

POLITIQUE SCIENTIFIQUE FEDERALE



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**FEASIBILITY STUDY ON THE PURCHASE OPTIONS FOR A NEW OCEANOGRAPHIC  
RESEARCH VESSEL AIMED AT REPLACING THE A962 BELGICA OR MODERNISING THE  
EXISTING RESEARCH SHIP**

**SUMMARY**  
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Within the framework of its reflection on the future policy relating to oceanographic scientific research, the Belgian Science Policy Office entrusted Techmar International to carry out a feasibility study on the purchase options for a new oceanographic research ship aimed at replacing the A962 Belgica (a ship that has been running for more than twenty-five years) or modernising the existing oceanographic research vessel. The summary is set out hereafter.

## **1 Assessment of the current condition of the A962 Belgica and its use**

It was possible to assess the current condition of the A962 Belgica by examining the documents provided by the owner (cf. bibliography), by looking at the results of the inspections carried out by the classification body, as well as the meticulous visits carried out during its technical stoppage in July 2009 (cf. photographic report). It was possible to conclude the following points:

- The Belgica is a twenty-five-year-old platform whose hull is still sound and whose mechanical equipment is in good working order and well maintained, thanks to continuous maintenance efforts,
- However, the equipment is faced with the problem of obsolescence, leading to extra costs for its replacement and presenting a risk in terms of reliability,
- The general condition of the facilities is of concern (hidden corrosion, sanitary appliances, drainage pipes, ventilation and air conditioning),
- Lack of space in general, since the space is overloaded with scientific and communication equipment necessary for modern missions.

As regards the use of the ship, it appears that the ship's average fill rate is between 65 and 82 %. This average was also confirmed by the foreign operators who were consulted. Operation, in terms of days at sea, is normal, considering it is operated by a single crew.

However, future "ship time" demands in terms of researcher units (8 hours) expressed by the Belgian scientific community would lead to a total of 10000 units compared with the current 4000/5000 units. The limitations expressed above will prevent certain works being carried out on the Belgica and they will be carried out elsewhere or not at all owing to a lack of suitable infrastructure.

## **2 Defining future research and mission needs within a national and international context**

An initial questionnaire was submitted in 2008 to the Belgian scientific community, dealing with various feasibility aspects, objectives and the operation of a possible future oceanographic vessel: while the Belgica can satisfy the current demands of scientific teams, it appears to be inadequate for the future, considering the technological advances available to marine research as well as the growing needs of this research.

During the present study, the future needs of the scientific community were defined during meetings organised with the main work groups and a survey was carried out among these groups on the basis of the characteristics of a possible new ship, its equipment and its performance. This survey provided the profile of a technical platform with the following main characteristics: it should be multi-purpose, teams should be able to work in dynamic positioning 80 % of the time in relation to the condition of the sea, with an autonomy of four weeks, offering more space and allowing the use of heavier materials as well as autonomous equipment (ROV, AUV, etc.). There was also a demand for a large laboratory space with a controlled atmosphere.

We then attempted to explore the international reality of scientific research and the European strategy in this area. It appears that European concerns regarding the future and the exploitation of the seas and oceans will increase and that the lack of knowledge of the marine environment and the associated climatic phenomena will lead to an increase in oceanographic scientific research programmes in the coming decades.

Furthermore, meetings were organised with European partners engaged in scientific research at sea (France, Netherlands, Ireland), in order to exchange views on different themes and to define possible partnerships to share maritime infrastructures. This led to the following points in particular:

- the trend is to encourage the mutualisation of ships and their equipment at a European level
- Eurofleets, a European project, was launched in September 2009 within this perspective. OFEG (Ocean research Fleet Exchange Group) already exists
- in the short term, multi-purpose oceanographic research vessels are lacking in Europe, owing to many ships leaving the fleet because they have reached the end of their lifetime and owing to the lack of projects underway

### **3 Defining the general characteristics of a possible new ship within a European context**

The elements above were supported by the analysis of work documents published by UNOLs (University National Oceanographic Laboratory System, USA) and by OFWG (Ocean research Fleets Working Group, Europe). The following observations were made:

- In the class of ships that interest us in the present study (regional/ocean class) to which the Belgica belongs, there will be too few ships available compared with the needs expressed in scientific missions if the fleet is not renewed by 2020,
- The more the ships are old and small, the less they met international standards in terms of modern equipment (the lifetime of a research ship is approximately 30 years),
- The investments in infrastructure for research at sea represents 40 to 50 % of its cost,
- General demand is growing for the use of autonomous, more sophisticated and more expensive instruments, justifying European partnership programmes.

