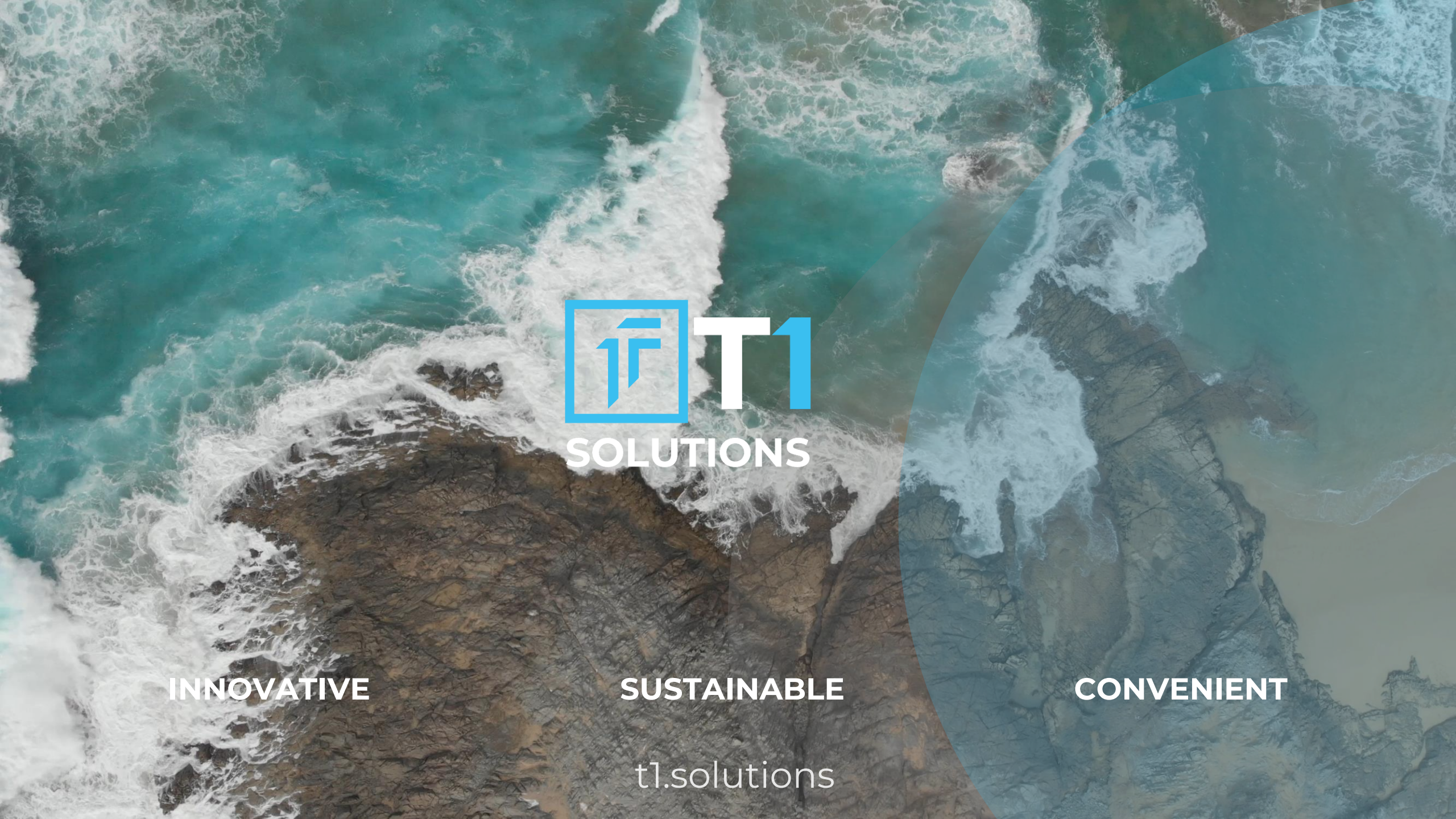

T1
SOLUTIONS
INNOVATIVE
SUSTAINABLE
CONVENIENT
t1.solutions

T1 SOLUTIONS

Shareholders

cdp
Fondo Nazionale Innovazione
CDP Venture Capital Sgr

a|impact

Selected Investments

LIFT
GIVING IDEAS THE HIGHEST VALUE

Certifications

eni

MINISTERO DELL'AMBIENTE E DELLA TUTELA DEL TERRITORIO E DEL MARE
ITALY

RINA

Università di Genova

ULPGC Universidad de Las Palmas de Gran Canaria
SPAIN

Ohmsett
US

TUHH Technische Universität Hamburg

NOSDRA
NIGERIA

Cedre
FRANCE

SEAL OF EXCELLENCE
EU

The Oil & Gas Technology Centre
UK

ASTM INTERNATIONAL
GLOBAL

Associations

ALIS
ITALIA IN MOVIMENTO

CONFITARMA
Confederazione Italiana Armatori

UK & Ireland Spill Association
THE VOICE OF THE SPILL INDUSTRY

ONBOARD OIL MANAGEMENT

The **management of on-board oils** and related spills represents an activity of primary importance in order to ensure high standards of safety and environmental protection

In routine activities, oil is usually recovered through the use of **rags**.

ROUTINE LEAKS

ONBOARD POLLUTION

Regulation 37 of MARPOL Annex I requires oil tankers of 150t gross tonnage and above and all ships of 400t gross tonnage and above to have an **approved SOPEP plan for oil pollution.**

