Cleantech *for* Iberia

INVESTMENT PLAN REPORT

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Cleantech Group

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Contents

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Cleantech for Iberia

EXECUTIVE SUMMARY

Iberia stands at a defining moment for green industrialisation. Europe's manufacturing revival, anchored in the Made in Europe strategy and accelerated by the Industrial Acceleration Act, offers Spain and Portugal a unique window to embed cleantech manufacturing and deployment at the heart of their reindustrialisation agendas.

The momentum is already building. Spain's España Crece initiative will start with around €10.5 billion in public capital, channelled via ICO and largely sourced from EU Recovery loans, and aims to mobilise up to €120 billion in total investment together with private and institutional investors. Portugal is moving in parallel through the Modernisation Fund, the announced Deep Tech fund, and recent energy tax reforms, including the adjustment of clawback mechanisms and the reform of support schemes for energy intensive industries. Taken together, these measures signal a shared drive to anchor industrial competitiveness in clean production and position Iberia as a core hub for Europe's low carbon value chains: from green steel and chemicals to advanced ceramics, glass, and sustainable fuels.

It is estimated that Iberia requires up to €50 billion per year in additional public and private investment until 2030 to meet its decarbonisation objectives and remain competitive in the European clean industrial transition and in venture capital alone, Iberia faces an estimated €4 billion funding gap between 2025 and 2030 relative to peer economies. That is also why it is critical to have effective public instruments drawing these amounts of private resources.

Yet public capital alone will not deliver that outcome - not because it is insufficient, but because it is poorly aligned with the risk profile of cleantech scale-up. Across Iberia, substantial public resources already exist, but they are predominantly structured for early-stage innovation or fully bankable assets. As a result, credible late-stage cleantech projects with strong sponsors and industrial offtakers are failing to reach final investment decision due to residual FOAK risk, revenue uncertainty, and the absence of fit-for-purpose late-stage equity, debt, and guarantees. This is now a binding constraint on industrial decarbonisation and competitiveness, not a future or hypothetical risk.

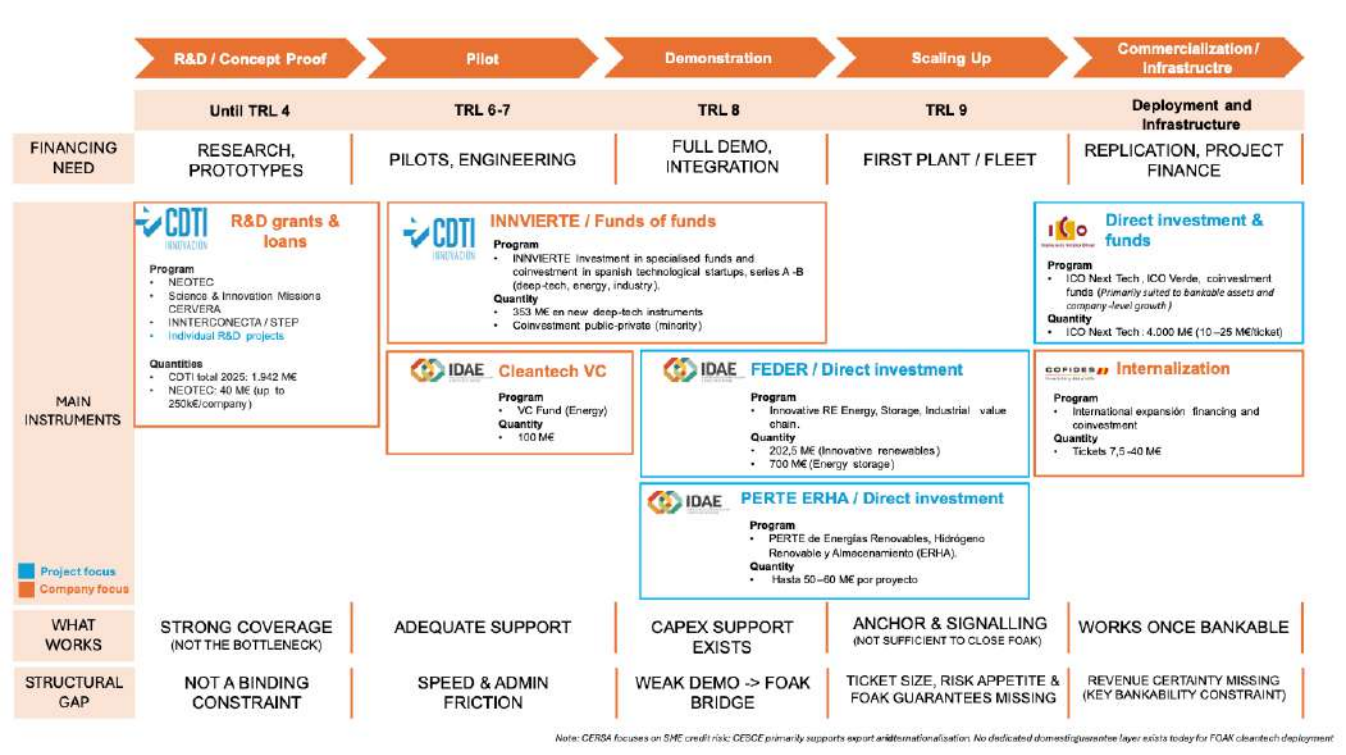

Figure 1: Spanish Public Finance Cleantech Landscape

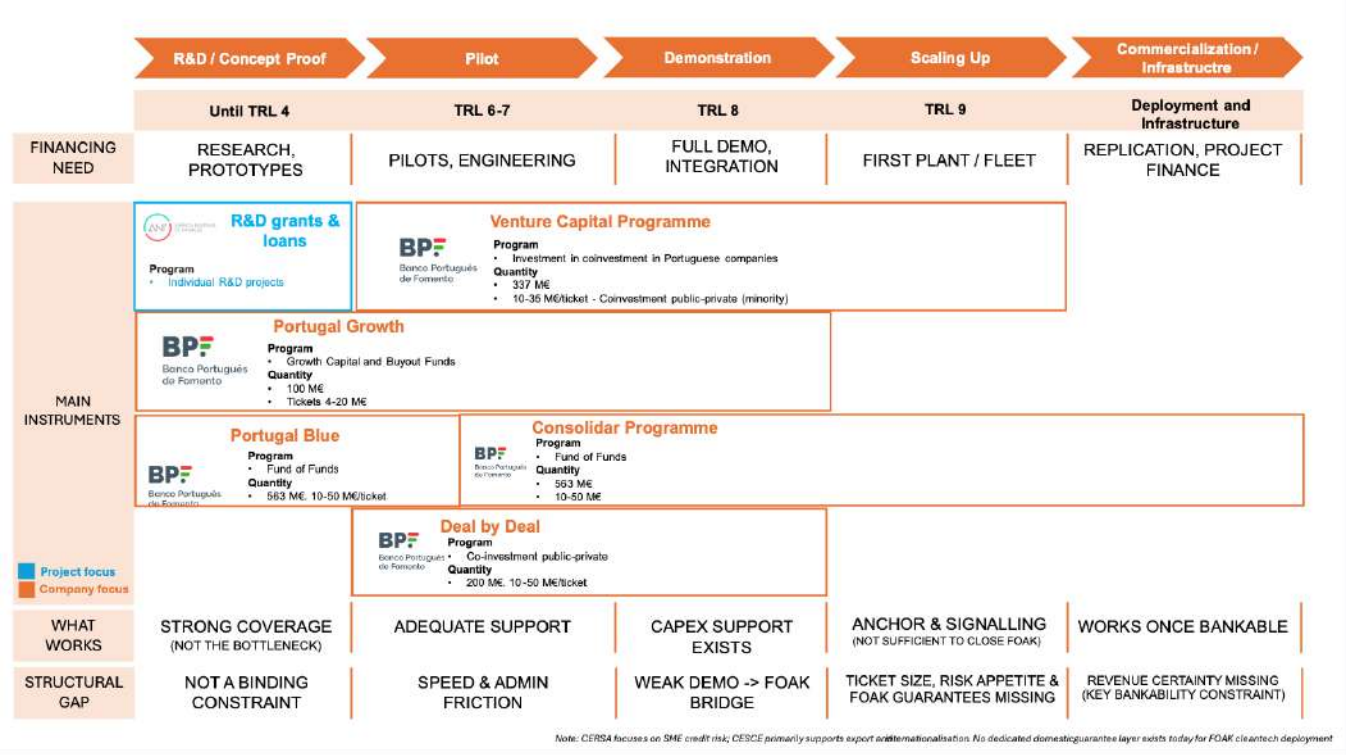

Figure 2: Portuguese Public Finance Cleantech Landscape

This report therefore proposes an Iberia Cleantech Investment Plan: not as new funding programme, but as a system-level framework to realign existing and future instruments around the actual financing bottlenecks facing cleantech deployment. The objective is not to increase public spending, but to organize demand-side tools, equity, public lending, and guarantees into a coherent, sequenced investment architecture that makes Iberian cleantech projects bankable and investable at scale. Doing so requires leadership not only from energy ministries, but from finance ministries and public financial institutions, which ultimately control the design, risk appetite, and deployment logic of the relevant instruments.

The plan is built around one central premise: that first-of-a-kind (FOAK) and early commercial deployments are a system problem, not a project problem.

From this perspective, the plan rests on five core principles:

- Start from industrial transformation, anchoring demand creation in the decarbonisation of real Iberian industries and their value chains.
- Treat FOAK and early commercial deployment as a system problem, requiring standardised pathways, templates and risk-sharing mechanisms that reduce bespoke negotiations, shorten time-to-FID, and enable replication.
- Build the capital stack around risk allocation, clarifying which risks are addressed at which stage and how they shift from public to private actors.
- Make public capital catalytic, using it to anchor or de risk, not to crowd out private and institutional investors.
- Keep execution simple and predictable, with one front door, clear eligibility, and reliable decision timelines.

From these principles, the report sets out four mutually reinforcing pillars for Iberia's investment architecture:

1. Bankable demand and revenue certainty: instruments that turn policy ambition into predictable, financeable cashflows including CfD style auction mechanisms for hydrogen, renewable gases and storage where appropriate, and strategic green public procurement to create lead markets for low carbon industrial products and infrastructure.

2. Late stage and FOAK equity: a dedicated Iberian capability, whether via a joint platform or coordinated national vehicles, able to provide patient, risk tolerant minority anchor equity for FOAK and early commercial projects in line with hard tech timelines.

3. Public lending and subordinated instruments: fit for purpose public loans, subordinated debt, and quasi equity that sit between grants and pure equity, reduce equity intensity, and enable projects to refinance progressively into private senior debt as risks decline.

4. Cleantech-specific guarantees that addresses residual risks, improves bankability, and allows banks and institutional investors to participate earlier in the deployment curve, without penalising projects for having received earlier stage public support.

Implementation is as important as design. The report calls for a single front door for FOAK and early commercial projects, enabling common intake, triage, and routing to the right mix of demand instruments, equity, public lending, and guarantees, while giving governments a clearer view of the project pipeline. It argues for a coherent Iberia facing investor proposition that presents Spain and Portugal as one integrated cleantech deployment market, with aligned design principles, contract structures, and visible pipelines. And it stresses the need to sequence instruments explicitly across the project lifecycle, so that early stage grants, FOAK equity, public lending, and guarantees operate as complements, not substitutes.

Spain's challenge is more structural: while it has a broad and sophisticated set of public equity and debt instruments, it lacks mechanisms that adequately de-risk technological or domestic FOAK deployment. The most urgent priority is to establish **a domestic cleantech FOAK guarantee mechanism** that explicitly covers technology, execution, and early-market risk, filling the gap between SME credit guarantees and export-focused instruments and unlocking senior debt for first commercial projects. In parallel, Spain needs to **scale up cleantech-specific late-stage equity**, moving beyond relatively small and capped instruments to enable larger anchor investments in FOAK and early-commercial projects, coordinated across IDAE, COFIDES, and ICO/AXIS. Finally, Spain should **convert its forthcoming capacity mechanism into a genuine long-term revenue stabilisation tool for energy storage**, with sufficiently long contract tenors and clear remuneration for availability and flexibility, creating the predictable cashflows required to make storage and other breakthrough grid technologies investable at scale.

