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## Submarine Technology in India

### Why in news?

French defence major Naval Group has announced that it is unable to participate in the P-75 India (P-75I) project under which six conventional submarines are to be built in India for the Indian Navy.

### What is the issue?

- France's Naval Group was one of the five shortlisted Original Equipment Manufacturers (OEM) for the Navy's P-75I project.
- The group has announced it would not bid for the project.
- The reason was that the Request for Proposal (RFP) requires that the fuel cell AIP be sea proven but the French Navy does not use such a propulsion system.

### What is AIP?

- Diesel electric submarines must come to the surface or close to it to run their generators to recharge the batteries that propel them underwater.
- Air Independent Propulsion (AIP) is a mechanism that allows the batteries to be charged even while the boat is submerged.
- Even with AIP, the submarine needs to surface every three weeks or so.
- There are different types of AIP mechanisms available and India is looking for under the P-75I project is AIP based on fuel cells.
- These cells convert chemical energy into electrical energy, recharging the batteries of the submarine.
- **Advantages**
  - Retain the element of surprise by remaining undetected.
  - Diesel submarines possess the advantage of being able to switch off their engines completely and lie in wait unlike nuclear submarines whose reactors cannot be switched off at will.
  - The ultra-quiet nature of modern diesel subs, has made AIP-equipped diesel subs a very attractive alternative.
- **Disadvantages**
  - Installing AIP increases the length and weight of the boats.
  - It requires pressurised liquid oxygen (LOX) storage on-board and supply for all three technologies.
  - Produce some acoustic noise from moving parts.
  - The submarine's unit cost increases by around 10%.

## What is the Navy's 30-year submarine building programme about?

- In 1999, the Cabinet Committee on Security approved a 30-year plan for the Navy to indigenously build and induct 24 submarines by 2030.
- The older Project-75 (P-75) was brought under the new plan, with the two production lines to be built under P-75 and P-75I.
- P-75 envisages indigenous construction of Scorpene-class submarines equipped with the state-of-the-art AIP system.
- Six Scorpene submarines are being built under Project-75 by Mazagaon Dock Ltd. (MDL) under technology transfer from Naval Group of France under a \$3.75-bn deal signed in 2005.

Name of the Submarine	Commission Year
INS Kalvari	2017
INS Khanderi	2019
INS Karanj	2021
INS Vela	2021
INS Vagir	Yet to be commissioned
INS Vagsheer	Yet to be commissioned

- Project-75I (approved in 2007) succeeded the Project-75.
- The first Request for Information for P-75I was issued in 2008, then again in 2010, but the RFP was issued only in July 2021.
- This will be India's first project under the Strategic Partnership Model where the government will give the contract to an Indian Strategic Partner (SP), which will partner with a foreign OEM to build AIP-powered submarines in the country.

## What is the status of the project?

- The project is lagging behind the curve as the final bids are yet to be finalised.
- The Naval Group has already announced it is pulling out, and the Russian and Spanish companies might also not proceed with their bids.
- **Concerns-** The requirement to demonstrate a sea-proven fuel cell AIP is the major concern.
- While some manufacturers may have the technology, it may not have been proven at sea yet.
- Another problem for the OEMs is the transfer of technology as they are unwilling to share all their expertise, especially the niche technologies that they have built.

## What submarines does India have now?

- India has 16 conventional diesel-electric submarines, which are classified as SSKs excluding the INS Vagir and INS Vagsheer
- India also has two nuclear ballistic submarines, classified SSBN.

### SSKs

4 Shishumar Class	Bought and then built in India in collaboration with the Germans in 1980s
8 Kilo Class or Sindhughosh Class	Bought from Russia (including erstwhile USSR) between 1984 and 2000
4 Kalvari Class Scorpene submarines	Built at India's Mazagon Dock in partnership with France's Naval Group

## **SSBN**

INS Arihant

INS Arighat

Indigenously-built nuclear-powered ballistic missile submarine

An upgraded version of Arihant (Yet to be commissioned)

## **References**

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