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Assessing Options to Increase Climate Support

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FOREWORD

This document was prepared by the OECD and IEA Secretariats in response to a request from the Climate Change Expert Group (CCXG) on the United Nations Framework Convention on Climate Change (UNFCCC). The CCXG Expert Group oversees development of analytical papers for the purpose of providing useful and timely input to the climate change negotiations. These papers may also be useful to national policy-makers and other decision-makers. Authors work with the CCXG to develop these papers. However, the papers do not necessarily represent the views of the OECD or the IEA, nor are they intended to prejudge the views of countries participating in the CCXG. Rather, they are Secretariat information papers intended to inform Member countries, as well as the UNFCCC audience.

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ABSTRACT

Assessing Options to Increase Climate Support

Climate support will be an important element in reaching a post-2020 climate agreement at COP 21 in December 2015. To further increase and mobilise the levels of climate support post-2020, a number of proposals have been made in the negotiating text produced in the Geneva session of the Ad-hoc Working Group on the Durban Platform of the UN Framework Convention on Climate Change (UNFCCC) in February 2015.

This paper explores the advantages and disadvantages of several of these proposals, focusing on those that are clear and specific. The paper assesses proposals on mobilising climate finance using the following criteria: (i) the level of financial flows that they could generate; (ii) how much of this could be mobilised in the UNFCCC context; (iii) the ease of implementation of the proposal; (iv) if and how such increased mobilisation could be monitored; and (v) whether the proposal would fill a specific gap in the context of climate support within the UNFCCC. The paper undertakes a similar assessment for proposals in the Geneva text on enhancing the level of technology development and transfer, as well as capacity building. It discusses whether the proposals could potentially increase technology development and transfer, capacity building and development, as well as whether they are likely to do so in practice, based on current experience and ease of implementation. The proposals vary significantly in the amount of climate support they could mobilise (or enhance, in the case of technology and capacity building), for a range of reasons. These include the particular wording of the proposals, their sensitivity to national implementation, uncertainty in measuring progress towards objectives, and in some cases the limited role the UNFCCC plays as an institution in a given area of climate support.

JEL Classification: F53, O19, O30, O44, Q54, Q56, Q58
Keywords: means of implementation, climate finance, capacity building, technology transfer, UNFCCC, climate change, 2015 agreement

RÉSUMÉ

Évaluation des options envisageables pour accroître le soutien en faveur de l'action climatique

Le soutien en faveur de l'action climatique sera un élément important pour parvenir à un accord sur le climat pour l'après-2020 lors de la Conférence des Parties (COP21) de décembre 2015. Afin de renforcer l'appui financier et de mobiliser le niveau de soutien nécessaire à l'action climatique pour l'après-2020, un certain nombre de propositions ont été formulées dans le texte de négociation établi lors de la session du Groupe de travail spécial sur la plate-forme de Durban de la Convention-cadre des Nations unies sur les changements climatiques (CCNUCC) tenue à Genève en février 2015.

Ce rapport étudie les avantages et les inconvénients de plusieurs de ces propositions, en mettant l'accent sur celles qui sont précises et spécifiques. Les auteurs évaluent les propositions portant sur la mobilisation de financements climatiques au regard des critères suivants : (i) volume des ressources financières qu'elles pourraient permettre d'obtenir ; (ii) proportion de ces ressources pouvant être mobilisée dans le cadre de la CCNUCC ; (iii) facilité de mise en œuvre de la proposition ; (iv) possibilité de suivi de cette mobilisation supplémentaire, et modalités de ce suivi ; et (v) capacité de la proposition à combler un manque spécifique dans le contexte du soutien climatique au titre de la CCNUCC. Le rapport livre une évaluation analogue des propositions contenues dans le texte de Genève portant sur la mise au point et le transfert de technologies, ainsi que sur le renforcement des capacités. Les auteurs examinent si les propositions formulées recèlent le potentiel d'intensifier la mise au point et le transfert de technologies, le développement et le renforcement des capacités, et sont susceptibles de le faire concrètement, en fondant leur analyse sur l'expérience actuelle et la facilité de mise en œuvre de la proposition. L'ampleur du soutien que ces propositions pourraient mobiliser (ou accroître, en ce qui concerne la technologie et le renforcement des capacités) varie considérablement selon les propositions, et ce pour différentes raisons, notamment : la formulation particulière de la proposition ; sa sensibilité à une mise en œuvre dans un contexte national ; le degré d'incertitude qu'elle présente s'agissant de la mesure les progrès accomplis au regard des objectifs ; et, dans certains cas, le rôle limité que joue la CCNUCC, en tant qu'institution, dans un domaine donné du soutien à l'action climatique.

Classification JEL : F53, O19, O30, O44, Q54, Q56, Q58
Mots clés : moyens de mise en œuvre ; financement climatique ; renforcement des capacités ; transfert de technologie ; CCNUCC ; changement climatique ; accord de 2015

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Agreement on the issue of climate support will be important in securing a post-2020 climate agreement that successfully limits climate change. Climate support (or "means of implementation"), including finance, technology and capacity building, is already being provided and mobilised by a vast array of actors. These include public and private sources that are channelled via domestic or international institutions. Climate support can be focused on direct support for specific actions or indirect support such as enhancing in-country enabling environments for green investment.

Several proposals for how to mobilise increased levels of climate support have been made in the context of the on-going international climate negotiations under the United Nations Framework Convention on Climate Change (UNFCCC). This paper explores the advantages and disadvantages of several proposals made in the negotiating text produced at the Geneva session of the Ad-hoc Working Group on the Durban Platform (ADP), the body charged with negotiating a post-2020 climate agreement. Most proposals are focused on climate finance; some are on technology development and transfer, and capacity building. Significant uncertainty remains regarding both what exactly the proposals would entail and how they would be implemented at the national level.

The paper examines climate finance proposals that are clear and specific according to five criteria. It seeks to assess whether the selected proposals have high, medium or low potential to mobilise support, in two categories:

- Whether the proposal could help generate significant levels of financial resources (through both public and private, international and domestic means);

- How much of this could be mobilised for international climate finance in the UNFCCC context;

Proposals that are assessed as having the potential to mobilise over USD 100 billion are labelled as "high"; those classed as "medium" are those proposals that could mobilise between USD 20 -100 billion; proposals that would mobilise less than USD 20 billion a year are classed as "low". In addition, proposals are also assessed using the following criteria:

- Whether the proposal is likely to be implemented given various political, economic or social contexts and therefore whether it will actually deliver on its aims and potential if included within the UNFCCC framework;

- If/how such increased mobilisation could be monitored (based on current experience);

- Whether the proposal could fill a specific gap that is not currently addressed under the UNFCCC framework.

Table ES-1 presents a simplified overview of the climate finance proposals examined in this paper according to the five criteria listed above.

Table ES-2 provides a similar assessment for certain proposals in the Geneva text for technology and capacity building. It looks at: (i) their potential to increase levels of technology development and transfer, or capacity building and development; (ii) the likelihood of effectively fulfilling their potential, based on experience with existing processes;(iii) the ease with which outcomes could be monitored; and (iv) whether the UNFCCC framework currently addresses the actions suggested by the proposals. There are few clear answers and few proposals with high ratings. This relates to the particular wording of the current

proposals which are narrow in scope and uncertain, as well as to the limited role of climate change as a driver (and the UNFCCC as an institution) in technology development.

In practice, it is challenging to clearly separate climate finance from the other forms of support (i.e. technology development and transfer, and capacity-building). For example, finance can be used for capacity building, acquiring technologies or supporting implementation of relevant policies for both areas. In particular, capacity availability can be a pre-requisite for implementing climate-related action.

The proposals vary significantly in the level of resources they could mobilise (e.g. Export Credit Agencies compared to fossil fuel subsidy reform). Those proposals that could generate significant levels of resources might not necessarily mobilise more international climate finance for developing countries; some proposals (e.g. phasing down of high-carbon investments) would free up domestic resources which may or not be subsequently earmarked as climate finance. In addition, some proposals (e.g. tax on oil exports) would be more difficult to implement, while for others (e.g. use of financial risk management instruments to mobilise climate finance for adaptation) there is insufficient data to accurately assess their potential. Not all the proposals would fulfil new functions or fill specific gaps within the UNFCCC. Finally, some proposals rely too heavily on processes outside the UNFCCC to be effective on their own (e.g. in the area of technology development and transfer).

Setting quantified goals for the provision of support requires striking a balance between the long timeframes over which capacity development, planning and implementation occur, and the short timeframes over which predictable financial flows (e.g. public finance) can be provided. Previous experience suggests short-term disbursement targets can lead to inefficient allocation of financial resources, in terms of their impact and achievement of stated objectives. Setting quantified goals is also complicated by the numerous methodological uncertainties that exist for identifying and quantifying climate finance. Further, quantified goals do not necessarily consider how effectively funding has been allocated and spent, e.g. to ensure it fits agreed criteria for aid effectiveness such as ownership, alignment, and harmonisation.

The goals and objectives of climate support will need to be tailored to different country circumstances. In many cases, measuring progress towards objectives relating to climate support would be possible - although subject to considerable uncertainty. This uncertainty will need to be taken into account as countries determine the shape climate support provisions will take in the 2015 agreement. Balancing global objectives with how they will be implemented nationally, and the need to manage uncertainties, will contribute to the durability and flexibility of the 2015 agreement.

Table ES-1– Summary of the assessment of the selected proposals on finance

Proposal (and section in which this is discussed)	**Potential to generate financial resources**[1]	**Potential to mobilise climate finance**	**Ease of implementation**	**Ease of monitoring**	**Currently addressed under UNFCCC provisions/ institutions ?**
Section 2. Finance					
2.1. Enhancing enabling environments	High/Medium/Low	High/Medium/Low	High/Medium/Low	Low	Partially (e.g. via GCF, GEF, REDD+)
2.2.1. Export credit Agencies to help investors manage risk	Uncertain/Low	Uncertain/Low	High	Low	No
2.2.2. Renewable energy and energy efficiency bond facility	High/Medium	High/Medium	Medium	Medium	No
2.2.3.1. Phasing down high-carbon investments	Medium	Medium/Low	High/Medium/Low	Low	No
2.2.3.2. Phasing down fossil-fuel subsidies	High	Low	Medium/Low	Low	No (agreed to in G20)
2.2.4.Tax on oil exports from developing to developed countries	Medium/Low	Medium/Low	Low	Low	No
2.3.1. Levies on market-based mechanisms for adaptation	Low	Low	High	High	Yes for CDM
2.3.2. Financial risk management instruments for adaptation	Uncertain	Uncertain	Medium	Low	No

[1] For potential to generate financial resources and potential to mobilise climate finance, proposals that could mobilise USD 100 billion or more a year are labelled as “high”; those between USD 20 -100 billion as “medium” and those less than USD 20 billion as “low”.

Table ES-2 – Summary of the assessment of the selected proposals on technology and capacity building

Proposal (and section in which this is discussed)	**Potential to increase tech development and transfer or CB?**	**Likely to effectively meet its aim?**	**Ease of monitoring?**	**Currently addressed under UNFCCC provisions or institutions?**
Section 3. Technology Development and Transfer				
3.2. Global goal on enhanced technology development and transfer	Medium	Medium/Low (as currently drafted)	Medium (development)/Low (transfer)	No
3.3. Addressing barriers to technology development and transfer	Medium	Low	Medium	Yes
3.4. Technology needs assessments	Medium	Low	High	Yes
3.5. Global collaboration on RD&D	High/Medium	Medium/Low	Medium	No
Section 4. Capacity Building (CB)				
4.2. Predictable targets and outcomes	Medium	Low	Medium	No
4.3. Integrating CB into 'all elements'	High/Medium	Medium	Low	Partially (recognised as part of CB Framework and activities)
4.4. International CB mechanism	Uncertain	Uncertain	Uncertain	No

1. Introduction

Increased resources for responding to climate change, if used effectively, will help to increase the level of mitigation and adaptation activity. There are different ways of channelling support for developing country climate actions, i.e. via climate finance, technology and/or capacity building. However, in practice these are not usually clearly distinguishable "forms" of support; for example, finance can be used for capacity building or implementing technology-specific policies. These three ways are referred to in the international climate negotiations as "means of implementation", though the term is not used in the negotiating text produced during the latest round of negotiations in Geneva (February 2015). All three play important roles under the United Nations Framework Convention on Climate Change (UNFCCC), and are expected to continue to do so in the climate regime that is set to be agreed at the 21st Conference of the Parties (COP 21) at the end of 2015, and that will come into effect from 2020. Domestic factors such as capacity, enabling environments, and policy alignment influence the effectiveness of support provided.

