

DESIGN THE CHANGE



HYDRAULIC WORKS



Reno Mattress Plus
with X-Ties

Speaker

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“The history of **water management** is nothing less than the history of **humankind**”

International Hydrological Programme - UNESCO



Watercourse management is one of the biggest challenge of the 21st century



Water hazards are consistently identified as among the highest global risks in terms of impact

World Economic Forum (WEF), 2020



Hydraulic engineers are called to design new solutions that help human to manage **water resources**, enhance people **safety** while defend the **ecosystems**



We are called to “meet the needs of the **present** without compromising the ability of **future** generations to meet theirs” International Institute for Sustainable Development (IISD)



A green thought has driven our engineering mindset.



For over 140 years, we have developed solutions that enhance river ecosystem resilience including the social ability to recover quickly from catastrophic events (flood, natural disasters)





*Integration of hydraulic engineering systems into the natural environment to provide **long-term economical, environmental and social** benefits*



HOW MUCH
DOES A BANK
PROTECTION
COST?



The cost of the solution is only one aspect of the total costs of owning a civil engineering structure

Total Cost of Ownership includes the purchase price as well as all the costs associated with owning of the item.

LESS MATERIALS

Less Reno Mattress steel and aggregate mean savings in terms of materials, emissions to the environment and money!



QUICKER INSTALLATION

Optimised solutions and material reduction mean easier and faster installation



TOTAL COST OF OWNERSHIP

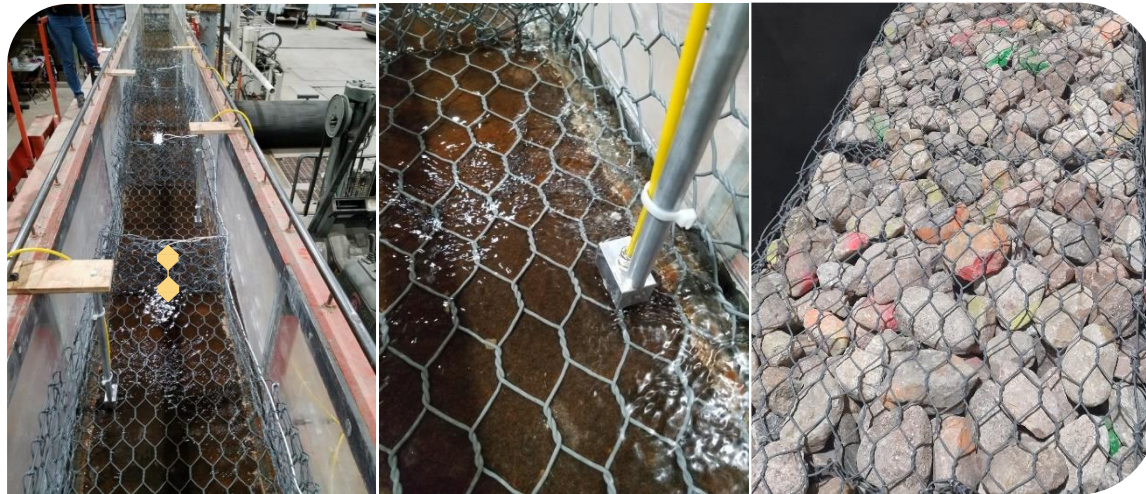


GREENER RESULTS

Less emissions and better integration into the natural environment mean less environmental burden



Design The Change
concept started with
the physical testing
campaign that aimed
at finding out a more
effective solution to
protect river banks
from erosion



INNOVATION CENTER
MACCAFERRI



The physical test campaign was conducted
by **Maccaferri Innovation Center** in
collaboration with **Colorado State**
University



