Theory and International Experience on Voluntary Carbon Markets

Advantages and disadvantages of different types of incentives for voluntary carbon markets and insights on including such markets in national reporting

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Executive summary

Voluntary carbon markets (VCMs) have emerged globally and in a number of jurisdictions over the last 20 years in parallel with compliance carbon markets (CCMs) under the Kyoto Protocol. They are characterized by a wide range of rules – overseen by non-profit organizations or private sector entities – and prices for VCM credits. The price range can span two orders of magnitude even for the same type of mitigation technologies depending on the attractiveness of the underlying project type for marketing purposes. Overall, transaction volumes and prices on the VCM markets have been significantly lower than those of CCMs, although the collapse of the price for Clean Development Mechanism (CDM) credits since 2013 has led to a reverse situation where the average VCM credit prices are higher than those of CDM credits. Transparency of prices is much lower than under CCMs. With regards to regulatory stringency regarding environmental integrity and additionality, the majority of VCMs is less stringent than CCMs.

In the context of the Paris Agreement (PA), the future of VCMs currently is unclear. Given that in contrast to the Kyoto Protocol, now all countries have national mitigation pledges under their Nationally Determined Contributions (NDCs), at first glance there seems no room for VCMs. However, governments can nurture VCMs if they do not want to introduce mandatory mitigation policy instruments. This of course entails the risk that the NDC goal is missed. Governments may thus require that VCM activities leading to the export of credits retain a certain percentage of the mitigation achieved in the country and thus restrict credit exports to a pre-determined share of mitigation achieved.

In the past, VCMs have faced challenges regarding double counting of VCM credits. Under the Kyoto Protocol, the key VCM standard VCS required cancellation of a number of compliance units from national registries equal to the volume of VCM credits issued. Other standards were more lenient. Under the PA, it is currently negotiated whether Internationally Transferred Mitigation Outcomes (ITMOs) under Art. 6 can be used for purposes other than compliance with NDC targets and thus be generated by VCMs. Principally, VCMs may be restricted to sectors not covered by NDCs, lead to a corresponding adjustment of the NDC, its target or any other form of registry, or be defined as activities underpinning national mitigation policies.

The success of VCMs is contingent on sufficient demand for VCM credits. This demand can be generated through different approaches. Governments could provide a perspective for VCMs to usher into CCMs, with credits retaining validity, or allow VCM credit use in the context of existing CCMs. Moreover, VCM credits could be used against mandatory regulation or fiscal instruments such as taxes, or be acquired through government programs. Certain types of VCM credits are eligible for use in various subnational emission trading schemes in North America and under the airline offset scheme CORSIA. Various jurisdictions allow the use of VCM credits against technology standards. Colombia allows entities to reduce their carbon tax burden by submitting VCM credits. Australia provides subsidies to buy VCM credits.

Incentives to drive VCMs can be assessed applying the criteria economic efficiency, environmental integrity, transparency, attractiveness for the private sector and political stability/acceptability. So far, no incentive system has been able to fulfil all these criteria. An interesting approach to prevent double counting has been applied in Switzerland after a prolonged phase of uncertainty: VCS credits generated by Swiss projects cannot be exported.

While India has been a key player in the CDM, and has exported VCM credits routinely, it lacks experience with domestic VCMs. However, there is a number of policy instruments that can serve as incentives for VCM credit demand. The Performance, Achieve & Trade (PAT) scheme for large industrial energy consumers as well as the Renewable Energy Certificate (REC) scheme could principally accept VCM credits; this would require conversion factors between CO2e and energy efficiency/ renewable energy. The coal cess could serve as fiscal incentive, but its use for general budget purposes makes this relatively unlikely. Pilot market-based mechanisms in the waste and small and medium enterprise sector developed under the Partnership for Market Readiness could become "embryos" of VCMs. A meta-registry developed under the same initiative could be used to enhance transparency of any VCM in India.

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Abbreviations

AAU	Assigned Amount Unit
BAFU	Bundesamt für Umwelt (Swiss Federal Office for the Environment)
BAU	Business-as-usual
CAFE	Corporate Average Fuel Economy
CCA	Climate change agreement
CCBA	Climate, Community and Biodiversity Alliance
CCL	Climate change levy
CCM	Compliance carbon markets
CCX	Chicago Climate Exchange
CDM	Clean Development Mechanism
CER	Certified Emissions Reduction
CORSIA	Carbon Offsetting and Reduction Scheme for International Aviation
CSR	Corporate social responsibility
DC	Designated Consumer
ERF	Emissions Reduction Fund
ERPA	Emissions Reduction Purchasing Agreement
ERU	Emissions Reduction Unit
ETS	Emissions trading scheme
EU	European Union
GHG	Greenhouse gas
GLCC	General Law on Climate Change
ICAO	International Civil Aviation Organization
ICROA	International Carbon Reduction and Offset Alliance
IEX	Indian Energy Exchange
ITMO	Internationally transferred mitigation outcome
JI	Joint Implementation
J-VER	Japan Verified Emission Reduction
KP	Kyoto Protocol
MOEFCC	Ministry of environment, forest and climate change
MRV	Monitoring, reporting and verification
NCEF	National Clean Energy Fund
NDC	Nationally determined contribution
OAK	Oberallmigkorporation (common land forest corporation Oberallmig)
OTC	Over-the-counter
PA	Paris Agreement

PAT	Perform, achieve and trade
PMR	Partnership for Market Readiness
PXIL	Power Exchange India Limited
RE	Renewable energy
REC	Renewable energy certificate
REDD+	Reducing Emissions from Deforestation and Forest Degradation
RPO	Renewable purchase obligation
TERI	The Energy and Resources Institute
UNFCCC	United Nations Framework Convention on Climate Change
VCM	Voluntary carbon market
VER	Voluntary emission reduction
VER	Verified Emissions Reduction

1. Introduction to voluntary carbon markets

1.1. Market size, prices and dynamics over time

Originally, voluntary carbon markets (VCMs) emerged since the late 1990s from the demand of private buyers – corporates or individuals – seeking to offset their carbon footprint in the absence of governmental regulations (Hermwille and Kreibich 2016). The voluntary schemes that were developed included so far only baseline-and-credit approaches, not cap-and-trade markets. Over time however, two types of voluntary markets developed, notably, (1) voluntary opt-in programs accompanied by a binding commitment, such as the Chicago Climate Exchange (CCX) or the Japanese and Thai voluntary emissions trading systems, and (2) a broader non-binding over-the-counter (OTC) market for voluntary carbon offsets (Estrada et al. 2008). The former remain limited in size and the evidence regarding their performance is yet to be collected. Regarding the CCX, its closure in October 2010 after eight years of operation (Lavelle 2010) showed that even highly visible voluntary approaches may not be sustainable.

OTC VCMs are decentralized and existed before the Kyoto Protocol established international compliance carbon markets (CCMs) with the Clean Development Mechanism (CDM) and Joint Implementation (JI) from 2001 onwards. Whereas demand on the OTC voluntary carbon markets was driven by corporate (or individual) social responsibility considerations, demand on the CCMs was driven by national mitigation objectives under the Kyoto Protocol or by private corporations regulated under domestic climate policy instruments accepting CCM units (Hermwille and Kreibich 2016). The nature of VCMs is therefore not directly linked to countries' emissions reduction objectives.

The VCMs have been and continue to be much smaller than the CCMs, even though they gained a higher value share in the total carbon market after the collapse of carbon credit prices under the Kyoto Protocol – Certified Emissions Reductions (CERs) and Emissions Reduction Units (ERUs). Due to the low compliance related demand for CERs, an internet-based platform for voluntary cancellation was established under the auspices of the UNFCCC in 2015. Still, the voluntary use of cancelled CERs is minuscule with 2% of transactions on the VCM (Hermwille and Kreibich 2016). Nevertheless, VCM credits have had a non-negligible impact on the development of a carbon price. VCMs have proven to be a valuable testing ground for the design of CCMs.

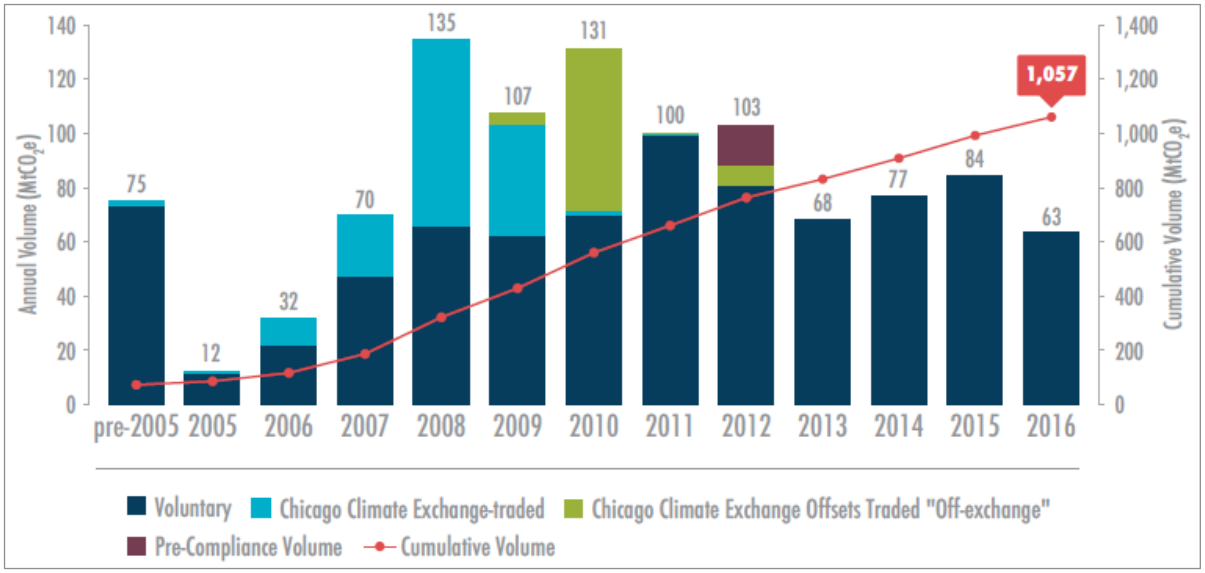
Over the past decade, the products and buyers in the VCMs have become increasingly sophisticated. VCMs are a source of innovation and inspiration leading to the emergence of third-party standards as a way to verify VCM credits in a consistent manner generating legitimacy. The latter was also bolstered by the development of a stronger commitment to achieve broader societal and environmental benefits (Hamrick and Gallant 2017a).

VCMs may be partially designed and/or supported by governments or emerge in the anticipation of private actors of a future CCM. This interaction between VCMs and CCMs to some extent explains the fluctuations in the market volume (see Figure 1). Whereas an anticipated change in regulatory

policy towards CCMs increases demand as private actors expect a rise of prices under a CCM, the transition of projects and buyers to CCMs limits the VCM in return (Hamrick and Gallant 2017a). At the same time, due to their voluntary nature, the VCMs cannot be perceived as a climate change policy instrument per se, but rather a complementary tool to carbon taxes and emission trading schemes (ETS) that may, for example, help reduce compliance costs or test new innovative approaches. VCMs may help improve political acceptability of these instruments as offsetting may help contain compliance costs for affected actors and mitigate negative social impacts such as increased cost of energy. However, while an ETS ensures the achievement of a fixed emissions reduction target and a carbon tax ensures a fixed level of the carbon price, VCMs cannot achieve any of these goals.