There are also distinct institutional arrangements in place for climate finance, technology transfer and capacity building under the Convention. These aim to enhance the provision of all three forms of support, and efforts have been made to better integrate them (TEC, n.d.). Reporting systems for Parties are also in place for these forms of support, though they are imprecise and do not always provide the information necessary to track the final destination and use of different forms of climate support. This complicates assessments of progress towards the developed country climate finance commitment of mobilising USD 100 billion per year by 2020 for developing country climate action (UNFCCC, 2010a).

Information availability on the mobilisation of climate support for developing countries is growing, mostly for climate finance. This support can come from a vast array of public or private sources; be channelled via domestic or international institutions; focus on direct support for specific actions or on indirect support such as enhancing in-country enabling environments for green investment. However, information on climate support is currently incomplete. While information on public climate-related development finance is available (SCF, 2014; DAC, 2013), there are significant gaps and large uncertainties surrounding the largest source of climate finance, i.e. private finance, in all sectors other than renewable energy (Jachnik, Caruso and Srivastava 2015; Clapp et al., 2012). Moreover, it is not always straightforward to distinguish between public and private sources of climate finance.

Several proposals on how to mobilise increased levels of climate support have been made in the negotiating text produced in the Geneva session of the Ad-hoc Working Group on the Durban Platform for Enhanced Action (ADP) (UNFCCC, 2015). Most of these proposals are focused on climate finance and targeted towards the actors that provide or mobilise support (e.g. public contributors and the private sector). These proposals have been put forward by different countries or groupings of countries, and have garnered various levels of backing from others. Moreover, some proposals focus on an end-point, rather than how they would be implemented in order to reach this end-point. This paper explores the technical advantages and disadvantages of several of these proposals to mobilise climate support, focusing on the proposals that are most clear, specific, and potentially implementable. The paper assesses the selected proposals using the following criteria (also used for Table ES-1):

- Whether the proposal could help generate significant levels of financial resources, (through both public and private, international and domestic means);
- How much of this could be in the context of mobilised international climate finance in the UNFCCC context (for example, via the Green Climate Fund);
- Whether the proposal is likely to be implemented given various political, economic or social contexts;

- If/how such increased mobilisation could be monitored;

- Whether the proposal could fill a specific gap that is not currently addressed under UNFCCC provisions or institutions.

The paper does not seek to identify new (but not yet proposed) provisions that the 2015 agreements could include for mobilising means of implementation. Further, the structure of the paper reflects the structure of the proposed negotiation text, i.e. it separately examines proposals for finance, technology and capacity building, even though provision of these different types of climate support is frequently integrated (discussed further in Box 1 and Section 4.3). Information on technology and capacity building support is sometimes presented in monetary terms (Aoki, 2013; Corfee-Morlot et al., 2009), but is also difficult to define and track. Moreover, political issues such as the level of support that is needed, what proportion of this should be committed to under the UNFCCC process, and how support should be allocated, are outside the scope of this paper. Section 2 of this paper focuses on proposals made regarding climate finance, section 3 on technology, section 4 on capacity building. Section 5 presents initial insights.

Box 1. Separate vs. integrated treatment of finance, technology and capacity building

While there is general agreement that climate finance, technology and capacity building are all important aspects of climate support, there is as yet no agreement as to whether these three aspects should be addressed separately or in an integrated manner in the 2015 agreement. The Geneva negotiation text includes both options, but with a focus on separate coverage of finance, technology and capacity building.

Current institutions and arrangements under the UNFCCC sometimes treat finance, capacity building and technology separately, and sometimes in an integrated manner. For example, the Durban Forum on Capacity Building focuses just on this aspect of support by collecting and sharing information and lessons learned (see e.g. Briner et al 2014). In contrast, the Green Climate Fund includes a specific work item on readiness support, which includes capacity building activities such as the development and strengthening of institutions and mechanisms (GCF, 2013a).

Advantages of having separate provisions for the different aspects of climate support include ensuring that sufficient attention is given to all aspects. However, in practice, these issues are often linked. Thus, multilateral sources of climate finance can often include capacity building (e.g. GEF) and/or technology-related (e.g. Clean Technology Fund) components. This means that treating the different aspects of climate support separately may impede development of integrated programmes, particularly from the perspective of countries receiving the support.

2. Technical assessment of specific suggestions: finance

The Geneva negotiating text (UNFCCC, 2015) includes some proposals specific to the issue of climate finance, including: guiding principles, institutional arrangements for the legal agreement, scale of resources, national contributions, and sources of finance. Sections 2.1 and 2.2 deal with the more technical elements of enhancing enabling environments and sources of finance, while section 2.3 explores specific elements proposed for adaptation finance. These sections explore several of the proposals by outlining what they could entail, and assessing them for the four outcomes mentioned above: mobilisation potential, ease of implementation and monitoring, and whether currently addressed within the UNFCCC. Section 2.4 examines political goals, encompassing several proposals on the scale of resources.

2.1 Current proposals – enhancing enabling environments

As well as addressing the scale of resources, the Geneva text also includes suggestions for the scope and form of climate finance contributions under the legal agreement, which include specific suggestions relating to a country's enabling or policy environment. Paragraph 112 includes an option whereby a "commitment of all Parties" would be an "enhancement of enabling environments"

(Option 2 of the same paragraph would be to have an agreement to not specify the enhancement of enabling environments). Option 1 specifically indicates four elements of enabling environments:

a) "Enhanced national regulatory frameworks, including policies and measures.

b) The dedication of sufficient domestic resources by countries seeking support.

c) Putting in place conditions to mobilise, attract and absorb climate-related investments.

d) Provision of a price signal for emission reductions, including through payments for verified emission reductions."

The importance of enhancing enabling to more effectively access and use climate finance is already addressed within the UNFCCC, for example, via the Green Climate Fund (GCF), Global Environment Facility (GEF) and the Warsaw Framework for reducing emissions from deforestation and forest degradation in developing countries (REDD+). While this proposal could potentially complement current provisions and institutions, it is not necessarily clear how: Under Article 4.2a of the UNFCCC, all Parties already have commitments to "regularly update … programmes containing measures to mitigate climate change…, and measures to facilitate adequate adaptation to climate change". It is not clear how the option (a) above would add to this current commitment. However, if this provision resulted in certain countries enhancing their national regulatory frameworks compared to other countries, it could result in greater mobilisation of private finance, both domestically and internationally.

There are a number of ways to implement each element listed in the proposal, which makes it difficult to assess the overall potential of an element as well as the entire proposal, even though it could potentially be very high. The mobilisation potential as well as the ease of implementation would vary depending on the specific measure and national circumstances. Regarding option (a), national regulatory frameworks and policies and measures are already in place to some extent in both developed and developing countries, including the more specific measure listed in option (d) (provision of a price signal for emission reductions). The impact of domestic policies and measures on attracting (or inhibiting) climate-related investments has been well-documented, particularly for the renewable energy sector. For example, UNESCAP (n.d.) highlights the importance of national targets and policies in the growth of investment in wind power capacity in China: installed capacity of wind power grew sharply from 0.53 gigawatts (GW) in 2003 to 31 GW in 2010. Also, Mexico saw a 348% rise in renewable energy investment in 2010 following the increase of its renewable energy targets from 3.3% to 7.6% in 2009 (REN21, 2011). Similarly, the rapid growth in German wind electricity generation during the 1990s has been attributed to its electricity feed-in act of 1991 (IRENA. n.d.). In contrast, recent retroactive policy changes to renewable energy support in various countries have had a negative effect (Siemens, 2012).

Enabling environments vary across countries. Thus, improving these enabling environments will have a greater or lesser effect on mobilising climate finance depending on how attractive the current policy framework is to climate-friendly investment. According to OECD (2015a), governments have a central role to play in mobilising private capital for a low-carbon energy transition, through reform agendas that strengthen the framework conditions for green investment. Policy makers need to ensure that: investors, producers and consumers receive consistent signals across the full breadth of the regulatory landscape; and that climate and investment policies are well integrated so as to provide the predictable environment that investors need.

Regarding the impact of domestic policies on mobilising climate finance, there have been attempts to estimate this in quantitative terms. Recent OECD analysis has indicated that more ambitious renewable energy policies in developing countries would be expected to lead to a greater mobilisation of private climate finance in these countries (Haščič et al., 2015). For example, an analysis shows that if feed-in tariff levels for solar energy in developing countries were comparable to those in the

developed countries, they could have mobilised an additional USD 50 billion of private finance during the 2000-2011 period (ibid.). In contrast, other policies can inhibit investment in renewable energy. For example, evidence suggests that local-content requirements in the solar photovoltaic and wind energy sectors have hindered international investment and have had mixed or negative results in creating local jobs, because they raise costs for downstream activities in these sectors (OECD, 2015,forthcoming).

In terms of option (c) above, putting in place conditions to absorb climate finance could help to increase the efficiency of climate finance, as well as to reduce delays in disbursement and address geographical gaps. Limited capacities have proven to be a significant barrier to accessing and managing climate finance for several African countries, as well as small island developing states (SIDS) (e.g. AfDB, 2012; Murabula, n.d.). However, improving capacity for absorbing climate finance would not necessarily increase the total levels of climate finance mobilised, although it could improve the impact and effectiveness of its use. Some developing country biennial update reports (BURs) have highlighted support needs and constraints (see, e.g. the BUR for South Africa and for Vietnam) (DEA, 2014). Because of variations in national circumstances, individual needs for different countries vary widely. It would therefore be difficult to prescribe specific measures that would help countries increase their absorptive capacity for climate finance under a 2015 agreement.

In terms of tracking and monitoring, the current reporting guidelines provide significant flexibility in the content of national reports, including for describing domestic policy environments, particularly for non-Annex I countries. For example, non-Annex I countries are encouraged (but not required) in their BURs to report on their individual mitigation policies and measures. Reporting requirements for mitigation measures in non-Annex I National Communications are less stringent (see UNFCCC, 2002). Reporting guidelines for provision of climate support do not include reporting of autonomous climate finance (i.e. finance that has not been mobilised by developed countries). Thus, if the proposed text in paragraph 112a was agreed, it is not clear that information would become available to robustly assess progress towards enhancing enabling environments.

As discussed above, the mobilisation potential and the ease of implementation could vary between "high/medium/low". This depends greatly on the national contexts and on the specific measure prescribed. Monitoring the outcomes of enhancing enabling environments would be "low" as existing reporting guidelines are flexible which explains why information to track improvements in enabling environments might not be available. It is also hard to disentangle the exact implications and outcomes of many policies, frameworks or measures, which increases the difficulty in monitoring and tracking. Furthermore, as mentioned above, enabling environments is not a new concept under the UNFCCC. For this reason it is assessed as being "partially" addressed under the UNFCCC in Table ES-1 (e.g. GCF, GEF, REDD+).

2.2 Current proposals - sources of finance

The Geneva text includes options for sources of the "financial resources to be mobilised and provided". There are several sub-options provided; this section focuses on those that are more specific, clearly defined or potentially actionable.

2.2.1 Efforts by Export Credit Agencies to help investors manage risk

Paragraph 128.1a of the Geneva text lists "efforts undertaken by Export Credit Agencies to help investors manage risk" as an action to leverage, mobilise or utilise private finance (UNFCCC, 2015). Export Credit Agencies (ECAs) offer financing services to companies in order to encourage exports, which are provided to national exporters through various forms of support (OECD, 2014a):

a) Official financing support. This includes:

- Direct credit/financing and refinancing – financed by ECAs, loans for projects overseas provided on favourable terms (e.g. extended maturity) which are usually not provided by private commercial banks (IPCC, 2000).

