November 2016

Internal carbon pricing

A growing corporate practice

entreprises pour l'environnement

I4CE
INSTITUTE FOR CLIMATE ECONOMICS
Une initiative de la Caisse des Dépôts et de l'Agence Française de Développement

Foreword from **the Chairman** of I4CE

Carbon pricing in all its dimensions

The team at I4CE (Institute for Climate Economics) has been working on the subject of carbon pricing for over ten years.

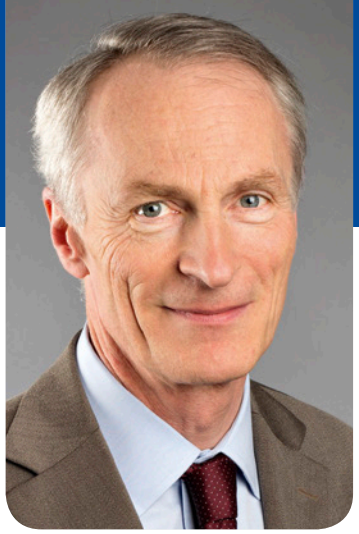
Initially specialising in emissions trading systems and project-based mechanisms, which is still the case, I4CE has since expanded its research activities at the international level while leading public debates and helping build capacity in all dimensions of carbon pricing: negative carbon pricing (such as fossil fuel subsidies), implicit carbon pricing, reference prices, national and regional policies, the future of project-based offset mechanisms etc.

It is an honour for I4CE to collaborate with the Entreprises pour l'Environnement (EpE) and French businesses who are at the forefront of private sector action for environment and climate on the subject of internal carbon pricing.

This report draws from I4CE's expertise, but even more so from the remarkable and innovative experiences of EpE members that have implemented an internal carbon price.

This informative and educational publication aims to inform a number of private and public sector actors on how to implement a carbon price and on what can be expected in the future.

Pierre Ducret, President of I4CE
Comptroller General and Special Advisor on Climate Change at Caisse des Dépôts Group



Foreword from **the Chairman** of EpE

Anticipating a low-carbon future

The Paris Agreement, which was reached in December 2015, is a powerful call to take action against climate change. The Agreement invites all States and non-state actors to act together, with the ambitious aim of achieving zero-net emissions before the end of the century. This is a significant commitment for the international community, calling upon society to alter industrial practices, financial systems and modes of governance, with a view to accelerate the transition to a low-carbon economy while driving growth and development.

According to the economic community and the IPCC[A] report, a large number of companies have been involved before, during and after COP21, in advancing the recognition of carbon pricing as an indispensable mechanism for this transition. Indeed, it is the most cost-effective means to attain the desired environmental results: by reducing the risks linked with decarbonising investments, increasing the profitability of these projects, reducing the use of fossil fuels and mitigating the rebound effect in consumer behaviour etc. At the 2016 Business & Climate Summit, the business and financial world confirmed its desire to see consistent carbon pricing emerge throughout the world, to enable a greenhouse gas emissions reduction trajectory that complies with the target to hold global average temperature rise at a maximum of 2°C.

Carbon pricing policies cannot exist without political decisions taken by governments; the implications on energy prices and for certain economic operators linked with fossil fuels often make such decisions difficult. As a result, carbon pricing has evolved in a progressive manner: currently, 13% of global emissions are subject to pricing schemes, while there is a trend towards extending those schemes. We should anticipate this trend with caution.

Some companies have chosen to apply a carbon price themselves without waiting for its adoption at the international or national level. The reasons and applications of this decision will vary and depend on the company, business activities, operating locations, culture and strategic goals in terms of decarbonisation. These internal carbon pricing programmes continue to demonstrate the determination to envisage a future where low-carbon solutions can develop successfully and to ensure that decisions taken today will make sense tomorrow.

As this practice becomes more widespread, the more government authorities will be able to adopt clearly anticipated price policies. This is why we wish to disseminate this practice as widely as possible, in France and throughout the world.

This publication is based on the experiences of EpE member companies that have already incorporated carbon pricing signals into their management processes and strategic decisions. It answers certain questions which arise for companies that decide to engage in these practices. We hope that it will be useful to many companies and that it will help them forge their own route, on our shared path towards a zero-carbon future.

Jean-Dominique Senard, Chairman of EpE
Chief Executive Officer and Managing General Partner of Michelin Group

A - Intergovernmental Panel on Climate Change

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Towards a society with "zero net emission"

In the Paris Agreement, signed in December 2015, the international community set itself the ambitious goal of achieving zero net emission before the end of the century, in order to comply with the average global warming cap of 2°C or less, if possible. The transition towards this low-carbon world means rapidly reinventing development in every field, including energy, transport, housing, production, farming, finance and consumption.

Most actors agree that assigning a price to greenhouse gas emissions has an influence on their decisions and is an effective means of encouraging economic decision-makers to invest in clean energy, low-carbon technologies and even in different products and services that meet the same requirements. Government authorities in several countries have already taken decisions along these lines and, in 2016, 13% of global emissions were covered by a regulatory pricing mechanism. This figure is likely to increase.

What is internal carbon pricing?

Companies are conscious of the risks relating to climate change and the need to transition to a low-carbon economy. They are also aware of the effectiveness of carbon pricing mechanisms and the important role that they have to play in decarbonisation. As a result, they pay close attention to this trend and are even making an active contribution to it, which is reflected in the development of voluntary pricing tools.

An internal carbon price is a value that companies voluntarily set for themselves, in order to internalise the economic cost of their greenhouse gas emissions. It can be used both as risk management tool and as part of a company's decarbonisation strategy. An internal carbon price can help companies enhance their global strategies to become more resilient to regulatory climate policies and more favourable to emission reductions.

Internal carbon pricing primarily takes two forms:

- **A shadow price:** which represents a carbon value (determined by the company) that is incorporated into investment decisions and applied to the greenhouse gas emissions generated by projects;
- **An internal carbon tax:** a levy that companies voluntarily apply to their operations and that increases operating costs depending on the resulting greenhouse gas emissions; the company then uses the proceeds of this tax as it sees fit.

What are the benefits for the company?

Introducing an internal carbon pricing system can offer several benefits to companies by enabling them to:

- Effectively reach established emission reduction targets;
- Protect against risks relating to compliance with future carbon pricing systems imposed by government, or future decarbonisation policies more generally;
- Prepare themselves for future climate policies, which could lead to competitive advantage in cases where these policies influence operating conditions (costs, changes in energy supplies or technical systems, etc.);
- Direct investments to low-carbon technologies more effectively;
- Drive R&D and identify new markets.

How to adopt this approach

Many companies, including those that are members of Entreprises pour l'Environnement, have embarked on this approach in order to effectively reduce their emissions, show their commitment to a low-carbon economy and protect themselves against the risks posed by this transition. Based on their experience in this area, this publication proposes a methodological approach to implementing an internal carbon pricing programme.

1 What is the purpose of assigning an internal price to GHG emissions?

Voluntary carbon pricing mechanisms are instruments available to companies which can contribute towards decarbonisation and, first and foremost, to reduce their direct and indirect greenhouse gas (GHG) emissions. Additionally, these mechanisms reflect and anticipate the increasing number of carbon pricing signals throughout the world.

International background

Carbon pricing: at the heart of climate negotiations and national politics

In 2015, companies strongly encouraged negotiations to take the price of carbon into account at the 2015 Business & Climate Summit, the Climate Finance Day and COP21's Climate Action Day. This mobilisation has helped to evoke carbon pricing discussions during the COP21 climate negotiations.

Article 137[1] of the Decision recognises "the important role of providing incentives for emission reduction activities, including tools such as domestic policies and carbon pricing". Accordingly, it invites all participants, including states, local authorities and companies, to equip themselves with carbon pricing instruments, without forcing them to do so.

Furthermore, the intended nationally determined contributions (iNDCs)[B], presented by states in preparation for COP21, indicate progress in domestic or regional carbon pricing policies. According to the World Bank[2], over 40 countries and 20 provinces or cities have already implemented, or are currently

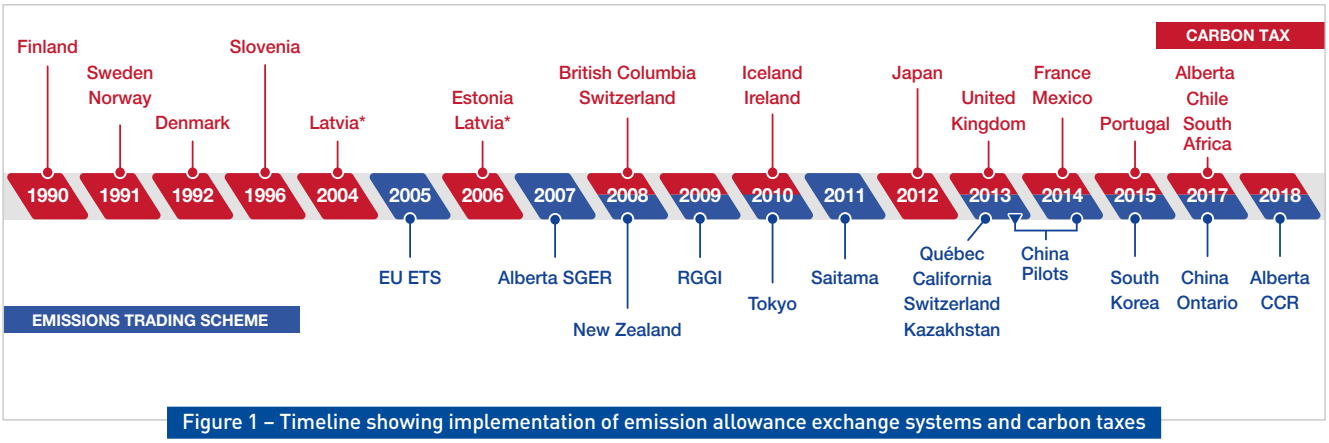

Figure 1 – Timeline showing implementation of emission allowance exchange systems and carbon taxes

(Source: I4CE – Institute for Climate Economics, July 2016)

B - intended Nationally Determined Contributions.

implementing, a carbon pricing system. In 2016, 13% of global emissions were covered by an explicit pricing mechanism. Members of the Carbon Pricing Leadership Coalition[C], are inviting decision-makers to implement carbon pricing instruments, to cover 25% of global emissions by 2020 and to achieve 50% coverage within the next 10 years. Over 90 of the 190 INDCs[D] submitted to the UNFCCC[3] mention carbon pricing policies as one of the drivers of the decarbonisation. This leads us to think that domestic carbon pricing policies are set to develop in a large number of countries throughout the world. Certain major carbon emitters, such as China, South Korea, Europe, South Africa, Japan and Mexico, have already introduced, or are in the process of establishing, a carbon pricing instrument. Several states in the US and some Canadian provinces are also going down this path.

A more and more widespread practice

Companies will increasingly need to factor in these mechanisms, either directly in their operations and investments, or indirectly via their suppliers and their customers. This will be both a risk and an opportunity for them, which it is in their interest to anticipate. In view of this, many companies have taken the initiative to integrate carbon pricing in their internal decision-making processes.

Carbon pricing world map

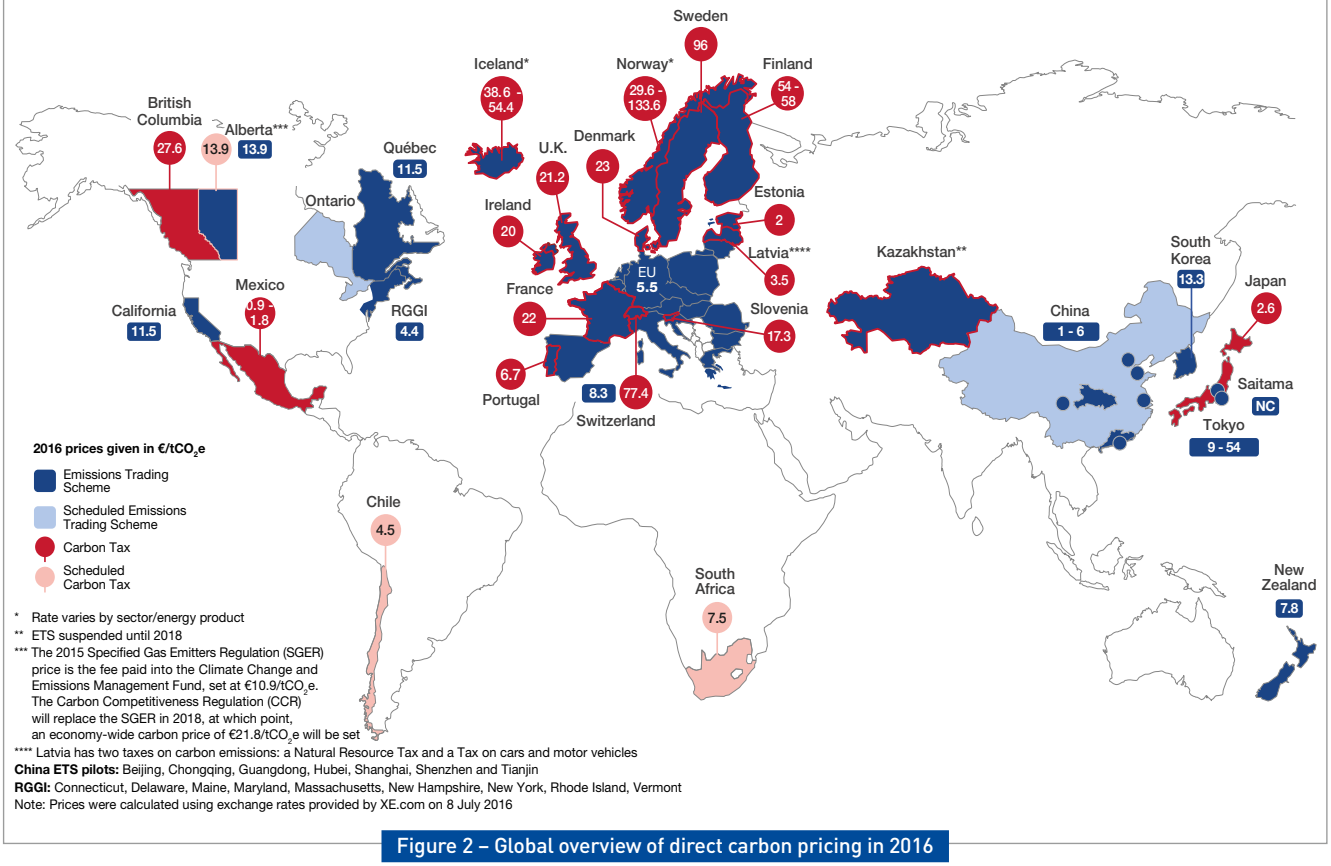

Figure 2 – Global overview of direct carbon pricing in 2016

(Source: I4CE – Institute for Climate Economics, July 2016)

C - See Section Global Initiatives, Carbon Pricing Leadership Coalition
D - United Nations Framework Convention on Climate Change.