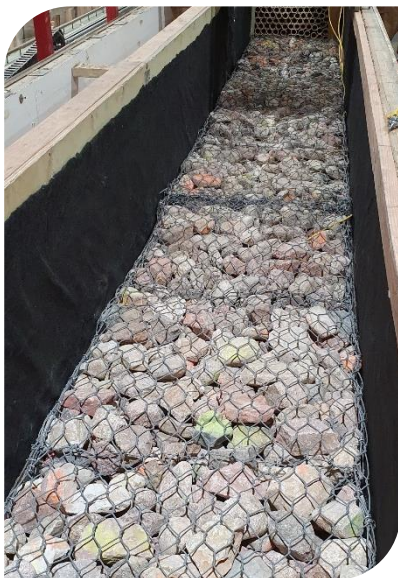
Everything started from physical tests

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3 YRS OF
TESTING
CAMPAIGN

500 k€
R&D INVESTMENTS

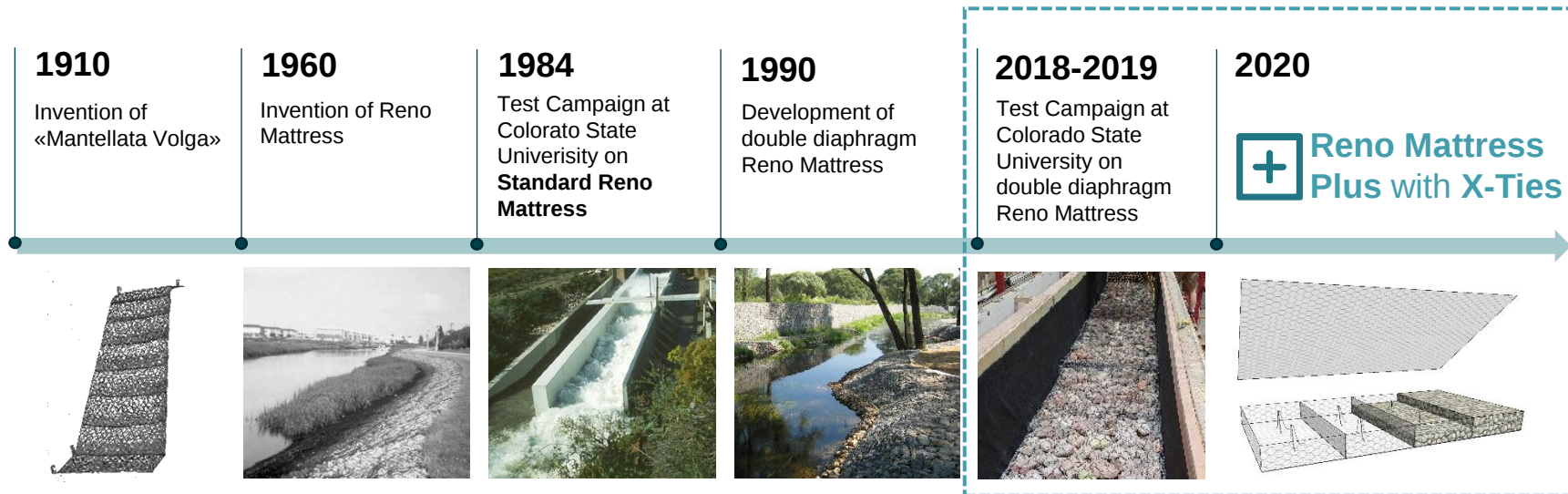
UP TO **73%**
MORE EFFECTIVE*



**reduction of bank protection thickness
compared to alternative solutions*

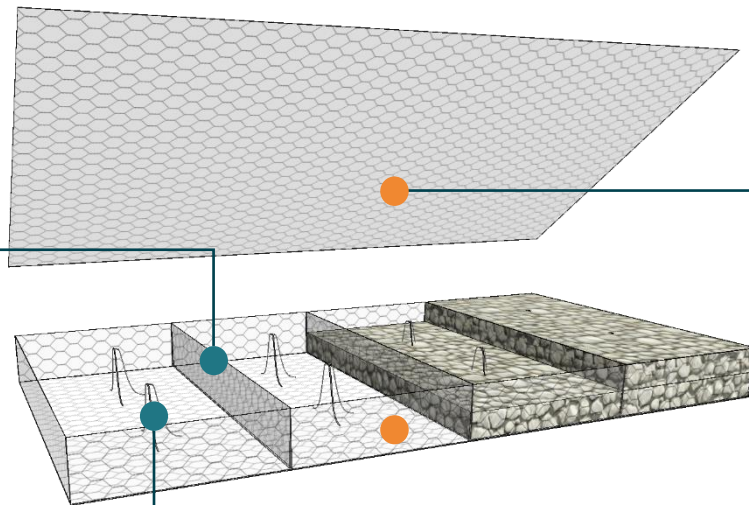
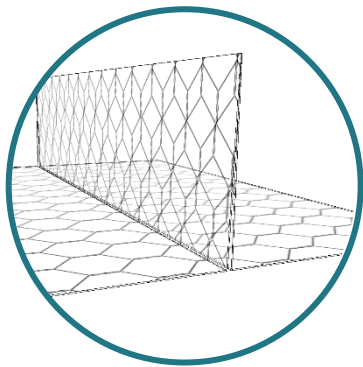


Experimental validation of field performance is of fundamental importance for Maccaferri. This is why we invest in obtaining **clear** and **comparable information** about the performance of our product.



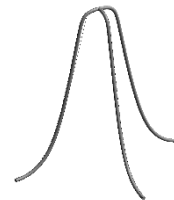
Reno Mattress Plus with X-Ties

Vertical standing double diaphragm make filling operation easier.