- Interest rate support (government supports a fixed interest rate for the life of the credit)

b) Export credit guarantee or insurance – offered to cover or insure domestic investors against possible losses resulting from an investment or export.

ECAs mitigate the risk and uncertainty of payments for exporters; they do so by taking the risk themselves in return for a premium (interest rate). The exports encouraged by ECAs can include technologies and systems that contribute to climate change mitigation or adaptation. ECAs are therefore a potential source of public climate finance that can be used to mobilise private climate finance (EFK, 2014). However, early estimates indicate that export credits are a relatively small source of climate finance (Clapp et al., 2012). Specific examples also indicate that export credits may not mobilise significant levels of private climate finance (e.g. EFK, 2014; Sumitomo Corporation, 2012).

In some cases, export credits cover the total value of projects, so do not result in private finance mobilisation. However, in other cases, support provided by ECAs covers only part of a project, and therefore can mobilise private climate finance. For example, Euler Hermes, mandated to manage Germany's export credit guarantee, provided guarantees constituting 80% of the total loan to the Dorper Wind Farm Project in South Africa (Sumitomo Corporation, 2012). Likewise, Danish Export Credit Agency EFK often backs projects together with other ECAs, development banks or pension funds, therefore only covering part of the funding (e.g. Jädraås Onshore Windfarm) (CPI, 2013a ; EFK, 2014). Current data on export credits is listed either by sector or by country, but not routinely "tagged" for climate relevance. While there is a good overlap between the renewable energy sector and climate mitigation, the link between other sectors and mitigation or adaptation activities is less clear (e.g. rail transport, agriculture or water supply). It is therefore currently not possible to obtain estimates of the level of total export credits going towards low-carbon or climate-resilient activities. The vast majority of export credits that go to climate-relevant sectors focus on actions with a mitigation component (TAD/XCR 2014 pers. comm.)

According to DAC statistics, in recent years export credits for corporations active in developing countries have decreased, from USD 75 billion in 2010 to USD 55 billion in 2012 (OECD, 2014b). During this period, middle income countries (emerging economies such as Turkey, India, Brazil, Mexico, and China) were the main beneficiaries. These figures represent the amount that is covered by export credit agencies and not the overall value of projects. The decrease in export credit volumes is likely to partially be a consequence of lower risks of investment in renewable energy due to improved and cheaper technologies. Investors are more likely to invest relying less on ECAs.

As data on export credits is currently patchy, the impact ECAs can have on mobilising climate finance is uncertain and it is currently not possible to estimate the level of mobilisation this proposal could provide[2]. The mobilisation potential is classified as "uncertain/low" based on current estimates of export credit financing in developing countries, which cover all export credits; as climate-related support is only a subsection of these estimates, mobilisation potential would be even lower. Further, as ECAs are demand driven, they have limited potential to directly target green development (WRI, 2005). The ease of implementing this proposal is considered "high". ECAs are existing institutions with the objective of reducing risk for investors; hence this proposal would be an enhancement of current activities with a focus on directing investments towards climate-related projects. However, monitoring and tracking the efforts undertaken by ECAs to help investors manage risk would be difficult given the lack of information availability, as discussed above, and is hence assessed as "low".

[2] At present, the OECD is working on improving data availability and transparency on export credits, aiming to obtain improved information on export credits directed to climate-related projects.

2.2.2 Renewable energy and energy efficiency bond facility

Paragraph 128.1c of the Geneva text calls for the establishment of an "international renewable energy and energy efficiency bond facility", as a possible source of "private and alternative" finance. In order to mobilise finance for a particular activity, governments or other entities (e.g. banks, corporations, individual projects) can issue bonds. The bond issuer commits to repay the bond purchaser a fixed return for a specified duration, on top of the return of capital invested at the end of the specified duration of the bond. Green bonds can be attractive to private investors, in particular to institutional investors, as bonds are traditionally their favoured asset class (Kaminker et al., 2013).

Bonds can thus be used as a debt instrument to mobilise financing for mitigation or adaptation activities. Indeed, there has been an enormous growth in issuances of "green bonds" over the last few years. Climate Bonds Initiative (2014) classifies climate-themed bonds into those that are labelled as "green", and those that are unlabelled; in the latter, proceeds are directed to climate-related projects, but not labelled "green". The total market for climate-themed bonds is estimated at USD 503 billion in 2014 (Climate Bonds Initiative, 2014). Issuance of labelled "green" bonds has grown from less than USD 5 billion in 2010, to USD 11 billion in 2013, to USD 36.6 billion in 2014 and is projected to grow to USD 100 billion in 2015. (Climate Bonds Initiative, 2015). Green bonds can raise debt financing for a wide variety of activities. For example, the green bonds issued by the World Bank (which has raised USD 7 billion via this method to date) include bonds for transport systems and water and irrigation management activities (World Bank, 2015). Renewable energy and energy efficiency bonds would be a sub-set of green bonds, with proceeds "ear-marked" for these activities. While it is not clear what share renewable energy and energy efficiency would comprise, green bonds have the potential to mobilise significant levels of green investment finance. This potential stems from the depth of the global bond markets (valued at over USD 100 trillion in 2014), and the potential alignment with the portfolios of mainstream institutional investors that manage USD 93 trillion in assets in OECD countries (OECD, 2015b).

Over the last few years, the issuers of green bonds and the types of bonds that have been issued have become increasingly diverse. National and municipal governments (e.g. Ile de France), as well as supranational institutions and agencies (e.g. development banks and Export Credit Agencies), were early issuers of green bonds. Since 2013, issuers have expanded to corporations in the form of "use of proceeds" corporate bonds and asset backed securities (e.g. GDF Suez, Toyota Financial Services and SolarCity), as well as projects themselves (e.g. Topaz solar and Shepherd's Flat wind) (OECD, 2015b). Voluntary guidelines have been developed by Climate Bonds Initiative and the International Capital Market Association, intended to improve transparency and information disclosure for investors and governments (ICMA, 2014). Developing rules for any international bond facility could therefore usefully build on existing standards.

The Green Climate Fund (GCF) has a Private Sector Facility (PSF) which allows it to finance private sector mitigation and adaptation activities at local, national and international levels (GCF, 2013b). The PSF currently addresses barriers to private investments as a way of mobilising finance, and the GCF Board will consider further modalities for the PSF to mobilise private sector resources at large scale (GCF, 2014a). Bond programmes are seen as the largest single avenue through which the GCF could achieve such mobilisation. In the short-term, the GCF could work through national and regional accredited entities to facilitate issuance of bonds through structuring and de-risking instruments, such as providing credit or first-loss mechanisms (GCF, 2015). In the medium- to long-term the GCF could itself issue bonds, if it receives an "A" or higher risk rating, and builds a sound risk portfolio and architecture (e.g., strong liquidity and solvency attributes) or sufficiently strong financial support from states that are investment grade (ibid.).

There are pros and cons to creating a single new facility. It is not clear this would increase issuance of green bonds and mobilisation of finance compared with using existing facilities and institutions, including the GCF in the future. Given the overlap within the current facilities and institutions, raising a new flow of capital for a new facility could be difficult. It is also unclear why the bond facility

should be limited to renewable energy and energy efficiency activities; this would restrict rather than expand the mobilisation potential of green bonds. However, centralising the provision of green bonds could improve the consistency of environmental standards of such bonds, as well as improve monitoring of the climate finance raised by such bonds.

Given the current and projected scale of bond markets worldwide, increasing issuance of green bonds has the potential to mobilise significant quantities of climate finance, though less so if limited to renewable energy and energy efficiency. Hence the mobilisation potential is considered as "high/medium". The ease of implementation of creating a single new facility is assessed as "medium". It has the potential to harmonise standards of green bonds internationally whilst at the same time could be contentious as it would overlap or replace already existing and functioning bond facilities including governments, development banks and corporations. Monitoring and tracking could build on the existing institutions such as Climate Bonds Initiative. However, it would depend on international data availability and require expanded capacity to avoid double-counting of climate finance via bonds. Hence, the ease of monitoring and tracking is considered "medium".

2.2.3 Phasing down of high carbon investment and fossil fuel subsidies

Paragraph 128.1d of the Geneva text suggests "phasing down" of high-carbon investments and fossil fuel subsidies. These are listed as sources of private and alternative finance.

2.2.3.1 High-carbon investments

High-carbon investments can take various forms, from asset investment in fossil fuel power plants, to equity in high-carbon emitting companies. The definition of "high-carbon" is not clear in the Geneva negotiation text but it could broadly indicate unabated fossil fuels (i.e. coal, oil and natural gas) or it could specifically mean unabated coal, as it has the highest carbon content of all the fossil fuels. In equity markets, divestment from high-carbon companies by investors could be considered as phasing down. A number of institutions, including CDP (formerly known as Carbon Disclosure Project) and Carbon Tracker Initiative, provide information on publicly listed companies' greenhouse gas (GHG) emissions and carbon emitting assets (i.e., fossil fuel reserves) to inform divestment. The value of such investments, represented by market capitalisation, is large: the total market value of 200 large fossil fuel equities globally amounted to USD 4 trillion at the end of 2012 (CTI, 2013).

On average USD 62 billion per year was invested in fossil-fuel fired power plants in non-OECD countries from 2000 to 2013 (IEA, 2014a). Of this, USD 43 billion was in coal and USD 16 billion in gas-fired generation facilities. Redirecting these investments to less GHG-intensive alternatives would limit carbon emissions in non-OECD that would have otherwise occurred from these assets.

High-carbon investments can be financed from public or private as well as from domestic or international sources. In India, government statistics show that the foreign direct investment in its power sector was USD 1.1 billion in fiscal year 2013 (from April 2013 to March 2014) (MCI, 2014). The government is expecting total investments in the power sector of USD 224 billion over its 12th five-year plan (2012 to 2017) (i.e., an average of USD 45 billion per year) (MEA, 2014). While comprehensive and comparable data for domestically and internationally sourced investments are unavailable, these figures imply that the majority of investments in the country would be financed domestically rather than internationally. Thus, while redirecting financial flows toward less GHG-intensive investments would increase resources available for mitigation, there may not be a straightforward link between reducing high-carbon investments and increasing international climate finance in developing countries.

Some development banks have made efforts to phase-down high-carbon investment in developing countries. For example, the World Bank indicated it will financially support green-field coal power generation projects only in rare circumstances, while it will assist gas-fired generation and natural gas across the entire supply chain (World Bank, 2013). The European Bank for Reconstruction and

Development also indicated in its Energy Sector Strategy that it will not finance investment in coal-fired power generation, except in rare and exceptional circumstances (EBRD, 2013). In addition, the European Investment Bank's assessment and screening criteria for energy sector lending would screen out power only coal- or lignite-fired power stations (EIB, 2013).[3] In announcing the phase down of high-carbon investment, these multilateral development banks emphasise their focus on renewables and energy efficiency, indicating the shift from brown (high-carbon) to green (low-carbon) investments (World Bank, 2013; EIB, 2013; ADB, 2013; ERDB, 2014). Multilateral development banks play an important role in channelling climate finance (Kato, Ellis and Clapp, 2014a); their shift from "brown" to "green" investments would likely have a positive impact on mobilising finance for low-carbon investments.

Phasing down high carbon investments could lead to some greater mobilisation of climate finance, though most of the potential would depend on how much money could be redirected from high-carbon investments (in infrastructure for example), and is therefore assessed as "medium" or "medium/low". Moreover, whether this proposal is implementable at the national level would depend on national circumstances (e.g. electricity demand growth and current capacity), and a given country's ability and willingness to phase-down such investments, therefore assessed as "high/medium/low".

Financial institutions could also estimate how much of the climate finance they provide is a result of reduced high-carbon investments. This could build on efforts by development banks and bilateral financial institutions to track and monitor the climate finance they provide. Indeed, six multilateral development banks release an annual joint report on climate finance provided for mitigation, adaptation and projects that are both mitigation and adaptation related (MDB Joint Reporting, 2014). However, quantifying the shift from reduced high-carbon investments would involve estimating a baseline for such investments, on top of which there is as yet no consensus on how to calculate mobilised climate finance. There could therefore be considerable uncertainties in tracking and monitoring climate finance mobilised from reducing fossil fuel investments (assessed as "low").