EDF
Expected real price


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Background

As an electricity producer, one of the goals of EDF's carbon strategy is to steer its direct emissions (Scope 1) in the right direction, i.e. to use means of production that emit the lowest possible amount of greenhouse gasses. Furthermore, the EDF group operates according to long timeframes. EDF makes long-term investments (20-30 years) and must, therefore, anticipate future risks well beforehand. By introducing an internal carbon price, these risks can be taken into account at a very early stage.

Initiatives

EDF has opted for an expected real price, with a view to steering its Scope 1 emissions (direct emissions) in a direction that is compatible with future environmentally-efficient regulations. This particular internal carbon pricing policy was launched in 2003, at a time when Europe was deciding to implement the European Emission Trading System (EU ETS), starting in 2005. The adoption of the first European 2020 Energy & Climate Package (the "3x20") in 2008 was a decisive factor ensuring and reinforcing the long-lasting incorporation of carbon pricing into research on the profitability of European investment projects. As a result, a specific working group was established to elaborate on carbon pricing scenarios within the EU ETS, as part of the strategic scenario-testing process. This work is fed to the Executive Committee on an annual basis. In particular, this work relates to economic analysis of current and future technologies, the future price of fuels and the anticipated macro-economic environment. On this basis, several expected carbon pricing scenarios are drawn up and the data contributes towards assessing the profitability of future investments. EDF prefers to talk about an expected real price rather than a shadow price. The figures used result from predicting expected prices on the European market (fundamentals) rather than prices that have been selected arbitrarily. By taking carbon pricing into account in its operations since 2005, EDF has been able to reduce CO_2 emissions across its European electricity plants, notably by de-prioritising the most carbon intensive fossil based thermal power plants which are the least energy efficient and generate the most emissions.[1] Anticipating the implementation of a carbon price has now been incorporated into the financial calculations used to assess the appropriateness of future investments. The EDF group now wishes to gradually extend the system to other regions where domestic policies are emerging.

However, environmentally-efficient measures have already been taken in these regions, primarily via technological decisions focussing on low-carbon power generation by prioritising, whenever possible, the best available technologies.

[1] **Note EDF :** the carbon price issued by the EU ETS market in 2016 did not allow for arbitrage encouraging the use of combined gas cycles rather than existing coal-fired power plants. For this to be possible, the CO2 price would have to reach around Đ30 per tCO2; hence EDF is currently engaged in discussions on the possibility of introducing a floor price as well as a European price corridor, to ensure this arbitrage takes place as soon as possible, and to support new investments, while complying with the rationale of the carbon market.

Incorporating climate risk… and seizing opportunities

Adapting to new risks

Companies are sensitive to the risks that climate change poses to business activities and their economic value. The 2016 issue of the Davos World Economic Forum's Global Risks Report[4] ranks "failure of climate change mitigation and adaptation" as one of the most significant risk facing companies.

A few years ago, the climate community was primarily interested in the physical impacts of climate change, regardless of whether the impact was due to extreme events or to medium-term changes. Today, companies face a multitude of wide-ranging risks:

• Physical risks

The consequences of climate change are already evident and will become increasingly so, including changes in temperatures, rainfall and water systems, changing periods of flooding or drought, an increase in the frequency and intensity of extreme events and changes in ecosystems encouraging, for example, the spread of new parasites, etc. This leads to an increase in the economic and financial risks facing companies and their stakeholders: physical damage to companies' assets, disruption of supply chains, increasing scarcity of resources, particularly water and agricultural raw materials, and an increase in the cost of protection and insurance[F].

• Regulatory risks

States throughout the world are taking measures to limit greenhouse gas emissions and to adapt territories to their inevitable effects. The increasing use of economic instruments (carbon taxes, emission trading systems, emission standards, etc.) can be disruptive, sometimes significantly, within the environment in which companies operate and to their business models.

ENGIE
Price scenarios (shadow price)

Contexte

As an international energy supplier, ENGIE is at the heart of challenges relating to climate change, in terms of the link between energy and CO_2 emissions, as well as the potential impact of climate change on its production tools and consumption methods. The transition to a low-carbon economy is unavoidable. In view of this, ENGIE has decided to introduce internal carbon pricing system in order to influence its investment choices.

Initiatives

ENGIE has implemented an internal carbon pricing system that reflects a medium- to long-term assessment of forthcoming regulatory changes, as well as the costs of making the transition towards low-carbon power generation.
ENGIE's Strategy Division draws up sensitivity analyses relating to the price of CO_2 for the company. Business units use these analyses as part of their studies on investment projects which are presented to the Investment Committee prior to decisions being reached by Central Management.

The adoption of these internal carbon pricing systems eventually led to the decision to cease the development of new coal capacities in late 2015.
This approach supports ENGIE's position in favour of stronger, more standardised carbon pricing signals, to reflect states' objectives linked to their international climate commitments (Nationally Determined Contributions).

F - See Les entreprises et l'adaptation au changement climatique, EpE 2014 (in French).

CLIMATE CHANGE IS A MAJOR RISK FOR THE FINANCIAL SECTOR, ACCORDING TO MARK CARNEY

Mark Carney, Governor of the Bank of England and Chairman of the G20 Financial Stability Board (FSB), believes that the financial sector, and in particular investors, fund managers and insurance companies, have long underestimated climate risk. These risks fall into three categories:

- **The physical and operational risk** of climate disasters and their direct or indirect consequences;
- The risk of the **depreciation of assets** that have become unusable as a result of decarbonisation policies (e.g. carbon pricing);
- **Fiduciary risk,** stemming from the legal risk of being sued by shareholders or investors who entrusted their money to fund managers, on the grounds that fund managers did not properly address climate risks that are well known and indisputable.

Mr Carney recommends drawing up climate risk reporting guidelines for the financial sector, with the aim to improve the visibility of these risks to financial operators are exposed. A better understanding of these risks will encourage companies to assess the carbon content of their portfolios and to initiate policies to decarbonise them. He would also like to see financial operators and companies implementing the use of climate stress tests.

CLIMATE FRAUD

Two energy groups are currently being investigated by the US courts where New York State Attorney General has determined that ExxonMobil and Peabody Energy hid at least part of the financial risks relating to climate change from investors. The Martin Act, a law dating from 1921 and specific to the State of New York, grants the Attorney General very extensive discretionary powers to combat financial fraud. The Act prohibits "any device, scheme or artifice to defraud and any deception, misrepresentations, concealment, suppression, false pretense".

This investigation demonstrates that the courts are taking more interest in the risks that climate change creates for economic operators. Furthermore, it demands that companies display a high level of transparency regarding the climate-related risks that they incur.

• Risk of depreciation of tangible or financial assets

The combination of climate and energy policies creates incentives to reduce, limit, or even prohibit the use of fossil fuels. These will result in lower global recourse to economic activities that generate high levels of emissions and which can be substituted at an international level. This is likely to decrease the value of the assets of many companies in these economic sectors; we refer to 'stranded assets'.

• Legal liability risk

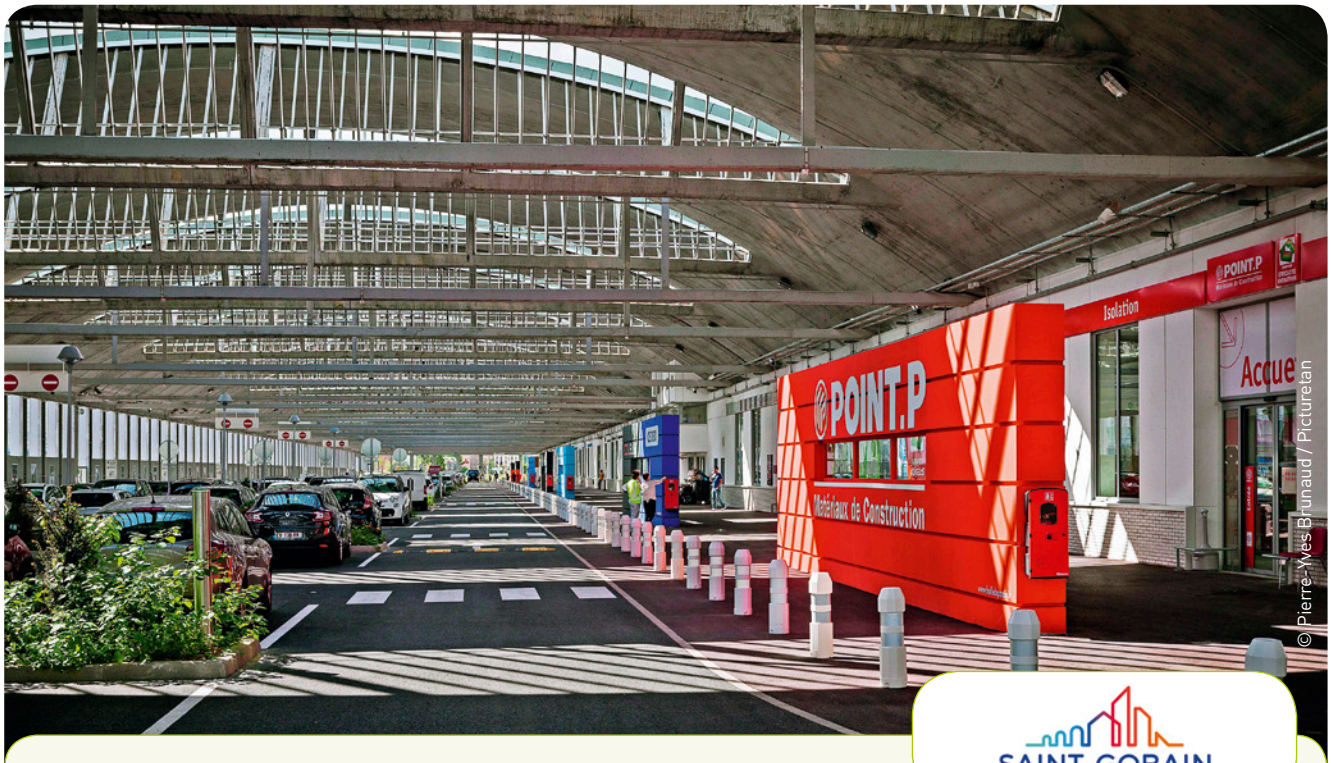
Stakeholders who have suffered loss or damage relating to the impact of climate change may request compensation from the operators whom they believe to be knowingly liable, despite the highly diffuse nature of this liability. As Mark Carney concludes, this liability will be more plausibly engaged in the case of investors who have entrusted funds that have been invested in stranded assets and for certain sectors that generate high levels of emissions.

Meeting climate challenges by anticipating them

Predicting the impacts of climate change and the effects of the transition to low-carbon economies helps reduce these risks, or at least manage them. Some tools can be adopted to enable companies to incorporate these expectations into their strategies.

Internal carbon pricing programmes are one of those tools. It introduces a price signal into a company's business activities and enables it to:

- Prepare its teams and internal procedures for the emergence of regulatory carbon pricing signals in the jurisdictions where they operate and also in the jurisdictions where customers, suppliers and investors are based;



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SAINT-GOBAIN

SAINT-GOBAIN
Shadow price

Background

As a responsible actor in construction and the living environment, Saint-Gobain strives to optimize energy consumption and reduce greenhouse gas emissions concerning both its manufacturing processes and the use of its products. Within this framework, after being in use for just three months on average, Saint-Gobain's insulation solutions offset the emissions related to their whole life cycle.

Saint-Gobain adopted in 2014 an "energy, air emissions and climate change" policy that sets a common framework to improve the energy efficiency of its processes. This mechanism was completed by the implementation of an internal carbon price on January 1st, 2016 aimed at accelerating the transition towards low-carbon technologies at the level of the group's operations.

Initiatives

Internal carbon pricing is a driver to reach the Saint-Gobain group's 2025 CO_2 reduction targets by:

- Measuring the current or potential impact of a regulatory carbon price on the group's activities, and including this in the risk management strategy;
- Identifying growth opportunities in low-carbon innovations;
- Redirecting capital expenditure and R&D; and
- Managing priority actions to reduce CO_2 emissions.

The first internal carbon pricing level is applied to capital expenditure from a certain threshold, to investments related to a change in energy source, to investments related to the energy in a current site or a green field for which the total annual energy consumption is higher than 10 GWh.

The second carbon pricing level, markedly higher, is used for R&D investments in breakthrough technology.
The internal carbon pricing experimentation phase will continue throughout 2016.

By fixing an internal carbon price, Saint-Gobain now takes into account the CO_2 emissions generated by the investment projects submitted, assessing their impact on the business's expenses and cash.

