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INPUTS FOR THE STIGLITZ-STERN COMMISSION

HOW TO MAKE THE REPORT THE MOST COMPREHENSIBLE AND IMPACTING FOR
PUBLIC AND PRIVATE DECISION MAKERS TO FOSTER THEIR CLIMATE ACTIONS

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I4CE thanks the World Bank for its invitation to provide inputs for the Stiglitz-Stern Commission. In our input, we would like to share some recommendations to the Commission to make its deliverable the most comprehensible and impacting one for policy makers, economic players, national and subnational governments and companies to foster their climate actions. We would also like to provide some results from our latest publications giving useful examples, case studies or key figures that could be of interest for the Commission's report.

An institutionalized indicative “confidence corridor” of carbon values to foster climate action is needed to reach the targets of the Paris Agreement

As demonstrated by several reports¹, governments, corporations and local communities have many options for minimizing climate change damages and encouraging the development of our economies towards a more low-carbon and climate resilient model. However, they must choose between conflicting priorities and objectives that are not always compatible with the target established by the Paris Agreement in 2015 of bringing net carbon emissions to zero in the second half our 21st century.

Over a decade, putting a price on GHG emissions has become a key and recognized policy to support the transition towards long-term emissions reductions targets. It is now well-established that carbon pricing policies are necessary for an efficient low-carbon transition toward. Indeed, it is an efficient way to reveal prices or costs of emitting one tonne of CO₂ for covered sectors

¹ Including, but not limited to, “Fay, Marianne; Hallegatte, Stephane; Vogt-Schilb, Adrien; Rozenberg, Julie; Narloch, Ulf; Kerr, Tom. 2015. *Decarbonizing Development: Three Steps to a Zero-Carbon Future*. Washington, DC: World Bank; The New Climate Economy Report, *Better Growth, Better Climate*, 2015.

and to raise revenues for governments, which can be used to support the low-carbon development or to reduce other taxes. However, given the many market and behavioral failures carbon pricing alone is not sufficient to drive the climate transition. Policy makers also need to adopt a package of climate aligned policies and measures such as targeted investment subsidies, standards and mandates, corporate and financial institutions communication obligations on their climate-risks, or fixing a public shadow carbon price that trigger the required changes in investment patterns, behaviors, and technologies.

The slow but increasing bottom-up progress of GHG emissions pricing policies and practices among countries and sectors means that most emissions are still not internalized by economic markets, and more broadly by the most part of economic decision makers. Stimulating the climate action by the institutionalization of indicative carbon values could definitively help the design of carbon pricing instruments and other climate policies, regulations, and measures to incentivize bold climate action and stimulate learning and innovation to deliver on the ambition of the Paris Agreement and support the achievement of the Sustainable Development Goals.

I4CE'S RECOMMENDATIONS TO THE COMMISSION

Providing a single range of carbon values by 2050 will be useful, however **we advise the Commission to strive to institutionalize a "confidence corridor" of indicative carbon values evolving over the next decades.** In defining this indicative corridor of carbon values/prices, the Commission should focus their efforts on explaining their underlying assumptions and on providing calculations and methodologies that can generate carbon values that can be applicable to various actors including state/non-state actors, companies, etc., in their specific context.

The aim of the Commission being to provide guidance and advice to economic actors, governments, and international agencies on how to value their climate actions and investments, **we recommend that the Commission deliver three major outcomes:**

- 1. Define a vision of what a net-zero emission world by 2050 requires,** explaining conditions to achieve this Paris agreement target and all underlying assumptions by providing a range of appropriate social carbon costs.
- 2. Provide guidance for policy-makers and economic players to develop their own price that reflects national and local circumstances** – the report could provide an explicit insight on how a low-carbon vision can be translated into and achieved by applying a carbon price or value. To secure the future development of climate action, the report could be in a format that can be adopted and disseminated by bodies involved in the climate debate or in action such as the Global Climate Action Agenda.
- 3. Establish a process that continues to support the updating of the “confidence corridor” after the report has been released.** This could inter alia involve establishing a framework to update and insert carbon values into the Global Climate Change Agenda, UNFCCC, Paris Agreement landscape, etc.

1. The appropriate social carbon value related with the vision of a net-zero emission world by 2050

The appropriate value of avoided carbon emissions depends on how decision-makers envisage a world in the future. In the new Paris agreement regime, its objective of moving towards a net-zero emissions world - has to be used as the main anchor for estimating the values of carbon.

Preparing the implementation of the Paris climate agreement by 2020, policymakers want to know how they can act most effectively to achieve the long-term goal limit global temperature increase to well below 2 °C, and reach global net-zero emissions by 2100. With such objectives of the Paris Agreement, a carbon value can be estimated to achieve it, meaning the value of avoided emissions. Any estimate of the carbon price trajectories consistent with a carbon concentration goal will depend on many assumptions about what the net-zero emissions world looks like: sectors, technologies, policy actions or no policy actions, technical progress, individual and collective behaviors, etc... The aim of the Commission could be to deliver a range of carbon values as the social value of the most cost and social-effective pathway to achieve the Paris Agreement objectives.

