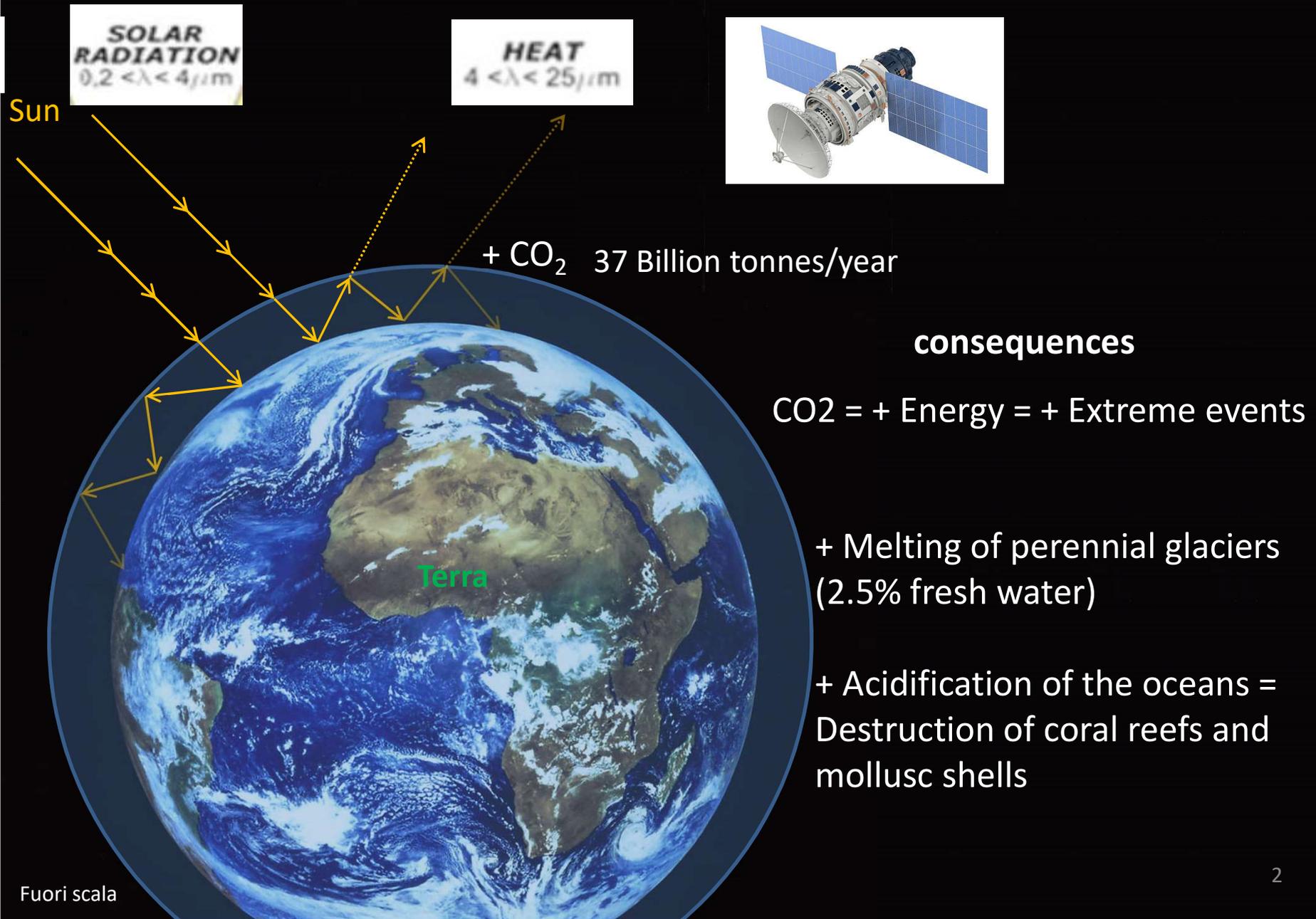
High Albedo solutions for global warming mitigation, water saving and energy efficiency