- Provide an economic perspective on internal GHG emission reduction strategies;

- Align operations and investments with the transition to a low-carbon economy, primarily by avoiding investments in tangible high-risk or financial assets;

- Steer long-term decisions, including strategic Research & Development (R&D) and market positioning towards products and production processes that are more appropriate for an economy that is moving towards decarbonisation. This new focus may lead to new opportunities and open up new markets;

- Position the company in the public debate on carbon pricing and its development, at the domestic, regional and international levels;

- Communicate the company's strategic decisions more clearly, including internally, by translating climate targets into financial language;

- Incorporate climate change into decision-making and investment processes, potentially at every level to boost employee commitment towards the company's climate policy.

Global initiatives

Several initiatives have been undertaken globally which encourage the emergence of carbon pricing mechanisms within companies. In 2013, CDP began to synthesize and collect information from its annual disclosure cycle on how companies worldwide are using internal carbon pricing, and issued a first report on internal carbon pricing in the USA in 2013. Each year since then, the number of companies reporting carbon pricing has increased substantially. Meanwhile, national, regional and international pricing mechanisms have also emerged.

Put a Price on Carbon, World Bank[5]
In 2014, the World Bank called on national and local governments, companies and non-governmental organisations to declare their support for the introduction of GHG emission pricing systems world-wide. The call resulted in over 1000 companies signing a declaration which was presented to the United Nations General Assembly by the World Bank in September 2014.

At Business & Climate Summit 2015, business called for global carbon pricing

THE WORLD BANK
Expert opinion: Tom Kerr, Principal Climate Policy Officer

As known is this publication, the momentum and action from governments and companies are welcome, it will not put the world on a 2-degree pathway. Carbon price levels are not high enough; we also need to expand pricing to more countries.
Progressive companies can move beyond calls for carbon pricing to actively support smart carbon pricing policies in two ways. First, businesses can prepare for carbon constraints by using internal carbon pricing. Most companies set a price higher than current government levels, and use it in one of three ways: to seed-fund the development of new, low-carbon products and services; to finance capital investments in energy efficiency or renewable energy, which are often part of a larger corporate climate goal; and to screen potential investments to identify carbon risks that may result from higher-emitting assets or companies.

Second, companies can support government carbon pricing policy. Some companies have helped governments to design carbon pricing schemes by doing voluntary pilot programs. For example, before the launch of California's cap-and-trade program, electric utility Pacific Gas & Electric and seven other companies ran emissions trading simulations that tested the implications of policy design features — such as allowance holding limits and allowance price containment reserves. The results were shared with the California Air Resources Board to help them understand the potential impacts of these policy features on the market. Another interesting example is the emissions trading simulation currently being run by over 20 companies in Brazil. Their goal is to develop a set of proposals for the government on how to design and implement a cap and trade program. The project is spurring conversations between companies and the government around how a carbon market in Brazil potentially could work. It is also helping to build capacity within the companies so they can begin to embed carbon reduction activities into their business strategy.

A final way companies can support carbon pricing policy: join the Carbon Pricing Leadership Coalition!

Carbon Pricing Leadership Coalition, World Bank[6]

To follow-up on the "Put a Price on Carbon" statement, the World Bank wanted to bring together government and non-governmental stakeholders around a common project, which was officially launched at the COP21 in Paris in December 2015. The Carbon Pricing Leadership Coalition (CPLC) is a voluntary initiative aimed at catalysing its partners' initiatives in order to roll-out carbon pricing world-wide. The coalition encourages States, local governments, companies and non-governmental organisations to commit to the three following initiatives:

- Supporting the emergence of domestic and regional carbon pricing policies that are sufficient to redirect investments on the scale and speed required by the magnitude of the climate challenge;
- Advancing the goals and implementation of existing carbon pricing policies;
- Improving cooperation between participants in order to improve the sharing of the information, expertise and experience acquired through the development and implementation of carbon pricing systems across various platforms.

The CPLC is chaired jointly by a Minister and a leading public figure from industry. EpE and I4CE are strategic partners in this initiative.

Carbon Pricing Champions, UN Global Compact – Caring for Climate[7]

Caring for Climate (a joint initiative by the UNFCCC, the United Nations Global Compact, and UNEP[G]) has been encouraging companies for several years to demonstrate climate leadership by putting an internal price on carbon.

The Carbon Pricing Champions who adopt the Business Leadership Criteria on Carbon Pricing agree to:

- Establish an internal carbon price that is sufficiently high to affect their investment decisions and reduce their GHG emissions;
- Publicly support the importance of carbon pricing in political discussions, while taking into account countries' specific economic features and local political contexts;
- Communicate progress made in the company's public reports.

Many of EpE's member companies have committed to such initiatives. Furthermore, an increasing number of them are introducing internal carbon pricing programmes. The following chapters are based largely on their feedback.

G - United Nations Environment Programme.

2 What is internal carbon pricing?

Implementing an internal carbon price program requires a deep understanding of the company's challenges. Depending on the companies, it may take different forms, presented in this section.

Definition

An internal carbon price is a value that the company sets itself voluntarily in order to internalise the economic cost of its greenhouse gas emissions. It can be used as both:

- a tool for supporting a company's decarbonisation strategy;
- a risk management tool, aimed at enabling the company's global strategy to become more resilient to regulatory climate policies and more favourable to emission reductions.

This voluntary carbon pricing tool intrinsically complements governments' GHG emission reduction policies to which companies are subject.

A large number of companies have embarked on this path: according to the CDP Global Carbon Price Report 2016[8], more than 1200 companies use an internal price on carbon now or plan to price in the next two years. And 147 of these companies are taking this approach further, by embedding a carbon price deeper within business strategies and operations. These figures should be interpreted with caution, as they encompass very different concepts of what an internal carbon pricing system may look like. Nonetheless, they demonstrate companies' commitment to the transition to a low-carbon economy and their genuine interest in internal carbon pricing systems as a tool for supporting their climate strategy.

Thermo-solar power plant in Ain Beni Mathar, Morocco

As demonstrated by the programmes of the companies that are members of EpE, an internal carbon price can take different forms. Although there is an increasing amount of feedback being provided on the subject, it is still a largely new field and significant amount of work still remains to be done on the issue. Based on experiments conducted over the past few years, two main internal pricing options appear to be emerging for companies:

- A shadow price;
- An internal carbon tax.

SUEZ
Shadow price

Background

In 2015, the SUEZ group's world-wide business activities resulted in the emission of 8.2 $MtCO_2e$ and managed to avoid 9.2 $MtCO_2e$ for its customers, thanks to the production of recycled products, green energy and alternative fuels. As part of the company's '12 commitments to the climate' SUEZ has set itself the target of incorporating a carbon price into its decisions on capital expenditure and R&D. Using this carbon price tool will also enable SUEZ to jointly assess value created via the implementation of low-carbon, or "carbon goodwill" solutions among its customers. Meanwhile, SUEZ is also campaigning for the introduction of domestic carbon pricing policies, including via its participation in the World Bank's Carbon Pricing Leadership Coalition (CPLC). Launched at COP21 the CPLC aims to encourage the emergence of visible and foreseeable price signals for carbon over the long-term, encourage the development of circular economy solutions and create innovative climate financing in the waste management sector.

Initiatives

In this context, SUEZ' 2015 and 2016 carbon pricing works on evaluate the sensitivity of the business models to a carbon price; the implementation of a carbon price in regions where SUEZ operates; and on the identification of commercial opportunities relating to the sale of low-carbon products and services to its customers, regardless of whether they are subject to a carbon pricing system. The assessment of the impact of external carbon prices on SUEZ's main business models showed the importance of local regulatory contexts and of the technological maturity of the solutions implemented, thereby supporting the introduction of several internal carbon pricing systems, depending on the type of business activity concerned and the country in which the operations are located. One of the main takeaways was the strategic importance of involving the group in assessing the carbon footprint lifecycle of its products and services, as well as the monitoring, reporting and verification processes for its emission reductions and its contribution to avoiding emissions.

As a result in July 2016, SUEZ decided to:

- Incorporate an internal carbon price into the business plans of its investment projects, based on pricing trends taken from domestic and/or European regulations (e.g. €30 per tCO_2e in the European Union in 2030, in accordance with the International Energy Agency's New Policies Scenario);
- Adopt a second internal carbon price which is deliberately higher (€50 per tCO_2e) in the business plans for low-carbon solutions currently under review as part of its R&D programmes;
- Systematically calculate the "carbon goodwill" attached to its solutions, in order to raise awareness among group's employees and customers of the carbon efficiency of circular economy solutions and their underlying economic impact.

Both these options are based on assigning an explicit price to CO_2 emissions.

Implicit carbon prices can also be observed, wherein the carbon value is deduced from the efforts (investments, changes in energy sources, R&D, etc.) that the company has made in order to achieve certain emission reductions.

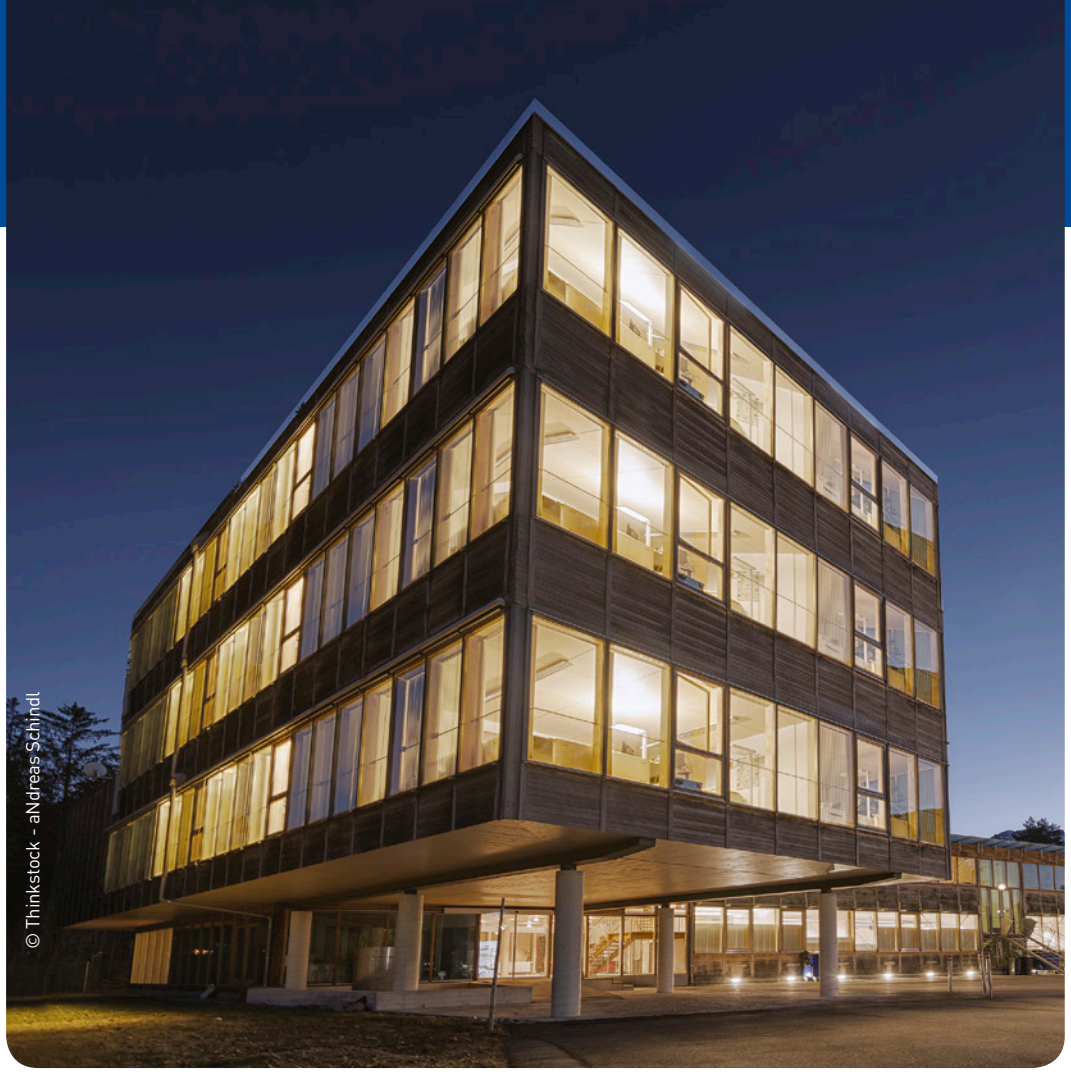
Shadow price

Method

The approach to implement shadow price on carbon consists of incorporating a "carbon value", decided by the company, into each investment decision (R&D, infrastructure, financial assets, etc.) and applying it to the resulting GHG emissions. The aim is to understand the impact a carbon price would have on the company strategy and on the calculation of its investments' internal rate of return (IRR). Testing the sensitivity of investment plans in this way enables companies to improve their risks management relating to future regulatory carbon pricing systems. This approach to risk management is quite typical for project approval process.

Companies that adopt a shadow price consider that the jurisdictions in which they operate already have or will have a regulatory carbon pricing system in the relatively short-term. In view of this, they make their investment decisions on the basis of an assumption of this carbon price in the same way they would make assumptions about exchange rates or commodity prices. The term "expected real price" may also be used.

This method does not imply any financial transaction. However, it introduces an additional criterion into business activities management and alters the decisions made by the company. Using a shadow price on carbon has an influence on corporate decisions relating to investing in internal and external projects, to strategic



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Internal carbon pricing can help finance energy efficient real estate

SOLVAY
Shadow price

Background

Solvay has committed itself to reducing greenhouse gas emissions by acting simultaneously on two fronts:

- Reducing the impact of its production as the result of a commitment to reduce the CO_2 intensity of its industrial activities, i.e. GHG emissions for each euro of value-added by 2025;
- Further accelerating the dissemination of solutions to combat climate change, particularly in the transport sector, by reducing the weight of vehicles and aircraft, low-energy buildings with high-quality thermal insulation and bio-sourced industry and chemicals, to reduce the use of fossil fuels.