Priority	Why it matters	How to do it	Expected impact
01. **Create a domestic FOAK guarantee mechanism (Spain's biggest missing instrument)**	Spain has equity, loans, and export guarantees but no technological or domestic FOAK risk coverage; CERSA is too small and credit-only, while CESCE is export-oriented; FOAK projects remain unbankable domestically.	Create a cleantech FOAK guarantee line that explicitly covers technology, execution, and early-market risk with large tickets, long tenors, and high coverage, coordinated by MITECO and IDAE and potentially implemented via ICO/CESCE-style structures with a domestic focus.	Unlocks senior debt for FOAK projects and relieves pressure on grants and equity.
02. **Scale cleantech-specific late-stage equity (beyond pilots)**	Spain has tools, but not at FOAK scale. Spain has targeted equity through IDAE, but it can support too few FOAK projects.	Scale up IDAE's equity role or complement it with a larger cleantech growth vehicle focused on FOAK and early-commercial stages, with larger anchor tickets and coordinated project-style investments alongside COFIDES, ICO, and AXIS.	Moves Spain from supporting a handful of pioneers to genuine industrial scaling and allows domestic actors to anchor large financing rounds instead of only co-investing at the margin.
03. **Convert the capacity mechanism into a real CfDs**	Spain lacks long-term revenue certainty for technologies as storage or hydrogen; market-based revenues are too volatile for project finance, so storage FOAKs stall regardless of capex support.	Redesign the capacity mechanism into CfDs with contract lengths of at least 10–15 years, remuneration for availability, reliability, and flexibility, and explicit eligibility for non-mature storage technologies.	Makes businesses bankable and better aligns Spain's grid and industrial needs with investment reality.

Table 1. Spain Cleantech Priorities

Portugal's cleantech financing bottleneck is not a lack of public capital, but its misalignment with FOAK and late-stage needs. The top priority is therefore the creation of a **dedicated cleantech-only FOAK and growth equity vehicle,** anchored by Banco Português de Fomento, with sufficient scale (at least several hundred million euros) and ticket sizes capable of anchoring first commercial projects in areas such as energy storage, green hydrogen, renewable gases, and industrial decarbonisation. This must be complemented by **a public FOAK lending facility,** moving beyond today's almost exclusively guarantee-led system to provide risk-tolerant loans, subordinated debt, and participative instruments that reduce excessive equity shares and lower the cost of capital. Finally, Portugal should **scale and broaden its existing Contracts for Difference framework,** building on its leadership in renewable gas CfDs by increasing volumes and extending CfD-style revenue stabilisation to energy storage and other capital-intensive clean technologies, thereby strengthening bankability and crowding in private finance.

Priority	Why it matters	How to do it	Expected impact
01. **Create a dedicated FOAK / late-stage cleantech equity vehicle (Portugal's most critical gap)**	Portugal has capital, but no cleantech-specific, stage-specific equity; FOAK projects compete with AI, digital, tourism, etc. and systematically lose; guarantee-led finance cannot substitute for anchor equity at FOAK.	Create a cleantech-only vehicle (storage, hydrogen, renewable gases, industrial decarbonisation) focused on late-stage / FOAK (TRL 7–9), with anchor tickets of €10–30m and a fund size of at least €500m (well above the €110m Deep Tech Fund); anchor it institutionally in Banco Português de Fomento, potentially co-structured with EIF/EIB.	Directly addresses the equity valley of death and enables Portugal to retain FOAK projects instead of losing them to other jurisdictions.
02. **Build a public FOAK lending facility (beyond guarantees) (Portugal's structural financing weakness)**	Portugal's system is almost entirely guarantee-based; FOAK cleantech needs subordinated, patient public debt rather than only bank risk-sharing; current structures lead to excessive equity shares, higher WACC, and fewer projects.	Establish a cleantech FOAK lending window inside BPF, offering risk-tolerant public loans / participative loans with ticket sizes well above single-digit millions, explicit tolerance for technology and ramp-up risk, subordinated / quasi-equity characteristics, and grace periods aligned with construction and ramp-up, designed to crowd in senior debt later.	Reduces equity intensity and makes FOAK projects genuinely financeable, not just nominally fundable.
03. **Scale and broaden CfDs beyond hydrogen**	Portugal already has Iberia's strongest demand instrument (renewable gas CfDs); the issue is limited scope and scale, not the concept itself.	Prioritise increased volumes in hydrogen and biomethane CfDs, extend the CfD logic to energy storage with availability / flexibility-based remuneration, and maintain the central buyer / supplier-of-last-resort model.	Turns Portugal's early lead into a structural advantage, directly improving bankability and lowering financing costs.

Table 2. Portugal Cleantech Priorities

Published in early 2026, with the upcoming European Scale Fund, this report aims to maximize the new initiatives in Portugal and Spain. While España Crece takes shape and Portugal's instruments evolve, policymakers and market participants must decide how to use this unprecedented public firepower to crowd in private capital and build bankable, replicable clean industrial projects.

The choices made in the next 24–36 months will determine whether Iberia becomes a destination for cleantech manufacturing and deployment, or a supplier of projects and talent to jurisdictions that move faster on bankability.

By focusing on de risking, public private partnerships, and bankability, the Iberia Cleantech Investment Plan provides a concrete "how to" for scaling clean technology manufacturing and deployment in Spain and Portugal, turning today's policy window into a lasting green industrial advantage for Iberia.

Cleantech for Iberia

1. INTRODUCTION & PURPOSE OF IBERIA CLEANTECH INVESTMENT REPORT

1. Iberia's Strategic Opportunity

Iberia is uniquely positioned to emerge as a leading European hub for green industrialisation. Spain and Portugal combine some of Europe's strongest renewable energy resources with established industrial capabilities, deep energy-system expertise, and growing innovation ecosystems in capital-intensive clean technologies. In particular, Iberia has developed emerging strengths across energy storage and green hydrogen value chains – technologies that are critical to enabling renewable integration, industrial decarbonisation, and long-term energy system resilience and security.
It is clear how important is a value chain approach covering the whole ecosystem (R&D, tech providers, suppliers, financiers, retailers), connecting upstream and downstream players – who are key for joint ventures and later strategic acquisition and/or offtakings.

This opportunity is not limited to domestic decarbonisation. Iberia has the potential to complement its role as a major producer of renewable electricity with high-value industrial and energy exports, including green hydrogen and hydrogen-derived fuels, advanced storage technologies, electrolysers, batteries, and other enabling decarbonisation solutions. Capturing this opportunity would strengthen the national trade balance, attract foreign direct investment, and position Iberia not only as a clean energy producer, but as an exporter of advanced clean industrial technologies.

European policy momentum reinforces this strategic window. Recent initiatives aimed at strengthening Europe's clean technology manufacturing base are increasing the availability of public finance for industrial-scale deployment. Under the Clean Industrial State Aid Framework (CISAF), Spain alone has received approval for €700 million in support for clean technology manufacturing, with additional EU-level and national instruments expected to follow, namely the coming European Competitiveness Fund in the MFF. These developments signal a shift from early-stage innovation support toward industrial scale-up and deployment.

At the same time, global competition for cleantech manufacturing capacity and deployment capital is intensifying. Jurisdictions that are able to mobilise capital quickly, provide clear risk-sharing frameworks, and offer catalytic investment conditions are pulling ahead. In this environment, access to public funding alone is insufficient. **The ability to translate public resources and support the preparation of bankable pipeline of national/Iberian projects towards investment ready stage and investable capital stacks that crowd in private finance has become a decisive competitive factor.**

Beyond natural resource advantages, Iberia also benefits from a strong institutional starting point. Spain and Portugal already host some of Europe's most active public finance and energy institutions – including IDAE, ICO, COFIDES and Banco Português de Fomento – with direct experience in energy, industrial decarbonisation, and large-scale project finance. This creates a unique opportunity for Iberia to pilot integrated, risk-sharing investment models that could later be scaled at EU level.

2. Key Findings from the Cleantech Capital in Iberia Report

The previous Cleantech Capital in Iberia report quantified both the scale of the opportunity and the depth of the challenge. It estimated that Iberia requires up to €50 billion per year in additional public and private investment until 2030 to meet its decarbonisation objectives and remain competitive in the European clean industrial transition.

While early-stage innovation benefits from a growing ecosystem of grants, seed capital, and public support, the report identified a structural financing bottleneck at later stages of development. This gap is particularly acute for capital-intensive hardware technologies that require large upfront investment, long development timelines, and first-of-a-kind (FOAK) deployments before reaching commercial maturity.

In venture capital alone, Iberia faces an estimated €4 billion funding gap between 2025 and 2030 relative to peer economies, even after adjusting for GDP, population, and emissions profiles.

More critically, beyond venture capital, the report highlighted the absence of effective mechanisms to finance FOAK projects, manufacturing scale-up, and early commercial deployment – stages that are essential for technologies such as energy storage, green hydrogen, and renewable biogases to move from pilots to bankable assets.

These challenges are not driven by a lack of public actors or headline funding commitments. Rather, they stem from a mismatch between the risk profile of cleantech scale-up and the design of existing financial instruments.

3. Structural Constraints on Cleantech Investment in Iberia

Despite increasing public investment and policy ambition, Iberia's ability to fully capture the cleantech opportunity remains constrained by several structural challenges.

A first binding constraint is uncertain demand for emerging clean technologies. For many cleantech sectors, revenues often depend on immature or evolving markets, limited long-term offtake agreements, and regulatory frameworks that do not yet provide stable, long-term revenue visibility for projects. This revenue uncertainty weakens project economics, complicates financing structures, and limits private capital participation.

Second, Iberia lacks effective mechanisms to finance first-of-a-kind (FOAK) and early commercial projects. Capital-intensive technologies face high upfront costs, technology and execution and commercialisation risks, and long payback periods, yet existing public instruments are rarely designed to absorb these risks in a way that makes FOAK projects financeable. As a result, many projects stall either in pilot and commercial deployment and due to permitting and licensing challenges. Coherently, it is important to recognise that FOAK risk often materialises upstream, at the technology-provider or OEM level, particularly as technologies move from pilots to first commercial and later large-scale industrial retrofits.

In deployments embedded within existing industrial assets, industrial clients tend to focus primarily on reliability, performance, continuity of operations, and confidence in the supplier's ability to deliver and scale. Even where overall project size is limited, technology providers may still need to absorb early engineering efforts, manufacturing scale-up investments, longer commissioning or ramp-up phases, and balance-sheet pressure before repeatability is proven.

Third, late-stage and growth equity capital remains scarce, particularly for hardware-based cleantech companies. While early-stage venture capital is increasingly active, there are few vehicles with the mandate, scale, or risk appetite to support industrial demonstration, manufacturing scale-up, or first commercial fleets, that underlines the need of funds that provide a variety of instruments (as a financial toolbox) that adapt the financial instrument to the project stage.

Fourth, participation from patient and institutional capital – including pension funds, family offices, and high-net-worth investors – remains limited.
This reflects a range of factors, including uncertainty around risk and returns, the absence of tailored incentives to invest in cleantech, and the limited track record of institutional investors engaging in cleantech at scale.
Finally, Iberia lacks sufficient de-risking and blended finance tools for late-stage cleantech, such as public guarantees, first-loss capital, or structured risk-sharing mechanisms. Without these instruments, private lenders and institutional investors remain reluctant to engage in FOAK and early commercial projects.

Investment conditions are further shaped by administrative complexity and fragmented public programmes. While these factors influence deployment speed and efficiency, the focus of this report is on addressing the core investment barriers related to demand uncertainty, FOAK risk, and late-stage capital gaps.

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4. Purpose of This Report

The Cleantech Investment Report builds directly on the findings of the Cleantech Capital in Iberia analysis by moving from diagnosis to action. Its goal is to focus on identifying precise, actionable investment mechanisms that can realistically be deployed to address Iberia's cleantech financing gaps, particularly for energy storage and green hydrogen, building on existing programmes and analyses.

Specifically, this report seeks to:

- Propose targeted public instruments capable of unlocking late-stage and FOAK investment;
- Explain how these mechanisms can work, drawing on relevant best practices from Europe and comparable jurisdictions where appropriate;
- Identify the institutions best positioned to lead implementation in Spain and Portugal; and
- Outline clear pathways to crowd in private and institutional capital at scale.

By focusing on deployable tools, the report aims to strengthen Iberia's cleantech capital stack, accelerate industrial-scale deployment, and ensure that public resources translate into durable private investment and long-term industrial competitiveness.

Cleantech for Iberia

2.