Thus, there are **two different product configurations** for the same activity. Although the **SOPEP** is **more performant than the rags**, committing it for routine activities would represent an **excessive cost to the shipowner**.

FOAMFLEX: INNOVATION AND GREEN TRANSITION

T1 Solutions patented

FoamFlex
HYDROCARBON ABSORPTION TECHNOLOGY

A unique absorbent material that can replace rags and SOPEP plan

- **Higher performance**
- **Operational benefits**
- **Cost reduction**
- **Environmental sustainability**

FOAMFLEX vs SOPEP

Traditional polypropylene **SOPEP** is **better performing than rags**:

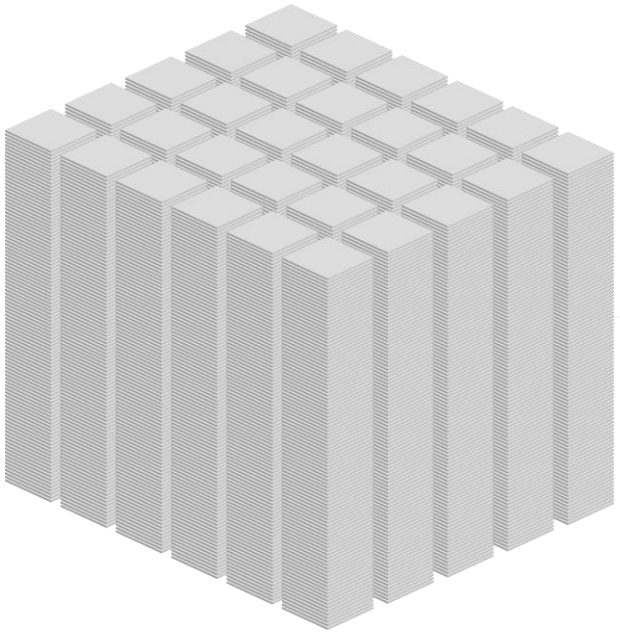
- Is composed of polypropylene that can **selectively absorb oils** versus water
- It has a significantly higher absorptive capacity (g/g)

In the performance analysis of FoamFlex, therefore, polypropylene is taken as a benchmark

- **Oil absorbing capacity** increased by **200%** compared to conventional SOPEP
- **Superior tensile strength** enabling long service life: **770 Newtons/m vs. 30**
- Functional on **any type of oil** (synthetic, mineral, vegetable, fuels, lubricants,..)
- More effectively retains the oil inside, **reducing dripping**