To date, VCMs have achieved a cumulative volume of 1 billion credits. Their heyday in terms of volumes was reached in 2008 when many actors in the US expected the creation of a cap-and trade CCM by Congress. This spurred high activities on the CCX. After the Senate did not pass the cap and trade bill, CCX folded and activity has fallen back to about half the volume of the best years. In 2016, voluntary markets saw a drop of 24% on overall amount of carbon offsets bought and sold, representing now 63.4 $MtCO_2e$ traded compared to 84.1 $MtCO_2e$ in 2015.

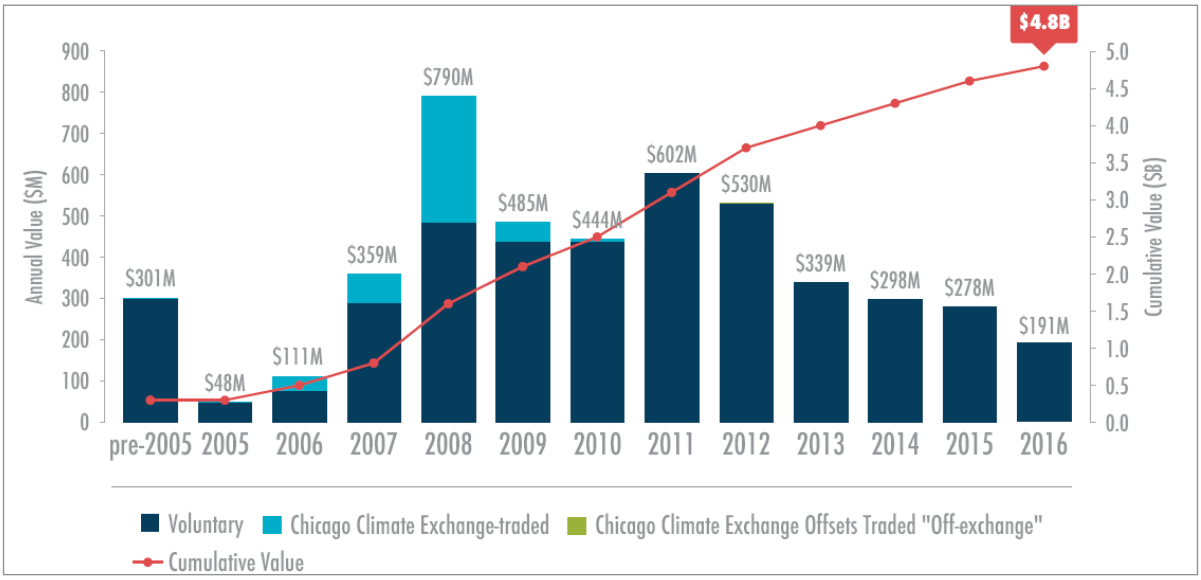
Figure 1: Historical market-wide voluntary offset transaction volumes



Source: Hamrick and Gallant (2017a), p. 6

The market is marked by a high degree of variability of prices over time as well as across project types, exceeding by far variations seen in CCMs (see Figure 2). Average VCM credit prices have fallen since the highs of the mid-2000s.

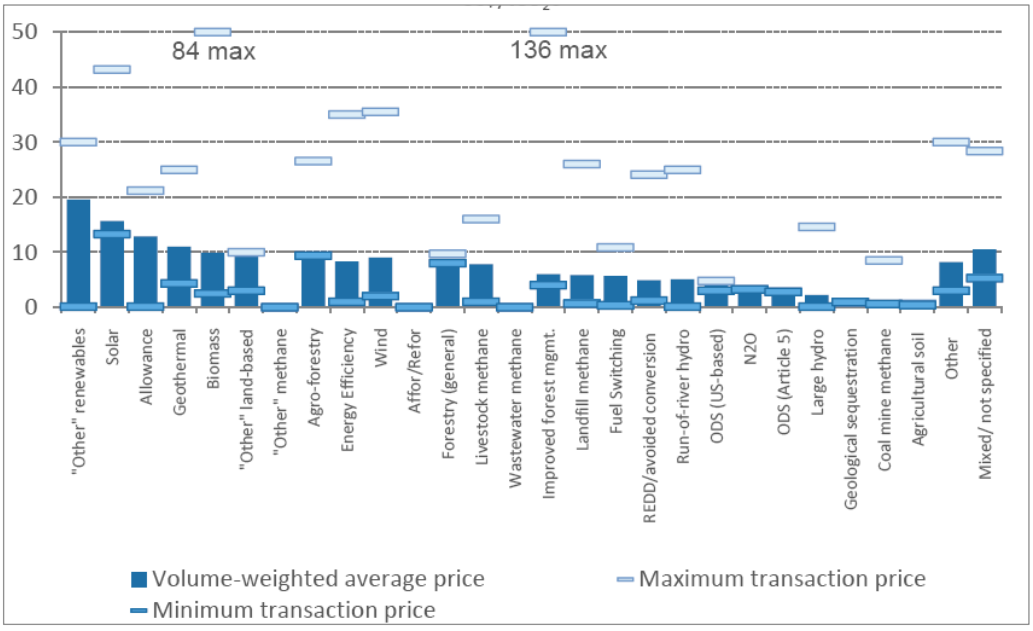
Figure 2: Historical values of VCM transactions



Source: Hamrick and Gallant (2017a), p. 7

VCM credits resulting from "fashionable" project types with a high communication and marketing value due to high sustainable development benefits are able to attract higher prices but are generally purchased in very low quantities. In general, prices range from less than USD 0.50/tCO_2e to more than USD 50/tCO_2e (Hamrick and Gallant 2017a). While unfortunately full price range data have not been published for the last years, values for the year 2010 show the massive differences that can occur even within one project category (see Figure 3). Price transparency and liquidity is much lower for VCMs than for CCMs, where exchanges publish prices on a daily basis. In VCMs, there is no centralized information on carbon prices. Only the annual market report by Ecosystem Marketplace (latest edition Hamrick and Gallant 2017a) provides some transparency (see also section below).

Figure 3: VCM credit price ranges per project type in 2011



Source: Peters Stanley et al. (2011), p. 20

Traditionally, Asia has been the source of the highest volume of VCM credits. This trend was reinforced in the past years as project developers for the CDM turned to the VCMs after the price collapse for CERs. However, VCM credits from Asia are often sold at lower prices with the average credit price being lower than the price from every other region except Europe, with most offsets stemming from renewable energy projects in India, China and Vietnam (65%). The largest share by value are forestry and land-use offsets coming primarily from countries with high-value tropical rainforests and high risk of deforestation, e.g. Indonesia (Hamrick and Gallant 2017b).

Figure 4: Market size of offsets transacted from Asia, 2016

Volume	Average Price	Value
21.5 $MtCO_2e$	\$1.6/tCO_2e	\$35M

Project Category	Volume	Value
Renewables	65%	34%
Forestry and land use	13%	38%
Energy efficiency and fuel switching	13%	16%
Methane	5%	5%
Household devices	3%	7%

Standard		Volume	Value
VCS	Only VCS	68%	41%
	VCS+CCB	10%	25%
	SOCIALCARBON	2%	1%
Gold Standard		13%	28%
CDM		6%	4%
ISO-14064		1%	0%

Source: Hamrick and Gallant (2017b), p. 6

1.2. Environmental integrity

Voluntary opt-in carbon markets suffer from adverse selection of firms participating. In a real world, the exact amount of emissions of different corporations is likely to be unknown to the regulator, firms that receive an excess allocation would opt-in and firms that receive too little permits would opt out (Montero 1999, 2000). Similarly, if the baseline for the VCMs is set too stringently, this would negatively affect the cost-benefit calculation of firms. If the baseline is set too generously, the program could generate non-additional VCM credits which would lease to an increase in global emissions and undermine the principle of environmental integrity (Millard-Ball 2013). An exception seems to be the VCMs in Japan as the understanding of voluntary engagement in Japanese culture implies a de-facto compliance by participants (IGES et al. 2016).

1.3. Governance and transparency

VCMs can be sources of innovation but are only relevant if they feature drivers for demand and supply. On the one hand, the absence of a unique set of rules and regulations that characterizes a CCM reduces transaction costs, enables innovation and creates space for testing new methodologies that might be included in compliance markets at a later stage. On the other hand, VCMs run a higher risk of low-quality credits and, therefore, lower credibility and potentially lower carbon prices that can be challenging for projects in the long run. To mitigate this risk, voluntary standards (Box 1)

have been developed, hedging the "cowboy atmosphere" of the early VCM years (Benessaiah 2012, Dhanda and Hartman 2011).

Box 1: Voluntary carbon offset standards (non-exhaustive list)

- **Verra** (formerly Verified Carbon Standard VCS): carbon offset standard focusing on GHG reduction attributes of projects
- **Gold Standard**: offset standard for renewable energy and energy efficiency projects, applicable to voluntary and CDM projects, with a focus on environmental and social benefits
- **Climate, Community & Biodiversity Standards** (CCBS): project design standard to ensure robust project design and benefits for the local communities and biodiversity; exclusive focus on land-based bio-sequestration and mitigation projects
- **Plan Vivo**: offset project method for small scale LULUCF projects with a view to promote sustainable development and improve rural livelihoods and ecosystems
- **ISO 14064**: policy neutral, GHG accounting standard for (1) designing and developing GHG inventories, (2) for quantifying, monitoring and reporting GHG emission reductions and removal enhancements from GHG mitigation projects as well as (3) for GHG information validation and verification
- **WBCSD/ WRI GHG Protocol for Project Accounting**: Tool for quantifying and reporting GHG emission reductions, without focus on verification, enforcement or co-benefits but with a view to enhance the credibility of GHG project accounting

Source: CORE 2011, own additions

Over time, many different standards were developed applying different metrics, without an agreement on a common set of standards. Standards were formulated to certify the quality of offsets, to certify offset sellers, products, services and claims of climate neutrality and other standards were developed by offset retailers to ensure the quality in their portfolios, as for instance the Carbon Neutral Company and MyClimate (Dhanda and Hartman 2011). Transparency of reporting in VCMs largely depends on these standards. While Verra (formerly the VCS) requirements for monitoring, reporting and verification (MRV) largely mimic those of the CDM, other standards may have more lenient rules. For example, the Japan Verified Emission Reduction (J-VER) scheme incorporates more flexible overall MRV requirements than the CDM. Notably, the additionality demonstration under J-VER is based on a "positive list" rather than project-by-project additionality demonstration. The monitoring process itself is also significantly simplified, with a wide use of conservative default values to calculate emissions reductions (Shishlov and Bellassen 2016).

Depending on its objectives, the government may choose to support only standards that fulfil given criteria with regards to MRV, for example project-by-project additionality demonstration or verification by an accredited third party. The regulator, however, must be aware of additional transaction costs imposed on project developers by more stringent MRV rules. For example, it was demonstrated that under the CDM, which is generally considered to have one of the most rigorous

MRV systems among carbon pricing schemes, MRV costs may range from a few cents to USD 1.5 and above per tCO_2e especially for smaller projects (Shishlov and Bellassen 2016).