SUMMARY OF CURRENT PUBLIC CLEANTECH FINANCING LANDSCAPE

Equity, debt, guarantees, and blended finance instruments are all essential to building a functioning capital stack for cleantech scale-up. Spain and Portugal have made meaningful progress in deploying public capital across each of these layers. However, the challenge in Iberia is not a lack of instruments, but a misalignment between how capital is deployed and where cleantech financing constraints are most acute. Persistent gaps at the late stage – especially for FOAK and early-commercial projects – reflect structural limitations in targeting, scale, and risk-sharing across both equity and blended finance tools. Understanding these gaps is critical to designing the next generation of instruments capable of unlocking private investment at scale.

1. The Late-Stage Cleantech Equity Gap in Iberia

One of the core findings of the Cleantech Capital in Iberia report was the existence of a significant late-stage equity gap for capital-intensive clean technologies. Addressing this gap is critical: FOAK and scale-up phases are where many cleantech innovations fail to progress, despite strong technical performance and clear decarbonisation and energy security value. These projects typically require large tickets, patient capital, and investors capable of underwriting technology, execution, and market risks simultaneously. Without sufficient late-stage equity, promising technologies risk stalling at demonstration stage or relocating to jurisdictions with more supportive financing environments.

At first glance, the persistence of a late-stage equity gap may appear surprising. Both Portugal and Spain have made substantial efforts to mobilise public equity capital, and today there are several billion euros available across direct investments, co-investment programmes, and fund-of-funds vehicles. These initiatives represent important and commendable steps by both governments to support innovation, industrial development, and the energy transition.

However, the challenge in Iberia is not primarily the absence of public equity capital, but rather how it is structured, targeted, and deployed. In most cases, public equity programmes are broad in sectoral scope, covering cleantech alongside areas such as artificial intelligence, robotics, digitalisation, life

sciences, and general industrial innovation. As a result, cleantech companies must compete for capital with sectors that typically offer faster returns, lower capital intensity, and more familiar risk profiles. This competition dilutes the impact of public equity instruments on cleantech scale-up, particularly for FOAK and hard-tech projects.

Critical to this effort is the active involvement of specialized cleantech and infratech funds. Unlike generalist venture capital or traditional infrastructure investors, these specialist managers act as anchor private investors by providing the high-conviction equity necessary to move hardware from pilot to industrial scale. They serve as essential early adopters of public guarantees and lending tools, using their niche technical expertise to integrate complex de-risking instruments into project structures. Ultimately, these funds function as execution partners for policy-driven frameworks, translating industrial strategy into bankable assets and ensuring that European innovations reach repeatable industrial scale within the continent.

Moreover, where programmes do have an explicit climate or energy focus, their scale is sometimes insufficient relative to the size of the challenge. FOAK projects frequently require total blended financing packages in the tens or hundreds of millions of euros, meaning that small or mid-sized equity funds can only support a limited number of deployments. While such programmes can be catalytic, they are rarely large enough to address the late-stage equity gap at a systemic level, highlighting as well the need to attract large infrastructure type funds. An example of a best practice is Breakthrough Energy program “Catalyst” – The programme funds large demonstration projects and invests in first-of-a-kind commercial-scale projects that use key emerging climate technologies that can include clean hydrogen, long duration energy storage, sustainable aviation fuel, direct air capture, and manufacturing.

Portugal: Broad Public Equity Capacity, Limited Cleantech Targeting

In Portugal, Banco Português de Fomento (BPF) acts as the central public development bank and is the primary vehicle for deploying public equity capital. BPF manages a portfolio of complementary programmes – largely supported by the Recovery and Resilience Plan – spanning direct co-investment, strategic

recapitalisation, and indirect investments through venture capital and private equity funds. Collectively, these instruments represent well over €1 billion in late-stage equity support across multiple sectors of the Portuguese economy.

On the direct investment side, BPF operates the Deal-by-Deal Co-Investment Programme, a €200 million facility that allows BPF, through the Recovery and Resilience Capitalisation Fund, to co-invest alongside private investors, with individual co-investment caps of up to €50 million[1]. The Strategic Recapitalisation Programme further provides equity capital to strengthen the balance sheets of strategically important Portuguese companies across a wide range of sectors[2].

Indirectly, BPF plays a significant role as an anchor investor in the Portuguese investment ecosystem through several fund-of-funds-style vehicles. These include:

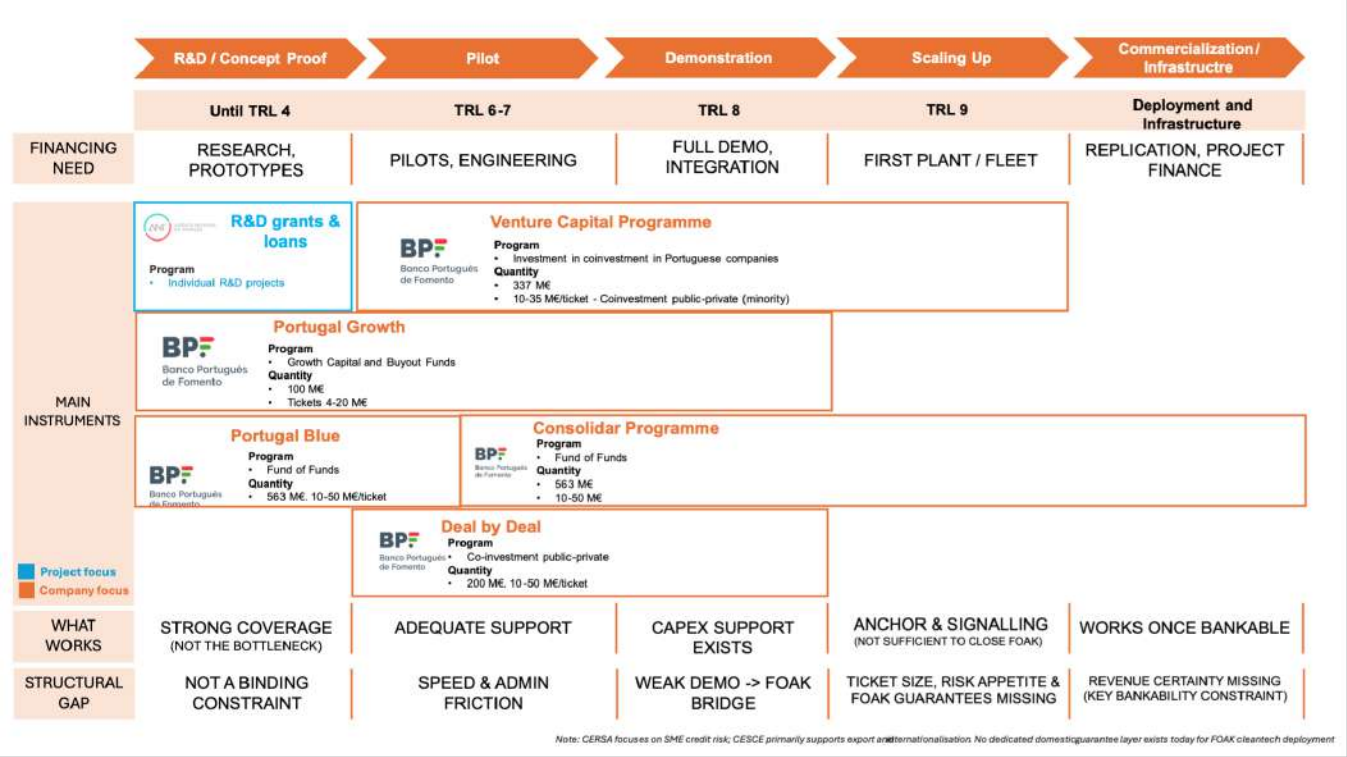
- **Venture Capital Programme:** a €337 million programme that invests between €10 million and €35 million in venture capital funds with minimum sizes of €20 million and mandates that include areas such as the green economy[3].
- **Portugal Growth:** a €100 million programme managed by the European Investment Fund, supports growth capital and buyout funds with company-level ticket sizes ranging from €4 million to €20 million[4].
- **Consolidar Programme:** a €563 million fund-of-funds instrument that invests €10–50 million per venture capital fund across a wide range of sectors including agribusiness, commerce, and tourism[5].
- **Portugal Blue:** BPF also manages sector-specific vehicles such as Portugal Blue, a €50 million fund focused on the blue economy, including ocean energy, green shipping, and blue biotechnology[6].

[1] https://www.bpfomento.pt/pt/catalogo/programa-de-coinvestimento-deal-by-deal/
[2] https://www.bpfomento.pt/pt/catalogo/programa-de-recapitalizacao-estrategica/
[3] https://www.bpfomento.pt/pt/catalogo/programa-de-venture-capital/
[4] https://www.bpfomento.pt/pt/catalogo/portugal-growth/
[5] https://www.bpfomento.pt/pt/catalogo/programa-consolidar/
[6] https://www.bpfomento.pt/pt/catalogo/portugal-blue/

While several of these programmes are clearly relevant to cleantech and climate-adjacent sectors, none is dedicated exclusively to clean technologies. Instead, cleantech investments must compete within broad, multi-sector mandates that also prioritise other sectors and industries. In addition, these programmes are generally not explicitly structured around stages of development: capital is deployed across a wide range of phases – from pre-seed and seed to growth and scale-up – rather than being deliberately concentrated where financing constraints are most acute. As a result, public equity support is spread across the innovation lifecycle, limiting its effectiveness in addressing the late-stage gap.

Finally, there is no instrument purpose-built for late-stage or first-of-a-kind (FOAK) cleantech equity, where capital requirements are largest, risk profiles are asymmetric, and private investors are most hesitant to lead. The absence of stage-specific, FOAK-oriented equity vehicles constrains the ability of public capital to anchor large financing rounds, crowd in private investors, and enable clean technologies to move from demonstration to commercial scale.

BPF has announced a forthcoming Deep Tech Fund of €110 million targeting TRL 6–9 technologies linked to the green and energy transition, explicitly aiming to address the “valley of death” where many cleantech innovations stall. While this initiative represents an important step in the right direction, its scale remains very modest relative to FOAK financing needs, and its ultimate impact will depend on how the fund is designed, governed, and deployed.



Spain: Extensive Public Equity Supply, Insufficient Cleantech Specialisation

Spain has developed an even broader set of public equity instruments relevant to cleantech, with several programmes capable of deploying large tickets and attracting private and international capital.

Spain's Institute for the Diversification and Saving of Energy (IDAE) has launched a dedicated Investment Strategy for 2024–2026, backed by an initial €100 million funding envelope, to act as a minority equity investor in emerging clean energy companies and projects. The strategy targets early commercial (FOAK) and scaling stages across priority areas such as renewable generation, storage and flexibility, hydrogen, energy efficiency, sustainable mobility, industrial value chains, and the circular economy, with investment caps of around €10 million per company[7].

While highly valuable as an early anchor and policy signal, current ticket sizes mean that IDAE's equity strategy alone is rarely sufficient to close FOAK financing rounds for industrial-scale deployments, which typically require significantly larger equity commitments.

[7] https://www.idae.es/sites/default/files/documentos/idae/Anexo_1_Estrategia_Inversiones_2024-2026_vf_rev_02.pdf

At larger ticket sizes, Spain has established the €2 billion Co-Investment Fund (FOCO), managed by COFIDES, to attract foreign capital into Spanish companies and strategic projects aligned with the green and digital transitions, as well as biotechnologies. FOCO can deploy minority equity or quasi-equity investments ranging from approximately €10 million to €150 million per operation, matched pari passu with foreign co-investors, and may invest both directly in companies and through investment funds[8].

Spain's national innovation agency, CDTI, deploys public risk capital through its Innvierte programme, combining direct co-investment in companies with indirect investments via venture capital funds. Through its Coinversión en Empresas Estratégicas line, CDTI participates as a minority investor in large venture or growth rounds of at least €20 million, typically investing €10 million in a wide range of technological sectors including energy storage, robotics, and aerospace[9]. CDTI also acts as an anchor investor in technology-focused venture funds through its reactivated fund-of-funds programme, committing at least €10 million per fund[10].

In parallel, Spain's public development bank, ICO, deploys long-term capital through AXIS, its dedicated venture and private investment arm. AXIS manages several investment vehicles, including Fond-ICO Global and Fond-ICO Crecimiento, which primarily operate as fund-of-funds supporting the broader venture and growth capital market. The most directly relevant instrument for cleantech deployment is the €400 million Fond-ICO Sostenibilidad e Infraestructuras, structured as a long-term minority investor with investment horizons of up to 20 years and typical ticket sizes of €10–30 million. The fund targets greenfield projects – new infrastructure or industrial assets developed from the ground up – across the energy transition, environment and circular economy, sustainable mobility, and social infrastructure[11].