OFWG, mentioned above, has also issued recommendations to optimise the use of the existing fleets:

- co-ordination and exchanges between ships
- co-ordination as regards equipment and easy access to modern equipment
- deployment of transnational teams
- development of equipment pools
- expansion of the access to the fleet by new member states, etc.

The report concludes on the need for all the European countries involved in marine research to be encouraged to implement these actions, supported by a desire at European Union level to inject the funds necessary to consolidate these projects.

European partnerships already exist (cf. OFEG), on the basis of exchanged ship time, whose exchange periods regularly increase; Belgium is currently not part of this. Partnerships founded on sharing investment and operating costs also exist (e.g. between France and Spain). The main aim of the Eurofleets programme, launched in September 2009 and to which Belgium belongs, is to develop the integration of European research fleets, and “allow networking of European vessels, underwater vehicles and embarked equipment, the reception of European scientific teams on board modern research vessels and common technological development of software and innovating sensors” in order to create a “European oceanographic research space” (press release of 24 September 2009). Indeed, the lack of cohesion, dispersed means and the lack of strategic vision are the most serious weaknesses as regards the infrastructures of European marine research.

Based on everything that was said, it was possible to design a model of a ship that reflects the demands of the scientific communities and the observations made at European level:

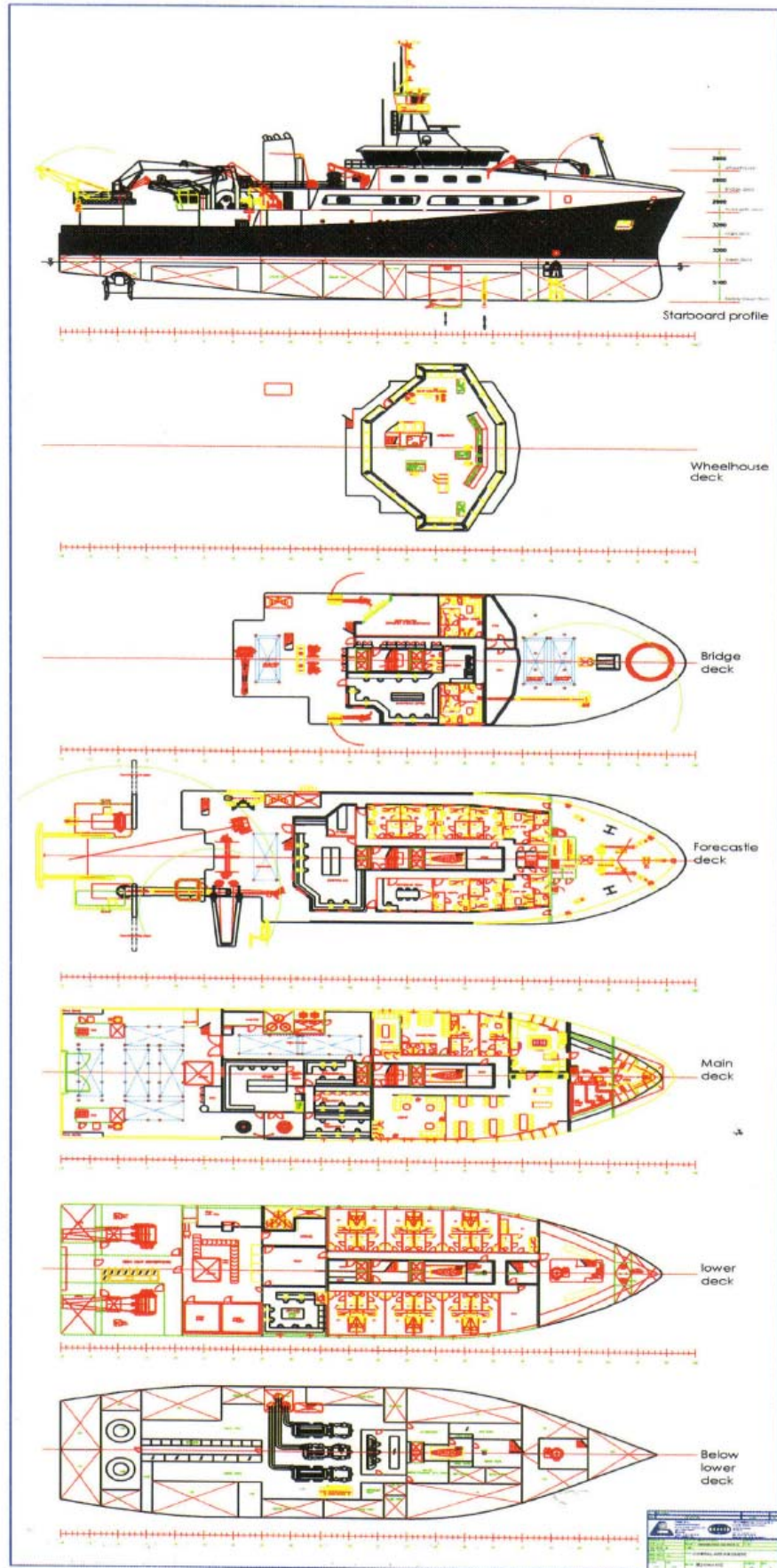
- o a multi-purpose research vessel, fisheries, acoustics, oceanography, environmental sampling, geology, biology, hydrography, etc. ;
- o ability to handle buoys, tripods and other equipment that can be mobilised at sea and on sea beds and to deploy ROV, AUV, UAV, MWDC and other towed or autonomous materials. ;
- o area of activity: 32° to 66° N (Arctic circle) to be defined - 15° E to 15° W to be defined;