2.2.3.2 Fossil fuel subsidies

Support for fossil fuels, e.g. in the form of subsidies, decreases the cost of fossil fuels, and thus encourages increased consumption of such fuels. Subsidies can also strain government budgets in some countries. Removing fossil fuel subsidies can help increase the level of funding available to governments while decreasing GHG emissions (IEA, 2014b).

Removing or reforming fossil fuel subsidies has been addressed in different international fora. At their 2009 Summit, G20 leaders committed to "rationalize and phase out over the medium term inefficient fossil fuel subsidies that encourage wasteful consumption'' (IEA et al., 2011). At their 2009 summit, the leaders of Asia-Pacific Economic Cooperation (APEC) countries also committed to the rationalisation and phase out of such fossil fuel subsidies over the medium term (APEC, 2009). However, the extent of fossil fuel subsidies in place remains substantial. In 2013, the global value of subsidies on all forms of fossil-fuel energy that officially lower end-user prices totalled approximately USD 548 billion (IEA, 2014b).

Subsidy reform could have both a direct and indirect impact on climate support, depending on how it is carried out. If all or part of the avoided cost of fossil fuel subsidies is earmarked for climate purposes, this could directly generate considerable levels of climate finance. The majority of fossil fuel subsidies are consumption subsidies in developing countries. Reforming such subsidies would free-up domestic and public funds, rather than international climate finance; hence the proposal is ranked as "high" for potential to mobilise financial resources, but "low" for potential to mobilise international climate finance. Subsidy reform can also have an indirect impact on climate support: by

[3] However, it would allow some coal- and lignite-fired high efficiency combined heat and power (CHP) plants, coal- and lignite-fired plants fitted with carbon capture and storage (CCS) technologies, as well as those co-fired with biomass.

levelling the playing field between fossil and non-fossil fuels, it can increase the competitiveness of non-fossil sources. This can help to mobilise investment in such sources.

However, as it could be politically difficult to implement the proposal, on this criterion the proposal is ranked "medium/low". While evidence suggests that fossil-fuel subsidies tend to be regressive, poor and vulnerable groups need to be protected from prices rises resulting from subsidy reform (Whitley, 2013). Reforms therefore have to be implemented carefully. A number of analyses and research for the phase-out have been conducted in response to the G20 Leaders' invitations. For example, the IEA has made proposals for how this can be done step-by-step (Table 1) (IEA, 2014b).

The ease of monitoring and tracking fossil fuel subsidy reforms is assessed as "low". While the data needed may not be complex to produce, past experience with trying to understand and monitor such subsidies, and the willingness of countries to share this information internationally, could make the monitoring and tracking process difficult.

Table 1. Steps for implementing fossil fuel subsidy reforms

Strategic planning	Capacity building and Institutional reform	Phased implementation	Outcome
o Identify subsidies to be reformed o Plan transition to free-market pricing and fiscal reform o Draw up sector reconstructing o Consult all stakeholders o Raise public awareness by communicating plans	o Prepare provisional administered pricing mechanism o Implement restructuring o Create pricing and competition authorities o Develop assistance programmes and create institutions to implement programmes o Communicate progress	o Introduce administrative pricing o Deregulate prices when competition becomes viable o Adjust taxes and remove non-price subsidies o Implement targeted sectoral measures o Evaluate outcomes o Advertise achievements to increase support and counter resistance	o Market determines price o Taxes reflect externalities and revenue needs o Targeted social welfare and economic assistance o Public acceptance of subsidy removal

Source: IEA, 2014b.

2.2.4 Tax on oil exports from developing to developed countries to be established

A tax levied on oil exports (suggested in paragraph 128.1b), not currently addressed within the UNFCCC process, could potentially mobilise climate finance. The Geneva text does not specify who the tax would be levied on, what the tax level would be, and whether or for whom (e.g. exporters, GCF) it would be earmarked. The analysis below is based on the understanding of Ecuador's Daly-Correa tax proposed to OPEC in 2001 (Alier, 2009). This proposal suggests that oil-exporting developing countries commit to raising the price of each barrel of oil by a certain percentage. The idea is to account for the negative environmental externalities caused by the oil industry and have the resulting funds reinvested toward climate change mitigation and adaptation. Hence, if the money were to be channelled as proposed by Ecuador, it would be earmarked for international climate finance; this could entail funds being destined to the GCF or potentially through another channel which would have to be agreed upon amongst Parties.

OECD statistics estimate that oil exports from non-OECD (excluding Russian Federation) to OECD countries in 2013 are 16.1 million barrels per day. At 2013 oil prices, applying a 3% or 5% tax per barrel, as proposed by Ecuador, would raise USD 19 billion and USD 32 billion respectively, all of which under Ecuador's proposal would be directed for international climate finance. These levels of mobilised climate finance rank as "medium/low" according to the criteria set for Table ES-1. To put this in context, total bilateral climate-related ODA reached USD 21.5 billion on average per year in

2010-12. However, the total amount of revenue that would be generated from such a tax is highly dependent on the price of oil, as well as on the tax rate, which is not currently specified in the Geneva negotiation text. Given the highly volatile nature of the oil market, the revenue from the tax would be subject to high fluctuations and would therefore not lead to predictable funding levels for climate finance. For example, the average oil price in the first quarter of 2015 was half the 2013 level, which would have a proportional impact on the level of revenue raised from such a tax.

The tax could either be collected by the exporting developing country or by the importing developed country. In the former case, it may be onerous to implement, as exporting countries would have to collect and the money generated from the tax to international climate finance mechanisms, rather than being used as domestic climate finance. If the tax is collected by the importing developed countries, they would need to separate out money paid to the exporting country for the purchase of crude oil, and the amount paid for the tax that would then have to be allocated to international climate finance. Implementation of such a system could also be complex. The ease of implementation is rated as "low" in both cases, whether it is paid by the exporting or importing countries.

Furthermore, the tax could also affect patterns of demand for oil. As oil consumption in OECD countries has been declining since 2005 and is expected to continue declining (IEA, 2014b), a tax on oil exported only to developed countries would become progressively less relevant. Moreover, as the tax would presumably not cover all developed country oil imports, it could negatively impact developing countries' competitiveness, should demand for oil shift towards countries that do not impose the tax on oil exports.

The proposal has the potential to increase levels of climate finance in the UNFCCC context if all oil exporters and importers – rather than those from a subset of countries – agreed to apply it, and to earmark revenues for international climate finance. As presented in the Geneva text, consensus on behalf of importing (developed) countries to face higher prices and exporting (developing) countries to lose price competitiveness compared to developed country sources is unlikely to be achieved. It may also be politically difficult for exporting countries to agree earmarking funds raised to international climate finance, rather than using this for their own needs. How the money would be collected and whether and how the funds could be tracked is uncertain, hence ranked as "low".

2.3 Current proposals - adaptation-specific

This section will examine proposals that focus on mobilising climate finance for adaptation (paragraph 116) within the finance section of the Geneva negotiation text.

2.3.1 Levies on market-based mechanisms

Paragraph 116.2 proposes the use of levies from "any market-based mechanisms" to be used for adaptation funding. There is precedent for this in the Kyoto Protocol, where the 2% "share of the proceeds" (SoP) on certified emission reductions (CERs) generated by Clean Development Mechanism (CDM) projects is earmarked for the Adaptation Fund.

Under the Adaptation Fund, total funding has been approximately USD 468 million as at 31 December 2014. Less than half of this (USD 190.8 million) was generated from SoP, with the rest being grants from donor governments (WBG, 2014). The funding from SoP has not generated significant amounts of finance, due to both high supply and lack of demand for CERs. Any new market mechanism established under the UNFCCC for the post-2020 period would therefore need to be widely used, for levies on market-based instruments to generate significantly increased levels of funding for adaptation. At the moment, demand for units from and market price of international market mechanisms under the Kyoto Protocol is low, and there is as yet no agreement on a "new market mechanism". For these reasons, the mobilisation potential of this proposal has been ranked as "low". However, the ease of implementation and monitoring are considered "high", because the proposal could build on existing mechanisms.

2.3.2 Financial risk management instruments

The proposal for financial risk management instruments to mobilise climate finance for adaptation (paragraph 116.3) falls under a paragraph calling for multilateral and/or bilateral financing for adaptation. It suggests a desire to ensure that financial risk management instruments be used for adaptation, but does not specify the types of instruments that are to be employed. Financial risk management instruments can be categorised into two types: managing investment risks for adaptation projects, including using risk mitigants and transaction enablers; and managing climate or weather risks for those financially vulnerable to such changes.

The terminology of risk mitigants and transaction enablers has been used in sustainable energy investment (OECD, 2015b), but could also be useful for adaptation-related investments. Public institutions such as multilateral development banks already provide risk coverage to mobilise private investment for climate related projects, including in adaptation. The World Bank Group, for example, provides risk mitigation instruments ranging from insurance policies and guarantees aimed at enhancing creditworthiness of projects, to contract-based instruments targeting the volatility of commodities and currencies (CPI, 2013b).

Risk mitigants are used to reduce or re-assign investment risks. This includes guarantees and insurance products, public cornerstone stakes and other types of credit enhancement. The instruments can cover risks which are new and currently not covered by financial actors. They could therefore enhance the mobilisation of financing sources for adaptation by increasing the attractiveness and acceptability of investments in adaptation for investors who would otherwise be averse to such risks. Transaction enablers are used to reduce the transaction costs associated with investment, and include securitisation and co-investment platforms. Examples of both types of instruments are provided in Table 2 below.

Table 2. Possible risk mitigants and transaction enablers for climate change adaptation finance

Risk Mitigants		Transaction enablers	
Loan loss reserves	Capital or capital equivalents set-aside to offset potential losses and reduce risk of non-repayment.	**Securitisation**	Bundling small-scale projects or illiquid assets to transform them into a standardised and tradable asset or security.
Insurance products/ Guarantees	Core credit enhancement tools that mitigate or reduce perceived or actual investment risks	**Warehousing**	Pooling of small-scale projects to create a bundled asset of attractive value.
Political risk coverage/insurance	Insurance against political conditions that result in a loss.	**Co-investment platforms and consortiums**	Direct investing through partnerships with other investors in order to reduce up front transaction costs.
Project completion coverage	Guarantees project completion or fulfilment of a funded contract or obligation.	**Standardisation of contracts and data collection, monitoring and evaluation**	Promotion of standard contracts and templates for reporting, monitoring and evaluation in order to reduce transaction costs. Facilitates application of other tools, such as securitisation.
Policy and regulatory risk coverage	Insurance covering legal and regulatory changes that may result in a loss. Related to sovereign risk products.		
Public investment funds	Seeding investment funds (by government) to attract outside sources of capital		

Source: OECD 2015b; Bachher, et al. 2012.

Regarding the management of weather or climate-related risks, risk transfer instruments have been used in sectors relevant to adaptation. The African Union's African Risk Capacity helps the Union's member countries in cases of natural disasters through its financial affiliate, the ARC Insurance Company Ltd. With the support of the ARC insurance pool, governments no longer need to keep contingency funds in the case of catastrophic events and can allocate resources where they are most needed (ARC, n.d.).

Another example is a project launched by Munich RE and Gesellschaft fur Internationale Zusammenarbeit (GIZ) GmbH to establish a risk transfer system for agriculture in Peru. The aim is to develop a legal, institutional and structural framework for the system to protect agricultural production against weather-related risks (Munich RE, 2014).

Financial management risk instruments relevant for adaptation exist, and insurance-related instruments are used widely as discussed above, all of which are important for enhancing resilience. However, it is difficult to estimate whether and how much these instruments have increased incremental finance for adaptation in developing countries, compared with the level without such instruments. As a result, the mobilisation potential of this proposal from the Geneva text is assessed as "uncertain". One reason for this is that value-at-risk is often difficult to determine for the assets against which insurance is being taken, and foregone losses can be difficult to trace. In the developing country context this is especially complex, as reinsurance markets have grown, but price discovery is difficult (i.e. limited price transparency) and transaction costs tend to be high (Collier et al., 2009; Singla and Sagar, 2012).