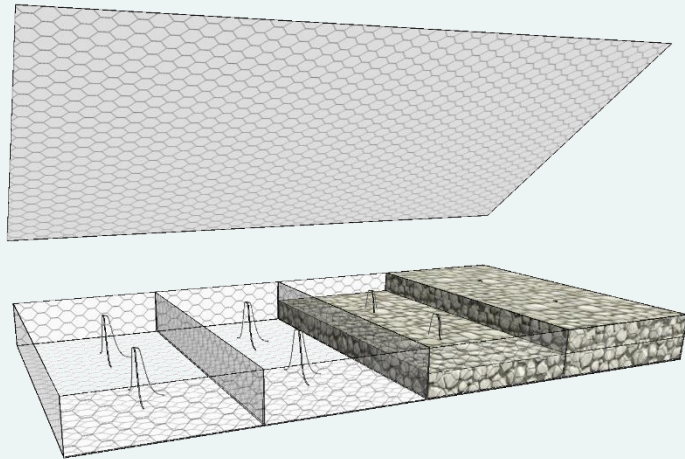
The **PoliMac®** coating gives outstanding protection against mechanical loads and chemical aggression.

X-Tie is the experimentally developed and patented tie to maximise the structural resistance of the mattress.





INNOVATIVE SOLUTIONS

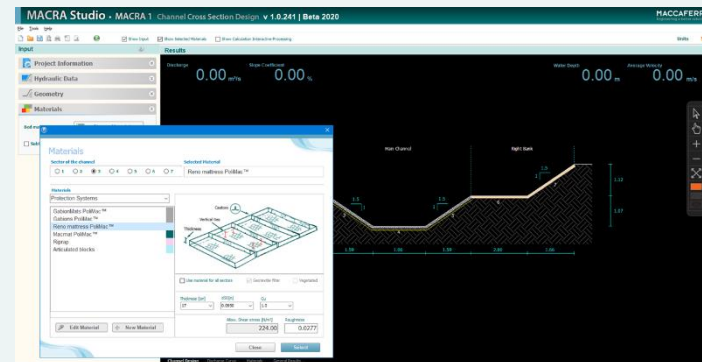


Reno Mattress Plus with X-Ties



UPDATED DESIGN SOFTWARE

MACRA is the software developed on the basis of experimental tests carried out at Colorado State University

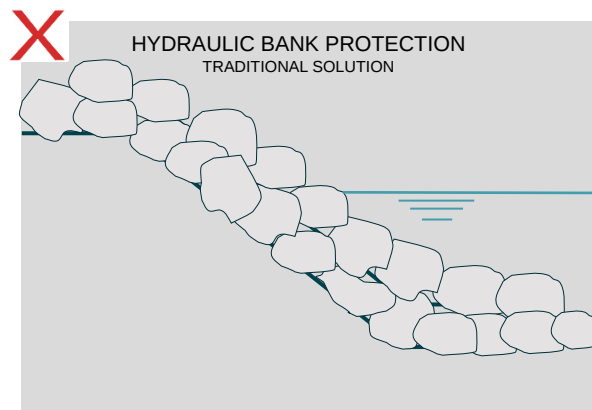


WHAT SETS US APART

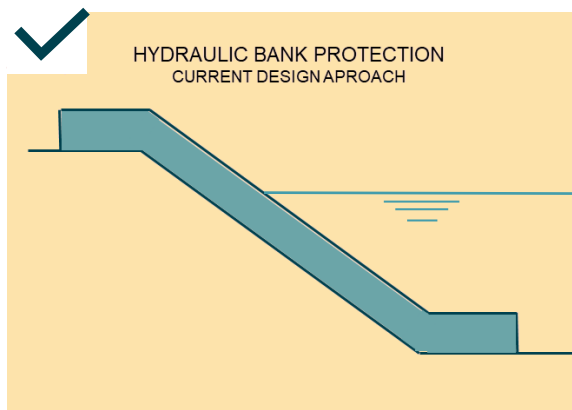
RENO MATTRESS PLUS BENEFITS

- M** MATERIAL REDUCTION
- M** ENVIRONMENTAL BURDEN REDUCTION
- M** INSTALLATION TIME REDUCTION

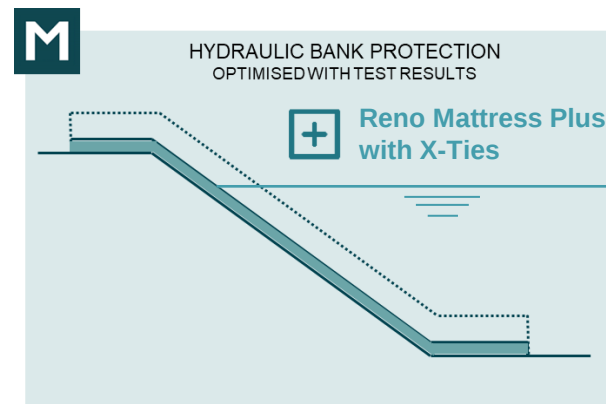




Traditional river bank protection constructed with **loose boulders** (riprap) require thick layers of materials to be effective. This is because the boulders are not confined and cannot be accurately placed resulting in the use of more stone and, consequently, an increase in environmental burden.