Given the unregulated OTC nature of the VCMs, the price for VCM credits vary drastically depending on the perception of the quality of a given standard, project type, geography, vintage (year of emissions reductions), etc. (see Figure 4, Benessaiah 2012).

With the emergence of pre-CCMs and the increasingly blurry lines between VCMs and CCMs after the Copenhagen conference of 2009, a greater fragmentation of the markets can be observed. For example, some nation states have bought VCM credits beyond their obligations, both VCM and CCM credits are used in the context of results-based finance and VCM credits issued by voluntary standards become eligible under compliance schemes, e.g. likely under the Carbon Offsetting and Reduction Scheme for International Aviation (CORSIA)[1] or in national emissions trading systems (ETS) as shown in the California example below or as a means to reduce the carbon tax liability (Hermwille and Kreibich 2016).

Even if VCMs may be able to avoid government bureaucracy and can serve to pilot a carbon market and provide a useful learning ground, they require enabling and connecting institutions – including the organizations developing standards, accredited auditors, consultants and NGOs – to ensure the equitable definition of credits and foster both mitigation and sustainable development. They have to be able to systematically assess and negotiate trade-offs among parties affected by VCM projects (Benessaiah 2012).

At the same time, the establishment of such institutions is an opportunity to test and develop systems needed to transition to a CCM. VCM experiences contribute to capacity building in countries through efforts to adhere to international standards or through the development of domestic standards; through pilot activities allowing for later scaling up; through training in auditing procedures and through the establishment of a market infrastructure (Guigon 2010).

In some instances, governments can provide explicit support to a VCM in preparation for a CCM such as for example in Thailand (Box 2). At the same time, it is important to emphasize that while VCMs can serve as an interim solution before establishment of a domestic CCM, from an environmental and climate policy point of view they cannot replace a CCM to achieve emissions reduction objectives (Guigon 2010).

[1] CORSIA has been designed by the International Civil Aviation Organization (ICAO) in order to allow airlines to offset emissions and reach net carbon neutral growth from 2020 onwards. The specific regulation is currently being elaborated (IATA 2018).

Box 2: Thailand government support for voluntary carbon markets

The Thai government supports the development of VCMs. To this end, the public Thailand Greenhouse Gas Management Organization (TGO) has been established.

Within the project-based Thailand Voluntary Emission Reduction Program (T-VER), Thailand Verified Emission Reductions (TVERs) are certified in order to enhance readiness of the stakeholders for carbon markets. The scheme is harmonized with international ISO standards and CDM methodologies (TGO n.D.).

From 2013- 2016, the TGO developed an MRV system for the Thailand Voluntary Emissions Trading Scheme (Thailand V-ETS). In its pilot phase from 2014-2017, an MRV system has been tested. The second phase from 2018-2020 will serve to test the registry and trading platform. The voluntary scheme is thus a preparation step, while the TGO is working on an ETS implementation roadmap (ICAP 2018c).

1.4. Attractiveness for private sector

To be attractive for the private sector VCMs need to provide regulatory and price certainty. Sudden regulatory changes, such as changes in offset eligibility requirements in an ETS, may hamper the private sector's confidence in the system. Uncertainty about prices makes it more difficult to elaborate credible business plans and obtain upfront financing for projects while the general oversupply of the offset market reflected in low carbon prices makes the prospect of marketing carbon credits vague, hence higher cost of capital for these projects.

Moreover, uncertainty about carbon revenues and the difficulty of presenting Emissions Reduction Purchasing Agreements (ERPAs) as collaterals to banks, made obtaining upfront financing difficult for both VCM and CCM project developers. In general, some argued that carbon finance was not successful in helping project developers to leverage additional capital to cover upfront investments in fixed assets (Climate Focus et al. 2017). In the VCM, this situation is further aggravated by the lack of transparency discussed above.

Policy uncertainty is one of the main factors adversely affecting new-energy and climate-related technology investment. Uncertainty can deter investment especially in long-lived energy-related capital. A stable policy and regulatory framework is therefore crucial to mitigate these concerns (Aldy 2017). Since carbon revenues accrue slowly over the lifetime of a project, VCM and CCM projects are particularly vulnerable to policy changes that may result in sudden price drops, as seen under the CDM after 2012.

The remainder of this study will discuss how incentivizing instruments that can be established (chapter 3), theoretical and practical assessment of their impact (chapters 4 and 5 respectively), and finally their applicability to the Indian context discussed (chapter 6). The discussion will be embedded into the new requirements and likely rules of the Paris Agreement (chapter 2) and the consequences this would have for national reporting on VCMs (chapter 7).

2. The Paris Agreement and voluntary carbon markets

2.1. Transfer of emissions reductions under Kyoto and Paris

The fundamental difference between the climate policy and carbon markets under the Kyoto Protocol (KP) and the Paris Agreement (PA) is the end of bifurcation of commitments between developing and developed countries. Under the KP, developed countries had formal mitigation obligations and could offset a share of their emissions by buying carbon credits from CDM projects implemented in developing countries. Under the PA all countries have formulated nationally determined contributions (NDC) representing their emissions reduction commitments. Although the NDCs have widely varying characteristics, any mitigation achieved in a country and sold to a foreign state or private actor must be accompanied by a corresponding adjustment to the emission inventory or the emissions reduction target of the selling country. This is important to avoid double counting and double claiming of emission reductions and preserve the environmental integrity of both compliance and voluntary markets. These circumstances result in the fact that former host countries for projects generating CERs or VCM credits now have an interest in keeping as many emission reductions as possible in their own books in order to achieve the national mitigation objectives, in particular with regard to projects with low-cost emission reduction potentials ("low hanging fruits") (Hermwille and Kreibich 2016).

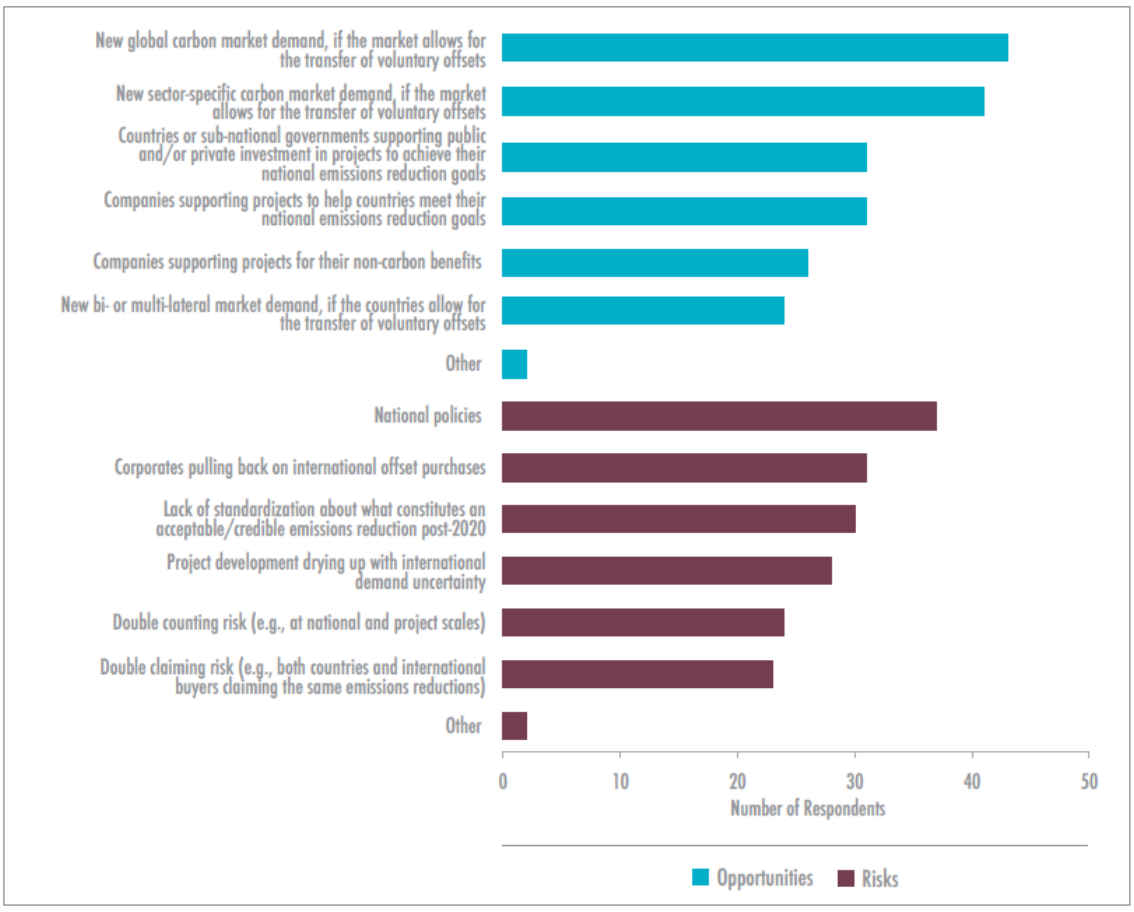
This situation is somewhat similar to the one observed in JI projects under the KP. For example, France being uncertain about its Kyoto compliance position in the beginning of the first Commitment Period acted cautiously with regards to "exporting" emissions reductions through JI projects. Most notably, the French government applied a "90% rule" to all JI projects, whereby only 9 credits were issued for every 10 tons of CO_2e abated. Together with conservative baselines to calculate emissions reductions, this likely resulted in carbon under-crediting, thus ensuring that part of emissions reductions achieved under JI projects could be "claimed" by the French government towards the achievement of its Kyoto targets. Similarly, under the Paris Agreement, countries with ambitious NDCs may be cautious in approving the "export" of cheap emission reductions whether through compliance or voluntary markets. They may ask for a part of the credits generated by a project to be kept in the host country, akin to a "withholding tax". A more refined variant of this approach would be to "lease" credits, i.e. that the share of credits to remain in the host country would increase over time. Conversely, in case of unambitious NDC targets, i.e. that are above business-as-usual (BAU) emissions, governments may not necessarily care about "exporting" some of the emissions reductions, which raises the question of additionality of these efforts (Michaelowa and Butzengeiger 2017).

2.2. Decay or expansion of voluntary markets in the Paris world?

In the context of the new characteristics of the climate regime and its consequences for voluntary carbon markets, two general lines of thought can be distinguished: The "**school of decay**" states that VCMs will vanish as governments will have an interest in controlling all emission reductions in order to achieve their NDCs. Consistent with this line of thought, Hermwille and Kreibich (2016) speak of a "serious identity crisis" of VCMs, as their offsets would be counted towards formal mitigation objectives. In order to remain credible, VCMs would have to become part of the Paris Architecture and report and track the transaction of VCM credits.