Based on a bottom-up process, the Paris Agreement codifies an international system of differentiated and voluntary climate policy formation, stimulating States' climate actions according to their national considerations and interests, with a global top-down net-zero emissions target before 2100. Decarbonizing our economies by taking into account national circumstances and sector dynamics, in order to maximize benefits of climate actions, leads to moving towards a mosaic of carbon price signals around the world rather than to defining a single global carbon price. As we are currently learning (in Europe), carbon price signals are necessary but insufficient. Decarbonisation facing too many obstacles especially the uncertainty of costs and benefits, strong complementary political signals are required to avoid getting stuck in technological and economic "dead ends" that would hinder the achievement of the targets.

In doing so, the appropriate way to achieve a given reduction in emissions - by 2030 for instance - depends on the long-term goal - by 2050 for instance - and speed of implementation. In this perspective, targeting options to low-carbon investments more expensive today makes sense (Decarbonising Development, World Bank, 2015). So every country needs to define a long-term target by 2050 for instance² that is consistent with decarbonization and to build short-term, sector-specific plans that contribute to that target and are adapted to the country's wealth, endowments, and capacity. Many options with high climate potential such as renewable energies or removals of fossil fuel subsidies offer immediate local co-benefits, so that early action need not represent a trade-off with short-term development goals.

Decarbonisation pathways (national GHG targets, sector specific GHG targets) and their speed of implementation can be translated into a computed or estimated social carbon value necessary to achieve long-term emission reduction goals. This indicative carbon value should encourage policy makers to make their climate policy framework more coherent and effective and economic market players to allocate finance flows in an optimal manner, minimizing the overall cost of achieving a given pollution target. In order to generate the needed shifts in investments and behaviors, public and private actors could use this indicative social carbon value as a "compass value" to guide their policy or investment decisions:

²As submitted by France at the UNFCCC on 29 December 2016 <http://newsroom.unfccc.int/unfccc-newsroom/france-submits-long-term-national-climate-plan/>

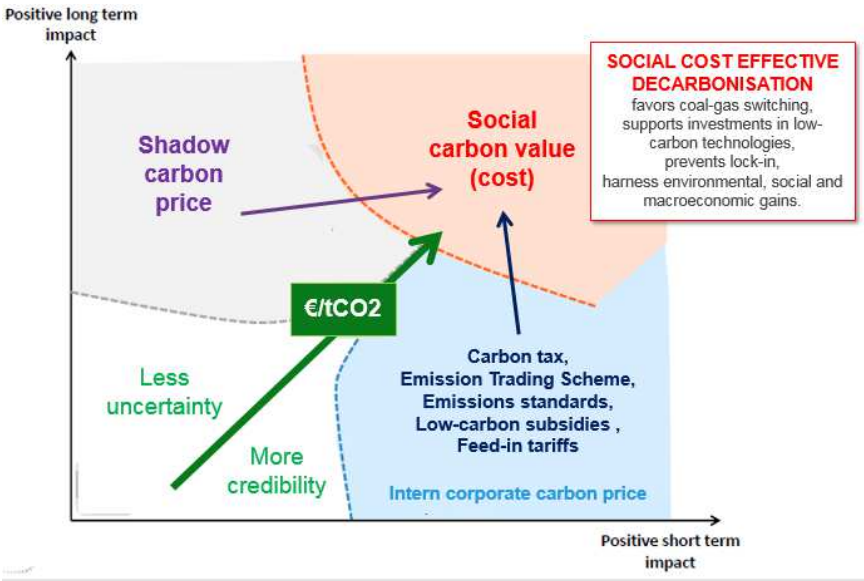
Defining a corridor of indicative carbon values would help to feed into overarching climate action platforms such as the Global Climate Action Agenda (GCAA) and potentially create opportunities to put these values within the Paris Agreement framework which fully endorses the development of these figures.³ The report could recognize and highlight that implementing an implicit or explicit value on carbon as an important part of a well-rounded decarbonization strategy has yet to be exploited for its maximum potential on a global scale. Looking forward, if the report is able to succeed in engaging various political and economic stakeholders to develop their own carbon values, the emergence of international cooperation to expand the scope and effect of this exercise could be thereafter envisaged.

2. An indicative corridor of carbon values applicable by various actors

The Commission could make sure that their values and value construction process is inclusive so that it can embark everyone on board the low-carbon transition. The report could focus on providing explicit insight into how calculations were developed and how they can translate into a toolbox that helps align adopters with Paris goals (net-zero emissions, generating funds for climate finance, adoption of new technologies), Sustainable Development Goals etc.

The report and its indicative “confidence corridor” of carbon values could help create the necessary impetus for stakeholders to define their own carbon values to assist them to align flows and decision making to help flesh out their long-term visions and act as a compass to navigate an increasingly carbon constricted future, as illustrated in Figure 1.

FIGURE 1 - A SOCIAL VALUE OF CARBON: THE COMPASS VALUE FOR COORDINATING SHORT-TERM DECISIONS TOWARDS A NET-ZERO CARBON WORLD



Source: I4CE, 2016

³ Decision 109 of the Paris Agreement (Enhanced action Prior to 2020) recognized the social, economic and environmental value of voluntary mitigation actions and their co benefits for adaptation health and sustainable development and its Decision 137 (Non-party stakeholders) recognizes the important role of providing incentives for emission reduction activities, including tools such as domestic policies and carbon pricing.

