Green Bank Approaches for Portugal

Supporting the operationalisation of the Banco Português de Fomento

Report for the Portuguese Ministry of Environment and Climate Action, the Ministry of Economy, and the Banco Português de Fomento

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Executive summary

New green banking approaches can help Portugal achieve its green and climate ambitions, both as a response to the COVID-19 challenge and beyond

€85 billion of additional investment will be needed to achieve Portugal's ambitious carbon-neutrality target by 2050, a significant shift of current capital flows in the Portuguese economy. Portugal's Roadmap for Carbon Neutrality 2050 (RNC2050) estimates that close to €1 trillion of overall investment is needed to achieve the target (Ministério do Ambiente e da Transição Energética de Portugal, 2019b). Of this, €930 billion are expected to be realised through planned investment and the course of expected economic modernisation. The remaining €86 billion must be catalysed with additional efforts.

The creation of the Banco Português de Fomento (BPF), a national promotion bank, offers an opportunity to accelerate and catalyse the investment in decarbonisation needed to meet this net zero target by mobilising the private financial sector and bringing down the cost of capital, while also promoting economic growth and entrepreneurship. The BPF's mission is to develop economy and entrepreneurial community through financing solutions that address market failures in the access to financing. Its statute claims that in following this mission it should also promote sustainability and focus on carbon neutrality. This grants the BPF an unique mandate for channelling finance towards decarbonisation.

The BPF's mission covers growth, sustainability, and stability

Given this challenge and opportunity, this report provides information to operationalise green approaches within the BPF, applying best practice methods from existing green finance institutions to the Portuguese context. For the BPF to fulfil its role as a catalyser of green finance, it can adopt best practices from existing financial institutions with a green mandate, like the UK Green Investment Bank or the New York Green Bank. These lessons can be adapted to fit the specific Portuguese context, considering green sector development, financial sector experience, and capacity for specific green financing tools. This report therefore provides a tailor-made approach to jump-start the BPF's green financing operations.

For the BPF to best support green investment, it is crucial to understand how green financial institutions address challenges and integrate financial markets. This requires identifying the commercial viability of different investments, technologies or sectors, and in particular determining whether they are close to becoming financeable exclusively by the private sector. Returns, counterparties, and risks of investments all need to be considered. From this, the role of the BPF as a green financial institution can be designed in relation to the financial state and challenges of investments.

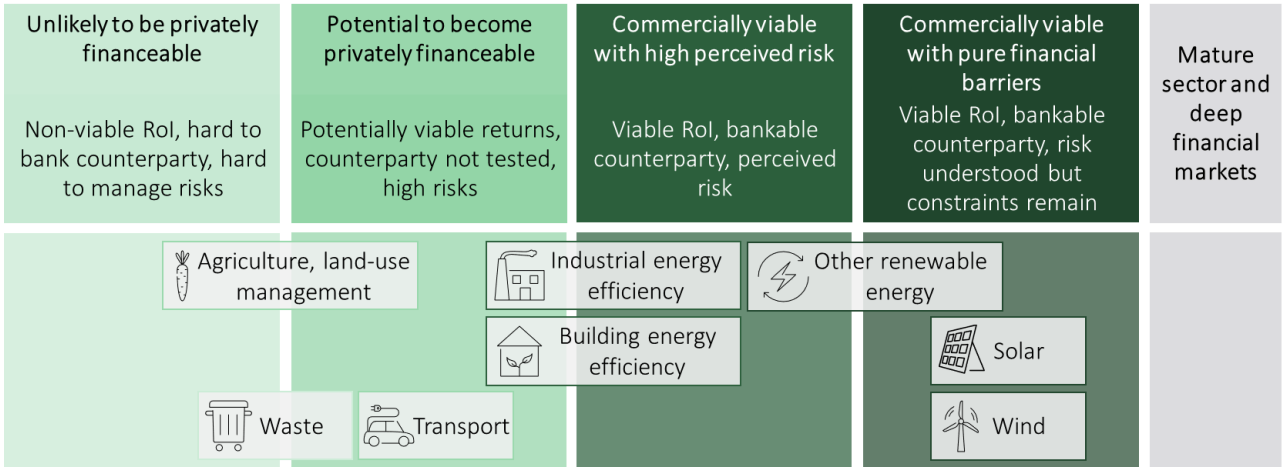
With these approaches, the BPF can increase green investment by focusing on key sectors with the greatest need and potential

To deliver its green mandate, the BPF should aim to increase green investment flows while being additional to and supporting the existing private financial sector.[1] Green banking approaches through the BPF's actions need not be in competition with or lead to the exclusion of private finance. Instead, it can and should support scaling up private green investment, through targeting the challenges or market failures that have kept the private sector from increasing its presence in green finance.

This requires mapping the commercial viability of green sectors in Portugal, in order to act where support is most additional. Green sectors will be at different stages of their financing journey. The BPF should avoid supporting those sectors and investments that are already fully privately financeable, and instead support sectors in becoming viable for private investors. Different approaches will be needed to do this, depending on the stage of commercial viability of green sectors.

The BPF should focus on the renewable energies, transport, energy efficiency, and agriculture and land-use sectors, chosen due to their financing needs for decarbonisation and likelihood of becoming commercially viable and privately financeable. Renewable energies and industrial energy efficiency have the highest need for additional finance, based on the RNC2050. Additionally, renewable energies, energy efficiency and transport can become fully privately financeable with support that targets specific financial barriers in investments. Agriculture and land-use faces important constraints to commerciality but there is a potential for specific products that the BPF can focus on.

Figure 1 The BPF should focus on renewable energies, energy efficiency, transport and agriculture



Note: RoI = return on investment.
Source: Vivid Economics, based on insights from research and stakeholder surveys

[1] The discussion of private financial institutions and the private financial sector refers to financial market participants that act independently of the government – including state-owned or state-supported financial institutions that operate as commercial institutions, such as the Caixa Geral de Depósitos.

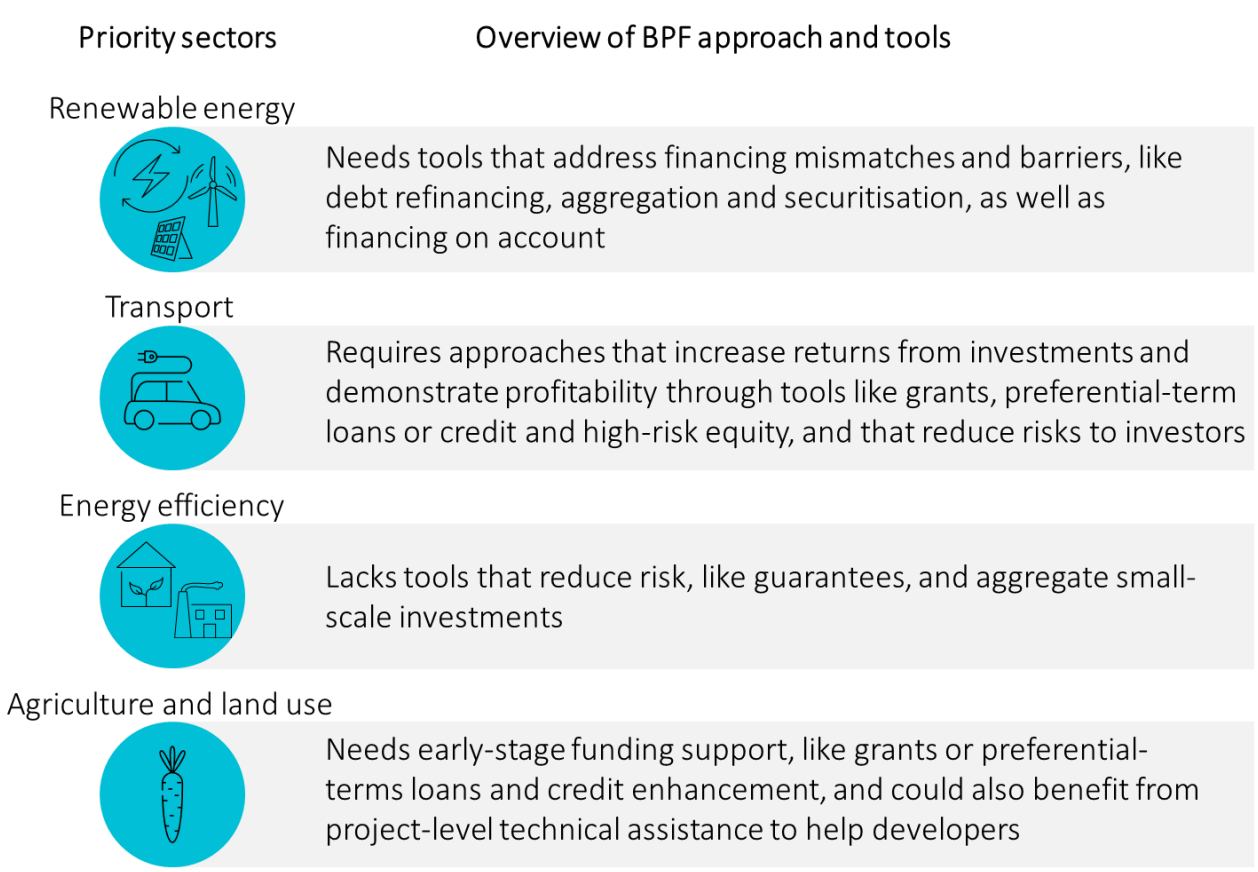
Financial tools that the BPF can use to promote green investment address both sector-specific needs and overarching challenges

The Portuguese financial sector faces challenges throughout the whole cycle of green investments, including data and complexity issues, leading to misunderstanding over investment risks, returns, and green results. Private financial stakeholders face difficulties in conducting risk–return analysis due to the seeming complexity and lack of data and information about green investments. Coupled with challenges associated with monitoring, reporting and verifying green results of investments, the private financial sector is discouraged from backing investments it struggles to analyse without the certainty of being able to report green or climate outcomes. Echoing this, providers of green products and services find that risks and returns of their investments are frequently misunderstood by financiers.

To counter these overarching challenges the BPF can act as an information provider and facilitator of green investment. The BPF should prioritise provision, coordination of efforts, and raising awareness of data and information sources and tools. To address the challenges of risk perception and complexity, it should also support due diligence and green monitoring, reporting and verification.

The BPF should also seek to deploy a range of financial tools to target distinct sector challenges and needs, creating a bespoke approach for Portugal. The BPF can draw on a range of approaches and tools to catalyse private financing by addressing barriers and demonstrating profits, and facilitate investments through technical assistance and information provision. Different approaches address challenges at different stages of the financing journey of green investments. Each green sector will benefit from a specific set of tools that target distinct challenges.

Figure 2 The tools recommended for the BPF match sectoral needs



Source: Vivid Economics

1 Introduction

In recent years there has been a global expansion in the popularity of specialised climate and sustainable finance, motivating Portugal's establishment of a Taskforce for Sustainable Finance and a search for bespoke ways to accelerate green investment. In order to drive a greater shift of financial resources, the Taskforce for Sustainable Finance was established to highlight the importance of environmental, social and governance (ESG) risk management and incentivise the development of and investment in sustainable finance products. The Taskforce has produced guidelines to accelerate sustainable financing in Portugal, as well as a letter of commitment to sustainable finance, signed by 22 public and private financial organisations[2] in Portugal (Grupo de Reflexão para o Financiamento Sustentável, 2019a, 2019b).

Portugal is taking a leading role on climate within Europe. The Portuguese government committed in 2016 to achieving climate neutrality by 2050. Portugal's Roadmap for Carbon Neutrality 2050 (RNC2050) sets out cost-efficient, technologically feasible, and economically viable national and sectoral pathways that achieve an 85–90% reduction of greenhouse gas (GHG) emissions relative to 2005 levels(Ministério do Ambiente e da Transição Energética de Portugal, 2019b).[3] Energy-specific objectives include a 35% reduction in primary energy consumption and a 47% share of renewables in final energy consumption by 2030.[4]

In order to achieve climate neutrality by 2050, significant green finance will be necessary. The RNC2050 estimates overall aggregate investment needed for climate neutrality by 2050 is close to €1 trillion, of which €930 billion are expected be realised in any case, leaving at least €85 billion of additional investment required to achieve these goals. Portugal is looking to mobilise this investment from national, European, and private investment funds.

While this is an important start, it is not enough to meet the targets, and hence Banco Português de Fomento (BPF) was created with the additional ambition offilling the green finance gaps. The BPF is a national promotional bank that was launched in November 2020 as a result of the merger of three existing institutions: : Instituição Financeira de Desenvolvimento (IFD), PME Investimentos, and Sociedade Portuguesa de Garantia Mútua (SPGM). It aims to support the development of the national economy and of the entrepreneurial community's financial solutions to market failures. As a centralised financial institution, it plays a key role in coordinating different funding sources and enabling companies to access funding, while also guaranteeing that this funding aligns with national policies, and environmental, social and economic commitments. The green mandate is an integral part of its mission.

This work aims to support the Portuguese government in the operationalisation of the BPF as a driver of green finance and offers practical guidance. In the first instance, the work assessed the precise gaps and needs of Portuguese green sectors. Further research was then conducted to identify the green financial products and green capacity-building best suited to address the needs of Portugal. The research was conducted through extensive stakeholder engagement with public actors, financial institutions, green investment experts and the private sector,[5] as well as in-depth desk-based research. The remainder of this report is structured as follows:

- **Section 2** provides context on green financial institutions and their tools;
- **Section 3** looks at investment needs and assesses green sectors in the Portuguese economy;

[2] Throughout this analysis, the discussion of private financial institutions and the private financial sector refers to financial market participants that act independently of the government – including state-owned or state-supported financial institutions that operate as commercial institutions, such as the Caixa Geral de Depósitos.
[3] Includes sequestration, excludes international credits.
[4] From the National Energy and Climate Plan 2030.
[5] The full list of stakeholders can be found in Annex 1.

- Section 4 examines experience with financing green investments from different perspectives, and assesses the capacity of the BPF both for carrying out green bank activities and investment and for complying with key external regulation;
- Section 5 provides recommendations for the BPF's offering, covering green sectoral focus, financial tools, and green capacity-building that best target the needs identified in the previous sections.

2 Green financial institutions

Financial institutions with a green mandate can help overcome green financing challenges such as those faced by Portugal and accelerate sustainable investment

Green financial institutions refer both to entities that are established specifically to facilitate private investment in green sectors, and to national development or promotion institutions that include mandates for sustainability. Exclusively green finance institutions are commonly referred to as green banks or green investment banks (GIBs), and have been established at the national level (Australia, Japan, and the United Kingdom), state level (California and Connecticut), county level (Montgomery County, Maryland, USA), and city level (Washington DC, USA and Masdar, United Arab Emirates). Institutions with integrated green mandates incorporate the objectives, approaches and tools of green financial institutions into their broader aims of economic development, as is the case of the BPF.

The core objective of a green financial institution is to mobilise private capital, through the investment of public funds, towards green sectors that would otherwise not receive sufficient private investment. These sectors should be in line with the country's green goals. Therefore, green financial institutions are a tool that can boost the economy towards meeting its low-carbon, adaptation, and broader sustainability targets.