CEO, Prof. Franco Cotana

3 December 2023

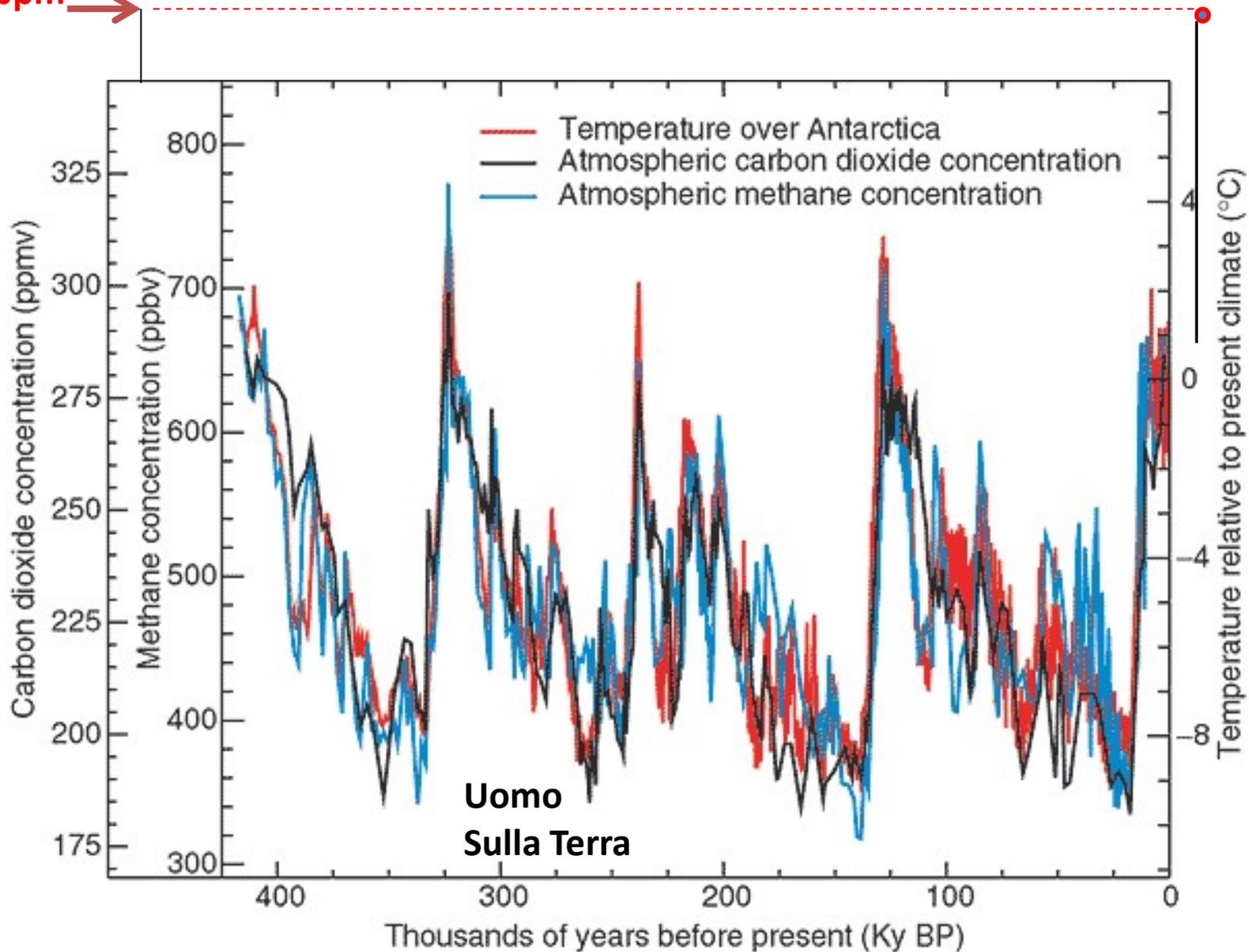


Water, Energy and Climate Change

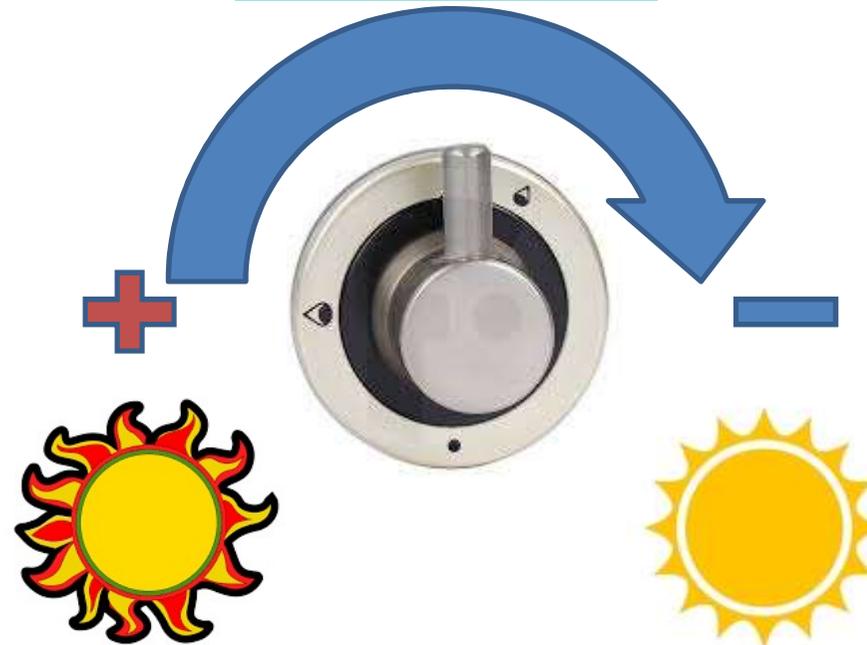


Temperature and CO2 variations over the last 400,000 years. +4°C/-9°C (Source: IPCC)