To reduce its carbon-intensity, Solvay relies on its SolWatt energy-efficiency programme, optimisation of its industrial processes, the development of clean technologies and increasing the production and procurement of renewable energy. In addition, on 1 January 2016, Solvay introduced an internal carbon price in order to take climate issues into account in all its investment decisions.

Initiatives

Solvay applies an internal carbon price of €25 per tCO_2e to GHG emissions and reductions to every new investment made world-wide. The value selected is higher than the value of existing carbon emissions trading units.

The introduction of a pricing signal can be a powerful mobilising tool. From a practical standpoint, an internal carbon price enables Solvay to:

- Immediately incorporate the impact of changes in domestic climate policies as part of the implementation of the Paris Agreement (COP21), including regulatory carbon pricing, into its medium- and long-term business decisions;
- Take action on the allocation of investments, research and innovation programmes and on prioritising GHG emission reduction initiatives, in order to encourage Solvay's transition towards a low-carbon economy.

"This means taking the lead and ensuring that the decisions that we take today will make sense tomorrow and in the future".

Solar panels on roofs

investments and business portfolios, and to R&D strategy, for instance. It promotes projects that reduce emissions and de-prioritises projects that generate emissions, thereby altering the company's exposure to carbon price as decisions are taken. The entire process has a long-term influence on the company's business model. If regulatory carbon prices are close to this shadow price in the future, the company will simply have reduced its risk; if the shadow price is higher in the long-term than regulatory prices, the company will actually have adopted a more ambitious decarbonisation approach than what has been implemented in countries where it operates.

As an internal decision-making tool, a shadow price enables companies to:

- Assess the resilience of capital investments to the risk of future domestic and regional regulations regarding climate change and related risks;
- Test projects' sensitivity depending on carbon pricing scenarios;
- Draw up strategic plans that include GHG emission reduction targets;
- Steer R&D towards products and solutions that take climate change into account;
- Raise employee awareness of pricing signals for GHG emissions.

In practice

A company that opts for a shadow price systematically incorporates that price into the economic assessments of certain investments. The scope selected for its application is important: in particular, companies may specifically choose to use it for investment projects (for example, production tools and new projects), R&D projects and for strategic transactions (purchasing a company, developing a new business activity, etc.). As the strategy becomes more consistent the scope broadens. If the shadow prices are proactive and high, it can be less rigorously applied to short-term decisions such as acquisitions and will then only be used as a sensitivity variable.

To set this complementary economic variable, the company may use a single price or a carbon price trajectory that involves different prices in defined timeframes, in the same way that price scenarios are drawn up for energy or commodity prices. The company may also choose different prices depending on business activities, operating areas, or type of project.

This carbon pricing tool applies to the emissions generated by a project, production plant and/or products and services offered (in the case of R&D projects), thereby improving the profitability of those investments that generate the lowest levels of GHGs and penalising those that generate the highest levels. The system therefore has an impact on the project's profitability ratio and predicted cash flows.

Incorporated in this way, the carbon price enhances the profitability of those projects that are most compatible with the transition to a low-carbon economy. As a result of this additional variable, projects that no longer meet the company's criteria are usually reworked in order to be profitable even in scenarios that include carbon pricing; otherwise they are abandoned.

The shadow pricing method is often applied to major investment projects that exceed a certain amount or those which require approval from the Executive Committee: risk is higher and it is often possible to calculate GHG emissions despite their complexity. However, it is possible to use this method for many decisions taken by the company.

Internal carbon tax

Method

The internal carbon tax is a tax that companies decide to voluntarily apply to their operations. The tax consists of adding a cost relating to generated GHG emissions to the operational costs. By increasing operating expenses (opex), it results in short-term emission reductions while driving innovation in the longer term, thanks to the general awareness of increasing climate-related constraints.

The introduction of an internal carbon tax implies transfers of actual funds within the company, which may be used for:

- Offsetting GHG emissions by purchasing offset credits externally;
- Financing internal projects, especially those relating to the reduction of GHG emissions;
- Rewarding any environmentally-friendly operations performed.

SOCIÉTÉ GÉNÉRALE
Internal carbon tax

Background

Societe Generale's Internal Carbon Tax is the focal point of its carbon reduction policy for own account.
Since 2007, Societe Generale has been proactive and committed to reducing its carbon emissions. The group increased its ambitions through a carbon reduction plan that intends to reduce carbon emissions for each occupant by 20% compared with 2014 levels by 2020.

Initiatives

Societe Generale was one of the first banks to introduce an internal carbon tax in 2011, a mechanism that is now at the heart of reducing their carbon footprint. Every year, €10 per tCO_2 is charged to business lines, according to their carbon emissions. The tax enables teams to gain awareness on the carbon impact of their day-to-day behaviour, encourages them to reduce their impact, and provides decision-making guidance.

Since 2013, the capital accrued through the internal tax has been used to finance internal environmental-efficiency initiatives. This redistribution system encourages each entity to reduce its carbon emissions and enables Societe Generale to demonstrate that environmentally-friendly initiatives are also opportunities to create value and innovate.

Over the three years that the system has been in place, the winners have been granted, on average, a total of €3.1 million per year to finance a total of 119 initiatives that have generated an average decrease of 4700 tCO_2e per year (i.e. 1.4% of the group's emissions) and recurring average savings of €30 million per year for the group. These 119 initiatives have also avoided the consumption of 30 GWh of energy each year on average (i.e. 3.4% of total energy consumption). 19 countries on four continents have received at least one award over the three-year period.

The proceeds from the internal carbon tax are redistributed via the company's "Environmental Efficiency Awards", which reward initiatives relating to buildings, IT, transport, paper consumption, and waste management. The amount of each award can cover up to 100% of implementation costs (up to a limit of €200,000 per initiative), thereby providing an additional budget for implementing new reduction initiatives.

The entities, which are guided by the group's targets and the incentivising effects of the internal carbon tax and the financing system, thereby become responsible for setting their own carbon action plans. This internal competition also creates enjoyment and fun, creating healthy competition, which stimulates creativity.

The incentive created by the tax also enables the group to gradually reduce its use of energy-intensive goods and services making way for others that are less energy-intensive and expensive, and which will receive a further boost from the energy-efficiency financing. As a result, a virtuous ecosystem is established and gains strength, by gradually introducing the idea that a policy aimed at controlling energy consumption and reducing GHG emissions can create a competitive advantage and increase attractiveness, including on the financial market in the broad sense of the term.


© Grégoire LE BACON

In all three cases, these funds will generally be assigned to decarbonisation policies.

As an operational decision-making tool, the internal carbon tax enables companies to:

- Immediately issue a price signal for GHG emissions and thus provide support for its internal and public policy aimed at reducing these emissions;
- Hold entities that generate the most emissions responsible, provided the cost breakdown is performed on an entity-by-entity basis;
- Showcase the emission reduction initiatives carried out or suggested by its employees;
- Offset all or part of its GHG emissions.

In practice

First of all, the introduction of an internal carbon pricing system requires calculating the company's direct and indirect GHG emissions, which will be used as the basis for the internal tax, i.e.

- direct Scope 1 GHG emissions: the emissions generated by the company's stationary or mobile facilities;
- indirect Scope 2 emissions: emissions relating to the consumption of electricity, heat or steam required for the company's business activities;
- indirect Scope 3 emissions: other indirect emissions relating to the company's business activities, such as the purchase of raw materials, employee travel and managing waste generated by the company's business activities, etc.). Taking the Scope 3 emissions into account requires the company to be able to record them with sufficient accuracy, as well as to have drivers for reducing the emission factors in question.

To take full advantage of the benefits of this mechanism, the company must be able to monitor the GHG emissions entity by entity. Entities can be business units, geographical regions, subsidiaries, divisions, etc. The cost of the emissions will be allocated to each entity. In this way, decision-makers will take greater ownership of the company's climate strategy and will be encouraged to contribute to reducing emissions at their decision-making level. In order to maximise understanding of the programme and its correct implementation educational support for the internal teams must be provided.

This approach also raises certain practical issues:

- What should be done when a carbon tax has already been adopted by the country's government: should the company nonetheless apply its own additional tax? Should it only apply an additional tax to the government tax in order to bring the total up to its own level? These are all issues that will arise as new countries introduce carbon pricing and as pricing levels make these internal and external charges more sensitive;

ACCOUNTING AND TAX TREATMENT OF INTERNAL CARBON PRICING

Introducing carbon pricing into corporate management processes raises the issue of corporate accounting processes. How should carbon pricing be integrated into these accounting processes? What tax arrangements apply when an internal carbon pricing system is implemented? These are all issues that are emerging as part of the discussion on implementation of voluntary carbon pricing programmes within companies.

Corporate accounting for regulatory carbon values, such as a carbon tax duty or the return and payment of emission allowances, has been clearly established within the accounting standards framework and depends on the nature of the carbon pricing policy. In France in 2013, for example, the country's Accounting Standards Authority (Autorité des Normes Comptables, ANC) introduced the concept of "administrative raw material" in the "inventory", in order to make it possible to account for the GHG emission allowances managed by companies under the European Emissions Trading System (EU ETS). As the accountability and valuation of allowances differ depending on the company's business model, it is imperative for companies to classify and justify these choices. Two business models have been identified: in the "production" model, companies emitting GHG emissions are subject to a new production charge on assets – this is the case for industrial companies – while in the "trade" model, the purchase of allowances is voluntary and is not linked to GHG emissions – this is the case for companies acting as financial intermediaries. The tax framework for emission allowances involves the collection of VAT.

However, as it is not an accounting asset, if a company introduces a voluntary carbon price into its operating practices as a management tool, this cannot be accounted for and therefore cannot be regulated.

Assembly of wind turbine

- How should transfers between subsidiaries and the head office be accounted? In the near future, this process will have to be approved by the government, to recognise its legality at accounting and fiscal levels. Here again, these issues will become more urgent when the level of these taxes makes them significant.

Implicit price of carbon, or "real" cost of decarbonisation

Method

Companies' implicit carbon prices can be calculated based on the measures and initiatives that it implements in order to reduce its emissions.

Capital investment decisions which are made to achieve the company's GHG emissions reduction targets indirectly reveal a "carbon price". For instance, some companies incorporate maximum emission standards on fleet vehicles into their purchasing policy. The price is not explicitly mentioned, but the introduction of the standard may lead to an increase in expenditure on this item. This additional cost reveals an implicit carbon price.

In practice

By definition, several implicit carbon prices may co-exist in a company. Its decarbonisation policy will become increasingly rational as the implicit carbon prices, relating to its various decisions, become more coherent. The implicit internal carbon price can only be calculated retroactively, based on the measures and initiatives effectively implemented by the company. Only a few companies do so. That is why implicit carbon prices are not always seen as internal carbon prices in the literature.

However, it is nonetheless interesting to mention it here, as it may be used as a benchmark for calculating and introducing an internal carbon pricing system. Indeed, any company that has climate or energy-related targets consequently has an implicit carbon price. Calculating this price for the entire company or for a few projects, allows for the estimation of a rough order of magnitude of the carbon price and helps to evaluate if existing decarbonisation initiatives are robust and relevant. However, an implicit price of this kind does not have the pedagogical and incentivising role as the other two internal carbon pricing mechanisms.

Choosing an objective-based approach

Very different uses

In practice, it appears that the choice between a shadow price and an internal carbon tax is highly correlated to the company's sector of activities.

MICHELIN
Shadow price

Background

Michelin supports the implementation of carbon pricing on a worldwide scale.

Initiatives

Today, there is no global carbon market or carbon pricing: only fragmented and uncoordinated systems (European Union, Chinese provinces, California, Quebec, etc.). Michelin however strongly encourages public authorities to stimulate the emergence of a more structured market. It is to this end that Michelin joined the Carbon Pricing Leadership Coalition set up by the World Bank in May 2015.

While awaiting the emergence of a global carbon market, Michelin is laying the groundwork for this, with the Group testing an internal carbon price for its investment projects since 2016, on the basis of €50 per tCO_2e.

BNP PARIBAS
Shadow price

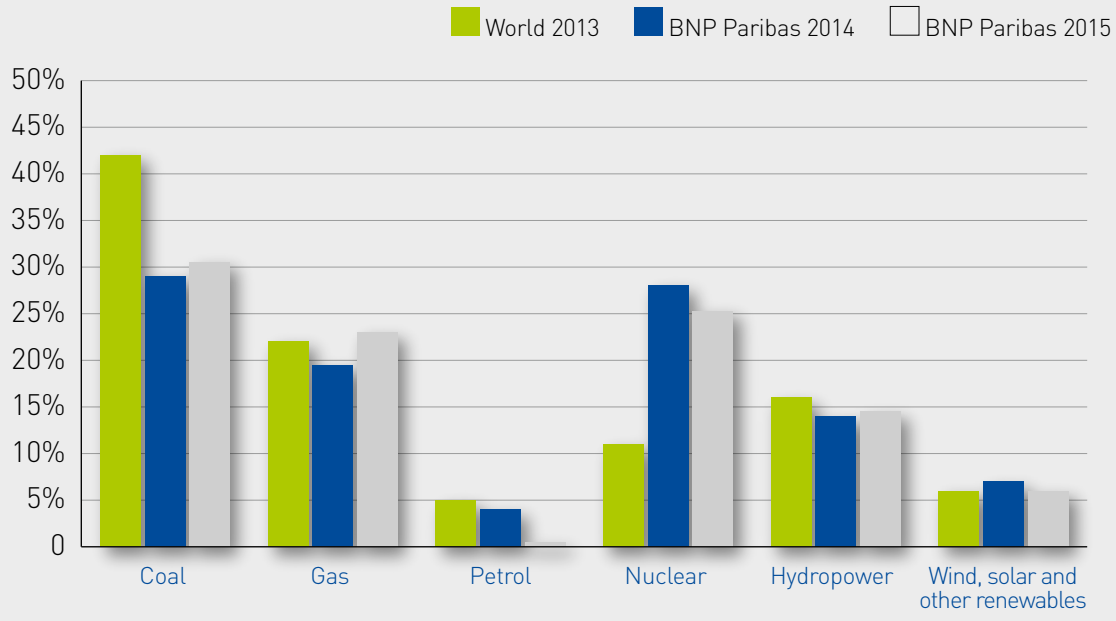
Background

BNP Paribas, which is aware of the impact of and the risks arising from climate change, has decided to boost its efforts in this area. Specifically, BNP Paribas is committed to:

- Increasing its engagements in the renewable energy sector by a factor of two, from €6.9 billion in 2014 to €15 billion in 2020;
- Strengthening its carbon risk management system (no further financing for coal mines, or coal mining companies that do not have a strategy to diversify their mix, no further financing for coal-fired power plants in high-income countries, and tightening the eligibility criteria in other countries);
- Helping its clients make the transition to a low carbon economy.