whose general characteristics are mentioned in the table and in the general layout plan thereafter.

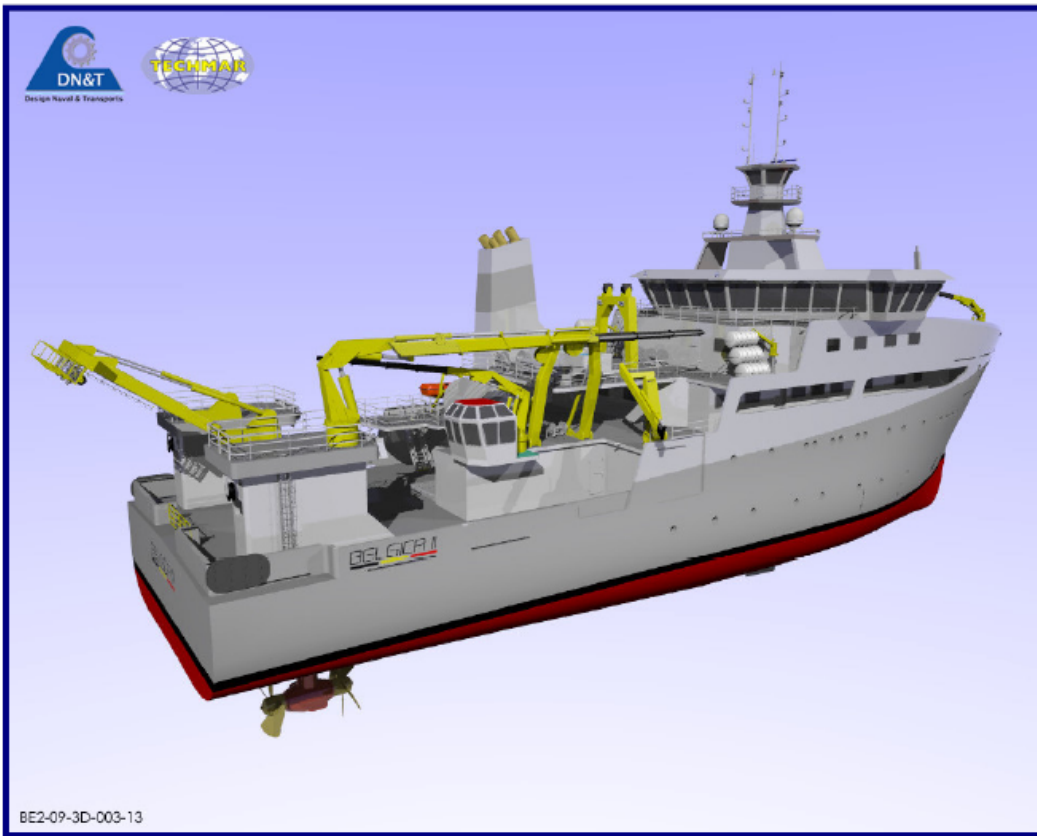
*Feasibility study on the purchase options for a new oceanographic research ship aimed at replacing the A962 Belgica or modernising the existing oceanographic research ship*