420 ppm



Improving ALBEDO = Lower the burner under the pot

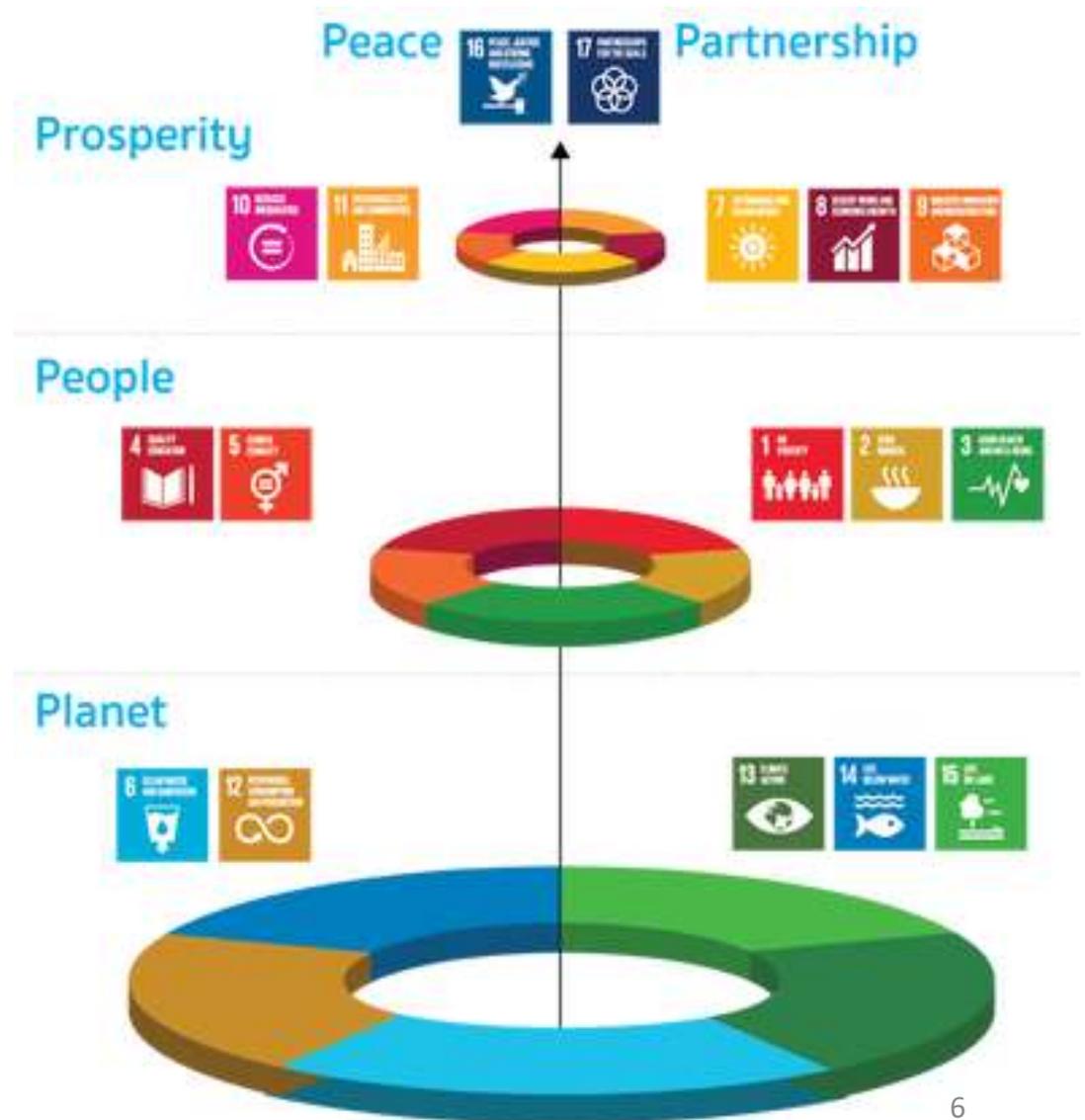


Energy transition and climate change

3 main pillars to consider

- **People** (8 billion population) +1.1%/Year
- **Planet** (40 billion tons/year of CO₂ comes from fossil fuel use
14 billion TOE/year)
- **Prosperity** (world Gdp is over 96 trillion of dollars)

ALBEDO FOR AFRICA - UN AGENDA 2030





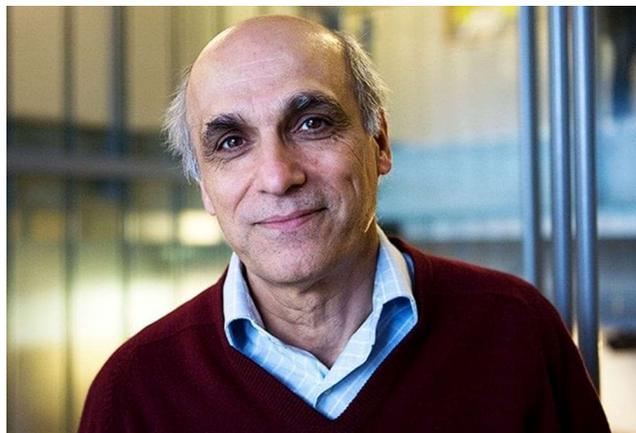
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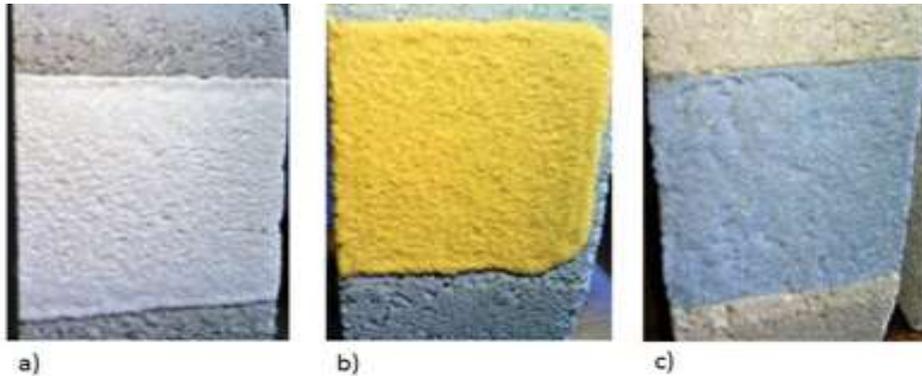