The "**school of realistic pessimists**" states that as long as there are no penalties for non-compliance with the NDC targets, government action will remain insufficient for achieving the PA temperature goal and therefore enough room for voluntary action permitted by the government that it will still claim towards its mitigation objectives. The Gold Standard (2018) states that the ambition of corporations and individuals will be crucial to achieve the goals of the PA and that as long as innovative solutions to address the risk of double counting are found, there is a need for VCMs. Similarly, the International Carbon Reduction and Offset Alliance (ICROA) holds the PA to be a "great opportunity for carbon markets" and an "opportunity for the private sector to step up and take a leadership role by helping to bridge the ambition gap" (ICROA 2017).

Figure 5: Perceived opportunities and risks for the voluntary markets post-2020



Source: Hamrick and Gallant (2017a), p. 21

Ecosystem Marketplace conducts regular surveys with participants in the VCMs. From this survey it becomes clear that VCM participants see opportunities for enhanced demand in line with enhanced climate ambition, in particular if VCM credits can be traded in future market mechanisms under the PA. The introduction of mandatory national policies, uncertainty about the future of market regulations and double counting and double claiming issues are perceived as main risks (Hamrick and Gallant 2017a).

2.3. Options to prevent double counting

Double counting has already been an issue in both VCMs and CCMs under the KP with regard to the double registration of projects or the double counting by actors (e.g. if a facility governed by a carbon tax reduces emissions for tax compliance but also issues voluntary credits for this action) (Gold Standard 2018).

Under the KP the risk of double counting became especially apparent in the case of VCM projects in Annex B countries that had binding emissions reduction commitments. To avoid the risk of double-counting and preserve the environmental integrity of the KP, the host country must convert its Assigned Amount Units (AAUs) into Emission Reduction Units (ERUs) under JI. VCM standards, however, adopted different approaches to address the issue. The main VCM standard, VCS, followed the JI principle and therefore requires the production of an official document from the country certifying that AAUs corresponding to the number of VERs (VCM credits under the VCS) have been cancelled from the national registry. Without such a document, projects carried out in Annex B countries are not eligible for VCS certification. The CCB Standard requires "convincing proof" that double counting has been avoided but does not necessarily require an official document. The CarbonFix Standard (CFS) allows negotiating on a case- by-case basis with the authorities during the certification process (Foucherot et al. 2014).

The universality of government mitigation commitments under the PA further expands the double counting risk for VCMs. Addressing the risk also becomes more complicated as countries do not have "AAU budgets" that made "corresponding adjustments" relatively straightforward. Without formal recognition of the host country followed by a "corresponding adjustment" of the target or inventory of the host country for the voluntary action implemented and the VCM credits resulting, any VCM credit issued would contribute to the mitigation goal of the country and thus necessarily result in double counting by the private entity and the host country (Hermwille and Kreibich 2016). Therefore, the UNFCCC decision 1/CP21 adopting the Paris Agreement highlights the need of corresponding adjustments to prevent double counting, including for approaches involving non-Parties such as CORSIA (Gold Standard 2018). This is reflected in the current version of the informal negotiation text (see Box 3).

Box 3: Double counting of voluntary and compliance action as negotiated under Art. 6

Article 6 of the PA establishes two market-based mechanisms based on the trading of Internationally Transferred Mitigation Outcomes (ITMOs) either within the context of cooperative approaches between Parties (Art. 6.2) or of a centralized mechanism under the auspices of the UNFCCC (Art. 6.4). According to the current version of the informal negotiation text, ITMOs can be units certified under Art.6.2 and 6.4 of the PA as well as under Articles 12 and 6 of the KP (§14). So far, VCM credits are not mentioned.

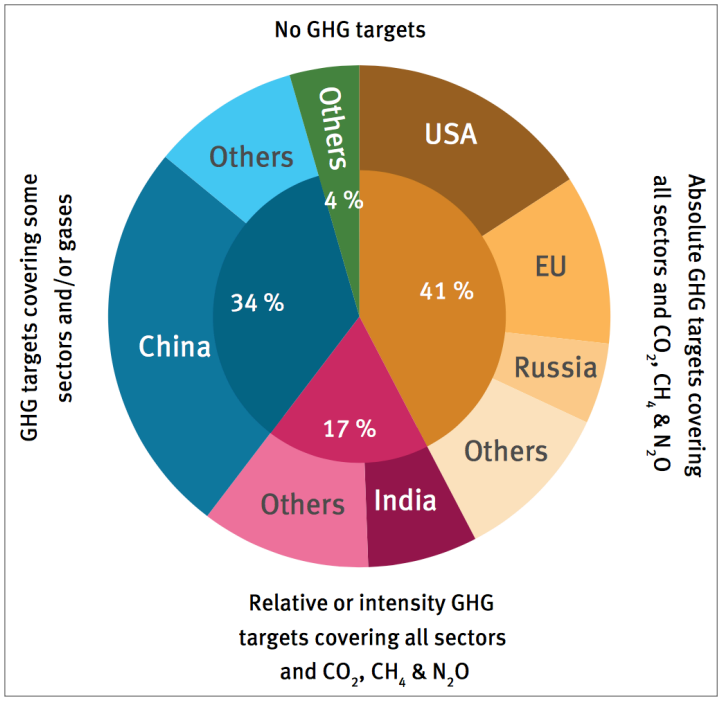
However, the option to allow the use of ITMOs by non-Party actors towards purposes other than NDC achievement is included in the text (§24 c, §116). Safeguards to avoid double counting could also be introduced (§117) for the use of ITMOs for international mitigation action outside the UNFCCC, voluntary climate action that are not mandatory in the relevant jurisdiction and as means of demonstrating climate finance. This will have to be made consistent with the corresponding adjustments (§118) with the option of having to apply always a corresponding adjustment or only for the sectors from within the scope of the NDC (SBSTA 48 2018).

Some observers say that double counting of voluntary and formal commitments is not relevant as they are separately accounted for and others say that due to the scale of the VCMs double counting is an acceptable risk. However, market participants are concerned that double counting would undermine the integrity of the VCMs as well as the confidence in national reporting (Gold Standard 2018).

The issue is further complicated by the varying characteristics of NDCs which make it difficult to ensure that double counting is prevented. NDCs are currently formulated using different measures for targets, including not only mitigation but also energy-related, forestry, finance or other targets (Figure 4). Furthermore, NDC accounting and/or NDC targets may be recalculated or retrospectively changed. Sectors not included in the first NDC cycle could be included at a later stage etc. According to the Gold Standard there are only "only very rare cases where it is feasible to demonstrate with certainty that no double counting is occurring" (Gold Standard 2018).

One possible solution would consist in enhancing the transparency of both compliance and voluntary transaction of carbon offsets. VCM credits per se could be declared to be ITMOs as well and become subject to the international standards and guidance developed under Article 6.2. If there was a centralized database on ITMO transaction to be established, it would theoretically be possible to balance the accounts of the host country of the activity and the country of residence of the entity that purchases and ultimately retires the VCM credit. Alternatively, reporting requirements for countries could be enhanced by demanding them to also report on imports and exports of VCM credits. Both solutions here proposed by Hermwille and Kreibich (2016) would require international oversight.

Figure 6: Share of global GHG emissions by target type and scope



Source: Graichen et al. (2016), p. 12

ICROA (2017) and the Gold Standard (2018) both propose three different models for a future framework for VCMs that have some similarities. They can be summarized into three general approaches:

- *Restrict VCMs to sectors not-covered under the NDC of the host country:* VCM credits could only be generated in sectors that are not part of a country's mitigation objective. Voluntary action would permit for additional mitigation beyond the official targets and also enhance data availability and market preparedness in the sector. However, and with regard to the objective of the PA to promote economy-wide NDCs, the issue of double counting would arise ex-post as soon as the sector gets included in the NDC. Parties would have to record all VCM credit issuances then for accounting in the case of NDC expansion. For example, New Zealand does not account for all land use activities under the Kyoto Protocol. Therefore, for the first commitment period at least, actors can take part in VCM projects in the excluded sectors of forest management, revegetation, cropland management, or grazing-land management without the risk of double counting (MAF nD).

- *NDC crediting with corresponding adjustment:* VCM credits could be generated within the scope of an NDC if the host country commits to undertake a corresponding adjustment (either to its NDC target number, to its inventory or to any other form of registry) and the VCM credit is cancelled by the private actor. This is a similar approach to the one spearheaded by the VCS for projects in countries with Kyoto commitments discussed above.

- *Reframing VCM credits to "sponsoring" national mitigation policies:* VCM credits would no longer represent the ownership of a certain amount of CO_2 reduced, but an attribution of a reduction to an actor contributing to the climate policy target of the host country or going beyond the commitment of this host country. This solution, however, would undermine one of the main

motivations of the private sector to purchase VCM credits, notably claiming "carbon neutrality" or a given percentage of emissions that are "offset". Moreover, the very nature of VCMs would prevent such a clear regulation. Indeed, some standards may simply decide to adopt a different approach to the double counting issue, as it was done, for example, by the CarbonFix Standard discussed earlier.

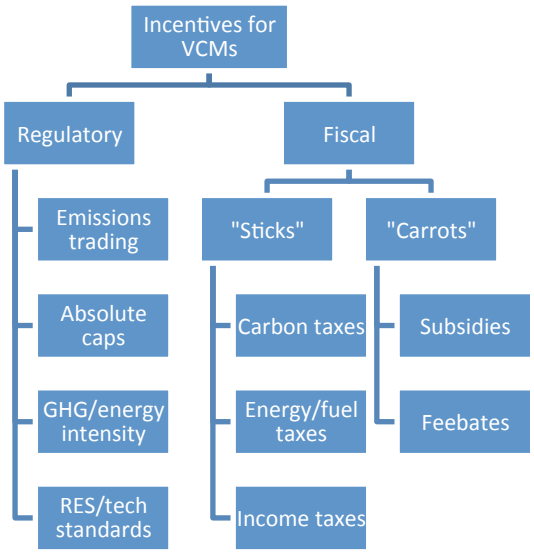
The viability and acceptability of these options fully depends on the current negotiations on the PA Rulebook and in particular on the definition of ITMOs and the guidelines developed with regard to the corresponding adjustment and other uses of ITMOs.

3. Potential public incentives for voluntary carbon markets

3.1. Types of incentives for voluntary carbon markets

While many private actors engage in VCMs to fulfil their corporate and social responsibility (CSR) objectives, such as, for example, achieving "carbon neutrality", governments may provide additional incentives to invest in emissions reduction projects. For example, market participants will be more likely to engage in VCMs if they expect either the VCM credits be eligible under a current or future CCM or projects to be eligible under a current or future compliance regime (Guigon 2010). This incentive typically comes in the form of an "exchange" of emissions reductions and/or implementing measures that reduce emissions against an incentive. The latter can in turn take the form of a reduced regulatory stringency or a fiscal incentive (reduction in a fiscal "stick" or increase in a fiscal "carrot"). The chart below provides an overview of possible incentives for VCMs that are briefly discussed in the following sections.

Figure 7: Overview of possible incentives for voluntary carbon markets



Source: authors' own elaboration

3.2. Regulatory incentives

The regulatory incentives for VCMs may come in the form of a reduced regulatory stringency allowed against the use of VCM credits.