The report could be established and designed as a **confidence-building tool**, in the sense that actors should trust that it is in their benefit to explore and apply these methodologies to discover a carbon “value” that can be integrated into their decision-making processes. The report could aim not at prescribing a single carbon value, but rather a range that can be refined by stakeholders and tailored to their own vision/needs using different methodologies referred by the Commission and a step-by-step process as illustrated in Figure 2. This would help create meaningful engagement in the development of carbon pricing policies or practices and create the necessary impetus to support public and private stakeholders to start investigations on their own carbon price. The result should be an orientation paper that begins the process for actors to establish their own prices and do their own research.

FIGURE 2 – A STEP-BY-STEP PROCESS FOR POLICY-MAKERS AND ECONOMIC PLAYERS TO DEVELOP THEIR OWN CARBON PRICE REFLECTING NATIONAL AND LOCAL CIRCUMSTANCES

OBJECTIVE OF THE STIGLITZ-STERN COMMISSION	Providing an indicative corridor of carbon prices to guide the design of carbon pricing instruments and other policies, regulations and measures to incentivize bold climate action to deliver on the PA and to support the SD goals			
STEP 1: REVEALING SOCIAL CARBON VALUES (COSTS AND BENEFITS)	Social carbon values can be estimated at national, regional or sector levels to reveal the costs and benefits of the climate action.			
STEP 2: SUPPORTING LEGAL CLIMATE ACTIONS	Carbon pricing policies (taxes, Emissions trading schemes, regulations, public shadow prices)	Alignment of Public policies to the 2°C target (climate policies, fiscal reforms, industrial policies, energy efficiency policies, renewables policies, etc..)		Financial regulations (prudential norms, risk assessment...)
STEP 3: STIMULATING THE EMERGENCE OF CARBON PRICES/VALUES/PRACTICES FOR CLIMATE ACTION	Explicit carbon value (ETS or taxes)	Implicit carbon values (Standards)	Shadow carbon price (financial analysis with the risk to future cash flows)	Social carbon cost (economic analysis of costs and benefits)

Source: I4CE, 2016

The Commission could endeavor to demonstrate that developing these values is in the best interest of all stakeholders and by doing so the methodology should clearly assist in defining “what’s in it for me” for the user. This can be done by highlighting trends in carbon pricing (at all level; corporate, national, subnational), identifying examples and case studies, and sharing best practices.

In addition, the commission could provide a ‘practitioners guide’ detailing how to apply these methodologies, and if applicable figures, and describe the implicit assumptions that helped develop the methodologies (e.g. discount rate/time horizon?). It could emphasize that stakeholders should develop their values according to their desired goals and design their value range accordingly. In doing so the Commission may wish to consider how methodologies can be applied to illustrate the direct and indirect financial and social benefits and practicality of adopting carbon pricing values. By adopting this approach, the acceptability of carbon pricing methodologies could be enhanced and become a starting point from which stakeholders can integrate climate considerations at all levels of the economy i.e. used to measure climate risk (for companies), used to reduce health costs (for governments) etc...

Options to translate these indicative social carbon values into actions are multiple.

- **Governments** can design **explicit carbon pricing policies** through emissions trading schemes and carbon taxes⁴, raising carbon revenues that can be used to support the low-carbon development or to reduce other taxes according to national priorities⁵. Governments can also define **standards** for promoting low-carbon technologies and finance through **subsidies for supporting low-carbon innovation**. Furthermore, fostering the needed shifts in investments and financial behaviors, governments have to establish an economic environment that make the low-carbon business model financially viable by implementing policies, measures, regulations compatible with the net-zero emissions world⁶. In addition, governments can decide to fix the long-term social carbon value in their legislations by **establishing a public shadow carbon price**⁷. Finally, in order to help financial institutions to improve issue guidance explicitly recognizing climate risks as material, public regulators can also aim at getting a better information on alignment of finance flows in favor of the low-carbon transition.

Two examples in France can be seen as a first experience at the global level.

- Financial institution should be able to assess and, where feasible, mitigate their investments climate risks accordingly. In doing so, in August 2015, the French Energy Transition Law (Article 173)⁸ requires French institutional investors to disclose information on sustainability factors in their investment criteria, and to explain how they take into account exposure to climate risks and how they measure greenhouse gas emissions associated with assets held in their portfolios.
 - In August 2015, the French Energy Transition Law (Article 174)⁹ calls the government to provide in the annex to the Finance Act of the Year, a report on the financing of the energy transition, quantifying and analyzing the public financial resources and evaluating the private financial means used to finance the energy transition to achieve the low-carbon objectives. In this Finance Act 2017, the French Government used the “Landscape of climate finance in France in 2014” published by I4CE¹⁰.
- **Private companies** can also use these indicative social carbon values as the main anchor among a benchmark of other carbon pricing values for estimating their own intern shadow carbon prices¹¹.
 - **Financial institutions** can also use these indicative social carbon values for considering climate related risks into their allocation decision-making process and for managing priorities and objectives that span multiple time horizons to plan their actions¹². Among the increasing number of financial institutions developing or improving their investment

⁴ As illustrated in Annex 1 – Figure 3: Map of explicit carbon prices around the world, I4CE. 2016.

⁵ As illustrated in Annex 1 – Figure 6: Recycling carbon revenues, I4CE. 2016.

⁶ As illustrated in Annex 2 – Figure 7: Economic and Investment Environment and the financial value chain, I4CE. 2016.