To meet this objective, green financial institutions frequently embody a set of core characteristics:

- **A strict mandate of mobilising private green investment using mechanisms to mitigate risk and facilitate transactions, with minimal use of public funds:** investments chosen should demonstrate profitability and additionality. The institution's objective is to catalyse investment in sectors which would otherwise not been invested in, and to accelerate the participation of private finance. Demonstrating profitability from these investments establishes precedent for private sector investment, enabling the institution to shift focus.
- **Independence with regard to investment and intervention decisions:** since green investment is often politically charged, independence provides the institution with the freedom to identify investment based on its clearly defined mandate. This independence also enables it to act with flexibility and agility in financial markets, ensuring that its effectiveness is not undermined by unnecessary transaction costs.
- **A focus on demonstrating cost-effectiveness and performance reports:** this complements the mandate of the institution in catalysing private investment, demonstrating viability. Additionally, it allows for clear tracking of public goals and accountability since it will be dealing with public funds.

Green financial institutions are typically designed to complement and support the existing private financial sector to accelerate and catalyse green investment flows. They help the private financial sector finance green projects that would otherwise not be viable due to their risk, uncertainty, or lack of appropriate instruments. Green financial institutions vary in their functions, but often play a diversified and facilitating role to support green finance – which involves direct financing in areas where the private financial sector is not yet comfortable investing, and partnering with financial institutions to enable investment by bringing down costs, managing green investment risks and overcoming informational barriers. These activities fall within the wider goal of bringing down the overall cost of capital and widening access to finance for green investments to accelerate and catalyse private green investment.

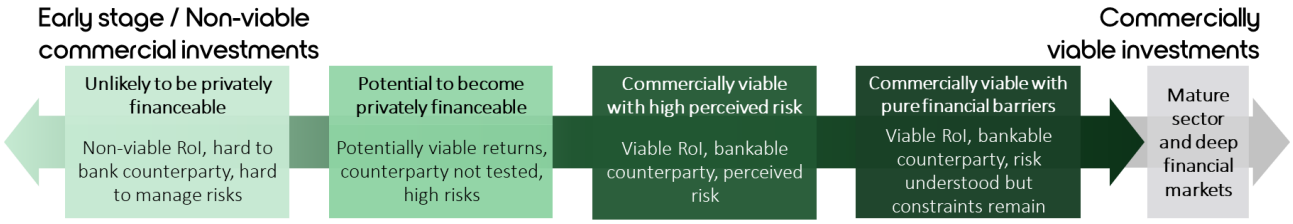
The approaches and tools for green financial institutions discussed in this section should be viewed as options that the BPF can pursue to promote green investment. As an institution with an integrated green mandate, the BPF is well placed to incorporate specific strategies of green finance to reach its objectives.

2.1 Green banking tools and approaches

Green financial institutions use a range of tools and financial instruments to address public and private financing challenges. This section presents financial challenges with green investments and the suite of tools available to the institutions to support them.

Green investments vary in their viability for financing, and often face challenges in their journey to becoming commercially viable and fully privately financeable. Figure 3 illustrates different stages of commercial viability. Investments face a spectrum of financing challenges, ranging from a lack of public support for investments whose risk–return profile doesn't meet private finance criteria, to information failures that inhibit private participation in otherwise profitable investments. Some investments, at the extreme left, may not be feasibly privately financeable due to their nature. But most other investments should progress along the right-hand arrow and become commercially viable as deployment and advances are made, eventually leading to mature and deep private financial markets fully meeting investment needs.

Figure 3 Viability for private financing varies across different green investments



Source: Vivid Economics

Supporting green investments across these viability stages requires both 'hard' and 'soft' investment tools to enable the development of both projects and investment pools, and to address green projects' specific risk and return profiles. The instruments can address challenges relating to insufficient public and private investment, as shown in Table 1.

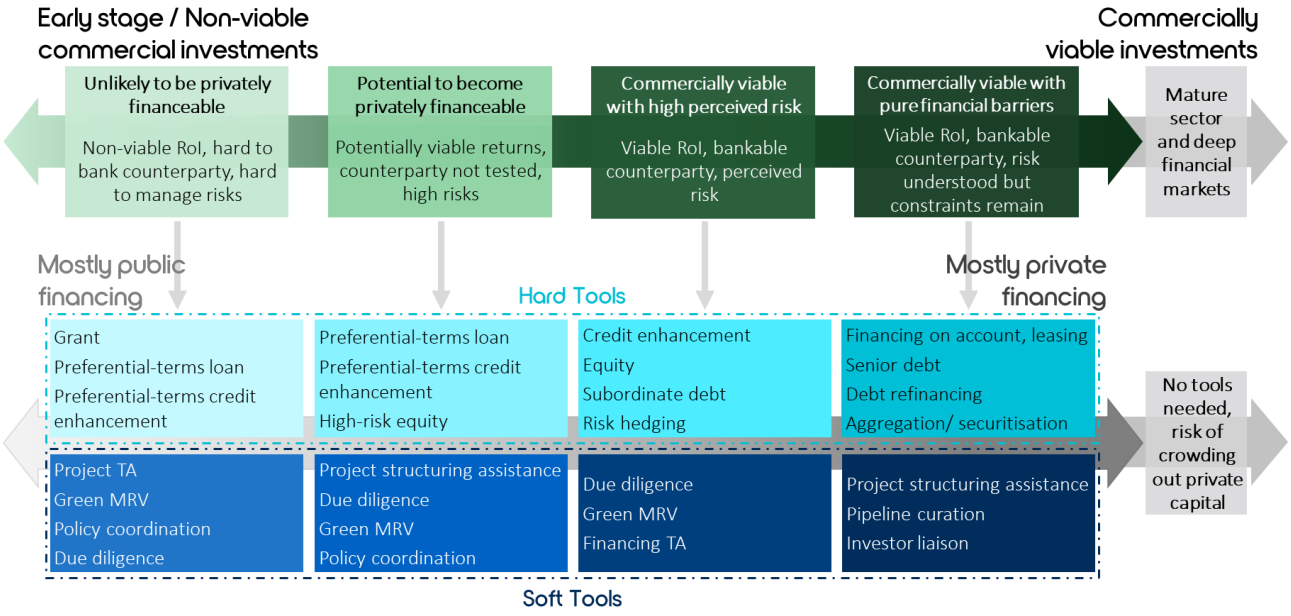
Table 1 Green finance vehicles around the world have made successful use of 'hard' and 'soft' tools to leverage private finance

Tools	Description
Hard tools	
Grants	Non-reimbursable grants to support project viability
Preferential-terms loans	Loans at below-market rates that don't reflect the full risk or transaction cost
Credit enhancement (with or without preferential terms)	Assurance to repay via collateral, insurance or third-party guarantee
Subordinate or hybrid debt	Funding that ranks after other sources of finance if a company falls into liquidation
Equity	Direct equity participation at early stage (e.g. construction phase)
Risk hedging	Dedicated products or support to help hedge against risks, such as guarantees
Financing on account, leasing	Repayment programmes through utility or tax bills, or through service charge
Senior debt & refinancing	Long-term senior lending and 'capital recycling' at market rates
Aggregation & securitisation	Financial engineering to match ticket size requirements of institutional investors
Soft tools	
Project technical assistance (TA) to developers	TA to project developers to identify and assess risks and structure green projects
Due diligence	Project technical and financial appraisal to better assess expected RoI and ex ante risks
Green monitoring, reporting and verification (MRV)	MRV systems to quantify carbon reduction impacts, green indicator definitions and standardisation
Policy coordination	Working with policymakers to align regulations with investor and developer incentives
Project structuring assistance	Support in preparing and ordering all information for the investment project
Pipeline curation	Gathering portfolio of upcoming and early-stage green projects in need of finance
Financing TA	Knowledge sharing and capacity building in the financial sector with regard to green tech
Investor liaison	Roadshows, presentations, workshops to bring private sector around the table to co-invest

Source: Vivid Economics

To effectively address challenges at various stages of the green financing journey, institutions may combine different sets of hard and soft tools. These tools can be used in isolation or combined to address the spectrum of challenges across the stages of viability. The deployment of tools for specific financing challenges is summarised in Figure 4 and discussed in detail below.

Figure 4 Public financing institutions can deploy a set of soft and hard tools to address different challenges at different stages



Source: Vivid Economics

Tools can be grouped by the financial challenges that they target, which helps understand their role throughout the financing journey of an investment. Tools offer specific solutions to financing problems. Grouping tools into areas clarifies which tools are substitutes for each other, and which can be effectively used in combination.

Hard tools: **Instruments that catalyse private financing into green sectors by reducing access barriers and demonstrating profitable investments**

<u>Improving returns</u>

In certain cases, green financial institutions may subsidise the cost of capital by lending capital at a lower-than-market rate, covering financial transaction costs, or providing direct grant-based payments. Subsidisation is used strategically, since the aim is to catalyse growth in a sector which can become more commercially viable in the long run. Subsidisation also needs to be well targeted to avoid crowding out or sending perverse signals to the market (i.e. that these investments are inherently non-commercial). They can also provide financial services at below-market prices, thus reducing transaction costs for early-stage investees without reducing perceived rates of return. In certain instances, green financial institutions may be used as a channel for policymakers to compensate for the positive externalities associated with green investment. In such cases, there must be clear advantages to channelling subsidies through the institution (e.g. access to beneficiaries), and those subsidies should be well calibrated to price efficiently for the positive externalities. Separating the grant component (e.g. through performance-based payments) from the lending rate is one way to ensure this.

Lowering risk

A large portion of green financial activity aims to lower risk through three types of intervention: i) directly providing capital and thus an implicit guarantee; ii) facilitating capital by risk sharing through mostly off-balance-sheet instruments; and iii) mitigating perceived risks by addressing information asymmetries. To reduce perceived and realised risks, institutions could take a stake in the equity of an innovative technology, or provide various forms of subordinate lending in addition to senior loans. They can also provide explicit or implicit guarantees, support due diligence, employ repayment mechanisms, and use 'bundling' tools.

Providing capital

Loans are the most common type of financing across existing green financial institutions. Although they increase the leverage of a company, they can help reduce the risk perception for private investors. By lending to a new market segment, a green financial institution sets precedent and acts as a proof of concept. Additionally, the associated due diligence is a valuable stamp of approval for investors, who are then more willing to co-finance the technology.

Equity, whether it is used as a standalone instrument or through hybrid mechanisms such as mezzanine financing, is a type of implicit guarantee to private investors. Since equity or mezzanine capital has a lower priority than debt, if the new project or technology were to default on investment, private debt would be repaid before equity. This instrument is well suited to ventures for which there is private investment interest, but the risk is too high. Over time, as projects become more commercially viable, the need for green investment banking institutions to hold equity is reduced.

Institutions can also issue subordinated debt, an intermediate product between equity and debt. This is useful to introduce diversity into green banking institutions' portfolios, while reducing risk to private lenders as subordinated debt is reimbursed after senior loans at the event of liquidation.

Facilitating capital

Green financial institutions can provide risk-reducing measures through guarantees and insurance that are less balance-sheet intensive compared to a direct equity stake, but increase the return profile of an investment. For example, GreenTech Malaysia and Australia's CEFC provide loan guarantees to encourage private banks to finance green projects.

Reserve pools leverage green banking institutions' capital and are set up specifically to cover defaults from green investments. These capital pools are usually financed by the institution's portfolio of investment returns. Backing up an investment with a reserve pool lowers the risk for private investors, as their payment is guaranteed.

Tools such as bill repayment or tax repayment are structured to reduce default risks from customers or beneficiaries and thereby reduce overall financial risk. On-bill financing, on the other hand, reduces the risk of default by streamlining repayment cash flows through bills. Loan repayments for energy efficiency improvements, for example, are made through savings on utility or tax bills. As utility and tax bills are statistically more likely to be paid on time, these repayment mechanisms lower the overall risk of the investment. To employ this tool, the institution can take advantage of its institutional mandate to collaborate with fiscal authorities or utility companies.

Targeting investment mismatches

Green investments, especially those related to infrastructure, are long-term projects that require large amounts of capital up front. Typically, however, private investors have shorter time horizon preferences and difficulties committing large amounts of capital, especially in less developed capital markets. To channel capital into these investments, green financial institutions can provide term-transformation services, akin to the term-transformation services provided by a typical commercial bank. For example, they can issue green

or other green financial institution bonds, tailored to the time horizon required by large institutional investors, while financing a portfolio of green investments with longer repayment horizons either via long-term lending or equity participation. In essence, this would mean that the institution can retain the longer-term exposure, taking advantage of its 'patient' public funding, while transferring the shorter-term needs to the market. As the institution's portfolio grows, it can create more tailored and varied bonds on the liability side of its balance sheet.

Green financial institutions can also use green investment funds to address mismatches in the size of investments. Institutions can target existing investment funds for green projects or set up a new entity. Investment funds serve the purpose of bringing together similar, small investments, assuming the role of capital distributor. Additionally, they can target specific types of investors, such as innovation investors, by offering low-risk equity and other types of investment options. Institutional investors, rather than tailoring the amounts invested to the needs of a particular project, can instead purchase parts of a fund tailored to their own investment appetite. The Connecticut Green Bank made equity investments in a solar lease fund, while the UK GIB created an offshore wind investment fund, grouping projects matching specific criteria and investment focus.

Other bundling techniques, such as (green) bond issuance and securitisation, can also be used to address size of investment mismatches, lower the risk of investment and facilitate institutional investment. For instance, collateralised loan obligations are a type of securitisation which consist of grouping together small and risky investments, often in the same sector or technology, to form a composite financial product with a lower risk profile. This instrument is often matched with loans and mezzanine financing, lowering the risk of individual components within the pool. The proceeds of green financial institution-issued bonds can be used to fund a portfolio of green investments, thus ensuring smoother returns, on top of matching investors' sizing preferences. In addition, the counterparty risk for the investors is transferred from the multitude of smaller investees to a single public institution. For example, the Connecticut Green Bank issued senior bonds to institutional investors with the institution retaining the junior bonds. By grouping smaller investments together, securitisation offers a similar double benefit of diversifying risk and resizing investments to match investment preferences. The grouping of investments can be tailored to the investment needs and regulatory requirements in the market, offering a share in a pool of investments with a certain risk profile, rather than idiosyncratic projects. For example, the NY Green Bank participated in a national energy efficiency warehousing and securitisation platform.

Soft tools: Approaches that facilitate better green investment by providing relevant institutions with technical assistance and information instruments targeting informational asymmetries, capacity building, technical assistance and due diligence

<u>Targeting information asymmetries and low capacity</u>

Green financial institutions can act as an intermediator, facilitating information flows by curating and channelling key information to private and public actors.

These institutions can facilitate information sharing between public and private sectors through policy advice and local capacity building. Green financial institutions are well positioned to inform private investors on relevant public policies and trends surrounding green finance and infrastructure. In parallel, they can communicate to policymakers the needs of the private sector, leading to policy which is better targeted at alleviating key investment barriers.

Green financial institutions can facilitate visibility between investors and investees, where there is lack of awareness of the key players and projects on either side. Gathering comprehensive information on green investment pipelines within specific sectors, and making this public knowledge, increases visibility for investors. On the flipside, institutions can leverage syndication capabilities and provide information to

investees, introducing them to a network of institutional investors and informing them of investor requirements and interest.

Green financial institutions are well positioned to provide technical assistance to investees, supporting them on how to meet the green investment criteria. This can include engineering expertise, financial and accounting advice, eligibility criteria, reporting standards, and use of green metrics. In this sense, green financial institutions can provide support on the ground, akin to practices implemented by different development banks, to effectively generate future investment opportunities at the investee level.

