

Maritime Summary Note n°261 – May 2024

« Supporting maritime innovation in France »

The environmental targets of carbon neutrality for maritime activities mandate a profound change in practices among all stakeholders. Bypassing carbon footprints in shipping requires long-term capital investments under a landscape still defined by high uncertainties regarding which technological innovations will ultimately prevail. The operational perimeter covered by blue finance remains exceptionally broad: encompassing transport decarbonization, port greening, marine renewable energies, resource regeneration, carbon sequestration, and sustainable blue biotechnologies. Faced with these colossal financial requirements and the severe risks inherent to tech innovation, what specific support systems and financing levers can be effectively mobilized?

Context and investment baselines

According to the 2023 report published by UNCTAD (United Nations Conference on Trade and Development), the energy transition of the maritime sector moves hand in hand with substantial costs. *"Between \$8 billion and \$28 billion in additional capital will be required annually to decarbonize vessels by 2050, and even more monumental investments, ranging from \$28 billion to \$90 billion per year, will be necessary to develop the shoreside infrastructures enabling the utilization of 100% carbon-neutral fuels by 2050."* Low-carbon decarbonized solutions are currently 3 to 4 times more expensive than their fossil fuel equivalents, regarding both capital expenditures (CAPEX) and operational expenditures (OPEX).

The Asian financial marketplace, most notably driven by China, has structurally supplanted Europe as the premier financial hub for maritime transport shipping. Within this fierce international competition, France nonetheless commands strong competitive advantages: a technological head start in selected low-carbon technologies undergoing research and development (wind-assisted propulsion, PIA investments in hydrogen) or full industrialization (Tier 2 equipment manufacturers in offshore wind, particularly floating wind), maritime financial services leaders in Europe, alongside a robust ecosystem of pioneering sustainable finance stakeholders.

To successfully accompany the ecological transition of the maritime sector, a comprehensive investment value chain must be engineered. This framework requires a continuous continuum of targeted public support systems synchronized across the diverse maturity stages of tech innovations, scaling from initial R&D to full industrial deployment. The primary hurdle when financing these low-carbon processes remains their high capital premium surcharge (10% to 20% of the vessel's baseline asset value), their prolonged return on investment (ROI) timeline (ranging from 5 to 12 years for wind-assisted ship propulsion retrofits), and the acute risk of technological obsolescence under the strict eligibility criteria defined by the European Commission for green finance assets. Consequently, LNG-fueled propulsion might completely cease to be financed by commercial banks and institutions like the European Investment Bank (EIB) as early as 2025, given that methane slip leakage rendering the fuel incompatible with the future European green taxonomy.

The financial volumes to be mobilized span from initial prospection phases to industrial rollout, transiting through fundamental research, technological R&D, and industrial development. Outside corporate equity (*fonds propres*), the financing levers are multi-layered and overlap across public and private mechanisms. Public financing manifests as direct aid via capital grants (*subventions*), repayable advances, and dedicated fiscal frameworks engineered to sustain R&D efforts while maximizing corporate competitiveness (such as green accelerated depreciation frameworks—*suramortissement vert*, and research and innovation tax credits—*crédit d'impôt recherche et innovation*). Private financing is embodied through standard bank loans, venture capital and private equity investment funds, business angels, and crowdfunding platforms.

Public Institutional Stakeholders and State Investments

As early as 2010, the French State launched the Investments for the Future Programme, endowed with a €47 billion envelope overseen by the General Secretariat for Investment (SGPI — *Secrétariat Général pour l'Investissement*). Bpifrance operates as the primary institutional operator directing these PIA funding streams toward French startups, SMEs, and mid-cap companies (*ETIs*) developing innovative, structural projects across key sectors of the economy. The master program aims to reinforce research excellence, facilitate technology transfers, scale up vocational training and employment, accelerate the ecological transition, and modernize public administration workflows.

The fourth iteration of the program, baptized PIA 4, was officially announced during the presentation of the macro-economic blueprint France Relance. It is endowed with a target budget of €20 billion over a 5-year timeline (2021–2025), representing a twofold increase compared to the previous twin programs launched in 2014 and 2017—thereby highlighting the heightened strategic importance directed at supporting innovation within the State's macroeconomic investment policy.

Already, €11 billion has been actively mobilized under the framework of the national recovery plan, with the strategic objective of accelerating innovation across all sectors, most notably within the decarbonized energies and sustainable transport and mobility segments. Green hydrogen features prominently among these strategic development axes.

The French Secretariat of State for the Sea and Biodiversity inaugurated the Maritime Intervention Fund in 2022 to accompany decentralized projects at the local tier and sustain the expansion of sustainable maritime activities. This dedicated fund was extended for 2024 with a €15 million financial envelope, rigidly structured around three core thematic pillars:

- Coastal development and spatial planning in favor of maritime activities.
- The growth and planning of the blue economy.
- Professional vocational training for seafaring and maritime careers.