Initiatives

In November 2015, BNP Paribas made the commitment to gradually use an internal carbon pricing system in order to take into account the changes resulting from the transition to a low-carbon economy and the related risks in its financing decisions. This commitment is currently being developed. BNP Paribas is working on implementing a methodology that will enable sensitivity tests to be performed based on pricing scenarios in certain pilot sectors that generate the highest level of emissions, in order to assess the impact on its main clients' business models in these sectors. The aim is to henceforth identify those clients that will find it easiest to adjust to dealing with carbon pricing in the relatively near future, and to understand how this will disrupt their cost and income structure, their markets, and their competitive landscape, while taking into account the option of upstream or downstream "pass-through" in their respective industry.



Changes in electrical energy mix financed by BNP Paribas

(Source BNP Paribas)

CARBON PRICING FOR INVESTORS

The transition to a zero-carbon economy alters the financial viability of some companies. These new risks may put pressure on the return on assets and asset portfolios.

It is becoming important for investors to be able to assess the climate risk resiliency of companies requesting financing. The aim is to understand how climate change will affect the profitability of the project, assets, or companies being financed. In this case, investors can use a shadow price which is applied to the investments requested. The price is incorporated into the assessment of the projects' financial viability. This is an internal carbon pricing system: the investor voluntarily decides to apply a carbon price to these products which is decided internally and is specific to the company.

This practice is emerging and may ultimately have a significant impact on the development of internal pricing mechanisms, by raising not only corporate awareness, but the State's awareness, during the search for financing.

Companies whose activities generate high levels of emissions (energy, chemical and manufacturing companies) usually use a shadow price rather than an internal tax, due to the significant transfers of funds that the carbon tax may incur. Specifically, the aim within these sectors is to steer production tools towards greater efficiency, in terms of investments made, for which the shadow price mechanism appears to be a sufficient tool.

Conversely, in sectors generating lower Scopes 1 and 2 emissions (banking, services, etc.), the emissions are low enough to be considered by staff only if they are genuinely charged as expenses and the pedagogical process is more effective if a carbon tax is used.

Internal carbon pricing is a corporate policy tool. It is natural that it is this policy which guides the choice of the tool, depending on the objectives which are set.

Tools and objectives:

- **Risk management**
  - Investments: shadow price
  - Operations: internal carbon tax (and shadow price)
- **Choosing between investments**
  - Strategic acquisition: shadow price
  - Production tool generating high levels of emissions: shadow price
  - Renovating or replacing equipment: internal carbon tax or shadow price
- **Raising awareness, increasing responsibility and integration into corporate culture**
  - Project managers, Strategy Divisions, R&D: shadow price
  - Middle management, management teams of subsidiaries or entities and employees: internal carbon tax
- **Emission reductions**
  - Products and services: shadow price
  - Operations generating high levels of emissions: shadow price
  - Other operations: internal carbon tax
- **Timeframe**
  - Short-term: internal carbon tax
  - Medium- and long-term: shadow price

As we can see above, both tools may be complementary. Although the aggregation of both tools within companies remains rare, it is perfectly possible to use both a carbon tax and a shadow price within the same company. As both mechanisms cater to different objectives, the tools can co-exist within a company. Accordingly, a bank that has introduced an internal carbon tax may review the projects that it finances by drawing up assumptions involving a higher carbon price than the level of its internal carbon tax, if only for risk management purposes.

Time for innovation!

Innovation still has an important role to play in the internal carbon pricing field. Companies are free to adjust various tools depending on their specific features. Accordingly, some companies have chosen to have several pricing levels responding to different objectives.

For instance, it is possible to introduce a different shadow price for investments in production tools and in R&D projects, which are considered as longer term.

Another example of innovation involves taxing the tonnes of CO_2 emitted by entities beyond a target determined for each entity by the company. To avoid this cost, each entity will be strongly encouraged to reduce its emissions to the set target level. This approach draws considerable inspiration from carbon markets with free allowances.

Some companies have also opted for programmes involving the internal exchange of emission reduction units. In this system, the company's commercial entities or units that have reduced their GHG emissions in relation to a set target can monetise these reductions by selling emission reduction units to other entities or commercial units that have exceeded their target within the same company. The long-term goal remains the same, i.e. achieving the emission reduction target that the company has set for itself. This approach enables the company to prepare for future greenhouse gas emission allowance exchanges, which can help justify committing to such a complex system.

Experience shows that companies determine their own internal pricing mechanism in accordance with their expectations, priorities, sustainability strategy and expectations for future external regulations and restrictions.

3 How to implement a carbon pricing programme

Companies wishing to implement an internal carbon pricing policy may follow the method set out in the section. This section provides details on how to implement the policy from the commitment stage through to the assessment of its effectiveness.

Getting started

Understanding the company's strategy in order to assess the usefulness of internal carbon pricing

Before committing to an internal carbon pricing initiative, companies are advised to understand the expected additional value of this tool. To do so, the company needs to calculate their carbon footprint, pinpoint the highest-emitting domains and identify the reduction drivers which are available or which need to be developed. Based on this assessment, the company can determine a climate strategy, qualitative and quantitative goals and the resources needed to achieve them.

Once this emission profile has been ascertained and the company's climate strategy has been defined, it can draw up a carbon pricing programme adapted to its priorities, its appropriate internal pricing mechanism, scope of application, and the expected effects of the pricing system.

This initial stage will also enable the specific strategies of the company's subsidiaries to be identified in order to ensure that the overall strategy is adapted to the specific features of their various business lines. This is particularly the case for multi-sector groups.

The questions to be asked

- What is my carbon footprint and which sources generate the highest level of GHGs? What sources have a high potential for reducing emissions?
- What is my climate policy?
- Have targets been set by the company or its subsidiaries? What resources have already been assigned to these targets? Are they adequate?
- Does my company or my business sector have a climate roadmap for the period until 2020, 2030 and 2050?

Identifying existing instruments

Conducting a review of the instruments and initiatives that have already been implemented within the company as part of its climate strategy enables the company to avoid a negative overlap between these initiatives and the internal carbon pricing system. Such an overlap may be inefficient or may even send out inconsistent pricing signals. Furthermore, a review of the existing measures enables the company to subsequently identify the most appropriate internal carbon pricing levels. For instance, a company's decision to no longer include coal as part of its energy supply is already equivalent to a significant implicit pricing signal. Introducing and calibrating an internal pricing policy without incorporating this would jeopardise its effectiveness and the understanding of the company's roadmap both internally and externally.

The advantage of an internal carbon pricing system is that it is a general measure that can be applied uniformly to all business activities , as well as being compatible with many other corporate measures (on purchasing, R&D, etc.).

The questions to be asked

- What emission reduction tools are already in place? Are they effective?
- Why would carbon pricing be more effective than other instruments?
- To which areas should carbon pricing be applied or not applied within the company?

TOTAL
Carbon shadow pricing applied in investment decisions

Background

Having clear medium- and long-term economic signals is essential for reducing greenhouse gas emissions. Total encourages the development of carbon pricing mechanisms in the main economic zones, as they are interconnected.

A price range of between $30 and $40 per tCO_2e would be enough to:

- Promote the switch from coal to gas, as gas emits half as much CO_2 as coal in power generation.
- Steer investments towards the technologies required to reduce emissions, such as carbon capture, use and storage.

Around 40 regions and countries and 20 cities have already implemented a carbon pricing mechanism or are planning to do so.

Generally speaking, clear rules are needed to support the transition to a lower-carbon economy. They must provide information on public policy, facilitate long-term investment and prevent unfair competition. International carbon credit mechanisms must also be maintained and/or implemented to foster the development of projects offering the highest emissions cuts at the lowest cost.

Total participates constructively in discussions with the public authorities, associations and its peers to share ideas and recommend solutions.

Initiatives

The Total Group has been involved in implementing a carbon pricing system since 2008.

- 2008: Total applied a price of €25 per tCO_2e in its investment decisions;
- 2014: Total supported the United Nations Global Compact Business Leadership Criteria on Carbon Pricing;
- 2015: Total and six other leading operators in the oil and gas industry called upon the international community to implement carbon pricing mechanisms via the "Paying for Carbon" Initiative;
- 2016: Total contributes to the roll-out of the World Bank Carbon Pricing Leadership Coalition.

In 2016, Total raised its internal carbon price to between US$30 and US$40 per tCO_2e, according to the price of oil. To ensure the viability of its climate-change projects and long-term strategy, Total is incorporating a long-term CO_2 price of between US$30 and US$40 per tCO_2e into the economic assessment of its investments, depending on the crude oil price scenario, or the current price, if it is higher, in a given country. This price is consistent with the Group's support for mechanisms encouraging the use of gas over coal in power generation, as well as investing in research on low-carbon technologies.

Uniting people around the project

Convincing people internally

Internal carbon pricing systems are expanding rapidly, but still remain an issue for insiders. Project backers must, therefore, convince people internally and find solutions to implement such a programme. This initially involves developing an internal understanding of the impact of climate change on the company's business activities and the related risks and opportunities, as well as an understanding of the resources available to the company for managing this impact and these risks and incorporating them into its strategy.

Senior Management commitment and positive support from the Finance Division have often played a key role within companies that have already introduced an internal carbon pricing system.

Setting up a Steering Committee

Companies' environmental policy tools are often managed by the Health Safety Environment or Sustainable Development Divisions. Regardless of whether it involves a tax or a shadow price, internal carbon pricing is considered as an instrument that relates to the company's climate policy, as well as to its economic policy and strategy. Furthermore, its application is a management decision that affects all of the operating staff. Well-defined and joint action is thus useful for its acceptance by everyone at the company.

Rolling out the system within the company appears to be made easier by setting up a group bringing together the divisions that are most involved in its implementation and most concerned by its effects, from the beginning of the process. Membership will obviously vary depending on the company, its organisational structure and business sector. It will usually include members of Senior Management, functional divisions such as the Environment, Finance (including Management Control) and Communications Divisions, and business operating units. They may form a steering committee for the programme.

Initially, the role of this committee will be to clearly identify the risks and benefits of introducing an internal carbon pricing system. This work will encourage greater appropriation of the issue by the participants who are members of the Committee, but will primarily enable potential sticking points to be identified and dealt with long before implementation.

The members of this committee will be the primary backers of the initiative's goals and of the company's strategic interest in committing to it: reducing emissions, making the group's investments resilient to future carbon pricing systems, raising awareness internally, etc. The choice of the type of mechanism suggested by the committee to senior management will result from this assessment.

This step may result in the drafting of a framework document and proposals on the basis of which senior management may take decisions to embark on a programme, and which will then be used to communicate about the initiative internally, as well as to assess its results compared with initial expectations.

LE GROUPE LA POSTE

Offset programme and purchase of electricity from certified renewable sources

Background

Le Groupe La Poste's carbon policy aims to reduce carbon and achieve carbon neutrality. It consists of:

- **Avoidance:** Plan ahead to anticipate potential greenhouse gas emissions and design low-emission products and services;
- **Measurement:** the group measures all emissions relating to its business activities (Scope 1, Scope 2, and Scope 3);
- **Reduction:** the group implements initiatives aimed at reducing emissions in the transportation, building and digital fields;
- **Offset:** the group has been offsetting the remaining CO_2 emissions relating to the Services-Mail-Parcels and Digital Services since 2012 via the purchase of carbon credits on the voluntary market.

Initiatives

Offsetting (internal carbon tax)

The group has been offsetting its Scope 1 and 2 emissions, and a portion of its Scope 3 emissions relating to its Services-Mail-Parcels and Digital Services since 2012. This voluntary offsetting process, which accounted for 1.5 $MtCO_2$ in 2015 and which represents 5% of the share of its GHG emissions that are offset on the European voluntary market, is strategic, and is monitored by Le Groupe La Poste's Executive Committee.

Furthermore, the size of the budget allocated to offset emissions encourages emission reduction efforts within the group by creating a visible price signal within the various departments concerned. Reducing emissions enables a direct decrease in this budget. One of the virtues of this tool is that it is highly informative, as it establishes a link between consumption and (economic and climate) expenditure on the one hand, and between behaviours and emission reduction initiatives on the other. As a result, Le Groupe La Poste's internal pricing policy has an operational impact, which encourages the reduction of emissions.

This programme, which is in addition to the other initiatives in the group's carbon policy, also enables it to provide a mail, parcel, and digital service that is 100% carbon neutral. This is a competitive advantage which also boosts Le Groupe La Poste's image as a responsible organisation.

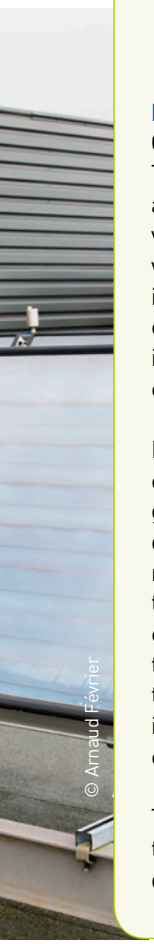
Purchase of electricity from entirely renewable sources (implicit pricing)

In 2015, the group set itself the target of switching to 100% renewable-sourced electricity by 2020, across all buildings managed by Poste Immo, its property management company. Since 1st October 2015, Le Groupe La Poste has purchased electricity from entirely renewable sources, in order to supply its 1300 main facilities, which represent 66% of its consumption, via the 'guarantee of origin' system.

