Clean Sea Technology

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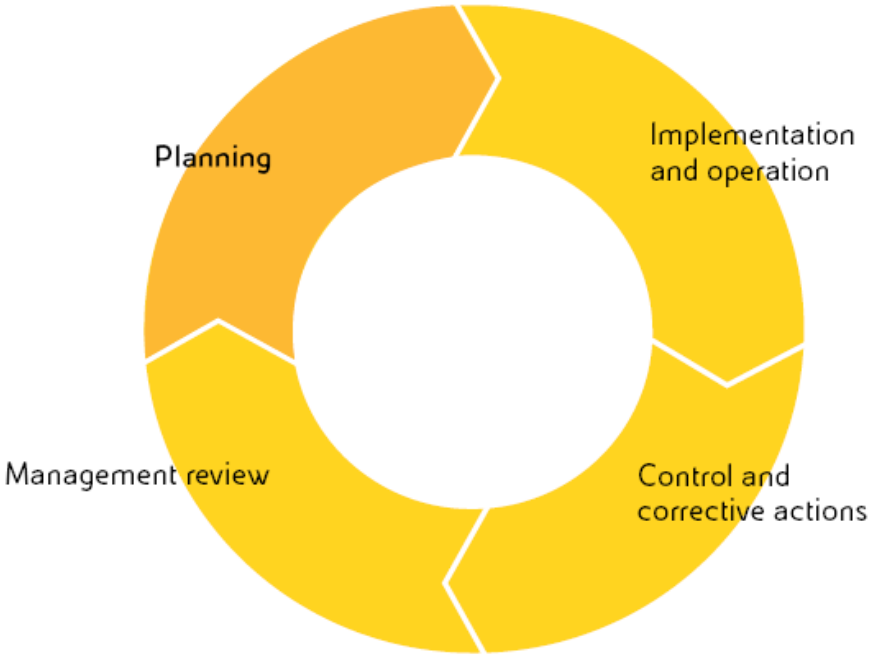
eni HSE Management System

Environmental Management

- in conformity with International Agreements and Standards and respecting the laws, regulations and National policies of the host Countries the **Environmental Management** (as part of a broader **HSE Management System**) is based on the principles of prevention, protection, information and participation and has as its main aims:
  - the identification of environmental issues and the **adoption of the best technologies**;
  - the mitigation of environmental impacts;
  - the use of a system for the **prevention of adverse environmental events, direct and indirect**, linked to the specific activities of production units;
  - the adoption of **site-specific methodologies** for the protection of the environment and biodiversity.



Clean Sea System

Clean Sea, an advanced autonomous underwater robot, is a product of eni Research Activities. Designed for environmental monitoring, protection and asset integrity inspection, it has already been tested in several marine environments.

Proprietary eni technology fully deployed for business, tailored around company present and future requirements.

