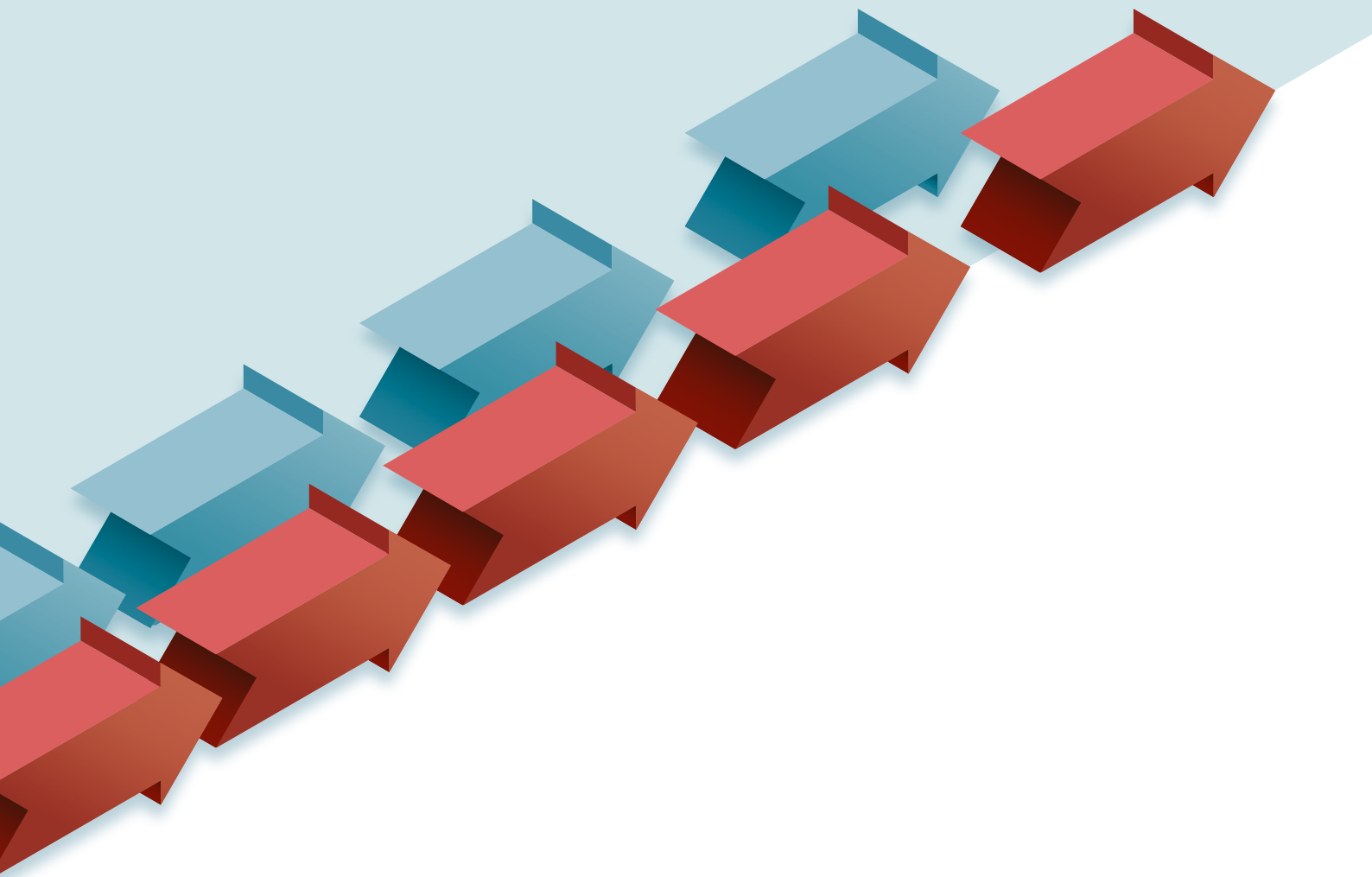


INTERNAL CARBON PRICING FOR LOW-CARBON FINANCE

A briefing paper on linking climate-related opportunities and risks to financing decisions for investors and banks



July 2019

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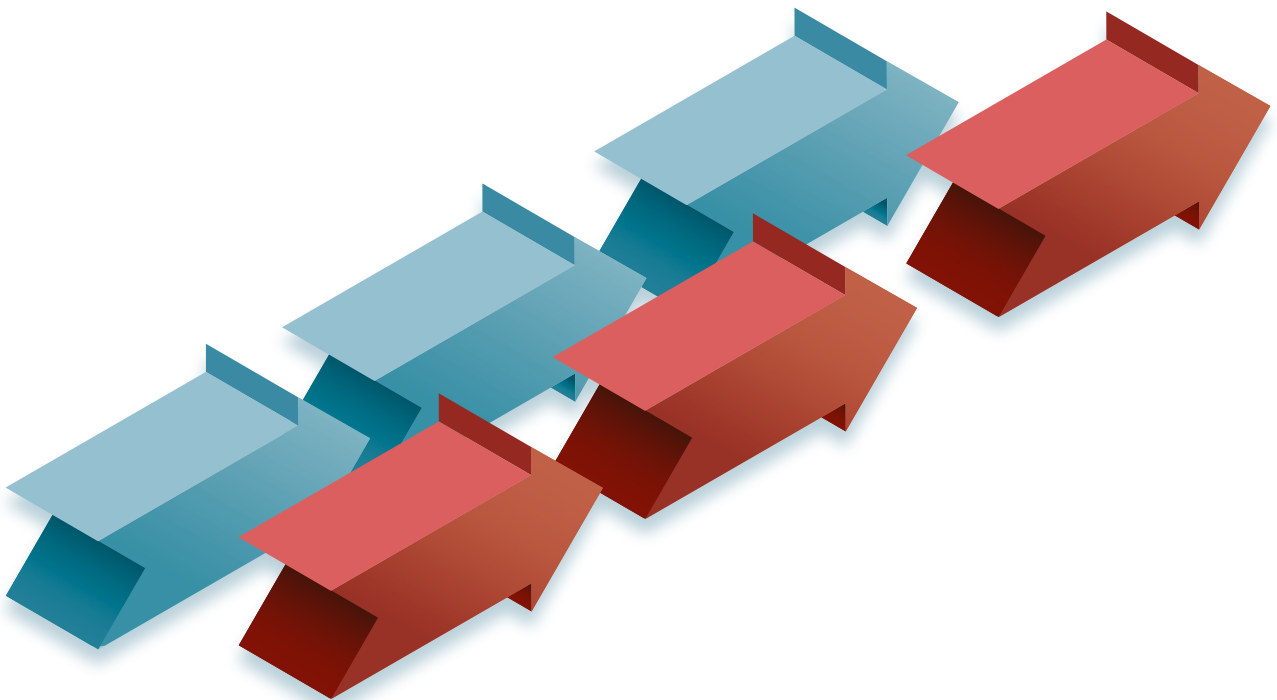
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A briefing paper on linking climate-related opportunities and risks to financing decisions for investors and banks



ABOUT US

About Navigant Consulting, Inc.

With over 600 consultants, Navigant's global Energy segment is the largest energy and sustainability consulting team in the industry. We collaborate with utilities and energy companies, government and NGOs, large corporations, product manufacturers, and investors to help them thrive in a rapidly changing energy environment. Having joined force with Ecofys in 2016, the company is a trusted advisor to governments, corporations, NGOs, and energy providers worldwide. The team delivers powerful results in the energy and climate transition sectors. Working across the entire energy value chain, Navigant develops innovative solutions and strategies to support its clients in enabling the energy transition and working through the challenges of climate change. Carbon pricing forms part of Navigant's core expertise: since its conception, we have advised the European Commission and other stakeholders on the design of the European Union Emissions Trading System, and we continue to provide analyses on the potential impacts of proposed design changes. Capturing the topic in its global scope, Navigant has been assisting The World Bank in producing their annual flagship report State and Trends of Carbon Pricing over the past seven years. We also work with the industry on compliance and internal carbon pricing strategies, thereby providing a fully rounded perspective on carbon pricing that spans from policies and technological innovation, to impacts at the consumer level.

NAVIGANT



For more information, please contact
Ian Trim at ian.trim@navigant.com

www.navigant.com

About Generation Foundation

The Generation Foundation (the 'Foundation') was part of the original vision of Generation Investment Management LLP ('Generation') since the firm was founded in 2004. The Foundation was established alongside Generation in order to strengthen the case for Sustainable Capitalism. Our strategy in pursuit of this vision is to mobilise asset owners, asset managers, companies and other key participants in financial markets in support of the business case for Sustainable Capitalism. In our effort to accelerate the transition to a more sustainable form of capitalism, we primarily use a partnership model to collaborate with individuals, organisations and institutions across sectors and geographies and provide catalytic capital when appropriate. In addition, the Foundation publishes in-house research, gives select grants related to the field of Sustainable Capitalism, engages with our local communities and supports a gift matching programme for the employees of Generation. All of the activities of the Foundation, a not-for-profit entity, are funded by a distribution of Generation's annual profitability.

generation —
foundation



For more information, please contact
Grace Eddy at genfound@generationim.com

www.genfound.org

About CDP

CDP is a global environmental impact non-profit working to secure a thriving economy that works for people and the planet. High quality, relevant information is the fundamental basis for action and CDP helps investors, companies and cities to measure, understand and address their environmental impact. The world's economy looks to CDP as the gold standard of environmental reporting with the richest and most comprehensive dataset on corporate and city action. CDP plans to release a new financial services sector questionnaire for climate change in 2020 for corporates with activities in banking, insurance, asset management and asset ownership. Financial services sector companies will be able to respond to the CDP climate change questionnaire in the context of these activities, in addition to operational activities. During the 2019 cycle we will provide specific guidance to companies in the financial services sector to assist their disclosure.



For more information, please contact
carbonpricing@cdp.net

www.cdp.net

About Carbon Pricing Unlocked

Today, over 40 national jurisdictions and about 25 cities, states, and regions are putting a price on carbon. Despite this global uptake, harmonisation of carbon pricing policies across different regions remains difficult. Furthermore, carbon prices are often too low to incentivise the investment necessary to decarbonise emissions-intensive value chains. At the end consumer level, the impact of carbon pricing is often insufficient to drive changes towards more low carbon consumption. How can carbon pricing facilitate sustainable global economic growth? In order to find vital answers to this question, the Generation Foundation has teamed up with Navigant in the Carbon Pricing Unlocked (CPU) research partnership. The research extends over three years from 2016 to 2019 and tackles carbon pricing from a new angle, exploring the role of carbon pricing along value chains up to the end consumers. The partnership aims to deliver quantified insights into the role carbon pricing can play in a 1.5°C future. Navigant is one of the pioneers in carbon pricing, and has worked on the topic for nearly two decades. The Generation Foundation is the advocacy initiative of Generation Investment Management LLP, which was co-founded by Al Gore and David Blood in 2004, and works on the decoupling of prosperity from resource-intensive growth. Combining in-depth expertise with a high-level stakeholder network, Navigant and The Generation Foundation investigate how carbon pricing might be better integrated in **the private sector** and at an economic policy level in order to unlock its full mitigation potential. For this output under the CPU partnership, Navigant and the Generation Foundation worked together with CDP (formerly the Carbon Disclosure Project).

Our partnership welcomes collaboration with interested parties. To receive news and updates about our project, please sign up at cpu@navigant.com.

EXECUTIVE SUMMARY

Putting a price on carbon and reflecting the hidden carbon risks and opportunities in investment

Internal carbon pricing (ICP) can help financial institutions assess carbon risks and identify opportunities to shift capital from high-carbon to low-carbon investment and lending, decarbonise their portfolios, and increase their resilience in a low-carbon transition.