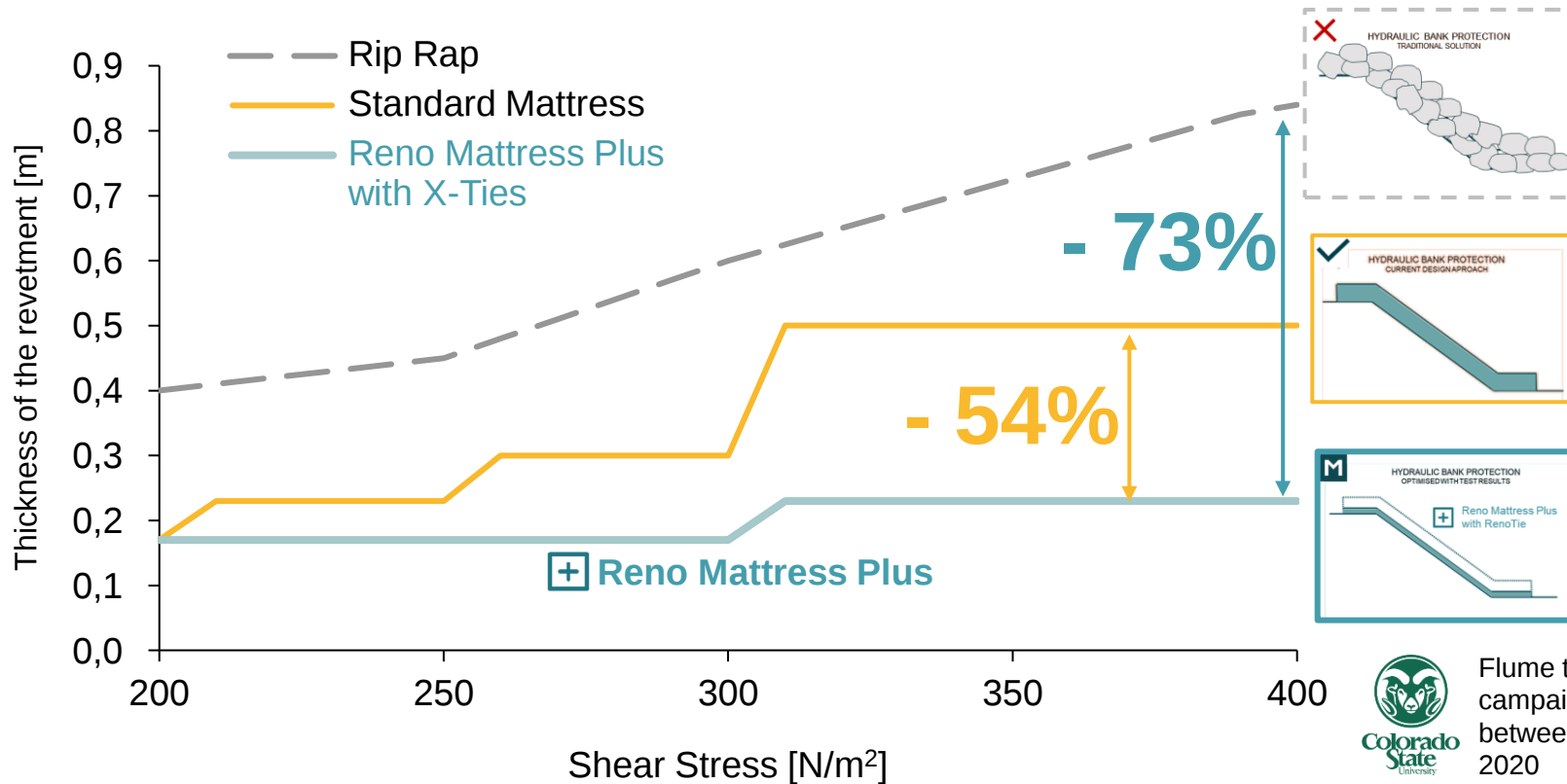


Standard Mattresses are over designed river bank protections compared to the actual load they are subjected to.



Reno Mattress Plus is the result of experimental tests. A deeper understanding of the performance of the mattress enable us to make more cost-effective designs that will give to our solutions an increase competitiveness in comparison to equivalent and alternative (traditional) systems.