Emission trading schemes

Some emissions trading schemes allow for the use of VCM credits in order to provide a "safety valve" cost containment tool and to stimulate emissions reductions outside the scope of an ETS. One such example is the California ETS that was initiated in 2012 and is currently in its third compliance period. It is the first multi-sector cap-and-trade program for GHGs in North America, covering 85% of state's total GHG emissions (ICAP 2018d). California ETS allows for the use of domestic credits with a quantitative limit of up to 8% of each entity's compliance obligation. Eligible domestic credits can be generated from sectors not covered by the ETS if certified under one of six eligible "protocols", for the following project types:

1. U.S. forest projects
2. Urban forest projects
3. Livestock projects (methane management)
4. Ozone depleting substances projects
5. Mine methane capture projects
6. Rice cultivation projects

Absolute emissions caps

Some regulations may set an absolute mandatory cap on GHG emissions in a given sector or sub-sector and allow for the use of offsets in order to mitigate the potential prohibitive cost of such a regulation. One example of this approach is the Carbon Offsetting and Reduction Scheme for International Aviation (CORSIA) developed by the International Civil Aviation Organization (ICAO). In order to enable airlines to achieve mandatory carbon-neutral growth post-2020, airlines are allowed to use eligible offsets (see section 5.1 for details). CORSIA will be implemented in a pilot phase from 2021 onwards and will allow CCM credits generated under the UNFCCC and the PA as well as VCM credits from some high-quality voluntary offsets standards and REDD+ (IATA 2018).

Emissions/energy intensity targets

Some regulations may also set a relative emissions reduction target – i.e. reduction in emissions intensity – in a given sector or sub-sector and allow for the use of VCM credits against this target. For example, in 2007, Alberta, Canada implemented a regulation requiring large emitters to either: reduce their emission intensity by 12 percent or offset these emissions through one of the options (C2ES 2015):

- buy emission performance credits from other facilities in Alberta;
- buy VCM credits from other firms in Alberta that have voluntarily reduced their emissions; or
  pay into a fund aimed at reducing GHG emissions in the province.

Similarly, energy intensity targets may be set to encourage more efficient power generation, transmission as well as energy use – for example, in industry or transportation. In the US, more than twenty states have established mandatory long-term energy savings targets through an energy

efficiency resource standard. In some states private companies can generate energy savings certificates – by taking steps to reduce electricity consumption – that can then be used towards compliance by other companies (C2ES 2015). Such efficiency standards can theoretically also be linked with VCMs if VCM credits are able to demonstrate reduction in energy consumption. India has ample experience with an energy intensity-based approach in the context of the Perform, Achieve, Trade (PAT) scheme for large industries, to which a voluntary market could be linked.

Renewable energy portfolio standards

Standards can be designed so each utility must obtain a certain percentage of its delivered electricity from a defined set of clean or RE sources. The regulator may then include a provision to reduce the cost of compliance through VCMs, e.g. utility exceeding standards can generate credits (RE credits) to bank for the future or to sell them to other utilities (C2ES 2015).

Technology standards

Since 2012, the US Corporate Average Fuel Economy (CAFE) standard simultaneously regulates fuel economy and GHG emissions from new vehicles. Car manufacturers have to reach a fuel efficiency target for their fleet which is usually calculated on the basis of distinct technology standards for different vehicle size/power categories. Vehicles not attaining the standards can be "compensated" by other vehicles that exceed the standards. In the US, the manufacturers are permitted to use credits not related to improvements in fuel economy to assist in reaching their goals (Schoettle and Brandon 2014). While to date, neither VCS nor CCM credits are eligible under CAFE, this would be principally possible without any problem. India could introduce efficiency standards for car importers as well as domestic producers which would contribute to resolve the air quality problem in Indian cities.

3.3. Fiscal incentives

Fiscal incentives for VCMs may come either in the form of a reduced fiscal "stick" – for example, reduced carbon taxes, reduced taxes on energy/fuel use, etc. – or in the form of an increased fiscal "carrot" – for example by providing subsidies or tax credits to actors that engage in voluntary emissions reduction activities.

3.3.1. The "sticks"

Carbon taxes

Some jurisdictions that implement carbon taxes allow for full or partial "offsetting" of the tax through VCMs, typically using domestic offsets. The latter condition is put in place in order to ensure that emissions reductions are achieved in the same jurisdiction as the carbon tax and thus avoid the "outsourcing" of emissions. For example, in Colombia entities regulated under the carbon tax can be certified as "carbon neutral" leading to the exemption from the tax liability. Entities can achieve "carbon neutrality" through selected CCM and VCM credits coming from projects registered after 1 January, 2010 on the Colombian territory under (IETA 2018):

- Clean Development Mechanism (CDM);

- certification programs or standards that have been either publicly consulted and verified appropriately or issued by the UNFCCC;
- projects recognized by the national government through a National Normalization Body or meet the requirements for the registration of initiatives established by the REDD+ registry.

In order to be qualified as "carbon neutral", companies must submit an exemption request that must also be accompanied by a "Voluntary Cancellation Certificate" and a "Declaration of Verification" of eligible credits.

Energy / fuel taxes

Credits can also be used indirectly to reduce the stringency of energy or fuel taxes, such as, for example, in the case of Climate Change Agreements (CCAs) in the UK. CCAs are voluntary agreements made by the UK industrial companies and the Environment Agency to reduce energy use and carbon dioxide (CO_2) emissions. In exchange for signing a voluntary CCA, operators receive a discount on the Climate Change Levy (CCL), a tax added to electricity and fuel bills. For operators who hold a CCA negotiated with the Environment Agency, the CCL will be reduced by 90% on electricity bills and by 65% on other fuels. CCAs represent a two-tier system, whereby umbrella agreements are first negotiated with sectors and then with individual companies.

Income taxes

Purchasing VCM credits from some NGOs may be qualified as a charitable donation and hence lead to income tax deductions. For example, the non-profit organization Carbonfund, which supports carbon offset projects and programs confirms that all contributions to obtaining VCM credits are tax-deductible to the extent allowed by law. Likewise, The Nature Conservancy elaborates that donations to charitable nonprofits are tax deductible because no financial benefit accrues to the donor (Carbonfund 2018).

3.3.2. And the "carrots"

Instead of using fiscal "sticks", a government may decide to provide fiscal "carrots" instead, which may come in the form of subsidies, tax credits, feebates, etc. In India, such subsidies in the form of accelerated depreciation have played a key role in incentivizing private companies to invest in wind turbines.

Subsidy programs provide government assistance for specific types of low-emitting activities or technology applications and may also be linked with VCMs. For example, the Australian Emissions Reduction Fund (ERF) provides incentives to implement emissions reduction activities in a variety of sectors including agriculture, energy efficiency, mining, oil & gas, transportation, vegetation management and waste. In order to select projects to support, the government conducts reverse auctions, chooses the lowest offers necessary to reach emissions reduction targets and guarantees to pay a certain price for the emission certificates accrued by the project (Freebairn 2014). The methodologies used by the ERF have been transitioned from the Carbon Farming Initiative (CFI).

4. Criteria for assessing different incentives that drive voluntary carbon markets

A government may decide to provide incentives for private sector participation in VCMs in order to achieve various objectives, such as incentivizing mitigation activities in sectors not covered by other policies, contain the compliance cost of other climate policies, test MRV systems and prepare for future compliance markets, to name only a few. However, it needs to be ensured that these incentives respect several criteria that are briefly discussed in this section. It needs to be stressed that this discussion does not relate to the characteristic of the VCM as such; this has already been covered in the introduction above.

4.1. Economic efficiency and environmental integrity

Economic efficiency of an incentive is linked to its breadth as well as lack of bias. A broad, but low carbon tax will have a higher efficiency than a very narrow one with a very high rate. Likewise, a broad regulation of a whole class of technologies will be more efficient than a very stringent one for a narrowly defined technology.

The economic efficiency of an incentive may also be seen through the prism of efficient use of funds. From this perspective, an efficient incentive would only cover the marginal cost of emission reductions in a given sector and not result in windfall profits. A good example of this concept is HFC projects under the CDM. Indeed, HFC projects under the CDM yielded large scale emissions reductions at a very low cost (few USD cents per tonne of CO_2e). However, project developers were remunerated based on the market price for carbon credits, which in the "golden days" reached USD 20/tCO_2e, resulting in huge windfall profits. It was therefore suggested that some technologies may be ripe to "graduate" from the CDM into other, more mainstream, economic tools, such as direct regulations with or without compensation for marginal costs (Shishlov and Bellassen 2014).

The environmental integrity depends on the link of the incentive to GHG emissions. The closer the incentive is coupled to the actual emissions level of an actor, the higher its environmental integrity. If an incentive is granted for an emission reduction, the methodological robustness for "MRVing" this reduction is crucial for the environmental integrity. Incentives not related to emissions levels will have low integrity.

Another key consideration for economic efficiency and environmental integrity of an incentive is additionality. In an ideal world, the regulator would not provide incentives to actions that would have happened anyway. This concept is the cornerstone of carbon offsetting, particularly when carbon credits from emissions reduction projects may be used for compliance, i.e. allow for an increase of emissions elsewhere.

4.2. Transparency

A transparent application of an incentive means that there is no lack of clarity who is eligible to receive the incentive and how eligible entities can access the incentive. This means that any discretion in allocating the incentive will be detrimental to transparency. Ideally, incentives should be accessible through IT-based platforms. Fiscal incentives are less likely to be transparent than regulatory ones; but also, regulatory incentives can suffer from a difference in formal regulation and its actual implementation.

For example, in the understanding of many actors Mexico allowed CERs to offset its carbon tax. However, in reality the government only allowed in kind payment of the tax with CERs at market value of the CERs. These rules were clarified by the Mexican official gazette in December 2017, where the rules for in-kind payment with CERs were made public (see section 5.2). This highlights the importance of making the rules of an incentive transparent and understandable to actors concerned.

4.3. Attractiveness for private sector

Carrot-type incentives will normally be more attractive for the emissions-intensive private sector than "sticks". Regulation that helps to mobilize no-regret action by removing informational barriers can also be attractive. For low GHG technology providers any incentive is attractive that generates more demand for their products.

In general, the attractiveness of an incentive for the private sector may depend on the sector concerned. For example, "carrot-type" incentives such as subsidies may be inefficient for actions that are already economically attractive but not implemented due to other barriers. A classic example is energy efficiency in buildings where barriers are not linked to economic attractiveness, but rather to the lack of information, split incentives, lack of available capital for upfront investments or behavioural biases (Grubb, Hourcade, and Neuhoff 2014). The design of an incentive should thus consider the specificities and barriers in a given sector.

4.4. Political stability and acceptability

Incentives contribute to political stability if they increase government resources while not leading to unrest/opposition due to relevant burden on important interest groups. Regulatory incentives can be attractive if the regulation addresses interest groups with low power and reduces information barriers to technology diffusion.

Fiscal incentives have different acceptability characteristics. Generally, fiscal tools are attractive that burden a broad group in a not very much visible manner, while distributing benefits to a small, well-defined group. This would mean that a low-level general carbon tax, or a subsidy financed by a small increase of a broad tax would be highly acceptable, while a high tax levied on a small group of entities, or a small, widely distributed subsidy would have low acceptability.