An alternative available funding lever is ADEME Investissement, a specialized investment structure wholly owned by the French State and endowed with a €400 million budget under the overarching France 2030 macro-investment plan. It responds directly to the capital requirements of innovative technologies within the ecological transition sector during their "first commercial deployment" or rollout acceleration phases.

ADEME Investissement can inject between €2 million and €40 million into the equity capital of innovative energy transition corporations, deliberately positioning itself on high-risk ventures or projects perceived as such. Nevertheless, European Union state aid regulations mandate compliance with the "Prudent Investor Principle" (*investisseur avisé*); economic and financial profitability must structurally materialize, meaning the final risk profile remains reasonably calculated.

By way of example, ADEME Investissement injected equity capital into the shipowning company NEOLINE Armateur, alongside *NEOLINE Développement* and premier maritime industry conglomerates including CMA CGM, Corsica Ferries, and *Louis Hardy SAS*. This equity participation successfully contributed to closing the comprehensive financing plan for a pioneering wind-powered merchant vessel, representing a total asset value of €60 million, thereby accelerating the energy transition of the fleet.

Financial Engineering and Asset Asset Montages

The operational deployment of leasing models represents an attractive strategic option, enabling shipping lines to shift equipment procurement costs away from capital expenditures (CAPEX) and route them instead through operational expenditures (OPEX). For instance, when applied to wind-assisted ship propulsion systems, if the parent vessel is ultimately decommissioned or laid up (*désarmé*), the physical components of the wind-propulsion system can be technically uninstalled and retrofitted onto another active hull asset.

Tax Levers and Fiscal Incentives

Sovereign fiscal instruments are permanently available to sustain corporate R&D and innovation efforts while maximizing corporate competitiveness. Consequently, approximately €7 billion in tax credits is claimed annually in France across 29,000 reporting corporations spanning all industrial sectors; significantly, 84% of these claimants are SMEs (*PMEs*), capturing 31% of the cumulative tax credits distributed.

- The Research Tax Credit: established in 1983, it covers 30% of eligible R&D expenditures (up to a specific threshold). To be legally eligible for the CIR framework, a project must rigidly satisfy five cumulative criteria: novelty (expanding the frontier of scientific knowledge), creativity (formulating greenfield concepts or ideas), technical uncertainty (unpredictability of technical feasibility), transferability (the capacity to replicate the acquired know-how across future separate projects), and systematicity (the presence of a structured, logged, and documented R&D protocol).
- The Collaborative Research Tax Credit: established in 2022, it covers 50% of R&D expenditures outsourced to accredited public research laboratories.
- The Innovation Tax Credit: established in 2013, it covers 30% of eligible innovation expenditures tied to the prototyping or pilot-scale market introduction of an innovative product or process that is significantly improved compared to the state of the art. Crucially, only product innovations are eligible for this public mechanism, which is strictly restricted to SMEs.

These overlapping frameworks target corporate entities subject to Corporate Income Tax or Personal Income Tax. A supplementary framework exists through eligibility for the Young Innovative Enterprise statutory corporate status. To qualify, a firm must operate as an independent SME, be under 8 years of existence, not originate from a corporate restructuring, and dedicate at least 15% of its tax-deductible operating expenses to qualified R&D.

This status unlocks a full exemption from employer social security contributions regarding the payroll of personnel dedicating at least 50% of their working hours to the R&D project (encompassing naval architects, R&D engineers, research scientists, lab technicians, R&D project managers, and legal counsels specialized in industrial intellectual property protection). It identically grants exemption from the Territorial Economic Contribution (*CET*) and local property taxes for a 7-year duration, subject to the approval of local collectivities.

Finally, the green accelerated depreciation framework enables companies subject to IS or IR to directly deduct from their taxable income a percentage scaling from 20% to 125% of their capital investment in shipboard equipment utilizing clean alternative energies.

Among these clean energies are hydrogen, LNG, and "assets designed for the treatment of polluting emissions (...), shoreside power supply during port calls, or to supplement main ship propulsion with a carbon-neutral propulsion system" (...). Critically, this domestic fiscal mechanism has recently been struck down (*retoqué*) by Brussels, resulting in the strict exclusion of LNG and LPG, alongside a downward revision of depreciation rates for alternative eligible equipment assets. To legally benefit from this updated green accelerated depreciation framework, a formal State aid notification must be submitted to the European Union. The administrative review timeline averages a protracted 18 months, operating as a severe operational bottleneck for selected shipping companies.