FOAMFLEX vs POLIPROPILENE

3.000
Polypropilene Mats



FoamFlex
HYDROCARBON ABSORPTION TECHNOLOGY

VS

SAME ABSORPTION CAPACITY

x 200
Performance

1/300
Volume

OPERATIONAL BENEFITS

SIMPLE

Easy to use and reuse with **long service life**

EFFECTIVE

Effective and fast in case of machinery leaks that cannot be stopped immediately

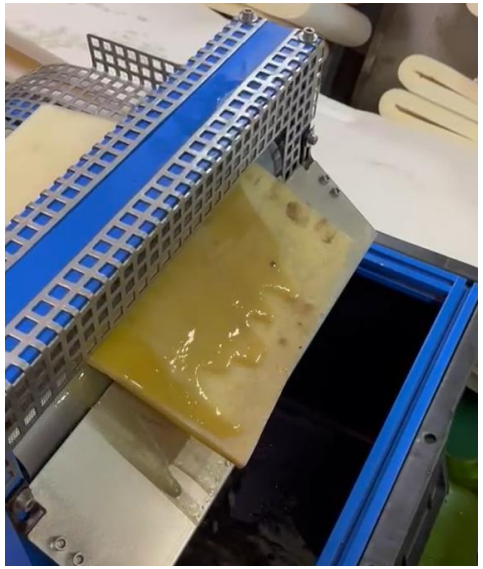
EFFICIENT

Reduces the time required for oil recovery operations, **significantly decreasing man hours**

ADAPTABLE

Adapts to any operational need and can be **customized at the moment according to dimensional requirements**

FIELD OPERATIONS (1/2)



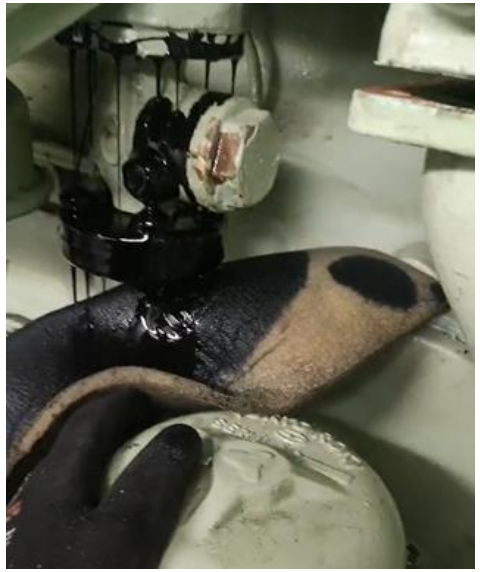
[Link Video 01](#)

Stern ice: oily surface with water. FoamFlex cloth deployment and associated wringing.

[Link Video 02](#)

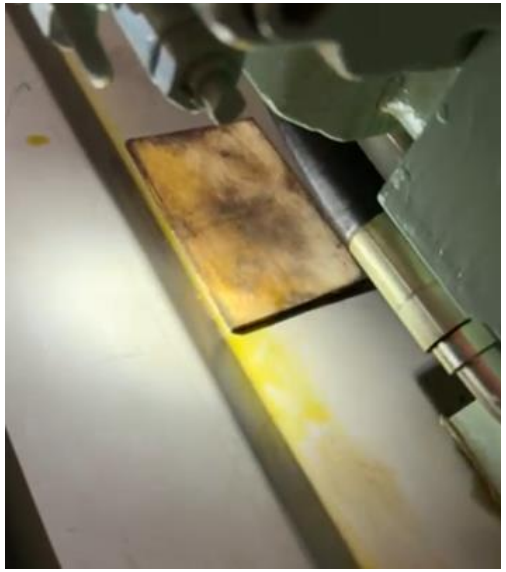
[Link Video](#)

Squeezing oil from FoamFlex carpet



[Link Video](#)

Oil recovery from leakage



[Link Video](#)

Oil recovery in tight space

FIELD OPERATIONS (2/2)

FoamFlex **freshly cut to size** to safeguard the operation of replacing gaskets diathermic oil heating system

FoamFlex pad reused numerous times. Upon receipt of the video it did not reach end-of-life and equated 50 rags that would have been disposed of.

Link Video

FoamFlex mats operational at sea in Tier3 incident.

