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Carbon Pricing

Using Market-based Mechanisms to Mitigate Climate Change

Imprint

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Introduction



The international community is working apace in efforts to mitigate climate change and adapt to its unavoidable effects. Just a year after the Parties concluded the world's first global climate change agreement, the Paris Agreement entered into force on November 4, 2016. This was made possible because the Agreement was ratified in record time. The willingness to set about implementing the measures agreed in Paris in 2015 was also stressed in Morocco at the first Confer-

ence of the Parties to the Paris Agreement. The Marrakech Action Proclamation makes it clear that from now on, the focus is on implementation and action.

But before the Agreement's implementation can begin, there are a number of implementation-related issues which need to be clarified and are to be laid down in a Paris Agreement rule book. The Parties have given themselves until the end of 2018 to finalise the



rule book's content. The still-to-be-agreed rules affect the new international market-based mechanisms contained in Article 6 of the Paris Agreement. Once accounting issues have been clarified and implementation rules agreed, these mechanisms will offer Parties a wide range of options for bilateral cooperation. Mitigation outcomes can be transferred between the states and used to meet nationally determined contributions (NDCs). This provides the basis for a new global carbon market for the post-2020 period.

Beyond the United Nations Framework Convention on Climate Change (UNFCCC) arena, efforts are also underway to use market-based tools to put a price on climate-damaging activities and thus develop affordable emission reduction potential. Use of carbon pricing instruments is gaining ground on a global scale: some 20 countries now have carbon tax programmes in place. Emissions trading schemes have been introduced in 36 national jurisdictions. Carbon pricing initiatives are being pursued at sub-national level too: in North America, Ontario and Alberta have recently introduced pricing instruments for harmful emissions. These use innovative approaches to enable interaction between differing administrative levels. For example, Canada has introduced a national framework under which all jurisdictions are required to introduce a greenhouse gas taxation programme by 2018. The combination of a range of different instruments continues to play an important role: the greenhouse gas tax introduced in Columbia is expected to enable use of emission reduction certificates.

Use of certificates to offset unavoidable emissions is also the core component of the Carbon Offsetting and Reduction Scheme for International Aviation (CORSIA) mechanism introduced by the International Civil Aviation Organisation (ICAO) in October 2016. To make the

aviation sector's rapid growth carbon neutral from 2020, use of offset certificates is to be enabled. The rules on using the mechanism are expected sometime in autumn this year.

Germany is actively involved in the technical design of these international climate change mitigation instruments and is driving the dynamic development of price-based instruments at government level. For example, the Federal Government made climate change a focal topic of its G20 presidency. With the exception of the US, all G20 states explicitly committed to the Paris Agreement and its implementation. With the G20 Action Plan on Climate and Energy for Growth an instrument was agreed which provides a wide range of cooperation measures concerning energy and climate policy, and fosters dialogue on market-based mitigation tools.

This brochure gives an overview of the various carbon pricing approaches, explains how they work and outlines the progress made in their development so far.

The Need for Carbon Pricing





Climate change is one of the central challenges faced by society in the 21st century. The effects of man-made climate change are already being felt: 2016 was the warmest year since temperature recording began. This makes it the third record year in succession after 2014 and 2015.¹ In October and November 2016, the ice sheet covering the Arctic Ocean was thinner than ever before and the Antarctic had the smallest ice sheet seen to date. Extreme weather events are becoming far more frequent and far more intense. Climate change is already seriously affecting societies around the world.

To mitigate climate change and coordinate efforts to deal with its effects, the international community adopted a new climate change agreement in Paris in December 2015. Under that agreement, the 194 Parties to the United Nations Framework Convention on Climate Change (UNFCCC) committed to limiting global warming to well below two degrees Celsius above pre-industrial levels and to pursue efforts to limit the temperature increase to 1.5 degrees Celsius.² Thanks to the quick ratification of the Paris Agreement by a large number of Parties, the Agreement went into effect on November 4, 2016 – far earlier than expected by even the most optimistic observers. The Paris Agreement’s provisions will be applied from 2020.

Carbon pricing as a market signal for industry

However, the emission reduction targets submitted by Parties so far – known as nationally determined contributions (NDCs) – are not enough to meet these goals. Around the world, greenhouse gas emissions are still far too high. One of the reasons is that emitters, those who cause the emissions, are not required to cover the costs of climate change. The damage caused to the climate equates to external costs that are not included in the price of a tonne of coal, a barrel of oil or a cubic

metre of gas. Putting a price on carbon can change all of that.³

If an appropriate price were to be charged for every tonne of CO₂e emitted, it would send a signal to businesses and consumers, helping them to give greater consideration to climate change in their production, investment and purchasing decisions. Carbon pricing also makes it easier to implement climate change mitigation measures because the price signal it sends helps to ensure that emissions are reduced in those areas where cost-savings can be achieved.

Price-based climate change mitigation mechanisms are not just an idea, but reality. Around the world, they are being used at various levels and in different forms. The EU Emissions Trading Scheme (EU ETS) is perhaps the best-known example. Alongside emissions trading schemes, many different instruments are now in place, including various forms of greenhouse gas (carbon) taxes and crediting mechanisms which are used to certify emission reductions and make them tradable.

An emissions trading scheme sets a regulatory ceiling or ‘cap’ on greenhouse gas emissions in industrial sectors. Within the sectors covered by the scheme, only a limited quantity of emission permits (allowances) are issued, namely just enough to allow the reduction target to be met.

¹ www.ncdc.noaa.gov/sotc/global/201613

² Paris Agreement, Article 2.

³ Where mention is made of a carbon market or carbon pricing, this also includes other greenhouse gases. Apart from carbon dioxide, these include methane (CH₄), nitrous oxide (N₂O) and a range of industrial gases (HFKW, PFKW und SF₆). The effects these far more potent greenhouse gases have on the climate is calculated in CO₂-equivalents (CO₂e), placing them in a common unit that is equal to the sum of CO₂ emissions over a period of 100 years.



Each business covered by the emissions trading scheme must possess an allowance for each tonne of CO₂e they emit. These companies are either issued a portion of the necessary allowances free of charge or they can purchase them by auction from the state. These allowances can also be freely traded. This allows the companies involved to buy additional allowances or, if they have succeeded in reducing their own emissions, to sell excess allowances they no longer need. This gives rise to a uniform carbon price, which in turn serves as an important market signal. The companies covered by the emissions trading scheme can then consider that carbon price in their short-term management decisions and long-term investment planning. The price depends largely on the level of ambition applied when setting the upper ceiling of the respective emissions trading scheme and on the costs incurred by the companies in implementing their emission reduction measures.