⁷ As illustrated in Annex 1– Figure 5: The shadow carbon price of France, CAS. 2009

⁸<https://www.legifrance.gouv.fr/affichTexteArticle.do?idArticle=JORFARTI000031045547&cidTexte=LEGITEXT000031047847&categorieLien=id>

⁹<https://www.legifrance.gouv.fr/affichTexteArticle.do?idArticle=JORFARTI000031045569&cidTexte=LEGITEXT000031047847&categorieLien=id>

¹⁰ As illustrated in Annex 2– Figure 8: The landscape of climate finance in France in 2014, I4CE. 2016.

¹¹ As illustrated in Annex 1– Figure 4: Examples of reference price curves for carbon pricing, I4CE and EPE. 2016.

¹² As illustrated in Annex 2– Figure 9: Examples of different development financial institution objectives across time horizons, I4CE and EPE. 2016.

decision making methodologies¹³, carbon can be priced in two different ways. First, they take into account climate risk in their financial analysis, though the use of a shadow price of carbon (i.e. what is the risk to future cash flows). Second, they can define in their economic analysis (costs/benefits) – the social cost of carbon (i.e. what is the public benefit from intervention). It's important to differentiate the two, as they are conducted by very different parts of institutions at times using different methods. The biggest difference is that of the discount rate used with many Multilateral Development Banks using discount rates ranging from 12 to 15% - this completely kills the future value of climate benefits and prioritizes short term gains over 'Sustainable' development. This value has not been arrived at through a technical process, but rather a political negotiation.

3. Updating the “confidence corridor” of carbon values over time to raise ambition

The report could be a useful starting point for an *ad hoc* body dedicated to helping actors define, revise and enhance their carbon values. Once enough actors have engaged in the process and developed their own ranges and applications for the provided methodologies, a basis for collaboration could emerge.

The Stiglitz-Stern Commission could thereafter establish a process that continues to support the development of carbon pricing policies and practices after the disclosure of the report. It could look towards launching a process that brings together stakeholder experiences developing these values with a vision to enhance the process at a later stage. This follow up process should aim to establish a way to:

- a) Update values over time to reflect changing national and international contexts and for ranges to “fit in” with overarching climate framework i.e. the Global Stocktake and Transparency framework of the Paris Agreement.
- b) Build on existing capacities (i.e. GHG methodologies provided by the UNFCCC etc). It could also involve providing more insight or support on issues that have been left aside by the report itself and/or its first calculations/methodologies.
- c) Assessing and promoting the impacts of this confidence interval for carbon values with supported research on its effectiveness, join/develop coalitions to help expand and research, spread best practices and extend the scope and coverage of carbon values. Additionally, the Commission could also clearly potentially look for ways to scale up the impact of these values through cooperation at the international levels, or by providing values as indicators in Paris Agreement /Global Climate Change Action Agenda under the UNFCCC.

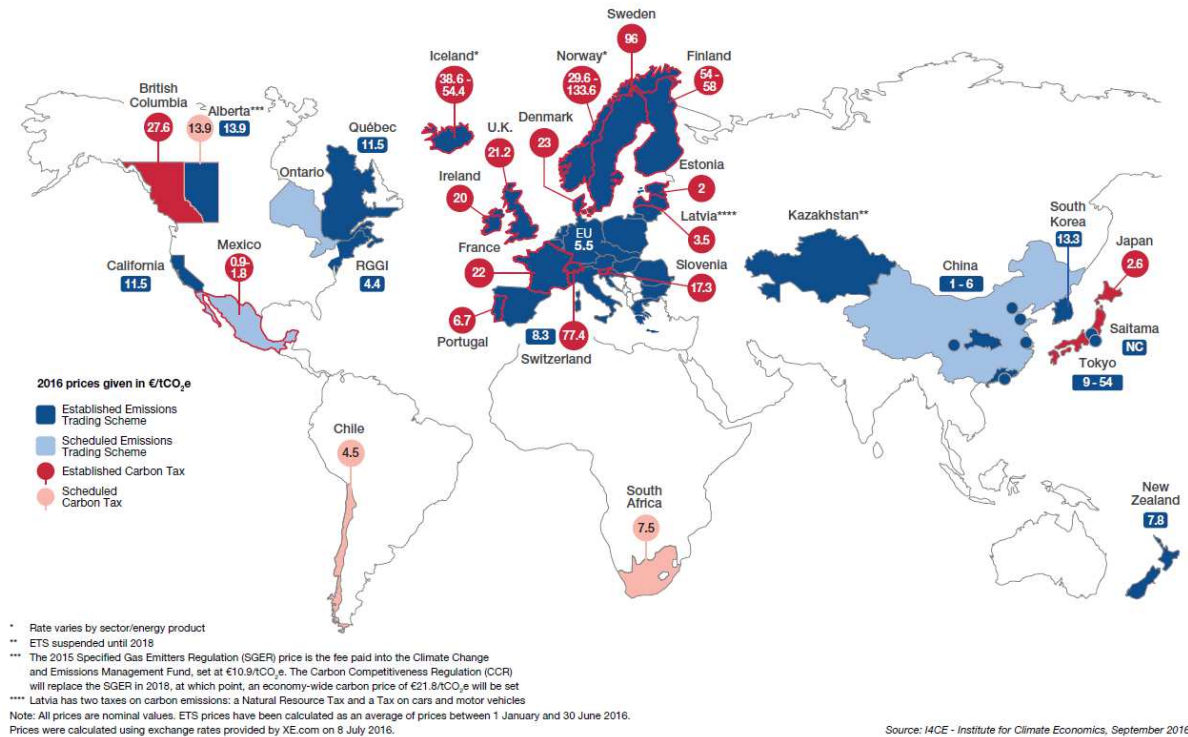
¹³ As illustrated in Annex 2– Figure 10: Three families of climate and low-carbon climate resilient metrics for investment decision-making, I4CE. 2016.