One way of increasing the acceptability of fiscal incentives is making them "revenue neutral". For example, when British Columbia introduced its carbon tax it set a goal of revenue neutrality, which means that all revenue collected by the tax must be recycled to households and businesses in the jurisdiction, largely in the form of tax cuts. Economists generally favour revenue-neutral carbon taxation because it has the potential to improve economic growth by reducing distortions in the tax

system. To counter the potential scepticism that the Government of British Columbia may be failing to deliver on tax-neutral promises, the Department of Finance is required to report annually on how tax revenues are being used which again highlights the importance of transparency of an incentive. Surveys show that the social acceptability of the carbon tax in British Columbia has therefore increased over time (Murray and Rivers, 2015).

5. Empirical assessment of incentives in case studies

Following the discussion of theoretical criteria to assess the performance and suitability of incentive instruments per se, the following cases illustrate the rationales in opting for certain incentives or solutions in different contexts.

5.1. Regulation: International air traffic – CORSIA

ICAO has adopted a threefold regulation for international air traffic:

- Improving annual average fuel efficiency of 1.5% from 2009 to 2020
- Stabilize net CO_2 emissions at 2020 levels with carbon-neutral growth post-2020
- Reduce aviation's net CO_2 emissions by 50% in 2050 compared to 2005 levels

In order to enable airlines to achieve carbon-neutral growth post 2020, ICAO developed the Carbon Offsetting and Reduction Scheme for International Aviation (CORSIA). The scheme is also designed to reduce uncertainty and "avoid the patchwork". Concerned by the increasing number of carbon pricing instruments, the scheme aims at avoiding the need for existing and new carbon pricing instruments to be applied to international aviation emissions on a regional or national basis. The ICAO opted for VCM/CCM credits rather than for the introduction of a carbon tax as a tax requires payment without guarantees that the payment leads to emission reductions.

CORSIA will be implemented in a pilot phase with 73 states from 2021 onwards. However, China already withdrew from the pilot phase, probably due to the non-willingness of other countries to include Chinese domestic offsets in the list of eligible offsets. There will be restrictions on eligible credits but surely CCM credits generated under UNFCCC and PA as well as some high-quality VCM credit standards and REDD + will be included in this list (IATA 2018).

The regulations of ICAO and the establishment of CORSIA will be one of the most important sources of demand for VCM credits in the short and medium term. Cumulative demand until 2023 is estimated at 117 million tCO_2e, and for 2024-2026 at 271 million tCO_2e. From 2027 to 2035 it would increase massively, reaching 2.3 billion tCO_2e (CE Delft 2016). Still, the problem of double counting of credits is yet to be addressed through host country approval and corresponding adjustments.

5.2. Carbon taxes: Colombia and Mexico

Colombia and Mexico both have first introduced carbon taxes and later voluntary emissions trading with the option to reduce tax liability with VCM credits, however to a different extent. Both countries plan for the introduction of a mandatory ETS in the medium or long term and specifically design the voluntary schemes as learning grounds.

Colombia

Colombia has analysed and formulated its policies related to carbon pricing via support by the Partnership for Market Readiness (PMR) programme of the World Bank. In 2016, the government approved a carbon tax of USD 5/tCO_2 on sales and import of fuel in the context of a broader fiscal reform (ICAP 2018a). However, this tax only covers 16% of Colombia's total emissions and 50% of the emissions from fossil fuels as coal and the consumption of natural gas in the generation of electricity are excluded. This loophole sets adverse incentives to increase coal consumption, as is the policy to promote mining activity in the country, in place since 2001 (Carbon Trust et al. 2018).

The tax allows for a full compensation through CCM and VCM credits. In order to be exempt from their tax liability regulated entities under the tax must be certified as "carbon neutral" through CCM and VCS credits coming from projects certified after January 1, 2010 and implemented within the Colombian territory (Carbon Trust et al. 2018). Furthermore, a platform for the registry and transaction of VCM credits has been established within the Colombian Stock Exchange (ICAP 2018a).

The following eligibility criteria apply for VCM credits used to reduce tax liability:

- Credits must be issued for activities implemented in Colombian national territory after January 1, 2010.
- Credits must come from GHG-mitigation initiatives and be implemented and formulated through certification programs or carbon standards, which must have a platform for public registry of emission reductions and GHG removals. Every credit eligible must have a unique serial number.
- Credits must have been generated from the implementation of any of the following methodologies:
  - CDM
  - REDD+
  - ISO 14064-2:2006 or the successor ISO standard
  - Methodologies developed by other certification programs or carbon standards, which must:
    - Have been publicly announced and be verifiable by an independent accredited third-party body in accordance with the provisions of the CDM; or
    - Be issued by the UNFCCC or be recognized by the National Government through the National Standardization Body or comply with the requirements for the registration of initiatives established by the REDD+ registry.

In 2017, exceptionally VCM credits from projects outside the territory complying with the methodologies described above were eligible (CDM credits were not). As soon as the planned National Registry of Reduction of Greenhouse Gas Emissions will go into operation, any cancelled VCM credit would have to be registered under it (Government of Colombia 2015, 2017).

Tax exemption requests must be accompanied by a "Voluntary Cancellation Certificate" and a "Declaration of Verification" of eligible CCM and VCM credits equal to emissions. In the first semester of 2017, 2 $MtCO_2e$ were compensated via offsets, representing 5% of taxed emissions (Carbon Trust et al. 2018). In 2017, only 15,088 CERs were cancelled voluntarily in Colombia, presumably because also VCM credits from international projects were exceptionally eligible. In 2018, it becomes clear that the tax is setting real incentives for voluntary cancellation of CERs in

Colombia: between January and August 2018, 2,736,239 CERs were voluntarily cancelled in 157 transactions for projects in Colombia (UNFCCC 2018).

Mexico

Mexico introduced its carbon tax in 2014 within the framework of its General Law on Climate Change (GLCC) of April 2012. The tax rate is USD 3.50/tCO_2 on fossil fuel sales and imports, while exempting natural gas. The Ministry of Environment estimates that the carbon tax has led to an abatement of approximately 1.8 million tCO_2e per year (MÉXICO2 et al. 2018).

Since 2018, companies can pay the carbon tax in kind with CCM credits from Mexican CDM projects issued after January 2014 at market value up to 20% of their carbon tax liability. It means that to pay tax for 1 tCO_2e, at current CER prices, about 15 CERs would have to be paid.

The country is currently in the final month of its national carbon market simulation started in October 2017, where over 100 enterprises, responsible for two-thirds of the Mexican GHG emissions are participating. In the near future, the market rules for a mandatory ETS and updated rules for the National Emissions Register are to be published. The ETS will officially start with a pilot phase in August 2018 and run until 2021. The formal phase will start in 2021 after update of the rules (ICAP 2018b). However, there is still need for clarification on details such as scope and other features by the Ministry of Environment (MÉXICO2 et al. 2018).

Both countries face the risk of political stability. Colombia will hold presidential elections in 2018 and there is no certainty about the continuation of the current climate policy under a new government (Carbon Trust et al. 2018). The same applies for the incumbent Mexican administration, that has so far not yet pronounced its stance regarding the carbon tax (MÉXICO2 et al. 2018).

5.3. Subsidies: Australia

Whereas regulation and carbon taxes represent a "stick", a subsidy approach is a "carrot" for private actors, offering an incentive by rewarding emission reductions, for instance through tax concessions, access to concessional loans or direct financial assistance (Freebairn 2014).

The Emission Reduction Fund (ERF) in Australia is such a subsidy approach, a voluntary mechanism and flagship of the country's climate policy. This subsidy scheme has been framed as an alternative to the "punitive" carbon tax introduced by the Labour government before, criticized for having increased the cost of electricity and gas. Simultaneously the fund was touted as a classic market mechanism, being superior to carbon tax and ETS instruments that are impacted by considerable uncertainty and policy instability around the world (Australian Government 2013).

From 2014 to 2018, the fund had a budget of USD 2.55 billion. To have access to the subsidies of the fund, businesses submit project proposals for emission reductions going beyond business-as-usual. At reverse auctions, the government then chooses the lowest price offers necessary to reach its target of GHG reduction or its budgetary targets and guarantees to pay that price for the emission certificates achieved in this project (Freebairn 2014).

Once implemented, the projects receive "Australian Carbon Credit Units" issued by the Clean Energy Regulator. The methodologies are based on the already existing Carbon Farming Initiative.

The scheme is complemented by a "safeguard mechanism" that sets limits on GHG emissions of large polluters, to prevent that the large corporations wipe out the effects of projects under the ERF. Emissions are calculated against a BAU scenario of current operations (Australian government 2013).

Until 2018, the scheme had auctioned reductions of 191.7 $MtCO_2eq$ (with 16% already credited), with an average price per ton of AUD 11.97 across all auctions. As the budget is now nearly depleted, the question is whether the fund will be replenished (MacKenzie 2018, Ludlow 2018).

However, the overall performance of this fund is being criticized. First, the scheme is deemed ineffective, as the emissions have increased in almost every sector covered by the ERF. The safeguard mechanism is being criticized for having set too generous baselines, not providing enough incentive for the large polluters to participate under the scheme (MacKenzie 2018).

Two thirds of emission reductions pledged to date come from vegetation projects in which landowners are paid not to clear their land, projects that often already existed in the Carbon Farming Initiative introduced by the Labour government in 2011. Restoration projects are less controversial and enjoy support, even though there is the leakage problem (i.e. clearance of land as soon as the crediting period is over) but avoided deforestation projects are more contentious as additionality is difficult to assess, presenting a transparency problem (Morton 2018). The large polluters covered by the safeguard mechanism are largely absent from the scheme (MacKenzie 2018).

Moreover, the cost effectiveness of the mechanism is called into question since the Green Institute published a study stating that it would have been cheaper per hectare if the government would have simply bought the land and not pay landowners for not clearing it (Morton 2018).

Finally, the fund lacks political support since the return of Prime Minister Turnbull to power, who criticized already before the scheme for spending taxpayers' money to buy VCM credits from farmers, so the industry can freely pollute. However, the projects currently under the ERF could become relevant for the new scheme being negotiated by the government, the "national energy guarantee" or NEG. This scheme would allow electricity retailers to buy credits as an alternative to reducing emissions, potentially creating a larger secondary market beyond the government for farmers and businesses to sell the credits they generate.

5.4. Handling double counting: Switzerland

Switzerland is an interesting case as the problem of double counting occurred here already under the Kyoto Protocol when the common land corporation OAK Schwyz administering forest land implemented a VCM project whose emission reductions at the same time were captured by the national inventory and counted towards the Swiss commitments as Annex I country.

The OAK Schwyz is the main land owner in the canton Schwyz, possessing also 9036 ha of forests for which it has developed the carbon sink "Oberallmig Climate Protection Project" according to the voluntary standard of the Climate, Community and Biodiversity Alliance (CCBA). The project aims at increasing the standing timber volume by 40 m^3/ha within 30 years (2005-2034), resulting in an estimate of 0.33 million tCO_2e to be sequestered (OAK Schwyz 2010).