Taken together, these instruments demonstrate that Spain has built substantial public equity capacity, spanning early commercialisation, growth capital, infrastructure-style investments, and international co-investment.

[8] https://www.cofides.es/en/financing/financial-instruments/co-investment-fund-foco
[9] https://www.innvierte.es/coinversion-en-empresas-estrategicas
[10] https://www.innvierte.es/fondo-de-fondos
[11] https://www.ico.es/web/axis/ico/nuestros_fondos/fond_icoinfraestructuras

However, as in Portugal, the persistence of a late-stage cleantech equity gap reflects structural features of the overall system rather than the absence of individual programmes.

First, many of these late-stage Spanish public equity programmes operate under broad, cross-sector mandates, where cleantech investments compete with biotechnology, digitalisation, artificial intelligence, and other strategic industries. While these sectors are all priorities for competitiveness, such mandates are less directly aligned with the needs of FOAK and hard-tech cleantech scale-ups, which require specialised risk capital, sector-specific technical expertise, and a higher tolerance for long development timelines and asymmetric risk. As a result, even when clean technologies are formally eligible, these programmes are not optimised to anchor FOAK financing or to concentrate capital where cleantech faces its most acute constraints.

Second, while Spain does have stand-out public equity instruments explicitly aligned with the FOAK and early commercialisation gap, most notably IDAE's investment strategy, their scale remains insufficient relative to the size of the challenge. FOAK deployments often require total blended financing in the range of €75–150 million per project[12], implying that current fund sizes and ticket caps allow only a limited number of deployments to be supported. Although these programmes are highly targeted and impactful, their current scale does not enable widespread industrial scaling on its own, underscoring the need for additional, larger-scale cleantech-specific equity vehicles to complement existing tools.

[12] https://www.greenfinanceinstitute.com/wp-content/uploads/2025/12/Playbook_10_Steps_FINAL.pdf

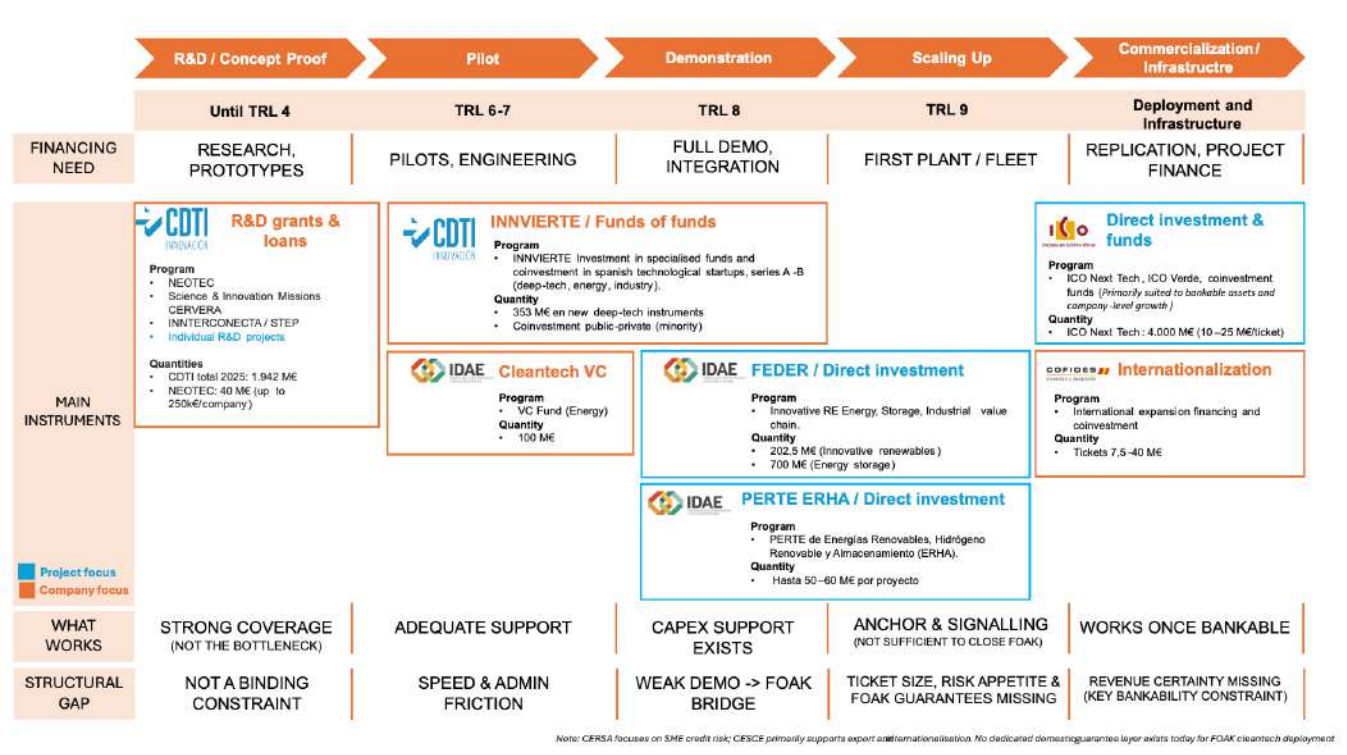


Figure 2: Spanish Public Finance Cleantech Landscape

2. Blended Finance: Debt, Loans and Guarantees

In addition to equity, debt, guarantees, and blended finance instruments play a critical role in enabling cleantech scale-up and commercial deployment. Across Iberia, a range of publicly backed debt and guarantee tools are available. However, several structural issues limit their effectiveness for cleantech, reflecting similar constraints to those seen in equity financing. Many programmes are multi-sectoral, forcing cleantech projects to compete with sectors that have shorter timelines and different risk profiles. Some instruments are relatively small in size compared to late-stage and FOAK financing needs. Few programmes offer guarantees that are explicitly tailored to the technological, execution, and early-commercial risks of FOAK cleantech. To unlock late-stage and FOAK deployment at scale, public institutions will need to move beyond facilitation and play a more catalytic role to meaningfully de-risk projects for private financiers.

Portugal: Guarantee-Led Support with Limited Cleantech Focus and relevant incentives

In Portugal, blended finance support for cleantech is provided primarily through guarantee-based instruments, rather than through direct public lending. While some Portuguese cleantech and industrial decarbonisation projects have benefited from large-scale debt financing from the European Investment Bank (EIB)[13], most domestic support is channelled via BPF, which provides public guarantees to commercial banks, enabling them to extend larger loans, with longer maturities and more flexible terms, to higher-risk projects. BPF's guarantee activity is largely structured under the InvestEU framework, which constitutes the primary debt-enabling mechanism for risky Portuguese SME and mid-cap investments. Through multiple InvestEU-backed guarantee lines, BPF manages a total framework of approximately €3.6 billion in potential financing capacity[14].

Several programmes are particularly relevant to cleantech and industrial transition projects. The BPF Invest Export programme is a government-backed export finance facility which supports export-oriented Portuguese companies across a broad range of sectors, including renewable energy, energy storage, hydrogen-related infrastructure, biogas and bioenergy, environmental services, and clean-energy engineering. Investment loans can reach up to €5 million for medium-sized companies with maturities of up to 10 years, while working-capital loans can reach €3 million with maturities of up to 5 years. Notably, up to 20% of an investment loan may be converted into a non-repayable grant after three years if performance criteria are met, increasing the attractiveness of the instrument for capital-intensive industrial and cleantech exporters[15].

The Linha de Garantia BPF InvestEU – PME e Small Mid-Caps provides approximately €2.56 billion in financing capacity across sustainable investment, general investment, and working capital. It supports a wide range of activities relevant to cleantech, including renewable energy, clean fuels and hydrogen,

[13] Examples include €250 million of financing for Galp's 100MW green hydrogen project and a €40 million loan to The Navigator Company to replace fossil-fuel boilers with a high-efficiency biomass boiler.
[14] https://www.bpfomento.pt/pt/pt/investeu/
[15] https://www.bpfomento.pt/pt/catalogo/linha-bpf-invest-export/

biogas and biomass, energy efficiency, circular economy solutions, waste management, sustainable mobility, and industrial decarbonisation. Loans are issued by commercial banks with public guarantee coverage of up to 80%, with per-company caps ranging from €2 million to €8.25 million depending on the investment category[16].

Another InvestEU-backed line, the Linha de Garantia BPF InvestEU – Investigação, Inovação e Digitalização, has a dedicated envelope of approximately €711 million and supports bank financing for research, innovation, demonstration projects, and technology deployment. While particularly relevant for demonstration-stage technologies, the programme is broad in scope and not tailored specifically to cleantech or FOAK deployment[17].

The Linha de Crédito para a Descarbonização e Economia Circular is a publicly supported credit line with a total allocation of €100 million, offering medium- to long-term bank financing of up to €2 million per company, with tenors of up to 10 years and guarantee coverage often reaching 80%. While aligned with decarbonisation objectives, its relatively small per-company cap limits its relevance for larger industrial or FOAK-scale cleantech projects[18].

Two mention worthy instruments launched in 2026 are SITCE and STEP, both managed by COMPETE2030 and part of Portugal 2030. SITCE offers 315 million euros to support operations aimed at reducing energy consumption and GHG emissions, namely through the replacement, adaptation, or introduction of low-carbon equipment, processes, and technologies. STEP is a 515 million euros program, with two calls: one of 400 million euros to promote the development or manufacture of critical technologies, or preserve and strengthen their respective value chains, in the field of clean and resource-efficient technologies and a second one of 115 million euros for early-stage projects - focused on R&D and Innovation on the same technologies.

Overall, Portugal has developed a robust guarantee-based framework that improves access to bank financing for sustainability-oriented projects.

[16] https://www.bpfomento.pt/pt/catalogo/linha-de-garantia-bpf-investeu-pme-e-small-mid-caps/
[17] https://www.bpfomento.pt/pt/catalogo/linha-de-garantia-bpf-investeu-investigacao-inovacao-e-digitalizacao/
[18] https://www.bpfomento.pt/pt/catalogo/linha-de-credito-para-a-descarbonizacao-e-economia-circular/

However, several limitations remain. There are very few direct public debt instruments available to cleantech companies. Guarantee programmes are largely multi-sectoral, meaning cleantech competes with digital, healthcare, retail, and other industries for the same risk capacity. Moreover, many programmes operate with loan and guarantee caps in the low single-digit millions, far below the financing needs of late-stage and FOAK cleantech projects. As a result, while Portugal's guarantee system is well developed, it remains insufficiently targeted and scaled to address the late-stage cleantech financing gap.

Spain: Strong Blended Finance Foundations, Gaps in FOAK Deployment

Spain has a more developed and diversified blended finance ecosystem, with a wider range of public loan, guarantee, and risk-sharing instruments available to support the green transition. On the debt side, Spain has deployed large-scale public financing through ICO-Verde, a €22 billion loan programme managed by ICO under the Recovery, Transformation and Resilience Plan. ICO-Verde supports investments across renewable energy, energy efficiency, sustainable mobility, industrial decarbonisation, water management, circular economy, and climate adaptation. ICO-Verde operates through multiple channels, including bank-mediated loans, direct ICO lending to projects, the purchase of corporate green debt instruments, and equity or quasi-equity co-investment via ICO's AXIS platform. The programme offers long amortisation horizons – often up to 20 years – and principal grace periods of up to three years, providing more patient debt than typical commercial loans and improving the viability of long-horizon green investments[19].

Spain also benefits from flexible debt and quasi-equity tools deployed through Fond-ICO Sostenibilidad e Infraestructuras (highlighted in Section 2.1), which can combine minority equity investments with subordinated debt and participative loans. These instruments allow repayment terms to be linked to project performance and cash-flow generation, making them well suited, in principle, to capital-intensive clean and industrial projects requiring blended financing structures[20].

[19] https://www.ico.es/plan-de-recuperacion-linea-ico-verde)
[20] https://www.ico.es/web/axis/ico/nuestros_fondos/fond_icoinfraestructuras

In addition, the FAIIP (Fondo de Apoyo a la Inversión Industrial Productiva), managed by SEPIDES, provides repayable public financing for industrial investments with a total allocation of €1.927 billion. FAIIP supports new industrial facilities, plant expansions, relocations, and sustainability-oriented upgrades, including Industry 4.0 and environmental modernisation[21].

IDAE also complements its equity activity with loan instruments under its 2024–2026 Investment Strategy, including participative loans, standard loans, and project finance. Participative loans function as a form of venture debt, with interest partially linked to project performance, while standard loans follow fixed repayment schedules. Guarantee requirements are assessed case by case, based on project maturity, innovation level, and promoter solvency[22].

