

IMPROVING MATERIALS AND SOLUTIONS FOR CIVIL ENGINEERING APPLICATIONS

Design The Change concept started with 3-yr long R&D campaign that aimed at finding out a more effective solution to protect river banks from erosion.

The physical test campaign was conducted by **Maccaferri Innovation Center** in collaboration with **Colorado State University**. It led to the development of Reno Mattress Plus with X-Ties and PoliMac® coating, the most effective response to the future hydraulic engineering challenges.

MACRA Maccaferri River Analysis



Download MACRA software to design environmentally sound bank protection

EPD®

Certification Number SP 01466

Maccaferri is committed to communicate reliable and comparable information about the life cycle environmental impacts of products. Discover more at maccaferri.com/EPD



Our products are certified and tested by leading institutes and in accordance with the latest guidelines and standards (ETAG027, EN10223-3, ISO 17746, ISO 17745). Product certifications include CE mark, NF mark, COPRO mark, and BAFU-FOEN homologation for snow-barriers. For more information contact our certification office.



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Engineering a Better Solution

Maccaferri's motto is **'Engineering a Better Solution'**. We don't merely supply products, but work in partnership with our clients, offering technical expertise to deliver versatile, cost effective and environmentally sound solutions. We aim to build mutually beneficial relationships through the quality of our service and solutions.

GLOBAL ENGINEERS

In the second half of the 19th century we invented Gabions and dramatically changed civil engineering landscape. We are still changing today. We work every day to find better solutions for our clients at every degree of latitude and longitude. Our worldwide network grows through innovation and diversification of sectors of activity and through an increasing range of high quality and environmentally friendly products and applications.

OFFICINE MACCAFERRI GROUP PROFILE

Founded in 1879, our Group soon became a worldwide reference in the design and development of advanced solutions, with offices in over 70 countries and 30 factories worldwide.

Our mission is to pursue excellence through continuous improvement, while delivering to customers engineered solutions that are innovative, advanced and environmentally friendly. We are committed to outstanding safety, quality and sustainability, to create value for all stakeholders as well as our communities.