They can alleviate information asymmetries by providing technical assistance to investors, both at the market and project level. At the market level, green financial institutions can leverage their narrow investment focus to provide information on the technical and operation profile of unproven technologies. Such organisations can provide assistance in estimating the impact of these technologies and advise investors on the use of green impact metrics to report such investments. The latter are particularly important for institutional investors in the context of the recent global push to increase financial transparency of climate-related investments, promoted by initiatives such as the Task Force on Climate-related Financial Disclosure (TCFD).

Lowering risk

Institutions can reduce perceived risks through project-level due diligence. Carrying out due diligence on new and unproven technologies and making the results publicly available addresses the informational asymmetry between investors and investees. Since green technologies and sectors are often novel, there is little awareness among private investors on the returns and risk of these investments. Private investors may not carry out this process since returns are unknown, and perceived risk remains high. A green financial institution can fill this gap and provide information which will attract investors and catalyse investment. Making such due diligence public knowledge can lead to a substantial reduction in risk perception during early market stages.

3 Prioritising green investments

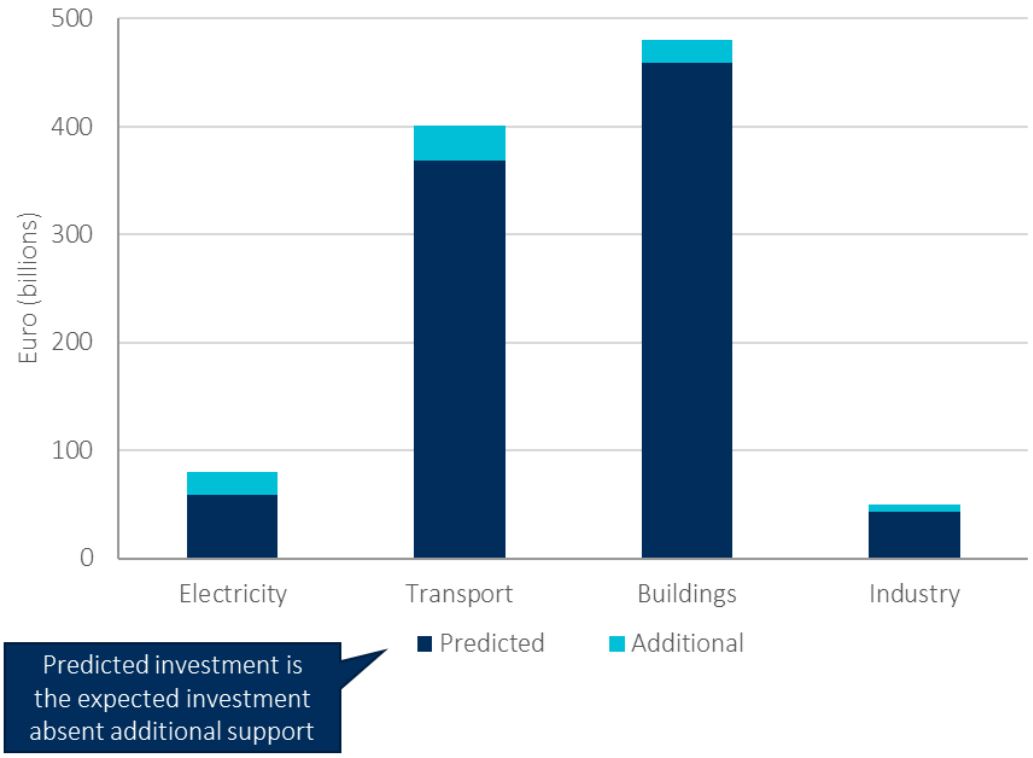
The BPF's strategy for green finance should focus on green sectors with the most pressing needs for finance and the most potential for commercial viability

To prioritise green investments into the most suitable and crucial areas of the economy, green sectors are assessed based on investment needs and the current state of the sector using research and surveys of stakeholders. Key investment needs across green sectors to achieve the aim of carbon neutrality by 2050 are identified, based on the RNC2050. These priority green sectors are then assessed to identify current commercial viability for private financing and barriers to scaling up green investment.

3.1 Sectoral investment needs

The RNC2050 estimates that almost €90 billion in additional investment will be needed over and above projected flows to achieve carbon neutrality by 2050. The overall level of investment required by 2050 will be close to €1 trillion, of which around €930 billion is expected to be delivered through planned investment and in the course of expected economic modernisation. Figure 5 shows total financing needs for the 2016–50 period by sector. While much of the existing finance needed may be delivered through anticipated channels, €90 billion in additional financing will need to be catalysed, and action is needed to help steer private investments towards green sectors at the right levels in order to realise Portugal's decarbonisation goals. This assessment also pre-dates the COVID-19 pandemic and associated economic crisis, which is likely to impact planned investments and reinforce the need for public action to help enable and steer investment to critical green sectors and technologies.

Figure 5 Transport and buildings have the highest total investment needs, but much of these will be met without additional support



Note: Covers the period 2016–50.
Source: Vivid Economics

Transport, electricity and buildings require the most additional finance both in each time period and overall. Table 2 shows the additional investment needs over three time periods and overall. Transport has more relative importance earlier on, whereas buildings and electricity gain in importance over time. One of the reasons this might be the case is the magnitude of emission reductions expected for these sectors: transport is expecting a 98% reduction in GHG emissions compared to 2005 levels; electricity a 99% reduction; and buildings a 96% reduction; whereas industry, for example, has a potential reduction of 73%.

Table 2 Transport, electricity and buildings require the largest amount of additional finance by 2050 (€ billion)

Sector	2016–30	2031–40	2041–50	Total (2016–50)
Electricity	2.2	11.3	7.6	**21.1**
Transport	6.2	17.6	8.2	**32**
Buildings	4.8	6.1	11	**21.9**
Industry	1.3	0.9	4.4	**6.6**
Total	**14.5**	**35.9**	**31.2**	**81.6**

Note: These estimates correspond to the higher band of the modelling in RNC2050. Totals exclude 'Other energy' category.
Source: Vivid Economics based on RNC2050

Electricity requires the biggest within-sector transformation of capital flows since it has the greatest need for additional finance as a percentage of total financing needs. Table 3 sets out the proportion of additional finance in total finance needs, which informs the relative importance of sectors. While electricity requires smaller investment needs in absolute terms compared to the other sectors, a green bank's intervention may be more important to achieve net zero in this area.

Table 3 Electricity requires higher relative additional finance compared to total investment.

Sector	2016–30	2031–40	2041–50	Total (2016–50)
Electricity	9%	37%	31%	**26%**
Transport	3%	22%	7%	**8%**
Buildings	3%	4%	7%	**5%**
Industry	8%	6%	26%	**13%**

Source: Vivid Economics based on RNC2050

Within each sector, the RNC2050 identifies different key technologies which require investment to achieve the goals set out in the road map. More specifically:

- In the electricity sector, investments will focus on the installation of solar capacity, which initially will be directed largely towards centralised solar plants, and in the second phase shift towards decentralised production such as on roofs of houses and buildings. Investments in onshore wind power at the beginning, and then in offshore wind power in a second phase, also represent a large proportion of technology investments in this sector.
- In the transport sector, which requires large technology investments to achieve net zero, investments are centred around the shift from the internal combustion engine (ICE) passenger car fleet towards electric vehicles (EVs), and a shift from heavy ICE passenger and freight transport modes towards either electricity- or hydrogen-fuelled vehicles.
- In the building sector, which also requires large technology investments, the majority of the investments will be related to the renovation of electrical equipment or its replacement with more efficient appliances, as well as substantial investment in building insulation and heat pumps.
- In the industry sector, the technology investments for the sector as a whole will focus on energy efficiency and electrification, such as through the adoption of electric furnaces and boilers.

The RNC2050 highlights financing needs across sectors, but does not describe the current state of such investment or the viability of private financing. It provides information on which sectors need support, without prescribing the type of financial support that should be used for each. Understanding the current circumstances of these green sectors helps identify the support needed. The following two sections present the approach to assessing the current circumstances of sectors, and the findings of this assessment.

3.2 Viability of and challenges to financing green sectors

3.2.1 Approach to assessing green sector status and financeability

The current viability of and challenges to the financing of green sectors in Portugal was assessed through interviews and surveys with private financial providers. Green sectors have different technologies with

varying maturity and levels of private sector engagement. Understanding current commercial viability helps identify which sectors should be prioritised by the BPF.

Building on the RNC2050, eight key green sectors that represent potential areas of decarbonisation were chosen for further assessment, in agreement with the Ministry of Environment and Climate Action. The RNC2050 was used to identify key sectors at the right level of detail.[6] The circular economy was excluded due to the lack of a precise definition in the RNC2050, but its overlap with other sectors means that certain aspects of it will be captured. The eight sectors chosen, and confirmed by the Ministry of Environment and Climate Action, are set out in Table 4.

Table 4 Sector description

Sector	Description
Solar	Investments related to solar energy, covering photovoltaics (PV) in both centralised solar plants and decentralised production (residential and service buildings)
Wind	Investment related to wind energy, including offshore and onshore wind
Other renewable energy	Investments related to all other types of renewable energy, such as hydroelectric (conventional dams and wave and tidal), bioenergy, hydrogen production
Industrial energy efficiency	Investment related to energy efficiency in industrial processes, for example, electric furnaces and boilers
Building energy efficiency	Investments related to improving energy efficiency of buildings both residential and commercial, with insulation, heat pumps and electrification
Waste	Investment related to the waste sector including industrial waste (treatment and recycling), municipal solid waste and wastewater (collection, treatment and recycling)
Agriculture and land-use management	Investments related to the agriculture and LULUCF (land use, land-use change, and forestry) sectors, such as urban green areas, wetlands conservation/management, forestry, sustainable agriculture land use, and low-carbon agricultural production
Transport	Investments related to greening the transport sector covering mass transit (buses, metro, trams and rail), passenger vehicles, and commercial vehicles (trucks and vans used in the carriage of goods). Measures include supporting a modal shift, low-emissions fuel switching, vehicle efficiency, electric/hybrid/zero emissions vehicles, for both light and heavy-duty vehicles

Source: Vivid Economics

Sectors were assessed on their commercial viability for financing using a combination of desk-based research and surveys with the private financial actors. Sectors were classified along a commercial viability scale, according to their proximity to becoming fully privately financeable, as set out in section 3.1 above. Returns on investment, bankable counterparties and risks were all considered. Private financial institutions were

[6] The sectors selected were those analysed in the RNC2050 trajectories, covering power generation, transport, industry, buildings, agriculture and land use, waste and wastewater, and the circular economy. Renewable power generation was further disaggregated into solar, wind, and other, to reflect the different maturities of these technologies. Circular economy was not specifically assessed in this study as rather than a distinct investment area or technology, it represents a series of individual investments and approaches within other green sectors.

asked to identify their interest in, and the feasibility of, investing in each of these sectors. The findings were then validated with key green finance stakeholders in a meeting of the Taskforce for Sustainable Finance.[7]

Assessing these eight green sectors provides a greater understanding of where support would be most additional, and can help establish sector priorities for the BPF. This assessment identifies green sectors with the most potential of becoming commercially viable. It also highlights sectors that are unlikely to ever become privately financeable and that should therefore not be a focus for the BPF. This prioritisation streamlines the operation of the BPF for meeting its goal of promoting sustainability by concentrating on the most promising sectors, at least initially.

The assessment also helps prevent the BPF from crowding out the private financial sector, as it identifies green sectors that are mature enough to not require extra support. The BPF should target sectors that are not yet fully financeable by the private sector. In this way, it will act in a supporting role in these markets, and not as a competitor for viable investments. Any sectors identified as already operating within mature and deep private financial markets can be disregarded by the BPF, further focusing its green financial operations.

The approach for the assessment provided sectoral findings and allowed the establishment of priorities, detailed in the section below. Following the method outlined here provided a detailed understanding of the viability of green sectors that is grounded in the authentic experience of Portuguese private financial actors.

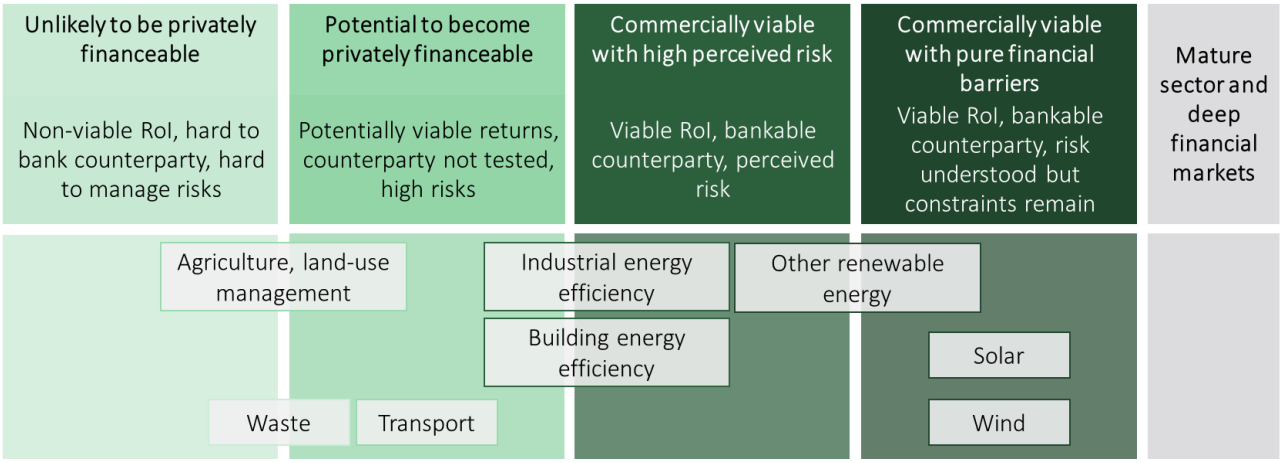
3.2.2 Assessment findings

Focusing the BPF's green investments in specific sectors with the most need and usefulness involves comparing the findings of the viability assessment with priorities established in national policy documents. The BPF's operations should aim to meet national objectives. Although its green financial operations are not meant to perfectly align with policy documents, it is nonetheless relevant to consider how it contributes to them. This can be done by comparing findings with national sectoral priorities for decarbonisation as well as sector focus of national investment plans.

The assessment found that, while the eight green sectors vary in their commercial viability for financing, none is yet mature enough to be fully financeable by the private financial market. This presents a unique opportunity for the BPF, which can enter the green market across the eight sectors to share risks and minimise the cost of capital with private finance. Once investments in these green sectors become fully commercially viable with the improvement and deployment of technologies, the private sector can fully take over and independently meet financing needs. The classification of sectors according to their viability is displayed in Figure 6.

[7] A list of stakeholders that attended the workshop is available in Annex 1.

Figure 6 The BPF should strategically select sectors based on overall needs and sector-specific challenges



Note: Examples of specific activities and technologies within these sectors are available in the EU Taxonomy Final Report as well as in the RNC2050 and PNEC 2030 (EU Technical Expert Group on Sustainable Finance, 2020, p. 56; Ministério do Ambiente e da Transição Energética de Portugal, 2019a, 2019b).
Source: Vivid Economics, using insights from research and stakeholder surveys

Solar

Solar energy is among the sectors with the highest potential of becoming fully financeable by the private sector in Portugal in the near future. Stakeholders surveyed generally identified an interest in solar energy and believed in the feasibility of investments in the sector. Solar, like other renewables, has a front-loaded cost structure, but this is mitigated by a steep decline in costs, with solar PV facing an 82% drop in the levelised cost of electricity between 2010 and 2019 to reach $0.068/kWh (IRENA, 2020b). The technologies in solar energy are mature, and the associated risks are well understood and managed by the project developers and investors (IRENA, 2020b).