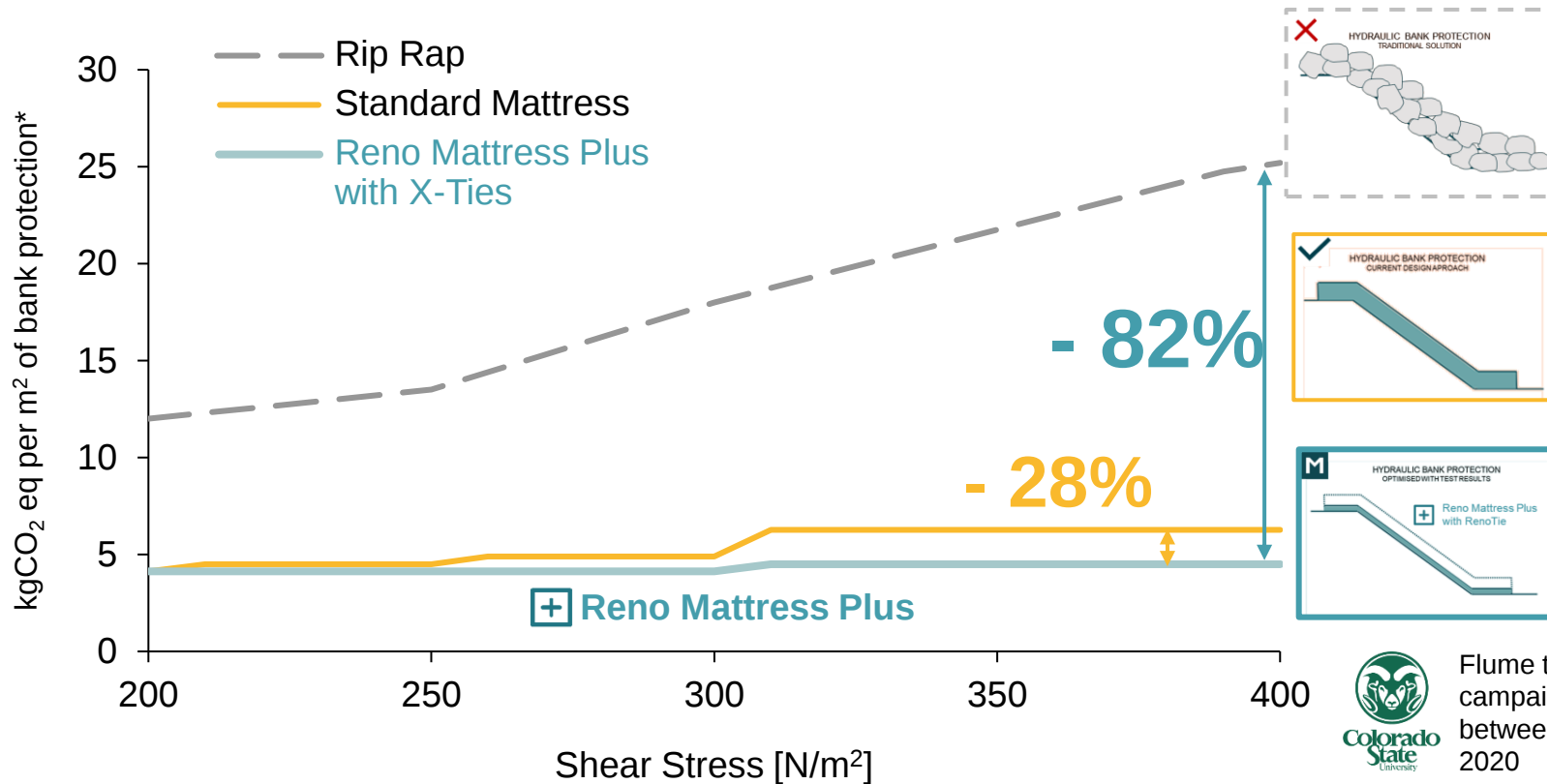


Flume testing campaign executed between 2019 and 2020



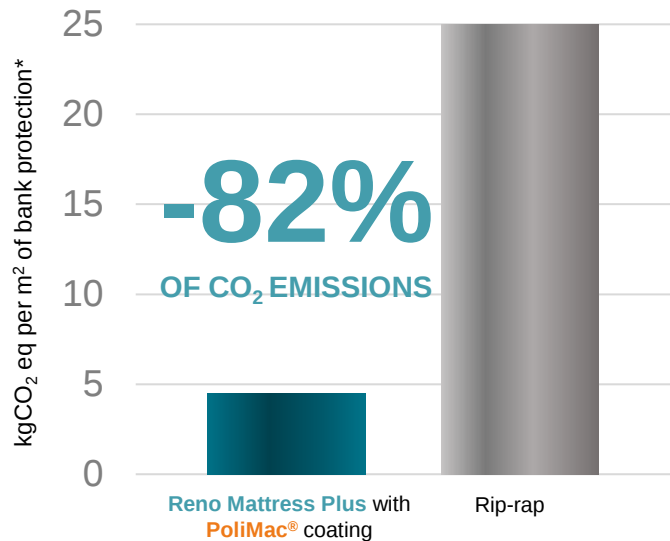
A photograph of a river with a Reno Mattress Plus structure installed on the right bank. The structure is a long, narrow, light-colored mat that extends into the water. The water is murky brown, and the surrounding area is green with grass and trees. The sky is dark and cloudy.