Le Groupe La Poste has taken the opportunity offered by the French NOME Law (New Organisation of the Electricity Market), which introduced the end of French regulated rates. Poste Immo, the Le Groupe La Poste's property management company, has developed a tender process for the supply of electricity to facilities that formerly benefited from 'yellow' and 'green' electricity rates. The main facilities concerned by this approach are industrial mail sorting facilities, parcel branches, and major commercial facilities, which account for 66% of overall energy consumption of the postal buildings.

On 1st May 2016, this approach was extended to the remaining 10,000 smaller facilities (formerly 'blue' electricity rate sites), thus covering 100% of the target, which means that the goal has now been achieved.

Internally, the Executive Committee has granted a purchasing mandate authorising procurement at a price between €0.10 and €0.30 per MWh higher than the standard electricity price. Furthermore, the purchase of electricity from entirely renewable sources enables Scope 2 GHG emissions to be reduced by a factor of 10, thus reducing the emissions that the group has decided to offset and budget for. The operation is cost-neutral overall. Furthermore, this system enables La Poste to power its electric vehicle fleet with electricity from entirely renewable sources.



The same Steering Committee, which may include more members, may subsequently ensure implementation of the programme and its follow-up, and assess its effectiveness.

The questions to be asked

- What are the risks and opportunities for my company in terms of climate and energy?
- Has senior management made climate-related or carbon pricing commitments?
- How can an internal carbon pricing system add to the fulfilment of these commitments?
- What form of price signal is the most appropriate for the company's situation and its timeframes?
- Who should be involved in implementing the approach?
- Which entities and management teams will be most affected?
- Which companies within the sector have already adopted such initiatives?
- How can an internal carbon pricing system add to our strategy, image and operations?
- What sticking points and questions should we expect?

Defining an internal pricing programme

Which instrument and at what price(s)?
By this stage, the Project Manager and the Steering Committee will have all the information required to choose the most appropriate mechanism and determine its scope of application. The essential issue of the level of the internal price then arises. The effectiveness of the system and its acceptability are largely conditional upon this stage. In fact, the price or prices selected will steer a number of subsequent decisions and will influence technology choices and even R&D decisions and, therefore, the products and services developed, and production tools.

If the price signal is too low, it will hardly have any effect on decisions and is likely to be heavily criticised for being a mechanism that is cumbersome to manage and pointless. It will also send a negative signal to external stakeholders, if the company makes a public announcement about its adoption.

If the price signal is too high, it will penalise the short-term competitiveness of the company's projects that still emit carbon emissions. It may therefore give the impression that the company is unrealistic, since it is anticipating political decisions that are a long way from being taken. If a high price is not consistent with a proactive decarbonisation strategy, shareholders may find it hard to understand the approach.

The questions to be asked

- What is the likely price level that may be imposed by the government authorities? Within what timeframe?
- What is the correct level for the company's internal prices?
- How will that level change?
- What is the magnitude of the changes expected as a result of this mechanism?
- What level would be consistent with the other climate policies that the company has already implemented?
- Does this pricing replace other policies or is it a complementary instrument?
- How does it relate to external prices imposed by the government?

Enhancing choices via simulation
Carrying out simulations before setting the price to be used is a common approach for companies. Initially, it is possible to apply prices to past activities.

Where the internal carbon tax is concerned, this consists of assessing the amounts that will be raised internally on through an entity-by-entity basis, and estimating the entities' requirements for supporting projects to reduce or offset emissions. The level of the tax can then be adjusted to make it acceptable and effective, or action can be taken on the scope of application: the type of projects supported, the regions concerned, etc.

Where the shadow price is concerned, the Steering Committee can assess the effect that it would have had on past investment plans or on the profitability of certain projects. How many projects would have needed to be reviewed or abandoned? Would a specific acquisition have been considered as more or less profitable, or more or less high-risk based on the carbon price selected? The approval stage enables the effects of various price levels to be assessed in the same way as for the tax.

LA BANQUE POSTALE
Internal carbon fund

Background

La Banque Postale wanted to align its climate-related targets with those of Le Groupe La Poste to ensure consistency. However, an analysis of the evolution of La Banque Postale's emissions showed that the subsidiary was not on track to achieve it's 20% emissions reduction target by 2020. An additional tool was therefore required in order to achieve the group's targets.

Initiatives

Offsetting emissions, as used by Le Groupe La Poste, did not appear to be the appropriate tool for La Banque Postale, which operates exclusively in France. The bank therefore opted to set up an internal carbon fund financed by monetising its carbon footprint. The value was benchmarked against the average price on offset markets, i.e. €7 per tCO_2.

This enables La Banque Postale to remain consistent with group's offsetting policy.

The scope selected for application of this internal carbon footprint monetisation process includes Scope 1 and 2 emissions, and a portion of Scope 3 emissions (emissions related to commuting and paper consumption). Waste could be included in the near future.

The fund's proceeds are then used in two ways:

- To fund internal CO_2 emission reduction projects. Projects that enable the bank to reduce its climate footprint are part of a call for projects, and the best projects are given an internal subsidy to encourage their implementation. The economic and environmental profitability of the projects financed internally is measured at an early stage using a tool designed by consulting company Carbone 4. Accordingly, only low-carbon and profitable projects are selected by the Selection Committee.

- To fund an environmental project in France, in partnership with the group's Services-Mail-Parcels Division. The 2015 project involved optimising the management of forests in the Massif Central Region.

This system, which was launched in 2014, enabled the bank to achieve 20% of the emission reduction target that it had set itself. The fund's budget was sufficient to finance project requests in the first year (match with financing requests). The second year saw a marked increase in responses to the call for projects, which showed that employees were taking ownership of the tool.

A "secondary" effect of this internal tax is the fact that funding decreases by the same proportion as the emissions. It is therefore planned to increase the internal carbon price in order to maintain the fund's budget.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Finding the "right" price

How can the price which enables the company's policies to be best supported and directed be identified? It's not an easy task and, ultimately, it is specific to each company. However, there are benchmarks which can help companies determine this price.

Drawing inspiration from regulatory carbon pricing policies

The company can identify regulatory carbon pricing policies in locations where it operates and where its customers and suppliers are based:

- Economic models for future prices, in geographical regions where carbon pricing has been introduced or is in the pipeline;
- Emissions-abatement cost curves, if they exist.

This data enables a range of values for the internal pricing system to be determined. For instance, a company that is subject to emission trading systems or a regulatory carbon tax may use these levels as the lower limit for determining its price.

Drawing inspiration from existing internal carbon pricing initiatives to coordinate the price

The company may also draw inspiration from the internal carbon pricing systems used by other companies in identical or very similar sectors. A survey of prices[9] used by several hundred companies in all sectors and all countries shows wide diversity, with prices ranging from a few dollars to over US$350 per tCO_2e. However, on closer inspection, price ranges emerge on a sector-by-sector and region-by-region basis. These prices will become more refined as companies acquire more experience on this issue.

One trend in particular is emerging: the values used as the shadow price are higher than those used for the internal carbon tax. This may be explained by the fact that, unlike the shadow price, the tax actually implies the transfer of tangible funds on an immediate basis. It could also be assumed that the shadow price applies to medium- and

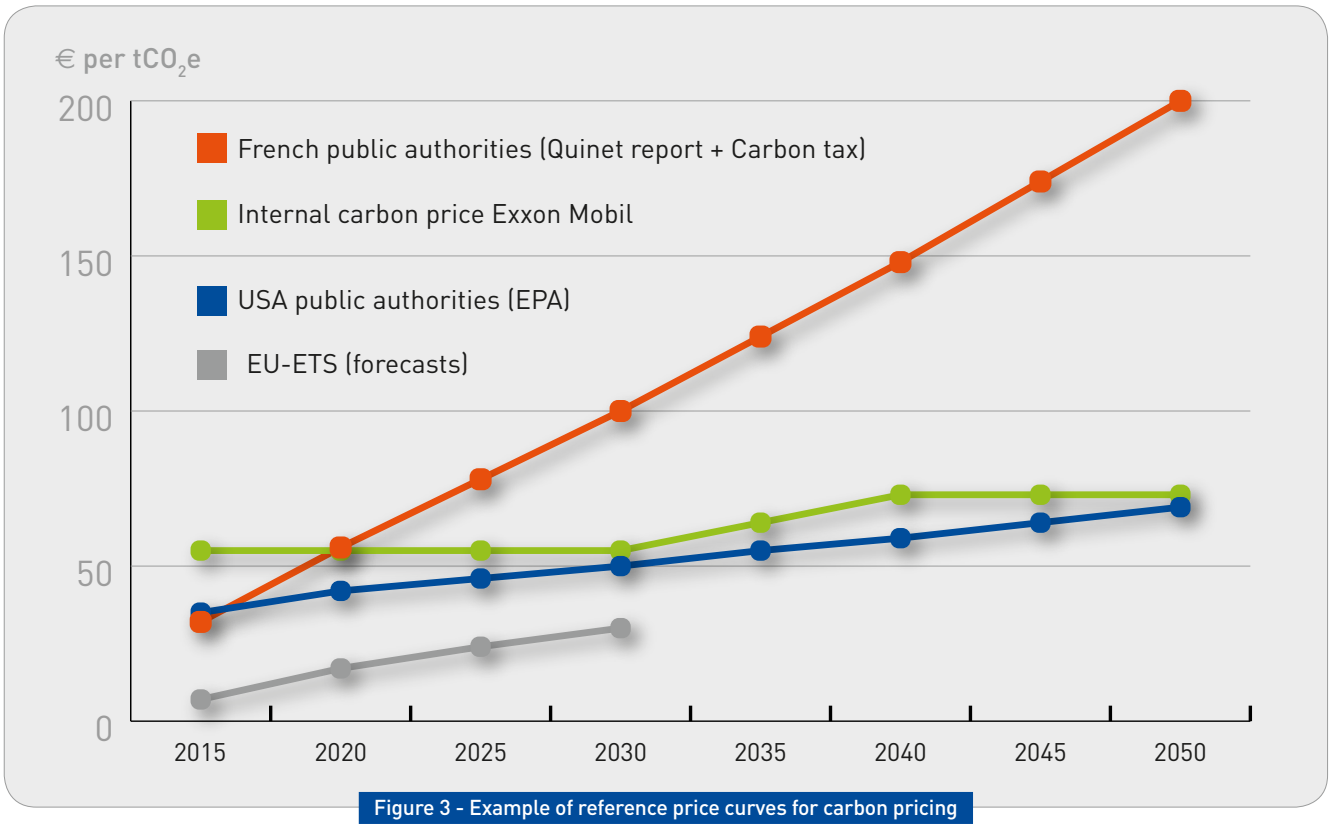

Figure 3 - Example of reference price curves for carbon pricing

long-term decisions, i.e. within timeframes where regulatory carbon prices are expected to be higher.

The range will undoubtedly narrow down as companies gain experience on this issue.

Drawing inspiration from external pricing benchmarks

Lastly, the company may use the prices available for making certain technology changes or producing this technology when they are unavailable. These are the pricing levels which, within a given geographical, temporal and regulatory context, enables the merit order between two competing technologies to be changed.

For instance, a recent research report prepared by RTE and ADEME[10] calculates that a price of €30 per tCO_2e is required to encourage natural gas-fired power plants instead of coal-fired power plants in Europe.

In France, the Quinet Report[11] also suggests a benchmark price: the regulatory carbon value is the one selected by the government to assess their investments and policies. This price, which has been determined by the State following multiple consultations with stakeholders, is supposed to be consistent with France's commitments to combating climate change. It is currently €50 per tCO_2e in 2025 and €100 per tCO_2e in 2030. In some ways, this price can help guide the public decision makers.

After these reflections, the price selected by the company's Senior Management will obviously be conservative and imperfect; however, the process of determining that price will provide it with a high degree of legitimacy within the company.

A single price?