Greenhouse gas or carbon taxation levies a predetermined tax rate for each tonne of CO₂ emitted. Taxation of this kind also puts a price on emissions, sending a signal to companies covered by the taxation scheme to reduce emissions in the shorter term and make their long-term investments climate friendly. In contrast to emissions trading schemes, there is no trading involved and very little flexibility is afforded to businesses as a result. While an emissions trading scheme determines the absolute quantity of emissions, carbon taxation

defines the price of the emissions. But although a taxation system ensures a stable carbon price, it cannot guarantee that the emission reduction targets set for the sectors involved will actually be met. The incentive is largely dependent on the taxation rate charged: if it is high, it provides an incentive to keep emissions low.

Crediting mechanisms exist outside the regulated world of emissions trading and carbon taxation. A crediting mechanism can either be based on individual climate change mitigation projects or be designed to cover entire industries or industry sectors. With this type of mechanism, tradable certificates are issued for actual emission reductions achieved. Certificates are issued when actual emissions are reduced below a predetermined project-specific or sector-specific ceiling. Participation in a crediting mechanism is voluntary and demand for generated certificates must thus be created elsewhere. This can be done, for example, by allowing the certificates generated under the crediting mechanism to be traded in an emissions trading scheme or under a carbon taxation programme. Use of certificates for voluntary offsetting of emissions can also provide an important source of demand.

The Clean Development Mechanism: Climate Change Mitigation as a Business Model



Environmentally compatible development: a CDM wind farm in the Philippines.

The first valuable experience to be gained with price-based climate action mechanisms at international level came in the form of the Clean Development Mechanism (CDM) – a crediting mechanism operated under the Kyoto Protocol. Under the CDM, climate change mitigation projects and programmes can be registered in developing countries according to international standards, with the emission reductions achieved being identified and certified using internationally accepted methodologies. These certified emission reductions (CERs) can, for example, be used by companies covered by the EU Emissions Trading Scheme (ETS) to meet their emission reduction targets. The reductions achieved thus help to reduce the costs involved in implementing the emission reduction targets agreed under the Kyoto Protocol.

The CDM has shown that price-based climate change mitigation mechanisms can be extremely productive. Since 2004, some 7,700 emission reduction projects and more than 300 programmes have been registered, with savings in the amount of 1.85 billion tonnes CO₂e achieved. This represents about twice the amount of greenhouse gas emitted in Germany in 2015. If all projects are implemented as planned and the anticipated emission reductions are achieved as expected, the climate change mitigation contribution made by the CDM could eventually be ten times this amount.⁴

The CDM has not only helped industrialised countries to meet their Kyoto Protocol commitments in an

affordable way, it has also aided the transfer of climate change mitigation technology to developing countries. For example, CDM activities in the renewable energy sector have resulted in the installation of facilities with output capacities of some 254 gigawatts (GW). Investments in registered CDM projects amount to a combined value of a staggering 420 billion US dollars (as of July 2017).

The CDM has also proven to be an extremely flexible and adaptable mechanism. Over the years, CDM guidelines and methodologies have been repeatedly adapted and enhanced, not least to counter negative developments. One particularly pioneering and thus positive development was the trend away from a purely project-based mechanism towards a more sectoral or programmatic approach. It is now possible to bundle a large number of smaller-scale projects into one Programme of Activities (PoA) and to set what are known as Standardized Baselines (SBs) to determine the emission reductions achieved – not for individual projects but for an entire industry sector. These approaches can significantly reduce the administrative effort involved in the respective projects and secure the environmental integrity of the CDM.

The experience gained with the CDM is invaluable in further developing international climate action mechanisms.

⁴ UNEP DTU, 2017.

The Paris Agreement: International Cooperation for Raised Ambition

Nations Unies
Conférence sur les Changements Climatiques
COP21/CMP11
Paris, France





At the climate change conference in Paris in December 2015, a trailblazing international agreement was reached. The Paris Agreement sets out the legal framework for all future global climate action from 2020 and beyond. Thanks to the quick ratification by a large number of Parties, the Agreement went into effect on November 4, 2016. The following addresses key aspects of the Agreement and explains how market-based climate change mitigation mechanisms can be used within the framework it provides.

Decarbonisation goes green

The Paris Agreement sets out the goal of the international climate change regime as a legally binding target: global warming is to be limited to well below two degrees Celsius above pre-industrial levels and Parties are to pursue efforts to limit the temperature increase to 1.5 degrees Celsius above pre-industrial levels, recognizing that this would significantly reduce the risks and impacts of climate change. The Parties have also committed to “achieve a balance between anthropogenic emissions by sources and removals by sinks of greenhouse gases in the second half of this century”. This rather awkward wording – which translates into greenhouse gas neutrality – goes even further than the goal of decarbonising the global economy, as called for by the G7 leaders at their meeting in Elmau in summer 2015, because it takes in not just carbon but also other greenhouse gases and specifically covers land use. Paris thus sends out a clear signal that the age of coal, oil and gas is coming to an end.

Nationally determined contributions

But how do the Parties intend to achieve this long-term global goal? How can the challenge faced by the entire international community be transferred to individual states? Under the Paris Agreement, the Parties

have agreed that all countries must comply with the provisions of international law and contribute to global climate change mitigation efforts: this means not just the traditional industrialised countries, but also the emerging economies and developing countries. All countries are required to draw up national emission reduction targets – called nationally determined contributions (NDCs) – which they must regularly submit to the UNFCCC. It was also agreed that each new NDC must be more ambitious and exceed its predecessor. The actual targets and the associated levels of ambition are, however, left to the countries to decide. The Parties have a legal obligation to develop their NDCs and implement measures in order to achieve them. This gives rise to a high level of political commitment for countries to actually meet the targets they define.

Transparency mechanism

The binding nature of NDCs is to be achieved through the use of a global transparency mechanism, with countries’ climate change mitigation efforts being subjected to binding international review. This transparency and monitoring mechanism also allows for comparison of climate change mitigation activities, because for the first time ever, countries are now subjected to the same reporting rules. This review process poses a significant risk to Parties’ reputations if they fail to deliver what they pledge in their NDCs. Also, a global stocktake is conducted every five years to verify whether the international community is on the right path to achieve the two degrees or 1.5 degree Celsius target. The first global stocktake will take place as early as 2018. Thus, by repeatedly shining the spotlight on the climate change mitigation effort, the mechanism raises public awareness and can contribute significantly to ensuring that steps are taken to actually implement NDCs.