Financial institutions are facing an increasing demand from the global community to incorporate climate change considerations into their investment and lending processes, including from the Task Force on Climate-related Financial Disclosures (TCFD), Investor Agenda, CDP, and Asset Owner Disclosure Project (AODP). ICP is one of the tools recommended by the TCFD to manage climate-related risks. It allows financial institutions to incorporate forward-looking costs associated with carbon, such as future market carbon price, carbon abatement cost, and pass-through carbon prices from suppliers, that are seldom included in the financial analysis.

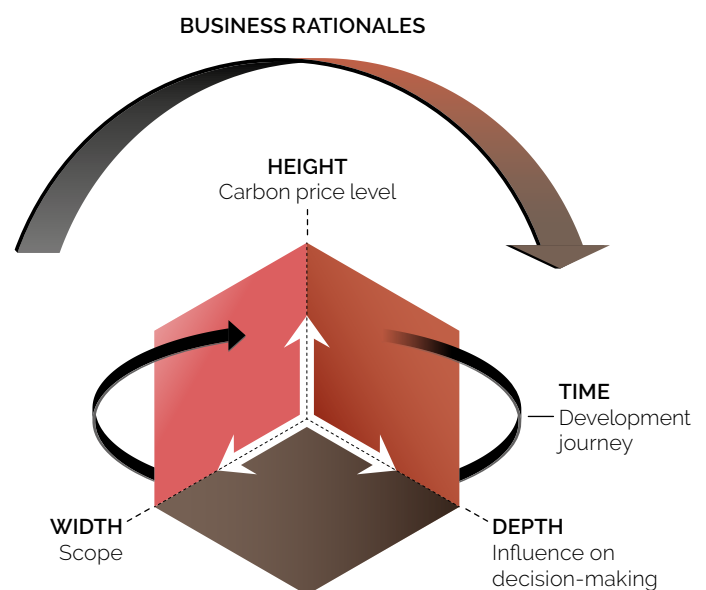
Financial institutions disclosed to CDP that low-carbon investment is a top-reported reason for applying ICP, but **the current level of awareness and practice among financial institutions remains relatively limited.**¹ From our interviews with various financial institutions, we have found that they often see the potential of using ICP to measure risks and identify opportunities associated with carbon emissions. Yet, they report that the methodology of setting an internal carbon price is unclear, making it difficult to validate the materiality of carbon risks and opportunities and incorporate them into financial decision-making.

Understanding ICP in four dimensions

This briefing paper aims to help investors and banks understand how they could use ICP in their decision-making, specifically for their investment and lending practices.² As a first step, investors and banks should understand the business rationale of ICP for their institutions. For instance, pricing can help investors and banks develop:

1. a **resilient strategy that evolves with the low-carbon transition** to address existing and potential regulations or stakeholder concerns that could affect the operations and duties of financial institutions;
2. an **implementation approach for actively managing investment and lending portfolio risks and seeking opportunities** in a decarbonising world.

FIGURE 1 The 4D Framework for ICP



¹ CDP, *2018 Climate Change Questionnaire (Investor Sample)*, 2018.

² While there are various functions of banks (e.g. accepting deposit, capital transfer, providing safety, etc.), this guide focuses on lending services (e.g. corporate loans, mortgages, credit lines) of banks given that lending contributes to an essential part of their balance sheets.

Understanding the business case for ICP enables financial institutions to develop an approach fit for decision-making along the four dimensions (see Figure 1). Most importantly, financial institutions should explore where and how to apply ICP in the investment and lending processes (*depth*). In addition, financial institutions should also determine how much of their portfolio should be subject to ICP (*width*), define the price level(s) (*height*), and aim to continuously adapt and refine the approach (*time*).

Both types of institutions are facing an increasing regulatory push to manage climate-related risks in their portfolios. This briefing paper focuses on the investment activities by asset managers and asset owners on asset classes such as equities, fixed income, and project finance, and lending activities for banks. While this is not the focus of the paper, the principle of pricing carbon risks into decision-making via ICP can also be applied to other activities of banks beyond lending.

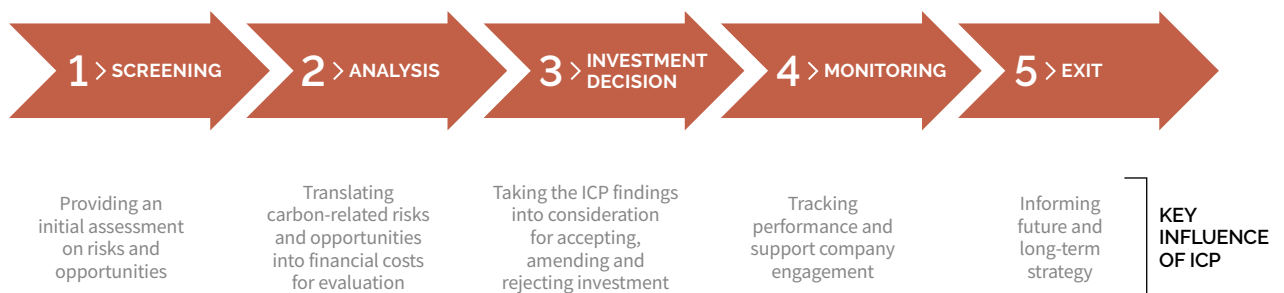
Linking ICP to current practices throughout the investment and lending processes

Generally, the application of ICP in the early stages — screening and analysis for investors, and origination and credit assessment for banks — helps set the scene to incorporate carbon risks into decision-making processes. In these stages, ICP can serve as a tool to filter and evaluate investment and lending opportunities by quantifying carbon risks into financial costs or savings. For example:

Where and how to apply ICP (depth) can be different for investors and banks, though there are some common roles ICP plays in the investment and lending processes (see Figure 2 below).

FIGURE 2 ICP plays some common roles in the investment and lending processes

INVESTORS' INVESTMENT PROCESS³



BANKS' LENDING PROCESS

↑
Applicable for existing loan portfolios

³ While the investment activities by investors could vary, this briefing paper focuses on the investment activities by asset managers and asset owners on asset classes such as equities, fixed income, and project finance.

INVESTORS

Screening (phase 1) and analysis (phase 2) are the key phases for using ICP to **manage risks and identify opportunities**. At the screening phase, ICP can be used to develop indices focusing on carbon risks and low-carbon opportunities. It plays an even bigger role through integration into fundamental analysis and evaluation (e.g. reflecting carbon costs in the company's future expenses), directly linking carbon risks to financial performance. For existing portfolios, ICP can influence investment decisions in phase 5, where divestment or increase in investment value could take place if ICP indicates that the carbon risks of an investment are diverging from investment goals.

Investors can also use ICP as **a tool to disclose** how carbon risks and opportunities are incorporated in the fundamental analysis (phase 2) and monitored over time (phase 4), demonstrating leadership on stakeholder value creation and responding to increasing regulatory attention around climate risk disclosure.

Monitoring (phase 4) is a key entry point for using ICP to **formulate strategy** through company engagement and portfolio management. ICP can help facilitate the discussion with investees on the low-carbon transition by being included in company surveys or illustrating how future carbon costs can affect a company's financial resilience.

BANKS

Banks can most effectively use ICP to **strategically identify and evaluate financing opportunities** during the origination phase (phase 1). In this phase, ICP can be used as a benchmark for preliminary credit assessment and to identify borrowers with high carbon risks for further actions, which is useful when meeting with the client to discuss their respective risks, or flat-out rejecting the loan if the carbon risk is deemed too high.

ICP can **reflect carbon costs in credit risk assessment** for new (phase 2) and existing loans or credit lines (phase 4). Carbon costs may affect both the probability of default (PD) through impacts on profit & loss (P&L) or cash flow (via revenues and/or expenses), or loss given default (LGD) by impacting asset values on the balance sheet (in the case of assets held as collateral or company assets available to be distributed if insolvency occurs). This applies to losses as well as profits associated with opportunities arising from carbon risks, including favourable exposure to increased revenues, reduced costs, or increased asset values as a result of the interplay of expected carbon pricing on business operations. Carbon costs could also be reflected and taken into account when renewing loan terms for existing loans in phase 3.

The application of ICP in phases 1, 2 and 4 can empower banks to prepare for the low-carbon transition, **responding to regulatory pressure** by incorporating and disclosing carbon risks as part of their lending process. Enhancing loan resilience against carbon risks can also highlight a bank's effort in **stakeholder value creation and offer new business opportunities**. For example, clients may be attracted to banks with more resilient balance sheets that incorporate a forward-looking basis with regard to climate change. Understanding carbon risk exposure can also support banks to be **strategic about near-term lending** and work towards win-win situations with recurring clients to **formulate long-term strategies** that minimise the risk of loan impairment.

Defining a scope and journey that fit your needs

All financial institutions interviewed during the preparation of this briefing paper cited **materiality as an important determinant for applying ICP**. The materiality of ICP depends on both the scope of ICP (*width*) and price level (*height*). In 2018, more than one hundred financial institutions disclosing to CDP reported operations or activities currently regulated by a carbon pricing system or expected to be regulated within three years.⁴ Climate risk is already materially affecting certain sectors, and will affect all sectors over time.⁵ The scope of ICP should take into account portfolio-specific characteristics, such as sector, financial exposure of the investment or loan, and relevant time horizons (e.g., liquidity, investment, and timeframe).

“It’s not about getting the perfect price at this point in time. We’re in a place where we need to understand the big picture by taking the first step and improving our approach over time.”

Crédit Agricole

Price level is a key factor for assessing the materiality of carbon risks. Selecting a carbon price (or prices) to use will depend on the business rationales for ICP and financial institutions’ visions and mandates. For example, using prices reflecting long-term abatement or societal costs would be more in line with stakeholder value creation. On the other hand, prices linked to expenses and revenue would be most appropriate for risk management. Applying ICP linked to expenses is crucial as carbon costs are embedded throughout the economy and certain sectors will see cost pass-through.

To formulate an internal carbon price, **it is important to consider not just the market price** (e.g., market price in an emissions trading system or carbon tax), **but also other operational** (e.g., removal of fossil fuel subsidy), **upstream** (e.g., carbon price passed through from supply chain), **and downstream carbon costs** (e.g., changes in revenue due to market shifts in demand).

In a carbon-constrained world where market dynamics continue evolving and technology keeps improving, financial institutions can assess a range of potential impacts resulting from the above through scenario analysis. **Scenarios ideally apply a range of prices over various time horizons to test the resilience of a portfolio, as opposed to just getting one “right price.”**

Information and resources to get started

To get started on ICP, this briefing paper aims to act as **a source for the information needed to implement ICP**, leveraging existing methodologies and information for estimating carbon footprint as well as carbon price. Some helpful resources include GHG accounting guidelines and data sources for various asset classes, reports and data sources for various types of carbon prices (e.g. [State and Trends of Carbon Pricing 2018](#) and the International Energy Agency’s World Energy Outlook), input-output models and literature for assessing sectors’ pass-through ability, and so on.

Investors and banks are encouraged to look beyond regulatory pricing – starting by experimenting with different approaches, assumptions and scopes, sharing their experiences with other institutions, and most importantly, ensuring regular evaluations to reflect developments in the low-carbon transition over time. A learning-by-doing approach will enable financial institutions to identify their optimal ICP journey to future-proof their portfolios against climate change.

⁴ CDP, 2018 Climate Change Questionnaire (Investor Sample), 2018.

⁵ PRI Inevitable Policy Response Work.