It is possible to find several internal pricing mechanisms within the same company including, for instance, an internal carbon tax where the aim is to assign a value to immediate energy-efficiency initiatives for buildings and transport and a different shadow price for assessing longer-term investments. A range of internal carbon prices is possible and effective, as long as the mechanisms do

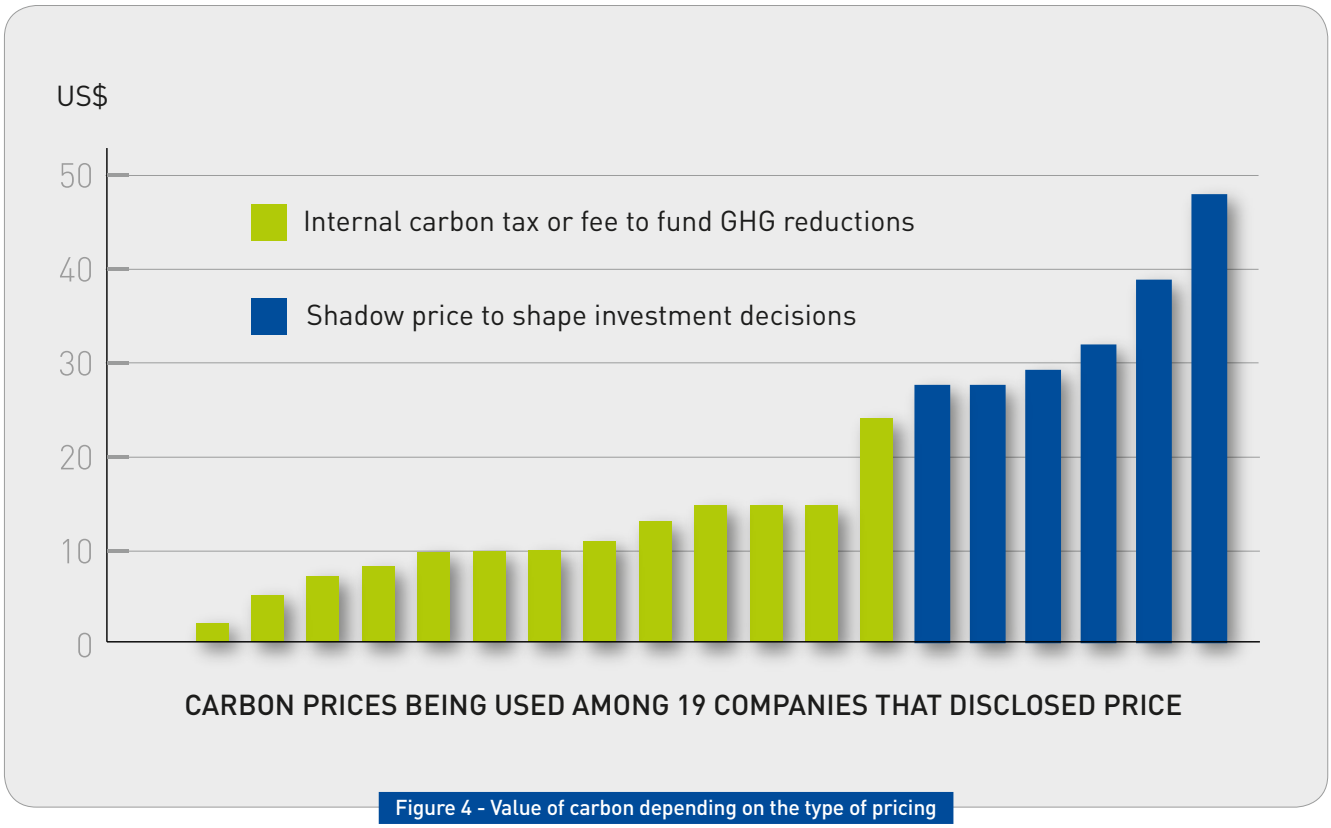

Figure 4 - Value of carbon depending on the type of pricing

(Source: Caring for Climate Business Forum, 2015. Executive Guide to Carbon Pricing Leadership. Consultation Draft)

VEOLIA
Shadow price

Background

The group has set itself very ambitious climate targets: achieving 100 $MtCO_2e$ of reduced emissions and achieve 50 $MtCO_2e$ of avoided emissions for the period spanning from 2015 to 2020. Furthermore, Veolia points out that it is less costly to pollute than not to pollute in many cases. This situation needs to be reversed, as it favours fossil fuels that generate the highest level of emissions, to the detriment of energy sources that generate lower emissions, such as using the inherent energy produced by waste or biomass. Accordingly, Veolia supports the introduction of regulatory carbon pricing, which will enable low carbon technologies to become more profitable and more attractive.

The introduction of an internal pricing system for greenhouse gas emissions is consistent with the argument in favour of a carbon tax, the proceeds of which would be reinvested in low-carbon solutions.

Initiatives

Veolia's strategy consists of introducing a "carbon pricing" factor to the business models of units located in geographical areas where carbon pricing exists or will enter into effect in the near future (Europe, China, South Korea, the US, etc.). In the case of business activities that are already subject to the EU ETS, price forecasts will be drawn up until 2030. Accordingly, business units must update their forecasts for future carbon prices. A risk matrix, to which the carbon risk has been added, is produced by the Risk Division, so that it can be taken into account by the Investment Committee. It should be stressed that this policy only takes the cost aspect into account. The income and opportunity aspects are not relevant at the current carbon price.

Veolia has determined its carbon price, which is expected to reach €31 per tCO_2e by 2030. This is a virtual price that enablesCO_2 emissions to be incorporated into investment decisions.

An initial assessment of the system has been carried out. It reveals a rapid roll-out of the strategy with participants at all levels have been included. Improved skills on the management of carbon risk are also evident within all business units. Support from the Group's Chairman and CEO, as well as pressure from shareholders on this issue, have enabled this rapid appropriation and strong internal commitment.

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VALLOUREC
Shadow price

Background

Vallourec is a world leader in premium tubular solutions providing the broadest range of seamless tubes and pipelines for the energy sector, particularly in the Oil and Gas markets, and for other applications. The Vallourec tubes, thanks to their high performance, help reduce GHG emissions of their customers in some of their processes.

Vallourec is a low GHG emitter regarding its production activity; firstly, because the main steelmaking process is based on recycling of scrap in electric arc furnaces; secondly, because of results of a detailed analysis released in 2015 on the carbon cycle of the Brazilian eucalyptus forests. This study, conducted with the assistance of academics and institutional experts, showed that the forests have, for a 30 year period, sequestered nearly 25% more carbon than it was previously estimated. This study has allowed to calculate the group's carbon footprint more accurately as of 2015.

As a responsible actor in the energy sector, since 2008, Vallourec has embarked on an ambitious energy efficiency program. This program has helped improve performance by nearly 15% through the implementation of "best practice" and the most advanced technologies. This program aims to ensure that the most important factories obtain the ISO 50001 certification. The program also reduces GHG emissions from operations and will be complemented by the recent introduction of an internal carbon price. This price, which will be applicable starting 1st January 2017, for practical reasons, aims to accelerate the transition to lowest-possible emitting technologies.

Initiatives

The establishment of an internal carbon price is a tool that will help:

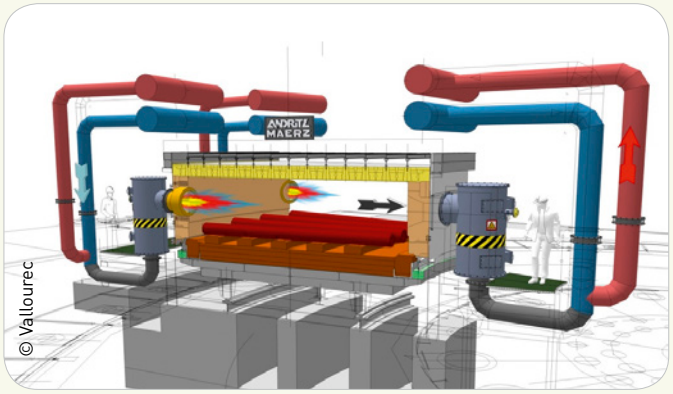
- Raise awareness among business leaders and project managers on issues related to carbon emissions;
- Assess the current or potential impact of a regulatory carbon price on new investment and R&D programs, and incorporate this impact into the risk management strategy;
- Align the group's practices with those of their most important customers, a significant number of which have already established an internal carbon price.

The corporate decision leads to apply an internal carbon price for industrial investments and R&D programs in their industrial effects and in the impact on their clients. This internal carbon price is applied for the projects discussed at the group level, i.e. over a financial threshold. The processes concerned mainly include steel making, tubes heat treatment and charcoal manufacturing.

The price was fixed for a period of five years and is the same for all group entities. The choice of price level results from the analysis of benchmarks and academic works on the subject. The final price is a little higher than the average observed among peers or energy sector companies.

The simulations performed on projects have already shown that the impact may be significant, thus legitimising the establishment of such a carbon price. The indicator used to evaluate the impact is the ratio of the present value of cash flows by the amount of investment.

The implementation will be accompanied by training programmes and methodological support in the coming months.



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For high-efficiency regenerative burners projects, internal carbon price may increase up to 50% the profitability of the project

not overlap and communications on the issue are clarified beforehand.

A company may also choose to apply different prices for the same tool, depending on the countries where it operates, or the decision-making timeframe, for instance. This scenario is particularly applicable to the case of the shadow prices and enables the price level to be adjusted to the context of each investment.

Moving to implementation

Once the internal carbon pricing level has been decided, companies usually choose to carry out a trial stage on a few entities before extending it to the company as a whole. The Steering Committee then launches the internal pricing programme to a limited area. The first results obtained are assessed and may be reviewed, before the system is rolled out more generally. This trial stage will also identify the reactions of the operating staff concerned and communications about the internal pricing system may be adjusted.

Applying an internal carbon price on its supplies can facilitate low-carbon freight

Monitoring the effects

Before implementing an internal pricing system, it may be useful to prepare for the evaluation of the initiative. This involves introducing performance indicators. These indicators will enable the programme to be assessed in view of the target goals following the first months and years of the experiment.

These indicators may be quantitative or qualitative:

- Percentage of the company's emissions covered by the policy;
- Percentage or number of projects that have been modified or refused due to the shadow price;
- R&D investments in low-carbon technologies;
- Average return on investment for projects considered as low-carbon;
- Number of projects supported by the internal tax;
- Amounts raised and reinvested via the internal tax;
- Reductions in GHG emissions since the implementation of the internal carbon pricing system;
- Expenditure avoided as the result of energy savings initiated by introduction of the internal pricing system;

Implementing the internal pricing system

Incorporating the price into day-to-day processes

Similar to economic tools, an internal carbon pricing system will have potential repercussions on many framework documents, valuation tools, reporting tools and functional policies. The Steering Committee may identify the documents and procedures that will need to incorporate the price, or ask the various functional and operating divisions to do so.

The documents and procedures will then be updated in accordance with the company's requirements. These documents may include:

- Rules, annual guidelines and tools for preparing plans, budgets and investment requests;
- The environmental or climate policy and its operational implementation;
- The purchasing policy, especially for energy commodities, energy-consuming equipment, company vehicles, etc.;
- The IT or Green IT policy;
- The environmental reporting process and supporting documents intended for external auditors;
- The pricing policy: this is an issue where decisions can be difficult, and few companies have currently adopted internal pricing systems that have led them to change their sale prices, which may be required if mandatory carbon prices were to become signifi-

cant. This is a major difference between the carbon tax, which creates a genuine expense for the operating entities (but is still currently at low levels), and the shadow price, which is only used as a decision-making tool and does not immediately change the company's cost structure;
- The company's internal and external communications;

Communication and training

Internally, carbon pricing mechanisms require awareness-building and training for relevant managers and teams, which may be perceived as a hindrance in terms of achieving operational and financial performance goals. Work performed at an early stage by the project backer and the Steering Committee, with support from the senior management, will enable the company to clearly communicate the goals of these programmes and their expected benefits. Furthermore, the strategic view supported by internal pricing programmes can be showcased.

Whatever the price, disclosing this information externally is not always desirable. Indeed, company can consider it as strategic, in the same way that information related to commodity prices or exchange rates for instance. This information can also be considered as confidential, as it gives a strong signal regarding the company's strategy: a company that uses a high price level is likely to make the transition to decarbonisation more quickly than another. The company may obviously decide to turn the pricing system into an external communication tool, in order to demonstrate its commitment to the climate and to encourage its partners to follow in the same direction, including to support government lobbying for the development of regulatory carbon pricing. Both attitudes, i.e. confidentiality and communication, exist among EpE's members.

SHADOW PRICE AND COMPETITIVENESS

The introduction of a shadow price on carbon into the process for assessing a company's investment plans is an internal tool for strengthening the management of risks relating to climate change. A value for the carbon price is introduced into the financial analysis for the project, which establishes predicted cash flows and calculates the project's rate of return. The company then makes the choice to add a carbon price to the project's costs as a new component of its cost structure. Although this carbon value leads to favouring the selection of an investment plan with lower carbon intensity, it cannot conversely be taken into consideration for operating decisions relating to the use of the existing infrastructure.

In the case of the energy sector, for instance, a shadow carbon price may be used to promote a decision to invest in power generation plants with a lower carbon intensity, e.g. gas-fired power plants rather than coal-fired power plants. Conversely, in terms of the operational management of their power plants, power suppliers cannot introduce a virtual carbon price in order to justify the merit order of the power plants.

Assessing the effects of internal pricing

This stage enables the company to assess the degree to which the set goals have been achieved and to then make the necessary adjustments, in terms of both the pricing level and the scope of application, to boost the effectiveness of the instrument.

The success of the assessment depends on the accuracy with which the initial targets were defined, as well as on the quality of the indicators designed. Identifying the appropriate indicators for measuring the effects of the mechanism beforehand is particularly useful.

In essence, however, the short-term assessment of an internal carbon pricing programme is complex. The tool has an influence on projects with a large number of determining factors, and its informative effect is often significant but hard to measure. Although it is important to monitor indicators and the trends they feed into, the effectiveness of the programme can only really be assessed over the long term.

In the case of the shadow price, ex-post assessment methods may be used. For instance, the Steering Committee may assess the profitability of the investment plans that have been approved by including the shadow price and comparing it to what it would have been without the price.

Adopting a shadow carbon price also means taking a risk: selecting investments that would only be profitable if there was a high carbon price in the future could ultimately cause the company problems if governments adopt decarbonisation policies at a slower rate than expected. This is also one of the merits of internal carbon pricing mechanisms in the social decarbonisation process: it is in the interest of companies that adopt such mechanisms to ensure that States adopt more ambitious pricing policies.

Conclusion

Integrate climate into management decisions using internal carbon pricing

Aside from being a historical document, the Paris Agreement requires all stakeholders, states, companies and local authorities to take joint action in order to ensure the transition to "net zero emission" societies. Internal carbon pricing systems are one tool that companies can use to make progress in this direction and turn the transition into an opportunity.

Internal carbon pricing is a practice that is still emerging. Feedback from EpE members, some of whom launched their programmes over a decade ago, shows that internal carbon pricing systems can play several roles:

- **An educational tool:** implementing a corporate pricing programme involves a large number of stakeholders, including operating staff, middle management, finance divisions and senior management. Specifically, by incorporating climate change into investment decisions and corporate management, and by making it an economic variable, the programme makes it a joint challenge, which is shared by everyone. It also popularises the idea of a carbon pricing system, which is a concept that is often still considered as obscure, but whose gradual mainstreaming will be essential for global decarbonisation;

- **An invitation to innovation:** internal carbon pricing results in project backers incorporating climate change alongside other variables that are usually taken into account, regardless of whether the project involves operating investments, research on new products and services, or the development of new business activities. Like any additional constraint, it generates new solutions in order to meet this new challenge. Consequently, companies are able to accelerate their positioning in a global "green race";

- **An instrument for anticipating and accelerating regulations:** voluntary carbon pricing today shows that a company is anticipating the appearance of regulatory prices in the short- or medium-term and that the company supports such policies. Incorporating a carbon pricing signal in day-to-day business activities enables the company to turn regulatory risks into opportunities, to train its teams and to steer its strategy in the direction of the transition to a low-carbon economy.