Figure 1: UNFCCC negotiation schedule and milestones 2015 to 2030



Note: COP is the abbreviation used for the annual Conference of the Parties (COP) to the UN Framework Convention on Climate Change.
Source: Wuppertal Institute

The need for raised ambition

In the lead up to the climate change conference in Paris more than 180 countries developed intended nationally determined contributions. Of the 153 Parties that have since ratified the Paris Agreement, 147 have defined and announced binding emission reduction targets (as of July 2017). However, analyses show that even if they are fully met, these targets will not go far enough to enable a development pathway which ensures that the two degrees Celsius limit can be secured.

The question thus remains as to how ambition can be raised to the level needed. When implementing their current NDCs, one option would be for countries to show that climate change mitigation does not put a burden on economic development, but can provide new impetus for growth. If this is achieved, the countries can exceed their NDCs and take a more ambitious

approach in future emission reduction effort. To ensure this does not remain some pious wish, among others, cooperation mechanisms have been enshrined in Article 6 of the Paris Agreement to assist Parties' ambition-raising efforts. Such cooperation mechanisms form the legal framework to allow use of market-based climate change mitigation mechanisms under the Paris Agreement.

International cooperation mechanisms

The Paris Agreement contains a range of principles which apply when Parties intend to use cooperation mechanisms to achieve their NDCs:

- Participation in the cooperation mechanisms is voluntary and must be approved by the national government.



- Use of the cooperation mechanisms is designed to allow for raising climate action ambition, thus increasing the effort in terms of climate change mitigation or adaptation.
- The cooperation mechanisms are to promote sustainable development. While the main focus is on reducing greenhouse gas emissions, other sustainability aspects shall also be addressed.
- The cooperation mechanisms shall ensure environmental integrity. This means that the mechanisms may not be used to circumvent ambitious climate change mitigation effort in the participating countries, as this would lead to a hollowing out of their emission reduction goals.

The Paris Agreement offers three approaches in the use of international cooperation mechanisms. First, Parties can cooperate directly with one another (Article 6.2).

This makes it possible for emission reduction measures to be implemented in one country and the resulting emission reductions to be transferred to another and counted towards its NDC. It requires transparent processes and accurate accounting of the emission reductions achieved to avoid emission reductions being counted more than once – for instance, in the emissions inventory of the country in which the reduction activities are conducted and also in the country to which the resulting emission reductions are transferred. This would thus enable diverse forms of cooperation. Apart from direct trading of achieved emission reductions between two governments, one country could also promote implementation of a climate change policy in another and then count a portion of the emission reductions achieved towards its own NDC. In addition, national and regional instruments such as the EU Emissions Trading Scheme can also be linked to similar schemes as one --> [continued on page 16](#)

The Future of the Clean Development Mechanism

While the CDM serves as the basic framework for integrating the cooperative approaches into the Paris Agreement, its future remains uncertain in the face of the new climate change mitigation mechanisms being introduced.

The low demand for certificates under the CDM means that hardly any transactions are taking place. Given the continued low price for CERs, only few requests for certificate issuance are being submitted and project registration is stagnating to boot. The new mechanisms, by way of contrast, can gain in importance even before the Paris Agreement goes into effect: if, as seen with the introduction of the CDM, a prompt start rule is agreed to allow climate change mitigation activities to be retroactively registered under the new mechanisms, the agreed implementation rules could serve as a new standard whereby the CDM would continue to lose relevance.

This raises the question of whether and to what extent the mechanism will be continued and further developed, if at all. The CDM will be needed for some years to come, at least formally: at the climate change conference in Doha in 2012, a second commitment period was agreed for the Kyoto Protocol, the framework that governs the CDM. That second period runs until 2020. Taking into account the 'true-up period' in which Parties are still able to conduct transactions to help them meet their targets, the CDM is expected to remain relevant until 2023/2024.

Also, with the CDM, valuable experience has been gained and capacities created which could be of great help in the design and introduction of a new mechanism. At UN level, robust procedures and methodologies have been introduced and institutions established to provide for effective quality monitoring and control of climate change mitigation activities conducted under the CDM. At the same time, all Parties have implemented processes at national level to allow them to benefit from using the CDM. In the private sector, considerable expertise has been developed, with auditing companies such as Germany's Technical Inspection Association TÜV obtaining global experience in validating emission reduction activities and building local

capacities. A range of consulting firms and project developers have also become specialised, both in identifying climate change mitigation potential and in developing suitable methodologies to help leverage that potential. One of the biggest challenges faced in the coming years will be to find ways to use this CDM-related experience when structuring the cooperation mechanisms to be used under the Paris Agreement. At the same time, the question arises as to how climate change mitigation activities initiated under the CDM can be continued in times of poor CER demand.

The **Nitric Acid Climate Action Group (NACAG)** launched by the Federal Government at the climate change conference in Paris addresses this very issue. NACAG plans to halt global nitric acid emissions in nitrous oxide production. Nitric acid is a compound of hydrogen, nitrogen and oxygen which is used in the production of fertilisers. In the past, the CDM has been used to reduce large quantities of the emissions which occur in fertiliser production. However, due to the fall in prices for certificates, there is a risk that available reduction technology can no longer be used and that this extremely cheap reduction potential can no longer be tapped. To drive sectoral transformation nonetheless, NACAG offers guidance and information and also provides financial support for those countries willing to address the sector and take mitigation into their own hands from 2020. This will enable efficient reduction of emissions of nitric acid (N₂O), which is an extremely potent greenhouse gas, despite the fall in prices on the global carbon market.

Further information: www.nitricacidaction.org

The German government additionally supports the World Bank's **Pilot Auction Facility for Methane and Climate Change Mitigation (PAF)**. The PAF also targets CDM projects which are at risk of being halted because of the drop in certificate prices. In doing so, it uses the particularly innovative approach of buying CERs from methane projects at guaranteed prices by offering put options at competitive auctions. The put options are secured by funding provided by the countries involved: in addition to Germany, these are Switzerland, Sweden and the US. Having obtained a put, the successful



Use of nitrogen fertiliser in farming is vital in ensuring soil fertility and supply of nutrients for crops. In the production of nitric acid, a key component of nitrogen fertiliser, emissions of nitrous oxide (N_2O) occur.

bidder then has the right to sell certificates to the PAF at the price set by the auction. By auctioning the puts, it is possible to determine the amount of funding project developers need to continue their climate change mitigation activities, guaranteeing maximum climate benefit as a result. This was the process used in a third auction in January 2017. With puts worth 13 million US dollars, reductions amounting to some 6.2 million tonnes of CO_2e can be achieved. While the first two

auctions held in 2015 and 2016 addressed methane emissions from landfills, the third auction focused on reducing emissions of nitric acid (N_2O) which, like methane, is an extremely potent greenhouse gas.