PRICING IN CARBON RISKS? THE KNOW-HOW IN 4 DIMENSIONS:

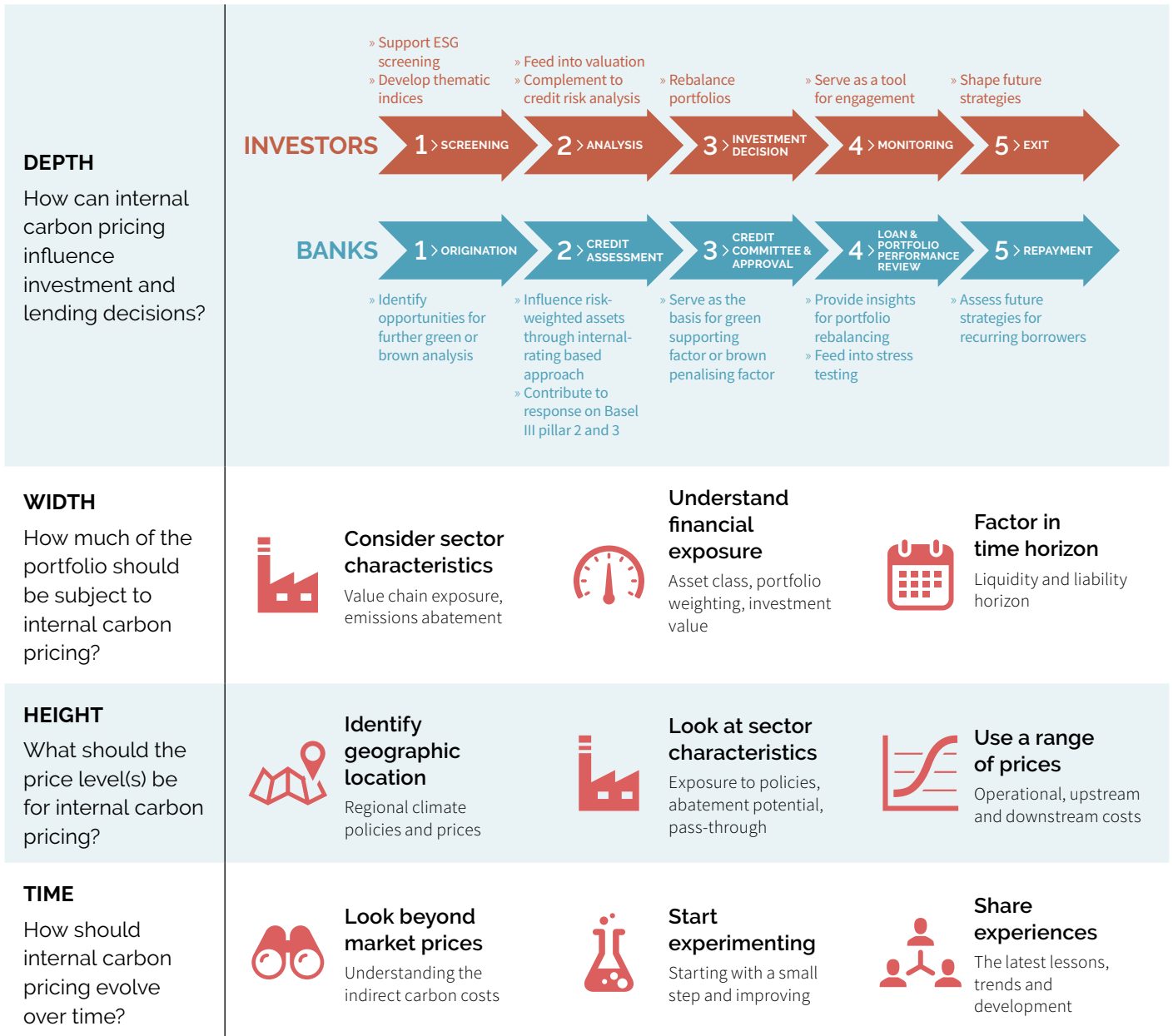


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1 | INTRODUCTION

There is money to be made and lost in the transition to a low-carbon economy. The Global Commission on the Economy and Climate conservatively estimated that up to \$26 trillion in economic gain could result from low-carbon investments through 2030.⁶ At the same time, bottom lines are sure to be negatively impacted if carbon risks are not taken seriously.^{7,8}

Managing carbon risks can result in win-win outcomes. Not only do financial institutions have an opportunity to accelerate the transition to a low-carbon economy in decarbonising their portfolios, they also stand to benefit from opportunities that arise from this transition. Through initiatives like the TCFD,⁹ Investor Agenda,¹⁰ Climate Action 100+,¹¹ the

FIGURE 3 Word cloud generated from interviews with financial institutions



- 6 New Climate Economy, *The 2018 Report of the Commission on the Economy and Climate*, 2018.
- 7 The New Climate Economy (Footnote 1) says this is our “use it or lose it” moment: investing now to build the right infrastructure will deliver a new era of economy growth, but getting it wrong will lock the world into an era of low-productivity.
- 8 Principles for Responsible Investments’ Inevitable Policy Response outlines policy pathways to below 2°C, and their estimated financial impacts.
- 9 The Financial Stability Board Task Force on Climate-related Financial Disclosures (TCFD) is a market-driven initiative, set up to develop a set of recommendations for voluntary and consistent climate-related financial risk disclosures in mainstream filings.
- 10 The Investor Agenda has been developed for the global investor community to accelerate and scale up the actions that are critical to tackling climate change and achieving the goals of the Paris Agreement.
- 11 Climate Action 100+ is a five-year initiative led by investors to engage systemically important greenhouse gas emitters and other companies across the global economy that have significant opportunities to drive the clean energy transition and help achieve the goals of the Paris Agreement.

Portfolio Decarbonisation Coalition,¹² AODP,¹³ and CDP,¹⁴ among others, the global community is urging financial institutions to incorporate climate change considerations into their decision-making processes.

For one, internal carbon pricing (ICP) can help financial institutions identify opportunities to shift capital from high to low-carbon investments and align their portfolios with a low-carbon economy. The Paris Agreement stipulates a reduction of global emissions to limit warming to well below 2°C relative to pre-industrial levels. ICP can be a tool to capture the potential costs for this transition (e.g. market carbon price and abatement costs necessary to incentivise sufficient emissions reduction under a 2°C or below scenario), and therefore provide insights on aligning portfolios.

Moreover, ICP is a tool to assess the materiality of the hidden carbon risks and opportunities in finance, such as the impacts on fair value and cash flow of assets and companies. These risks – driven by changes in the economy caused by climate regulations, policies, market shifts, and technological developments – can be translated into financial costs, referred to as carbon costs in this briefing paper. In identifying these risks and decarbonising portfolios early on, financial institutions can benefit from low-carbon investment opportunities. In addition, ICP can help reduce financed emissions¹⁵ and act as a tool to achieve the goals of the Paris Agreement.

It is important to acknowledge and manage the limitations associated with ICP as a tool for low-carbon finance. **ICP can be used to manage carbon risks and opportunities related to emissions. Reputational risk, physical risk, and opportunities less directly linked to emissions** (e.g. market opportunities for innovative products and services related to the low-carbon transition) are not necessarily captured by ICP. Understanding these limitations is key to incorporating ICP into financial institutions' strategies for long-term capital allocation to complement other risk assessment tools.

Some early success stories demonstrate the value of ICP for financial institutions. For example, Crédit Agricole has developed a top-down methodology to apply ICP to measure carbon risks in certain emissions-intensive sectors. Although still in the early stages, results of their analyses have made their way into decision-making and changed the way the Group allocates capital. While they acknowledge imperfections in both the data and methodology used to assign internal carbon prices, their message is clear: it is better to start by using the best available data and reasonable assumptions than to do nothing and wait until the data and methodology are perfect. Assumptions need to be made in the face of data gaps, and methodologies can be refined and updated as consensus builds. For Crédit Agricole, paving the way for ICP in finance is an opportunity in itself.

- 12 The Portfolio Decarbonisation Coalition (PDC) is a multi-stakeholder initiative that will drive GHG emissions reductions on the ground by mobilizing a critical mass of institutional investors committed to gradually decarbonizing their portfolios.
- 13 The Asset Owners Disclosure Project (AODP) rates and ranks the world's largest institutional investors and assesses their response to climate-related risks and opportunities.
- 14 CDP is a not-for-profit charity that runs the global disclosure system for investors, companies, cities, states and regions to manage their environmental impacts.
- 15 Financed emissions refer to the GHG emissions associated with providing capital (lending) or financing (investment). GHG Protocol, Technical Guidance for Calculating Scope 3 Emissions, 2013, https://ghgprotocol.org/sites/default/files/standards/Scope3_Calculation_Guidance_0.pdf.

Many financial institutions cited lack of data and clear methodology as barriers to implementing ICP. To date, financial institutions using ICP tend to use it in pilots or limit its application to the most carbon-intensive assets and companies. However, interest in exploring ICP for low-carbon investment is apparent – approximately one-third of financial institutions that reported to CDP in 2017 use or plan to use an internal carbon price. The TCFD recommendations on climate-related financial disclosures also highlight ICP as a tool to aid in risk management and disclosure.¹⁶ Greater buy-in from upper management and demand from clients can give financial institutions the push required to integrate ICP in financial analysis.

“Internal leadership and making clear the value of the insights are key to bringing ICP into the agenda and discussion.”

EBRD

Building on the how-to guide to corporate internal carbon pricing published last year by The Generation Foundation, Navigant and CDP, **this briefing paper is tailored for investors and banks. It aims to outline the key considerations for implementing ICP specific to these financial institutions.** This briefing paper focuses on the investment activities by asset managers and

owners on asset classes such as equities, fixed income, and project finance, and lending activities for banks. While the operation of both types of financial institutions goes beyond this scope, the principle of pricing carbon risks into decision-making via ICP can also be applied to other activities.

This paper was developed by interviewing investors, banks, and related stakeholders to gain insight into their awareness of ICP, perceived values associated with its use, potential use cases, and barriers to implementation. It is organised in the following sections:

- » **The business rationales of ICP:** This section focuses on “why” using ICP for investors and banks, supporting the establishment of internal awareness within financial institutions for exploring ICP.
- » **The four dimensions of ICP.** This section focuses on “how” to design ICP, including how it can be applied in each phase of the investment and lending processes.
- » **Information and resources to get started.** This section focuses on key information financial institutions need to implement ICP.

While ICP can serve as a tool to link carbon risks and opportunities to investment and lending decisions, it should not be the only stand-alone tool. It should be integrated into the wider climate-related risk and opportunity assessment processes conducted regularly by financial institutions.

2 | THE BUSINESS RATIONALE FOR ICP FOR FINANCIAL INSTITUTIONS

When implementing ICP, the first step is to understand the business rationale for ICP for the relevant organisation, and what ICP would achieve for the business in context. All financial institutions interviewed for this briefing paper agreed that ICP's greatest value lies in managing risks and identifying opportunities to develop a resilient strategy and implementation approach as the world transitions to a low-carbon economy.

Strategy: evolving with the low-carbon transition

Many financial institutions have started to consider and even incorporate decarbonisation into their strategies, as demonstrated by the increasing participation from the sector in initiatives such as CDP, The Principle for Responsible Investment (PRI), Investor Agenda, and TCFD. They are looking for ways to improve their disclosure and reduce financed emissions to align with the realities of a carbon-constrained future. Recently, five commercial banks and nine multilateral development banks pledged to align their portfolios with the Paris Agreement.^{17, 18} The United Nations Environment Programme Finance Initiative (UNEP FI) has also been carrying out pilot projects with banks, asset managers and insurance companies on implementing the TCFD recommendations to assess climate-related risks.¹⁹

The financial sector also faces increasing regulatory pressure to incorporate climate-related risks.²⁰ For example, Article 173 of the French Law on Energy Transition and Green Growth requires investors to report on the climate-related risks of their investment,²¹ and The UK's Prudential Regulation Authority is carrying out a consultation on financial services organisations, including banks and certain investment firms in the UK, to take systematic steps to assess, manage and disclose climate-related risks.²² The UK central bank is considering including climate change impacts as part of the annual stress testing for banks as early as 2019.²³ Financial institutions are facing increasing pressure over the link between climate-related risks and fiduciary duty; the regulation proposal published by the European Commission in May 2018 introduces a transparency requirement on the use of ESG factors and opens up the potential to ensure incorporation of ESG factors in investment decisions.²⁴

Carbon risks are often perceived as long-term risks. However, these risks can also be material in the near term as some risks may unfold more rapidly than expected and investment decisions made today can lead to future lock-in.²⁵ ICP is one of the tools to track and stress test carbon risks under various circumstances over time, improving readiness for increasing climate regulation and facilitating proactive stewardship to

17 ING, *ING talks climate in Katowice at COP24*, 2018, <https://www.ing.com/Newsroom/All-news/ING-talks-climate-in-Katowice-at-COP24.htm>.