The ease of implementation of financial risk management instruments is rated as "medium" as some instruments already exist and have been introduced, though with varying degrees of difficulty

depending on the instrument used and on the specific context. Among the risk mitigation instruments offered by the World Bank Group, information on premiums for almost all products is accessible. However, it is difficult to estimate other costs, such as transaction and enforcement costs, because information is not fully available (CPI, 2013b). Therefore, the ease of monitoring is assessed as "low". It would be challenging to track and monitor how such instruments would mobilise climate finance for adaptation and how effective they would be.

2.4 Current proposals – political goals

Several proposals in the current Geneva text refer to scaling up the level of resources. These include specific suggestions relating to qualitative or quantitative targets without specific action points.

2.4.1 Scaling up climate finance to meet the goal of limiting the temperature rise to less than 2°C

One current proposal in paragraph 91 of the Geneva text (UNFCCC, 2015) is for climate finance "to be scaled up in order to provide the finance, access to technology and capacity building necessary to meet the goal of limiting the temperature increase to below [2][1.5]°C ….". It is not clear what exactly this text refers to regarding climate finance. In particular, the level to which climate finance would need to be scaled up would vary widely depending on whether this text is assumed to refer to incremental climate finance needs to be consistent with a 2°C pathway (e.g. estimated by the Global Commission on the Economy and Climate (GCEC) at USD 4 trillion for infrastructure over 2015-2030) or total climate finance needs (e.g. estimated at USD 94 trillion for infrastructure over the same time period). This complicates separating *climate* finance from other types of finance, though the scale of the mobilisation potential is high. No indication is given in the text how such scaling up is to be achieved. The legal and policy context within which such a proposal is made is likely to have a considerable influence on its effectiveness in mobilising climate finance. Policies that transform enabling environments will also be needed to ensure that sufficient climate finance is mobilised to reach levels consistent with a 2°C pathway (Kato, Ellis and Clapp, 2014a).

Efforts to monitor climate finance mobilised by developed countries are underway. Indeed, guidelines for reporting climate finance in developed country biennial reports focus on total public bilateral and multilateral climate finance. The guidelines also request reporting on private finance leveraged by bilateral flows "to the extent possible" but do not require this information, or data on finance leveraged by multilateral flows: (UNFCCC, 2011); Caruso and Ellis (2013) provide a more detailed discussion of which sources are included and excluded from current reporting guidelines. Without further information on what such a proposal would entail, it is difficult to assess how it could mobilise climate finance, whether it would effectively lead to scaling-up of finance, and whether it would fill a gap that the UNFCCC currently does not address.

2.4.2 Deliver adequate and predictable funding for adaptation

A proposal outlined in paragraph 82.1 of the Geneva text (UNFCCC, 2015) is that the "mobilisation and provision of finance" is to "deliver adequate and predictable funding for adaptation". The importance of "predictability" is recognised in official development assistance (ODA), and is currently monitored as part of effective development co-operation commitments (OECD/UNDP, 2014). A large proportion of adaptation finance is composed of Official Development Assistance (ODA) in the form of grants. The unpredictability of development assistance funding has repeatedly been mentioned by partner countries as an obstacle to more effective aid use (e.g. see OECD, 2014c). It is not clear whether the proposal refers to total or incremental adaptation finance and it is difficult to know what "adequate" funding means in concrete financial terms. The success of any such proposal as currently worded will be influenced by the legal nature of the document in which it is contained.

The scale of resources needed for adaptation finance in developing countries is significant, while estimates of the extent of such needs vary widely, e.g. between USD 70-100 billion per year (IPCC,

2014a) or between USD 250-500 billion per year (e.g. UNEP, 2014). These estimates are likely to overlap to some extent with the estimates for infrastructure investment and are very sensitive to what is defined as adaptation. Higher estimates also reflect the lack of adaptive capacity to *current* climate variability in many developing countries (UNEP, 2014; Agrawala and Frankenhauser, 2008). It is also difficult to estimate the costs of an uncertain but very high impact event materialising by the end of the century (e.g. two metres of sea-level rise).

While the mobilisation potential is high, delivering on this proposal could be challenging for several reasons. In particular, there is no agreed definition of what an adaptation activity is, as this will vary from site to site. To date, whether or not an activity relates to climate change adaptation is generally assessed according to the intention of the project, rather than its likely outcome (MDB Joint Reporting, 2011; OECD DAC Statistics, 2015c).

The proposal is also challenging due to its reference to adequacy. The question "adequate for what?" is difficult to answer. It is not possible to robustly calculate the additional costs of climate change. It is also difficult to separate funding needs for adaptation related to specific climate change impacts, from funding needs for adaptation due to socio-economic or other developments within a country. For example, funding for the Sustainable Development Goals would also be beneficial for adaptation. These are some factors behind the large range in estimates of financial needs for adaptation (UNEP, 2014).

Some Parties have suggested that "adequate" support for adaptation be equated with mitigation-related temperature scenarios (e.g., African Group submission, 31 May 2014). While a link can be made between emissions levels, temperature rises, and climate impacts, this is technically challenging. It would be difficult to deliver on this proposal, because even if global climate trends were known with certainty, there is doubt regarding the exact nature and extent of climate change at national and sub-national levels (IPCC, 2014a; 2014b). For example, there is considerable uncertainty regarding the levels of temperature and precipitation extremes, which can have a significant effect on agricultural production. Such uncertainties in climate impacts lead to insecurities in how to address them most efficiently, and therefore hesitation in estimating current and future financial needs to address them. However, immediate needs for adaptation finance are likely to be unaffected by emissions trajectories until the middle of the century (Agrawala et al., 2010), though large investments, such as sea-rise defences for coastal cities, could be different depending on these emissions pathways. Finally, while financial needs for adaptation are related to the environmental impacts of climate change, they are also influenced by socio-economic changes within a country (population growth, location of population and assets in climate-vulnerable areas). Adaptation finance needs are therefore influenced by domestic policies within a country (e.g. construction/zoning requirements in low-lying and coastal areas). For a given level of climate change impacts, costs can therefore vary significantly depending on socio-economic factors. (see Helgeson and Ellis, 2015).

Efforts to monitor and track financial flows are complicated by the way adaptation measures are developed and implemented. Adaptation activities are more effective when mainstreamed into sectoral and national strategies (UNEP-UNDP, 2011). This may explain why the majority of adaptation-related aid is currently a significant (but not principal) aim of adaptation-related projects (OECD, 2014d). Thus, disentangling the financial needs of different components of an integrated strategy is not straightforward.

However, this integration also makes it difficult for individual countries to have a clear bottom-up view of their needs for adaptation finance. For example, of the 10 BURs submitted to the UNFCCC by mid-January 2015, only South Africa's provided a quantified indication of adaptation needs in monetary terms (DEA, 2014), though only for a subset of individual projects. Other BUR, such as Tunisia, outlined sectoral investment needs, but did not distinguish how much of this investment was needed from international sources of climate finance, nor how much was specifically adaptation-related (SDD, 2014).

It would thus appear to be difficult to quantify and implement this proposal. This is because of the uncertainties in what country-specific climate impacts are (now and in the future), the significant influence of non-climate drivers (socio-economic changes) on adaptation costs, and the difficulty in identifying, disentangling and monetising adaptation-specific actions. The provision of sufficient, predictable financial resources for adaptation remains extremely important. However, it is unclear if or how predictability in the global level of support for adaptation would translate to predictability at the national or sub-national level. The text proposal could be taken as a means to signal the importance of predictability, rather than an attempt at calculating an "adequate" level of financial resources.

2.4.3 Short-term collective quantified goal (post-2020) and provision of finance to be based on a floor of USD 100 billion per year

Some of the proposals in the Geneva text (paragraphs 92, 98, 101) call for determining "a short-term collective quantified goal that defines the expected, scaled-up climate finance level for the post-2020 period … in order to enhance the predictability of the provision of climate finance, indicating specific levels of public sources to be provided." (UNFCCC, 2015). This wording implies that it is referring to total levels of mobilised climate finance, i.e. public sources and the non-public sources of finance they trigger (rather than e.g. incremental and/or additional climate finance), presumably from developed countries.

The same paragraphs of the Geneva text suggest "the provision of finance to be based on a floor of USD 100 billion per year" or "a short-term collective quantified goal… shall be determined… on the basis of a floor of USD 100 billion per year". If this level were to be achieved, the mobilisation potential of the proposals would be high. The proposal builds on the commitment that developed countries made at COP16 in 2010 to jointly mobilise USD 100 billion per year by 2020 to address the needs of developing countries (UNFCCC, 2010b). However, there is no certainty on what climate finance comprises (Clapp et *al*., 2012). It is therefore currently difficult to assess how progress towards such quantified commitments should be assessed. Furthermore, despite the commitments undertaken, there is a lack of data needed for tracking progress and assessing their current impact on climate finance (Jachnik, Caruso and Srivastava, 2015).

In terms of short-term quantified goals for climate finance, developed countries do have experience. The "Fast Start Finance" (FSF) commitment (USD 30 billion of new and additional resources by developed countries over 2010-2012) pledged at COP15 and formalised at COP16 is an example of such a collective goal (UNFCCC, 2010a). While the FSF commitment involves only public finance, there are several technical-level lessons that can be drawn from such experience (e.g. UNFCCC, 2013a; ODI et al., 2013). These include lessons about the level of funding, as well as on the prospects for scaling up. Regarding levels of FSF, the fact of having a short-term target raised the political profile of such expenditure. Countries have subsequently reported that they exceeded their FSF commitments (UNFCCC, 2013a; ODI et al., 2013). However, different countries' reports are not comparable, as they use different definitions of climate finance (e.g. most countries counting only public sources, but some including private; Minami, 2014), as well as of "new and additional".

In terms of effectiveness, some donor FSF countries have indicated that there were sometimes delays to disbursing climate finance, in part caused by time needed to establish a project pipeline (McDougall, 2013), or to ensure that programmes proposed were in line with country priorities (Talley, 2013). This means that a focus on ensuring that financial outflows are made by a specific date may lead to trade-offs in the effectiveness of such disbursements (e.g. by focusing them on stand-alone projects rather than integrated programmes aligned with country priorities). In terms of scaling up, the importance of domestic enabling environments in encouraging increased investment in general – as well as for climate-friendly investments in particular – is clear (see e.g. Kato, Ellis and Clapp, 2014; Haščič et al., 2015; OECD, 2015b). However, the difficulty of encouraging and scaling up private investment, particularly in adaptation-related actions, is also clear (Minami, 2014; Kato et al., 2014b). Some donors have also highlighted the (political) difficulty for individual countries in

agreeing a collective climate finance goal, without an agreed burden-sharing arrangement in place (e.g. Perez, 2013).

Monitoring and tracking progress towards any future quantified climate finance goal is likely to be subject to uncertainties and difficulties, both in terms of tracking public and other sources. These difficulties will persist even if the international community agrees on the definition of which activity types count as climate finance. It is not always straightforward to distinguish between public and private sources of climate finance. This is particularly true where the source of climate finance has a mixed public-private ownership, where the disbursing entity has blended public and private funds (e.g. by issuing green bonds), or where there is not a direct link between the disbursing entity (e.g. a fund) and a specific climate activity (see Caruso and Jachnik, 2014 for a detailed discussion). In addition, there are considerable gaps in data availability for private climate finance, which complicates any assessment of progress towards a quantified goal (see e.g. Jachnik, Caruso and Srivastava, 2015).

The proposal focuses on climate finance outflows/provision (presumably from developed countries, though it could feasibly include other countries that currently provide climate finance or might wish to in the future) rather than climate finance inflows to developing countries. Thus the proposal is not currently drafted in such a way as to fulfil specific funding gaps or gaps in coverage of countries or sectors, nor to focus on ensuring the effectiveness of the climate finance outflows.

2.4.4 Advantages and disadvantages of different types of climate finance goals

As discussed above, the Geneva text proposes a variety of quantified and non-quantified climate finance support goals. Countries have previous experience in the UNFCCC context with such goals which has highlighted the benefits and challenges for both types of goals, summarised in the table below.