Further information: www.pilotauctionfacility.org

of the cooperative approaches provided for under Article 6.2. Whether all of these cooperation forms will actually be possible and under what conditions is currently the subject of negotiations between Parties to the UN Framework Convention on Climate Change. Guidelines on using these cooperative approaches will be decided in 2018.

A second option involves the use of the newly created mechanism to contribute to the mitigation of greenhouse gases and support sustainable development (Article 6.4). This mechanism will be supervised by a body designated by the Conference of the Parties. In addition, the Conference of the Parties will adopt rules, modalities and procedures which must be observed when implementing activities under Article 6.4. The aim is to ensure that standardised procedures are followed in the design and implementation of emission reduction activities and when verifying the results achieved.

Another unique aspect of the mechanism is its goal of mobilising the private sector to participate in climate change mitigation by providing suitable incentives. The Paris Agreement will thus offer private-sector actors an opportunity to directly use the mechanism established under Article 6.4.

As with the bilateral cooperation approaches provided for under Article 6.2, the emission reductions achieved using this mechanism can be transferred from the country in which they were generated to another country and counted towards its NDC. These transfers must also result in raised ambition. And under Article 6.4 of the Paris Agreement, use of the mechanism must also lead – as a net global outcome – to an absolute reduction in global greenhouse gas emissions.

As a third option, use of non-market-based approaches is provided for under Article 6.8. As the name suggests, market-based climate change mechanisms play no role at all. Just how these non-market-based approaches are to work will be determined in the coming years with the development of a “framework for non-market-based approaches”.

Challenges arising from use of cooperation mechanisms under the Paris Agreement

While the Paris Agreement is a done deal and has been in effect for the past year, many questions still need to be answered before the measures it contains can actually be implemented. Many of the details contained in the Agreement’s small print have still to be finalised, including those concerning the cooperation mechanisms. This is the case, for example, concerning how use of the cooperation mechanisms can be kept separate from NDCs. What portion of its emission reductions can be defined as a host country’s national contribution and what portion can be transferred to another country? How will use of the mechanisms in a given NDC period affect the targets defined for the subsequent period several years on? The cooperation mechanisms must thus be designed in a way that they provide no incentive whatsoever for host countries to delay their own climate change mitigation activities because, rather than taking efforts to reduce their own emissions, they would prefer to sell their CERs.

Also, the industrialised countries have committed to supporting developing countries’ climate action efforts by providing both finance and technology. If emission reductions are transferred between countries it usually means that money is involved. How can this flow of funding be separated from the climate finance amounts agreed? Clear rules are needed here.

To ensure that emission reductions can be documented in a transparent way, a robust transparency and accounting system is needed which allows the flow of finance, the emission reductions achieved and the associated reduction measures to be clearly recorded and traced. This kind of system still has to be developed for the Paris Agreement as a whole, posing one of the biggest challenges the international climate change regime will face in the near future.

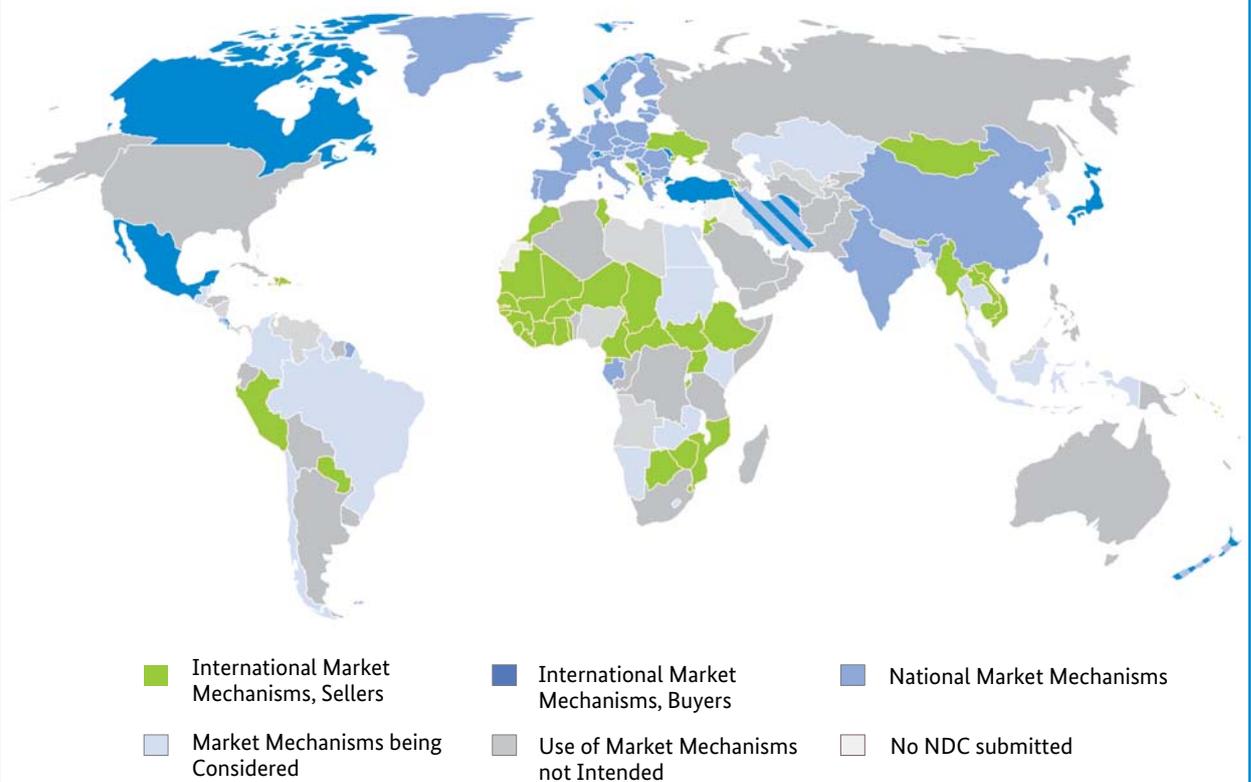
Not all countries have set out their NDCs as absolute emissions ceilings over a period of several years. Some have set themselves the goal of reducing the carbon intensity of their economies, meaning the greenhouse gases emitted for each dollar or euro generated. Others, by way of contrast, have chosen not to reduce emissions in absolute terms, but in relation to a hypothetical business-as-usual scenario. And there are even

Market Mechanisms and Nationally Determined Contributions

Many countries state that they intend to use market-based mechanisms in their NDCs. However, only a few say that they intend to purchase international credits and count these towards those NDCs. By way of contrast, a large number of countries say they want to

finance their climate action by selling international credits. However, the number of countries wanting to import international credits may grow as the level of ambition in nationally determined contributions is raised.