18 World Bank, *Multilateral Development Banks (MDBs) Announced a Joint Framework for Aligning their Activities with the Goals of the Paris Agreement*, 2018, <https://www.worldbank.org/en/news/press-release/2018/12/03/multilateral-development-banks-mdbs-announced-a-joint-framework-for-aligning-their-activities-with-the-goals-of-the-paris-agreement>.

19 UNEP FI, *Task Force on Climate-Related Financial Disclosures*, 2018, <https://www.uneofi.org/climate-change/tcfd/>

20 Mercer, *Mercer research reveals more European pension funds consider financial risks of climate change*, 2018, <https://www.uk.mercer.com/newsroom/european-asset-allocation-survey-2018-financial-risks-climate-change.html>.

21 Forum Pour L' Investissement Responsable, *Article 173-VI: Understanding the French regulation on investor climate reporting*, 2016, https://www.frenchsif.org/isr-esg/wp-content/uploads/Understanding_article173-French_SIF_Handbook.pdf.

22 Bank of England, *Enhancing banks' and insurers' approaches to managing the financial risks from climate change*, 2018, <https://www.bankofengland.co.uk/prudential-regulation/publication/2018/enhancing-banks-and-insurers-approaches-to-managing-the-financial-risks-from-climate-change>.

23 Financial Times, *Carney plans to test UK banks' resilience to climate change*, 2018, <https://www.ft.com/content/0ba2390a-ffd4-11e8-ac00-57a2a826423e>.

24 European Commission, *Proposal for a regulation of the European Parliament and of the Council on the establishment of a framework to facilitate sustainable investment*, 2018. https://ec.europa.eu/info/law/better-regulation/initiatives/ares-2017-5524115_en#pe-2018-3333

25 The CO-Firm, *Investor primer to transition risk analysis*, 2018, <http://et-risk.eu/wp-content/uploads/2018/02/Investor-primer-to-transition-risk-analysis.pdf>

ensure long-term financial stability. Addressing these risks is crucial to the continuity and performance of business for investees and borrowers, who will continue to operate beyond the investment term. It is especially important for financial institutions that engage in recurring business or long-term investments to take into account when formulating strategies.

Implementation: managing portfolio risks and identifying opportunities

ICP is complementary to financial analysis and can be used to implement a low-carbon strategy throughout the investment and lending processes. By translating carbon risks into financial risks, ICP can easily feed into investment and lending decision-making, and it provides a more accurate view of the prospective financial performance of loans and investments. ICP reflects the extra costs investees or borrowers would face in a carbon-constrained future. Carbon-intensive industries potentially face the highest costs, as they have the most profit at risk when faced with tighter regulations, higher costs, and shifting consumer behaviours. They are also likely to be the first targeted with regulation in the transition to a low-carbon economy, and should be considered as such in portfolio decision-making.

Theoretically, the future risk-adjusted return of an investment is supposed to be reflected in its current market value. However, the misalignment of long-term climate risks and short-term financing timeframe (the “tragedy of horizon”)²⁶ could lead to the overvaluation (e.g., additional decrease in return due to carbon costs) or undervaluation (e.g., additional increase in return due to emissions mitigation potential) of an investment.²⁷ Overvaluation is often referred to as the risk of stranded assets, in which investments in sectors subject to regulation see a premature devaluation.^{28, 29}

The lending equivalent is the over- or underassessment of credit risk (via P&L and cash flow impacts) associated with changes in carbon pricing, which can result in impaired assets.

For example, the Carbon Tracker Initiative found that about 33% of capital expenditure in the oil, gas and thermal coal industries will prove redundant in the transition to a 1.75°C scenario by 2025.³⁰ S&P Ratings also found 106 cases where environmental and climate change risks led to a change of rating or ratings outlook between July 2015 and August 2017, of which 41% involved the downgrade of ratings and 19% involved the upgrade of ratings.³¹ Therefore, incorporating future carbon risks into investment and lending analyses now can help investors and banks minimise loss from overvaluation or overassessment and to identify hidden opportunities in the low-carbon transition.

“In theory, all long-term information is meant to be priced into stocks today, but that’s not always true. Carbon risk is not fully embedded into today’s prices, so the value of ICP lies in risk mitigation.”

A global asset management firm

Moreover, ICP can be a tool to engage investees and borrowers to prepare for future carbon costs. This can help build comprehensive risk management and emissions reduction strategies. Beside shifting capital towards low-carbon activities, engagement is a key way for financial institutions to decarbonise and align their portfolios with the low-carbon transition. Mitigating carbon risks is beneficial to financial institutions because investments and loans will be resilient to higher carbon costs.

26 Bank of England, *Breaking the Tragedy of the Horizon – climate change and financial stability*, 2015, <https://www.bankofengland.co.uk/-/media/boe/files/speech/2015/breaking-the-tragedy-of-the-horizon-climate-change-and-financial-stability.pdf?la=en&hash=7C67E785651862457D99511147C7424FF5EA0C1A>.

27 BlackRock Investment Institute, *Adapting portfolios to climate change*, 2016, <https://www.blackrock.com/corporate/literature/whitepaper/bii-climate-change-2016-us.pdf>

28 Carbon Tracker, *Stranded Assets*, 2017, <https://www.carbontracker.org/terms/stranded-assets/>.

29 Generation Foundation, *Stranded Carbon Assets*, 2013, <https://www.genfound.org/media/1374/pdf-generation-foundation-stranded-carbon-assets-v1.pdf>.

30 Carbon Tracker Initiative, *Mind the Gap: the \$1.6 trillion energy transition risk*, 2018, <https://www.carbontracker.org/reports/mind-the-gap/>.

31 Standard & Poor’s Financial Services, *How Environmental and Climate Risks and Opportunities Factor into Global Corporate Ratings – An Update*, 2017, <https://www.spratings.com/documents/20184/1634005/How+Environmental+And+Climate+Risks+And+Opportunities+Factor+Into+Global+Corporate+Ratings+-+An+Update/5119c3fa-7901-4da2-bc90-9ad6e1836801>.

3 | THE FOUR DIMENSIONS OF ICP FOR FINANCIAL INSTITUTIONS

Last year, the Carbon Pricing Unlocked partnership developed a 4-Dimensional framework to help companies design and apply ICP. This framework offers a new way of thinking about ICP and has influenced CDP's expansion of their climate change disclosure questionnaire on carbon pricing.³² This briefing paper looks at how this framework can be used by investors and banks to understand:

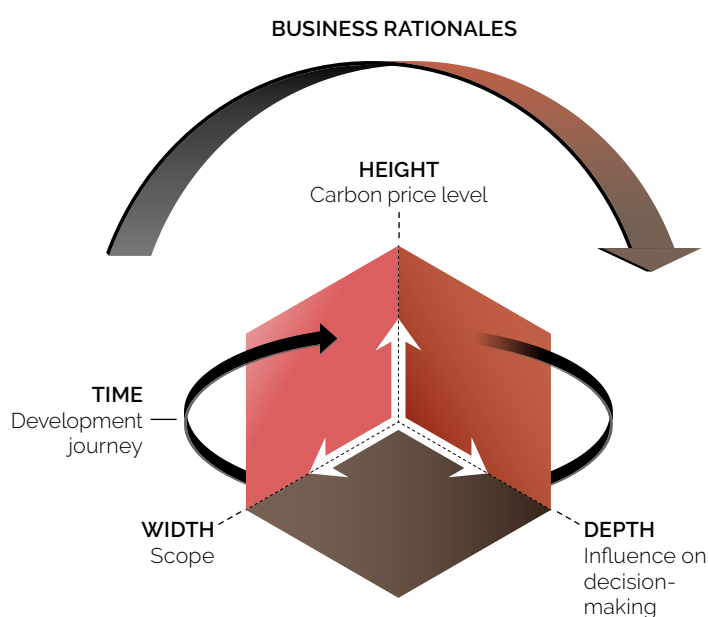
- » how ICP can influence investment and lending decisions (*depth*),
- » how much of the portfolio should be subject to ICP (*width*),
- » the internal carbon price level (*height*), and,
- » how ICP should evolve over time (*time*).

Understanding the particular business rationales of carbon pricing (as described in section 2) is crucial to implementing ICP. After the introduction of ICP, financial institutions should continually assess their strategies and implementation approaches as they learn more about ICP and its relevance to their business. Uncertainty around these factors should not deter pilot implementation. The approach can and should develop over time. Depth, height, width, and time, the four dimensions of our ICP framework, will be more deeply explored in the next section.

3.1 Depth – how can ICP influence investment and lending decisions?

Depth refers to the magnitude of ICP's influence on investments and lending decision-making. There are parallels in the application of ICP in the investment and lending processes (see Figure 5 below). In the early stages of investment (phase 1), ICP should be used to screen potential investments based on exposure to carbon risk. The same goes for banks that should appraise borrowers by carbon risk in the loan origination phase. This helps translate carbon risks and opportunities into financial costs for in-depth analysis in the next phase. By incorporating ICP into evaluation in phase 2, the financial implications of carbon-intensive investments or loans can be considered in decision-making in phase 3. Using ICP as a tracking tool and input in scenario analysis also empowers financial institutions to monitor and act on evolving carbon risks in their portfolios in phase 4, contributing to ex-post assessment and long-term strategy development at the end of the investment or loan processes.

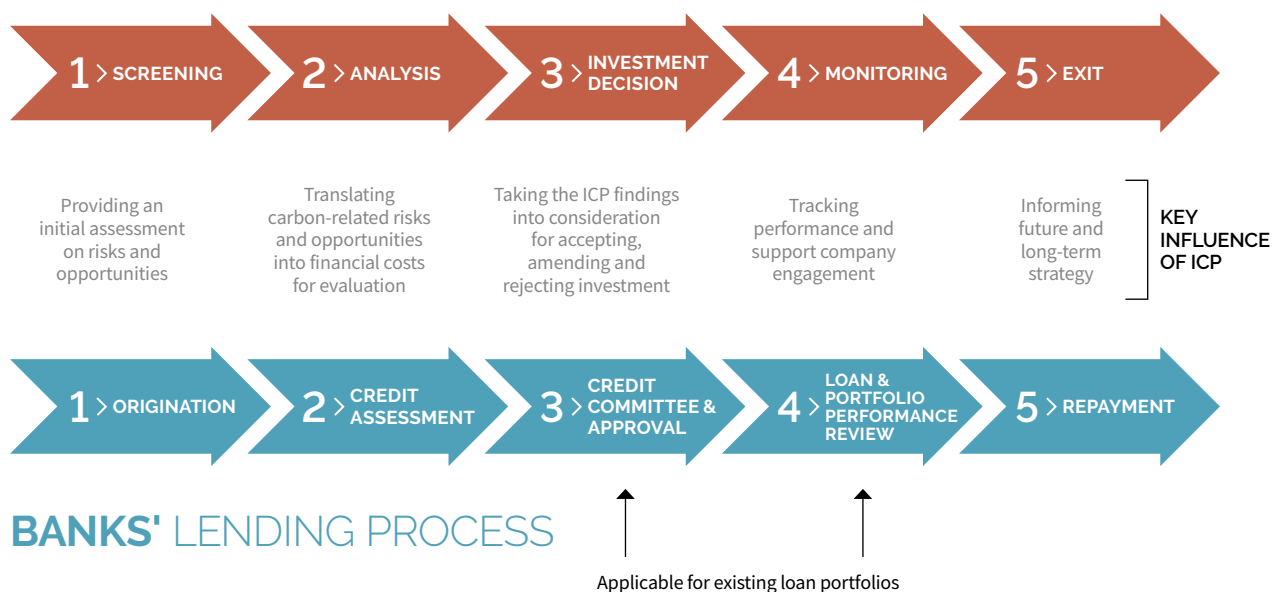
FIGURE 4 The 4D Framework for ICP



³² CDP, *Carbon Pricing: CDP Disclosure Best Practice*, 2018, http://b8f65cb373b1b7b15feb-c70d8ead6ced550b4d987d7c03fcd1d.r81.cf3.rackcdn.com/cms/guidance_docs/pdfs/000/001/567/original/CDP-technical-note-carbon-pricing.pdf?1523952114.