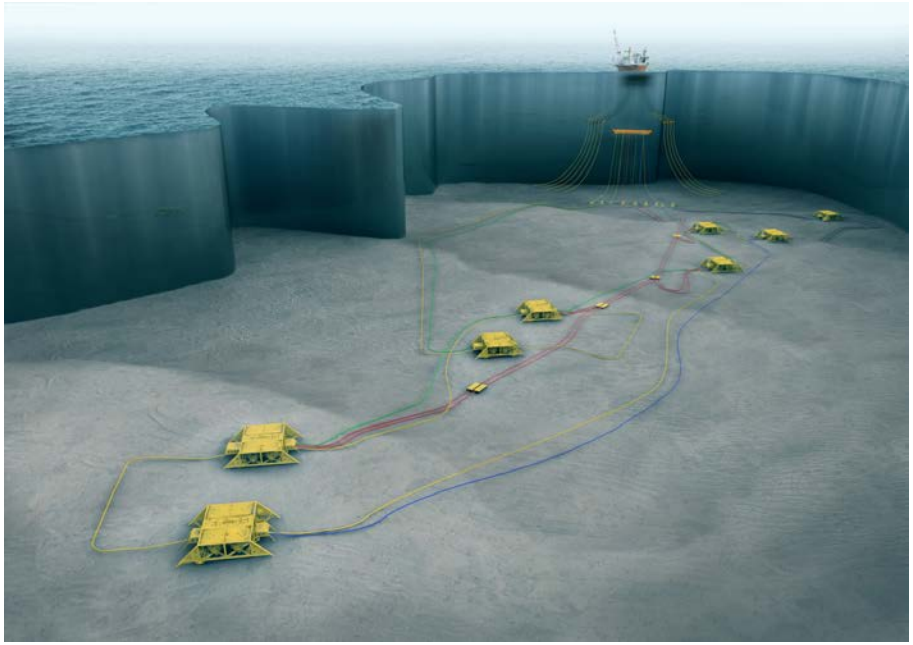
Clean Sea Features

- Environmental characterization & water sampling
- Seabed survey (visual, acoustic & bathymetric inspection)
- Visual inspection of structures and subsea installations
- Automatic Pipeline Tracking

Clean Sea Technology

Key elements of the technology

- improved marine environmental protection by enhancing quality & quantity of data
- interchangeable mission payload to accomplish many tasks by a single system
- capability to change mission strategy in real time, optimizing survey duration
- possibility to be operated either as AUV (autonomous) or as ROV (surface controlled)
- water depth operability limit 3000 m ; battery duration 12 h in AUV modality

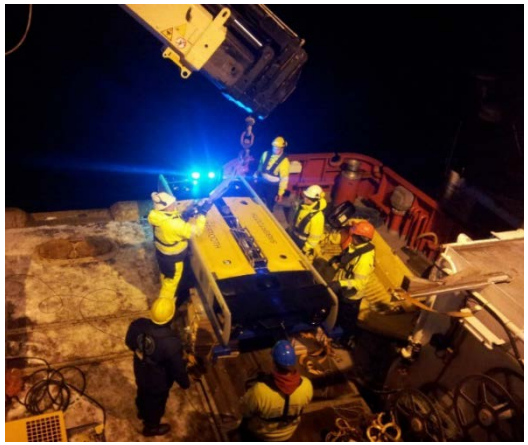


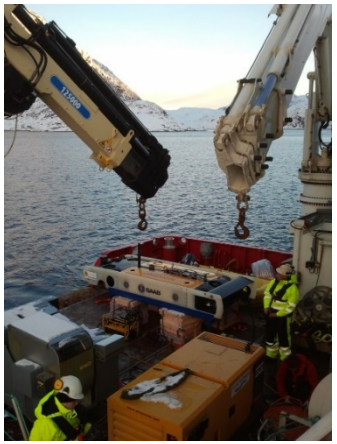
Major Advantages

- low logistics
- cost-effectiveness
- flexibility
- on-board intelligence

Clean Sea Project Storyline

- Proof of concept in 2010
- R&D project executed in two years (2011-2013)
- Clean Sea commissioning in Hammerfest, Norway in October 2013 (first open sea application)
- Offshore trials to integrate new features in 2014:
  - ✓ trials in Caspian Sea (ice free area offshore Bautino and around Kashagan)
  - ✓ offshore Sicily (Perla and Prezioso field)
- Offshore campaign in Mediterranean Sea in 2015:
  - ✓ environmental surveys
  - ✓ visual and acoustic surveys for asset integrity on platforms and 50 Km pipelines



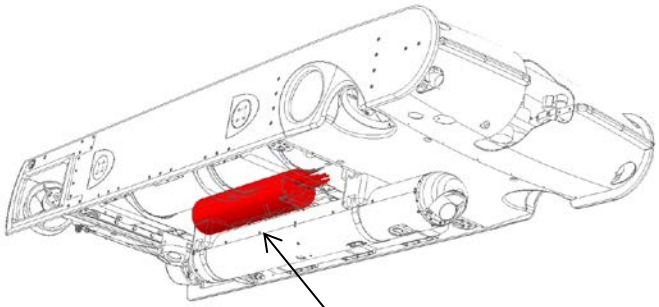


Clean Sea: from research to industrial application

- In 2016 Clean Sea will continue to operate for marine environmental monitoring and offshore asset inspection in the Mediterranean region and West Africa
- Eni will establish two logistics bases, one in West Africa and the other in Italy for the Mediterranean region, with a dedicated operative team to cover Worldwide routine activity
- A future development will pursue integration of an autonomous subsea resident robot concept, capable to operate from subsea templates and perform continuous environmental monitoring (4D) without supporting vessel: first feasibility study of this resident system was carried out for Goliat