4. Annexes: I4CE references

Annex 1 – Pricing carbon and its benefits

According to *State and Trends of carbon pricing (2016)* and other observers (I4CE, ICAP, IETA), 40 jurisdictions have implemented carbon pricing policies delivering a range of carbon prices between 1 and 131 \$ in 2016. Different tools of carbon pricing policies coexist and can be complementary (emission trading schemes, carbon taxes, offsets). Political will is essential to make carbon pricing policies in driving the low-carbon transition. In 2016, the average level of carbon price is too low to be efficient in the most part of cases.

FIGURE 3 – MAP OF EXPLICIT CARBON PRICES AROUND THE WORLD

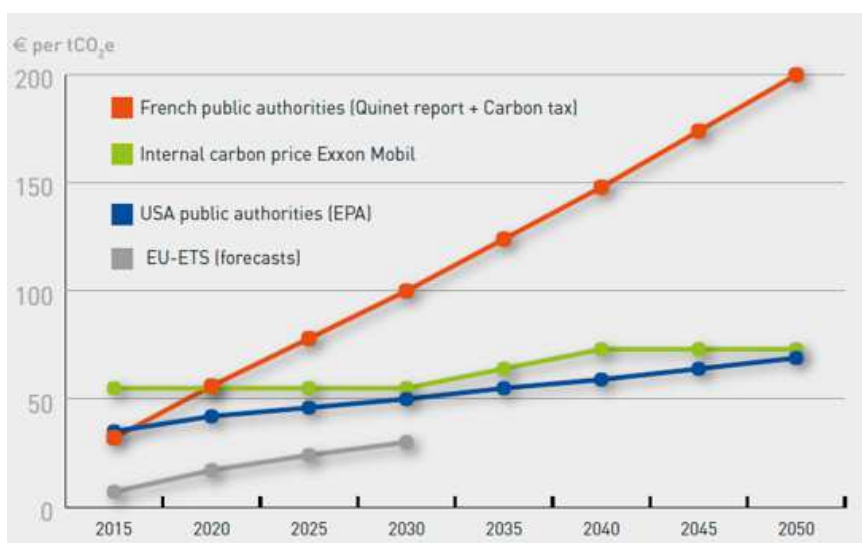


Source :I4CE (2016), <http://www.i4ce.org/wp-core/wp-content/uploads/2016/10/16-10-07-Panorama-des-prix-explicites-du-carbone-VANG-Final.pdf>

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Getting the “right” reference carbon price for governments and companies that would like to define their carbon price is not an easy task and, ultimately, it is specific to each player. In 2016, there are several benchmarks which can help governments and companies determine this price.

FIGURE 4 – EXAMPLES OF REFERENCE PRICE CURVES FOR CARBON PRICING

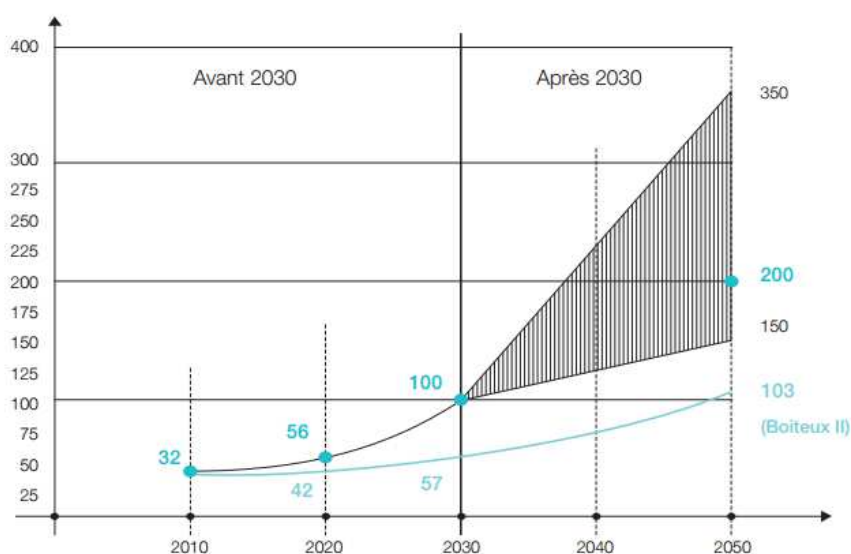


Source: I4CE and EPE, “Internal carbon pricing – A growing corporate practice. The case of French companies”, September 2016 <http://www.i4ce.org/wp-core/wp-content/uploads/2016/09/internal-carbon-pricing-november-2016-ENG.pdf>

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In France, a shadow carbon price has been fixed by the State through the Commission Quinet in 2008 to achieve its 2050 emission reduction target. The Quinet report defines the trajectory of a shadow carbon price until 2050. The 100 €/tCO₂ in 2030 is the focal point of the Quinet carbon value and the dynamic is provided by the discount rate (4% revised to 4.5% for the risk premium). On this basis, the French energy transition law voted in 2015 includes the two values of €56/tCO₂ in 2020 and €100/tCO₂ in 2050.