FIGURE 5 ICP plays some common roles in the investment and lending processes

INVESTORS' INVESTMENT PROCESS



ICP may play a larger role in some stages of the process than others, particularly during the early stages (phases 1 and 2) and the monitoring of investments or loans (phase 4). For example:

- » **For investors**, ICP can be one of the ESG screening criteria, a factor for index weighting, a way to adjust cash flow for fundamental analysis and valuation, and a topic for company engagement.
- » **For banks**, ICP can highlight potential loans or credit lines with high carbon risks for more in-depth analysis and disclosure requirements at origination, assess credit risks of borrowers, justify capital

requirement via internal-rating based approach, justify the interest rate for ESG-linked loans, act as a green supporting factor or brown penalty factor, and conduct scenario analyses. Importantly, this can be applied to test the resilience of existing loan or credit portfolios (phase 4) and renew lending terms (phase 3).

While the high-level influence of ICP may be similar for investors and banks, the ways in which ICP manifests in implementation differs between them. The next sections will further explain how investors and banks can apply ICP in each phase of the investment and lending processes.



3.1.1 Phase 1 – initial assessment of risks and opportunities



When screening investments, ICP can be used as an ESG screening criterion for:³³

- » **negative screening** – excluding certain sectors or companies based on high carbon risks in the present or near future;
- » **positive screening** – prioritizing sectors or companies with low carbon risks; or
- » **norm-based screening** – filtering investment by setting a maximum carbon cost.

ICP therefore offers insights for **sector exposure and market factors** in relation to carbon risks.

Some investors may also find ICP helpful for constructing thematic, alternatively weighted or factor **indices**, thus creating investment opportunities.



ICP can be integrated into the evaluation of companies, flagging lending opportunities based on their carbon risks for corresponding actions in the following phases. Banks can use ICP to **strategically target low-carbon risk prospects** for greater portfolio resilience, and/or identify potential high-risk loan or credit applications for **more in-depth analysis, disclosure requirements, or exclusion**. For example, banks can set thresholds via ICP that can flag them to request more information related to the abatement capability (the technological and financial potential to reduce GHG emissions) and business resilience (investment or R&D in low-carbon products and services) if carbon costs by borrowers exceed a certain percentage. This is crucial to proving repayment capability should the company be affected by carbon risks.

Differentiating lending opportunities with ICP can help direct them towards various green or sustainable initiatives for banks. These could potentially include implementing a sustainable taxonomy,³⁶ green supporting factor or brown penalising factor, and ESG-linked loans. Box 1 shows an example of how an internal carbon price can be used to implement the sustainable taxonomy proposed by the European Commission.

BOX 1 Hypothetical example for banks: using ICP in a sustainable taxonomy for green finance

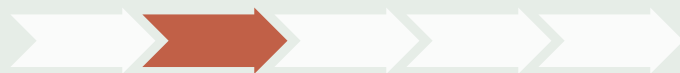
In May 2018, the European Commission proposed to establish a Sustainable Taxonomy – a harmonised classification system of sustainable economic activities as part of its sustainable finance package.³⁴ The taxonomy aims to outline what qualify as sustainable activities in key sectors, offering a unified definition for all asset classes and financial institutions. One of the potential assessment metrics mentioned in the draft taxonomy is to require a minimum share of monetary values of GHG savings to total investment costs.³⁵ A shadow price was proposed to calculate the monetary savings over the economic lifetime.³⁵ Here, an internal carbon price can be used as the basis for this shadow price and can reflect the regional and forward-looking variations. Establishing the assessment criteria based on an internal carbon price can help investors and banks filter out investments with high carbon risks relative to the investment cost.

33 PRI, *ESG Screening*, 2014, <https://www.unpri.org/fixed-income/esg-screening-in-fixed-income-investing/36.article>.

34 EU High-Level Expert Group on Sustainable Finance, *Financing a Sustainable European Economy*, 2018.

35 EU High-Level Expert Group on Sustainable Finance. *Annex III: Informal supplementary document on the sustainability taxonomy*, 2018.

36 Sustainable taxonomy generally defines sustainable activities in various sectors and applies to all asset classes.



3.1.2 Phase 2 – translating carbon-related risks and opportunities into financial costs for evaluation

INVESTORS

2 > ANALYSIS

For two common asset classes, equities and fixed income,³⁷ ICP can be incorporated into fundamental analysis by linking a company's expenses and cash flow.

In the case of equities, ICP can provide insights for **industry analysis** by highlighting sectors subject to potentially higher future carbon costs due to climate regulations and policies. Investors can use information from **company strategy and financial reports** to justify the price level for ICP. For example, based on historical financial data, investors can gauge how resilient a company is to cost shock and its pass-through ability. Based on the insights from various aspects of fundamental analysis, the impacts of ICP on a company's financials can feed into **valuation** analysis, such as discounted cash flow (DCF), enterprise values, price-earnings ratio, price/earnings to growth.

An indirect link for credit instruments can be formed on the strategy side via internal credit risk assessment in addition to external credit rating. For example, Hermes Investment Management investigated how ESG could be priced into credit markets based on the relationship between ESG scores and the spread of credit-default swaps, **complementary to core credit risks**.³⁸ A similar exercise could apply to ICP, forming a momentum strategy that guides investment in credit instruments.

The key influence of ICP in fundamental analysis is to help investors identify potential carbon risks and opportunities, which may not be entirely reflected in the current pricing system – through equity price or credit risk assessment. By factoring in the potential future carbon costs and profits in ICP, investors can identify investments that might be currently **under- or overvalued**.

BOX 2 Case Study: a global asset management firm using ICP for mitigating carbon risks and identifying opportunities in equities

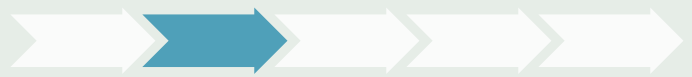
One of its equity investment teams applies ICP to carbon-intensive companies and sectors in its portfolio as part of its fundamental analysis.

It mostly focuses on companies' operational emissions (Scope 1 and 2) and in some cases includes supply chain emissions (Scope 3 upstream). Using scenario analysis, a range of carbon prices is applied based on current and future regulatory prices, technology costs and the social cost of carbon. The results then inform investment decisions by accounting for the long-term carbon risks a company may face.

For example, a fertiliser company was evaluated by factoring in a range of internal carbon prices into the DCF analysis, reflecting possible impacts from a carbon tax. The potential additional costs associated with carbon emissions had a significant impact on the fair equity value. Together with other risk factors, the team decided not to invest in this company.

³⁷ Equities and bonds account for 80% of asset allocation by European investors. Mercer, *European Asset Allocation Survey*, 2018.

³⁸ Hermes Investment Management, *Pricing ESG Risk in Credit Markets*, 2017, <https://www.hermes-investment.com/ukw/wp-content/uploads/sites/80/2017/04/Hermes-Credit-ESG-Paper-April-2017.pdf>.



BANKS

2 > CREDIT ASSESSMENT

Credit assessment is the basis for lending. In this phase, ICP can reflect carbon risks and opportunities in future revenues, costs, and asset values, feeding into the **evaluation of credit risk** via PD or LGD on expected loss. For example, during the review of corporate loans, expected future income is assessed based on cash flow. By adjusting a borrower's expected operational expenses (e.g., expenses to purchase emissions allowances, increase in material cost due to carbon price passed through from supply chain, etc.) and revenue (e.g., income from selling carbon credits, increase in sales of low-carbon products like renewable electricity) using ICP, the profitability prospect of the company may change dramatically. In addition to credit risk, ICP could also **provide insights into operational and market risks** of banks' portfolios.

Reflecting carbon risks via ICP in credit, operational and market risk assessments can **influence the risk-weighted assets for banks if an internal-rating based approach is taken to assess the capital requirement**. This also implies that higher carbon risk exposure can be associated with higher capital allocation and lower capital utilisation for banks. The different rate of return for loans or credits by carbon risks can then be used to **calculate the premium or discount interest rate for lending** according to carbon risks and opportunities. These assessment results can then be considered in the next phase when structuring the lending agreement.

Additionally, ICP can support the **due diligence of infrastructure and project finance**. It offers insights into potentially hidden operational and life cycle costs and revenue for projects. This could translate into indicators of a project's expected profitability (e.g., earnings before interest, tax, depreciation and amortization (EBITDA) and internal rate of return) and repayment ability (e.g., debt-service coverage ratio). Factoring in these additional costs and income can enable banks to identify loans with under- or overestimated repayment ability to protect returns and future asset value.

Embedding carbon risks into risk assessment via ICP allows banks to respond to the rising regulatory pressure to include climate-related risks in the systemic risk management process under Basel III.³⁹ ICP can be a metric for **demonstrating the integration of climate-related risks (in response to Basel III pillar 2) and disclosing such risks under pillar 3**.

BOX 3 Case study: Garanti Bank incorporating ICP into credit risk analysis

Garanti Bank has introduced ICP for its project finance activities in the energy generation sector. The bank applies a shadow price on carbon based on an applicable Emissions Trading Scheme (ETS) price or the advice of its sustainability team. The bank incorporates the price directly into project evaluation as an indicator and has found that a project's EBITDA could be affected by up to 35%.⁴⁰

ICP has enabled Garanti Bank to incorporate a carbon cost, and therefore prioritise investments in renewable energy over carbon-intensive projects. As a result of the bank's initiatives in this area, along with internal carbon pricing, 100% of the greenfield energy generation projects within the project finance scope have been renewable energy investments since 2014.⁴¹ The bank has not only been able to mitigate its exposure to carbon risk, but also to better align its project finance activities with its values.

39 Basel III is a set of banking regulations put forth by the Basel Committee on Bank Supervision, which regulates finance and banking internationally. Basel III is an international regulatory accord that introduced a set of reforms designed to improve the regulation, supervision and risk management within the banking sector.

40 Garanti Bank Interview, July 30, 2018.

41 Center for Climate and Energy Solutions, *The Business of Pricing Carbon*, 2017.



3.1.3

Phase 3 – taking ICP findings into consideration



Building on fundamental analysis, ICP can provide an overview of aggregate carbon risk exposure at a portfolio level. For example, ICP can be the basis for **rebalancing** a portfolio to mitigate potential carbon risks and capture opportunities.



In loan structuring, banks can determine an interest rate based on credit assessment from phase 2, potentially **offering a discount for green loans, or a premium for brown loans, using ICP to evaluate their carbon risks**. As described in section 3.1.2, the difference in capital requirement resulting from carbon risk can be used for setting a green supporting factor or brown penalty factor.

BOX 4 Hypothetical example for banks: using ICP to justify lower interest rates for ESG-linked loans

The rationale for a lower interest rate for ESG-linked loans is that better ESG performance by companies theoretically correlates with lower ESG and financial risks. Borrowing the concept from a green supporting factor,⁴² the level of discount can be a function of the “riskiness”⁴³ of the loans. ICP can be used to adjust default risk through profitability (e.g., EBITDA / total asset), activity (e.g., net turnover / total asset) and coverage (e.g., EBITDA / interest on financial debts). The monetary nature of ICP would enable a risk-based set-up for this type of linked loan.