However, a number of constraints remain, particularly around the size and length of investments, which the BPF could help address. The longer time frame for returns on investment can deter participation by the private sector. The size of solar deals, particularly for decentralised and small-scale solar, is also often considered too small to be attractive when compared with high transaction costs associated with appropriate due diligence (IRENA, 2020a).

Wind	**Wind energy, particularly onshore, is similarly close to becoming fully privately financeable.** It was considered a sector of interest by the private financial stakeholders consulted. Onshore wind is a mature and deployed technology, which has seen declining costs, with a 39% drop between 2010 and 2019, resulting in a price of $0.053/kWh (IRENA, 2020b). **Constraints nevertheless remain on the length of investments and the need for diversification into offshore wind.** Long-term return on investments may deter short-minded investors (IRENA, 2020a). Although the focus on onshore wind has benefited from low costs, this may shift towards offshore as limits on onshore development arise and suitable windy sites in Portugal are used (Wind Europe, 2020). However, Portugal has not developed significant offshore wind investment. There is low feasibility for nearshore wind development with turbines fixed to the sea floor due to significant ocean depths along the Portuguese coast. There may be potential for offshore floating wind,[8] but this technology is not sufficiently mature and has higher upfront costs than other technologies (Fundação Calouste Gulbenkian, 2017).
Other renewable energy	**Other renewable energies have some potential for commercial viability, depending on the technology, but face additional risks and challenges beyond those faced by wind and solar**. Stakeholders expressed interest in this sector; however, other renewable energies have developed more slowly than wind and solar (European Commission, 2017). There are technological risks involved with nascent energy sources like wave and tidal. These are unlikely to become viable in Portugal without significant improvements in terms of efficiency, robustness and cost reduction (Fundação Calouste Gulbenkian, 2017). Although biomass is in place in Portugal, it has resource risks related to availability and the future price of its resources (IRENA, 2016). Hydrogen is also not currently viable technologically, and there is no developed market or price-setting mechanism that could incentivise private financiers in Portugal (Ministério do Ambiente e Ação Climática de Portugal, 2020). Hydroelectric production, which is well developed in Portugal, is mostly financed through concessions with support from loans at preferential terms from public financial institutions, namely the European Investment Bank (EIB).

[8] The first floating wind farm in Portugal, consisting of three turbines, became operational in July 2020.

Industrial energy efficiency	**Energy efficiency improvements in industry face risks and counterparty issues that require the deployment of special tools to become privately financeable.** The private financial institutions surveyed claimed experience with and interest for industrial energy efficiency investments. Investments in the sector are often cost-saving, contributing to viability of returns However, difficulties with counterparty risks in industrial settings have been noted (Energy Efficiency Financial Institutions Group, 2015). Energy performance is also hard to assess, as transparent monitoring and measurement systems, like energy audits, are not always in place. Investments can be too small to attract investors, depending on the size of the firm. **Commercial viability crucially varies by the size of the firm, as that will dictate the type of efficiency investments undertaken and their appeal to the private financial sector.** Industrial small and medium-sized enterprises (SMEs) are more likely to increase their energy efficiency through heating, ventilation, and lighting improvements. These are less attractive to investors given their small size. Large industrial companies are more capable and likely to seek larger investments for improvements like equipment upgrades (electric furnaces for iron and steel) and process updates, as well as carbon capture, usage and storage (CCUS) (Material Economics, 2019). Beyond the greater investment size, larger industrials can also more easily provide energy performance data and set up risk-mitigation measures, which all help in demonstrating viability to investors.
Building energy efficiency	**In buildings, energy efficiency investments tend to have viable returns, but face barriers in terms of aggregation and information.** Energy-efficient buildings were recognised as a priority area by the stakeholders consulted. Investments can be cost-saving, making returns on investment potentially viable. A few technologies, which range from lighting to upgraded boilers tend to be mature and widely deployed. Other technologies, like heat pumps and whole net zero architectures, are quickly developing. However, investments in the sector, regardless of technology but particularly for residential buildings, are often too fragmented to be of interest to the private financial sector (Interreg Europe, 2017). Lack of performance or measurement data also makes benefits and financial risks harder to assess (Energy Efficiency Financial Institutions Group, 2015).
Waste	**Investments in the sustainable waste management area suffer from uncertainty over returns on investment and technology risks**. Interest in the sector varied across stakeholders reviewed, but experience investing in it was generally low. There are difficulties in establishing and guaranteeing revenue streams to service investments, also associated with high maintenance and operational costs (Associate Parliamentary Sustainable Resource Group, 2011). However, there may be opportunities in the future, linked to the supply of high-quality recycled material for consumer goods (Ellen Macarthur Foundation, 2020). For the near-future, however, risks inherent to waste infrastructure and difficulties reaching economies of scale will keep hindering the commerciality of investments (Associate Parliamentary Sustainable Resource Group, 2011; R2pi, 2018).

Agriculture and land-use management	**The agricultural sector faces issues in terms of financial incentives and high risks that make it unlikely to be fully privately financed**. Stakeholders surveyed claimed they already had experience investing in sustainable agriculture, and one stakeholder even identified the sector for priority intervention. However, projects suffer from high costs of capital projects and long payback periods associated with the long-term transition to sustainable agriculture (World Bank Group, 2016). Risks are also high, linked to difficulties in assessing the creditworthiness of small and medium-scale farmers, as well as the variability of production and volatility of costs (World Bank Group, 2016). **Land-use investments face similar difficulties with assessing returns of projects and high risks.** Land-use management, particularly fire prevention, is a priority for the government, yet it is unlikely to be fully financed by the private sector (Ministério do Ambiente Ordenamento do Território e Energia de Portugal, 2015). Investments can take between 5 and 20 years for positive cash flows which, coupled with high risks, may not be interesting for investors (Hoffman Center for Sustainable Resource Economy, 2019). The lack of clarity over revenue potentials of land use and forests, as well as uncertainty over the demand for sustainable land-use products (carbon credits or sustainable resources), hinder risk–return calculations for investors (Global Canopy Programme, 2017). This is associated with little awareness of revenue-generating business models such as nature-based solutions and payments for ecosystem services among project developers and financiers. There may be a role for specific financial products linked with these, but the relative novelty of these products presents risks for the sector (European Investment Bank, 2019).
Transport	**For transport and mobility, technologies are quickly developing and providing returns; however, concerns remain in terms of risks and enabling environments.** Clean mobility was identified as a priority sector by the stakeholders consulted. In terms of mass transit, planning and construction processes are often lengthy. Investments in this sub-sector have high upfront costs and longer-term returns over time. Electric and low-carbon buses in particular may be hard to scale financially as rollout is often gradual or focused in one jurisdiction (World Resources Institute, 2019). Future demand for public mass transit is also uncertain, complicating risk–return calculations. EVs face uncertainties as to demand and take-up, given that prices are still higher than their ICE equivalents. They also face technological risks associated with the grid and charging infrastructure.

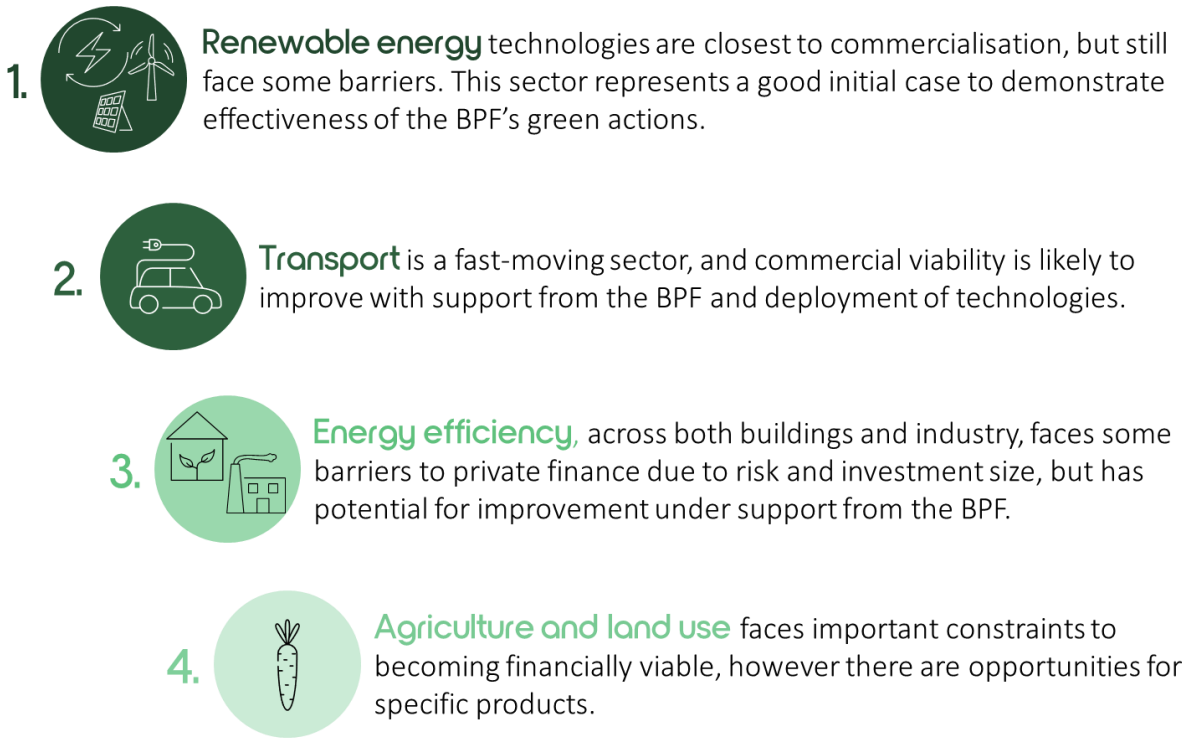
One cross-cutting issue is the size of green firms and investments, which also determines the commercial viability of an investment. Across all sectors studied, commercial viability will vary between large enterprises and SMEs. SMEs by definition will provide smaller investment projects, which may not be worth investors' while. Their size and balance sheet also dictates available capital and potential risk mitigation. Finally, SMEs have smaller internal capacity, in terms of employees, to provide information that may be important to investors. The tools needed for a sector will therefore also depend on the size of the company or investment, and not only the technologies within the sector described in the table above.

3.2.3 Priority investment areas

Accordingly, renewable energies, transport, energy efficiency, and agriculture are likely to be high-priority sectors for the BPF. With this focus, the BPF is targeting various sectors across different stages of commercial viability, shown in Figure 7. This is also particularly important given synergies between the sectors in meeting

sustainable objectives. For example, the electrification of transportation and industry should be achieved with clean energy sources.

Figure 7 The assessment identified four priority green sectors for the BPF



Source: Vivid Economics

The suggested focus on renewable energies matches the highest additional finance needs found in the RNC2050, and the focus on transport corresponds to the National Investment Programme 2030 (PNI 2030) which allocates 58% of investments to the sector. In the RNC2050, electricity has the highest additional finance needs, measured as a percentage of total investment required to achieve carbon neutrality. With solar, wind, and other renewables classified as commercially viable with few barriers, this highlights the potential to spur finance into the sector where it is both most needed and useful. The PNI 2030 sets out €22 billion of structural investments across the transport, environment, energy, and irrigation sectors (Ministério das Infraestruturas e da Habitação de Portugal, 2019). Sustainability appears across all four sectors as a defining strategy axis, in the form of carbon neutrality or resource efficiency. Transport received the most funding under the PNI, followed by energy.

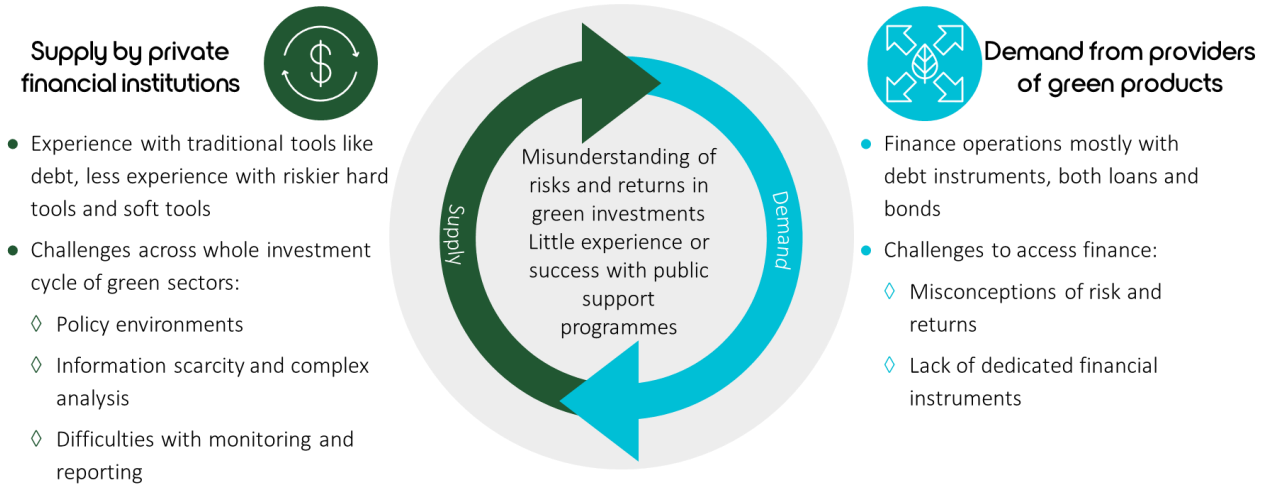
4 Financial sector assessment

Market gaps in green finance within the current Portuguese financial sector are areas which the BPF should target

The variation in the commercial viability and readiness across green sectors in Portugal calls for the use of different approaches to deploying finance using various tools. As assessed in section 3.2, green sectors face different challenges to commercialisation, ranging from non-viable returns on investment to high perceived risks. Even with a focus on the green sectors most likely to becoming privately financeable, these challenges still call for specialised and differentiated solutions.

Understanding the Portuguese financial sector's and green businesses' existing knowledge and experience of deploying and accessing different financial tools can expose market failures across the supply and demand side, which the BPF should target. On the supply of finance side, understanding the experience of the private financial sector with specific sectors and tools helps identify areas of current strength, as well as areas where complementary action by the BPF and/or capacity building for financial institutions will be needed to enable and accelerate green investment. On the demand for finance side, understanding access to finance from the perspective of providers of green products and services clarifies whether the private financial sector is meeting financing needs, and the types of approaches that may be needed to unlock green investment in practice. Figure 8 illustrates this approach.

Figure 8 Market gaps are identified by assessing both the demand and supply sides of financing green projects



Source: Vivid Economics

Assessing the capacity for green finance and compliance with external regulations within the emerging BPF itself – based on the skills brought in from the three merged institutions – helps ground recommendations in the existing experience and knowledge of the institution. Identifying areas of relative strength and weakness within the BPF, and highlighting gaps in knowledge, helps target recommendations to the areas of most need.

4.1 Supply-side experience

To determine the capacity of the private financial sector to support green financial investments, stakeholders were asked about their experience with specific financial tools and green sectors. Figure 9

displays the themes and provides example questions that private financial institutions answered in surveys and interviews. They were first asked about their integration of ESG factors and green finance in their operations, and were then asked about their experience with green sectors, including their interest in them, feasibility of investment, and challenges faced with such sectors. Private financial institutions were asked about their experience with financial tools. They were presented with a subset of the soft and hard tools described in Table 1 that private financial institutions are expected to use. Finally, they were asked about their experience with programmes from the public sector and their view of the role of a green financial institution.