Prof. F. Rossi
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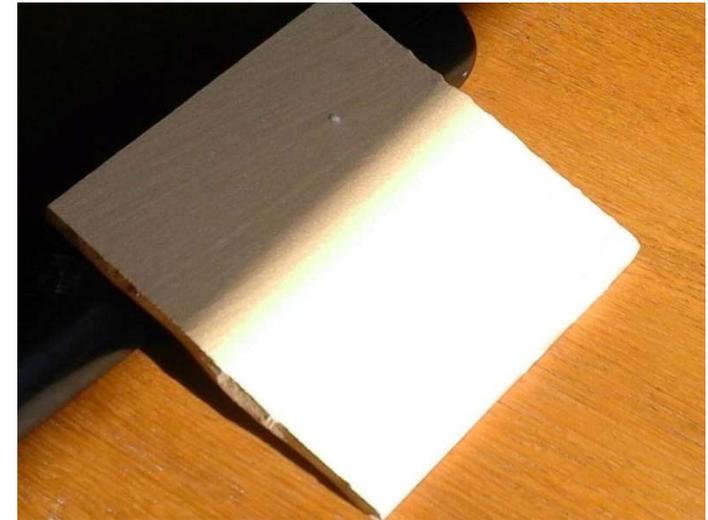


Prof. A.L. Pisello
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CIRIAF-CRB cooled material LAB



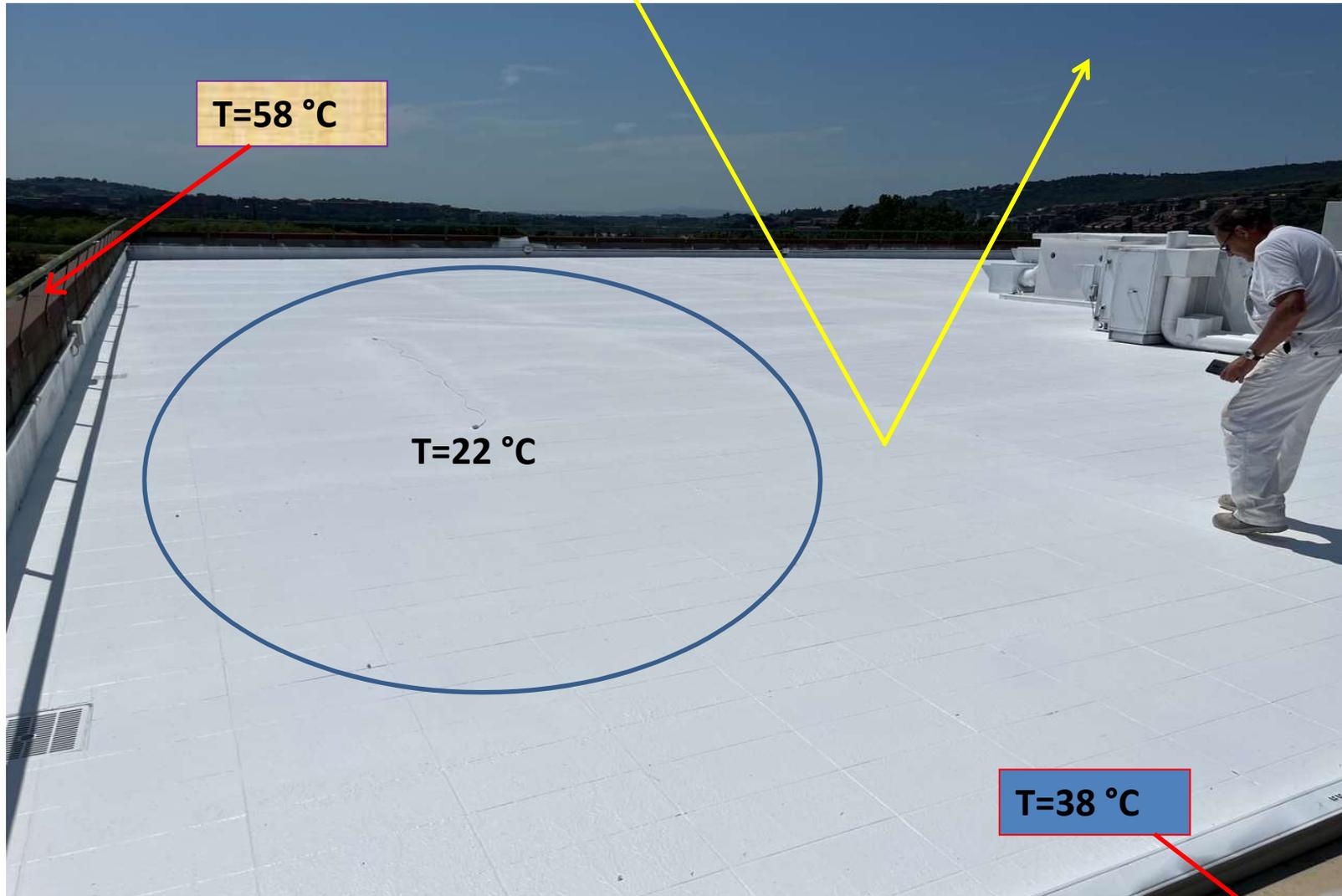
Pitture Retro-reflective: a) bianco RR; b) Giallo RR; c) Blu RR.



Pitture Retro-reflective e le test-rooms.