In fact, some banks including, BNP Paribas, ING and OCBC Bank, are offering a discount based on borrowers’ sustainability performance – an “**ESG-linked loan**” – through loan covenants to reflect better credit performance.⁴⁴ Borrowers will receive a lower interest rate if certain sustainability targets are met during the loan term. If the targets are not met, a premium must be paid. ICP can act as a key performance indicator added to this type of loan (see Box 4). It can encourage borrowers to reduce GHG emissions over time at an escalating rate (given the rising price over time estimated by scenarios), or to adopt low-carbon operations in the design phase of projects (if lending is made before capital investment).

42 A green supporting factor refers to the reduction of capital reserve requirement for financial institutions on green assets. European Banking Federation, *Towards a Green Finance Framework*, 2017, <https://www.ebf.eu/wp-content/uploads/2017/09/Geen-finance-complete.pdf>.

43 Riskiness is defined as individual default risk (idiosyncratic) and systematic risk by the European Banking Authority, *EBA Report on SMEs and SME Supporting Factor*, 2016, <https://www.eba.europa.eu/documents/10180/1359456/EBA-Op-2016-04++Report+on+SMEs+and+SME+supporting+factor.pdf>.

44 Responsible Business, *ESG-linked loans: A game changer for the future of corporate sustainability?*, October 29, 2018, <http://www.responsiblebusiness.com/news/asia-pacific-news/esg-linked-loans-game-changer-future-corporate-sustainability/>.



3.1.4

Phase 4 – a tool to track ongoing performance and support company engagement



ICP can be used as a tool for **company engagement**. In addition to CDP disclosure on companies' use of ICP, investors can discuss potential carbon risks in financial terms with investees, enhancing awareness and disclosure on long-term financial resilience against climate change, for example, in line with the TCFD recommendations.

Formulating an internal carbon price **tipping point** for key sectors can help investors monitor their portfolios in a changing risk landscape. The tipping point can be a price level that will lead to material changes in performance and should be updated based on the latest developments in regulations, policies and industry development.



Current and projected carbon risk exposure by both geography and sector is key to a bank's understanding of how its loan portfolio may perform under a variety of climate change scenarios. This may lead to strategic portfolio **rebalancing**. In the same way ICP can be used in credit assessment, it may also be used in the credit monitoring process, where loans within the portfolio are assessed and, if necessary, provisioned against if the credit position has shifted since inception or last reporting period. Such credit risk movements may be the result of shifts in PD or LGD as outlined in section 3.1.2. This may result in a loan having a provision or an impairment assessed against it.

ICP can also be incorporated into loan book **stress testing** by applying ICP under the Basel II⁴⁵ framework. Changes in profit or asset values (either P&L or balance sheet driven) due to ICP can have impacts on PD and LGD – and therefore the expected loss – across different carbon risk scenarios. Proactive monitoring and review may allow for remedial action at the time of stress, and even prevent default.

BOX 5 Case Study: Carbon Bubble Project – stress testing carbon risks in investment portfolios and banks

As part of the Carbon Bubble Project, a methodology and accompanying tool were developed for German financial institutions to assess carbon risks in their investment portfolios.⁴⁶ The changes in expected profit due to carbon risks can affect both PD and LGD. For example, if buildings need to be renovated to reduce emissions to comply with regulations in a low-carbon scenario, the renovation cost will increase the LGD for mortgages.⁴⁶ For loans, if default has a 0.54% sensitivity to profit, while profit is likely to decrease by 9.3% due to carbon risks, the loan will be subject to an additional $(9.3 \times 0.54 = 5.022\%)$ increment in PD. By linking the changes in profit to PD and LGD under various scenarios, banks can stress test their portfolios against different levels of carbon risks.⁴⁶

⁴⁵ Basel II is a set of banking regulations put forth by the Basel Committee on Bank Supervision, which regulates finance and banking internationally.

⁴⁶ Navigant, et al., *Carbon Bubble – Analyses, economic risks, measures and instruments*, 2019.



3.1.5

Phase 5 – informing future and long-term strategy



While findings from the monitoring phase can lead to decisions in selling or rebalancing, the key role of ICP in this phase is in shaping future strategies. For example, ICP can highlight the low-risk or high-opportunity areas for the no-regret and low-cost investments (e.g., sector, market, technology). This can inform the investment mandate on sector, market and asset class exposure, feeding back into phase 1 of screening. Any decisions on divestment or reducing exposure can inform future investment strategy.



The role of banks in the loan repayment phase is less active than that of investors in the exit phase given the term of loans is often fixed upon approval. However, banks often have a group of long-term clients with recurring business. ICP can play a role when assessing the future strategy with these borrowers.

BOX 6 Hypothetical example for banks: maintaining strategic relationship with long-term clients through ICP

The term of bank loans is often 5 – 10 years – with some exceptions of 20 years or longer for commercial and residential buildings – a time frame considered to be shorter than the time frame in which carbon risks are likely to manifest. However, this is extremely hard to predict and likely to surprise lenders who have not been proactively managing such risk. Companies are expected to operate beyond the loan terms. To establish and maintain a resilient business with recurring clients, banks should take the long-term perspective and work with clients on future financial resilience from a carbon risk perspective. One approach is to use ICP for scenario analysis, facilitating discussion with clients about potential risks and no-regret policy, thereby developing a win-win business relationship.

3.2 Width – how much of the portfolio should be subject to ICP?

All financial institutions interviewed cited materiality as the most important determinant for applying ICP. *Width* is one of the dimensions for assessing materiality and refers to how much or how little of the portfolio emissions are covered by the ICP. A carbon price can inform material assessment by helping financial institutions identify the part of a portfolio with the greatest exposure to carbon risks based on sector characteristics, financial exposure, and time horizons. This applies to both loans and investments. For example, infrastructure and project finance are the most common asset classes that financial institutions currently apply ICP to because of the high carbon intensity associated with the underlying assets, high financial exposure, long maturity, and liquidity. There are three key factors that will help financial institutions to consider how much of their portfolios should be subject to ICP:

- » **Sector characteristics** are inherent to various aspects of carbon risks. These include aspects such as operational and value chain emissions intensity, decarbonisation pathway, abatement capability,⁴⁷ pass-through ability,⁴⁸ and so on. These characteristics indicate which sectors are likely to experience a rapid transition to a low-carbon economy as well as which sectors may suffer most if regulation is unexpectedly implemented.

- » The level of **financial exposure** tied to an investment or loan should be a consideration for financial institutions when determining the width of ICP. This can be defined as the portfolio weighting or the investment value of an asset or company. Financial exposure may also refer to the seniority of the financial instrument (e.g., senior secured loans will be repaid before equity in the case of a sale or bankruptcy of the issuer), as well as how much the return on investment depends on the financial performance – such as cash flow – of the asset or company. For example, bond returns rely on the interest payments (coupons) from sufficient cash flow of the investee, whereas the return on equity depends on both the interest payments from dividends and capital appreciation (which can be driven by market expectations and shifts and changes in policy).

“There is a greater emphasis on climate change in private equity and infrastructure portfolios because of longer time-frames and less liquidity.”

Ontario Teachers' Pension Plan

- » **Time horizon** refers both to the liquidity of *financial instruments* as well as the time horizon of the financial institution based on its function. It is assumed that carbon risks are likely to become more material in the future. Therefore long-term investments or lending may be locked in for potential losses. However, carbon risks are already manifesting indirectly through value chain characteristics and can be expected to worsen as climate risks do.

⁴⁷ Abatement capability refers to the share of emissions reduction achievable under the regulatory carbon price.

⁴⁸ Pass-through ability refers to the percentage of additional costs, which companies are able to pass onto their customers (own-pass-through ability) or suppliers to companies (supplier-pass-through ability).

The *time horizons of financial institutions* also play a key role. Some financial institutions are subject to long-term liability (e.g., pension funds and insurance) or tend to maintain long-term business relationships with key accounts. The share of these long-term investment activities can indicate which asset classes and parts of the investment plan are more vulnerable to potential costs from carbon risks. Every financial institution interviewed stressed the importance of considering the time frame and liquidity of an investment or loan compared to the timeline possible for carbon risks to materialise, mostly stressing a minimum outlook of around ten years. ICP is seen as mostly relevant for quantifying risk for investments and loans with longer time horizons and less liquidity.

The above three factors are interlinked and should be jointly reviewed. In addition to the exposure to carbon risks, implementation of ICP also depends on the **emissions data availability** of assets and companies. Data on GHG emissions tied to an investment or loan are fundamental to applying ICP. Most financial institutions indicated the lack of data as a barrier to using ICP. Even when data is available, emissions are often only quantified for Scope 1 and 2, leaving Scope 3 – what is usually the most significant portion of value chain emissions – out of the picture. There are some emerging data providers offering emissions data independent of company disclosures, which could potentially help financial institutions fill the data gap.⁴⁹ Discussions with investees and borrowers on the data they can provide to manage carbon risk can signal that emissions accounting is becoming increasingly important. Some additional challenges faced by financial institutions around data availability for price setting will be further explored in section 3.3.

While the width dimension helps financial institutions understand where in their portfolio ICP should be applied, it only offers half of the picture for materiality. The materiality of carbon risks and opportunities also depend on the price level – the height dimension.

3.3 Height – what should the price level(s) be for ICP?

“ICP is an easy proxy to capture many risks, but it implies you do the homework before you set the price. We’re exploring very diverse scenarios using many assumptions to see what happens. It’s not about precision at this point in time. We’re at a lever where we want to understand the big picture.”

Crédit Agricole

Height refers to the price level(s) set to reflect carbon risks and opportunities. Determining the price is one of the most commonly cited challenges of applying ICP to investments or loans, particularly due to incomplete data and inconsistent methodology.

One of the challenges for price setting is the uncertainty of future carbon costs for investee companies and borrowers – for example, the exact ways in which governments and economies will react to climate change are unknown. However, Crédit Agricole stresses the importance of making appropriate assumptions on the price and future trends in order to move forward with ICP and build a resilient strategy. They warned that inaction due to lack of data is dangerous, and that scenario analysis can help evaluate and manage the uncertainty in carbon costs.

Some financial institutions experimenting with ICP note the importance of **using a range of prices to test outcomes of different scenarios**, including both current and future prices. Using various prices can help financial institutions assess potential future risks in line with their maximum risk tolerance.

⁴⁹ Alternative data sources such as ISS, [Asset Level Data Initiative](#), [Trucost](#), CDP database, etc. could provide carbon emissions data based on modeling or asset-level data.

When setting the price(s), there are several key considerations:

- » **Geography** is a good starting point for considering price level(s) as local policies can influence a wider regional or national regulatory carbon price (e.g., Emissions Trading Scheme (ETS) price or carbon tax), as well as other carbon-related policies that could affect industry profit and mitigation efforts.
- » Price level(s) should be further adjusted based on **sector characteristics**. For example, certain sectors are subject to an ETS or tax; some may face greater pass-through costs from suppliers, while others may have higher abatement potential to reduce emissions at a lower cost than the ETS market price or tax. Therefore, sector-differentiated prices could provide more insight into the magnitude of carbon risks.
- » An internal carbon price can be based on **more than one type of cost** – ranging from operational, upstream, and other value chain carbon costs. Each should be applied to a specific scope of emissions (e.g., carbon tax to Scope 1 emissions, or carbon price passed through by suppliers to Scope 2 and 3 emissions). Table 1 summarises the types of carbon prices that could be used, potentially jointly, for ICP.

The key message is that **carbon risks should be priced beyond the current regulatory carbon price (e.g., ETS price or carbon tax) for a better picture of future financial costs**. One financial institution felt that only using the regulatory carbon price gave

a false sense of security, having minimal impacts on profitability, while the impacts on a carbon-constrained economy are not properly reflected. The Carbon Bubble Project, prepared by Navigant, Triple A Risk Finance, and others for the German Environment Agency, also found that carbon costs from supply chain pass-through and emissions abatement costs could also be material for certain sectors in Germany under a 2°C scenario in 2030.⁵⁰ As such, looking only at the regulatory carbon price can lead to underestimation of carbon risks.