Strategic Support Networks for Maritime Innovation

The CORIMER (Advisory Council for Maritime Industry Research and Innovation) acts as the central governance body of the French Maritime Industries Strategic Branch Committee. Its mandate focuses on defining master roadmaps for innovation, steering corporate projects toward the most optimized financing mechanisms, and better embedding the industrial sector within the project evaluation and licensing workflow.

At the regional tier, the Pôles de Compétitivité Mer (the specialized maritime competitiveness clusters Pôle Mer Méditerranée and Pôle Mer Bretagne Atlantique) actively accompany local entrepreneurs throughout their corporate development, strategic positioning, and fundraising campaigns. Concurrently, regional economic development agencies, technopoles, and Regional Councils deploy dedicated experts specialized in maritime innovation. Furthermore, ADEME directly finances innovation through targeted competitive calls for projects, notably *Navires du Futur* (Vessels of the Future), *Véhicules et Transports du Futur*, and *Accélération du développement des écosystèmes d'innovation performants*. Nevertheless, it remains exceptionally difficult for private corporations to map out and seamlessly articulate both the institutional resource actors and the diverse multi-layered financing levers (European, national, and regional) to which they might pretend. The administrative "entry ticket" required to access these grants can prove highly deterrent for selected firms, particularly when stripped of any strict guarantee of ultimate success.

To bridge this structural gap, the Meet 2050 Institute ambitions to federate public and private stakeholders to accelerate the energy and environmental transition of the maritime sector by pooling technical expertises and funding tracks, backed by the strategic support of the State and local collectivities.

At the supranational tier, the European Commission has engineered a dedicated assistance platform to guide project developers. However, the extreme structural complexity of application assembly, combined with the draconian quality standards required to secure European Union funding, renders access virtually impossible for isolated SMEs, unless they are structurally embedded within a macro-consortium masterminded and piloted by a large corporation.

A fragmented network of research centers

While scientific research covering numerous components of the vessels of the future remains highly productive in France—spanning wind-assisted propulsion, advanced materials, meteorological routing software, maritime safety, drones, and hydrogen technologies—it concurrently appears substantially fragmented. A wide multiplicity of public actors (Ifremer, *IRT Jules Verne*, *École Centrale de Nantes*, the *Weamec* network) and private stakeholders (ocean carriers, masterminded by CMA CGM, and shipyards led by Chantiers de l'Atlantique) conduct their research workflows separately, raising high risks of engineering redundant and inefficient loops. Consequently, there is currently no centralized national research institute commanding a sufficient critical mass to effectively compete against premier international research benchmarks, such as the *Mærsk Mc-Kinney Møller Center for Zero Carbon Shipping* (backed by a €60 million public-private budget) or the *Green Shipping Programme* in Norway.

Private financial stakeholders and capital markets

Commercial bank lending and maritime debt

On the international stage, it is through the framework of the "Poseidon Principles" that a coalition of approximately thirty global commercial banks formally committed to accompanying maritime actors toward the ecological transition of seaborne transport. Signatory financial institutions bind themselves to measure and publicly disclose annually the weighted carbon intensity of their shipping loan portfolios¹ relative to the decarbonation trajectories codified by the IMO.

The Poseidon Principles deliver a standardized benchmark framework enabling financial institutions to structurally integrate climate considerations—fully aligned with the targets locked in during the Paris Agreement—into their corporate lending decisions, aggregating approximately 80% of global maritime ship finance.

Nevertheless, traditional private bank lending is occasionally incompatible with the elevated risk profiles characteristic of non-mature technologies. This operational barrier is severely exacerbated by the enforcement of stringent European prudential capital requirements (Basel III, followed by Basel IV — *Bâle 3 / Bâle 4*). While ocean carriers historically secured asset financing through a traditional ratio of 80% debt to 20% corporate equity, this leveraged matrix could plunge to a mere 60% or even 55% debt against 40% to 45% mandatory corporate equity for small and medium-sized shipowners that do not benefit from a first-rate, rock-solid credit rating.

Diversifying funding sources remains absolutely indispensable through systematic recourse to investment funds.

Investment funds and impact-driven venture capital

Commercial banks are frequently at the origin of specialized private equity and venture capital funds. A prominent model is "Mer Invest", engineered by the *Banque Populaire Grand Ouest* via its *Crédit Maritime* division, commanding a €15 million envelope explicitly dedicated to developing maritime and coastal corporate activities across the French Grand Ouest region. The targeted sectors encompass legacy traditional activities—such as commercial fisheries, shipbuilding, and port infrastructures—as well as rapidly emerging blue economy fields like marine biotechnologies, seaweed aquaculture (*algoculture*), and Marine Renewable Energies (MRE).

By way of example, pioneering clean-tech startups such as Ayro in wind-assisted ship propulsion, *AlgoSource* in the microalgae sector, or *Lisaqua* in sustainable land-based shrimp farming operate as selected highlights among the 25 marine projects accompanied by the Mer Invest fund. This financing

intervenes via direct equity participations or corporate bond issuances, complementing the firm's baseline equity to successfully unlock and leverage conventional bank debt.