Spain's guarantee ecosystem is anchored by two main public actors with differentiated mandates. At the SME level, CERSA plays a central role by providing credit guarantees to banks lending to Spanish SMEs. CERSA's guarantees are designed to address traditional credit risk, enabling banks to extend loans to viable SMEs under improved conditions (lower interest rates, longer maturities), including for investments linked to energy efficiency, decarbonisation, or green technologies. However, CERSA operates strictly within a conventional credit framework, as it does not cover technological risk, and works with relatively small ticket sizes, with guarantees typically capped at around €2–2.5 million per company and average guarantees significantly below that level. As a result, while CERSA is highly relevant for smaller-scale investments and the modernisation of established SMEs, it is not designed to support capital-intensive FOAK or early-commercial cleantech projects.

At the other end of the spectrum, Spain's guarantee system is anchored by CESCE, the state-owned export credit and risk insurance agency. CESCE provides a range of state-backed risk-coverage instruments that support green investments, particularly abroad. These include the Póliza Verde de Inversión, which insures bank loans to foreign subsidiaries of Spanish companies investing in green projects overseas[23], and enhanced export credit instruments that have been adapted to be more supportive of sustainability by aligning

[21] https://sepides.es/fondo-faiip-sepides/
[22] https://www.idae.es/conozcanos/quienes-somos/estrategia-de-inversiones-2024-2026
[23] https://www.cesce.es/es/w/cuenta-del-estado/polizas-verdes/poliza-verde-de-inversion

coverage criteria with the EU Taxonomy and OECD green definitions[24]. While valuable for supporting international expansion, these tools are generally not designed to address local scale-up and deployment needs within Spain[25]. While export credit tools are valuable and can indirectly benefit Spanish cleantech companies, they are not specifically applicable to the domestic financing needs of early-commercial or FOAK cleantech deployment.

At the domestic level, CESCE also offers the Financiación de Inversiones Estratégicas programme under the Cuenta del Estado, which provides guarantee coverage of up to 80% for bank financing of large, strategic investment projects supporting Spain's carbon-neutral transition, including renewable energy, hydrogen, and energy storage[26]. In parallel, ICO leverages InvestEU guarantees to mobilise additional financing for green and critical infrastructure projects[27].

Taken together, Spain's debt and guarantee instruments represent a strong foundation and demonstrate significant public commitment. However, several structural challenges remain. Many loan and guarantee programmes prioritise bankable assets and industrial expansion over FOAK and early-commercial technologies, limiting their catalytic impact. Furthermore, while guarantee systems exist for SMEs and internationalization, there are no dedicated guarantees that systematically covers FOAK and early-commercial cleantech projects at domestic scale, particularly where technological, execution, and early-market risks remain material. As with equity, several instruments are multi-sectoral, creating competition between cleantech and sectors with very different risk and timeline profiles. Finally, while Spain's overall debt and guarantee envelopes are large, some of the instruments most directly aligned with cleantech and FOAK deployment remain small relative to the scale of late-stage financing needs, particularly where equity and debt are drawn from the same limited capital pools.

[24] Under these enhanced policies, projects eligible under the EU Taxonomy or OECD green criteria benefit from more favourable risk coverage, such as broader risk acceptance, tailored coverage terms, and incentives for environmental projects, which helps exporters and their financiers secure financing for green investment activities that meet recognised climate and sustainability standards aligned with EU Taxonomy and OECD green criteria. For more information, visit: https://www.cesce.es/es/cuenta-del-estado/polizas-verdes

[25] An exception is CESCE's Crédito Suministrador, which insures Spanish exporters against non-payment by foreign buyers and can indirectly support Spain-based companies by improving liquidity and access to financing through receivables-backed structures, even though the underlying transactions are cross-border.

[26] https://www.cesce.es/es/w/cuenta-del-estado/entidades-financieras/financiacion-inversiones-estrategicas

[27] https://www.ico.es/programa-de-garantias-investeu

Cleantech for Iberia

3.

KEY RECOMMENDATIONS: A TOOLBOX OF CLEANTECH INVESTMENT INSTRUMENTS

Building a robust capital stack for cleantech scale-up in Iberia requires a coordinated set of instruments that address demand risk, equity constraints, and the lack of risk-tolerant debt and guarantees at FOAK and early-commercial stages. While Spain and Portugal already deploy a wide range of public finance tools, these instruments are often not fully aligned with the specific risk profile and capital intensity of FOAK cleantech deployment. This section focuses on a targeted toolbox of deployable mechanisms that can be used to close these gaps – strengthening revenue certainty, mobilising late-stage equity, and unlocking private debt through venture lending and guarantees – so that public capital more effectively crowds in private investment and supports the transition from first projects to repeatable industrial scale.

1. Revenue Stabilisation and Demand Creation Mechanisms: CfD's and Innovative Public Procurement

Financing alone is insufficient to unlock large-scale investment in capital-intensive clean technologies without stable and predictable demand signals. Across Iberia, a lack of long-term revenue certainty remains a systemic barrier, particularly for technologies at early commercial and first-of-a-kind stages. Addressing this challenge requires redefining the role of the public sector – not only as a source of capital, but as a facilitator of demand. Instruments such as Auctions with Contracts for Difference and Green Public Procurement can provide sufficient price and offtake visibility needed to make cleantech projects bankable and investable at scale.

A. Revenue stabilisation mechanism through Contracts for Difference (CfDs)

Contracts for Difference (CfDs) are among the most effective demand-creation tools for capital-intensive clean technologies. By stabilising revenues over long periods, CfDs reduce exposure to market volatility and provide the revenue certainty required for projects to reach final investment decision. Two-way CfDs,

in particular, have become a preferred instrument in Europe: they provide a 'strike price' that acts as a guaranteed floor for investors when market prices are low, while protecting public budgets through 'clawbacks' – requiring producers to pay back excess revenues whenever market prices exceed that agreed level. This effect is evident in the UK, where the CfD framework has underpinned rapid scale-up and steep cost reductions in offshore wind through successive competitive allocation rounds. Nonetheless, in many industrial hydrogen use cases, adoption happens through partial volumes, progressive ramp-up phases and retrofits of existing assets, rather than through projects with stable long-term output profiles. As a result, industrial offtakers often remain cautious even when production-side support exists. We need flexible designs that accommodate that create confidence and risk-sharing.

Portugal: Centralised CfD-style procurement for renewable gases

Portugal is currently the most advanced Iberian jurisdiction in applying CfD-style demand creation for green hydrogen and biomethane. In 2024, The Minister for the Environment and Energy of Portugal announced a state-aid scheme for the centralised purchase of renewable gases, financed through the Environmental Fund (Fundo Ambiental) and managed by the Directorate-General for Energy and Geology (DGEG)[28]. Under this mechanism, producers of renewable hydrogen and biomethane compete in electronic auctions for 10-year contracts structured as two-way CfDs. Notably, the state-owned Wholesale Supplier of Last Resort (Transgás) acts as the central counterparty, guaranteeing the purchase of the gases for injection into the national grid. The total state-aid envelope publicly associated with the scheme is approximately €140 million.

Portugal's renewable gas CfD scheme is a unique demand instruments in Iberia. It directly underwrites revenues, reduces dependence on bilateral industrial offtake agreements, and creates a clear route to market for early hydrogen projects. However, it remains narrow in scope, technology-specific, and limited in scale. There is no equivalent CfD-style mechanism for energy storage or broader industrial decarbonisation.

[28] https://www.portugal.gov.pt/pt/gc24/comunicacao/comunicado?i=lancado-leilao-de-gases-renovaveis-com-dotacao-de-14-milhoes-de-eurosano

Spain: CfD-adjacent mechanisms without a unified revenue framework

Spain does not yet operate a dedicated national CfD scheme for green hydrogen or energy storage, but it has deployed several CfD-adjacent instruments, including the Renewable Energy Economic Regime (REER) which awards long-term fixed remuneration through competitive auctions for renewable power projects[29]. In practice, recent auctions have failed to provide a stable foundation for projects. After energy prices spiked, many developers abandoned their auction contracts to sell power on the open market or through private deals instead[30].

For hydrogen, Spain has relied primarily on capex-heavy support through programs like PERTE ERHA. More recently, the government has expanded this to include operational support via the European Hydrogen Bank's 'Auctions-as-a-Service' (AaaS) scheme. Spain committed €370 million to this mechanism in 2024 to support domestic projects and has pledged an additional €415 million for the 2025 auction round[31]. These funds provide a fixed subsidy for every kilogram of green hydrogen produced, helping producers bridge the gap between their costs and market prices. However, some innovators note that while subsidies help close near-term cost gaps, they fall short of providing the long-term revenue visibility required to unlock large-scale investment – a role more effectively played by CfD–style mechanisms.

Spain's MITECO (Ministerio para la Transición Ecológica y el Reto Demográfico) is also developing a centralised capacity mechanism intended to remunerate reliable capacity – including storage and demand response – through auctions with multi-year payments (up to 15 years). If designed with sufficient contract length and tailored for breakthrough storage technologies, this mechanism could evolve into a CfD-like demand anchor for grid-scale energy storage. At present, however, design details are still under development[32].

[29] https://www.boe.es/eli/es/rd/2020/11/03/960/con

[30] https://cincodias.elpais.com/companias/2025-03-04/las-adjudicatarias-de-las-subastas-de-renovables-celebradas-desde-2021-renuncian-a-la-retribucion.html

[31] https://planderecuperacion.gob.es/noticias/sara-aagesen-anuncia-financiar-proyectos-espanoles-proximas-subastas-europeas-hidrogeno-verde-prt

[32] https://www.miteco.gob.es/es/prensa/ultimas-noticias/2024/diciembre/el-miteco-lanza-la-propuesta-de-regulacion-para-un-mercado-de-ca.html

Recommendations for CfDs in Iberia

The Iberian experience highlights an asymmetry: green hydrogen is beginning to benefit from CfD-style or CfD-adjacent demand instruments, particularly in Portugal, while energy storage lacks a comparable revenue stabilisation mechanism in both countries.

This creates several opportunities:

1. **Scale and replicate hydrogen CfDs:** While Spain's participation in the European Hydrogen Bank (AaaS) provides useful opex and production support, the "fixed premium" model does not eliminate price volatility for the end-user. Iberia should adopt Portugal's renewable gas CfD model, including a "Supplier of Last Resort" (like Transgas) which acts as a guaranteed counterparty. By establishing a standardized two-way CfD, the region can provide the long-term price certainty required for industrial offtakers to sign firm purchase agreements, effectively unlocking FID for large-scale projects.

2. **Extend CfD logic to energy storage:** For energy storage, CfD-like contracts should be structured around availability, capacity, or flexibility services. MITECO's proposed capacity mechanism in Spain can become the backbone demand tool for storage if it awards sufficiently long-tenor contracts and is explicitly designed to accommodate storage technologies. In practice, this requires auctions that remunerate availability and reliability – and, where relevant, flexibility services – thereby creating predictable, long-term cashflows that can support project finance. Without such revenue anchors, storage projects will continue to face significant financing constraints, as revenues remain largely short-term, market-exposed, and difficult to forecast over investment horizons. On the Portuguese side, the Ministry of Environment and Energy would likely be best place to develop a CfD-like tool for energy storage, given their success and experience in renewable gases.

Together, these measures would move Iberia from isolated revenue stabilising interventions toward a systematic, investment-grade framework capable of supporting deployment and large-scale capital mobilisation for green hydrogen and energy storage.

B. Demand-creation mechanisms through Green Public Procurement

Green Public Procurement (GPP) can be a powerful lever for creating lead markets for clean technologies by using public purchasing to shift demand toward low-carbon products and services. Public procurement represents a significant share of economic activity in the European Union (commonly cited at around 14% of GDP[33]), yet its potential to support cleantech scale-up remains underutilised. Evidence shows that when public authorities actively deploy GPP, they can push industry to develop greener products and change production patterns[34]. Despite this potential, recent analysis indicates that only around 21% of EU public contracts include environmental considerations, with many still awarded primarily on the basis of lowest price[35].

In Iberia, GPP can create bankable demand in specific public-use applications – such as public buildings, ports, backup power, and critical infrastructure – while also supporting adoption across a wider set of sectors. By providing credible demand, GPP can reduce offtake risk, help cleantech companies build market trust, and improve the investment profile of innovative solutions.

A critical component of demand-creation is also the transposition and implementation of REDIII – the Renewable Energy Directive, that enforces binding targets to renewable technologies and renewable gases consumption – such as hydrogen – meant to kickstart demand.