FIGURE 5 – THE FRENCH SHADOW CARBON PRICE RECOMMENDED BY THE QUINET COMMISSION IN 2008 ENDORSED BY THE FRENCH ENERGY TRANSITION LAW IN 2015



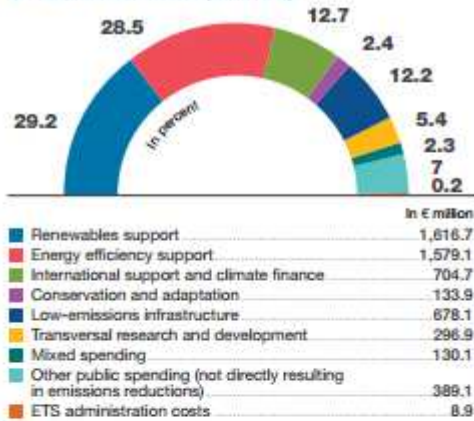
Source : Centre d’analyse stratégique, France, 2009. Page 101, <http://www.ladocumentationfrancaise.fr/var/storage/rapports-publics/094000195.pdf>

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According to the World Bank in 2015 alone, \$26 billion in government revenue has been generated through carbon pricing initiatives. These revenues can be used for many purposes – including achieving climate ambitions – that could yield economic and environmental gains. This potential gain is referred to as the ‘revenue recycling effect’. I4CE Revenue allocation decisions made by governments are vital as these revenues can help shift the narrative on carbon pricing from ‘burden to benefit’. Regardless of where the revenues are spent, a well-positioned decision-making and governing framework is required to ensure that revenue spending is in accordance with set objective.

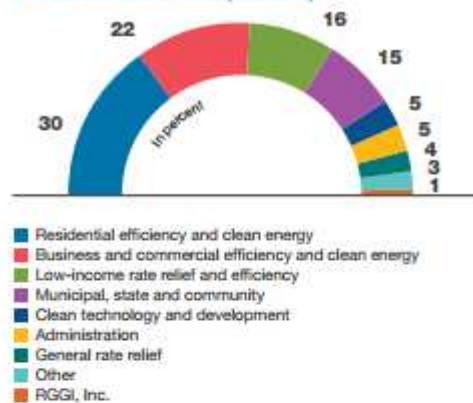
FIGURE 6 – RECYCLING CARBON REVENUES: TRANSFORMING COSTS INTO OPPORTUNITIES.
EXAMPLES OF SPENDING CARBON REVENUES IN SOME ETS IN 2015

FIGURE 1. ETS REVENUE SPENDING BY EU MEMBER STATES (2013-2015)



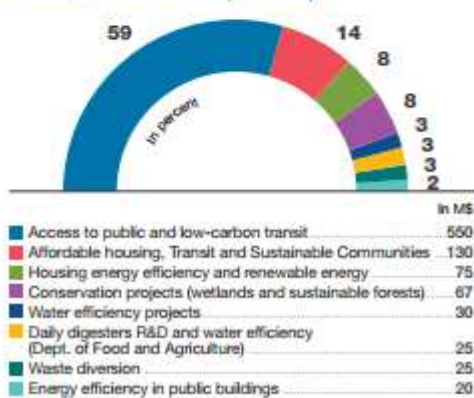
Source: I4CE - Institute for Climate Economics, 2016

FIGURE 2. CAP-AND-TRADE REVENUE SPENDING BY RGGI MEMBER STATES (2008-2013)



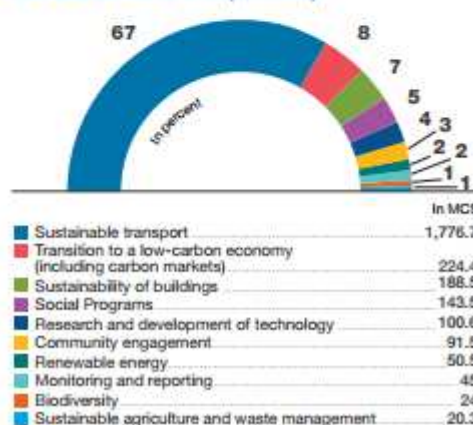
Source: Investment of RGGI Proceeds Through 2013, 2015

FIGURE 3. CALIFORNIA'S CAP-AND-TRADE REVENUE SPENDING PLAN (2013-2015)



Source: I4CE - Institute for Climate Economics, 2015 and California Air Resources Board, 2015

FIGURE 4. QUEBEC'S CAP-AND-TRADE REVENUE SPENDING PLAN (2013-2020)