Link Video

FOAMFLEX vs RAGS

FLEET SIMULATION (Total values on N ships with average LOA 128 m and average DWT 15,000 T)		
SUPPLY ACQUISITION COSTS	**RUGS**	**FOAMFLEX**
Cost per kg absorbent material	2 €	250 €
Annual purchase of oil absorbents (Kg) per ship	500	8
Number of ships in fleet	10	
Annual absorbent purchase for oil handling (Kg)	5.000	80
Total absorbent capacity full supply (L)	30.000	112.000
Annual absorbent purchase cost for entire fleet	10.000 €	20.000 €
Cost of ancillary machinery per individual ship	-	2.000 €
Years machinery depreciation	-	5
Annual machinery cost breakdown		400 €
Total machinery cost over entire fleet	-	4.000 €
Total annual purchase cost	**10.000 €**	**24.000 €**
DISPOSAL COSTS	**RUGS**	**FOAMFLEX**
Average oily solid waste disposal cost (per kg)	2 €	
Kg tot used absorbent material to be disposed of as oily solid waste	35.000	88
Total absorbent disposal cost	70.000 €	176 €
Average liquid waste disposal cost (per cubic metre) - BILGE	119 €	
Average liquid waste disposal cost (per Liter)- BILGE	0,12 €	
Liters of tot oils to be disposed of	-	112.000
Percentage oil recovered post wringing and reusable	-	0%
Liters of reusable recovered oil	-	0
Total oil disposal cost	-	13.328 €
Total annual disposal cost (oils + solids)	**70.000 €**	**13.504 €**
Price per Liter of virgin oil (lubricant)	5 €	
Savings generated by oil reuse (Revenue +)	**-**	**0 €**

TOTAL ANNUAL COST PER N SHIPS FOR PURCHASE AND DISPOSAL	**80.000 €**	**37.504 €**
COST REDUCTION (%)	**53%**	
SAVINGS GENERATED	**42.496 €**	

Taking into account all expenses, from purchase to disposal of FoamFlex kits, and calculating only 35% of the 200 possible reuses, this results in an average **cost reduction per ship of 50-70% compared to traditional mops**

Variable data

Cost simulation excel sheet available upon request, customizable to shipowner company's current costs

ENVIRONMENTAL SUSTAINABILITY

In addition to ensuring **higher safety standards and effective management of potential spills**, FoamFlex is a basic requirement for **environmental and marine ecosystem protection**.

Foam Flex vs Polypropylene
Life Cycle Assessment

Vedi Annex

- 99,5 % CO_2 **REDUCTION**

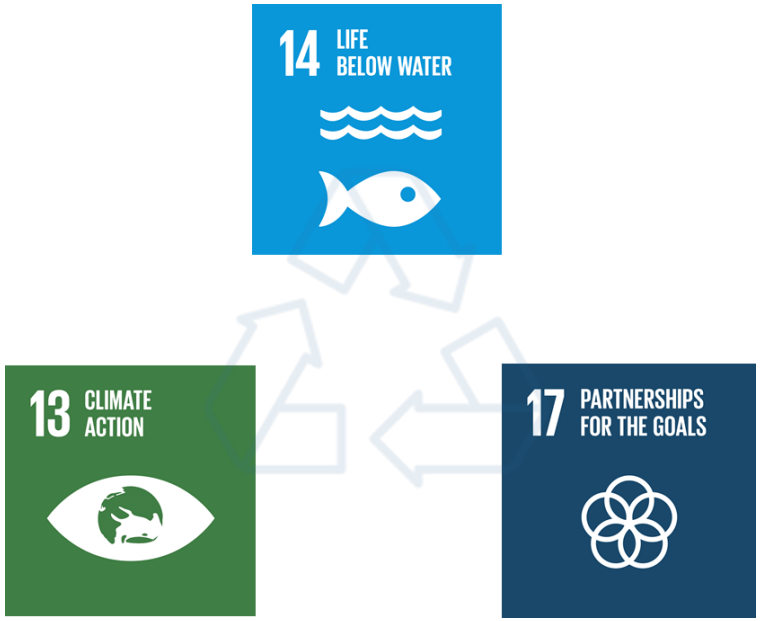
- 99,8 % **CARBON FOOTPRINT (CFP)**

RINA
LCA and CFP comparative report

eni *ENI approved*

More and more **shipowners, ports and infrastructure are adopting FoamFlex to raise sustainability standards**.
See the attachments to explore our successful initiatives.