Cool Roofs and Terraces



Albedo Mulching applied in Agriculture

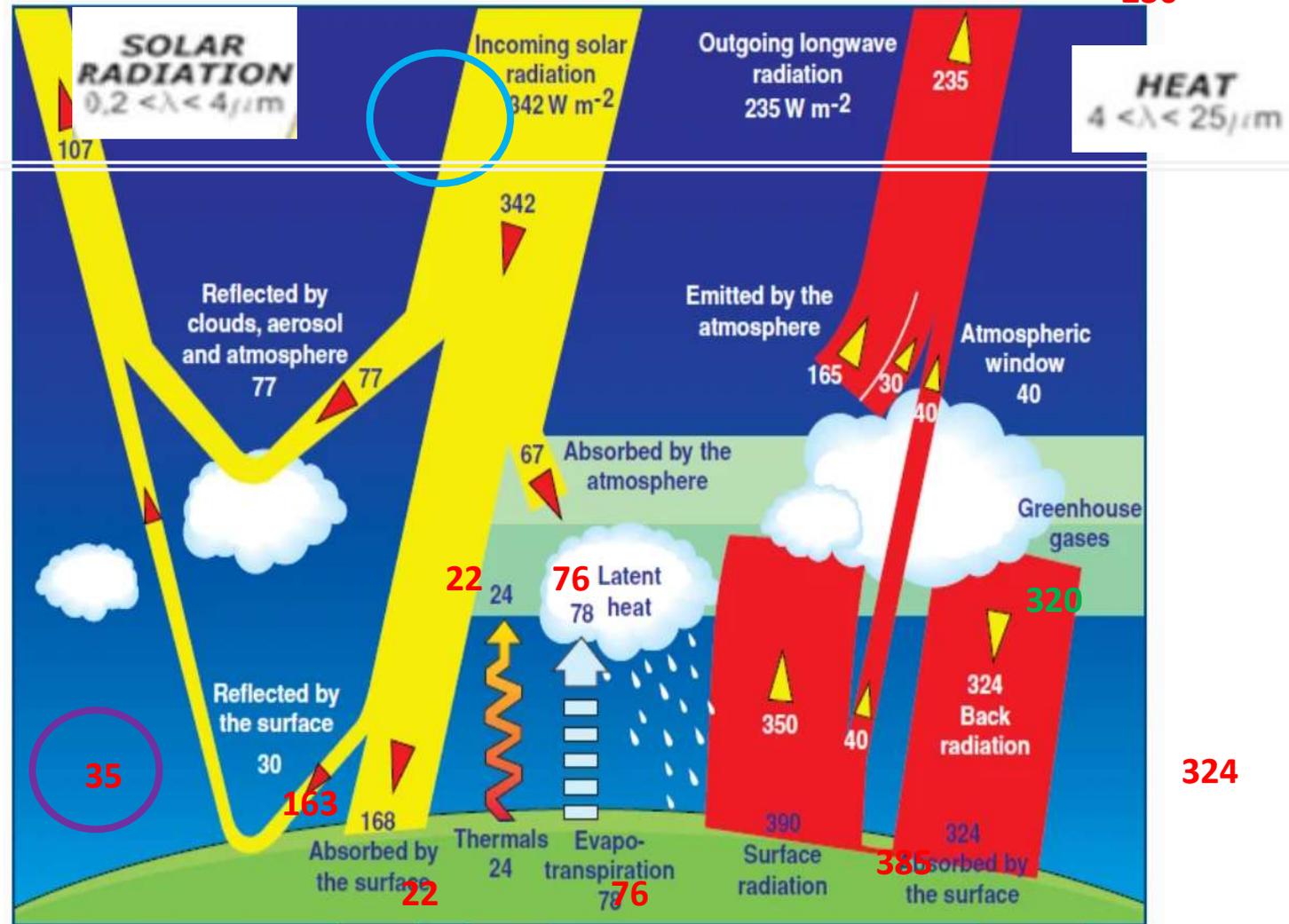


PLANET ENERGY BALANCE: 1800, TODAY, Albedo

112

240

230



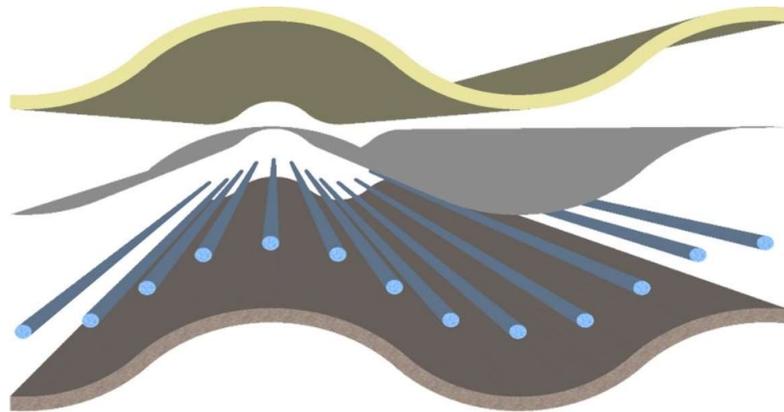
T = 13,7°C
 T = 14,9°C
 T = 15,2°C

35

324

Globally averaged energy budget of the atmosphere. Figure from <http://asd-www.larc.nasa.gov/ceres/brochure/> based on data from Kiehl and Trenberth (1997).