Figure 9 Private financial institutions were asked about their experience of ESG and green sectors

Note: The full survey can be found in Annex 2.
Source: Vivid Economics

The private financial sector in Portugal has shown a willingness to incorporate ESG factors in its products and services. All stakeholders surveyed claimed to pay attention to ESG factors, despite not all having an explicit policy in place. They highlighted the positive role of ESG factors in balancing the creation of value in the long term with other social and environmental considerations. This supports the findings of a previous survey on institutions' approaches to sustainable finance conducted by the Comissão do Mercado de Valores Mobiliários (CMVM)(2019).

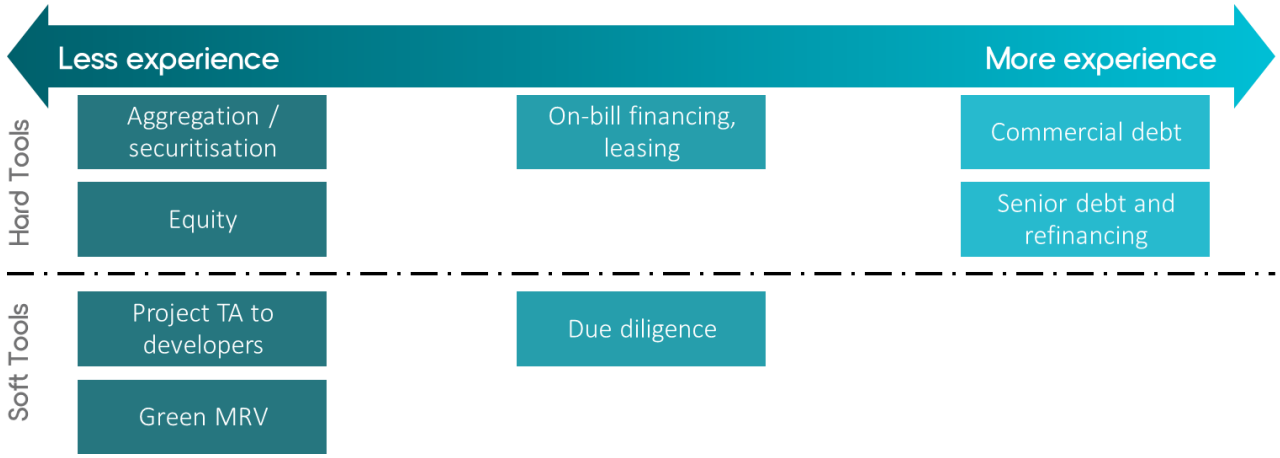
The private financial sector expressed difficulties with national support programmes like funding lines or warranties, since these present additional bureaucracy which can constitute barriers for potential clients. A few stakeholders referred to past finance-supporting programmes that they did not use due to the lack of demand from the private sector. They claimed that these programmes were too bureaucratic and time-consuming to access, and that communication about them was often lacking. Stakeholders did highlight the success of the deployment of the IFFRU (Instrumento Financeiro de Reabilitação e Revitalização Urbanas) as a good example of cooperation between the private and the public sectors.

The private financial sector in Portugal has more experience with more traditional financing approaches, in line with common financing activities. Most stakeholders claimed to have extensive experience with hard tools like commercial debt and loans, senior debt and refinancing, shown in Figure 10. These are typical financial tools used extensively in commercial banks, so it is not surprising that surveyed institutions have the most experience with these. Such tools are also the least risky for investors, given their cash-flow priority. Nevertheless, stakeholders referred to challenges in analysis timelines and first-time assessments.

There is limited experience with tools that could enable green investment, such as on-bill financing and leasing, as well as due diligence. Stakeholders reported lower levels of experience with these tools. Due diligence helps address risks, which can be an important source of reassurance compared with the riskier and less traditional investments of green sectors. On-bill financing could increase the total amount of projects taken up in certain green sectors. Developing institutions' experience of this tool could enable further investments in green projects.

Stakeholders have the least experience with riskier or more complex green investment approaches, and with more involved aspects of soft tools. All stakeholders reported no experience with hard tools such as equity or aggregation and securitisation. Structured finance tools, namely aggregation and securitisation, can be particularly helpful when dealing with small-scale risky projects, which encompass numerous projects within green sectors. However, these tools are complex to develop internally, and are associated with higher risks. Stakeholders also referred to a lack of propensity in the national market for equity and related tools. In terms of soft tools like TA and green MRV, experience was split across the stakeholders surveyed. Where stakeholders claimed they had some experience, it tended to be limited.

Figure 10 The private financial sector has the most experience with hard tools linked with debt



Source: Vivid Economics

When specifically asked about barriers to investing in green sectors, private financial institutions referred to challenges in data, knowledge and complexity that affect the whole investment cycle. These exist throughout the financing journey of green investments, from the enabling environment through to investment selection and post-investment monitoring. The table below describes the main challenges highlighted. These correspond to findings in other reports about sustainable finance in Portugal, emphasising the consistency and intensity of such challenges.

Uncertain and fast-moving policies	**A small number of stakeholders referred to a rapidly changing policy environment that prevents private financial institutions from taking the initiative.** National and supra-national guidelines regarding sustainable finance are in development, but there is uncertainty regarding their detail and implementation. This lack of clarity, consistency and visibility on policy measures supporting green sectors creates an unstable and unpredictable investment environment. This then translates into policy or regulatory risks and prevents predictable project revenue streams. Most notably, stakeholders referred to the European Commission's Taxonomy for sustainable finance. Additionally, institutions find it very difficult to develop internal processes and classifications for green investments given incoming changes. This then limits the number of auxiliary measures and products available within private financial institutions that could facilitate green investments.

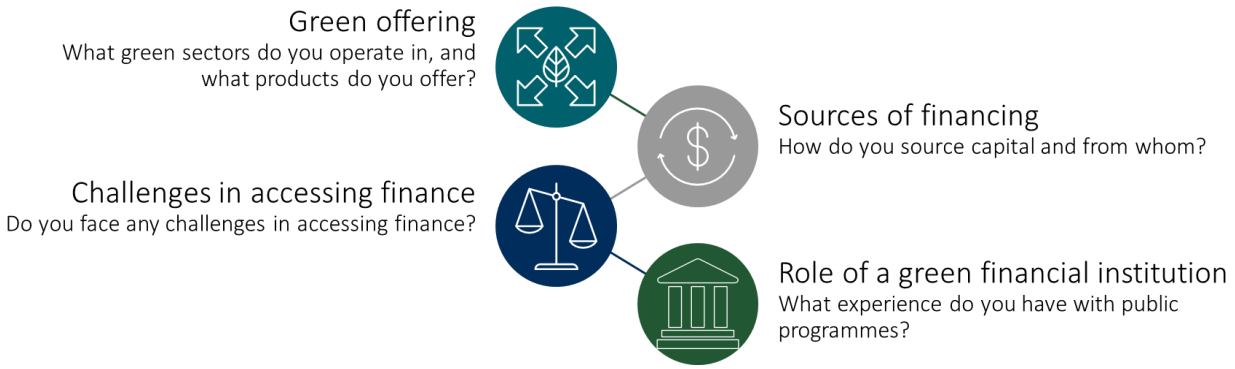
Lack of data and information	**Most stakeholders claimed difficulties in selecting green investments, associated with a lack of data and information about green sectors.** When choosing investments or developing products, pre-investment data and information are important. Institutions need to identify what classifies as a green investment and what environmental benefits are associated with it. They also need to understand how projects are monetised and returns generated, and within what time frame. Due to the novelty of many green projects, there is often little information available. This is supported by a CMVM survey, which specified that few companies disclose non-financial information, and the few that do disclose sustainability reports do not do so in a standardised way (Comissão do Mercado de Valores Mobiliários, 2019). This scarcity of information creates uncertainty during the selection process, and ultimately discourages investments in green sectors.
Complexity of analysis and technical knowledge required	**Stakeholders described how the complexity in analysing green investments deters them from choosing these investments.** Understanding risks and business models associated with green investments was particularly challenging for stakeholders. This lack of understanding leads to a default perception of high risk associated with such projects, which either worsens lending terms or curtails investments. As explored in section 3.2.2, green sectors in Portugal do have risks associated with them, including regulatory, counterparty and technology risks. However, the extent of these risks is not well understood, given the lack of knowledge and experience with such projects. Additionally, analysing the risks requires specific technical knowledge about projects which, according to stakeholders, is missing in the Portuguese private financial sector. The CMVM similarly found that including sustainability in financial products requires additional specific knowledge that needs to be developed in Portugal (Comissão do Mercado de Valores Mobiliários, 2019). Altogether, the complexity of, and lack of experience with, green investments reduce confidence in assessments and leads to fewer projects being chosen.
Difficulties with MRV results	**Even once investments in green sectors are undertaken, stakeholders cited difficulties in monitoring, reporting and verifying results.** Understanding and reporting the benefits of investments in green sectors allows the private financial sector to report these to governments and potential off-takers and investors looking specifically for green products. However, quantifying results from investments requires dedicated approaches which stakeholders are not familiar with. Since stakeholders find it hard to measure and report results from green projects, or to benefit from the additional interest associated with the green credentials such projects, they are discouraged from undertaking these investments. This issue was also identified in the CMVM survey (Comissão do Mercado de Valores Mobiliários, 2019) and in a report by the Business Council for Sustainable Development (BCSD, 2017).

Implications for the BPF
The financial sector has less experience with precisely those tools that might enable green investment. Many of the financial tools which the sector has little experience in could be particularly useful in targeting the challenges of investing in green sectors. Tools like due diligence, aggregation, and securitisation can help reduce risks associated with green investments. Soft tools like green MRV and project TA can help with information challenges. **This suggests a clear role for capacity building and direct BPF action to provide and build these tools in a way that is additional, and not competitive to the market**. The BPF should target these gaps in the market in order to have the biggest impact. The BPF may support financial sector institutions, or provide finance directly to green sectors. Its approach should provide the most support to green investments without crowding out the private sector.

4.2 Demand-side experience

To assess whether green sectors have struggled to access finance, providers of green products and services were surveyed about their financing experiences. Nine stakeholders were surveyed, and sectors covered included renewable energies, transport, consumer goods, and construction. Figure 11 summarises the main themes of the survey. Stakeholders were asked to detail their green products and services. They were then asked about their common sources of financing, and whether they faced challenges in accessing finance. Finally, they were questioned about their experience with public programmes and their opinion of the role of a green financial institution. Obtaining their perspective provided greater detail of the market failures relating to financing green sectors. The findings can also be compared to the challenges faced by the private financial sector in terms of green investments in order to check if they correspond.

Figure 11 Providers of green goods and services were surveyed on their green offering and access to finance



Note: The full survey can be found in Annex 3.
Source: Vivid Economics

There are various sources of potential finance for providers of green services and products, ranging from debt instruments through to equity. Table 5 lists the sources of financing cited by stakeholders, offers a description, and provides the number of stakeholders that claimed to have used it.

Most stakeholders have had experience with debt instruments of different types. A majority of stakeholders claimed to have obtained finance through loans from commercial banks, both domestic and international, as well as loans from the EIB. There was also experience with bond issuance across some stakeholders.

There is effectively no experience of receiving financing or support from public institutions. Only one stakeholder received subsidies for investment. No other stakeholders reported any kind of financing or support from public institutions.

There is some experience with EIB and European Commission funds. Three of the larger companies surveyed had accessed loans from the EIB, and one energy major had obtained European Commission funds. This seems to indicate that even experience with European financing is limited to the larger-sized companies.

Table 5 Providers of green products and services financed themselves mostly through debt

Type of financing	Description	Number of stakeholders that have used source
Commercial bank debt	Loans from commercial banks, both domestic and international	6
Capital markets	Bonds issued by companies	4
European Investment Bank debt	Loans from the EIB, at more attractive terms regarding financing and longer time frames	3
Private capital/equity	Private capital covers funding from a private lender (or other non-institutional sources), provided as a loan or equity Equity includes the sale of shares to public, institutional investors, or financial institutions	3
Private market debt	Loans by non-bank institutions, often private debt funds	2
European Commission funds	Funds from the European Commission, often with non-repayable terms	1
Public investment subsidies	Subsidies received from public institutions for specific investment areas	1
Public capital/ investment	Capital or investment from public institutions	1

Source: Vivid Economics

Despite these varied sources of funding, most providers of green sectors and services surveyed claimed to struggle in accessing finance, citing perception of risk and uncertain returns. The table below sets out the main barriers they described.

Perceptions of risk	**Stakeholders referred to an unwillingness from the financial sector to take on green projects due to perceptions of high risk that does not necessarily materialise.** Higher risk is associated with newer technologies, particularly renewable energy projects. One company claimed that its credit rating is affected by Portuguese regulatory risks.
Misunderstanding of returns	**A small number of stakeholders claimed that a misunderstanding of returns from green investments restrained finance.** One stakeholder described the private financial sector as reluctant to address projects with uncertain remuneration. This is in part associated with an unwillingness to explore and analyse new technologies or new business structures – in particular, how green business models generate returns. Many green projects are hindered by this approach to financing. Returns from green projects also tend to have longer time frames compared with more conventional investments, which may not always match the short-termism ingrained in private financial institutions.

Lack of specialised financial instruments	**Stakeholders referred to a lack of instruments that are adapted to green projects and that address the distinct structure of investments**. Beyond their distinctions in risk and returns, investments in green products also tend to be illiquid, which generates concerns for private financial institutions that wish to retain flexibility. One stakeholder also claimed that the relative lack of export support for Portuguese products, and green products in particular, hindered the expansion and competitiveness of domestic green sectors.

Implications for the BPF

The experience of providers of green products and services highlights relatively limited exposure to direct engagement with a public financing body, which has implications for the BPF's functioning. Stakeholders reported minimal experience with financing or receiving support from a public institution. Given this lack of experience, the BPF may need to start by working with and through existing financial institutions. However, in the course of deploying its functions, it can build on the experience that some stakeholders have had with the EIB and eventually reach providers directly.

The barriers to accessing finance for green sectors echo the challenges that financial providers face, indicating that the right market gaps are being identified. There is a general issue with understanding risk across green investments. Coupled with questions over revenue streams, this leads to an absence of specialised financial instruments. The BPF should strongly and consistently target identified market gaps in order to be additional to the market.

4.3 BPF experience

4.3.1 Internal capacity

The BPF was formed through a merger of three institutions, and by mandate can retain all staff – including their capacities and experiences – across all three. As per the legal document Decree-Law No.63/2020, the BPF is a merger of the IFD, the PME Investimentos, and SPGM. The BPF takes over as employer of the existing employees of the merged institutions (See Article 2 of the Decree-Law No.63/2020). The experience and knowledge within these institutions established the foundations of the BPF, and it is important to understand this in setting out how and where the BPF needs to develop its capacities in order to deploy specific tools and meet financing needs of priority green sectors.

All three constituent institutions have experience with traditional commercial banking tools. Together, they have a depth of experience across the use of guarantees, credit and funding lines, on-lending, and co-financing – including equity financing. This experience, both as direct lenders and as supporters of private sector investment, is relevant for the BPF.

However, none of the institutions brings with it familiarity with explicit financing of green or environmental projects across institutions. The three institutions have little experience with specialised instruments dedicated to this topic. Their mandates do not list green or environmental goals or objectives. Historically, when the institutions have invested in green projects, their 'green' characteristics have not been a major factor in investment decisions.