Overall length	~ 65 m
Width	17 m
Load draft	4.6 m
Maximum speed	16 kn
Speed of service	11 kn
Slow speed	1-3 kn
Endurance	30 days
Statutory conformity	<p>Applicable international rules in force on the date of construction                      Applicable national rules in force on the date of construction                      Rules in force and foreseeable relating to respect of the environment                      Classification company's rules for the following:</p> <ul style="list-style-type: none"> <li>- research vessel</li> <li>- open sea (the nomenclature depends on the classification company: GL, Lloyd's Register, DNV, etc.)</li> <li>- AUT (unmanned) engine room</li> <li>- ice reinforced category I (the lightest)</li> <li>- dynamic positioning (non-linear model predictive control) known as "Green DP" to be defined in the project phase</li> <li>- acoustic discretion in compliance with the provisions of ICES CRR 209</li> <li>- active hydropneumatic anti-roll device (type Interling)</li> <li>- transducer drop keel mount, hull transducer mounts, two vertical wells 500 and 200 in diameter for mobile instrumentation (drop pipes)</li> <li>- High-precision acoustic positioning system (Hipap/GAPS or equivalent)</li> <li>- Capacity for seven ISO 20 containers and fittings for equivalents of four 20' flats or eight 10' flats for incubators and other materials.</li> </ul>