In application with high
values of shear stress,
Reno Mattress Plus is
over **73%** more efficient
than rip-rap



Flume testing campaign executed between 2019 and 2020





Reno Mattress Plus coated with **PoliMac®** decreases CO₂ emissions of 82% compared to Rip-rap solution



VS



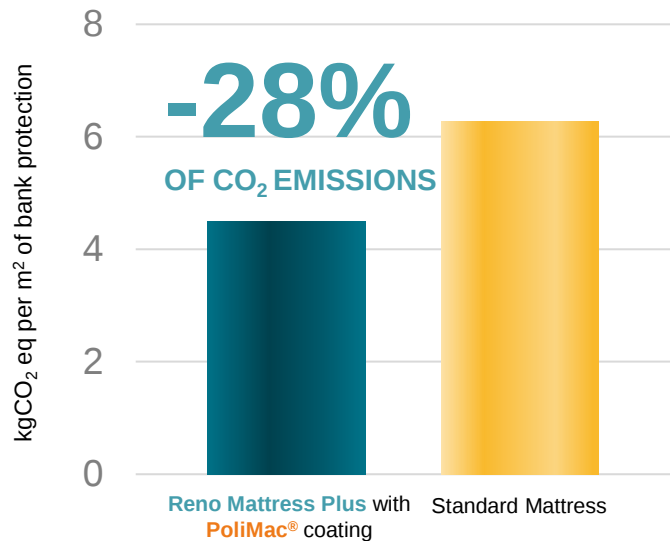
Reno Mattress Plus reduces environmental footprint of river bank protection. This is due to savings of materials, transport.

Since Reno Mattress enhance the vegetation growth, it additionally produce a carbon sequestration of 0.46 kgCO₂/m² per year**.

*Data are based on Environmental Product Declaration (EPD). Figures refer to specific field condition (shear stress 400 N/m²). Additionally, not considered in the graph, Reno Mattress enhances the vegetation growth further increasing the environmental benefit of the solution.

** APMC, 2012. *Carbon Footprint dei Gabbioni e Materassi Maccaferri e confronto con soluzioni tradizionali*





Reno Mattress Plus coated with **PoliMac®** decreases CO₂ emissions of 28% compared to Standard Mattress



Reno Mattress Plus with X-Ties further reduce the environmental burden in comparison to Standard Mattresses

Less stones means less CO₂ emissions, less truck movements





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“While there is a growing recognition that biological diversity is a global asset of tremendous value to future generations, the number of species is being significantly reduced by certain human activities”

United Nations

- M** Living species can find habitat in the stone interstitial spaces of **Reno Mattress Plus**
- M** Trees and flowers can grow through the **Reno Mattress Plus**



Reno Mattress Plus creates a natural habitat for living species, enhancing biodiversity through the protection of the benthos.

The interstitial spaces of the mattress offer a habitat for species that live in the transition zone between water and land.

Before



After



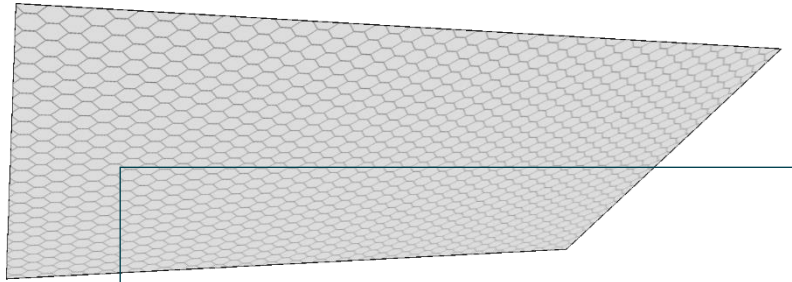
Benthos is the community of organisms that live on, in, or near the seabed, river, lake, or stream bottom, also known as the benthic zone.



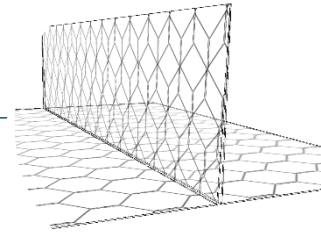
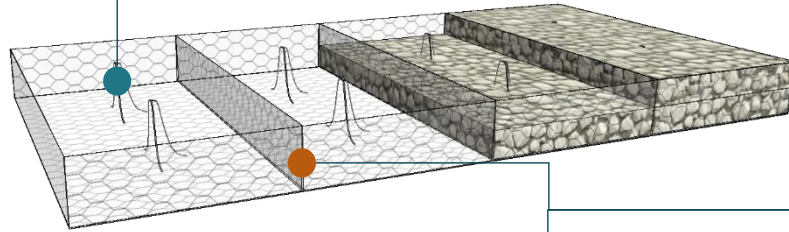


Installation Benefits: speed up onsite operations

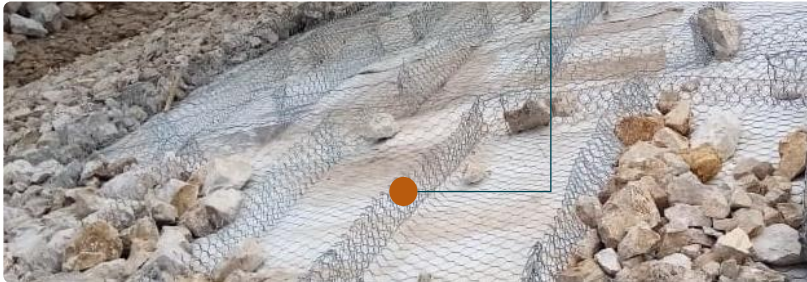
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X-Tie, the new self-standing tie developed to make installation easier and improve the structural performance of the mattress.