Figure 2: Overview of the use of market-based climate change mitigation instruments in nationally determined contributions (NDCs)



Source: Wuppertal Institute



countries which, when defining their NDCs, do not only consider greenhouse gas emissions as an indicator but also factors such as increased renewable energy use and improved energy efficiency. This wide range of very different types of commitment poses a huge challenge when it comes to defining common rules and requirements to govern the international transfer of CERs.

Great inroads already made

From a German perspective, the negotiations on the new market mechanisms have been a success despite the many open issues that remain. Several important enhancements have been achieved in relation to the market-based mechanisms operated to date. While up to now, a purely project-based approach has been used under the CDM, the cooperation mechanisms contained in the Paris Agreement take a different, more open approach. They are designed to allow consideration of entire sectors, develop large-scale programmes and co-finance implementation of targeted policies such as renewable energy feed-in tariffs (based on Germany's Renewable Energy Sources Act [the EEG]). This could give the mechanisms a new and considerably wider reach.

United Nations Climate Change Conference

Bonn, Germany



Another significant success is that the Paris Agreement brings raised ambition firmly to the forefront. The provisions of Article 6 require that host countries make own contributions and that use of the new mechanism created under Article 6.4 must result in an overall reduction in global emissions of greenhouse gas.

Last but not least, it is important that the mechanisms do not focus solely on reducing emissions of greenhouse gas. They must also promote other sustainability aspects in a targeted way.

With regard to implementation of the necessary framework, the negotiations held in Marrakech at the end of 2016, and also the interim talks held in Bonn last May, have driven the process a good way forward. Although there remain some differences of opinion, there are

signs that a mutual understanding will be reached as to how the mechanisms under Article 6 can be integrated into the Paris Agreement structure and contribute to achieving its goals. The task now at hand is to further strengthen this mutual understanding to ensure that the Paris rule book to be adopted at the end of 2018 is both precise and action-oriented to the greatest possible extent.

Price-based Climate Change Mitigation Efforts Worldwide





While the negotiations on international use of market-based mechanisms have been stepped up following the adoption of the Paris Agreement, efforts to establish price-based mitigation instruments continue apace. Even in the run up to the Paris climate conference, when the global carbon market was laden with uncertainty, an increasing number of countries and regions planned to introduce their own emissions trading schemes or already had them in place. It seems that carbon pricing is also increasingly being seen as an attractive climate change mitigation tool outside the framework of the international regime.

In 2016, China introduced emissions trading schemes in eight important industry centres. These are designed as pilots to pave the way for the introduction of a national emissions trading scheme some time towards the end of 2017. The planned national scheme will be the biggest emissions trading scheme in the world and will regulate more than twice the emission quantities covered by the EU ETS.

South Korea has been operating what is the second-largest emissions trading scheme after the EU ETS since the start of 2015. Switzerland and New Zealand have also introduced national systems. A national scheme introduced in Kazakhstan has since been put on hold. During a two-year review phase, the scheme's procedures are to be optimised and its design adapted to the country's changing economic situation. Kazakhstan plans to reintroduce the scheme in 2018.

Apart from these national approaches, some countries have also introduced emissions trading at sub-national level. There are currently two emissions trading schemes in place in the US: the Regional Greenhouse Gas Initiative in the north-west, and the emissions trading scheme in California.

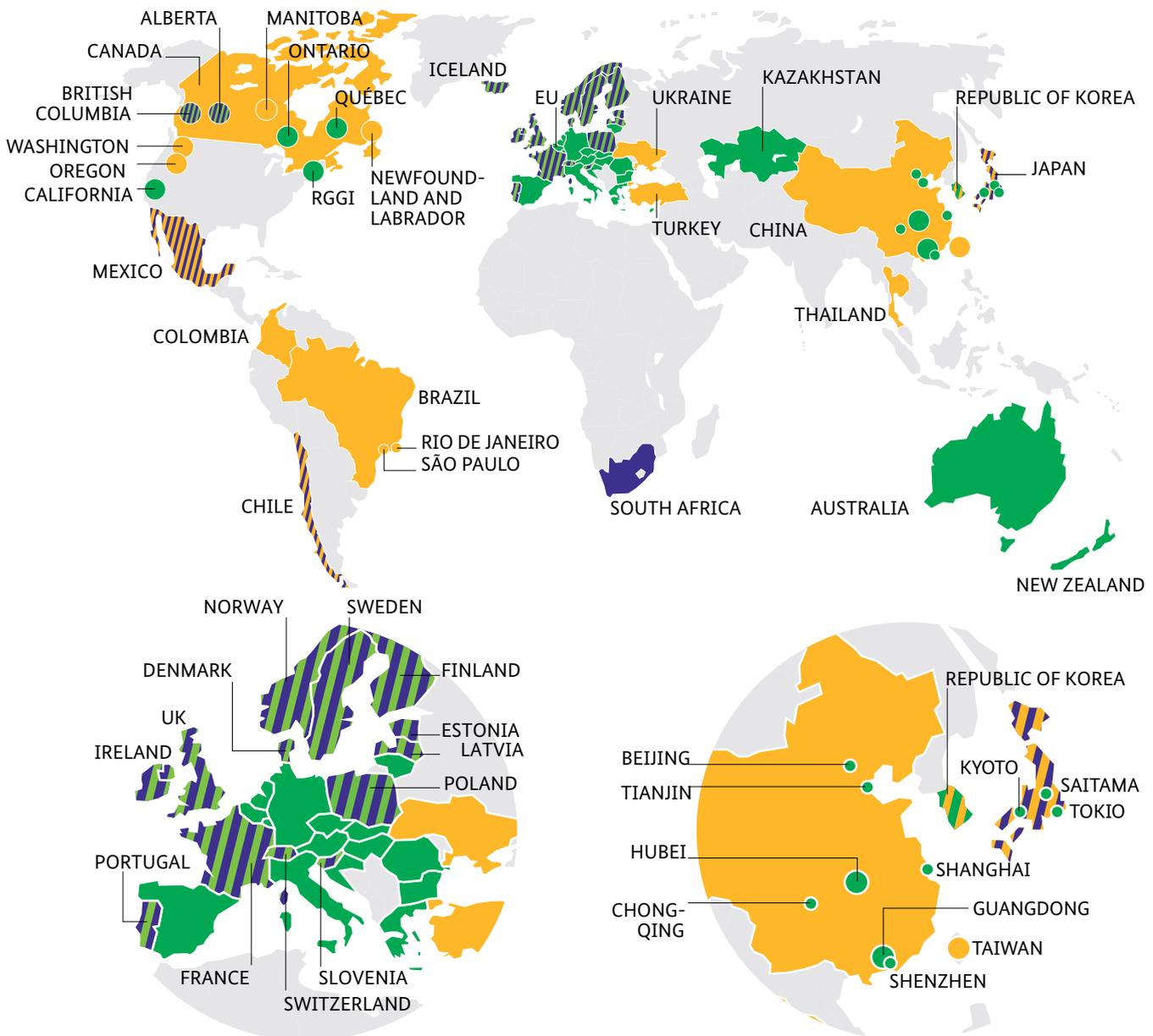
In Canada, which recently adopted a framework at national level requiring all jurisdictions to introduce carbon pricing instruments by 2018, Ontario is launching an emissions trading scheme and is the second province to do so after Québec. Many others are set to follow, among them Manitoba and Nova Scotia.