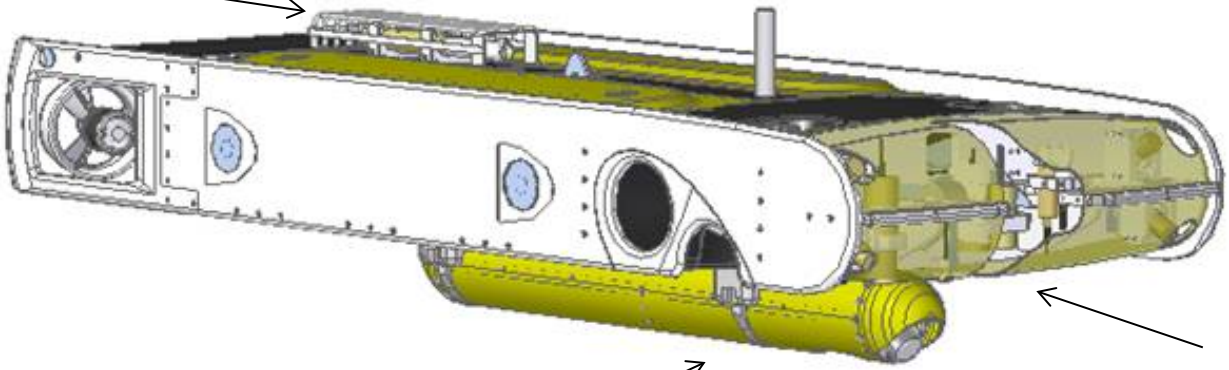
Back-up

Clean Sea system configuration



On board Computer

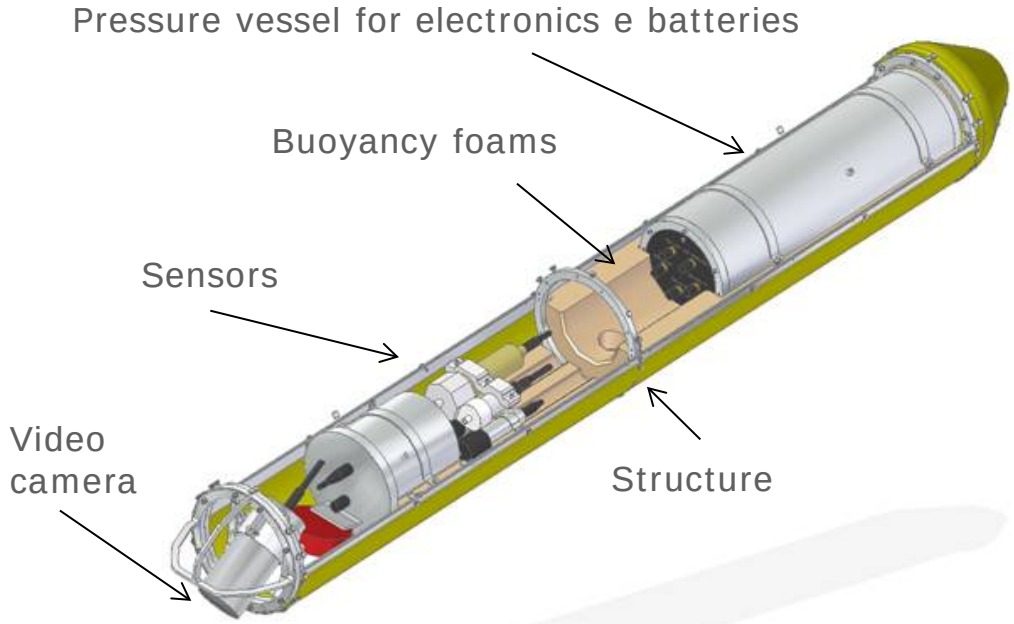
Fixed sensors



Interchangeable payload

Fixed sensors

Interchangeable payload (e-pod) characteristics



e-pod 1:
water sampling

- Automatic water sampler

e-pod 2:
visual inspection and HC leakage detection

- Fluorometer (crude oil)
- Dissolved CH4 (fast)
- Acoustic leak detector
- High res. videocamera

e-pod 3:
acoustic seabed survey

- Side Scan Sonar
- Echo Sounder

Fixed sensors

- Conductivity
- Temperature
- Depth
- Turbidity
- Chlorophyll
- Dissolved O2
- pH
- Redox
- Stills camera
- Dissolved CH4
- Policyclic Aromatic Hydrocarbons
- Dissolved H2S