In this view, **time horizon** also proves relevant to the height dimension, especially when financial institutions use ICP to estimate future carbon costs of their investments and loans. Future costs can be adjusted by expected market carbon prices, as well as abatement capability (e.g., through sector emissions outlook and technological advancement). Relevant information can be found in reports and data such as the IEA World Energy Outlook and Energy Technology Perspective (see section 4).

Table 1 below provides some examples for price setting for ICP. These firm-level carbon prices reflect potential risks on return for investors and banks and can be used in combination. Financial institutions can also leverage insights from their internal market analyses to shed light on how markets react to additional costs such as carbon costs, similar to traditional assessment of other market and policy changes readily used by financial institutions. The type of information required and potential resources for setting up ICP are further discussed in section 4.

TABLE 1 Three examples of price setting approaches for ICP

	DESCRIPTION	EXAMPLES
OPERATIONAL CARBON PRICE	<p>Refers to the income or expenses generated from emissions-related policies and regulations, directly related to companies' operational activities. Companies must pay these costs in order to continue operating now or in the future. The price should be applied to Scope 1 emissions of an asset or company. Some key examples include:</p> <ul style="list-style-type: none"> » ETS carbon price » Carbon tax » Energy tax » Removal of fossil fuel subsidy » Capital investment in abatement measures for compliance 	<ul style="list-style-type: none"> » In Canada, the federal carbon pricing approach came into force in 2019. Provinces and territories have to implement cap-and-trade system in line with the national GHG emissions reduction target and/or a carbon tax of at least C\$20 per tonne of CO₂e in 2019, increasing annually by C\$10 to C\$50 by 2022. Provinces and territories that do not meet the requirements fall under a federal carbon pricing backstop system.⁵¹ » IEA estimates the future market carbon price to reach \$40 - \$60 per tonne by 2025 and \$130 - \$140 per tonne by 2040 under the "well below 2°C" scenario.⁵²
UPSTREAM CARBON PRICE	<p>Refers to the income or expenses caused by emissions-related policies and regulations to a company's supply chain. It includes all types of operational carbon costs experienced by suppliers, which are then passed on to the company as a cost or saving. The price should be applied to Scope 2 and Scope 3 upstream emissions of an asset or company.</p>	<ul style="list-style-type: none"> » The Carbon Bubble project found that the changes in carbon costs' pass-through from supply chain could be material for some sectors. Suppliers located in the same or different regions can be subject to market carbon price, increasing their costs of production. Suppliers could pass this additional costs onto companies and affect companies' procurement costs, depending on their bargaining power and market sensitivity. Therefore, it is important to look beyond market carbon price in order to get a holistic picture of carbon risks.
OTHER VALUE CHAIN CARBON PRICE	<p>Refers to the income or expenses caused by emissions-related policies and regulations to the customers and wider economy. It includes the market effects that emissions policies have in shifting demand away from carbon-intensive products (e.g., by banning diesel vehicles), as well as other societal costs from a company's emissions. The scope of emissions the costs should apply to varies case by case. Some key examples include:</p> <ul style="list-style-type: none"> » changes in revenue due to shift in market demand,⁵³ and » the social cost of carbon. 	<ul style="list-style-type: none"> » A study found that carbon prices under the 2°C scenario will lead to an increase in the cost of driving, leading to a 5% to 50% profit at risk for the automobile manufacturing sector in 2025 and 2050.⁵⁴ » The U.S. Environmental Protection Agency has modelled the social cost of carbon in different climate change scenarios; to encompass all long-term damage done by a tonne of CO₂ per year, the model sets the price at \$123 per tonne in a high impact scenario by 2020.⁵⁵

51 Government of Canada, *Carbon pricing: regulatory framework for the output-based pricing system*, 2018.

Note: prices are in Canadian Dollars. In 2018, 10 CAD is equal to approximately 7.50 USD.

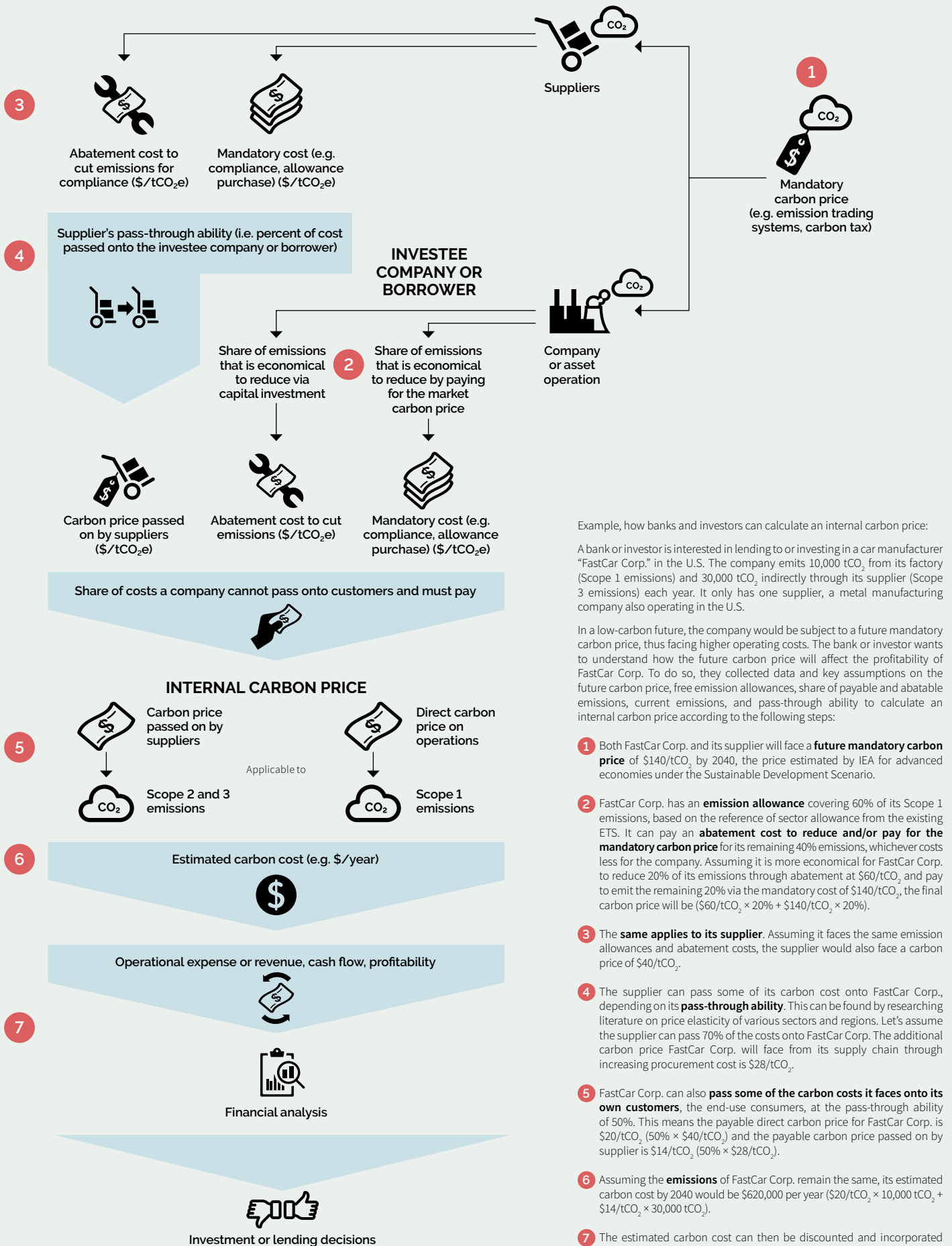
52 International Energy Agency (IEA), *World Energy Outlook 2018*, 2018.

53 This could be caused by either customer preference shifting to low-carbon products and services, or the changes in demand due to higher cost passed through by the companies because of their operational carbon costs. While financial institutions are often aware of the downstream effects of carbon prices, the analysis approach is subject to high uncertainty and further development.

54 Trucost (part of S&P Global), *Carbon Pricing: Discover Your Blind Spots on Risk and Opportunity*, April 19, 2018, https://yoursri.com/2018-04-19_carbon-pricing.pdf.

55 The United States Environmental Protection Agency, 2018. Retrieved from https://19january2017snapshot.epa.gov/climatechange/social-cost-carbon_.html

FIGURE 6 Example approach to adopt multiple carbon prices across value chain for ICP



Example, how banks and investors can calculate an internal carbon price:

A bank or investor is interested in lending to or investing in a car manufacturer "FastCar Corp." in the U.S. The company emits 10,000 tCO₂ from its factory (Scope 1 emissions) and 30,000 tCO₂ indirectly through its supplier (Scope 3 emissions) each year. It only has one supplier, a metal manufacturing company also operating in the U.S.

In a low-carbon future, the company would be subject to a future mandatory carbon price, thus facing higher operating costs. The bank or investor wants to understand how the future carbon price will affect the profitability of FastCar Corp. To do so, they collected data and key assumptions on the future carbon price, free emission allowances, share of payable and abatable emissions, current emissions, and pass-through ability to calculate an internal carbon price according to the following steps:

- 1** Both FastCar Corp. and its supplier will face a **future mandatory carbon price** of \$140/tCO₂ by 2040, the price estimated by IEA for advanced economies under the Sustainable Development Scenario.
- 2** FastCar Corp. has an **emission allowance** covering 60% of its Scope 1 emissions, based on the reference of sector allowance from the existing ETS. It can pay an **abatement cost to reduce and/or pay for the mandatory carbon price** for its remaining 40% emissions, whichever costs less for the company. Assuming it is more economical for FastCar Corp. to reduce 20% of its emissions through abatement at \$60/tCO₂ and pay to emit the remaining 20% via the mandatory cost of \$140/tCO₂, the final carbon price will be (\$60/tCO₂ × 20% + \$140/tCO₂ × 20%).
- 3** The **same applies to its supplier**. Assuming it faces the same emission allowances and abatement costs, the supplier would also face a carbon price of \$40/tCO₂.
- 4** The supplier can pass some of its carbon cost onto FastCar Corp., depending on its **pass-through ability**. This can be found by researching literature on price elasticity of various sectors and regions. Let's assume the supplier can pass 70% of the costs onto FastCar Corp. The additional carbon price FastCar Corp. will face from its supply chain through increasing procurement cost is \$28/tCO₂.
- 5** FastCar Corp. can also **pass some of the carbon costs it faces onto its own customers**, the end-use consumers, at the pass-through ability of 50%. This means the payable direct carbon price for FastCar Corp. is \$20/tCO₂ (50% × \$40/tCO₂) and the payable carbon price passed on by supplier is \$14/tCO₂ (50% × \$28/tCO₂).
- 6** Assuming the **emissions** of FastCar Corp. remain the same, its estimated carbon cost by 2040 would be \$620,000 per year (\$20/tCO₂ × 10,000 tCO₂ + \$14/tCO₂ × 30,000 tCO₂).
- 7** The estimated carbon cost can then be discounted and incorporated as a cost to FastCar Corp.'s balance sheet and cash flow, informing the possible impacts on investment return and decision-making.

Financial institutions can incorporate more than the operational carbon price into their investment analyses. Figure 6 illustrates how financial institutions can monetise carbon risks using more than one type of carbon price, including indirect costs from the supply chain due to emissions constraints. The aggregated cost of carbon can then be used for evaluating investments and loans, for example by calculating the implied profit change, fair market value change, asset devaluation or impairment.

Following this illustrative example, financial institutions can derive a region-sector price for quick screening and evaluation that includes not just the future ETS price or carbon tax, but the abatement capability and pass-through costs. This can be applied to multiple asset classes – equities, bonds, loans and mortgage – to show future carbon risks.