Reno Mattress Plus features robust double diaphragms which permit faster installation on steep slopes and minimise installation issues.



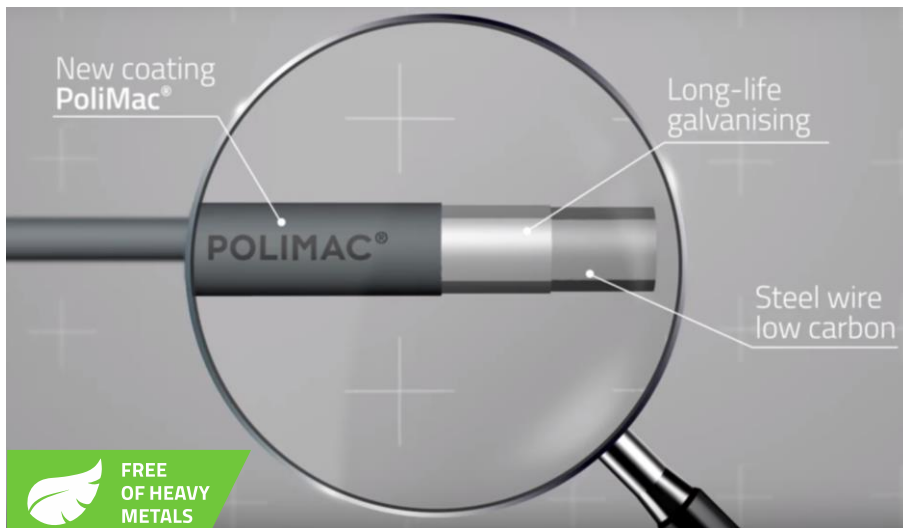
UNIQUE MATERIALS FOR UNBEATABLE PERFORMANCE



PoliMac®
WIRE PROTECTION FOR A CHANGING WORLD



Reno Mattress Plus is coated with **PoliMac®**, the revolutionary coating that can withstand the most aggressive environmental conditions.



PoliMac®
WIRE PROTECTION FOR A CHANGING WORLD



Better resistance to **abrasion**, including installation damage



Outstanding resistance to **chemical aggression**



Excellent performance in **cold weather**



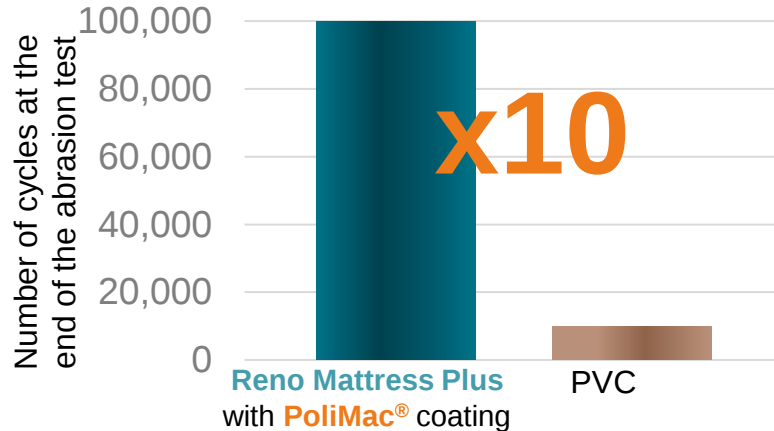
Proven resistance to **UV rays**



Reno Mattress Plus coated with **PoliMac®** is harder and more resistant than other systems with traditional polymeric coatings thus preventing damages.

PNEUMATIC PISTON

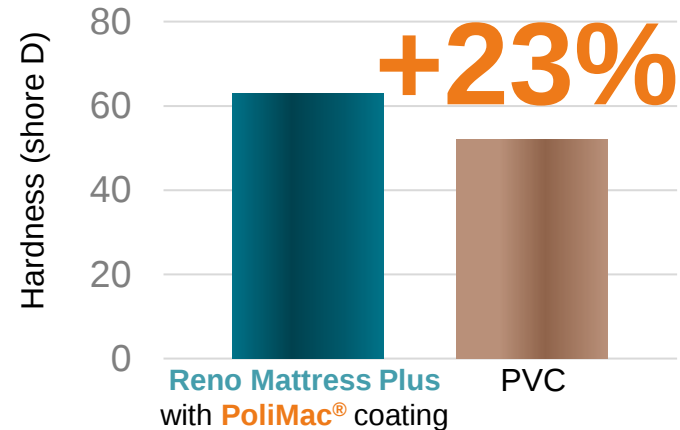
Adapted from the standard **EN 60229**
"Wires and Electrical Cables"



Reno Mattress Plus coated with **PoliMac®** offers 10x better abrasion resistance than traditional polymeric coating.