FOAMFLEX E CORPORATE REPUTATION



Protection of the marine ecosystem

Due to its high performance and ease of use, FoamFlex has been successfully used in numerous hydrocarbon spills

Circular Economy

Due to the reuse of absorbent material and the possibility of recovering intact oil, there is total reuse of resources, minimizing waste

Net zero

The LCA-GHG study carried out by Rina showed that the use of FoamFlex compared to traditional methods reduces emissions by 99 percent

RINA GREEN PLUS

Major Italian ports are beginning to include this type of reusable material as a requirement.
FoamFlex is thus beginning to become a mandatory standard for major ports operated by the Italian government

Source of "waste" pollution: "use of hydrophobic and oleophilic polyurethane absorbent materials for oil cleaning, reusable at least **10 times**"

GREEN PLUS RINA

+ 5 points

RAGS & SOPEP

FoamFlex
HYDROCARBON ABSORPTION TECHNOLOGY

NON-SELECTIVE RAGS, RECOVER WATER AND OIL INDISCRIMINATELY SORBENTS WITH **REDUCED ABSORBENT CAPACITY** (13L x KG)	EFFICIENCY	**SELECTIVE ON OIL** **HIGH ABSORBENT CAPACITY** (25/30L x KG x 200 times)
SINGLE-USE **FREQUENT REPLACEMENT**	DURATION	**REUSABLE UP TO 200 TIMES** (BY SIMPLE WRINGING) **LONG SERVICE LIFE, LOW TURNOVER**
HIGH VOLUME IN STOCK **HIGH VOLUME SOLID WASTE MANAGEMENT**	FOOTPRINT& VERSATILITY	**UNIQUE CUSTOMIZABLE PRODUCT** FOR EACH OPERATION, **1/3 VOLUME** **SIGNIFICANT SOLID WASTE VOLUME REDUCTION**
HIGH AMOUNTS OF SOLID WASTE TO BE **DISPOSED OF BY WEIGHT** (2-3€/KG)	COSTS	SOLID WASTE REDUCTION. **RECOVERS REUSABLE INTACT OIL.** **TOTAL COST REDUCTION OVER 50%.**
EMPLOYMENT OF MAN HOURS TO SELECT SUITABLE RAGS. **LOW EFFECTIVENESS; SLOW; FREQUENT REPLACEMENT**	REQUIRED TIME	**PRACTICAL, FAST, LOW REPLACEMENT**
INEFFECTIVE MANAGEMENT OF OILS, INCREASED RISK OF POLLUTION, SINGLE-USE PLASTICS, **EXTENSIVE CREATION OF SOLID WASTE**	SUSTAINABILITY & CORPORATE REPUTATION	**CIRCULAR ECONOMY, CARBON FOOTPRINT ABATEMENT** (-99.8% CO2), **WHOLE OIL RECOVERY**

Annex

WATER DEFENDERS ALLIANCE

Every action matters, every gesture is a drop.
And the sea is the sum of our drops.

The **Water Defenders Alliance** promoted by LIFEGATE respond to the problems of our waters, identifying the main challenges and proposing concrete, impactful and measurable solutions that can be put on the ground, or rather in the water.