Table 3. Summary advantages and disadvantages of different types of climate finance goals

Type of climate finance goal (and section in which this is discussed)	**Advantages**	**Disadvantages**
Quantified (individual)	Provides a concrete goal, with high visibility. Raises the political profile of such expenditure domestically.	No indication of how effectively money is used. Difficult to quantify in comparable manner May focus on the short-term, because of budget and planning cycles. Requirements to disburse by specific date can lead to trade-offs in effectiveness.
Quantified (collective) (Section 2.4.3)	Provides an indication of total climate finance provision or mobilisation (assuming that all Parties subsequently ratify any agreement). Raises political profile.	No indication of how effectively money is used. Without an agreed burden-sharing provision, agreeing to a collective goal increases the potential risk for country A if country B subsequently does not ratify or withdraws.
Long-term (quantified and non- quantified) (global) (Section 2.4.1)	Provides indication of climate finance provision on a time-frame that provides certainty for long-term policy decisions.	Not possible for several donor countries to commit to, given short-term nature of public budgets
Predictable (Sections 2.4.2 and 2.4.3)	Provides an indication of total provision (assuming all Parties agreeing subsequently ratify).	Countries currently struggling to meet this requirement individually as part of broader development co-operation efforts (providing some visibility on three- to five-year cycles). Predictability at a global level does not provide predictability at the country or sector level.
Focused on needs (Section 2.4.2)	Would lead to a massive scaling up of climate finance flows. Would require countries seeking support to assess needs in a holistic and concrete manner.	The concept of "needs" is not easy to define or quantify, e.g. to disentangle adaptation needs caused by climate change from those caused by socio-economic changes. Not consistent with UNFCCC Article 4.3 commitment for developed countries to provide "agreed full incremental cost of implementing measures [in developing countries]".

3. Technical assessment of specific suggestions: technology development and transfer

The current textual proposals on technology development and transfer (UNFCCC, 2015) are rather limited and therefore difficult to assess concretely. This section briefly describes selected proposals and assesses them according to several criteria, namely whether the proposals could lead to greater levels of technology development and transfer, do so effectively and achieve their stated aims. Their likelihood of meeting stated aims is largely based on whether proposals seem implementable or not,

both practically and politically, and past experience with similar processes or institutions. Other criteria include whether the proposals can be monitored; and whether they tackle issues currently being addressed under the UNFCCC or not. This assessment involves looking at experience with technology development and transfer, and other multilateral processes currently discussing these issues. In some cases a specific issue may not be not currently addressed as part of the UNFCCC, such as a global goal related to technology development and transfer, but other intergovernmental processes may be attempting to do so.

It is difficult to assess most of the current technology-related proposals in more than a superficial manner. First, there are not many concrete proposals; most tend to be general or their meaning unclear, and several have not garnered broad support across countries in the past. Second, because understanding how a given action might work to increase the development, diffusion and transfer of climate-relevant technologies is difficult. The options presented in the "General" section of the Geneva text (paragraph 130) are, as stated, general statements of support and encouragement for continued enhancement of technology development and transfer, while paragraph 133 focuses on institutional arrangements; neither of these will be assessed here.

Paragraph 131 is a placeholder for a "framework for scaling up technology development and transfer". This brief proposal is not specific enough to assess in detail, and appears to mimic the objectives of the current Technology Mechanism under the UNFCCC, operational since 2012. In addition, the UN General Assembly is considering "arrangements for a facilitation mechanism" to promote development, transfer and dissemination of environmentally sound technologies. A series of structured dialogues on the topic have taken place. These resulted in work to improve co-ordination and mapping of existing mechanisms; views still differ on whether and how new institutional capabilities should develop (UNGA, 2014). Technologies for climate change mitigation and adaptation fall squarely in the category of environmentally-sound technologies, making these discussions highly relevant. Any outcomes under this process would benefit climate-relevant technology processes and could be fully utilised.

3.1 Definitions and context

Within the proposals in the Geneva text, various processes and outcomes are mentioned, the main one being "technology development and transfer". This covers a potentially broad range of activity, included in the IPCC's definition of technology transfer as:

> ….a broad set of processes covering the flows of know-how, experience and equipment for mitigating and adapting to climate change amongst different stakeholders such as governments, private sector entities, financial institutions, non-governmental organizations (NGOs) and research/education institutions… the broad and inclusive term "transfer" encompasses diffusion of technologies and technology cooperation across and within countries. It covers technology transfer processes between developed countries, developing countries, and countries with economies in transition. It comprises the process of learning to understand, utilize and replicate the technology, including the capacity to choose and adapt to local conditions and integrate it with indigenous technologies. (IPCC, 2000).

The proposals also refer to "barriers" to accessing technology and to technology development and transfer. These can occur at different stages in the process of technology transfer, and tend to vary according to the specific context of a given sector and country. Examples of barriers include: lack of information, insufficient human capabilities, political and economic barriers (e.g. high transaction costs, lack of capital, trade and policy barriers), business limitations (e.g. risk aversion), and institutional limitations (e.g. lack of legal protections, weak environmental codes and standards) (IPCC, 2000). As part of the process for assessing technology needs and developing project proposals, countries undertaking technology needs assessments (TNAs) under the UNFCCC identify and analyse

barriers relevant for their technology development and transfer needs (Boldt et al., 2012; UNFCCC, 2013a).

Most of the proposals assessed are directed to "contributors" of technology, i.e. countries or institutions that transfer technologies or fund access to technology. However, some of them are also directed at "recipients", notably regarding technology needs assessments. Overall, technology development is an area where separating "contributors" and "recipients" is not always straightforward or effective, as will be discussed in Section 3.5. The private sector is not explicitly mentioned in the proposals, though globally most technology development and diffusion occurs by private rather than government actors. Several of the proposals might contribute to enhanced technology development and transfer, though they may be limited to actions governments can take directly, and their effectiveness relies to a great extent on processes outside the UNFCCC. This would include trade and investment frameworks, for example. As such, if only included within the UNFCCC, the potential these proposals contain for mobilising greater technology development and transfer may not be fully realised.

3.2 A global goal on enhanced technology development and transfer

Paragraph 129 calls for a "global goal on technology development and transfer" to meet technology needs associated with an emissions pathway consistent with meeting a temperature goal (1.5°C or 2°C), as well as "considerably improving" the adaptation capacity of developing countries. The "commitments" listed as part of this technology goal are not global or universal, but apply only to developed countries. This is somewhat restrictive, given the current, and growing, role of several developing countries as environmental technology producers. The way the commitment is worded would require either very close co-operation with the private sector ("develop a list of ready-to-transfer technologies"), which is not mentioned by name, or the transfer of only publicly funded and owned technologies. Focusing on technologies that developed countries can transfer suggests technology "contributors" will make these decisions, which may not be sufficiently demand-driven or country-specific for "recipient" countries.

It would be technically challenging to robustly link a future temperature goal with current support needs, including for specific technology needs for adaptation, as discussed in section 2.4.2 (related to quantifying needs for adaptation support). However, there are technology-based mitigation scenarios for emissions pathways consistent with a temperature goal. For example, the IEA's Energy Technology Perspectives (IEA, 2014c) models different energy technology scenarios to 2050, consistent with staying below 2°C warming by the end of the century. These scenarios might be helpful in mobilising additional investments in technology development and deployment, by channelling resource towards high priority technologies, though much of this currently occurs through commercial channels (OECD, 2010). The largest technology "wedges" contributing to emissions reductions to 2050 comprise end-use energy efficiency and renewable energy, followed by carbon capture and storage (CCS). Some technologies are mature and commercialised (e.g. energy efficiency, certain renewable energy technologies), though they face various deployment challenges (IEA, 2014d). Some renewable energy technologies will require significant cost reductions (offshore wind, solar thermal electricity), or further technological advancements (advanced biofuels, enhanced geothermal) (IEA, 2014e) in order to be deployed more broadly. In contrast, CCS is a technology that lags behind in terms of demonstration and deployment, and requires public funding and support (IEA, 2014c). However, if support for technology development and transfer is to meet the needs of developing countries, focusing on technologies identified using global emissions scenarios may not always be nationally appropriate or aligned with these needs. There is no global assessment of technology needs for adaptation, as these tend to be country specific; however, the largest gaps identified at national-level appear to be in the agriculture and water sectors (UNEP, 2014).

The idea of a "global goal" related to technology would be a new feature of the UNFCCC, although it already exists in current discussions of the post-2015 Sustainable Development Goals (SDGs). Under the current draft proposal for SDGs, Goal 17, "Strengthen the means of implementation and revitalise

the global partnership for sustainable development", includes three technology-specific goals. One relates to enhancing co-operation, the second is specifically aimed at environmentally-sound technologies for developing countries (which would include climate-relevant technologies). The third refers to the creation of new institutions by 2017: a Technology Bank and a Science, Technology and Innovation (STI) capacity-building mechanism for least-developed countries[4]. Such goals could have a positive impact on climate-relevant technology development and transfer, since the challenges and barriers impeding these processes are broadly applicable and not necessarily specific to climate change (OECD, 2010; Dechezleprêtre, Glachant and Ménière, 2013).

Being able to monitor and measure progress towards these goals is more difficult, however. Current discussions on indicators for the SDGs list technology sharing and diffusion as a complementary national indicator, but one that remains to be developed (SDSN, 2015). There are few indicators for tracking technology development, though investment in relevant research, development and deployment (RD&D) is one way. The IEA tracks this data for clean energy technologies, and assesses this against investment rates needed to meet a 2°C scenario. It also tracks development and deployment of key technologies at a global level compared to its modelled 2°C scenario pathway (Hood and Briner, 2014). Empirical evidence of innovation and technology transfer tends to focus on patent data (Latif, 2015), while other important factors are not yet well understood or even captured. These include other types of intellectual property such as copyright and trade secrets, barriers to international trade and foreign direct investment, as well as tacit knowledge (Dechezleprêtre, Glachant and Ménière, 2013).

Ideas for goals that might channel resources towards climate-relevant technologies have been put forward; they tend to be more specific, in order to be measurable. For example, such goals could take the form of targets for governments to increase public funding for domestic and international climate-relevant RD&D, by a percentage or specific volume. This type of spending generally focuses on early stage technology research. On the other end of the technology development spectrum, a global goal could be to increase diffusion rates for climate-relevant technologies (higher level of penetration in shorter number of years), or to bring down the costs of certain technologies to a particular level (Morgan, Dagnet and Tirpak, 2014)[5]. There is existing work to guide goal-setting at a global level. For example, global energy technology roadmaps developed by the IEA for specific technologies also include estimated cost reductions and cost ranges required for the achievement of a given rate of technology deployment.

A global goal could simply take the form of a financial goal, either via a specified amount of money dedicated to climate-relevant technology RD&D and/or acquisition in different countries, or a share of climate finance flows to be allocated towards such activities. This type of goal would have the same advantages and disadvantages as other quantified finance targets (see section 2.4). It could require governments to take measures that stimulate greater private investment in climate-relevant RD&D, and thus affect private flows indirectly. Unless adopted by private actors as well, a financial goal could be *directly* implemented only by national governments and affect only public flows with some certainty. This could potentially limit its impact, particularly in the area of technology transfer and acquisition. There are also some risks with pre-determining what climate finance flows must be used for. Doing so may not be sufficiently demand driven; a given country may prefer funds to be used for other purposes than technology acquisition, and potentially have access to fewer funds as a result. In addition, if a share of global flows is earmarked for technology, this may lead to a more uneven geographic balance, with funds disproportionately flowing to countries with specific technology needs. A financial goal could also take the form of dedicated funding within the Green Climate Fund (GCF) for the Technology Mechanism (ibid.), which may have the advantage of better integrating finance for technology, as needed, within broader financing mechanisms.

[4] See the current proposed goals at https://sustainabledevelopment.un.org/focussdgs.html

[5] For example, the US Department of Energy's SunShot Initiative specifically aims to reduce the cost of electricity generated by solar energy systems to USD 0.06 per kilowatt-hour (kWh).