Multiple investment funds dedicated exclusively to the blue economy have been successfully structured over recent years, including the joint *Mer Invest* (Banque Populaire / Go Capital) matrix, the flagship Blue Ocean fund commanding a €170 million envelope managed by *Swen Capital Partners*, the *Blue Forward* vehicle (Banque Populaire / Seventure), and the *Impact Ocean* fund (Go Capital). Collectively, this specialized investment ecosystem represents a capital matrix hovering around €400 million.

In parallel with banks diversifying their financial engineering offers, the market records the rapid rise of impact investment funds (*fonds à impact*). An increasing headcount of retail savers seek to inject profound societal meaning into their personal savings. According to the latest *BRS* market review, sustainable finance continues to expand, delivering robust financial yields. Concurrently, the structural proportion of sustainability-linked loans within global banking portfolios expands steadily. Impact investing operates as a deliberate corporate investment strategy seeking to generate verified synergies between social, environmental, and societal impacts on one hand, and a robust financial return on investment (ROI) on the other, spanning diverse maturity tiers (seed capital, venture capital, social venture capital, or development capital). The alternative decentralized funding channel manifests as crowdfunding.

Multimodal crowdfunding and cooperative shipping models

Crowdfunding, structured through secure internet platforms, can manifest as capital donations, micro-loans, or direct equity crowdfunding shares within the startup's corporate structure.

Windcoop, which operates legally as a Collective Interest Cooperative Society, ambitions to commercially operate a fleet of wind-powered container ships (150 TEUs). The first pioneer vessel entered its construction phase this year to be fully operational across the 2026 timeline, scheduled to trade a regular liner route interconnecting Marseille and Madagascar.

The core corporate objective does not target the aggressive maximization of short-term profit at all costs, but focuses on the long-term economic sustainability and resilience of the cooperative enterprise. Today, the shipping cooperative aggregates 1,200 member shareholders (*sociétaires*, spanning private citizens, corporate shippers, and local collectivities) backed by a core group of 27 commercial shippers. This original macroeconomic model successfully secured a total capital raising of €6,7 million, including €1.5 million extracted directly from equity crowdfunding, complemented by impact investment funds and a leveraged layer of commercial bank debt.

An alternative prominent example of maritime crowdfunding campaigns is mapped out on the *LITA.co* platform by TOWT (TransOceanic Wind Transport), which is concurrently building a fleet of large wind-propelled cargo-sailboats (*voiliers-cargos*). These targeted public calls for funds successfully collected several million euros through corporate bonds or convertible bonds (*obligations convertibles*).

Corporate Industrial Initiatives and the European Carbon Tax Matrix

Within the private industrial sphere, first-rate initiatives are emerging from major market leaders. In 2023, the ocean carrier CMA CGM announced the creation of a dedicated €20 million fund to financially accompany the ecological and energy transition of the French fishing sector. This mechanism follows its milestone "Fonds Énergies" (Pulse Fund), endowed with a monumental €1.5 billion budget over a five-year timeline to directly finance massive decarbonization blueprints across the maritime, logistics, and air freight transport sectors. CMA CGM concurrently funded the sovereign French maritime fund—announced in 2022 by the Secretariat of State for the Sea—with a €200 million capital dotation to accelerate the ecological transition of the national maritime cluster.

Concurrently, the premier shipyard Chantiers de l'Atlantique, through its advanced *Ecorizon* R&D master program, successfully engineered a world-class revolutionary solid-sailing rigging: the SolidSail system, meticulously tailored for next-generation mega-cruise vessels propelled primarily by wind energy.

Crucially, since January 1, 2024, at the supranational tier, ocean carriers operating within European jurisdictions are legally mandated to pay a strict carbon tax premium proportional to their verified (CO_2) emissions. The implementation of this regulatory mechanism is progressively phased to reach a mandatory 100% compliance of declared emissions by 2027. The cumulative public revenues extracted from these European Union Allowances (EU ETS) will be historically massive.

However, the explicit routing and precise ring-fencing (*fléchage*) of these carbon revenues back into the maritime cluster—and specifically to subsidize deep fleet decarbonization—remains highly opaque today. Statutorily, three-quarters of the collected carbon tax revenues must return directly to the

sovereign budget of the shipowner's flag State, while the remaining balance fills the European Union's central Innovation Fund.

Ultimately, the dense plurality of participating stakeholders, combined with a chronic lack of structural visibility regarding public aid mechanisms, renders the urgent establishment of a centralized National Single Window highly pertinent to effectively guide, screen, and accelerate the financial paths of these true pioneers of maritime innovation.

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