MACCAFERRI APPLICATIONS

 RETAINING WALLS & SOIL REINFORCEMENT

 HYDRAULIC WORKS

 ROCKFALL PROTECTION & SNOW BARRIERS

 EROSION CONTROL

 SOIL STABILIZATION & PAVEMENTS

 BASAL REINFORCEMENT

 COASTAL PROTECTION, MARINE STRUCTURES & PIPELINE PROTECTION

 ENVIRONMENT, DEWATERING & LANDFILLS

 DRAINAGE OF STRUCTURES

 TUNNELLING

 LANDSCAPE & ARCHITECTURE

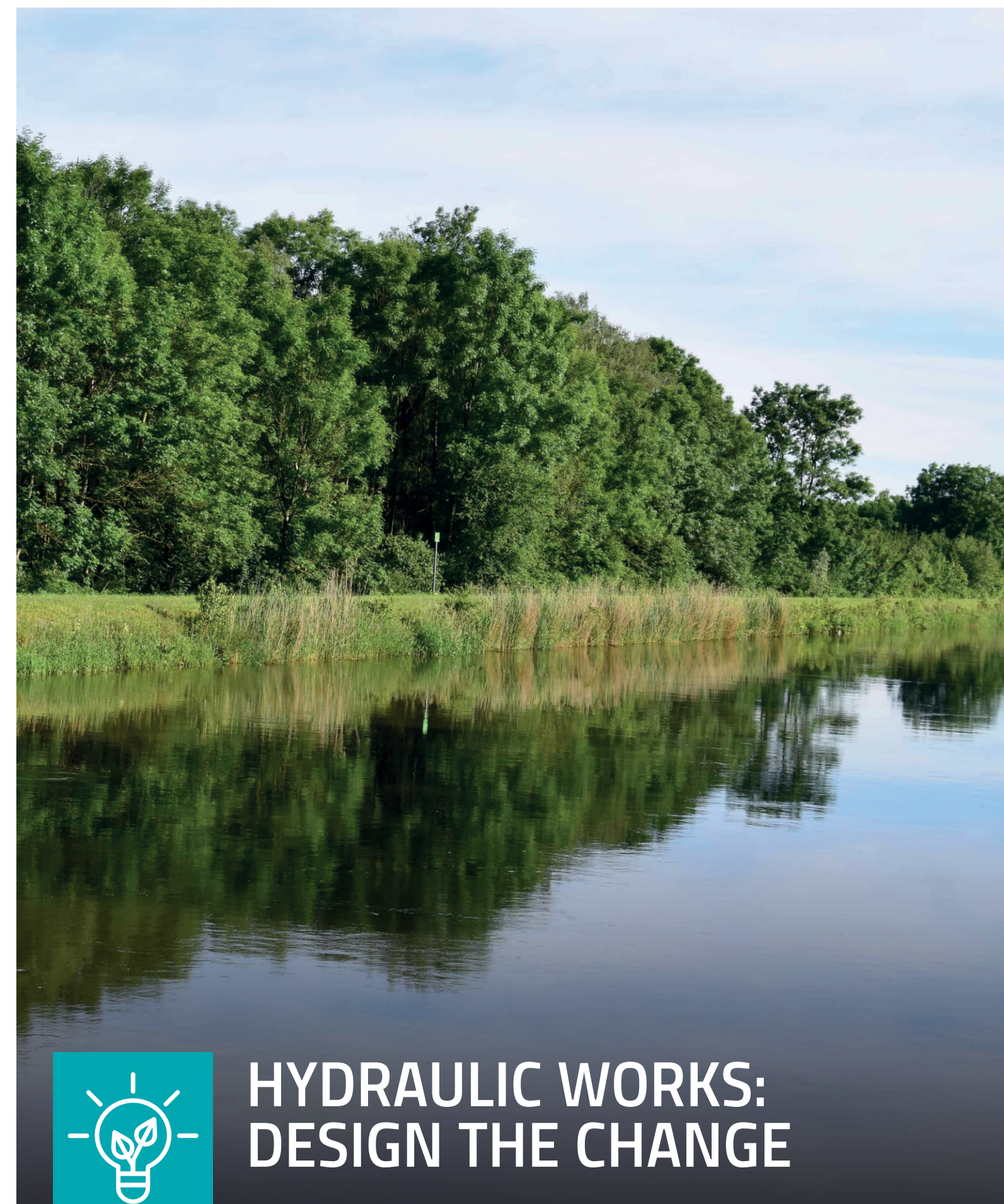
 SAFETY & NOISE BARRIERS

 FENCING & WIRE

 AQUACULTURE NETS/CAGES

 CONCRETE FLOORING, PRECAST & OTHER USES

 INDUSTRIAL MANUFACTURING



HYDRAULIC WORKS: DESIGN THE CHANGE

DESIGN THE CHANGE

The approach to watercourse management is increasingly considering social and environmental aspects along with the economical impacts of hydraulic structures.

Sometimes referred to as Green Infrastructure approach, the incorporation of the natural environment and engineered systems has proved to be effective to enhance community health and safety, ecosystems and to boost the economy.

Understanding of hydraulic engineering and watercourse ecosystems enables us to find a better balance between the demands of our societies and environmental equilibrium.

DESIGN THE CHANGE



RENO MATTRESS PLUS: NATURALLY BETTER

"The mastery of reducing the amount of material while improving the serviceability of the structure"

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.



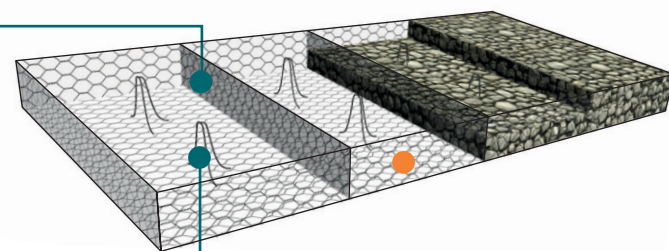
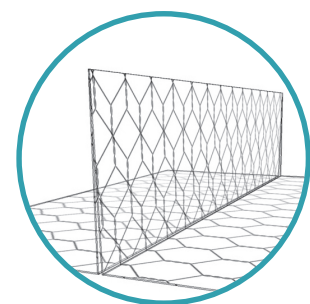
+ Reno Mattress Plus with X-Ties



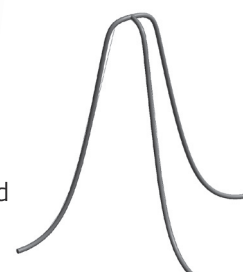
The **PoliMac**® coating gives outstanding protection against mechanical loads and chemical aggression.



Vertical standing double diaphragm make filling operation easier.



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

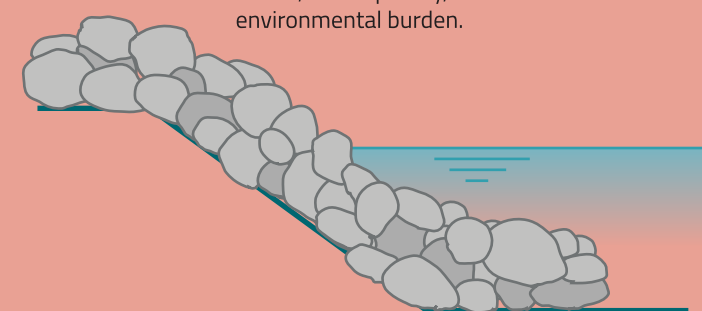


Download BIM from maccaferri.com/BIM or on **bimstore**



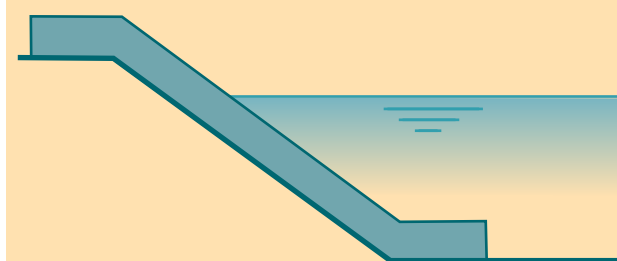
HYDRAULIC BANK PROTECTION RIP-RAP

Traditional river bank protection constructed with **loose boulders** (rip-rap) 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.