In Japan, sub-national emissions trading schemes have also been introduced in the metropolitan regions of Tokyo and Saitama. Similar schemes are either under discussion or being developed in many other countries and regions.

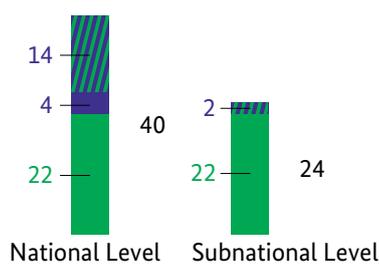
Carbon taxation schemes are also starting to take hold and are already in place in several EU member states as well as in Switzerland, Mexico and Japan. While Chile has been levying a carbon tax since January this year, South Africa has postponed its own carbon taxation plans yet again. Most recently, Columbia introduced a tax on burning liquid and gaseous fossil fuels.

In addition to emissions trading schemes and carbon taxation, other carbon pricing instruments have been introduced over the past two years. As a supplement to its existing carbon tax, the Canadian province of British Columbia launched a baseline and credit scheme in 2016. And earlier this year, Washington State in the US introduced a similar scheme covering two-thirds of its emissions. To achieve their emission reduction targets, the facilities covered by these schemes can conduct climate change mitigation activities or trade their emission reductions with others in their respective scheme. In Australia, the Safeguard Mechanism operated since July 2016 works somewhat differently: in this baseline-and-offset approach, baselines are defined for the companies participating in the scheme. If the baselines are exceeded, participants can buy offsets to meet their reduction targets. In contrast to baseline-and-credit schemes, emitters in the baseline-and-offset schemes

Figure 3: Overview of the various price-based climate change mitigation mechanisms currently being planned or which are already in place.



Tally of carbon pricing initiatives



- ETS implemented or scheduled for implementation
- Carbon tax implemented or scheduled for implementation
- ETS or carbon tax under consideration
- ETS and carbon tax implemented or scheduled
- ETS implemented or scheduled, tax under consideration
- Carbon tax implemented or scheduled, ETS under consideration

Source: World Bank, Ecofys and Vivid Economics 2016.

do not automatically receive credits if their emissions fall below their respective baselines.

One relatively new development is the introduction of greenhouse gas taxation (also known as carbon tax), which has been expanded to include an offsetting component. This offsetting option allows companies subject to greenhouse gas taxation to pay a portion of that tax by submitting emission reduction certificates generated from mitigation activities. By investing early in emission reduction activities, companies can thus gain an economic advantage rather than simply paying the tax. From a climate policy standpoint, this hybrid model has the advantage that investment in an emission reduction activity secures a climate protection effect. By way of contrast, with the simple levying of a carbon tax, use of that revenue for climate change mitigation is not necessarily guaranteed. Mexico is one of the pioneers in applying this hybrid approach, having introduced a tax on fossil fuels in 2014 which allows the companies involved to submit certificates from Mexican CDM activities to reduce their tax burden.

The circles represent subnational jurisdictions: subnational regions are shown in large circles and cities are shown in small circles. The circles are not representative of the size of the carbon pricing initiative.

Note: Carbon pricing initiatives are considered “scheduled for implementation” once they have been formally adopted through legislation and have an official, planned start date. Carbon pricing initiatives are considered “under consideration” if the government has announced its intention to work towards the implementation of a carbon pricing initiative and this has been formally confirmed by official government sources. Jurisdictions that only mention carbon pricing in their INDCs are not included as different interpretations of the INDC text are possible. The carbon pricing initiatives have been classified in ETSs and carbon taxes according to how they operate technically. ETS does not only refer to cap-and-trade systems, but also baseline-and-credit systems such as in British Columbia and baseline-and-offset systems such as in Australia. Carbon pricing has evolved over the years and initiatives do not necessarily follow the two categories in a strict sense.

Little practical experience has been gained with this option, however, because the requirements for its use have yet to be finalised. In Columbia, the recently introduced tax on burning fossil fuels will possibly also allow for the use of offsets because companies that can provide proof of their carbon neutrality are exempt from the tax. South Africa is also considering using an offsetting option when it introduces its own carbon tax. Chile is also looking to add an offsetting option to its existing carbon tax.

An ever greater share of global greenhouse gas emissions has thus been covered by carbon pricing in recent years. A World Bank study conducted in 2016 predicts that around 13 percent of the global greenhouse gas emissions emitted in 2017 will be covered by a carbon tax programme or an emissions trading scheme.⁵

This positive trend is, however, countered by the fact that in many countries, exorbitant climate-damaging subsidies are still being paid. Although these subsidies are on the decline, dropping from almost 500 billion US dollars in 2014 to 225 billion US dollars in 2015, this downward trend is not entirely the result of policy reforms. It is also being driven by low market prices for fossil fuels.⁶ International policy initiatives to withdraw subsidies altogether thus remain crucial. Withdrawal of subsidies makes both economic and climate policy sense, but it will nonetheless be difficult to implement in policy terms due to the distribution effects involved. However, if global warming is to be limited to well below two degrees Celsius, it remains vital that subsidies on fossil fuels be withdrawn.