Click here
to discover more

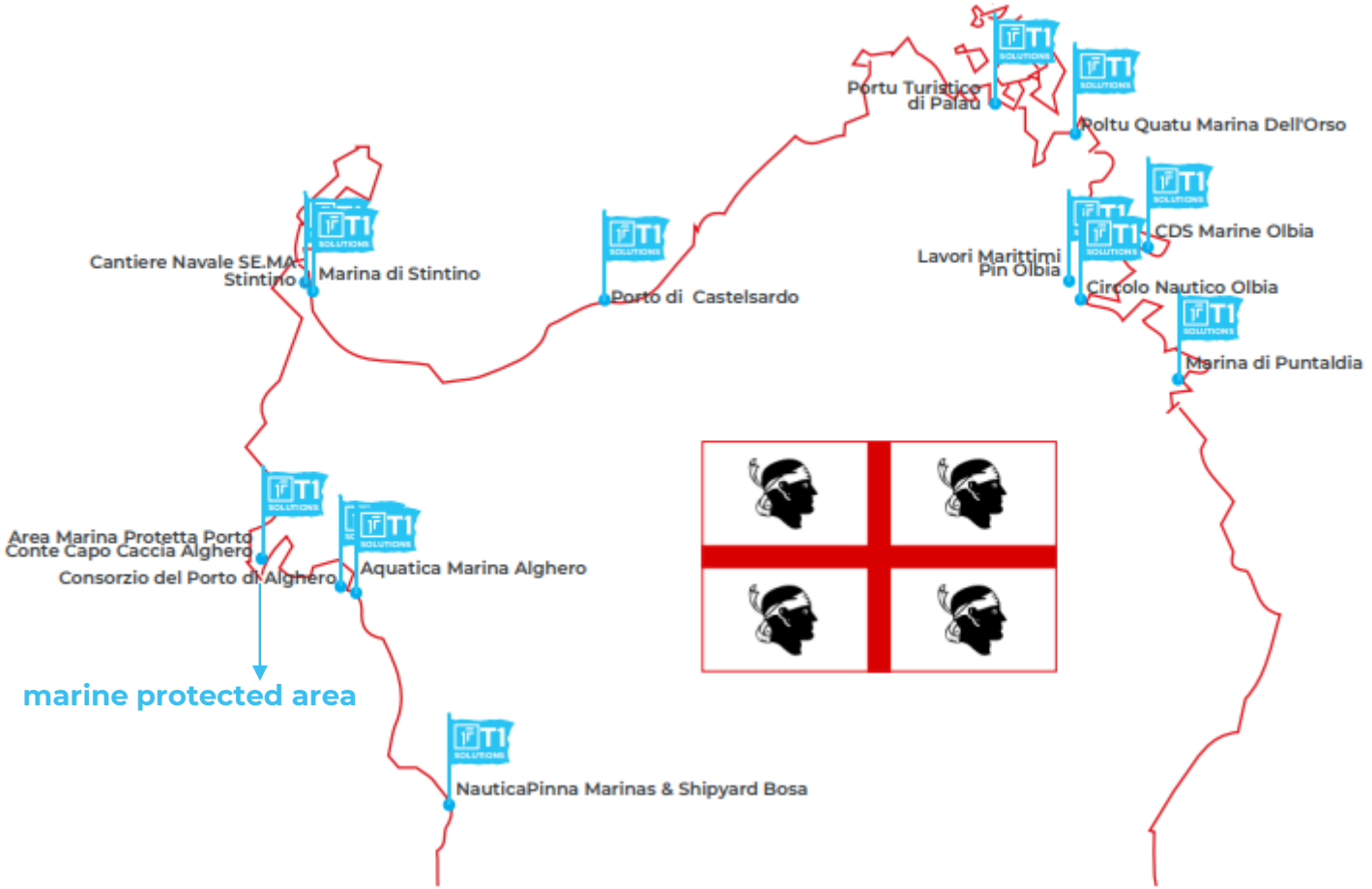
Water Defenders Alliance

Everyone has a crucial role to play

- Innovative companies can be part of the solution
- T1 provides the technological innovation
- Ports can host them
- People can actively partecipate in monitoring activities and stimulate institutions to establish more effective regulations for the protection of our seas.

The purposed solutions can range from **capturing** floating waste and **hydrocarbons in the water**, engaging in habitat restorations activities that aim to restore the increasingly fragile marine biodiversity in **99 ports** and **4 protected marine areas**.

WE ARE PROTECTING SARDINIA



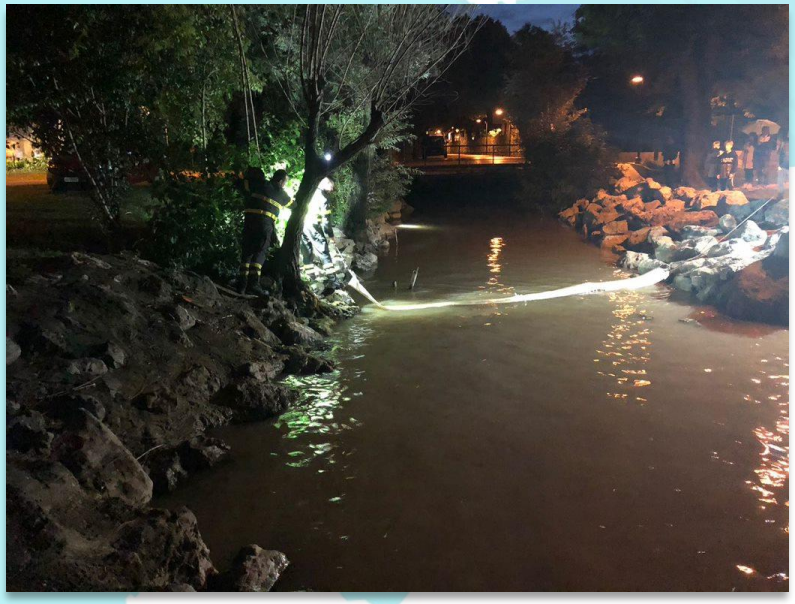
Through our network of suppliers we have reached ports in northern Sardinia in Italy. Commercial activity has focused on:

- Changing the current **remediation paradigm**
- **Spill prevention** activities & furniture, training
- Raising awareness of both **environmental and economic sustainability** issues
- Ability to intervene extensively throughout the northern region

Oil spill in Canton Ticino, Switzerland

User: Fire Brigade
Location: Switzerland
Year: 2021
Need: Containing the spillage of a diesel tank into the Ticino River
Adopted Solution: Carpets and Wringer
Result: Cleaning the river and collecting the diesel fuel.

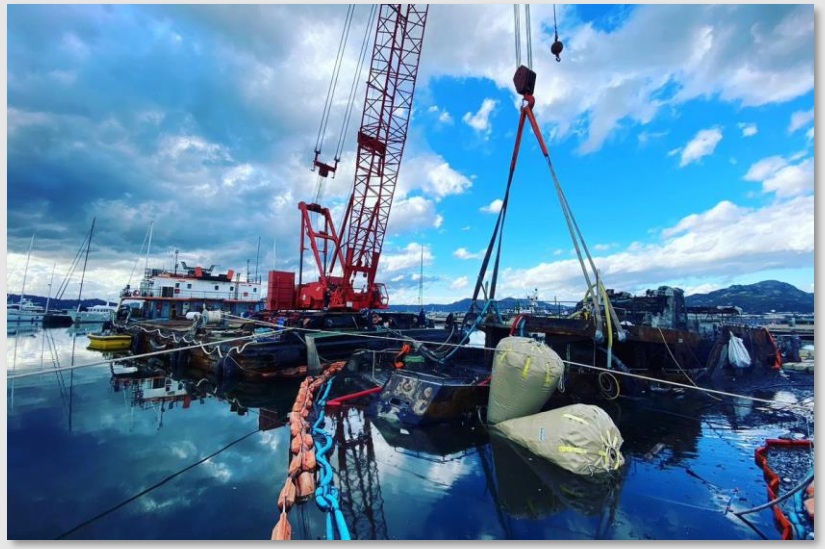
Oil spill in Garda Lake, Italy



User: NBCR Brescia
Location: Lake Garda
Year: 2018
Need: Contain spillage from a tank into an irrigation ditch that has direct path to the lake
Adopted Solution: Mats and Wringer
Result: Cleaning the irrigation ditch and collecting hydrocarbon

Oil spill in Palau, Italy

User: Port Authority
Location: Palau
Year: 2021
Need: Contain spillage due to the sinking of a tourist boat
Adopted Solution: Containment barriers, mats and Wringer
Result: Cleaning the sea and collecting spilled diesel



Oil spill in Portici, Italy

User: Harbour Master
Location: Portici
Year: 2022
Need: Contain spillage in port area
Adopted Solution: Containment barriers, mats and Wringer
Result: Cleaning the sea and collecting spilled hydrocarbons

UNIVERSITY CONCLUSION

“FoamFlex is **highly effective** in **removing** diesel and crude oil from water. **Comparison with polypropylene shows superior performance of the FF** both as regards the **absorption capacity** and the possibility of **reusing** the material after squeezing. Economic considerations also show **advantage in economic terms**, related not only to the **greater absorbency**, but especially to the **possibility of reusing** the adsorbent material (up to 200 times), unlike the PP, and **recovering** the **spilled product** unaltered. This leads to the **dual benefit** of a considerable **reduction** in the quantity of **product** to be **disposed** of and the possibility of economically **valorising** the **recovered oil**.
FoamFlex is a **cost-effective** and **environmentally-friendly** solution for oil spill. The study provides valuable insights into the performance of FoamFlex and its potential as a solution for oil spill cleanup.”

Journal of environmental and chemical engineering ScienceDirect

TUHH
Technische
Universität
Hamburg

“Finally, **deployment** examples in **real conditions** are shown, where it proves to be a **flexible**, highly **reusable**, and **cost-effective** alternative to materials already in use. It was also shown that, after 50 cycles of sorption and desorption, there is no significant decrease in the recovery rate and no material deformation.”

Journal of Marine Science and Engineering Journal of Marine Science and Engineering

ULPGC Universidad de Las Palmas de Gran Canaria