Similarly, the institutions have enacted relatively limited integration of green considerations into investment strategies, portfolios or criteria. Corporate governance reports refer to environmental considerations minimally, in one case regarding only its compliance with the Taskforce Letter of Commitment. They do not explicitly state policies or actions taken to develop these commitments.

This suggests a need to build capacity within the BPF across three main areas, to drive green investment. The tools and approaches to drive investment need to address both green sector-specific challenges as well as cross-cutting financial sector challenges. Given the technical requirements of this task, developing capacities to deploy the BPF in an effective and timely manner is important. There are three broad areas in which the BPF needs to develop capacities:

- **Specific tools**: Some green sectors require advanced financial tools, like aggregation and securitisation, financing on account, and senior debt and refinancing. The founding organisations of the BPF do not have extensive experience with these tools, and will need to build capacity in order to deploy them.
- **Internal green capacities**: All green investments need specific internal processes to be undertaken. These cross-cutting tools, which cover green MRV and due diligence, allow the BPF to correctly assess the viability of green investments. Given the special characteristics of these, namely on returns and risk, capacity in these cross-cutting tools needs to be developed internally.
- **External green capacities**: The functioning of financial markets and of existing private financial institutions also needs to be supported. The BPF should therefore provide assistance to different actors. This includes technical assistance to project developers and financiers, investor liaison, and market-making support.

To develop these three capacity areas, the BPF can take an approach that balances both short- and long-term goals. Given that the BPF has already been launched, there is a certain urgency to enact and instate green methods to drive green investments in the short term. These aim to meet the BPF's investment goals quickly. In parallel, the BPF should take a different approach to long-term goals.

In the short term, the BPF can rapidly build the green capacities it needs by hiring additional staff and partnering with existing financial institutions. The BPF should hire staff with the knowledge and experience across the three key areas of development outlined above in order to kick-start its green investments. It could also outsource some of the main tasks of green investment support to a specialised organisation – though this may mean partnering with international green investment specialists, given the relatively early stage of investment in green areas across the Portuguese green financial sector.

In the longer term, the focus shifts to building these capacities in-house. Green investments should be promoted throughout the whole institution. Developing knowledge and capacities internally can be done through two methods. For soft tools, like the internal and external green capacities, training should be provided. To develop capacities for specific hard tools, opportunities to learn by doing should be promoted internally.

4.3.2 Capacity to comply with external regulations

Upcoming European Commission regulations will inform how the BPF sets its green mandate, and the complexities of these regulations call for special consideration of how it can build capacity to address them. Regulations (EU) 2020/852 and 2019/2088, described hereafter as the 'Taxonomy' and 'Disclosure' regulations, are important cornerstones in the sustainable finance market. The Taxonomy regulation creates a framework to define what activities and investments are classified as environmentally sustainable. The Disclosure regulation harmonises the communication of sustainability risks to, and impacts on, sustainable outcomes for financial market participants. As with other European promotional banks like the EIB and Germany's KfW, these regulations will apply to the BPF (Valero, 2019). It should therefore seek to deepen its understanding of them.

The Taxonomy regulation seeks to classify economic activities based on their environmental sustainability, helping to clarify to financial market participants and companies the extent to which an investment is

environmentally sustainable. Under the Taxonomy, an economic activity qualifies as environmentally sustainable when it significantly contributes to at least one of the six environmental objectives,[9] without significantly harming the others, complies with minimum social safeguards, and aligns with technical screening criteria (Chapter II, Article 3). As the EU Technical Expert Group on Sustainable Finance clarifies in its Taxonomy Technical Report, the EU taxonomy is a tool that can help financial markets contribute to environmental policy objectives, both external and internal (EU Technical Expert Group on Sustainable Finance, 2019, p. 10).

The Taxonomy regulation is tightly linked with the Disclosure regulation that mandates publication of sustainability risks and impacts. The Disclosure regulation provides harmonised rules for financial market participants and financial advisers. It calls for transparency in pre-contractual documents[10] and websites regarding the integration of sustainability risks in investment decision-making processes and advice, and the consideration of adverse sustainability impacts on sustainability factors. It also mandates an explanation for financial products that claim to promote as their objective environmental or social characteristics, or sustainable investment.

The BPF will have to comply with both regulations, which presents an opportunity to integrate the regulations with its own objectives and structures from the beginning of its operations. The Taxonomy will have many applications across the financial sector (Schutze & Stede, 2020). It can be used to evaluate the sustainable performance of new investments, and of a company or portfolio. The BPF can use this to identify those which would fall under its green sectors and provide special dedicated tools to these. It could also use the Taxonomy to track its own record in financing sustainable projects and its commitment to its green mandate. This is especially relevant as the Taxonomy and Disclosure regulations are widely adopted in Europe, since the increased scrutiny of the environmental performance of financial actors will also fall on national promotion banks like the BPF. By competently implementing both regulations, the BPF can create awareness and facilitate the transition in financial markets, two points identified by other promotion banks (European Investment Bank Group, 2020, p. 102; KfW, 2020).

The BPF should start building internal capacities for the Taxonomy and Disclosure regulations across the whole bank. Financial market participants are still determining how to apply the regulations, but initial findings from a survey of 37 financial organisations provide high-level recommendations based on tests and pilots that could be applied to the BPF (European Banking Federation & UNEP Finance Initiative, 2021). It should start engaging multiple teams within the BPF – not only the regulations team. This is because front office will need to gather data from clients, and back office, like IT, will be key in automating data collection and the taxonomy assessments. In addition to engaging the bank as a whole, it will be important to assign clear roles and responsibilities to different teams and individuals internally. The BPF should also use environmental/social and industrial specialists, as well as legal experts, to ensure that due diligence, monitoring, and legal documents are compliant with the Taxonomy regulation. It should be looking externally for any common methodologies being developed by platforms or banking representatives, certification schemes by independent experts, and implementation tools such as a central EU database.

For the Taxonomy specifically, the BPF can take a gradual approach to alignment to build experience and confidence within the institution. The BPF could initially align green sector categories with a Taxonomy list of sectors that make a substantial contribution to climate change mitigation. This could involve starting small, evaluating selected investments to identify the approach and specific challenges, and then using the experience of these first evaluations to engage internally about the knowledge and data needed. Subsequently, as the knowledge and experience of the Taxonomy are built internally through application to specifically green sectors, the BPF should seek to ensure that all its investments are made in sustainable, transitional, or enabling categories of the Taxonomy.

[9] The six objectives are: climate change mitigation; climate change adaptation; the sustainable use and protection of water and marine resources; the transition to a circular economy; pollution prevention and control; and the protection and restoration of biodiversity and ecosystems.
[10] Pre-contractual documents include prospectuses, marketing documents and annual reports.

Obtaining data to comply with these regulations, as well as to measure any other internal objectives, will be a challenge that the BPF should overcome through client engagement. Due to the limited corporate ESG disclosure, as well as a lack of unified standards of reporting, it may be challenging for the BPF to obtain sustainability data from its clients. In part, this will be helped by the EU's Directive 2014/95/EU (Non-Financial Reporting Directive), which is set to be adjusted to better support environmental disclosure. According to the revision consultation currently ongoing, the update seeks to improve disclosure of sustainability data to better inform investors and meet the Taxonomy and Disclosure regulations (European Commission, 2021). It is likely to include descriptions of how and to what extent activities are associated with Taxonomy-aligned activities in an annual report or dedicated sustainability report.[11] However, clients are ultimately responsible for supplying information and data to the BPF, so it is important that the BPF engages with its clients now to facilitate data-collection processes – for example, by referring to the European Commission's guidelines on non-financial reporting (Official Journal of the European Union, 2019). In addition, it could embed information and data requirements into products and contracts – one of the recommendations made in the European Banking Federation survey (European Banking Federation & UNEP Finance Initiative, 2021). For example, a deal to finance renewable energy projects such as solar PV could require detailed disclosure on the origin of PV panels in order to assess Taxonomy compliance.

[11] The EU's Non-Financial Reporting Directive, which requires companies with more than 500 staff to report on social and environmental challenges, is to be altered by the Taxonomy regulation to better align with reporting requirements Directive.

5 Recommendations

The BPF should prioritise four key green sectors and use targeted tools that address sector-specific challenges to commercial viability and private green investment

Portugal's ambition to be carbon-neutral by 2050 calls on finance to be redirected towards investments that support the decarbonisation of the economy. Modelling of potential pathways to carbon neutrality has found that around €90 billion of additional investment is needed by 2050 to meet this goal. There is therefore an urgent need to mobilise finance into green sectors that can drive a complete decarbonisation of the economy. This must be done by in collaboration with the existing private financial sector in order to maximise impact.

The BPF can integrate successful green financial institution approaches into its operations and be a catalyser of finance for green sectors in Portugal in a way that is additional to the existing private sector. The newly formed BPF has the objective of spurring the development of the economy and supporting the entrepreneurial community, by providing financial solutions that target market failures in the access to finance. In doing this, the BPF must promote investment in sustainability and other environmental goals. This makes it a good vehicle to drive green financial investment. To do this, it can employ tools and approaches used in green financial institutions in its own operations. Crucially, the BPF must be designed in a way that makes it a supporter of private financial institutions, and not a competitor.

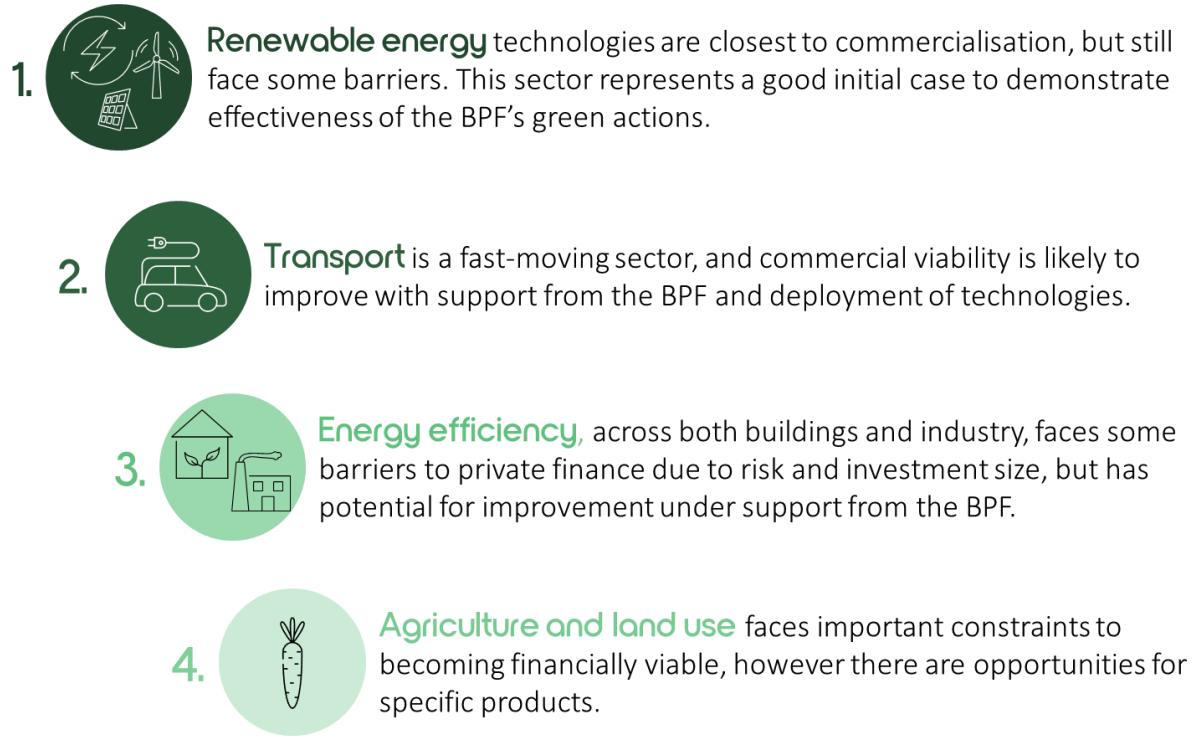
These recommendations seek to ensure that the BPF deploys its green finance operations where there is the most need and value, using the most appropriate tools. These build on the findings of the assessments of sectors most in need of investment, set out in the RNC2050, and sectors with the most viability for financing. They also build on the assessment of existing green finance to effectively employ tools that are the most appropriate for solving the market failures identified.

5.1 Priority green investment areas

The BPF should focus its green operations in four green sectors that offer the most potential and have the biggest need for investments. This allows efforts to be concentrated in those sectors that may yield the best results. It also serves as a good opportunity to develop internal experience of the approaches of green finance within a narrow set of sectors.

Four initial priority green sectors were chosen based on their need for additional finance and proximity to being fully commercially viable and financeable by the private sector. The RNC2050 modelling indicated that electricity, followed by industry, has the highest need for additional finance as a percentage of total financing needs. The analysis found that renewable energies were closest to becoming fully privately financeable, facing some constraints. Transport was identified as a second priority, given its potential for commerciality. Energy efficiency, across both industry and buildings, was suggested as a third-order initial priority due to potentially viable returns associated with cost-saving measures, but high risks. Agriculture and land use was also included as a priority as it faces important constraints to commerciality, but there is potential for targeted support to demonstrate viability and build awareness of possibilities within the sector. Figure 12 summarises the priority sectors.

Figure 12 Four key green sectors of focus for the BPF



Source: Vivid Economics

5.2 Priority financing approaches

The tools and approaches that the BPF should employ to help green investments become viable for private financial institutions should be appropriate for the sectors' commerciality and challenges. The tools should draw on the commercial viability assessment conducted in the analysis, and take into account specific challenges faced by sectors and technologies. Figure 13 summarises the tools that have been identified as most appropriate for each target sector. The sections below dive deeper into each sector, addressing specific challenges and respective tool selection.

Figure 13 The tools recommended for the BPF match sectoral needs

Source: Vivid Economics

5.2.1 Solar

The solar sector is closest to becoming fully privately financeable, and there is already some experience investing in the sector. Portugal has high solar power potential to continue exploring. The technologies are well developed in Portugal, and the costs of installation have dropped significantly, and may continue to do so in the future. Stakeholders reported experience with the sector, particularly with larger-scale investments. To address concerns of long-term returns, the BPF could deploy long-term senior debt, refinancing and equity.

However, within the solar energy sector, small-scale and decentralised solar will require support such as aggregation. Large-scale solar plants have an easier time attracting finance, as their size is appealing to the private financial sector. Smaller-scale investments are less commercially viable for financiers, as they cannot justify conducting due diligence and analysis for small returns. It is particularly important to address these concerns because of the crucial role of small-scale and decentralised electricity production for decarbonisation, as detailed in the Nacional Plan for Energy and Climate (PNEC) (Ministério do Ambiente e da Transição Energética de Portugal, 2019a). The main tool the BPF could provide to make these investments viable for the private sector is aggregation and securitisation, in order to match the size requirements of institutional investors. Alternatively, financing on account could be employed.

Box 1 Instrument deep dive: Aggregation and securitisation

With aggregation, individual small and medium-sized projects are bundled together through techniques like loan warehousing (where small assets are originated under a common contract structure). Securitisation takes these aggregated assets and turns them into standardised tradeable assets. This can be done through a commercial bank loan facility (term loan funding) or by using capital markets.[12] Together, aggregation and securitisation reduce transaction costs and open new financing pools for investments in green sectors.