Together, the height (price level[s]) and width (scope of emissions) dimensions define the materiality of ICP and the potential carbon costs that specific sectors, regions and even companies may face in a low-carbon future. Yet these elements are likely to change over time. This will be explained in the next section – the time dimension.

3.4 Time – how should ICP evolve over time?

Time refers to the development journey of the ICP approach. This dimension applies across the other three and describes how each of the other dimensions can develop over time and adapt to ensure the ICP approach continues to meet its objectives.

Financial institutions can take these steps to advance their ICP journey over time:

- » **Look beyond market carbon prices.** A crucial part of mitigating carbon risk is understanding where it is hiding. Many organisations associate carbon costs with market prices, which can often underestimate the wider financial implications of carbon risks. This applies particularly to sectors with a longer, more carbon-intensive supply chain. Once the full scope of carbon risks is understood, ICP can be a powerful tool for synchronising carbon-related financial implications into a cost figure. Financial institutions should incorporate ICP into existing risk management practices and processes through scenario analysis and other use cases described earlier, leveraging insights from those practices along the way.
- » **Start experimenting with ICP.** Financial institutions are already looking at the materiality of carbon risks by piloting and experimenting with ICP. Financial institutions should explore which application (the depth dimension) is most suitable and effective based on the portfolio and internal structure of a financial institution. They can also test how various assumptions (height) and scope (width) align with their risk appetite.
- » **Share experiences.** Sharing experiences is one of the key ways in which financial institutions can learn from each other and optimise ICP within their firms. Engaging with other financial institutions and organisations relating to carbon risk analysis is vital to staying at the cutting edge of preparing for the low-carbon transition. There are many lessons already learned regarding ICP development, and ongoing conversations about new developments in TCFD and CDP reporting.

Specific to financial institutions, a way to approach ICP can be through piloting the most material part of the portfolio and involving the relevant risk team for that portfolio or asset class. As the approach evolves and, ideally, improves, financial institutions can expand the integration of ICP to include portfolio managers or credit committees in the process, expanding the “width” and “depth” of ICP implementation. Similar approaches can be adopted for engaging investees or borrowers, gradually expanding from the top key investees or borrowers to a wider group across sectors, asset classes, and regions.

Inherent to this dimension is the need for ongoing monitoring and evaluation to see how the ICP approach is functioning in pricing carbon risks and facilitating the transition to a low-carbon portfolio. Our previous internal carbon pricing guide for companies showed that a best practice approach for establishing an internal carbon price is to start small and learn by doing – possibly starting with the most material sector per scoping guidance in the width dimension. For example, once the carbon price (height) and coverage (width) are established in a pilot, the financial institution should set up a monitoring system to gauge how well the ICP approach is functioning in meeting the firm’s ability to account for carbon-related risk. The review process should be continuous and regular, adjusting parameters over time to incorporate the latest information on carbon risks (e.g., any changes in the regulatory landscape or market shifts driven by the low-carbon transition).

As the low-carbon transition unfolds over time, financial institutions may find more evidence and data to support the indirect costs from carbon risks (e.g., pass-through from suppliers, abatement cost for regulation compliance, and shift in market

demand for low-carbon products and services). As such information becomes available, financial institutions should consider revisiting the basis of the ICP approach and adapt it to include relevant indirect costs into risk analysis.

While this briefing paper lays out the key aspects of ICP, further research would facilitate the understanding and use of ICP by financial institutions. For example, a more in-depth discussion and examples on applications for different asset classes, experience using ICP for investee and client engagement, ICP materiality in investment analysis, and resources to support key assumptions (e.g., pass-through ability or abatement capability) on setting the price would all be valuable in expanding knowledge around ICP.

4 | INFORMATION AND RESOURCES TO GET STARTED

To implement ICP, financial institutions need certain information to start, including portfolio GHG emissions and the basis for calculating different types of carbon prices. Table 2 below summarises key information needed for each aspect, and some selected resources for reference.

When incorporating this information, financial institutions should consider starting with reasonable assumptions and estimates by sectors, gradually improving to regional variation, forward looking scenarios, supply chain pass-through, asset-level data, etc.

TABLE 2 Information needed to get started on ICP and relevant resources

	KEY INFORMATION	RESOURCES
PORTFOLIO GHG EMISSIONS	<p>For ICP to be effective, financial institutions require not only comprehensive and transparent carbon accounts, but also an efficient accounting methodology.</p> <p>As described in Table 1, Scope 1, 2 and 3 emissions of assets or companies are required for different types of carbon pricing.</p>	<ul style="list-style-type: none"> » The Platform Carbon Accounting Financials report is a potential resource for a harmonised carbon footprinting methodology for six asset classes, including emissions allocation rules. PRI also provide some guidance on portfolio emissions measurement. » For corporate instruments, GHG emissions of companies can often be found in public disclosures (e.g. CSR reports, CDP), databases from ESG data providers, or alternatively, can be requested as part of the engagement or loan application process. » For mortgage or real estate, emissions data could be estimated based on the buildings' energy performance, which can be found in energy certificates, labelling, or regional building energy intensity from databases. For example, the Global Real Estate Sustainability Benchmark provides global energy intensity for service buildings, the EU Buildings Database has energy data for service and residential buildings in Europe, and the EIA Residential Energy Consumption Survey 2015 and Commercial Buildings Energy Consumption Survey 2012 provides energy consumption data for residential and service buildings in the U.S. » For project finance, several reports highlight the methodology and proxies for emissions calculation, such as the report from AEA on infrastructure emissions,⁵⁶ Asian Development Bank on transport projects⁵⁷ and road transport,⁵⁸ IEA on rail infrastructure⁵⁹ and operation,⁶⁰ and a carbon footprint tool by Agence Française de Développement covering various project types.⁶¹ Since project finance emissions are often location-specific, financial institutions should adopt and adjust these resources according to their own portfolios.
OPERATIONAL CARBON PRICE	<p>The market price of carbon emissions includes the ETS market price, carbon tax, energy tax. It is important to understand the regional variations and sector coverage of these prices.</p>	<ul style="list-style-type: none"> » Current prices: the State and Trends of Carbon Pricing 2018 report gives an overview of all existing and upcoming ETS carbon prices and carbon taxes around the world,⁶² and sector-specific prices are often available in case studies by IETA. A report by the Office of Economic Cooperation and Development also reviews current carbon prices, including ETS, carbon tax and tax of fossil fuels.⁶³ » Future prices: IEA WEO provides annual updates on projected future carbon prices in certain regions under different scenarios up to 2040.⁶⁴

⁵⁶ AEA, *EU Transport GHG: Routes to 2050 II*, 2012.

⁵⁷ ADB, *Reducing Carbon Emissions from Transport Projects*, 2010.

⁵⁸ ADB, *Methodology for estimating carbon footprint of road projects – case study: India*, 2010.

⁵⁹ International Energy Agency (IEA), *Energy Technology System Analysis Programme: Rail Infrastructure*, 2011.

⁶⁰ International Energy Agency (IEA), *Energy Technology System Analysis Programme: Rail Infrastructure*, 2011.

⁶¹ AFD, *The AFD Carbon Footprint Tool for projects*, 2017.

⁶² World Bank, *State and Trends of Carbon Pricing 2018*, 2018.

⁶³ OECD, *Effective Carbon Rates*, 2018.

⁶⁴ International Energy Agency (IEA), *World Energy Outlook 2018*, 2018.

	KEY INFORMATION	RESOURCES
OPERATIONAL CARBON PRICE (CONTINUED)	Capital investment in abatement measures depends on the extent of abatement needed (the expected regulatory stress to reduce emissions or sector decarbonisation pathway), capability and costs. The latter two can vary for individual assets or at the company-level as well.	<ul style="list-style-type: none"> » Abatement needs: expected regulatory pressure on emissions reductions can be assessed based on countries' climate policy ambitions such as the Nationally Determined Contributions under the Paris Agreement or national climate action plans. Alternatively, financial institutions can use emissions reduction needed per sector under certain scenarios (e.g. 2°C or 6°C), such as the sectoral decarbonisation pathways available in IEA's online database Tracking Clean Energy Progress. » Abatement capability: IEA WEO provides sector-level information on projected efficiency gains and technological advancements in the next few decades. Financial institutions should also work closely with internal experts on market developments for their insights on sectoral trends and improvements. » Abatement costs: while there is existing research on the cost to reduce emissions by technology (e.g. USD/tCO₂e reduced), this highly depends on the investment location and technology availability. For example, there are some existing estimates of Marginal Abatement Cost Curve that highlights the potential cost per tonne of carbon reduced through various measures.⁶⁵ Alternatively, financial institutions can leverage information from its existing portfolio to estimate cost data (e.g. loan amount for renewable or energy efficiency projects).
UPSTREAM CARBON PRICE	An upstream carbon price depends on the supply chain sector, the operational carbon price they are subject to, as well as suppliers' pass-through ability.	<ul style="list-style-type: none"> » Suppliers' operational carbon price: financial institutions can assess the price based on supplier sectors and steps described above. » Supply chain sector: while supply chain for companies and assets can be complex, input-output models – such as the one provided by the U.S. Bureau of Economic Analysis – enable financial institutions to estimate the sectoral breakdown of the supply chain for a certain sector. » Pass-through ability: price elasticity of demand can be used to reflect pass-through ability. Financial institutions can work with their internal team on market research or adopt existing research by others, such as the research done by Schroders on the main Global Industry Classification Standard industry groups.⁶⁶
OTHER VALUE CHAIN CARBON PRICE	Changes in revenue due to shift in market demand depend on companies' own pass-through ability as well as consumers' price elasticity of demand.	<ul style="list-style-type: none"> » Own-pass-through ability: using the pass-through ability research mentioned above, apply this to the company's market to assess how much of the increment cost could be passed onto their customers and the relevant rebound effect from changing prices of their products and services. » Consumer price elasticity of demand: unlike the price elasticity of demand for sectors, the elasticity of consumers varies greatly across products and services. Financial institutions can use similar sources for own-pass-through ability across sectors for business-to-business companies, and consumer sensitivity to product pricing if companies mainly sell end products to consumers.
	The social cost of carbon indicates the societal damage of emissions and possibility of future carbon price if governments decide to internalise such damages through market prices.	<ul style="list-style-type: none"> » The U.S. Environmental Protection Agency and U.K. Department for Business, Energy & Industrial Strategy have previously published data on the social cost of carbon at \$120/tCO₂ by 2020 in the high impact scenario.^{67, 68}

Data can also be obtained from existing internal market research by financial institutions and integrated into company engagement or the loan application process. While carbon risk is like any other emerging risk,

financial institutions should consider mainstreaming this information into existing research and data management practices so that relevant information can be tracked consistently over time.

⁶⁵ McKinsey, *Pathway to a Low-carbon Economy*, 2009.

⁶⁶ Schroders, *Climate change: redefining the risks*, 2017.

⁶⁷ United States Environmental Protection Agency, *The Social Cost of Carbon*, 2018, https://19january2017snapshot.epa.gov/climatechange/social-cost-carbon_.html.

⁶⁸ BEIS, *Updated short-term traded carbon values*, 2017. https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/671194/Updated_short-term_traded_carbon_values_for_appraisal_purposes.pdf.

Navigant, The Generation Foundation and CDP, *Internal Carbon Pricing for Low-Carbon Finance – A briefing paper on linking climate-related opportunities and risks to financing decisions for investors and banks*, July 2019. Prepared under the Carbon Pricing Unlocked partnership between the Generation Foundation and Navigant.

Contact:

cpu@navigant.com

genfound@generationim.com

generation —
foundation

Generation Foundation

20 Air Street
London W1B 5AN
United Kingdom

NAVIGANT

Navigant

Woolgate Exchange
25 Basinghall Street
London EC2V 5HA
United Kingdom