High albedo Mulch membrane for horticulture



Vegetation layer

Mulching membrane with high albedo
sub drip irrigation
land

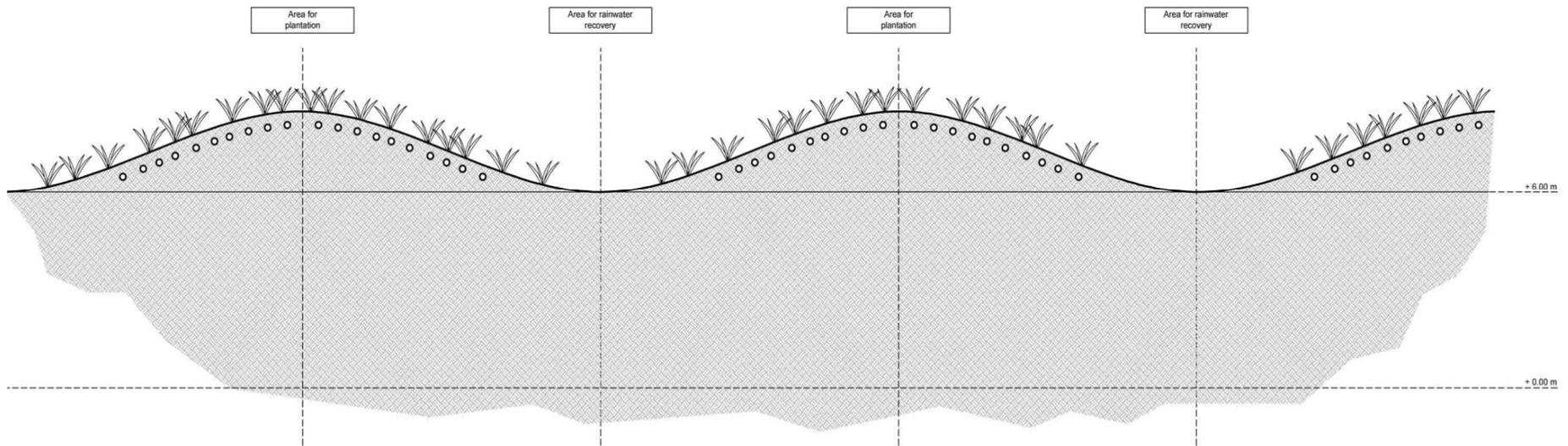
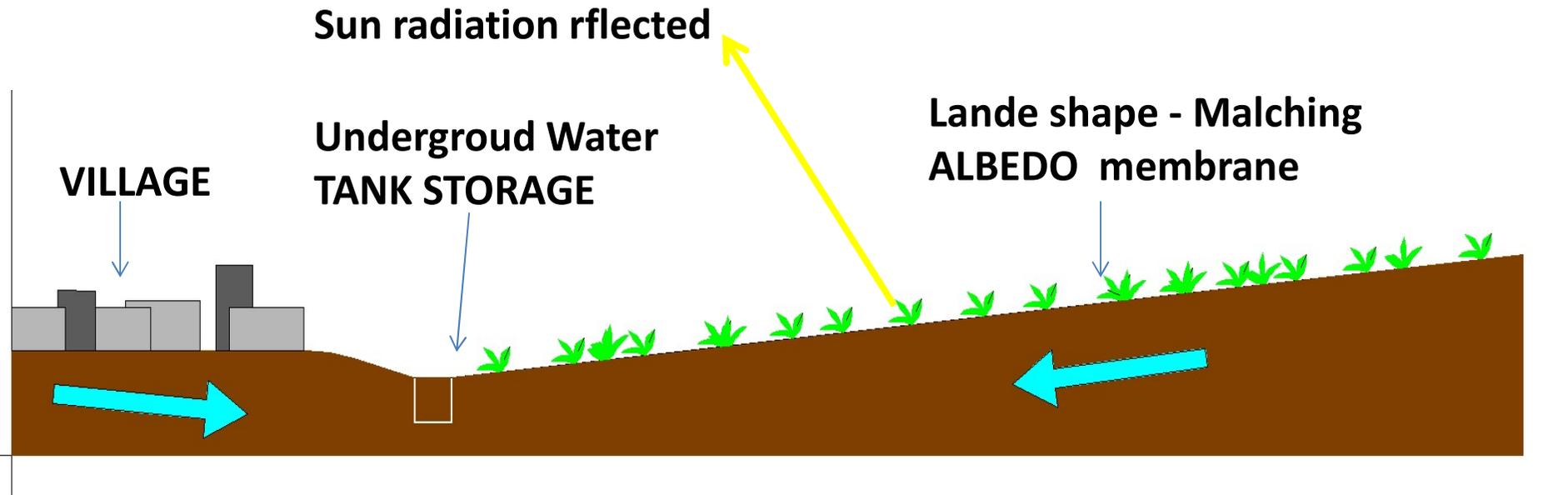


Micro glass spherules

High Albedo Mulch membrane for horticulture: effects

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

Rainwater harvesting and utilization system in large horticultural crops



The horticultural experimental field at CIRIAF



Environmental Assessment of an Innovative High-Performance Experimental Agriculture Field

Aims

- Investigation and characterization of the potential impacts of an experimental tomato field at the University of Perugia;
- Evaluation of the impact of the production increment over time.

The first-year crop campaign was the baseline reference to measure the system's efficiency