Source: I4CE - Institute for Climate Economics, 2015 and Québec MDELMCC, 2015

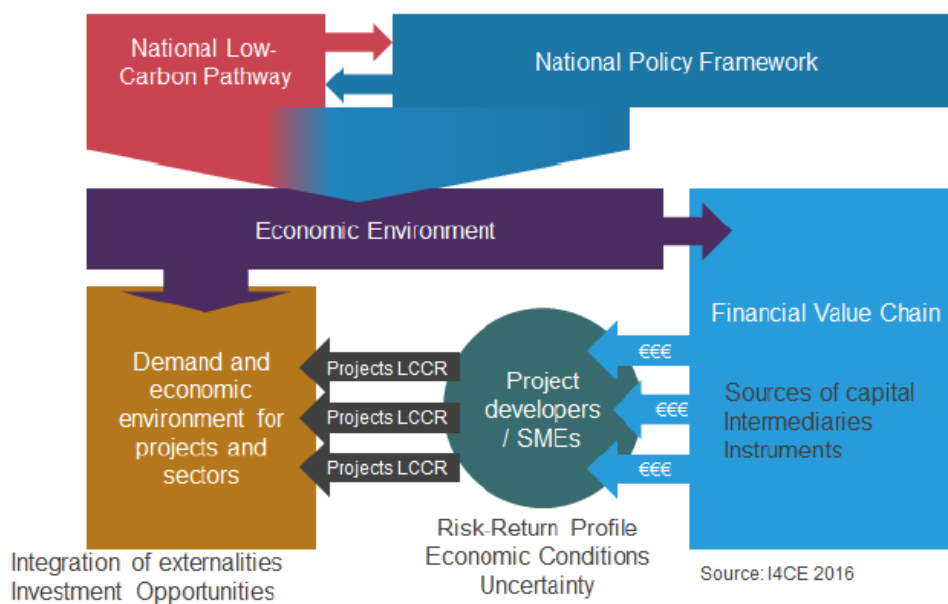
Source: Vaidyula M. and Alberola E., “Recycling carbon revenues: transforming costs into opportunities”, I4CE policy brief, June 2016 <http://www.i4ce.org/wp-core/wp-content/uploads/2016/06/16-06-20-I4CE-Note-on-recycling-of-carbon-revenues.pdf>

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Annex 2 – Aligning financial flows to the 2°C scenario

Fostering the reorientation of financial flows and investments to support the transition to a low-carbon and climate resilient economic model is ensuring that the overarching national policy frameworks make this model financially viable. Integrating especially carbon pricing policies, this policy framework, can create an economic environment that creates demand for low-carbon projects and growth in relevant sectors – and a pipeline of projects for the financial value chain. This framework should also incentivize the involvement of project developers to invest through economic conditions that reduce uncertainty and ensure acceptable risk-return profiles for investors. Finally, this can foster the involvement of the entire financial value chain – including different sources of capital, intermediaries and instruments.

FIGURE 7 - ECONOMIC & INVESTMENT ENVIRONMENT AND THE FINANCIAL VALUE CHAIN

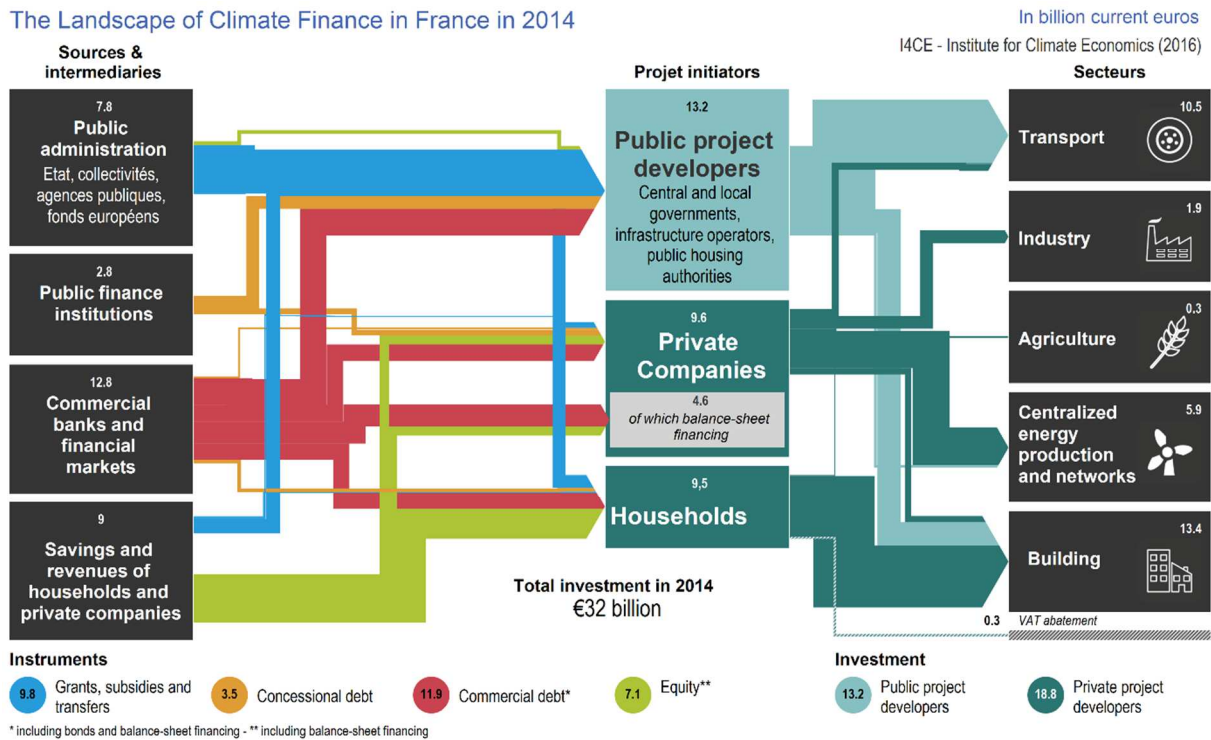


Source: I4CE, 2016

Tracking progress of financial flows alignment to the 2°C. Since 2014, I4CE has realized the Landscape of Climate Finance which is a comprehensive study of domestic financial flows in favor of climate and the broader energy transition in France. The study maps the flows supporting investments leading to greenhouse gas mitigation across the French economy. The 2016 Edition of the Landscape of Climate Finance disclosed in December 2016 tracks up to €32bn of climate investment in 2014. This corresponds to approximately 10% of all material investment that occurred in France in 2014.