In the project design document, the OAK Schwyz states that double counting would be avoided by "specific procedures confirmed by the Swiss Federal Office for the Environment". However, double

counting became an issue not resolved until 2017 and the validation of emission reductions did not take place (Lüscher 2017). Nevertheless, VCM credits continued to be sold to finance the project, now accompanied by the communication that the buyers are "supporting the Swiss climate goals" (OAK Schwyz 2017). This is the compromise confirmed in a statement of the Swiss Federal Office for the Environment (BAFU 2018). It confirms that there will be no double counting if the buyers only compensate for emissions from within the Swiss territory.

The BAFU does not recognise the requirements from the international standards that the host country cannot claim the emission reductions embodied in sold VCM credits. They defend the point of view that the VCM allows for buying of credits that neutralise the climate impact of an activity inside the scope of the Kyoto Protocol as both the emissions as well as the emission reductions are captured in the national inventory. The BAFU understands the activities in the VCM as implicit part of the national efforts to attain the goals of the KP. At the same time, the VCM credits from this project cannot be sold to offset emissions outside the Swiss jurisdiction or from international aviation.

So, the BAFU places two requirements on the buyers of VCM credits to avoid double counting (BAFU 2017):

1) The buyer of the VCM credits must use them to compensate for emissions from within the country borders and the scope of the Kyoto Protocol
2) the CO_2 credits that come from a Swiss VCM project shall not be accountable in any other country

In consequence, the OAK Schwyz now signs an agreement with the buyer of its VCM credits. This agreement states the credits can only be used for voluntary compensation within Switzerland and the requirement that credits must be cancelled immediately (OAK Schwyz 2017).

We see here the case of a practical implementation of the future approach to VCMs as proposed by ICROA and Gold Standard (see section 2.2). However, the project suffered for several years from a lack of transparency on the integrity of the VCM credits as well as the absence of a clear statement from the official authorities how double counting would be avoided.

6. Applicability of incentive mechanisms in the Indian context

6.1. India's experience with market and pricing instruments

6.1.1. India's experience with international carbon markets

The Clean Development Mechanism

To date, the Clean Development Mechanism (CDM), a CCM, has been the dominant form of carbon market activity in India (IETA 2015). India has been very active in the CDM since 2005 and currently has the second largest number of registered CDM projects (1664 projects), after China (3764 projects), as well as 31 CDM Programmes of Activities (PoAs) (UNEP DTU 2018a and UNEP DTU 2018b), i.e. 16% of CDM projects in Asia and 13% of CDM projects worldwide (UNEP DTU 2018a).

The majority of registered CDM projects in India belong to the energy industries, including activities in the solar, biomass, wind and hydro power generation, as well as fuel switch and energy efficiency projects contributing to about 70% of the estimated CER potential in the country (GIZ et al. n.D.). As of July 2018, India has cumulatively issued around 13% of all CERs – or 244 million out of the total 1925 million CERs issued globally so far (UNEP DTU 2018a). With the fall of CER prices, incentives for voluntary use of CERs could theoretically help the continuation of existing mitigation activities in the country (PMR 2017), although it will be conditional on sufficiently large demand.

The international voluntary carbon markets

India has significant experience in VCMs as a host country for projects. Indeed, Asia sold more voluntary offsets than any other region in 2016 (21.5 $MtCO_2e$) and half of them came from India (10.0 $MtCO_2eq$). India is thus among the most popular VCM credit supply countries and has received a significant amount of revenue over the years – USD 205 million as of 2016 (PMR 2017).

The dominant position of India on the VCMs is closely linked to its experience with CCM, as CDM project registration delays often led waiting project developers to seek cash flows by certifying first to voluntary standards and selling to voluntary buyers (PMR 2017). However, Indian VCM credits were only sold at an average price of USD 0.6/t CO_2, considerably lower than credits from other Asian countries that sold lower quantities[2] (Ecosystem Marketplace 2017).

[2] China sold 3.3 $MtCO_2e$ in 2016 at an average price of USD 2.2 /credit, with the majority of project developers shifting their focus to the compliance market. Indonesia sold 1.8 $MtCo_2e$ at an average price of USD 3.3 USD/credit and Vietnam 1 $MtCo_2e$ for an average price of USD 3.4 USD/credit (Ecosystem Marketplace 2017).

6.1.2. India's domestic market-based instruments

The PAT scheme

The Perform, Achieve & Trade (PAT) scheme was implemented under the National Mission on Enhanced Energy Efficiency with its first phase ("cycle") from 2012 to 2015 (PMR 2017), followed by the second cycle 2017- 2019 and the third cycle envisaged to start in 2020. Under the first cycle, 478 plants (designated consumers, DCs) in eight energy-intensive industrial sectors with a total energy consumption of 165 Mtoe are covered, while the second cycle covers 621 entities with a consumption of 227 Mtoe (BEE 2016). PAT constitutes an important domestic effort to link a regulatory instrument to a market-based mechanism. Under the scheme, industries are regulated to enhance energy efficiency and given the opportunity to trade excess energy savings after a process of certification, resulting in the issuance of "ESCerts" by the Central Electricity Regulatory Commission (Ministry of Power 2017). The PAT scheme resembles an ETS, with the important distinction that traditional cap-and-trade systems usually entail an absolute cap, whereas PAT is designed to reach energy targets that are intensity-based (IETA 2015).

For each DC, a Specific Energy Consumption (SEC) target is specified for the baseline year and the target year. DCs that exceed their targets are then awarded the ESCerts (PMR 2017). The first PAT cycle has achieved an energy saving of 8.67 Mtoe against the target of 6.68 Mtoe; for the second cycle the target has been increased to 8.87 Mtoe (BEE 2016). The Bureau of Energy Efficiency has established a webpage for registration of eligible entities, the status of issuance of ESCerts and their trading[3] (Ministry of Power 2017). Government of India issued about 3.8 million ESCerts to 306 DCs while 110 DCs have to purchase about 1.4 million ESCerts for their compliance. Trading of ESCerts at Power Exchange started on 26th September, 2017. The total volume of ESCerts traded has reached 1.3 million to date (BEE 2018).

REC scheme

The Renewable Energy Certificate (REC) scheme is a market-based policy instrument to promote the growth of renewable energy. The scheme has been introduced in 2010 in order to overcome the limitation of uneven distribution of RE sources across the country. The State Electricity Regulatory Commissions are mandated to set targets for Obligated Entities to purchase a certain percentage of their total annual power requirement from RE sources, termed "Renewable Purchase Obligation" (RPO). Obligated Entities include distribution utilities, captive power producers, and open access consumers. The certification of Renewable Energy Certificates for the generation of one MWh of electricity from RE now allows for the trading across geographical and physical boundaries and facilitates the growth of renewable energy in areas suitable for it as certificates can be sold for compliance to states with low RE potential (Narula 2013).

RE generators have the option to sell the REC at a preferential tariff fixed by the concerned Electricity Regulatory Commission or to sell electricity generation and environmental attributes associated with RE generation separately. In the latter option, environmental attributes can be exchanged in the form of REC. The REC issued are verified by auditors and maintained through a common registry (the "REC Registry") (PMR 2017).

[3] Accessible at: https://beenet.gov.in/?AspxAutoDetectCookieSupport=1

The RECs are traded at the Indian Energy Exchange (IEX) and the Power Exchange India Limited (PXIL). As of June 2016, 1,135 RE generators have been registered. However, the scheme suffers from a lack of RPO compliance data, limiting its effectiveness. Non-compliance is insufficiently penalized, and the mechanism is heavily dependent on state level policy and compliance. Insufficient market transparency increases investors risks. As prices are fixed given the floor and forbearance prices, the volumes traded are volatile and only 50% of RECs are actually sold (PMR 2017).

National Clean Energy Fund

India established a carbon pricing instrument in the form of the National Clean Energy Fund (NCEF) through a levy on coal. While not being a market mechanism per se, the instrument is akin to a carbon tax and thus could principally be used in conjunction with a voluntary market, where the tax liability would be waived if credits covering the CO2 emissions of the taxed fuel are cancelled. The fund was established in 2010 and is used to provide viability gap funding to support clean energy technologies. The Clean Energy Cess on coal has been increased from about 0.75 USD to about 6 USD per tonne of coal produced (Sengupta 2018). In July 2015, the NCEF had over US$2.5 billion (PMR 2017). However, recently Government of India announced to use the proceeds for the Coal cess to cover net tax revenue reductions due to the introduction of the Goods and Services Tax Act in 2017 (Climate Home News 2018).

Sectoral market-based instruments

India is currently assessing market-based approaches for GHG reduction in the municipal solid waste sector. Whether this should be a domestic or international market- based mechanism is currently being assessed by the government (PMR 2017). In July 2018, a study has been commissioned by the World Bank and the Ministry of Environment, Forest and Climate Change (MOEFCC) to assess possibilities and identify a pilot. The study is scheduled to be finalized before the end of 2018.

REDD+

In 2013, MOEFCC constituted an Expert Committee to formulate a National REDD+ policy and implement the mechanism that aims to provide monetary incentives for protecting forests which are major carbon sinks (Shrivastava 2015). As per India's submission on REDD+ to UNFCCC, India's national strategy aims to enhance and improve the forest and tree cover across the country, while enhancing the value of forest products to the communities dependent on the forests for livelihoods and other services (GIZ et al. 2015). GIZ developed a REDD+ methodology for Verra which was approved as VM0037 "Methodology for Implementation of REDD+ Activities in Landscapes Affected by Mosaic Deforestation and Degradation" (GIZ and IORA 2017) which has however not yet been used by any project. There have been a few studies (e.g. TERI study supported by the Royal Norwegian Embassy) where small pilots were undertaken as demonstration projects. However, the implementation of large-scale REDD+ projects requires global agreement on financing and strategic guidance (PMR 2017). India has released its National Forest Reference Level and the National REDD+ strategy documents which makes India eligible to develop projects to access GCF funding under the REDD+ pilot programme for results-based financing.

6.1.3. Initiatives in India that can support market-based mechanisms

Partnership for Market Readiness (PMR)

The World Bank's PMR aims at supporting emerging economies and other developing countries to set up domestic market mechanisms. India joined PMR in 2012. In 2017, the Indian engagement in PMR has spawned three concrete initiatives. For two sectors, municipal solid waste management and Micro, Small and Medium Enterprises (MSMEs), concepts for market mechanisms are to be developed. Furthermore, a national meta-registry of the various initiatives to monitor, report and verify GHG reduction is set up.

India GHG programme

The India GHG Programme, led by WRI India, the Confederation of India Industry (CII) and The Energy and Resources Institute (TERI), is an industry-led voluntary framework to measure and manage greenhouse gas emissions. The programme builds comprehensive measurement and management strategies to reduce emissions and drive more profitable, competitive and sustainable businesses and organizations in India (PMR 2017).

It is an exchange platform for sharing best practices, creating a pool of trained practitioners and encouraging businesses to have a high-level focus on managing GHG risks and opportunities. The total inventory managed by businesses under this program ranges from 300 to 360 $MtCO_2e$. This is equivalent to 15 – 25% percent of India's total emissions (WRI India et al. n.D.).

CPLC

The Carbon Pricing Leadership Coalition (CPLC) is a voluntary partnership of national and sub-national governments, businesses, and civil society organizations that agree to advance the carbon pricing agenda by working with each other towards the long-term objective of a universal carbon price (Partnership for Market Readiness 2017). CPLC helps companies exchange knowledge and experiences in using internal carbon pricing, work more proactively with one another and engage with policy makers and other stakeholders to accelerate ambition and the transition to a lower-carbon future.