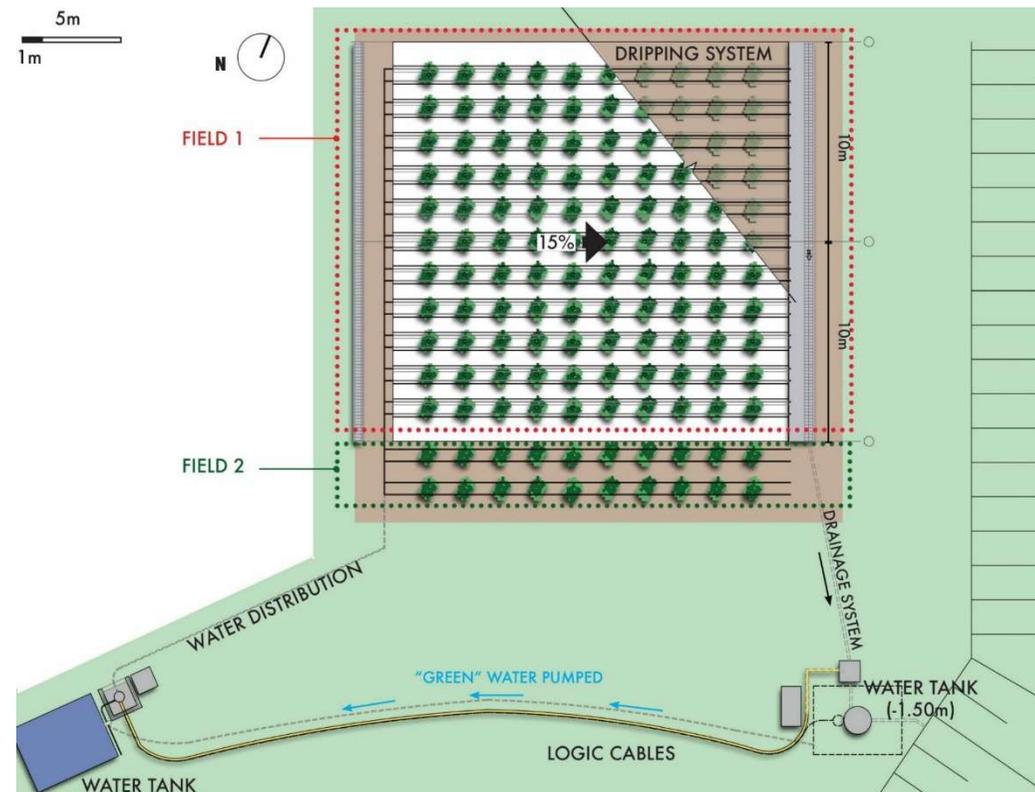
Two fields were modeled:

Field 1 (F1) = 100 m² (area covered by the high-reflective **mulching membrane**);

Field 2 (F2) = 20 m² (uncovered part)

Very Low Water consumption: less than 1/20 (for square meter) comparing with usual cultivation of uncovered part.

Field plan : water management system



The horticultural experimental field



ALBEDO Vs CO₂

Resultes and simulations



15÷20 m²

=

1 ton CO₂

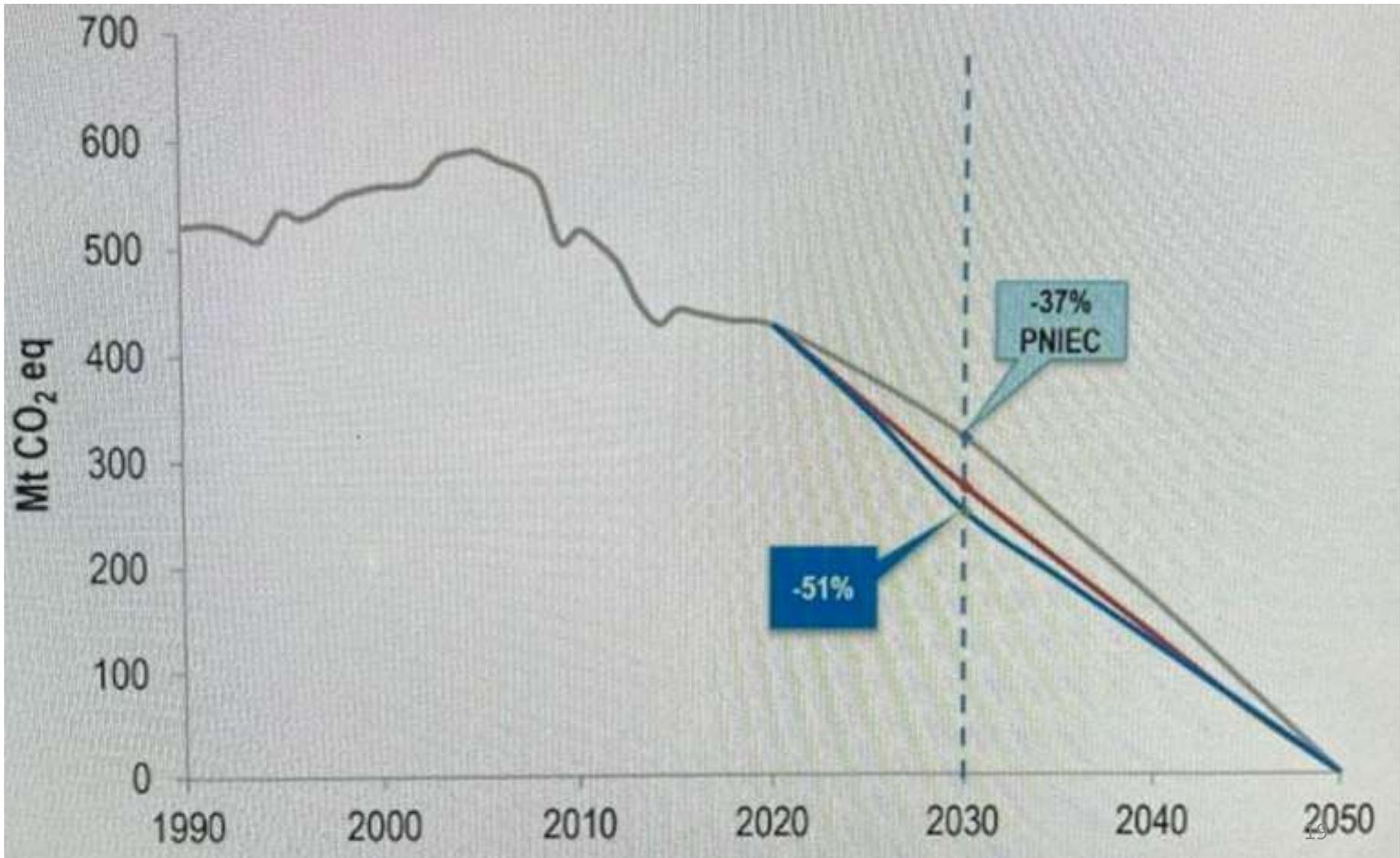
5÷6 m²

=

1 ton CO₂

Italian Decarbonisation scenarios to 2050

PNIEC -40%of CO2 (Italy -37%) **EU fit for 55/2021:**
14 directives (Italy -51%of CO2) **...10 GW/Y newRES !?**