- From this total, €12.8 was invested in energy efficiency, mainly in the building sector,
- €6.5bn was invested in renewable energies and
- €10.6bn was invested in sustainable infrastructure, such as railways and mass urban transport.
- An additional €2.1bn went to the nuclear sector.
- Between 2011 and 2013, investments increased by €2.3bn to reach €32bn. This amount remained stable in 2014 and 2015. This overall stability, however, hides variations in the different end-uses. After a 50% increase from 2011 to 2013, investment in sustainable infrastructure declined through 2014 and 2015. Meanwhile, investment in energy efficiency and renewable energy increased by 14% and 10% respectively, contributing to the overall stability of investment.
- In 2014, public-driven finance represented 55% of the total of investments. This includes instruments used by public institutions to support and finance private project developers.

FIGURE 8 – THE LANDSCAPE OF CLIMATE FINANCE IN FRANCE IN 2014



Source: Hainaut H, Cochran I and Morel R., "Landscape of Climate Finance in France 2016 Edition – Executive Summary", I4CE policy brief, December 2016 <http://www.i4ce.org/wp-core/wp-content/uploads/2016/12/Executive-summary-A4-EN.pdf>

Stop the tragedy of horizons. An indicative corridor of carbon prices could help finance Institutions which are confronted with priorities and objectives that span multiple time horizons to plan their actions. As seen in Figure 7, Development Finance Institutions are subject to short-term performance objectives (signatures, disbursement, financial performance), medium-term development objectives (such as the Sustainable Development Goals currently in discussion) or long-term objectives (such as the Low Carbon Climate Resilient transition).

FIGURE 9 - EXAMPLES OF DIFFERENT DEVELOPMENT FINANCIAL INSTITUTIONS OBJECTIVES ACROSS TIME HORIZONS

Short-Term Objectives	Medium-Term Objectives	Long-Term Objectives
Annual performance objectives: Volume ESG Climate Finance Reporting	Multi-year strategic plans and objectives Formal external performance objectives from mandating institutions National and international development aid financing objectives (0.7% of GNI, etc.)	Low-Carbon, Climate Resilient Energy Transition Eradication of poverty Eradication of certain diseases Universal literacy Gender equality

Source : (Eschaliér, Cochran, and Deheza 2015)

Source: Eschaliér, Cochran and Deheza 2015, I4CE and AFD

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The challenges to mainstreaming climate change into financial operations are linked to internal technical and information needs. As seen in Figure 10, assessing and understanding the climate-related impacts of a Development Financial Institutions’ interventions requires multiple forms of information. As presented in the case of metrics to assess individual projects, approaches used can be qualitative in nature - i.e. based on categories of project types or technologies, quantitative - i.e. based on GHG emission levels or a combination of information to assess the exposure of projects to different climate-related risks. Current practice can vary between institutions; as multiple methods are currently used to calculate GHG emissions and ‘optimize’ projects to reduce GHG emissions or improvements in resiliency.

FIGURE 10 THREE FAMILIES OF CLIMATE AND LOW-CARBON CLIMATE RESILIENT METRICS FOR INVESTMENT DECISION-MAKING

	Qualitative or List-Based	Quantitative or Volumetric Impact	Exposure
Outcome of assessment	Projects, companies and/or activities are classified as contributing to, neutral or counter-productive to climate change objectives.	Impact of projects and activities on climate change (GHG emissions, other quantifiable indicators for climate change such as: hectares of protected forests, emission intensity of the energy mix, access to clean energy, etc.)	Exposure of projects and/or activities to direct and indirect: Physical impacts of climate change Impacts of climate policy and regulation regulatory impacts (energy-related costs, regulations standards, etc.); Market behavior evolutions
Required definitions and methodological frameworks for data collection and analysis	Qualitative definitions to classify "climate" projects Check-list criteria (such as company ESG screening methods)	Quantitative methodologies: GHG emissions Energy use Resource efficiency (energy savings, water use, etc)	Methodologies to calculate: Country-level vulnerability Project level physical impact Exposure to climate policy and regulatory changes
Potential Data Inputs	Specifications allowing to identify: sectors and sub-sectors of activity involved technologies and techniques physical context company or asset-issuer descriptive information	Data allowing to quantify: Energy use GHG Emissions (potentially including all scopes) Quantitative sector and country specific information	Context related information: Energy data (consumption, fuel mix, price) Technologies and techniques in use (efficiency, externalities) Costs to users and consumers Cost of externalities Projected climate and economic scenarios Adaptation-related data on vulnerability and resilience

Source: After (Cochran, Eschaliere, and Deheza 2015)