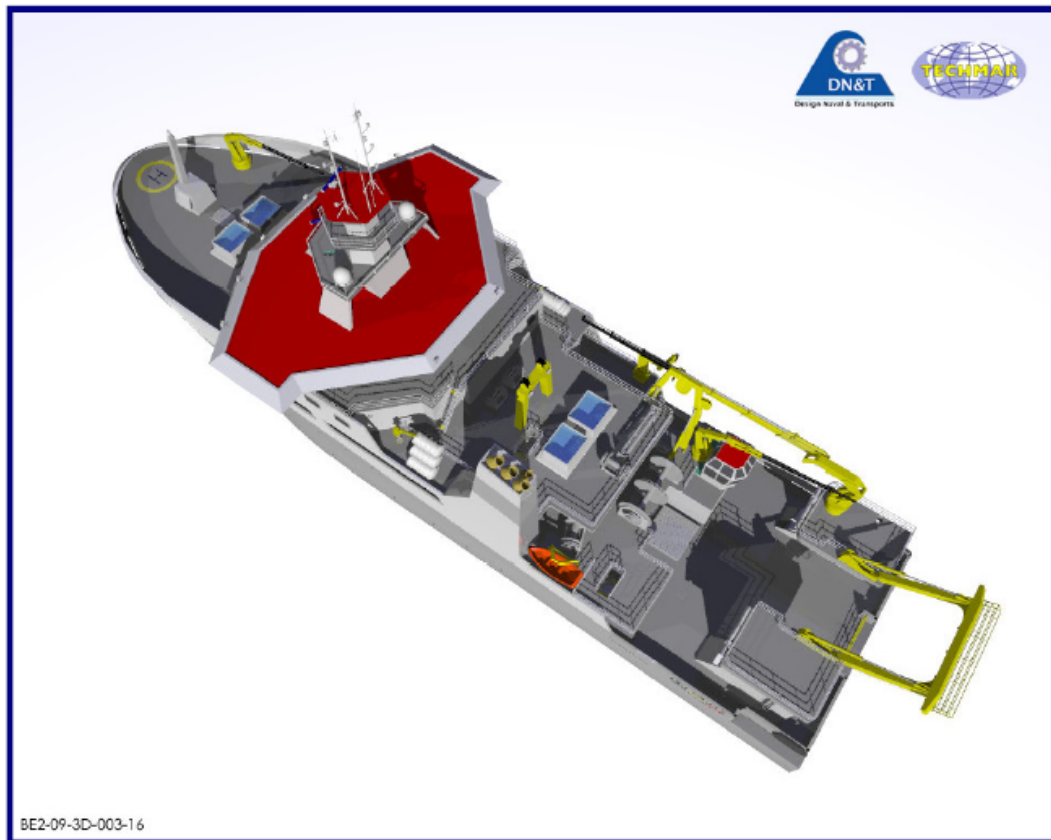












#### 4 Analysis of the options and budgets

The needs expressed reveal that owing to the future evolution of scientific missions, implementing increasingly sophisticated equipment such as ROV, AUV, stations deployed at sea, etc., as well as the growing demand in processing and on-board analysis and communication means, the size of the current platform is inadequate for future missions.

**On a technical level**, the jumboisation of the ship would cause major problems, without providing a greater width to the ship. Its dynamic positioning capacity would not increase either.

**On a statutory level**, lengthening the ship would entail a major conversion. It would involve new construction rules (cf. Solas 2004-ILO C92 art, 10). The age of the rest of the ship would still be considered to be its actual age. **This factor alone is prohibitive.**

**On a financial level**, the risk is also high; unexpected overtime is frequent in this type of intervention and the results can be disappointing. **We can no longer consider a mid-life conversion for the Belgica, which is already 25 years old. The estimated budget is between EUR 20 and 24 M.**

Overall, there are three solutions:

- 1) The construction of a new ship adapted to future needs,
- 2) The (major) conversion of the existing ship,
- 3) Doing nothing and waiting until the end of the Belgica's lifetime to the detriment of scientific work and the presence of Belgium in the European circle of oceanographic research.

In our opinion, the only coherent possibility with regard to future missions defined by the Belgian scientific community and Belgium's obligations with regard to its economy and Europe, consist of launching the project for a new adapted ship.

The following schedule has been suggested, with a deadline of 5 to 7 years, excluding administrative or budgetary constraints, to have a new operational ship (the Belgica will be more than 30 years old by then):

Feasibility study	6 months (done)
Project and financial set-up study	1.5 to 2 years
Final terms and conditions and bids for tender	6 months to 1 year
Finalisation of the contract and final financial set-up	6 months to 1 year
Project and construction taking into account the delivery times for specific materials	2 years
Finalisations and putting the vessel into service	3 to 6 months

**The estimated budget for the whole project for a ship as defined in Chapter 3 is EUR 45/50 M**, based on the cost of recent similar ships.

## **5 Future of the Belgica**

If we choose to go for a new ship, several possibilities can be retained for the use of the remaining potential of the current Belgica: keeping the ship in the Belgian fleet for hydrographic/bathymetric missions; as a replacement ship or responsible for exceptional missions if other ships are overloaded; or in case of accidents; or special surveillance missions; as a fishing surveillance ship; conversion into an anti-pollution intervention ship (occasional use); use as a civil or military naval school, or both; sale to or attribution to an emerging country within the framework of co-operation agreements, whose main missions in terms of oceanography are compatible with the current capacities of the Belgica (FAO programmes or others); museum ship and static exhibitions (on scientific or maritime themes linked to oceanography); as a second-hand ship, it may interest diving companies, sub-marine works, wind farm maintenance, etc.

Possible value of the sale:

- according to demand EUR 2/3 M
- scrap price ~ EUR 650000 to 800000 (source "Athenian Shipbrokers SA", demolition prices, November 2009)