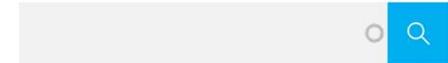
The Albedo for Africa project of CRB - CIRIAF Perugia University is a Program of United Nations

<https://sdgs.un.org/partnerships/albedo-africa-0>



United Nations

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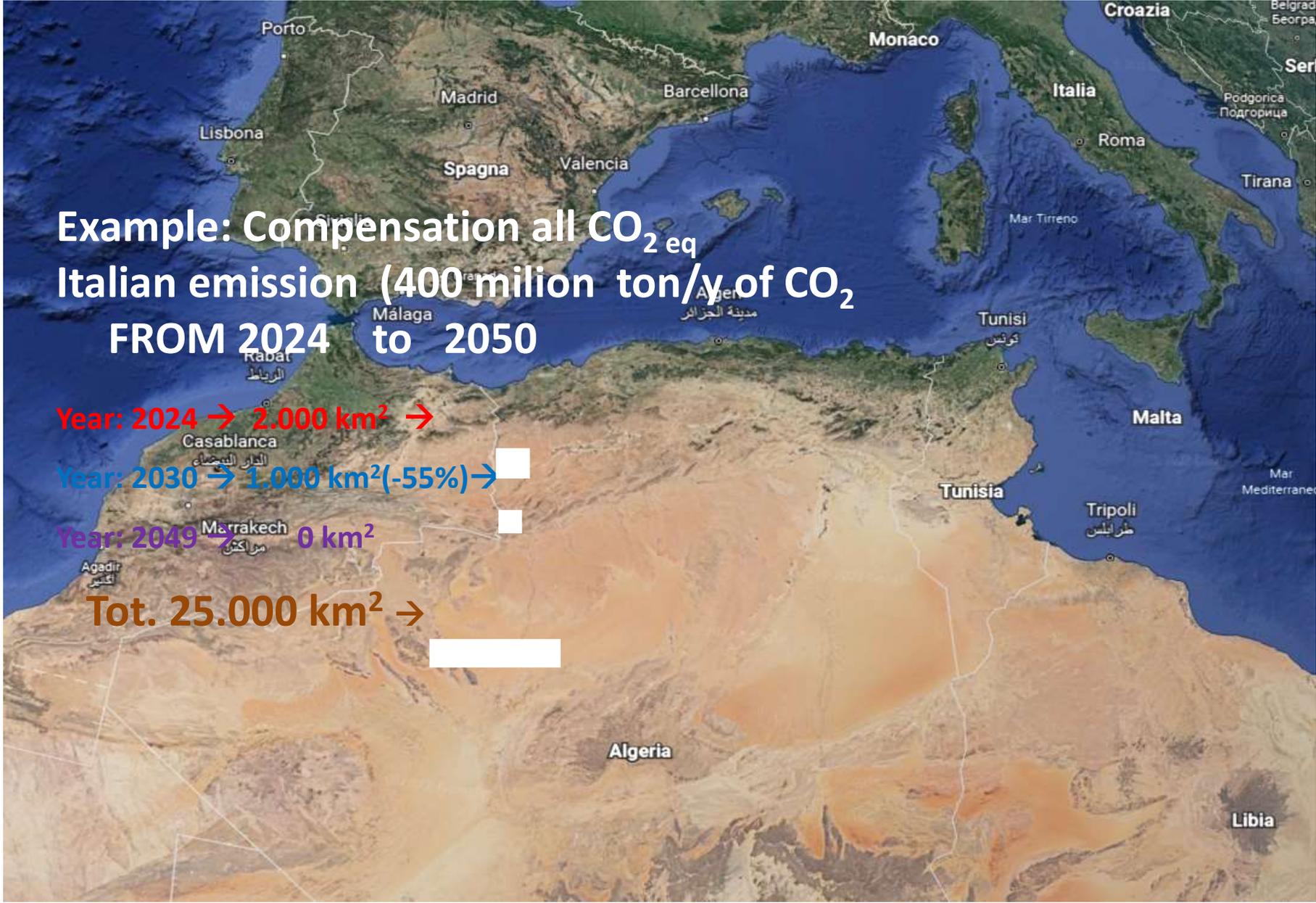
ALBEDO FOR AFRICA

BIOMASS RESEARCH CENTRE, CIRIAF INTERUNIVERSITY RESEARCH CENTRE ON POLLUTION AND ENVIRONMENT MAURO FELLI, UNIVERSITY OF PERUGIA, Academic institution

[#SDGAction50779](#)

#SDGAction50779

Since yesterday 22 March 2023, the «Albedo for Africa» project has become the world program of the United Nations



Example: Compensation all CO₂ eq
Italian emission (400 milion ton/y of CO₂)
FROM 2024 to 2050

Year: 2024 → 2.000 km² →
Year: 2030 → 1.000 km² (-55%) →
Year: 2049 → 0 km² →
Tot. 25.000 km² →

ALBEDO FOR AFRICA



**IMAGINE....20 million
people in Sahel area – offset of
All CO2 Italian emission until 2050**





ALBEDO FOR AFRICA: THE SOLUTION!

Grazie!

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