HARDNESS TEST

ASTM D 2240 "Standard Test Method for Rubber Property - Durometer Hardness"



Reno Mattress Plus coated with **PoliMac®** is 23% harder than traditional polymeric coating.

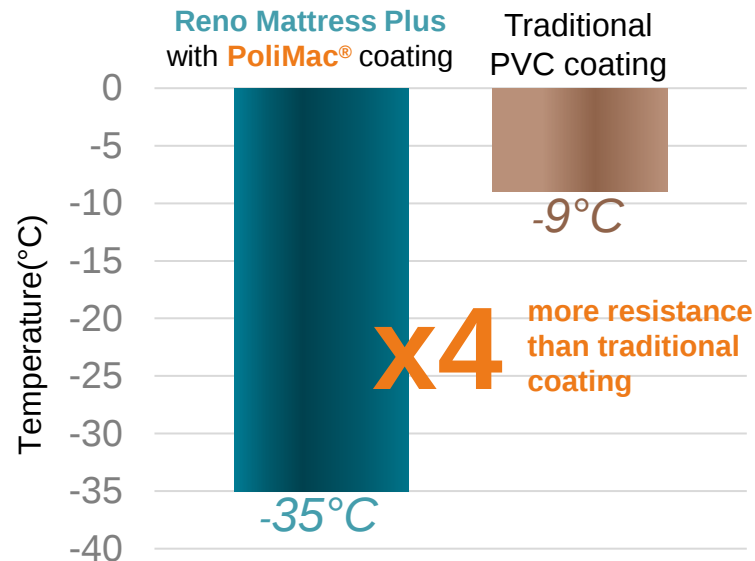


Reno Mattress Plus coated with **PoliMac®** offers an outstanding resistance to low temperatures, enhancing the durability and effectiveness of the bank protection in cold climates.



LOW TEMPERATURE BRITTLENESS

ASTM D 746 "Standard Test Method for Brittleness Temperature of Plastics and Elastomers by Impact"



PoliMac® protection maintains its properties right down to -35°C.

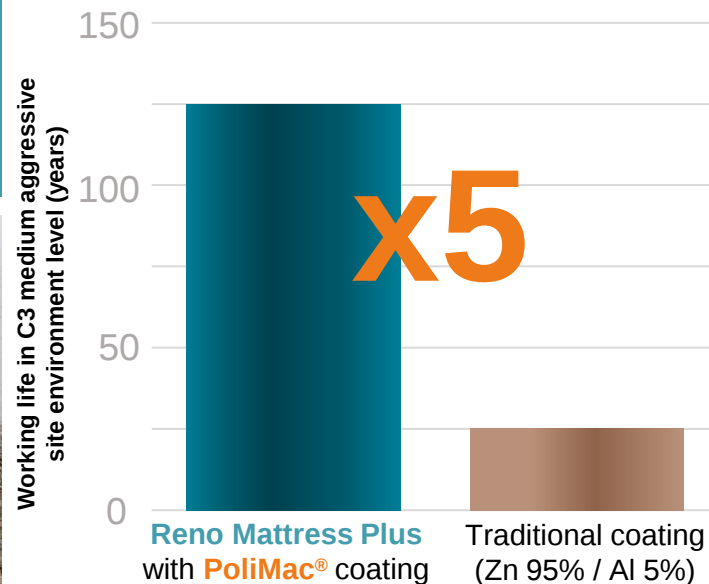


DURABILITY

PoliMac® coated **Reno Mattress Plus** is engineered to face the most aggressive environmental conditions.



Metallic wire shall not be used in very aggressive environment, including coastal areas and polluted zones (EN10223).



Reno Mattress Plus with PoliMac® coating has a working life **5 times** longer than traditional metallic coating in medium aggressive environments.



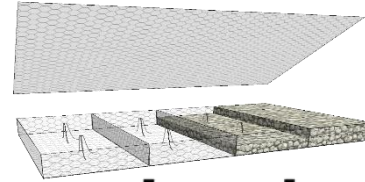


Not only **performance** certification but also to **environmental** and **digital** ones.



THE INTERNATIONAL EPD® SYSTEM

We provide reliable and comparable information on the product life cycle to allow the **environmental impact of our products** to be assessed by our clients.



bimstore

Our products are also available as certified BIM Model. BIM system **reduces design time and cost** and facilitates cooperation between project stakeholders

visit maccaferri.com/EPD

visit maccaferri.com/BIM





The UN set the SDG

We took on the challenge of achieving a better and more sustainable future for all.



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DESIGN THE CHANGE



*Brittlestars populating Reno Mattress,
South Africa*