Case study – Connecticut Green Bank
The Connecticut Green Bank aggregated 32 energy efficiency and solar PV projects and bundled their collective revenue streams for sale. The securitisation process saw the Clean fund, a capital provider, purchase a single class of senior bonds to fund 80% of the portfolio purchase price, while the Connecticut Green Bank retained ownership of two tranches of subordinated bonds. After this first transaction, the Connecticut Green Bank attracted further investment through a partnership with Hannon Armstrong to increase the number of projects which were funded using a special purpose vehicle (SPV) structure (Green Bank Network, 2019; IRENA, 2016).

Hypothetical application to the BPF
Aggregation could address the challenge of complex risk–return analysis identified by Portuguese financial institutions, reducing transaction and due diligence costs. Securitisation could address green sector-specific challenges like small-sized renewable energy projects, and open green services and goods providers to new sources of financing and types of investor, such as large institutional investors. A hypothetical approach to the BPF could involve aggregating loans and securitising them through an SPV.

5.2.2 Wind

Similar to solar, investments in wind are close to becoming fully privately financeable across some segments and technologies. Onshore wind, in particular, has seen costs fall particularly steeply. The private financial sector reported having experience investing in the wind sector. There may be a role for 'patient capital' equity investment or long-term debt to address long-term returns on investment.

Small-scale wind, as well as offshore developments, will require the deployment of targeted BPF tools. Small projects will benefit from support in the form of aggregation and securitisation or financing on account, to become viable for investors. Offshore wind is underdeveloped in Portugal, with only one floating wind turbine farm. High investment and operation costs limit interest, and the novelty of floating technology means high risks. To further promote offshore wind, additional incentives are required for investors. These could come in the form of guarantees or other risk-hedging tools to cover the novelty, or loans on preferential terms.

[12] To obtain funding from capital markets, bonds to be repaid from the proceeds over the time of the bundled loans could be issued, or bond-like returns or dividends on capital investments in the securitised pool of assets could be provided.

Box 2 Instrument deep dive: Direct loans and credit enhancement

Loan financing – whether direct lending or partnering with other financial institutions through on-lending or credit enhancement – is the most common type of financing in green financial institutions, and has been widely used to support a range of green investments.

Case study – UK Green Investment Bank Municipal Street Lighting
The programme provided loans to municipalities to upgrade street lighting to more energy-efficient lights. The UK GIB designed the loans' fixed rates and terms to match the payback period of project, providing financing that was better suited to the specifics of the green investments (UK Green Investment Bank, 2014).

Hypothetical application to the BPF
The BPF has experience with loans and credit enhancement through its three merged institutions, and should draw on this experience when applying these instruments to green sectors. Stakeholders cited the successful deployment of the IFFRU credit line (Instrumento Financeiro de Reabilitação e Revitalização Urbanas), and a similar model could be used for green sectors. This would involve providing subsidised and guaranteed credit lines.

5.2.3 Other renewable energy

Mature renewable energy technologies like hydroelectric are close to becoming privately financeable, requiring little support from the BPF. Hydroelectric power has been widely developed in Portugal, usually through concessions. There is a limited role for the BPF in this segment.

However, some nascent renewable energies are hampered by technology risks and are unlikely to be commercially viable without significant support from the BPF. Wave, tidal and hydrogen are still not commercially viable for the private sector, as the capital costs are high, technologies unproven at scale, and the risks of investments are unknown. For these technologies, the BPF could directly provide funding in the form of grants, loans or credit enhancement on preferential terms. By deploying these technologies and furthering their development, the BPF gains information about their financial viability and raises awareness.

5.2.4 Transport

Investments in green transport have potentially viable rates of return, but private sector investment is hindered by risks and other barriers. High upfront costs, coupled with slow and uncertain rates of return and the need for enabling environments, mean that the current financial commerciality of transport investments is non-viable. The BPF's role in this sector should be active, seeking to drive investments into viable rates of return. This can be done with tools providing direct funding, like preferential term loans or credit and high-risk equity, as deployment of technologies will reduce costs. Risk management tools can also be employed. For example, guarantees, leasing, and more innovative financing like utility financing on account can help address technology, policy and fuel or electricity price risks.

Box 3 Instrument deep dive: Guarantees

Guarantees are a type of risk-hedging method through credit enhancement. They can be provided by many entities to support private lenders and incentivise them when they are not confident about a project's financial viability. There are various types of guarantees, targeting different elements of risk (including credit, technology, and political risks).

Case study – US Department of Energy Loan Programs Office loan guarantee scheme
The Loan Programs Office provides federal loan guarantees to cover up to 80% of a qualified project's cost, and has up to $4.5 billion of available loan guarantees. It has a remit to guarantee innovative projects in the areas of renewable energy and efficient energy. There are four basic eligibility requirements and a streamlined four-step application process (Loan Programs Office, 2020; Taxpayers for Common Sense, n.d.).

Hypothetical application to the BPF
Guarantees can be used to address the perception of high risk of green projects cited as a problem by providers of green products and services. The BPF could leverage the experience with guarantees among its three merged institutions, and particularly SPGM. They would have to be adapted to the distinct structure of green investments, particularly the long and uncertain payback periods and the illiquid nature, two challenges noted by providers of green products and services. They should also be applied to support mature, low-risk green technologies and business models. The application for a guarantee should be as streamlined as possible – setting basic pre-qualification requirements, simpler risk-assessment templates, or risk-rating methodologies that can be applied across projects. However, the BPF should undertake enough due diligence and screening to avoid 'moral hazard' risks of default or non-performance for guaranteed investments, and to avoid unnecessarily subsidising projects that are financially viable without guarantees.

5.2.5 Industrial energy efficiency

Projects in industrial energy efficiency tend to have viable rates of interest, but face a few barriers to private investment in terms of risk. Stakeholders claimed to have experience with investments in this sector. Incentives to undertake these projects are usually high, as these projects are cost-saving and have viable rates of interest. This makes industrial energy efficiency a smaller priority for the BPF. However, there may still be a role for the bank in reducing counterparty risks with guarantees and other risk-hedging measures, as well as help accounting for energy savings through green MRV.

Additionally, small-scale investments in this sector struggle to attract investors, assigning a possible role for the BPF as aggregator. SMEs in the industrial sector may fail to receive funding from private investors because their investments are too small. When targeting industrial SMEs, the BPF should use tools like aggregation to help investments become viable for the private sector, as well as loans on preferential terms or even grants.

5.2.6 Buildings energy efficiency

Investments in building energy efficiency have viable rates of interest but barriers in terms of information and size. Energy efficiency options for buildings offer cost savings that help guarantee viable rates of return. This means investments are mostly commercially viable. However, the sector suffers from generally small-scale investments, especially in residential buildings, as improvements are undertaken by the owners. The tools that the BPF should use to spur private investment in this sector are aggregation and preferential-terms loans, as well as grant incentives for small-building owners or SMEs.

5.2.7 Agriculture and land use

Investments in this sector are generally far from commercially viable, as revenue streams are not yet well defined and risks are unknown. The business models in this sector, covering productivity enhancements, nature-based solutions and ecosystem services, are not sufficiently defined or established to ensure returns for investors. The long payback periods of the sector also do not suit many investors. Finally, the high risks associated with such projects discourage investments. The BPF should provide early-stage funding support, for example, through grants or preferential-terms loans and credit enhancement. In terms of soft tools, the BPF can also deploy project-level technical assistance to developers to help identify projects and assess risks.

5.2.8 Cross-cutting approaches

The BPF should also prioritise and deploy provision of data and information tools, as well as due diligence and green MRV across all target sectors and the broader financial sector. Stakeholders identified difficulties with data and information availability for green projects, both on the supply and demand side of green finance. The BPF should take on the role of information provider, coordinating efforts and raising awareness of information sources. This could be done through a portal for sharing information on green projects. Another cross-cutting area of focus for the BPF is supporting due diligence and green MRV. These soft tools address issues of misunderstanding of returns and revenue sources, as well as incorrect perceptions of risk, which were quoted as challenges to green financing.

Box 4 Instrument deep dive: Supporting green MRV and due diligence

Due diligence appraises projects for their ex ante risks and expected returns on investment. Green MRV establish definitions of green, measurements of impacts, and help with standardisation. Together they can address information gaps regarding specific technologies and green sectors.

Case study – EBRD's monitoring, reporting and verification system
The EBRD (European Bank for Reconstruction and Development) has a system in place to track its green projects. The approach was developed by an internal team with experience. It provides guidance at project initiation as to whether projects are considered climate investments. Before the investment is made, an assessment of climate impact is undertaken and verified by an in-house MRV expert. Throughout project lifetime, key data is captured and used for both internal and external reporting (Climate Action in Financial Institutions Initiative, 2015).

Hypothetical application to the BPF
To help support green due diligence, the BPF could either develop a service to conduct due diligence for private financial institutions directly, or provide knowledge products and process guidance to support due diligence among financial institutions, such as a checklist of standard questions. Alternatively, it could serve as a clearinghouse for due diligence by providing a list of vetted, qualified third parties that could conduct due diligence of green projects. For green MRV, the BPF could lay out an approach similar to that of the EBRD, where key impact indicators are identified before the investment is made, and data for these indicators is gathered as the project proceeds.

5.3 BPF capacity development

The BPF can establish the capacities needed to support green investment through additional hiring and partnerships or outsourcing to green investment experts in the near term, while building internal capacities

across the BPF in the longer term. To drive green investment, the BPF will need to develop additional capacities to deploy specific tools in order to support green investment, conduct internal green investment processes, and provide market-making informational and technical support to the private financial sector. In the short term, the BPF can rapidly build the green capacities it needs by hiring additional staff with the knowledge and experience to support internal green investment and to provide external services to Portuguese banks and investors. It can partner with existing institutions to outsource some of the main tasks of green investment, or co-invest alongside institutions with deeper green experience. In the longer term, the BPF should look to build its green capacities in-house, including promoting green investment throughout the whole institution through training and learning-by-doing.

The BPF should also start building its internal capacity for alignment and compliance with key European Commission sustainable finance regulations – the Taxonomy and Disclosure regulations. The Taxonomy regulation creates a framework to define what activities and investments are classified as environmentally sustainable, while the Disclosure regulation harmonises the communication of sustainability risks to, and impacts on, sustainable outcomes for financial market participants. The BPF will have to comply with both regulations, which presents an opportunity to integrate them with its own objectives and structures from the beginning of its operations. It can immediately start engaging multiple teams internally to support compliance with the Disclosure regulation, including the regulations team but also client-facing and back-office teams. The BPF should also use environmental/social and industrial specialists, as well as legal experts, to ensure that due diligence, monitoring, and legal documents are compliant with Taxonomy. The BPF can draw on external resources to align with common methodologies being developed by platforms or banking representatives, certification schemes by independent experts, and implementation tools like a central EU database.

References

Associate Parliamentary Sustainable Resource Group. (2011). *Rubbish to Resource: Financing New Waste Infrastructure*.

BCSD. (2017). *Financiar a sustentabilidade*.

Climate Action in Financial Institutions Initiative. (2015). *The EBRD's Measuring, Reporting and Verification Approach Allows for Transparency and Accountability*. Retrieved from https://www.mainstreamingclimate.org/wp-content/uploads/2017/10/P4_EBRD.pdf

Comissão do Mercado de Valores Mobiliários. (2019). *Finanças sustentáveis: desafios e prioridades para o mercado e a CMVM*.

Ellen Macarthur Foundation. (2020). *Financing the circular economy*.

Energy Efficiency Financial Institutions Group. (2015). *Energy efficiency - the first fuel for the EU economy.*.

EU Technical Expert Group on Sustainable Finance. (2019). *EU Taxonomy: Technical Report of the Technical Expert Group on Sustainable Finance*.

EU Technical Expert Group on Sustainable Finance. (2020). *EU Taxonomy: Final report of the Technical Expert Group on Sustainable Finance*.

European Banking Federation, & UNEP Finance Initiative. (2021). *Testing the application of the EU Taxonomy to core banking products: high level recommendations*.

European Commission. (2017). *Assessing the European clean energy finance landscape, with implications for improved macro-energy modelling*.

European Commission. (2021). Published initatives - Non-financial reporting by large companies (updated rules). Retrieved from https://ec.europa.eu/info/law/better-regulation/have-your-say/initiatives/12129-Revision-of-Non-Financial-Reporting-Directive

European Investment Bank. (2019). *Investing in nature: financing conservation and nature-based solutions*.

European Investment Bank Group. (2020). *EIB Group Climate Bank Roadmap 2021-2025*.

Fundação Calouste Gulbenkian. (2017). *Energias renováveis marinhas em Portugal*.

Global Canopy Programme. (2017). *Incentives to save the forest*.

Green Bank Network. (2019). *Green Bank Insight - Aggregation and Securitization*.

Grupo de Reflexão para o Financiamento Sustentável. (2019a). *Carta de Compromisso para o Financiamento Sustentável em Portugal*.

Grupo de Reflexão para o Financiamento Sustentável. (2019b). *Linhas the Orientação para Acelarar o Financiamento Sustentável*.

Hoffman Center for Sustainable Resource Economy. (2019). *Closing the Gap: Overcoming Barriers to Investment in Forests*.

Interreg Europe. (2017). *Financing energy efficiency: models and lessons.*

IRENA. (2016). *Unlocking Renewable Energy Investment: The role of risk mitigation and structured finance*.

IRENA. (2020a). *How Falling Costs Make Renewables a Cost-effective Investment*.

IRENA. (2020b). *Renewable Power Generation Costs in 2019*.

KfW. (2020). *Climate action campaign - SMEs play a decisive role*. Retrieved from https://www.kfw.de/stories/environment/climate-change/climate-action-campaign-sme/

Loan Programs Office. (2020). *Renewable Energy and Efficient Energy Loan Guarantees*. Retrieved from https://www.energy.gov/sites/prod/files/2020/01/f70/DOE-LPO-Renewable-Energy-Efficient-Energy-Jan2020.pdf

Material Economics. (2019). *Industrial Transformation 2050 - Pathways to Net-Zero Emissions from Heavy Industry*.

Ministério das Infraestruturas e da Habitação de Portugal. (2019). *Programa Nacional de Investimentos 2030*.

Ministério do Ambiente e Ação Climática de Portugal. (2020). *Estratégia Nacional para o Hidrogénio*.

Ministério do Ambiente e da Transição Energética de Portugal. (2019a). *Plano Nacional Integrado Energia-Clima*.

Ministério do Ambiente e da Transição Energética de Portugal. (2019b). *Roteiro para a Neutralidade Carbónica 2050*.

Ministério do Ambiente Ordenamento do Território e Energia de Portugal. (2015). *Compromisso para o Crescimento Verde*.

Official Journal of the European Union. *Communication from the Commission — Guidelines on non-financial reporting: Supplement on reporting climate-related information C/2019/4490*. , (2019).

R2pi. (2018). *Enablers and barriers to a circular economy*.

Schutze, F., & Stede, J. (2020). *EU Sustainable Finance Taxonomy - What is its Role on the Road towards Climate Neutrality*.

Taxpayers for Common Sense. (n.d.). *Renewable Energy and Efficient Energy Loan Guarantees 101*.

UK Green Investment Bank. (2014). *Low energy streetlighting: making the switch*.

Valero, J. (2019, December 5). EU reaches milestone by agreeing on green criteria for finance. *Euractiv*. Retrieved from https://www.euractiv.com/section/energy-environment/news/eu-reaches-milestone-by-agreeing-on-green-criteria-for-finance/

Wind Europe. (2020). *Wind energy in Europe in 2019*.