The idea of a technology goal could also be seen as a general objective calling for technology-related commitments by countries. These could be commitments to undertake specific actions, in line with a global objective of enhancing climate-relevant technology development and transfer. Individual country commitments may well vary, but these could be measurable. Morgan, Dagnet and Tirpak (2014) suggest global goals be combined with, for example, nationally determined diffusion rates for specific technologies, national targets for government spending on RD&D, and national policies for enabling environments (e.g. tax credits that encourage industry to undertake research). Hood, Briner and Rocha (2014) give examples of short- to medium-term technology goals, which can contribute to longer-term technological transformations. For example, a commitment to demonstrate and deploy specific technologies, quantified investments in certain types of RD&D, increasing the volume of "green" patents or low-carbon technology exports, or implementing technology standards. Countries could focus on a set of technologies to prioritise for development or accelerated deployment in the medium-term, that fall within longer term decarbonisation pathways (IEA, 2015). These commitments could also take the form of country-specific technology roadmaps, potentially supported via the Technology Mechanism or GCF. The IEA has worked with countries to produce both country- and technology-specific roadmaps: one for wind energy in China, and one for low-carbon technologies in the cement industry in India.[6]

One challenge for implementing technology-specific goals and objectives is that climate-related technologies may be difficult to classify as being purely climate related. This is true particularly for those technologies that lead to improved resource efficiency – which therefore have economic as well as environmental benefits. Technologies for adaptation to climate change are multi-dimensional and difficult to define purely in adaptation terms. It is difficult to distinguish adaptation technologies from adaptation measures, and these are best not treated separately (UNEP, 2014). This also makes assessment and quantification of their transfer, deployment and diffusion complicated (ibid.). Even within broader discussions of environmentally-related technology development and transfer, such as those on a Technology Facilitation Platform for environmentally-sound technologies, being able to define "technology" and technology areas is proving challenging. A global goal would be a new feature within the UNFCCC framework. This could potentially focus the efforts of a large number of countries on technologies we know are important for medium- to long-term GHG mitigation globally, such as energy technologies tracked by the IEA. It could arguably lead to even more technology development and deployment if implemented in the form of national-level targets and actions. This potential is mitigated by the narrow range of technologies for which global assessments are available, the limited applicability to adaptation technologies, and the difficulty in isolating climate-relevant technologies. It is therefore ranked as "medium" in the summary table ES-2 in terms of its potential to increase technology development and transfer).

In practical terms, introduction of a global technology goal in the UNFCCC is unlikely to lead to vast increases in technology deployment. This is because a large swathe of policies and regulations unrelated to climate policy will have a strong impact on this potential. As currently worded, the text also limits actions to developed countries, which is an inaccurate reflection of current technological realities, as well as the capacities of many developing countries and their potential for various types of innovation (Ockwell and Byrne, 2015). As such, the likelihood of the goal meeting its aim is considered "low", but could be "medium" if a varied set of actions were implemented at the national level in most countries, not just developed ones. Monitoring issues, described above, would mean a score of "low" given current proxies for technology transfer, and of "medium" for technology development.

3.3 Addressing barriers to technology development and transfer

The bulk of proposals for technology commitments are included in paragraph 132 (UNFCCC, 2015). Paragraphs 132.1 and 132.2 remain relatively general, though they emphasise the issue of addressing

[6] A full list of all IEA technology roadmaps are available at *www.iea.org/roadmaps/*.

various barriers to accessing, developing, absorbing and transferring technologies. Strengthening enabling environments and tackling barriers to technology development, diffusion and transfer are both of capital importance; doing so is part of the Technology Executive Committee (TEC) and Climate Technology Centre and Network (CTCN) mandates and work programmes (FCCC/CP/2010/7/Add.1), so this area is currently being addressed within the UNFCCC Technology Mechanism[7]. The CTCN also provides technical support to countries requesting it[8]. The Global Environment Facility (GEF) also supports various technology-related initiatives; several pilot finance and technology centres, mechanisms and networks have recently been implemented, many of them at the regional level (UNFCCC, 2014a). Proposals on addressing barriers, as well as those on strengthening TNAs (Section 3.4), highlight an area where it is challenging to separate enhancing technology development and transfer from enhancing capacity development, particularly where the Geneva negotiating text refers to enhancing "endogenous capacities and technologies" of developing countries. Depending on the level of capacity development needed, and for what purposes, such activities might be classified as either support for capacity building or technology.

A commitment to addressing barriers to technology development and diffusion would require strengthening domestic enabling environments in all countries, though the kinds of barriers and measures taken would vary according to national context. An important source of technology transfer is foreign direct investment and trade flows, though technology spillovers are more likely if country absorptive capacity is higher (Popp, 2009). The flow of clean technologies is greater when environmental policies in recipient countries provide incentives to adopt clean technology (ibid.); improving domestic absorptive capacities and enabling environments is therefore essential. This is closely linked to capacity building more generally, an area addressed separately in the current Geneva text. Given the types of common barriers listed in section 3.1, some capacity building may be climate-technology specific (for example, electricity grid management and transparent tariffs for renewable energy deployment), while others may be more generic (for example, improving business framework conditions). Work undertaken under the technology mechanism could usefully focus on climate technology-related barriers.

Indicators would also be needed to assess whether barriers were being removed, and capacities for technology development and absorption strengthened. Some of these could be related to broader capacity development, regulatory or economic indicators. This includes customs procedures, general intellectual property legislation and enforcement, and economic and regulatory policy frameworks for the environment (Halonen, 2008). Countries could also use technology development indicators outlined in the previous section, or more process indicators, such as implementation of relevant plans and guidelines, or changes to investment patterns (Hood, Briner and Rocha, 2014). Other relevant SDGs also have indicators to measure improvements in enabling environments that could positively impact technology development and transfer (SDSN, 2015).[9]

Proposals for creating a Technology Bank and STI capacity-building mechanism for LDCs in order to facilitate technology development and transfer also aim to address barriers. This activity would also need indicators, which have not yet been developed (SDSN, 2015). The Technology Bank is meant to address broader science, technology and innovation related capacity gaps experienced by LDCs. It

[7] The TEC work programme for 2014-15 is available at *http://unfccc.int/ttclear/misc_/StaticFiles/gnwoerk_static/TEC_infobox_2/0bde16ddda98494d86f0e4ed105b0629/50099ad819ac40a98d336a23c06a4257.pdf* .

[8] Examples can be found at *www.unep.org/climatechange/ctcn/Services/Technicalassitance/tabid/771786/language/en-US/Default.aspx.*

[9] For example, availability and implementation of a transparent and detailed deep decarbonisation strategy; share of population with access to reliable electricity; revenues allocated to sustainable development; researchers and technicians in R&D.

could usefully be used to address barriers to climate-relevant technology development and transfer, if these are prioritised by the LDCs that can access the Technology Bank.[10]

Paragraph 132.4 contains text similar to 132.1 and 132.2, with an emphasis on promoting access to and deployment of technology. It then includes options which specify actions taken in relation to intellectual property rights (IPRs). These include providing financial resources to address the barriers caused by them, establishing an IPR "mechanism" that would facilitate access and deployment, and a list of specific measures that could be used to facilitate access to technologies protected by IPRs (e.g. patent pools, preferential rates, joint licensing, collaborative research and development). While some of these options may be appropriate in certain cases, they may not be applicable to all countries. Existing evidence, which mostly uses patent data, finds that IPRs are generally not a clear barrier to technology transfer; where they are, their impact varies by technology and context, and would need to be addressed case-by-case (Latif, 2015; TEC, 2013a). Developing countries have identified a range of barriers to accessing priority technologies, among which IPRs are not dominant (UNFCCC, 2013a). Proposals for a LDC Technology Bank include addressing IPR issues through facilitative licencing, but also through helping inventors from LDCs obtain IPR protection (UNGA, 2013).

Addressing barriers to technology development and transfer would potentially increase the volume and quality of technology development, deployment and transfer. These barriers vary greatly by country and by technology, and the proposals contained in the Geneva draft negotiating text are either too vague or too specific (e.g. mentioning only IPR). As such, the potential of this proposal is assessed as "medium" in the summary table (Table ES-2). The implementation of measures to address barriers, along with their outcomes, could also be monitored, though these would need to be specific to the different measures taken at national level. There would also potentially be a time-lag between implementation of actions to address barriers, and measurable outcomes such as product innovation, patents or investments. Monitoring would therefore require considerable capacity, and is also assessed as "medium". In terms of effectiveness, the proposal is rated as "low"; effectively addressing the wide range of barriers to technology development and transfer would fall outside the "climate" domain, and require significant coordination within governments and between relevant international organisations.

3.4 Technology needs assessments

Paragraph 132.5 calls for developing countries to assess their technology needs with the aim of developing project proposals; the outcomes of any assessment are to be effectively implemented, with the support of developed country parties. To this end, the Geneva text specifies various measures relating to the process of technology needs assessment (TNA), in terms of strengthening these, improving capacity to conduct them, and enhancing their implementation. It also calls for linking them to implementable or bankable projects, as well as to other processes under the Convention, such as nationally appropriate mitigation actions (NAMAs) and national adaptation plans (NAPs). All these measures are clearly important and useful; they are in fact an explicit part of the TEC and CTCN's mandate, and part of the TEC's work plan. Strengthening the TNA process, enhancing implementation of outcomes from the process, and linking TNAs to other Convention processes are ongoing activities within the UNFCCC.

Specifically aligning TNAs more closely with bankable projects, or improving these to result in implementable projects, are not currently specified in the TEC work programme. This emphasis is welcome; while TNAs have been a valuable enabling activity, and have included more specific project ideas and technology action plans (TAPs) since 2009, the number of sound project proposals as reported in TNAs remains small (TEC, 2013b). This underscores the difficulty of developing concrete and bankable project proposals (Sill, 2013). Work on linking project ideas and TAPs with other processes such as NAMAs and NAPs within the technology mechanism is intended to further

[10] For more on how the Technology Bank might be conceived, see UNGA (2013). The Technology Bank is understood to be a time-bound mechanism, which would conclude once countries "graduate" out of LDC status (UNGA, 2014).

support their implementation. The technology mechanism appears to be emphasising better operationalisation and implementation of country TNAs, including through collaborating with the financial mechanism. This is a welcome development, and crucial to enhanced action within countries.

To date, therefore, the impact of TNAs on enhancing the development and transfer of technologies has been limited. Should the TNA exercise be more focused on developing bankable projects that are more clearly linked to financing and broader policy processes, it might play a greater role in enhancing enabling environments and lead to the implementation of concrete projects. Given the limited scope of TNAs, their potential to mobilise greater development of and access to technology could be considered "medium" (See summary table ES-2). The slow implementation of TNAs, and their slow evolution towards greater specificity, also suggests the likelihood that they would effectively lead to such mobilisation would remain "low". It is easy to monitor whether they have taken place; monitoring of their outcomes could occur in terms of progress with specific projects stemming from TNAs and TAPs. However, it is not clear what the role of the 2015 agreement should be in this regard, given the technology mechanism is meant to address current and evolving technology needs.

One area to emphasise is the importance of embedding any assessment of technology needs within broader, coherent mitigation and adaptation strategies (TEC, 2014). A technology action plan that focuses on accessing and implementing actions for individual technologies risks ignoring opportunities for meeting development objectives and strengthening innovation. The 2015 agreement could emphasise and enhance this role within the mandates of the technology mechanism bodies. However, this would be more appropriate in a COP decision, so as not to preclude evolving developing country needs and technological developments over the course of the agreement's lifetime.

3.5 Global collaboration on RD&D

Finally, paragraph 132.6 specifies action in the form of global collaboration on technology research, development and demonstration (RD&D). It first calls for provision of support from developed to developing country parties for the RD&D of technologies, and goes on to call for a global collaborative programme or global participative collaboration on RD&D. The IEA (2013; 2015) expects multilateral technology collaboration to play an important role in transitioning to low-carbon energy systems. The OECD (2013) has found a positive correlation between international scientific collaboration and cross-border patent applications. Furthermore, deployment, not just RD&D, will be essential. For both these processes, domestic innovation and absorption capacities will need to be improved across countries. The text does not mention the private sector, though public-private partnerships for RD&D have long been effectively used in science and technology (OECD, 1998). In addition, successful public-private partnerships can also help with the diffusion of technologies, including adapting them to local conditions (Forsyth, 2005).