[33] https://www.oecd.org/en/topics/public-procurement.html

[34] https://www.intereconomics.eu/contents/year/2022/number/3/article/green-public-procurement-a-neglected-tool-in-the-european-green-deal-toolbox.html

[35] https://www.iisd.org/system/files/2025-11/reform-options-eu-public-procurement.pdf#:~:text=public%20procurement%20,based%20on%20the%20lowest%20price

Portugal: a strengthened policy framework, early implementation stage

Portugal has recently strengthened its GPP framework through the National Strategy for Green Public Procurement 2030 (ECO360), which promotes the systematic inclusion of environmental criteria in public procurement across entities under direct and indirect State administration and the State business sector[36]. The ECO360 framework is designed to shift procurement away from "lowest upfront price" and toward lifecycle impacts, targeting high-impact purchasing categories and supporting the transition to circularity and climate neutrality through 2030.

However, evidence suggests that translating GPP policy into practice remains the binding constraint. Research assessing Portuguese tendering practice finds that, despite advances in policy, award decisions have often remained heavily price-driven, with environmental criteria applied inconsistently or with limited weight – reducing the ability of procurement to pull higher-cost low-carbon solutions into the market at scale[37]. This implies that Portugal's near-term opportunity is less about creating new strategy documents and more about operationalising ECO360 through standard criteria, minimum weighting rules, and institutional capability-building so contracting authorities can confidently evaluate non-price criteria.

Spain: comparatively mature legal requirements, uneven uptake in practice

Spain has national GPP plans and a comparatively advanced legal basis for sustainable procurement. Green criteria appear in a minority of tenders but with an upward trend over time –- bringing Spain broadly in line with EU averages of 20% of contracts[38]. Spain's framework includes requirements that, in certain categories of service contracts, quality-related criteria must carry substantial weight (e.g., at least 51% in specified services), and Spanish law provides an open-ended basis for contracting authorities to include environmental conditions in contract performance and execution requirements[39].

[36] https://stip.oecd.org/stip/interactive-dashboards/policy-initiatives/2023%2Fdata%2FpolicyInitiatives%2F9999672
[37] https://eco4all.org/wp-content/uploads/2025/12/Castilhos.pdf
[38] https://www.greener-project.eu/files/Greener-National-Report-Spain_final.pdf
[39] https://www.vlaanderen-circulair.be/src/Frontend/Files/userfiles/files/files/2025-07/impact-analysis-of-sustainability-requirements-in-tender-procedures-in-the-netherlands-france-italy-and-spain.pdf

While Spain is comparatively well positioned from a legal and policy standpoint, the main constraint remains implementation. In practice, sustainability criteria are rarely decisive in Spanish procurement: in many tenders, ESG requirements are absent from admission and award criteria, leaving sustainability largely a compliance obligation rather than a determinant of contract outcomes[40]. Uptake also varies materially across tiers of government and contracting authorities, suggesting that an "EU-average" level of GPP is unlikely to be sufficient if Spain aims to use procurement as a cleantech industrial strategy rather than a marginal environmental add-on.

Recommendations for GPP in Iberia

Across Iberia, the policy direction is clear, but the gap lies in execution. In practice, GPP's impact is constrained by persistent over-reliance on lowest-price award decisions, inconsistent weighting or weak enforcement of non-price criteria, and limited technical capacity and risk aversion among contracting authorities. Nonetheless, the Made in Europe strategy and IAA are changing the context and shall contribute to clean technologies to receive clearer recognition or additional weighting when public support instruments are designed, where European solutions are available.

This creates a set of practical opportunities:

1. Shift to minimum environmental implementation rules. Both countries can increase real-world uptake by limiting "lowest price only" awards (except where justified) and introducing minimum weightings for lifecycle or environmental criteria in relevant categories. In Spain, this would build on existing requirements – such as the use of majority non-price criteria in certain service contracts – by extending similar minimum weighting principles to a broader range of service and supply contracts. This approach could be operationalised through the Ministry of Finance, in coordination with major purchasing ministries and other relevant ministries like the Ministry of Science and MITECO.
   In Portugal, implementation would primarily involve ESPAP, as the central procurement and framework agreement body, supported by IMPIC.

[40] https://www.vlaanderen-circulair.be/src/Frontend/Files/userfiles/files/files/2025-07/impact-analysis-of-sustainability-requirements-in-tender-procedures-in-the-netherlands-france-italy-and-spain.pdf

2. Create targeted “lead-market” procurement programmes for strategic clean technologies. Public authorities can use green public procurement more strategically by establishing targeted lead-market procurement programmes in critical sectors. In infrastructure, this could include dedicated procurement requirements or scoring advantages for low-carbon construction materials – such as green cement or steel – in public works projects. In energy, lead-market procurement can support the deployment of energy storage by prioritising applications in public buildings and critical infrastructure and valuing availability, flexibility, and resilience rather than lowest upfront cost. For green hydrogen, procurement can create early offtake through quotas in natural gas grids, but also ports or other operations where hydrogen use is technically appropriate. This would support the creation of “Iberia champions” in different sectors.

3. Portugal can learn from Spain’s comparatively stronger legal architecture; Spain can scale ambition beyond “EU-average.” Spain’s mandatory sustainability provisions and contract-design rules provide a useful reference point for Portugal, while Spain itself may need to move from compliance-oriented GPP toward more strategic “market-making” programmes if it aims to live up to its potential as a European hub for green industry and clean energy, while building export-oriented green industrial supply chains.

Ontario’s Battery Storage Procurement: A Best-Practice Example of Market-Making Green Public Procurement

A compelling example of green procurement in action is Ontario’s recent competitive solicitation for electricity storage capacity, which resulted in the largest battery storage procurement in Canadian history, securing nearly 1.8 GW of clean energy storage through long-term contracts to help meet growing grid demand. By focusing on competitive, technology-neutral procurement with clear performance requirements, the Independent Electricity System Operator attracted a diverse set of 10 storage projects while also supporting reliability and emissions goals. The procurement process delivered economically competitive outcomes, strong community support, and significant participation from Indigenous and private sector partners, illustrating how transparent, demand-driven tendering can unlock investment in emerging clean technologies.

2. Mobilising late-stage equity capital for cleantech scale-up

Both Portugal and Spain already deploy substantial volumes of public equity capital through direct investments, co-investment programmes, and fund-of-funds vehicles. However, these instruments are generally broad in scope and often insufficiently specialised or scaled to address the specific financing needs of capital-intensive cleantech projects – particularly at the late-stage and first-of-a-kind (FOAK) phases. At the same time, participation by long-term institutional investors, pension funds, and high-net-worth individuals in cleantech remains limited, further constraining the available pool of patient equity capital.

Addressing Iberia's late-stage equity gap therefore requires a dual approach: sharpening and scaling public equity instruments so they are better aligned with cleantech FOAK and scale-up needs, while creating clearer incentives and investment pathways for institutional investors, family offices, and high-net-worth individuals to participate in cleantech at later stages. Together, these measures are essential to mobilise sufficient risk capital, support commercial deployment, and position Iberia as a competitive hub for green industrial development by strengthening and developing finance instruments and vehicles to recycle capital.

A. Public equity investment: strengthening the cleantech growth capital layer

Public equity instruments play a central role in addressing Iberia's late-stage cleantech financing gap. While capital is already present in the system, the challenge is to deploy it in ways that directly address cleantech's most critical bottlenecks. To strengthen the late-stage cleantech equity layer, Iberia could pursue two complementary approaches:

1. **Create an Iberia Clean Growth Fund.** One option would be to establish a dedicated late-stage cleantech equity vehicle with an explicit mandate to support FOAK and early commercial

deployment. Unlike existing multi-sector funds, such a vehicle would be purpose-built for capital-intensive clean technologies, ensuring that cleantech projects do not compete for capital with sectors offering faster returns and lower capital intensity.

The fund's mandate could focus on priority areas where Iberia has strong strategic advantages and large-scale deployment potential – such as energy storage, green hydrogen, and renewable gases – while remaining flexible enough to support adjacent hard-tech decarbonisation solutions. In practice, FOAK cleantech plants in Iberia are currently financed predominantly through equity, which often represents 50–60% of total project capitalisation and, in some cases, an even higher share, reflecting the limited availability of debt at early commercial stages. Crucially, the vehicle would be sized to reflect FOAK realities. Given typical FOAK project sizes of approximately €50–150 million, and equity shares in the range of +50%, meaningful participation requires equity tickets of roughly €25–75 million per project. Importantly, the public vehicle would act as an anchor investor – committing up to a maximum of half of the required equity (c. €10–35 million, depending on the project) – with the balance mobilised from private investors. On this basis, an indicative fund size in the €500 million to €1 billion range would allow a dedicated vehicle to support a meaningful portfolio of FOAK and early-commercial projects.

Experience from comparable initiatives, such as Breakthrough Energy Catalyst, suggests that governance and execution speed are as important as fund size. Clear investment mandates, the ability to write large tickets, and decision-making processes aligned with industrial timelines are critical if such a vehicle is to act as a credible anchor investor for private capital.

Such a vehicle could be managed by institutions that already have relevant capabilities and market credibility. In Spain, IDAE brings deep sectoral expertise in energy and industrial decarbonisation; CDTI contributes experience in late-stage technology co-investment;

COFIDES offers structuring capacity for large, project-based investments; and ICO/AXIS provides long-term investment horizons aligned with infrastructure-style assets. In Portugal, Banco Português de Fomento (BPF) could play an analogous role, leveraging its existing co-investment and fund-of-funds infrastructure while sharpening its mandate toward cleantech FOAK deployment.

From a strategic perspective, this vehicle could be implemented either as a joint Iberian fund, pooling capital across Spain and Portugal to increase scale, diversify risk, and create a single, recognisable platform for international investors; or as parallel national funds with coordinated mandates. A joint approach would maximise capital efficiency and signal Iberia's ambition as an integrated green industrial market, while a coordinated national approach may be more straightforward institutionally to set up. A second step for this fund could be to evolve to Green Bank, dedicated to fund the transition at national/Iberian level.

2. **Restructure and sharpen existing public equity tools.** Iberia could increase the effectiveness of existing public equity instruments by sharpening mandates and introducing stage-specific allocation logic. This could include ringfencing part of current funding programmes for "cleantech only" investments, carving out dedicated late-stage or FOAK windows within existing programmes, or setting higher minimum ticket sizes for hard-tech cleantech investments. Such adjustments would allow existing capital pools to be deployed more strategically, concentrating resources where financing constraints are most acute, without requiring wholesale institutional redesign. By clearly signalling a willingness to anchor late-stage cleantech rounds, public equity programmes can improve deal certainty, accelerate financial close, and create clearer pathways for private investors to participate at scale.

B. Mobilising institutional investors, pension funds, family offices and high-net-worth individuals

Large pools of long-term capital – particularly pension funds, institutional investors, family offices, and high-net-worth individuals (HNWI) – remain largely absent from Iberia's cleantech investment ecosystem. Greater involvement from these investors is critical to moving the needle for cleantech scale-up, as they have the financial firepower to support larger ticket sizes and sustained deployment at scale. While demand-side instruments, public equity vehicles, and improved cleantech guarantees can significantly reduce risk and crowd-in private investment, progress in closing the late-stage and FOAK equity gap will require measures that actively enable and incentivise participation from these investor groups, such as tax benefits. This elevated risk perception is also driven by the structural characteristics of venture capital as an alternative asset class, notably the limited liquidity of investments. This lack of liquidity discourages institutional investors from crowding in.

To address this constraint, public intervention is required to strengthen exit pathways, including incentives for strategic industrial acquisitions, support for mergers and acquisitions, the development of public market routes for cleantech companies, and public lending instruments that facilitate VC exits. For institutional allocators, the bankability of a project is defined as much by its exit potential as its initial funding. Strategic use of revenue stabilization and risk-sharing instruments does more than just lower the cost of capital; it fundamentally compresses the time-to-exit for early investors. Instruments like Contracts for Difference (CfDs) and public guarantees create the predictable cash flow profiles required to transition an asset from a high-risk First-of-a-Kind (FOAK) project to an "infrastructure-grade" Nth-of-a-Kind (NOAK) asset.

This transition is the primary catalyst for liquidity. As technical and market risks subside, projects become attractive to a broader pool of buyers, including pension funds and insurers seeking long-term, inflation-linked yields. This shift enables several exit routes:

- **Project Refinancing:** Early-stage, high-cost debt can be replaced with lower-cost institutional debt once operational stability is proven.