- **Carbon pricing is a tool, not a goal:** the aim is not to take the view that introducing carbon pricing is an end in itself. It is a tool that supports a broader climate strategy.

Companies are increasingly improving the way in which they incorporate climate change into how their business activities are conducted. Above all, the development of internal carbon pricing initiatives shows that companies share a vision in which one or several carbon prices exist in the world. They are anticipating a world where states will take significant measures to combat climate change and have placed themselves on the pathway towards +2°C.

In doing so, they are sending a challenging message to governments and international institutions: companies are preparing for the transition to low-carbon economies, developing tools to support their transition and are putting themselves in a position whereby more ambitious climate policies are in their own interests.

EpE and I4CE hope that you will find this brochure useful for taking action yourselves, and will join a group that includes the most dynamic stakeholders in the decarbonisation process.

Carbon prices around the world

Table showing carbon prices around the world

Country / Region	Carbon pricing tool	Status	Implementation	Sectorial coverage	Price in euros
Canada, Alberta	SGER	*Active*	*2007*	Power (generation and cogeneration); industries (chemicals, pulp and paper, stone, clay and glass, fertilize, metal, wood, concrete,); processing coal, heaby oil, oil sands or minerals; processing food; waste; fossil fuel (solid, liquid or gaseous fuels)	14
	Carbon Tax	*Scheduled*	*2017*	Applied to all fuels that emit greenhouse gases when combusted (including transportation and heating fuels such as diesel, gasoline, natural gas, propane)	14
Canada, British Columbia	Carbon Tax	*Active*	*2008*	Carbon tax applies to the purchase or use of fuels such as gasoline, diesel, natural gas, heating fuel, propan, coal and other combustibles	28
Canada, Ontario	ETS	*Scheduled*	*2017*	Power sector (including imported electricity and natural gas distribution), industry, and petroleum product suppliers	-
Canada, Quebec	ETS	*Active*	*2013*	Electricity generation; industries; fossil fuel distributors and importers for transportation, building and small business sectors	12
Chile	Carbon Tax	*Scheduled*	*2017*	Stationary thermal generation sources with output equal to, or greater than 50MW	4.5
China	ETS	*Scheduled*	*2017*	Power (generation, heat-power cogeneration and grid operators); Petrochemicals (crude oil refining and processing, ethylene); Chemicals (methanol, ammonia, carbide); Iron & Steel; Non-ferrous metals (copper smelting, electrolytic aluminum); Building production and materials (clinker, plate glass); Pulp & Paper and Aviation (civil commercial, cargo, and airportd)	-
China, Beijing	ETS	*Pilots*	*2013*	Power and heat generation; industries (cement, petrochemical, car manufacturing); public buildings; banks; public transportation and airports	6.0

Appendix –Carbon prices around the world

Country / Region	Carbon pricing tool	Status	Implementation	Sectorial coverage	Price in euros
China, Chongqing	ETS	*Pilots*	*2014*	Electro-plated; industries (aluminum, metal alloy , calcium carbide, caustic soda, cement, steel & iron)	1.5
China, Guangdong	ETS	*Pilots*	*2013*	Power; industries (cement, steel, ceramics, petrochemical, non-ferrous metals, plastics, paper, textiles, chemicals); aviation	1.9
China, Hubei	ETS	*Pilots*	*2014*	Power generation; industries (steel, chemical, cement, automobile manufacturing, , non-ferrous metals, glass, pulp and paper)	2.7
China, Shanghai	ETS	*Pilots*	*2013*	Power generation; industries (steel, petrochemical, chemical, non-ferrous metal, building materials, textile, paper, rubber and chemical, fiber); local ship traffic	1.0
China, Shenzhen	ETS	*Pilots*	*2013*	Power; gas and water supply; industries, public use buildings	5.6
China, Tianjin	ETS	*Pilots*	*2013*	Electricity and heat geenration; Industries (Iron and steel, chemicals, petrochemical); oil and gas mining; civil construction	2.9
Denmark	Carbon Tax	*Active*	*1992*	Consumption of fuels including (coal, gas and oil). Electricity generators and industries covered by EU ETS are excempt	23
Estonia	Carbon Tax	*Active*	*2006*	Thermal energy generators (including those in the EU ETS)	2.0
European Union	ETS	*Active*	*2005*	Power and heat generation; industrial processes (oil refineries, coke ovens, iron and steel plants); industries (cement, glass, lime, bricks, ceramics, pulp, paper and board, petrochemicals, ammonia, non-ferrous metals, gypsum and, aluminum, nitric, adipic and glyoxylic acid); commercial aviation, CCS networks	5.5
Finland	Carbon Tax	*Active*	*1990*	Transport fuels and heating fuels	55-58
France	Carbon Tax	*Active*	*2014*	Fossil fuels usage (natural gas, coal, fioul, superethanol E85, biofuels, gas, diesel)	22

Appendix –Carbon prices around the world

Country / Region	Carbon pricing tool	Status	Implementation	Sectorial coverage	Price in euros
Iceland	Carbon Tax	*Active*	*2010*	Fossil fuels usage (in liquid or gaseous form)	39 - 54
Japan	Carbon Tax	*Active*	*2012*	Fossil fuel usage (oil, natural gas and coal)	2.6
Japan, Saitama	ETS	*Active*	*2011*	Consumption of fuels, heat and electricity by business entities	NC
Japan, Tokyo	ETS	*Active*	*2010*	electricity consumption by office, commercial and public buildings; district heating and cooling plants	9.0 - 54
Latvia	Carbon Tax	*Active*	*2006*	Fuel combustion installations, ferrous metals, cement clinker, glass, ceramic, pulp and paper - if the amount of the activity (installation) is below the limit defined for inclusion in EU ETS	3.5
			2004	Cars and motorcycles based on the amount of CO2 they generated. Need to be paid the first time the owner is going to registered the vehicle	
Mexico	Carbon Tax	*Active*	*2014*	All Fossil fuel usage (generation and importation) except natural gas	0.9-1.8
New Zealand	ETS	*Active*	*2008*	Forestry; liquid fossil fuels; power generation; industrial processess (iron, steel, aluminium, glass, sulphur hexafluoride, Importing hydrofluorocarbons or perfluorocarbons, Importing or manufacturing synthetic fertilisers containing nitroge); waste (disposal facility)	7.8
Norway	Carbon Tax	*Active*	*1991*	Petroleum activities; select mineral oil activities, petrol, natural gas, LPG	30-134
Portugal	Carbon Tax	*Active*	*2015*	Applies to all energy products that are used in non-EU ETS sectors	6.7
Slovenia	Carbon Tax	*Active*	*1996*	Producers and importers of all fossil fuels (liquid, gaseous and solid fuels) outside of EU ETS	17

Appendix –Carbon prices around the world

Country / Region	Carbon pricing tool	Status	Implementation	Sectorial coverage	Price in euros
South Africa	Carbon Tax	*Scheduled*	*2017*	Emissions from fossil fuel combustion and industrial processess (energy, industry and transport sectors)	7.5
South Korea	ETS	*Active*	*2015*	power & heat; 23 industries (including steel, cement, petrochemicals...); refineries; buildings; waste and aviation	13
Sweden	Carbon Tax	*Active*	*1991*	All fossil fuels not covered by EU ETS and motor fuels	96
Switzerland	Carbon Tax	*Active*	*2008*	Fossil thermal fuels (heating oil, coal, petroleum cole, natural gas...) used for electricity or heat generation	77
	ETS	*Active*	*2008*	distric heating; industries (aluminium, cement, ceramics, coke, chemicals, ferrousand non-ferrous metals, glass, lime, pharmaceuticals, refineries, steel, pulp &paper, nitric acid, adipic acid, glyocal, ammonia, hydrogen, soda and sodium bicarbonate)	8.3
United Kingdom	Carbon Tax	*Active*	*2013*	Fossil fuels usage (natural gas, Liquefied petroleum gas coal and other taxable solid fossil fuels, gas oil, rebated bio-blend, kerosene, fuel oil and other heavy oil, rebated ligh oil)	21
USA, California	ETS	*Active*	*2013*	Power (electricity generation, self-generation and importation, cogeneration, petroleum and natural gas systems, petroleum refining); industries (cement glass production, hydrogen, iron and steel, lead, lime, nitric acid production, pulp and paper); suppliers of CO2 suppliers, suppliers of reformulated blendstock for oxygenate blending (RBOB) and distillate fuel oil, of Liquid petroleum gas, of Liquide natural gas	12
USA, RGGI	ETS	*Active*	*2013*	Fossil fuel electricity generation	4.4

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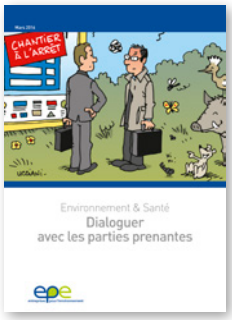
Latest EpE publications

'Entreprises pour l'Environnement', EpE, created in 1992, is an association of around fifty large French and international companies from all sectors of the economy, who want to make environmental considerations a greater part of both their strategies and their day-to-day management.
EpE does most of its work through permanent and temporary committees and working groups. They focus on newly emerging and forward-looking subjects such as climate change, the link between health and environment, environmental foresight, biodiversity, the green economy and others. Some of this work is published. It can be found on the EpE's website: **www.epe-asso.org**



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March 2016

Measuring and managing water
April 2015

Business Strategies for Climate
March 2015

Business Strategies for Climate: Transport
Novembre 2014

Les entreprises et l'adaptation au changement climatique (in French)
April 2014

Mesurer et piloter la biodiversité (in French)
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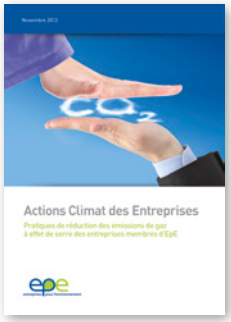

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Mai 2011

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October 2013

Acknowledgements

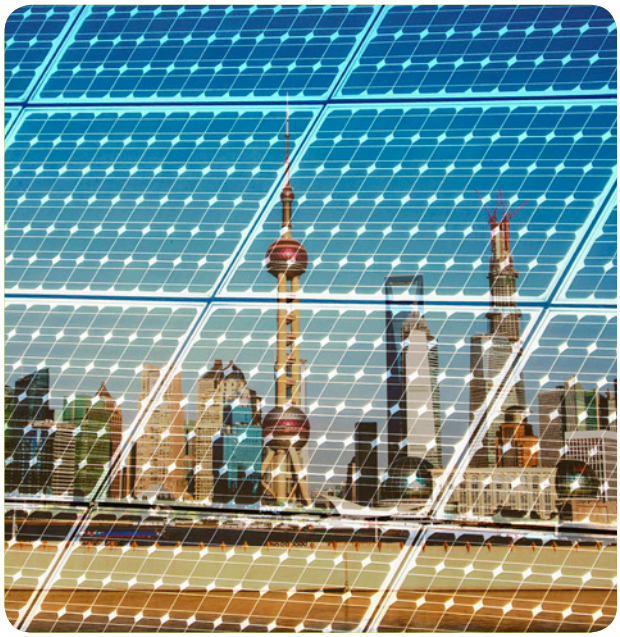
This brochure is the result of the work conducted by the Climate Change Commission and during the workshop on internal carbon pricing organised by EpE in April 2016. It was jointly drafted by EpE and I4CE, and brings together EpE members' experience and best practices in terms of voluntary corporate emission pricing mechanisms. I4CE has added its views and expertise on climate and energy-related, economic and political instruments in France and throughout the world.

EpE would like to thank Séverin Fischer (BNP Paribas), Chair of the EpE Climate Change Commission, for his involvement in this group's work and in the workshop preparation. EpE would also like to thank the many representatives of member companies who shared their experience, attended the working meetings and contributed to this publication.
EpE and I4CE would like to thank the external experts, scientists and representatives of government authorities and voluntary organisations for their contribution, especially Pascal Canfin (General director, WWF France), Alain Grandjean (Economist and co-funder, Carbone 4) and Tom Kerr (Principal Climate Policy Officer, International Finance Corporation, Carbon Pricing Leadership Coalition, World Bank Group).

EpE and I4CE would like to thank Emilie Alberola and Marion Afriat, who are respectively the Programme Director and Project Head of I4CE's Industry, Energy and Climate Unit (IEC Unit), for their contribution to drafting this document, and Lara Dahan and Manasvini Vaidyula, who are respectively two research followers of IEC Unit, for their precious review for the English version.

Lastly, EpE and I4CE would like to thank Julien Colas, the Head of EpE's Energy & Climate division, and Jean-Daniel Houéto, project coordinator, who drafted this publication.

Claire Tutenuit, General delegate of EpE
Benoît Leguet, Director of I4CE



Cover photograph
The reflection of the Oriental Pearl Tower in Shanghai

At a time when it could soon become the world's leading economic power, China is facing new challenges. The country has made huge efforts in terms of energy efficiency and developing renewable energies over the past few years. However, its strong economic growth makes it heavily dependent on fossil fuels, of which China is the world's largest importer. Furthermore, Chinese growth has been achieved at significant cost to the environment. In particular, the air is saturated with particles, primarily due to the development of coal-fired power plants and road transport.
Against this backdrop, after operating seven regional pilot markets, China has committed itself to introducing a domestic emission trading system in 2017, which will put a price on around 50% of its emissions.
Companies with an internal price will already have anticipated the consequences of this policy for their projects.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