Several Indian companies have partnered with CPLC for building readiness towards carbon pricing, and, as of 2017, 40 Indian companies claim to be pricing carbon (Kerr 2017).

6.2. Incentivizing voluntary carbon markets in India: Options & challenges

India can incentivize VCMs by building on the experiences with domestic and international VCMs and CCMs and on the basis of the regulations and instruments already in place. The strength of the incentive for a VCM depends on the stringency of the implementation of the underlying instrument and its enforcement. The strength and design of the incentives will ultimately depend on the policy objectives that can range from engaging sectors that are not covered by other policies, building capacity and awareness raising and, finally, providing a testing ground for CCMs. On the one hand, VCMs could grow especially where governments clearly communicate that entities not participating under the VCMs would lead to the enforcement of command-and-control policies or CCMs. On the

other hand, a VCM can be used as a testing ground where participating companies can gain experience and build capacity to participate in international CCMs.

VCM credits to reduce a tax

The most far-reaching proposal for incentivizing the demand for VCM credits would be to introduce a carbon tax and then allow to submit credits instead of paying the tax. This would follow the same principle as the combination of carbon tax and voluntary offsets in Colombia. While linking VCM credits with a carbon tax makes sense since they are related to the same environmental objective, in principle there is no need to couple the market instrument to a specific carbon tax. Tax credits could be applied to any kind of tax, e.g. general corporate taxes. Eligible credits could be for instance CERs issued after a given date for a CDM project or Programme of Activities implemented in India, in order to sustain the mitigation potential of the CDM in times of uncertainty about the transition requirements under the Article 6 mechanisms under the PA.

Challenges include the heavy opposition against a carbon tax by companies/entities which would have to pay the tax. Support of the carbon tax would likely to be lower than opposition given the smaller economic weight of the companies benefitting from such a tax. In case use of VCM credits against another tax such as the corporate tax is allowed, tax revenue would be lost. This will be opposed by a large number of stakeholders, particularly the Ministry of Finance.

Eligibility of VCM credits under PAT and/or REC

A second option would be to make VCM credits eligible for use under the existing PAT or REC scheme. This would require the conversion of VCM credits measured in tCO_2e into energy savings or renewable energy units. The broad scope of PAT and REC would theoretically provide a broad and diversified demand for VCM credits.

However, in order to actively stimulate demand for VCM credits, the challenges that both schemes face would have to be addressed first. As previously described, market transparency, effectiveness and attractiveness for the private sector would be key. Currently, the compliance schemes of PAT and REC are not effective and there is a lack in market transparency. The REC scheme is already suffering from oversupply of certificates, so that broadening the scope of credits eligible would not be recommendable in the short- and medium term.

Eligibility of VCM credits for compliance with Corporate Social Responsibility requirements

In India, Corporate Social Responsibility (CSR) activities have moved from a philanthropic form of business donations and contributions to a more structured practice, regulated by the government, in order to address the urgent developmental challenges of the country. CSR obligations on companies are detailed in the Companies Act as revised in 2013. Every company with a net worth of 500 crore (around USD 70 million) or more must spend 2% on average of its three-year net profits on CSR policies as well as establish a CSR committee to monitor the activities (Gatti et al. 2018). So far, the list of "desirable" CSR activities to be included in the CSR policies of companies does not include GHG mitigation, however, one could include into the list the acquisition of VCM credits from projects demonstrating high local sustainable development co-benefits.

However, in order to stimulate demand for VCM credits, the compliance mechanism would again need to be enhanced. At the moment, no penalties are prescribed in the Company Act for companies

failing to spend the required amount of CSR expenditures (Gatti et al. 2018). Moreover, buying VCM credits might be seen by companies as not generating reputational benefits comparable to those that direct sustainable development investments, e.g. for disadvantaged communities.

Combining the Coal cess with voluntary offsets

The government of India could also allow to offset the Coal cess by VCM credits. Given the high level of the Coal cess, this would be a highly attractive incentive for a VCM.

A key challenge to this approach is that the Coal Cess currently is used for general budget purposes. Thus, the same group of institutions that will oppose use of VCM credits against existing taxes will oppose this for the Coal Cess as well.

7. Insights on including VCM in national reporting

To date, no country reports on VCM credits in their national reports under the UNFCCC (such as Biennial Update Reports), as there are no rules under the UNFCCC that would require this. This may change under the Paris Agreement in the context of the modalities and procedures for transparency under Art. 13 PA. As these modalities and procedures are currently under negotiations, it is unclear how their final version will look like.

Facilitating market transparency through enhanced reporting

As transparency is one of the major challenges surrounding VCMs, enhanced reporting would be crucial to incentivize their use. However, VCM participants may not have an interest in providing detailed information. Due to the oversupply on the market, strategic communication is key in order to achieve higher prices for the VCM credits, while detailed reporting and stringent assessment of underlying activities would generate costs. Greater transparency requirements would therefore only be feasible if the government introduces reporting obligations and provides the necessary infrastructure to collect and analyse the information provided.

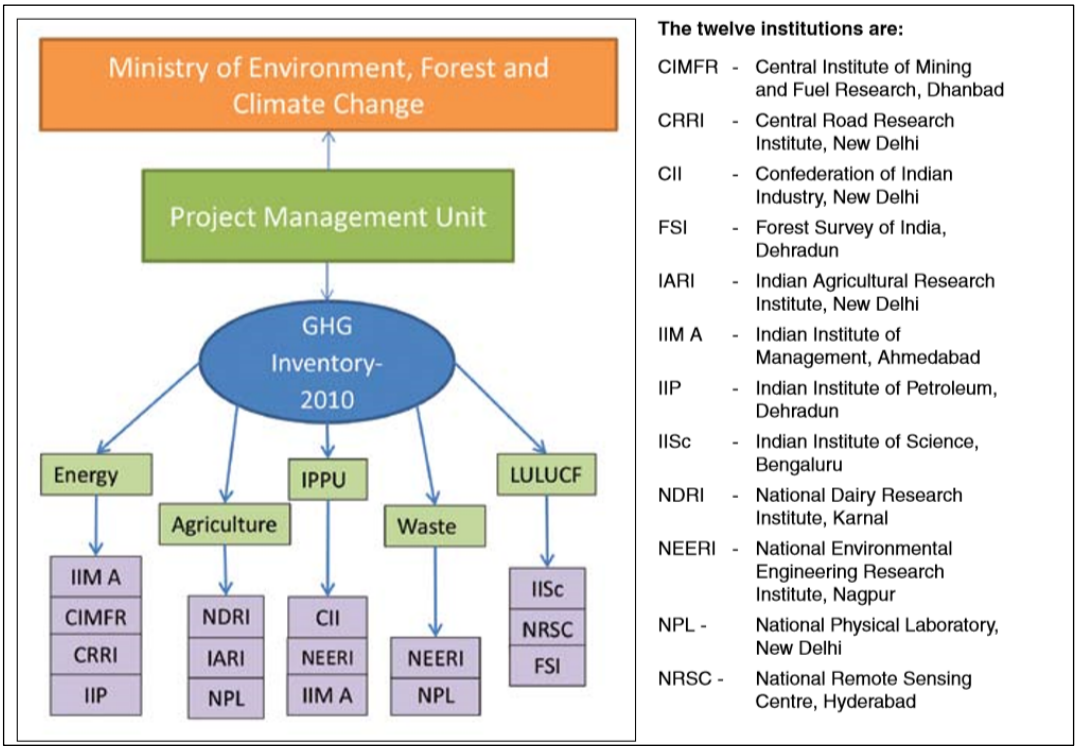
Exploit synergies with UNFCCC reporting

Monitoring and reporting systems are resource intensive and difficult to establish. Therefore, it is strongly recommendable to exploit synergies with the reporting procedures under the UNFCCC. The UNFCCC developed the most elaborate concepts of monitoring, reporting and verifying of GHG emissions necessary to preserve the integrity and the transparency of the voluntary market, if used for compliance with a government instrument (Chang and Bellassen 2015).

India could build on the experience of other countries in creating synergies with existing reporting. For example, Colombia is currently establishing a robust MRV framework with the National Registry on Emission Reductions. The MRV system planned to be introduced will have the capacity to register official GHG emissions information year to year, information and accountability on GHG mitigation projects and information of financial flows, transfer of technologies, capacity building and related impact. It is also planned to be linked to the national emissions registry (see section 5.2). The Colombian case is somewhat particular, as the government also disposed of the relevant revenues through the carbon tax.

India submitted its first Biannual Update Report in December 2015 with a GHG inventory of the year 2010 and a time series inventory for the period 2000-2010. The report provides some insights on the enhancement and the remaining challenges in compiling the data necessary for the UNFCCC reporting. Currently, there are twelve institutions that helped in the preparation of the inventory in the respective sectors:

Figure 8: Institutional arrangement for GHG inventory preparation



Source: Government of India (2015)

A relatively well established MRV system is in place for the PAT scheme, which would facilitate its use also for reporting on voluntary carbon markets, in case incentives are introduced in the context of this scheme. The work on a national meta-registry under the PMR currently undertaken by Markit could be helpful to advance reporting of VCM activities in India. When establishing an MRV system for the voluntary market incentives and activities in the country, it is imperative to build a system compliant with the regulations for the transparency framework of the Paris Agreement, to be adopted at COP24 in Katowice.

Install safeguards in order to avoid double counting

The government will have to ensure that VCM credits used in the context of its incentive schemes are not double counted on the international VCMs or CCMs. In case that only VCM credits of an Indian entity for projects implemented in India and used by Indian companies would be eligible under the incentive mechanism, no further safeguards to avoid double counting of voluntary action and government compliance would be needed. However, if CERs issued under the CDM are made eligible for use under the incentive instrument, their voluntary cancellation in the CDM registry would have to be ensured.

On a more general note, the overall question on the future of VCMs in the Paris world remains unresolved. The government of India will have to communicate clearly if it is willing to support voluntary action inside its country borders and to preserve the VCM integrity through corresponding adjustments or if the government will account all mitigation action in the country towards the fulfilment of its NDC. If the latter is the case, the government will probably have to opt for a "rebranding" of voluntary action in its territory towards a concept of voluntary support to the Indian NDC. However, this could further limit the demand for VCM credits issued in India.

8. Conclusions

VCMs have a long history under varying circumstances. They can be useful instruments to "train" actors on the functioning of carbon market mechanisms. Indian actors having ample experience with CCMs however do not need such training. In the context of the PA the role of VCMs remains to be clarified. A stringent interpretation would not leave much room for VCMs, while a broad interpretation requires relevant incentives in the context of national mitigation policy instruments. VCMs thus will not be a panacea to address all challenges in the context of reaching the NDC targets under the PA. If designed well, they can provide interesting niches and cushion the introduction of potentially contentious climate policy instruments, such as seen in the context of the Colombian carbon tax. Government of India thus needs to assess which instruments could be introduced that would need VCMs as such a "cushion", with the coal cess being the most visible current candidate.

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