• **Infrastructure Fund Buy-outs:** De-risked assets provide the stable profiles necessary for large-scale infrastructure funds to acquire projects from specialized developers.
• **Strategic M&A**: Industrial players looking to secure supply chains or decarbonize their core operations provide a secondary layer of liquidity. By establishing clear pathways for capital recycling, these policy tools ensure that specialized equity is not "trapped" in mature projects but can be reinvested into the next wave of industrial innovation.

Portugal: substantial capital, limited risk tolerance

Portugal's pension funds represent a significant pool of capital, with assets on the order of €20 billion in recent years[41]. However, Portuguese pension funds are among the most risk-averse in the European Union, with over 60% of assets allocated to bonds, and only a limited share invested in growth equity or alternative assets[42]. This is an example on how the country has been facing some difficulties in mobilizing savings that needs to be addressed.

While Portuguese regulation does not impose an explicit cap on listed equity, pension funds face quantitative limits on investments in private investment funds[43]. Because exposure to venture capital and growth equity is primarily accessed through such funds, these limits act as a de facto constraint on allocations to VC and private equity of no more than 10%[44]. In practice, this significantly limits the ability of pension funds to participate in late-stage cleantech equity funds or FOAK-relevant equity vehicles.

Spain: larger capital base, but constrained allocations

Spain's pension system represents an even larger potential source of patient capital, with assets exceeding €130 billion. Spanish pension funds are permitted

[41] https://www.asf.com.pt/documents/42559/2115887/REAFP_3T_2025.pdf/7365b057-bdec-b071-b925-3c2f019373ae?version=1.0&t=1764172749538
[42] https://www.oecd.org/content/dam/oecd/en/publications/reports/2025/11/pensions-at-a-glance-2025_76510fe4/e40274c1-en.pdf
[43] Portugal caps pension fund exposure to non-harmonised (non-UCITS) investment funds at 10% for closed/open pension funds and 5% for certain PPR schemes, and also applies a 2% limit per single non-harmonised fund. Source: https://www.oecd.org/content/dam/oecd/en/topics/policy-sub-issues/asset-backed-pensions/2024-Survey-of-Investment-Regulation-of-Pension-Providers.pdf
[44] https://www.pensionsforpurpose.com/assets/uploads/2025-10-01-ImpactLens-EWVC-Venture-Capital-v5.pdf

to invest in alternative assets, including venture capital, but face diversification and liquidity requirements under national rules. Roughly 70% of assets must remain in traditional, liquid investments, leaving up to ~30% for alternatives, with additional caps limiting exposure to individual VC funds (generally 5% per fund and 10% across related entities)[45], although the European Commission is also working on this topic, namely by encouraging long-term investments by enhancing the investment capacity of insurers.

Although these limits are more permissive than in Portugal, actual allocations to venture and growth equity remain well below theoretical ceilings, reflecting conservative investment cultures, fiduciary caution, and limited familiarity with hard-tech cleantech risk profiles. Policymakers are increasingly debating whether further adjustments are warranted, in line with broader EU efforts to mobilise long-term institutional capital into strategic sectors.

Beyond pension funds, family offices and high-net-worth individuals represent a major, under-utilised source of flexible capital. In Spain alone, the wealth of billionaires reached approximately €180 billion in 2025, following strong year-on-year growth[46]. At the same time, around 35% of Spanish family offices are expected to undergo a generational transition over the coming decade – creating a window to influence asset allocation strategies toward innovation- and impact-oriented investments, including cleantech[47].

Recommendations to mobilise institutional investors, pension funds, and HNWI

1. Adjust regulatory and policy frameworks to enable greater participation in private cleantech equity. Both countries could improve access to late-stage cleantech capital by easing or refining rules that constrain pension fund investment in private companies and funds. This is particularly relevant in Portugal, where quantitative limits

[45] https://cincodias.elpais.com/extras/inversion-fondos-planes/2025-04-24/los-fondos-de-pensiones-cuentan-con-el-capital-riesgo-para-preparar-la-jubilacion.html?

[46] https://www.ubs.com/us/en/wealth-management/our-solutions/private-wealth-management/insights/billionaires-ambition-report.html

[47] https://www.caixabank.com/en/headlines/news/one-in-three-family-offices-in-spain-will-be-facing-a-generational-shift-over-the-next-ten-years

on private funds materially restrict VC and growth equity exposure, but also relevant in Spain, where diversification and liquidity requirements may serve to discourage meaningful allocations.

Responsibility for such adjustments would sit primarily with finance and treasury authorities - notably the Ministries of Finance - in coordination with pension regulators. Importantly, reforms need not mandate allocations; rather, they can expand permissible investment space, allowing pension funds to allocate more capital to well-structured, professionally managed cleantech vehicles.

France's TIBI Initiative demonstrates how governments can mobilise institutional capital into venture and growth assets without mandates. Launched in 2020 and led by the French Treasury, TIBI provides a government-endorsed label for qualifying non-listed technology funds, reducing perceived risk for conservative investors. To date, the initiative has mobilised approximately €6 billion from pension funds and insurers, with a target of €7 billion by 2026, including investments in deeptech and the energy and ecological transition.
The model shows how public signalling, quality standards, and voluntary commitments can unlock institutional capital at scale.

2. Introduce targeted fiscal and financial incentives to crowd in institutional private capital. Even where regulation allows limited exposure, many institutional investors, family offices, and HNWIs remain highly risk-averse in practice. Interviews conducted for this report indicate that actual allocations to VC and growth equity often fall well below legal limits. Targeted fiscal or monetary incentives can help bridge this gap by improving risk-adjusted returns for investments aligned with national cleantech priorities.

Such incentives could include tax credits, accelerated depreciation, enhanced deductions, or downside protection mechanisms for investments into qualifying cleantech funds or projects – particularly at late-stage and FOAK phases where capital needs are largest.
To ensure additionality and fiscal discipline, incentives could be tied

to minimum investment sizes (for example, projects or funds with eligible investments above €30 million), and to certain priority cleantech sectors (like energy storage, green hydrogen, or renewable biogases), helping direct support toward scale-up bottlenecks. Ministries of Finance and other decision-makers would be critical in introducing the incentives.

These types of mechanisms are not unique in Europe. For example, Finland offers a large-investment tax credit administered by Business Finland for projects contributing to a climate-neutral economy. Companies undertaking eligible investments of at least €50 million in renewable energy and storage, industrial decarbonisation, energy efficiency, or strategic clean-tech manufacturing can receive a 20% corporate income tax credit, capped at €150 million, which is applied against future tax liabilities over a multi-year period following project completion[48]. A similar initiative using targeted tax credits to improve risk-adjusted returns for large, strategic clean investments could be adapted to Iberian fiscal frameworks and investor profiles.

UK Enterprise Investment Scheme (EIS): Crowding Private Capital into Innovation

The UK's Enterprise Investment Scheme (EIS) and Seed Enterprise Investment Scheme (SEIS) are long-standing, government-backed tax incentive programmes designed to mobilise private capital into high-risk, innovation-driven companies by improving risk-adjusted returns for investors. The schemes use the tax system to reduce investor downside and enhance upside, making investments that would otherwise be considered too risky more attractive to private capital.

Under SEIS, individual investors can claim up to 50% income tax relief on qualifying investments made into very early-stage companies. EIS offers 30% income tax relief on investments of up to £1 million per tax year, or up to £2 million when investing in designated "knowledge-intensive" companies. In addition, both schemes provide capital gains tax advantages, including exemption from capital gains on shares held for at least three years, as well as loss relief that allows investors to offset a portion of losses against income or capital gains if an investment underperforms.

The scale and durability of these incentives have translated into substantial market uptake. In the 2023–24 tax year, approximately 3,780 companies raised £1.575 billion

under EIS, while 2,290 companies raised around £242 million under SEIS. Over time, the schemes have become sufficiently predictable and attractive that entire investment funds have been established specifically to deploy capital through EIS and SEIS, with fund strategies explicitly built around the availability of these tax incentives.

While EIS and SEIS are oriented toward early-stage investment, a similar approach – pairing clearly defined, high-risk strategic sectors such as clean energy, energy storage, or industrial decarbonisation with targeted tax relief – could be adapted to later-stage equity and FOAK deployment, complementing public cornerstone equity and increasing the volume of private capital available for cleantech scale-ups.

3. Blended Finance Instruments for FOAK Cleantech Deployment

As outlined in Section 2.2, Iberia already deploys a meaningful set of public blended finance tools across loans, subordinated instruments, and guarantees. However, the core challenge in Iberia is not the absence of tools, but their fit with the financing realities of FOAK and early-commercial cleantech deployment. Many instruments remain multi-sectoral, structured for bankable expansion projects rather than FOAK realities, or capped at levels that are too small for FOAK-scale needs. To position Iberia as a cleantech scale-up and manufacturing powerhouse, existing debt and guarantee tools can be further sharpened and specialised – particularly toward (i) risk-tolerant public loans and subordinated debt that reduces the cost of capital for scale-ups and FOAK sponsors, and (ii) guarantees that unlock commercial debt where lenders remain constrained by technology, execution, and early-market risk.

A. Scaling FOAK Deployment through Public Lending

Compared with equity and grant funding, tailored debt tools remain underdeveloped for cleantech FOAK deployment in Iberia. At the EU level, loans and venture debt instruments have played an increasingly important role in financing late-stage cleantech scale-ups and first commercial deployments, particularly through EIB-backed structures and InvestEU-linked facilities.

Recent examples are Aisti, AM Silk and Meva Energy, which received EIB venture debt financing in 2025, illustrating how quasi-equity tools can support capital-intensive climate hardware companies at a pivotal scale-up stage[49].

At the national level, gaps remain more pronounced. Portugal currently has no dedicated cleantech debt facility designed for FOAK or early-commercial deployments, and domestic support is overwhelmingly delivered through guarantees to commercial banks rather than direct or quasi-direct public lending. Spain has more developed public debt capacity – including ICO-Verde alongside IDAE's ability to deploy loan and participative instruments – but these tools are either not systematically structured around FOAK and early-commercial risk profiles or remain limited in scale relative to FOAK financing needs.

This matters because, in practice, FOAK cleantech projects in Iberia are often financed predominantly through equity. In many cases, equity represents well over 50% of project capitalisation, reflecting the limited availability of bankable debt at early commercial stages. In some cases, FOAK projects have been financed almost entirely through equity. While grants play an important and often catalytic role, an overly equity-heavy capital stack increases the cost of capital, reduces project bankability, and limits the number of deployments that can be financed with scarce patient equity.

The policy implication is clear: Iberia needs more purpose-built public lending instruments that can sit between grants and pure equity – including subordinated loans, participative instruments, and venture-style debt – to reduce equity requirements, improve capital efficiency, and accelerate FOAK replication once first plants are built.

Recommendation for Public Lending

1. **Portugal should establish a public-lending facility explicitly designed for capital-intensive cleantech scale-up and FOAK**

[49] https://www.eib.org/fr/projects/all/20240895
https://www.eib.org/en/press/all/2025-546-finnish-startup-aisti-secures-eur20-million-eib-loan-to-advance-sustainable-noise-reducing-panels
https://www.eib.org/en/press/all/2025-410-eib-backs-swedish-cleantech-pioneer-meva-energy-with-eur40-million-for-biogas-innovation

deployment. This would address a structural gap in the Portuguese financing ecosystem, where support remains guarantee-led.

A Portuguese cleantech lending facility could be structured with the following characteristics:

- **Target stage and use of proceeds:** late-stage scale-ups (e.g., TRL 7–9) and FOAK/first commercial deployments
- **Instrument types:** risk-tolerant public loans, subordinated debt, and participative or quasi-equity loans with repayment partially linked to project or company performance (e.g. cash-flow or revenue-linked components)
- **Risk absorption:** higher tolerance for technology and execution risk than commercial lenders
- **Ticket sizes and leverage:** sized to be material for FOAK capital stacks (i.e. beyond single-digit millions), with an explicit objective of reducing equity share and enabling subsequent senior debt once performance and market is proven.

Banco Português de Fomento would be the natural anchor institution, given its central role in Portuguese public finance, with potential co-financing or risk-sharing alongside the EIB/InvestEU to import proven structuring approaches and underwriting standards. Other commercial banks could also be implementing partners.

2. **Spain should ringfence existing public lending capacity to create a coherent FOAK lending pathway for cleantech.** Spain already has meaningful public lending capacity, but the opportunity lies in sharpening and coordinating this capacity toward FOAK and early-commercial cleantech deployment, rather than creating entirely new institutional structures.

