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INDUSTRY, INNOVATION AND INFRASTRUCTURE

Build resilient infrastructure, promote inclusive and sustainable industrialization and foster innovation.



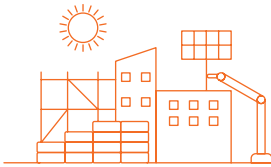
GOAL 9: KEY POINTS & RECOMMENDATIONS

Non psychoactivity-related products of the Cannabis plant have proven to efficiently replace synthetic or petroleum-based materials, being high performance and environmentally-friendly.

Authorities should foster the use of building materials such as "hempcrete" (Cannabis fiber-made concrete) and seed-pressed oils (used for paints and sealants), and consider using these materials locally to incentivize "kilometre zero" markets for infrastructure construction and rehabilitation.

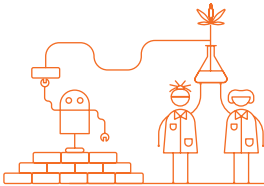
Biocomposites made of Cannabis fibers (polypropylene, polyethylene, polyester) are resistant, durable, cost-effective, and for these reasons already widely used commercially (for furniture, roofing shingles, bioplastic, cars package trays, automotion door panels, etc). That material is key to building resilient and environment-friendly infrastructures and industries.

As Cannabis sequesters important quantities of carbon dioxide during its growth, the territorial repartition of these crops can help existing geoengineering strategies to overcome the adverse impacts of climate change and foster climate resilience.



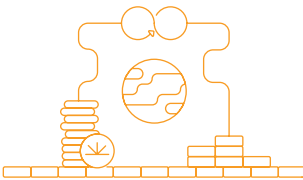
Target 9.4

By 2030, upgrade infrastructure and retrofit industries to make them sustainable, with increased resource-use efficiency and greater adoption of clean and environmentally sound technologies and industrial processes, with all countries taking action in accordance with their respective capabilities



Target 9.5

Enhance scientific research, upgrade the technological capabilities of industrial sectors in all countries, in particular developing countries, including, by 2030, encouraging innovation and substantially increasing the number of research and development workers per 1 million people and public and private research and development spending.



Target 11.c

Support least developed countries, including through financial and technical assistance, in building sustainable and resilient buildings utilizing local materials.



**ACCELERATE
CLIMATE
ACTION
FOR ALL SDGs**

Accelerate climate action for all Sustainable Development Goals.

**Operational Recommendations from the
UNGASS 2016 Outcome Document**

6- cooperation
(d)

7- development
(h) (i) (j) (k) (l)

As explained under Goal 1 and 2, the so-called “hemp”-type chemovars of *Cannabis* (plants grown for non psychoactivity-related purposes) have multiple derived marketable products. Among these, a series of building materials can be manufactured from the fibers of the stalk of the *Cannabis* plant.

Products of the *Cannabis* plant have proven to efficiently replace synthetic or petroleum-based materials, providing high performance and environmentally-friendly products. Among these, the most notable products that can contribute to upgrading infrastructures and making them sustainable, efficient, and clean are:

- **Concrete:** *Cannabis* fiber-made concrete (“hempcrete¹⁶⁷”), a mixture of the plant’s hurds and lime used either directly for construction, or insulation purposes. Lime and hurds chemically react and bind the mixture together, which continues to solidify over time, ensuring a strong and resistant material¹⁶⁸.
- **Industrial oils:** Oil pressed from the seeds of the *Cannabis* plant are ideal to use for manufacturing paints and sealants. Its superior performance – devoid of volatile organic compounds or hazardous air pollutants – provides high protection from the inside out, for wood sealants, in particular.
- **Plastic and composites:** Biocomposites made with part of *Cannabis* fibers are being developed for a range of products (polypropylene, polyethylene, polyester) allowing interior or exterior uses of the material. Biocomposites containing *Cannabis* fibers are resistant, durable, and cost-effective. The material is already used commercially for products, such as furniture, roofing shingles, or bioplastic for the car industry¹⁶⁹ (in particular, for cars package trays, door panels, window pillars, or luggage racks).
- The **carbon sequestration and storage properties of *Cannabis* fiber-based bioplastics** and biocomposites through photosynthesis is a remarkable additional advantage of *Cannabis*-based building for infrastructure sustainability¹⁷⁰.

It should be noted that, in addition, the *Cannabis* plant also sequesters carbon dioxide during its growth phase (each kilogram of hemp sequesters about 1.8 to 2 kilograms of carbon dioxide¹⁷¹), constituting an excellent geoengineering strategy to overcome the adverse impacts of climate change, foster climate resilience and low greenhouse gas emissions in a manner that does not threaten food production.

Public policies should seek to foster local production and supply of these materials locally to **create “kilometre zero” markets for infrastructure construction and rehabilitation materials.**

167 Piot et al., 2017.

168 Chaban, 2015.

169 Shahzad, 2012.

170 Pervaiz and Sain, 2002.

171 *ibid.* and Tarun, 2018.