HYDRAULIC BANK PROTECTION STANDARD MATTRESS

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



HYDRAULIC BANK PROTECTION OPTIMISED WITH TEST RESULTS

Reno Mattress Plus is the result of experimental tests at Colorado State University. A deeper understanding of the performance of the mattress enables us to make more cost-effective designs that will give to our solutions an increased competitiveness in comparison to equivalent and alternative (traditionals) systems.

**OVER 70%
OF STONE SAVINGS
VS RIP-RAP**

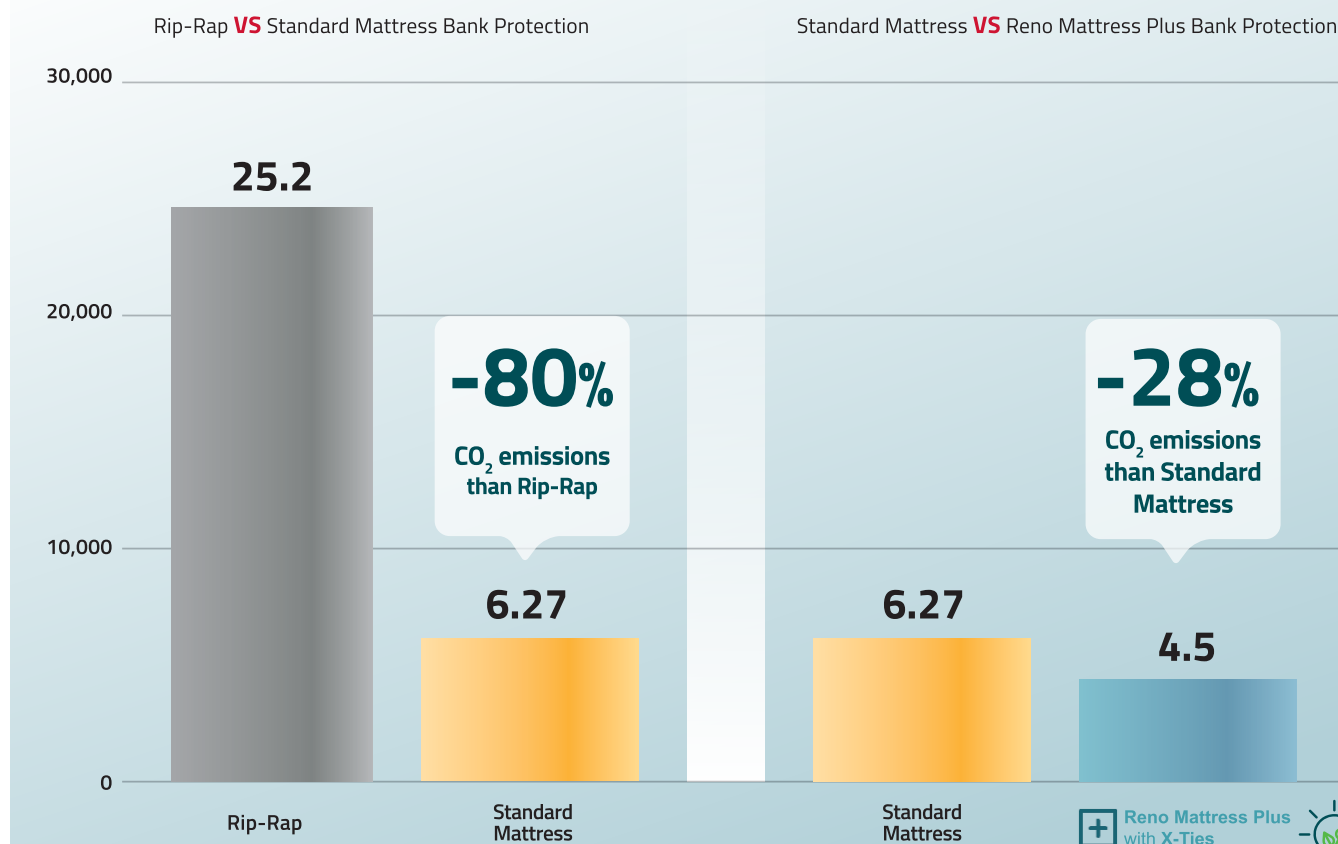
**OVER 50%
OF STONE SAVINGS
VS STANDARD MATTRESS***



*Figures based on experimental campaign run at Colorado State University (1984; 2019)

A GREEN THOUGHT DRIVES OUR SOLUTIONS

CO₂ (KgCO₂eq) emission for the construction of 1 sqm of river bank protection.



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.