World Bank Group. (2016). *Making climate finance work in agriculture*.

World Resources Institute. (2019). *Barriers to adopting electric buses*.

Annex 1: Stakeholders consulted

List of stakeholders that responded to the survey, and/or were interviewed:

- Águas de Portugal
- Amorim
- Associação Portuguesa de Bancos
- Associação Portuguesa de Seguradores
- Brisa
- CaetanoBus
- CEiiA
- EDP
- Euronext Lisboa
- Finerge
- GALP
- Millennium BCP
- Ministério da Economia
- Montepio
- Mota & Engil
- PME Investimentos
- Santander

Annex 2: Survey for private financial institutions

In 2016, Portugal made the ambitious commitment to carbon neutrality by 2050. In order to achieve this, Portugal has set out targets for 2030, which include a 45–55% reduction in GHG emissions from 2005, 47% incorporation of renewables into end-use energy consumption, and 80% of electricity production from renewable sources. By 2050, Portugal is aiming to have 100% renewable electricity production, a 100% electrified passenger mobility sector, and to have reduced CO_2 emissions by 85–95% compared to 2005 levels.

This commitment and its associated targets will require large investments in order to green the economy. The Portuguese government has launched several financial instruments that promote sustainable investments, including a €100 million decarbonisation and circular economy fund. However, a more concerted effort is needed to shift both Portuguese and international financial flows towards more sustainable outcomes and in turn achieve carbon neutrality.

A green finance institution could support the shift towards more sustainable investment patterns. A green finance institution could take multiple forms and provide different tools, and ultimately accelerate the commercial financial sector's move into financing decarbonisation. A green finance institution can provide financial tools ('hard tools') to improve returns on green investments, and 'soft tools', such as technical assistance to investors or investees to redress information asymmetries.

Vivid Economics, Climateworks, the European Climate Foundation and the government of Portugal are undertaking this study to provide design options for a potential Portuguese green bank.

This survey aims to identify the gaps and needs that a green finance institution could address. A survey has been designed for each of the key actors in this space to understand what challenges private financial institutions, public financial institutions, and providers of green products/services face. It then looks to assess what support a green finance institution could provide. The overall aim is to inform the design of a potential green finance institution that is adapted to the Portuguese context and supports the relevant actors that are key to achieving carbon neutrality in 2050.

Green financing experience and challenges

1. Does your institution have an environment, social and governance (ESG) policy? If so, could you briefly describe it?

2. Does your institution currently include green finance as a key component of its portfolio?

3. Is your institution looking to re-orient its portfolio to include green finance as a key component of it?

4. Which of the following sectors are you interested in? Please check the box in the column that corresponds to your institution. For more detail about what these sectors cover please find Table 6.

Sector	No interest	Theoretical interest	Have invested in	Key sector for investment
Renewable energy – solar	☐	☐	☐	☐
Renewable energy – wind	☐	☐	☐	☐
Renewable energy – other	☐	☐	☐	☐
Industrial energy efficiency	☐	☐	☐	☐
Building energy efficiency	☐	☐	☐	☐
Waste	☐	☐	☐	☐
Agriculture and land-use management	☐	☐	☐	☐
Transport	☐	☐	☐	☐

5. Which of the green segments discussed above fit the risk appetite of your institution?

6. Can you describe the key factors that affect your institution's assessment of the rating (e.g. project profitability, lack of expertise internally, challenges in due diligence)?

7. From the perspective of your institution, can you please rate the feasibility of providing finance to the following green segments? For more detail about what these sectors cover please find Table 6.

Sectors	Never	Rarely	Sometimes	Often	Mostly	Always	NA / DK
Renewable energy – solar	☐	☐	☐	☐	☐	☐	☐
Renewable energy – wind	☐	☐	☐	☐	☐	☐	☐
Renewable energy – other	☐	☐	☐	☐	☐	☐	☐
Industrial energy efficiency	☐	☐	☐	☐	☐	☐	☐
Building energy efficiency	☐	☐	☐	☐	☐	☐	☐
Waste	☐	☐	☐	☐	☐	☐	☐
Agriculture and land-use management	☐	☐	☐	☐	☐	☐	☐
Transport	☐	☐	☐	☐	☐	☐	☐

8. What are the challenges and barriers that you face when investing in these areas? (e.g. lack of sufficient resources, insufficient knowledge and expertise, anticipated technical complexity, lack of credible, diversified pipeline of projects, regulatory barriers)

9. Do you have the following tools and what is your level of experience with them? Please fill in the table below. For more information about what these tools are please find Table 7.

Tool	Is the institution currently applying, developing or considering the use of this tool?		What level of experience does the institution have with this tool?					Sector focus	
	Yes	No	Concept only	Pilot phase	Limited experience	Regular experience	Extensive experience	Green	General
Commercial debt	☐	☐	☐	☐	☐	☐	☐	☐	☐
Equity	☐	☐	☐	☐	☐	☐	☐	☐	☐

Tool	Is the institution currently applying, developing or considering the use of this tool?		What level of experience does the institution have with this tool?					Sector focus	
	Yes	No	Concept only	Pilot phase	Limited experience	Regular experience	Extensive experience	Green	General
On-bill financing, leasing	☐	☐	☐	☐	☐	☐	☐	☐	☐
Senior debt and refinancing	☐	☐	☐	☐	☐	☐	☐	☐	☐
Aggregation and securitisation	☐	☐	☐	☐	☐	☐	☐	☐	☐
Project TA to developers	☐	☐	☐	☐	☐	☐	☐	☐	☐
Due diligence	☐	☐	☐	☐	☐	☐	☐	☐	☐
Green MRV	☐	☐	☐	☐	☐	☐	☐	☐	☐

10. Do you face any challenges or barriers with offering these tools?

Role of a green bank

11. Does your institution have experience of working with the public sector to support investment? If so, could you give some examples of your experience?

12. Does your institution have experience with public-type support (including PPPs)? If so, could you give some details about your experience?

13. What challenges have you faced when working with the public sector?

14. What could have improved these experiences?

15. What role would you see for a green finance institution? Please select in the table below. For more about what these roles entail, please find Table 8.

Information intermediation and local capacity building	☐	Lowering risk	☐
Due diligence and information provision to mitigate perceived risks	☐	Providing capital	☐
Technical assistance	☐	Facilitating capital	☐
Improving returns	☐	Targeting investment mismatches	☐

16. What position in the value chain of finance should a potential green finance institution be?

17. What type of mandate, tasks, financing solutions should a green bank offer? To what type of organisations and what type of projects?

18. Would you have any concerns about the implementation of a green bank?

19. How would you envisage collaboration between your institution and a green bank? What type of support could a green finance institution provide your organisation?

Appendix to survey

Table 6 Sector description

Sector	Description
Renewable energy – solar	Investments related to solar energy
Renewable energy – wind	Investments related to wind energy, both offshore wind and onshore wind
Renewable energy – other	Investments related to all other types of renewable energy, such as wave/tidal, bioenergy, hydrogen production
Industrial energy efficiency	Investments related to energy efficiency in industrial processes
Building energy efficiency	Investments related to improving energy efficiency of buildings both residential and commercial
Waste	Investments related to the waste sector including industrial waste (treatment and recycling), municipal solid waste (collection, treatment and recycling), waste water
Agriculture and land-use management	Investments related to the agriculture and LULUCF sectors, such as urban green areas, wetlands conservation/management, forestry, sustainable agriculture land use, and low-carbon agricultural production
Transport	Investments related to greening the transport sector, such as supporting a modal shift, low -emissions fuel switching, vehicle efficiency, electric/hybrid/zero emissions vehicles

Source: Vivid Economics

Table 7 Tool descriptions

Name of tool	Type of tool	Description
Commercial debt	Hard tool	Project financing (loan for a specific project) and enterprise financing (loan for a company)
Equity	Hard tool	Direct equity participation at early stage (e.g. construction phase)
On-bill financing, leasing	Hard tool	Repayment programmes through utility or tax bills, or through service charge
Senior debt and refinancing	Hard tool	Long-term senior lending and 'capital recycling' at market rates
Aggregation and securitisation	Hard tool	Financial engineering to match ticket size requirements of institutional investors
Project TA to developers	Soft tool	Tech. assistance to project developers to identify, assess risks, structure green projects
Due diligence	Soft tool	Project technical and financial appraisal to better assess expected RoI and ex ante risks
Green MRV	Soft tool	Measurement, reporting and verification systems for low-carbon impacts, green definitions and standardisation

Source: Vivid Economics

Table 8 Description of different potential green bank interventions

Potential role of green bank	Description
Information intermediation and local capacity building	A green finance institution could: Facilitate information sharing between public and private sectors through policy advice and local capacity building Facilitate visibility between investors and investees, where there is a lack of awareness of the key players and projects on either side Increase the flows of international capital by providing local knowledge and institutional legitimacy on the ground
Due diligence and information provision to mitigate perceived risks	A green finance institution could carry out due diligence on new and unproven technologies and make the results publicly available to address the information asymmetry between investors and investees.
Technical assistance	A green finance institution could provide technical assistance to investees, supporting them on how to meet the green investment criteria; and it could provide technical assistance to investors both at the market and project level.
Improving returns	A green finance institution could subsidise the cost of capital by lending capital at a lower than market rate, covering financial transaction costs or providing direct grant-based payments. It could also provide investees with technical assistance to boost productivity and increase returns on the ground.
Lowering risk	A green finance institution could lower risk by: Directly providing capital and thus an implicit guarantee Facilitating capital by risk sharing through mostly off-balance sheet instruments Mitigating perceived risk by addressing information asymmetries
Providing capital	A green finance institution could provide capital through: Loans Equity (standalone and hybrid, e.g. mezzanine financing), which acts as a type of implicit guarantee to private investors Issuing subordinated debt, which is between equity and debt
Facilitating capital	A green finance institution could provide risk-reducing measures through: Guarantees and insurance that are less balance-sheet-intensive compared to a direct equity stake, but increase the return profile of an investment Reserve pools which leverage green banking institutions' capital and are set up specifically to cover defaults from green investment Tools such as bill repayment or tax repayment are structured to reduce default risks from customers or beneficiaries and thereby reduce overall financial risk
Targeting investment mismatches	A green finance institution could address investment mismatches through: On-bill and tax financing Green investment funds Other bundling techniques, such as (green) bond issuance and securitisation

Source: Vivid Economics

Annex 3: Survey for providers of green products and services

In 2016, Portugal made the ambitious commitment to carbon neutrality by 2050. In order to achieve this, Portugal has set out targets for 2030, which include a 45–55% reduction in GHG emissions from 2005, 47% incorporation of renewables into end-use energy consumption, and 80% of electricity production from renewable sources. By 2050, Portugal is aiming to have 100% renewable electricity production, a 100% electrified passenger mobility sector, and reducing CO_2 emissions by 85–95% compared to 2005.

This commitment and its associated targets will require large investments in order to green the economy. The Portuguese government has launched several financial instruments that promote sustainable investments, including a €100 million decarbonisation and circular economy fund. However, a more concerted effort is needed to shift both Portuguese and international financial flows towards more sustainable outcomes and in turn achieve carbon neutrality.

A green finance institution could support the shift towards more sustainable investment patterns. A green finance institution could take multiple forms and provide different tools, and ultimately accelerate the commercial financial sector's move into financing decarbonisation. A green finance institution can provide financial tools ('hard tools') to improve returns on green investments and 'soft tools' such as technical assistance to investors or investees to redress information asymmetries.

Vivid Economics, Climateworks, the European Climate Foundation and the government of Portugal are undertaking this study to provide design options for a potential Portuguese green bank.

This survey aims to identify the gaps and needs that a green finance institution could address. A survey has been designed for each of the key actors in this space to understand what challenges private financial institutions, public financial institutions and providers of green products/services face. It then looks to assess what support a green finance institution could provide. The overall aim is to inform the design of a potential green finance institution that is adapted to the Portuguese context and supports the relevant actors that are key to achieving carbon neutrality in 2050.

Understanding of offering

1. Which are the key sectors in which you operate? Please select in the table below. For more information about what these roles entail, please find Table 9.

Building energy efficiency	☐	Renewable energy – solar	☐
Waste	☐	Renewable energy – wind	☐
Agriculture and land-use management	☐	Renewable energy – other	☐
Transport	☐	Industrial energy efficiency	☐

2. What are the different types of green products / services that your company is offering?

3. How much of your activities are destined for the Portuguese market?

4. How do you think your business creates value in the market?

Barriers to growth

5. What do you think may be holding back your expansion in the market, on the customer/demand side? Please select in the table below.

Limited information on products/services	☐
Strong interest but limited ability to pay	☐
Strong demand	☐

Understanding financing for green products / services

6. How do you source capital and from whom (e.g. private equity, public equity, bond issuance, private market debt, public grant support, public debt)?

7. Have you received funding or other support (e.g. credit enhancement, technical assistance, incubation support) from a public institution? If so, what kind?

8. Do you currently face any challenges in accessing finance? For example, concerns around the profitability your product/service, lack of technical expertise within financial institutions, lack of ability to demonstrate strong customer demand for specific (green) products.

Role for a green finance institution

9. What role would you see for a green finance institution? Please select as many as apply in the table below – or none. For more information on what these roles entail, please find Table 10.

Information intermediation and local capacity building	☐	Lowering risk	☐
Due diligence and information provision to mitigate perceived risks	☐	Providing capital	☐
Technical assistance	☐	Facilitating capital	☐
Improving returns	☐	Targeting investment mismatches	☐

10. What position in the value chain of finance should a potential green finance institution be?

11. What type of support would your company be interested in receiving from a green finance institution? (e.g. technical assistance, customer outreach, credit enhancement or co-investment).

Appendix to survey

Table 9 Sector description

Sector	Description
Renewable energy – solar	Investments related to solar energy
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Source: Vivid Economics

Table 10 Description of different potential green bank interventions

Potential role of green bank	Description
Information intermediation and local capacity building	A green finance institution could: Facilitate information sharing between public and private sectors through policy advice and local capacity building Facilitate visibility between investors and investees, where there is a lack of awareness of the key players and projects on either side Increase the flows of international capital by providing local knowledge and institutional legitimacy on the ground
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Potential role of green bank	Description
Lowering risk	A green finance institution could lower risk by: Directly providing capital and thus an implicit guarantee Facilitating capital by risk sharing through mostly off-balance sheet instruments Mitigating perceived risk by addressing information asymmetries
Providing capital	A green finance institution could provide capital through: Loans Equity (standalone and hybrid, e.g. mezzanine financing), which acts as a type of implicit guarantee to private investors Issuing subordinated debt, which is between equity and debt
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Targeting investment mismatches	A green finance institution could address investment mismatches through: On-bill and tax financing Green investment funds Other bundling techniques, such as (green) bond issuance and securitisation

Source: Vivid Economics

Company profile

Vivid Economics is a leading strategic economics consultancy with global reach. We strive to create lasting value for our clients, both in government and the private sector, and for society at large.

We are a premier consultant in the policy-commerce interface and resource- and environment-intensive sectors, where we advise on the most critical and complex policy and commercial questions facing clients around the world. The success we bring to our clients reflects a strong partnership culture, solid foundation of skills and analytical assets, and close cooperation with a large network of contacts across key organisations.

Contact us

Vivid Economics Limited
163 Eversholt Street
London NW1 1BU
United Kingdom

T: +44 (0)844 8000 254
enquiries@vivideconomics.com