This could be achieved by designating a FOAK-oriented public lending window within existing instruments, structured to move beyond conventional bankability frameworks. ICO-Verde's scale and mandate make it a natural platform for such a window, while IDAE's experience

with participative loans and sector-specific energy expertise provides a strong foundation that could be expanded and systematised. In parallel, SEPIDES' FAIIP could play a complementary role in supporting industrial facilities and manufacturing scale-up, provided eligibility criteria and structuring are adapted to early-commercial cleantech risk profiles.

Whichever institutional pathway is chosen, the objective should be the same: to create a coherent FOAK public lending pathway that reduces reliance on equity-heavy capital stacks, improves project investability, and enables cleantech projects to progress from first deployments to repeatable commercial scale without requiring entirely new public finance architecture.

The U.S. Department of Energy Loan Programs Office (LPO): How mission-driven public debt can unlock FOAK cleantech deployment at scale

The U.S. Department of Energy's Loan Programs Office (LPO) demonstrates how strategic public debt can catalyse large-scale clean technology deployment by underwriting risk that private lenders often avoid. Between 2021 and the end of 2024, LPO announced 53 deals totalling approximately $107.6 billion in committed project investment, including roughly $60.6 billion in closed loans and loan guarantees — illustrating sustained demand for long-horizon, risk-tolerant financing for energy infrastructure and industrial projects.

In 2024 alone, LPO closed 14 loans and loan guarantees and submitted 15 additional deals for conditional commitments spanning emerging clean energy technologies, grid modernisation, manufacturing scale-up and large-scale renewables deployment. Highlights include a $1.52 billion loan guarantee to restart a U.S. nuclear power plant, more than $40 billion across multiple utilities for hydropower, storage and grid upgrades, and a $1.45 billion loan guarantee to rebuild domestic solar manufacturing capacity — each transaction supporting both deployment and industrial competitiveness.

These figures show how mission-driven public lending, when deployed at scale and across technology types, can shift capital flows toward projects. For Iberia, the LPO experience underscores the value of public loans that (i) accommodates long deployment timelines, (ii) assumes early execution risk alongside private capital, and (iii) deploys materially sized tickets to drive industrial-scale adoption.

B. Guarantee instruments tailored to FOAK cleantech realities

Guarantees are a critical but underutilised lever for unlocking private debt financing for FOAK and early-commercial cleantech projects. Across Iberia, a range of public guarantee instruments already exist, but most were designed for conventional SME lending, export finance, or bankable industrial expansion. As a result, they often fall short of addressing the specific risk profile of FOAK cleantech, where technology risk, execution risk, and early-market uncertainty remain material despite successful pilots and demonstrations.
The opportunity for Iberia is therefore not primarily to invent entirely new guarantee architectures, but to repurpose and refine existing vehicles – or design future ones – with FOAK cleantech in mind. Well-designed guarantees can materially improve bankability by reducing downside risk for lenders, enabling longer tenors, larger ticket sizes, and more flexible repayment profiles. In doing so, they can crowd in private banks and institutional lenders, reduce reliance on expensive equity, and allow FOAK projects to scale more rapidly toward repeatable commercial deployment.

Recommendations for guarantee instruments:

1. **Portugal can repurpose InvestEU-backed guarantees for cleantech FOAK deployment**. Portugal already operates a large and sophisticated guarantee ecosystem through Banco Português de Fomento (BPF), largely backed by InvestEU. These instruments provide substantial risk-sharing capacity and are well integrated into the domestic banking system. The key challenge is not availability, but targeting. To increase impact for cleantech, a portion of BPF's existing guarantee capacity could be explicitly ring-fenced for FOAK and early-commercial cleantech deployment, with eligibility criteria and structuring adapted accordingly. This would include:

   • Cleantech-only specification, prioritising capital-intensive cleantech areas such as energy storage, green hydrogen, renewable gases, and industrial decarbonisation technologies;
   • Larger ticket sizes than current guarantees in the single-digit millions,

aligned with FOAK project economics rather than SME investment norms;
• Maintain high guarantee coverage ratios offered in current frameworks ranging from 80% up to 100%, subject to robust due diligence;
• Longer maturities and grace periods beyond the current 10-year average, reflecting construction timelines, ramp-up, and market integration.

By sharpening the design of existing guarantee lines rather than creating parallel systems, Portugal could rapidly improve access to debt financing for FOAK cleantech while leveraging institutions and banking relationships that are already operational and trusted.

2. **Spain can create a new guarantee line to fill the domestic gap**.
Spain's guarantee landscape is more fragmented and leaves a clearer structural gap at the domestic FOAK stage. At one end of the spectrum, CERSA plays a valuable role in supporting SME lending, but operates within a conventional credit-risk framework and is not designed to absorb technology or early-commercial risk. At the other end, CESCE provides strong support for internationalisation and overseas investment, helping Spanish cleantech companies expand abroad, but these instruments do not address domestic deployment, job creation, or early industrial scale-up within Spain.

This leaves a missing middle: early-commercial and FOAK cleantech projects that are too risky for standard SME guarantees, but not scaled enough for export markets. Addressing this gap would require the creation – or explicit designation – of a domestic cleantech FOAK guarantee mechanism capable of technology, execution, or early-market risk for projects deployed within Spain.

Such a mechanism would need to share several core features:
• Explicit coverage of technology and early-market risk, not only traditional credit risk;
• Eligibility focused on domestic FOAK and early-commercial

deployments, including first plants, first fleets, and manufacturing scale-up;
• Guarantee coverage sufficient to materially de-risk senior lending and crowd in private banks;
• Coordination with energy and industrial agencies (IDAE, MITECO, etc.) to ensure alignment with national decarbonisation and industrial strategy objectives.

In filling this guarantee gap, Spain could significantly improve the bankability of domestic FOAK cleantech projects and reduce the pressure on public equity and grant instruments to carry the financing burden.

3. **Develop targeted guarantees for specific FOAK bottlenecks**.
In addition to standard loan and credit guarantees, targeted guarantee instruments could address specific bottlenecks that disproportionately affect FOAK cleantech deployment. Some examples may include
• **Permitting and grid-connection guarantees**. In Iberia, securing permits and grid or utility connections can cost, according to our interviews, over €500.000 – well before construction begins. Guarantees that support permitting and connection fees would allow companies to deploy capital toward building FOAK assets rather than absorbing high pre-construction costs.
• **Technology-related guarantees**. While cleantech technologies reaching FOAK have been validated at pilot and demonstration scale, first commercial deployment can still involve scale-up challenges. Carefully designed guarantees that absorb a limited share of technology-related risk during early operations could increase lender confidence, provided they are time-limited and paired with robust technical due diligence.

4. **Ensuring access to guarantees across the cleantech development lifecycle.** A final constraint to consider is the interaction between guarantees and broader public support limits. In practice, cleantech companies that have already received public funding through grants, loans, or other instruments may face difficulties accessing guarantees due to cumulative public support ceilings.

While these limits are intended to prevent over-subsidisation, they can inadvertently penalise capital-intensive cleantech companies that require different types of public support at different stages. Early-stage grants and demonstration funding address technology risk, while guarantees are designed to mobilise private debt and reduce financing costs. Treating these instruments as interchangeable can restrict access to guarantees precisely when companies need them most to transition from demonstration to commercial deployment.

This highlights the need for better sequencing and coordination of public instruments, ensuring that access to guarantees is not automatically constrained by prior use of grants or other support. Clearer differentiation between innovation support and risk-sharing mechanisms would allow public guarantees to function as intended: as catalytic tools that crowd in private capital and support FOAK deployment, rather than as an extension of early-stage subsidy.

Unlocking industrial-scale hydrogen manufacturing for Sunfire via German government guarantees

Germany provides a strong example of how public guarantees can unlock large-scale private financing for commercial cleantech deployment. In 2024, Sunfire, a leading German electrolyser manufacturer, secured €200 million in guaranteed financing to support the scale-up of its industrial hydrogen technology and manufacturing activities.

The financing was arranged through a consortium of commercial banks led by Commerzbank, alongside several major European lenders. Eighty percent of the loan amount is covered by parallel default guarantees provided by the German Federal Government and the Free State of Saxony, with the remaining 20% retained by the banks. The facility has a five-year tenor.

Importantly, the guarantee line is structured around industrial execution needs rather than general corporate financing. It is used to secure customer advance payments, contract fulfilment, and warranty obligations associated with large electrolyser orders – areas where cleantech manufacturers often face binding constraints. By replacing cash collateral requirements with public guarantees, the structure allows Sunfire

to deploy working capital more efficiently and scale production without tying up significant equity or liquidity.

The Sunfire transaction illustrates how targeted public guarantees, deployed alongside commercial banks, can materially improve bankability for FOAK cleantech projects. By addressing specific execution and contractual risks, such instruments reduce reliance on equity-heavy capital stacks and accelerate the transition from first industrial orders to repeatable commercial scale.

Cleantech for Iberia

CONCLUSION

Iberia has all the essential ingredients to become a leading European hub for clean industrial deployment: world-class renewable resources, established energy-intensive industries, strong public finance institutions, and a growing pipeline of cleantech innovators. Yet, as this report has shown, realising this opportunity is not primarily a question of ambition or headline funding volumes. It is a question of alignment.

The window for establishing Iberia as a global leader in industrial cleantech is closing as international competition intensifies. Strategic frameworks like the US DOE Loan Programs Office and localized regimes in Germany and France are already redirecting global capital flows toward markets that offer the highest degree of execution certainty. For Spain and Portugal, the “why now” is not merely about meeting climate targets, but about preventing the flight of home-grown innovation to more aggressive jurisdictions. Failing to align public instruments with the speed of private markets today will result in a higher cost of decarbonization tomorrow and the loss of long-term industrial sovereignty.

Across Spain and Portugal, public capital is already present at scale. What remains missing is a coherent investment system that translates policy objectives into bankable projects, addresses first-of-a-kind risk explicitly, and enables private capital to participate earlier and more consistently. The constraints facing Iberian cleantech scale-up – uncertain revenues, FOAK risk, equity scarcity, and limited access to fit-for-purpose debt and guarantees – are structural. They cannot be solved through isolated programmes or one-off funding calls.

This report has therefore argued for a shift in approach. Rather than adding new instruments indiscriminately, Iberia should organise its existing and future tools into a sequenced, risk-aware cleantech investment plan. Demand-side mechanisms must be anchored in industrial transformation. Equity must be deployed where it is most catalytic. Public lending and guarantees must be designed around early-commercial realities, not retrofitted from conventional bankability frameworks. Above all, public capital must be used deliberately to crowd in private finance, not substitute for it.

If executed effectively, an Iberia Cleantech Investment Plan can deliver a visible transformation by 2030:

1. First, demand becomes bankable. Long-term contracts, CfD-style mechanisms, and strategic green procurement reduce revenue uncertainty and enable final investment decisions for hydrogen, energy storage, and other enabling technologies tied to industrial decarbonisation.

2. Second, FOAK becomes financeable. A government-anchored cleantech equity fund, capable of writing large FOAK-scale tickets, acts as a credible anchor investor – crowding in private equity and providing the confidence needed to close complex financing rounds. In parallel, risk-tolerant public lending and well-designed guarantees expand the role of debt in early-commercial projects, lowering the overall cost of capital and allowing scarce late-stage equity to support a greater number of deployments.

3. Third, replication replaces exception. The system shifts away from one-off flagship projects toward repeatable deployment pipelines, with growing participation from commercial banks and institutional investors. Iberia emerges not only as a producer of low-cost renewable electricity, but as a competitive base for clean industrial production, technology manufacturing, and export-oriented value chains.

But policy ambition alone cannot generate bankable assets; successful deployment requires a robust ecosystem of specialized private execution partners. The instruments detailed in this report, from revenue stabilization to venture lending, are most effective when channeled through private partners who possess the technical depth to manage FOAK risk. Recognizing these actors as the primary bridge between public mandates and institutional-grade assets is vital. Capital mobilization is an ecosystem function, and the success of these policy tools depends on a collaborative framework where public de-risking and private expertise work in lockstep to build a repeatable, scalable industrial base.

The prize is significant. A functioning cleantech investment system would strengthen Iberia's industrial competitiveness, create durable skilled employment, improve energy security, and position Spain and Portugal as reference markets for Europe's clean industrial transition. The opportunity is no longer theoretical. With the right investment framework in place, Iberia can move decisively from potential to performance.

THANK YOU

Feel free to contact us with any questions you have.

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