⁵ World Bank, Ecofys and Vivid Economics (2016): State and Trends of Carbon Pricing 2016.

⁶ International Energy Agency (2016): World Energy Outlook 2016.

German Government Supports the Development of Innovative Climate Change Mitigation Tools

For developing countries, international support in the implementation of innovative climate change mitigation tools is of key importance. However, they still have hardly any experience in introducing market-based mechanisms at local level. International exchange and transfer of experience gained in other regions can be of great value, as can providing advice to local actors on site. This is why, in addition to targeted bilateral cooperation activities, the German government supports a range of international initiatives that contribute significantly in this field.

The **Partnership for Market Readiness (PMR)** launched in 2010 is designed to support developing countries in preparing for and implementing innovative climate change mitigation tools. It uses a two-phased approach: in the first phase, the participating countries (with PMR assistance) prepare market readiness proposals (MRPs) setting out specific measures for targeted preparation and implementation of price-based climate change mitigation instruments. In the second phase, those countries whose MRPs have been approved receive technical and financial support in developing and implementing the measures they have planned.

In addition to these specific support measures, the PMR also promotes bilateral exchange of information between countries that already use such instruments and those

still considering whether to introduce them. The PMR takes a strong participative approach which allows its players to exchange technical experience independent of any political controversy. The experience gained can also provide valuable input to assist the official UN process.

At the climate change conference in Paris, Norway, Germany, Sweden and Switzerland announced that they had joined the World Bank in launching the **Transformative Carbon Asset Facility (TCAF)** – another initiative to promote new forms of market-based emission reduction activity. Using public funds to the tune of 500 US dollars, private industry is to be mobilised to generate climate investment worth over two billion US dollars. The TCAF will fund emission reduction activities using broad-based programmes to overcome the project-based approach, achieving a transformative effect in partner countries. The funded measures are integrated into the respective national climate change strategies, thus boosting national climate change mitigation effort and securing a lasting contribution to achieving climatically sound sustainable development. TCAF activities will be closely linked to the process under the international climate change regime: transformative experience is to be transferred to other regions and will also contribute to implementation of the Paris Agreement.

Climate change and global aviation

Although all Parties to the Paris Agreement have agreed to operate ambitious climate change policies, emissions from international aviation – which are not covered by the Agreement – continue to rise. The International Civil Aviation Authority (ICAO) has set itself the goal of stabilising net emissions from the aviation sector from 2020 onwards. To enable carbon-neutral growth in the aviation sector as of 2020, a range of measures will be used: increased efficiency in ground operations, optimised flight routes, use of biofuels and improved efficiency in global aircraft fleets. However,

given the growth seen in the aviation sector, these measures will be nowhere near enough to harness its future emissions.

Thus, in autumn 2016, the ICAO General Assembly decided to adopt a global market-based mechanism – the Carbon Offsetting and Reduction Scheme for International Aviation (CORSIA). The mechanism will be used to offset emissions from aviation with certified climate change mitigation projects on the ground. CORSIA's phased introduction involves voluntary participation from 2021, with all countries – except the poorest developing countries – being required to



participate from 2027. Some 70 countries, including Germany, have already declared their willingness to participate in CORSIA voluntarily. This means that more than 80 percent of international aviation will be covered by the CORSIA scheme.

If CORSIA is to become an effective climate change mitigation tool then, among other things, robust rules on monitoring, reporting and verification of emissions will need to be established, as will clear and concise quality control criteria for the certificates that airlines will be allowed to use to offset their increased emissions. Also, reliable accounting of transferred emission

reductions is key. It must thus be ensured that the CORSIA mechanism is subject to the same requirements as the cooperation mechanisms contained in the Paris Agreement. Environmental integrity can only be guaranteed if the certified emission reductions are documented accurately and verifiably in the climate inventories of the countries in which they are achieved and are not counted towards other emission reduction targets at the same time. These and other aspects of the relationship between the ICAO and the UNFCCC must be taken into account when developing CORSIA rules and procedures. These are to be developed in the course of 2017.

Policy Coordination for Fragmented Carbon Markets



Under the Carbon Pricing Leadership Coalition, price-based climate mitigation instruments are discussed at the highest political level. Christine Lagarde, Managing Director of the International Monetary Fund, in talks with top government officials.

Largely independent of developments at UN level, a range of market-based mechanisms have been developed at national and sub-national level in various regions in recent years. This expansion reflects the attractiveness of market-based mechanisms and presents an important opportunity for climate change mitigation worldwide. The diversity in the mechanisms' design could, however, prove difficult for subsequent linking of the various schemes. Important climate change potential would thus go unused, as would the opportunity to improve efficiency and secure the environmental integrity of the activities involved.

There is thus an urgent need to coordinate these policies through international cooperation. This is the approach taken by the **Carbon Market Platform** formed under Germany's G7 presidency in June 2015. As a platform for dialogue, it serves strategic exchange on the further development of the global carbon market.

Open dialogue on market-based mechanisms fosters a better understanding of the differing national and regional approaches involved. It also encourages exchange on related drivers, obstacles and experience

gained. How and to what extent should the different approaches be coordinated? Which of the approaches adopted bring the greatest benefits? By providing answers to questions like these, the Carbon Market Platform will help to boost environmental integrity, improve efficiency and eliminate competitive mind-sets. Through open dialogue, the platform will also support and enhance negotiations held under the auspices of the UNFCCC. The platform thus offers a new opportunity for international cooperation and serves to stimulate policy-based ideas for further development of the global carbon market.

In addition to high-ranking decision makers in the G7 and the European Commission, the Carbon Market Platform is also open to representatives from various international organisations like the World Bank, the International Carbon Action Partnership (ICAP), the UNFCCC and the Organisation for Economic Cooperation and Development (OECD). At a high-profile meeting in June 2016, participants from the G7 countries and also from Chile, Indonesia, New Zealand, Senegal, Switzerland and Vietnam exchanged views and experience on using international carbon markets and developing national carbon pricing instruments. A second Carbon Market Platform meeting was held in Rome in September 2017. A high point of this strategic dialogue involved exchange on the issue of how market-based instruments should be designed in order to raise ambition in climate change mitigation effort. During the dialogue, ways were identified in which the Carbon Market Platform can contribute to this process.

