Suited for all concepts of naval operations, Fuel Cell 2nd Generation Air Independent Propulsion (FC2G AIP) solution is designed to limit detection risks for submarines. It increases submerged endurance, providing energy without external air supply. FC2G ensures unmatched stealth during missions, allowing more than two weeks diving endurance, avoiding multiple snorkelling periods.

The “plug and play” architecture, designed in autonomous sections, enables optimised integration and simple maintenance. FC2G is easy to operate, without additional manning needs.

DCNS expertise in propulsion systems covers the whole spectrum of activities related to warship propulsion, from nuclear to diesel, from surface ships to submarines, giving the strongest and most reliable solutions.
**KEY POINTS**

**A choice for operational advantage**
- With more than two weeks without snorkelling, FC2G allows upgraded capabilities in submarine tracking, interception, intelligence gathering and preparation for special operations.
- FC2G is designed for fast and efficient handling, without additional crew.
- Diesel oil is easily available worldwide, so there is no need for a dedicated shore-based system to replenish.

**Safety as a priority**
- With FC2G, hydrogen is produced on demand, avoiding storage constraints and hazards. The conversion from diesel oil to hydrogen through a reformer is safe. AIP is designed to be silent thanks to the chemical process, robust and resilient to major incidents.
- The system integration is taken into account early in the submarine design studies.

**DCNS’ proven technology**
- Since 2012, a full scale system has been tested by DCNS experts at our dedicated facilities. It has reached thousands of hours of operational functioning. FC2G AIP is based on the DCNS strong experience in:
  - the integration of AIP MESMA® on board Agosta 90B;
  - the integration of nuclear systems on board French submarines;
  - hundreds of years of expertise in propulsion, mastered at our DCNS site in Nantes-Indret.

**Simplified logistics**
- Using diesel oil and liquid oxygen, FC2G is economical to operate. It is also quickly rechargeable with reduced consumable costs and logistical constraints.
- Submarine availability at sea is extended, due to the absence of pure oxygen in the fuel cells, ensuring a longer life cycle for the system.

**Easy worldwide logistics**

**Air Independent Propulsion - Fuel Cell 2nd Generation**

- 2003
  - Technology Watch: Emerging fuel cell technology survey
- 2008 - 2011
  - Demonstrator: Main components individual qualification & validation
- 2012 - 2015
  - Shore Facility: Robustness & performances overall system testing
- 2016 - 2018
  - Industrialisation: On board system integration