Various levels of international cooperation – from coordinating standards and price corridors to linking – were also discussed.

By promoting this kind of exchange between interested countries, the Carbon Market Platform serves in driving new forms of cooperation and in developing common carbon market strategies.

Germany is also a member of the **Carbon Pricing Leadership Coalition (CPLC)**, which has set itself the goal of advancing the carbon pricing agenda worldwide. The Coalition, which was called into being by the World Bank, was announced during the climate change conference in Paris in November 2015. It brings together leaders from national and sub-national governments, the private sector and civil society to support the implementation of existing carbon pricing policies and drive the introduction of new policy measures. The CPLC is to develop guidelines for effective carbon pricing. Experience gained in designing and implementing carbon pricing policies will be collated by the CPLC. The work performed by the Coalition will be supported by parallel policy-making and research. Political support will be provided by the Carbon Pricing Panel comprising the heads of seven national and sub-national governments along with high-ranking representatives from the World Bank, the IMF and the OECD. With the aim of further improving the scientific basis on which to introduce carbon pricing, the CPLC is also forming a High-Level Commission on Carbon Pricing. The Commission will work to identify development pathways for rapid decarbonisation which also enable implementation of the UN Sustainable Development Goals (SDGs).



The voluntary market

In addition to the compliance market, meaning the market whose demand is fed by the binding emission reduction targets of the industrialised countries, a market for voluntary offsetting of greenhouse gas emissions has also developed in recent years. This newer market enables businesses and individuals to reduce their carbon footprint voluntarily. For example, German provider atmosfair makes it possible for private customers to offset their air miles from private travel and business trips.

Buyers need not necessarily use certificates that meet the strict international rules laid down by the UNFCCC. A number of private initiatives have responded by developing their own certification mechanisms. Pioneers in this field include the Verified Carbon Standard (VCS) and the Gold Standard Foundation. These standards each have their own requirements regarding the design and implementation of emission reduction

activities. Some focus purely on the climate impact of the certified projects, while others take a broader approach which includes their social and environmental impacts. Combinations of different standards are also possible and are frequently used. Certificates generated by projects with especially high social and environmental additionality are particularly attractive to voluntary market buyers.

Since the voluntary carbon market came into operation, approximately one billion tonnes of CO₂e have been transferred, with total investment worth close to 4.8 billion US dollars. In 2016, voluntary demand for certificates dropped to 63 megatons of CO₂e, representing a decline of 24 percent compared with the previous year.⁷ Most certificates are bought by companies and in many cases, their engagement is driven by the desire to

⁷ Ecosystem Marketplace (2017): Unlocking Potential—State of the Voluntary Carbon Markets 2017



accept their corporate social responsibility (CSR) and position themselves as an environmentally conscious enterprise. German companies like Puma, Deutsche Post DHL Group and Allianz all use voluntary offsetting. The German government also voluntarily uses carbon certificates to offset the air miles accrued in business trips conducted by members of the government and ministry employees. In doing so, the government uses certificates generated under the CDM.

Use of the voluntary market has enabled private businesses to gain experience with market-based mechanisms which could well give them a competitive advantage should binding schemes be introduced at a later date. But in addition to private businesses, national governments also benefit indirectly from the voluntary market. In the US state of California and in Australia, experience gained with voluntary offsetting has been used in designing emission reduction schemes which are partly based on the methodologies used in the voluntary market. Because up to now, the

CERs traded on the voluntary market have not been used to meet binding emission reduction targets, it has been possible to experiment with a range of different approaches without putting the environmental integrity of the global Kyoto system at risk. In some areas, the voluntary market has thus been able to function as a groundbreaker for later binding schemes.

With the Paris Agreement's entry into force in November 2016, the voluntary market is equally subject to altered conditions. Under the Agreement, all countries are required to contribute to the global climate change mitigation effort. In terms of the voluntary market, this raises the question as to how emission reductions can be accurately documented and accounted for in host countries' greenhouse gas inventories. Key players in the voluntary market, among them the Gold Standard Foundation, are currently working on proposals setting out how the voluntary market can fit into this altered environment.

The Future of the Global Carbon Market: Open Issues on the Road to Implementation





The Paris Agreement is a milestone in international climate change policy. It sets out a new legal framework for climate change mitigation at global level, with market-based mechanisms playing a key role. Article 6 of the Agreement enables the Parties to use cooperation mechanisms. These in turn allow emission reductions to be transferred between countries. This means that emission reduction activities can be implemented in one country, but a portion of the resulting emission reductions can be counted towards the emission reduction target of another. The Paris Agreement thus lays the foundation for the use of market-based climate change mitigation mechanisms beyond national borders. Many issues of central importance in their implementation remain open, however. These must be addressed and clarified in the course of the coming years.

The Agreement's cooperation mechanisms must be designed in such a way that emission reductions can be accurately recorded and counted towards the national greenhouse gas inventories of the countries involved. This is the only way to prevent double counting of the emission reductions achieved, first by the host country and then again by the country to which the reductions are transferred.

Also, clarification is necessary regarding the relationship between finance provided in relation to the cooperation mechanisms and general climate finance. It is also necessary to prevent double counting – in this case of the funding provided – because the cooperation mechanisms were created explicitly to raise climate change ambition and not to provide an escape hole for countries wanting to duck out of serious climate change mitigation effort.

Finally, the issue of how, in relation to a country's existing emission reduction target, use of the cooperation mechanisms will impact the design and ambition of its future NDCs. The implementation requirements for the cooperation mechanisms and the associated guidelines must ensure that the mechanisms provide no incentive whatsoever for host countries to minimise their own contributions to mitigating climate change and push climate change mitigation ambition off onto others because they prefer to sell their emission reduction potential on the carbon market.

One central challenge in all of this will involve developing the climate change mechanisms at differing levels without approaching each of them in isolation. More and more price-based mechanisms are being planned, developed and introduced – both at national and at sub-national level. The global framework set out by the Paris Agreement must thus be designed in a way that does not detract from these initiatives, but rather supports and harmonises them while securing the environmental integrity of the system as a whole.

The German government is thus committed to finding a solution to all of the challenges outlined above, the ultimate aim being to ensure that the international cooperation mechanisms contained in the Paris Agreement will secure the environmental integrity of the climate change regime, contribute to greater reduction of emissions and drive sustainable development in countries that implement action to mitigate climate change.