The paragraph includes reference to global collaboration, references to a technology transfer mechanism for developing countries, and also includes references to specific groups of countries that would provide "financial and intellectual support". RD&D and innovation activities are currently concentrated in Annex I countries (using patent data as evidence). However, there is also significant activity in non-Annex I countries, such as South Korea, China and Brazil. In addition, more non-Annex I countries are also important technology trade and research partners, in the area of clean energy technologies for example (OECD, 2010; Latif, 2015). Corvaglia (2013) indicates that "an increasing number of developing countries are leading sources of climate-related technologies, diffusing them to other developing countries through trade and investment flows". It appears somewhat limiting to specify that "intellectual support" (which is rather ill-defined) be exclusively from developed to developing countries. As expressed in the preparatory process background paper for the Third International Conference on Financing for Development, "the view that technology is developed in the North and simply transferred to the South is misleading" (UNDESA, 2014).

While an explicit global collaborative programme would be a new feature within the UNFCCC, a range of "global collaborative programmes on the research, development and demonstration of technologies" currently exist, and many involve the participation of both developed and developing countries. Barnsley and Ahn (2014) found developing country participation in multilateral collaborative initiatives for low-carbon energy technologies has been increasing. However, they also point out that most initiatives are not established with global membership in mind. There are also significant bilateral collaborations on climate-relevant technologies, notably between the United States and China, and the United States and India (Lewis, 2014; Basu, Ghatikar and Bansal, 2014). The EU's Horizon 2020 research programme has a high degree of international collaboration with those outside the EU; it also provides funds to support participation from developing countries[11]. One proposal in the Geneva text calls for special intellectual property right modalities for global participative collaboration. Joint or collaborative RD&D activities generally specify intellectual property provisions, as is the case under the US-China Clean Energy Research Center (Lewis, 2014). It is likely any future climate-related collaboration would do the same. Most international cooperation for environmentally-related technologies happens at the diffusion level, where there is room for greater co-ordination, rather than on upstream R&D (UNGA, 2014).

One example of a centrally managed global R&D programme is the CGIAR, a global agricultural research partnership supported by the CGIAR Fund, a multi-donor trust fund administered by the World Bank.[12] The research carried out by CGIAR centres has had significant impact in the past on increasing agricultural productivity, primarily through crop genetic improvement research on a limited set of crops[13]. CGIAR has also undertaken successful research in crop management techniques (e.g. biological pest control) and zero-tillage. While the CGIAR focuses on research with a global impact, which is the driving force behind its establishment, some activities have different impact across regions; their benefits tend to be more geographically specific with less opportunity for geographic spillover (Pingali and Kelley, 2007). The diffusion aspect of CGIAR's research also remains a challenge. As in other areas, countries with greater capacity have benefitted more from technology spillovers, and agricultural extension services play an important part in ensuring that research benefits are disseminated (Pal, 2011). Finally, assessing the impacts of CGIAR's work is essential; it has focused to date on impacts on agricultural yields and productivity, and has struggled with assessing environmental impacts, as well as impacts of natural resource management research and policy-oriented research (Renkow and Byerlee, 2010).

A global collaborative RD&D programme on climate technologies would likely similarly be useful if focused on a) technologies with a global impact and b) technologies and technological processes with opportunity for geographic spillover. For adaptation technologies a significant challenge is currently adoption and diffusion at the local scale (UNEP, 2014), something the CGIAR has struggled with. When technologies must be specifically adapted to certain contexts, this makes it difficult to achieve scale in the diffusion. For example, water and soil conservation technologies vary greatly depending on local agricultural ecology conditions (Kato et al., 2009). The use of new technologies by a given group of farmers, such as new seed varieties and crops, can be impeded by various factors, including

[11] Some countries that are non-Annex I countries under the Convention do not receive automatic funding, but are granted funding according to a specific collaborative arrangement, as in cases of bilateral agreements for scientific and technical collaboration between the EU and a given country. This includes Mexico, Korea, China, South Africa, and India.

[12] In place since the 1970s, the CGIAR only recently established itself as a consortium, an international organisation which develops and carries out research programmes across 15 research centres. Funding has increased steadily over the past decade, and reached USD 986 million in 2013 (CGIAR, 2005, 2008, 2014).

[13] Mainly rice, wheat and maize; sorghum, cassava, beans and potatoes also benefitted.

missing credit and insurance markets, inadequate extension systems, weak local institutions, and poorly functioning markets (Lybbert and Sumner, 2012).[14]

Global collaboration on RD&D has yielded positive impacts in the past, in non-climate fields as well. As such, the potential for such collaboration leading to technological advancements and greater technology development could be "medium" to "high" (see summary Table ES-2). While focus on RD&D fills a gap in current collaborative technology activities, efforts should also continue to focus on deployment and diffusion. The effectiveness of current proposals in actually enhancing technology development and transfer is assessed as "low" to "medium". First, this will depend on how collaboration is structured and implemented: including whether it would narrowly focus on laboratories and research institutions, or include innovative practices that can adapt technologies and practices on the ground (Ockwell and Byrne, 2015). Second, it might be difficult to separate climate-relevant technologies from other environmental technologies. Finally, it is not clear the UNFCCC would be the most efficient body through which to establish a single, collaborative RD&D programme. This would require significant resources, and the programme should ideally be independent from particular political processes and flexible. The financial flows and results of global collaborative efforts could be monitored. Any global research programme is likely to struggle to determine how it chooses to measure its impacts, and have to overcome methodological constraints to assessing these; ease of monitoring is therefore assessed as "medium". Nothing precludes the existing Technology Mechanism from co-ordinating collaborative activities or monitoring their implementation and results.

4. Technical assessment of specific suggestions: capacity building

The current textual proposals on capacity building (UNFCCC, 2015) in the Geneva negotiating text are rather cursory. This section explores whether some of the current proposals could contribute to enhancing capacity and capacity-building activities. It also explores whether they could be effective in meeting their objectives (are they based on practices that have worked in the past, and could they be implemented), and whether these are currently addressed within the existing climate regime. Though the proposals assessed are a small sub-set of those contained in the text, they still remain rather vague; it is not clear which actors are targeted, and how these proposals could be operationalised.

Certain proposals in the Geneva text to enhance capacity building in paragraphs 136 and 137 will not be assessed, as most of these are principles rather than specific activities. Some of these proposals simply describe actual capacity building activities themselves, such as the promotion of public awareness and education, or the strengthening of domestic institutions and the creation of enabling environments. Another, "the development of climate policies", may develop capacities but also requires capacity to implement. Finally, the proposal for "the mobilisation of private sector capital and public engagement" is vague; it is unclear what is meant by both. The commitment proposed in paragraph 138 is rather generic; it is not clear that this would be new or different from existing commitments under the Convention, or that it would be monitored in a manner other than current reporting obligations. Paragraphs 136 to 138 also contain general references to the provision of support for capacity building, for implementing capacity-building activities, and for "enhancing capacity", which will not be examined. They highlight the difficulty of separating provision of financial support with the types of activities finance can be used for, namely capacity building or technology development. As described in the technology section above, in practical terms pre-determining what climate finance is to be used for at a global level can lead to exacerbating geographical disparities in finance flows, and can undermine demand-driven provision of funds.

[14] Thanks to Anne Olhoff of the UNEP DTU Partnership for these examples, provided in a discussion paper prepared for a Workshop on Technology issues under the 2015 Paris Agreement hosted by UNEP on 26-27 March, 2015.

4.1 Definitions and context

There is no clear definition of "capacity building" within the UNFCCC. Decision 2/CP.7 established a capacity building framework which states that: "capacity building should assist developing countries to build, develop, strengthen, enhance and improve their capabilities to achieve the objective of the Convention through the implementation of the provisions of the Convention…". While conceptual debates continue, "capacity building" can be understood as an external intervention to strengthen capacity, distinguished from "capacity development" which can be seen as an internal process (Simister and Smith, 2010). Capacity building can therefore be seen as a *process* and an *end* in and of itself, though it is primarily a *means* to achieving actual capacity development (ibid.). UNDP (2010) for example, which prefers to use the term capacity development, defines it as "the process through which individuals, organisations and societies obtain, strengthen and maintain capabilities to set and achieve their own development objectives over time". Another very broad definition sees capacity as "the ability of a human system to perform, sustain itself and self-renew" (Ubels, Flowler and Acquaye-Baddoo, 2010). The OECD (2006) has defined capacity development as "the process by which individuals, groups and organisations, institutions and countries develop, enhance and organise their systems, resources and knowledge; all reflected in their abilities, individually and collectively, to perform functions, solve problems and achieve objectives." Capacity-building outcomes are generally evaluated by the organisations providing such support using their own tools, which also assess various capacity-building outcomes within supported programmes or projects (Pearson, 2011; WBI, 2012; Bellamy and Hill, 2010; GEF, 2011).

As such, capacity building in the context of the UNFCCC can be seen as supporting the development and enhancement of systems, resources and knowledge required to meet the objective of the Convention. The ability of countries to implement the Convention and achieve their climate-related objectives can be a measure of effectiveness of capacity building (UNFCCC, 2008). In practice, it is difficult to separate climate-related objectives from other socio-economic objectives. This is largely due to the nature of the climate change challenge, and the inextricable link between action on climate change and broader economic activity. As such, certain capacities needed for undertaking climate adaptation and mitigation policies may be similar to those required to develop, implement and evaluate other sound socio-economic development policies, such as institutional development (UNFCCC, 2014b). For example, Tunisia highlighted that it needed capacity building support for measurement and verification systems, communication, project management and developing new financing mechanisms within the renewable energy and energy efficiency sectors (SEDD, 2014). Human and technical capacities to undertake these activities will be similar for other economic sectors (e.g. having skilled engineers, a developed financial sector, having data gathering processes and human capacity for these activities). Capacity development for adaptation is generally strengthened with mainstreaming and linking adaptation to other development priorities (UNFCCC, 2014b). The move from national adaptation programmes of action (NAPAs) to national adaptation plans (NAPs) underlines a shift toward development of a wide set of capacities in a broader range of actors, including non-environmental ministries. National adaptation strategies in OECD countries tend to focus heavily upon capacity development (Mullan et al., 2013).

The continued need for developing and building capacity for climate action is widely recognised. Parties clearly express the need for continued capacity developed in various fora under the UNFCCC, both in formal negotiations and within the Durban Forum for Capacity Building (UNFCCC, 2012, 2014b). While some capacities needed are common to those required for other socio-economic development needs, there are also capacities specific to implementing the Convention. This includes preparing GHG inventories, as well as preparing national communications, biennial update reports, as well as technology-focused (TNAs, TAPs) and adaptation-focused reports (NAPs, and NAPAs). These activities receive specific funding under the Convention and support includes capacity building (UNFCCC, 2014a; Briner et al., 2014). There are also technical capacities specific to climate change actions, such as climate vulnerability assessments and estimating GHG emission factors for specific activities.

Many aspects of strengthening institutions and enabling environments for climate change are common to challenges with enhancing the "greening" of economic development more generally (OECD, 2012). Within the wider context of capacity challenges for sustainable development in many countries, processes under the UNFCCC aim to strengthen specific climate-relevant capacities that may not spillover from or be included in other capacity development efforts. Similarly, the capacity building provided under the UNFCCC will likely be limited and not necessarily strengthen more broadly needed socio-economic development capacities.

4.2 Predictable targets and outcomes

Paragraph 136 (UNFCCC, 2015) includes reference to "clear and predictable targets and outcomes" to "guide" capacity building. At the global level, current discussions of the post-2015 Sustainable Development Goals integrate the aim of building capacity within different goals, [15] though a few are cross-cutting (data collection and implementation of sustainable development goals). Across these goals, only two would require specific indicators relating to capacity building: one for increased capacity related to water and sanitation services, and another related to the science, technology and innovation (STI) capacity building mechanism for LDCs (see section 3.3) For both these areas, no indicators currently exist and would have to be developed.

It is possible to have clear targets and outcomes for capacity development at the national level; as a country-driven process, this would require countries to outline specific capacity outcomes and targets. These could then be broken down into indicators for both the capacity-building activity, and the actual capacity development sought (Pearson, 2011). For example, a country may wish to better integrate climate and other environmental concerns into poverty reduction policies, planning and investment. Specific activities can be monitored, such as completing a public expenditure review, producing economic analysis of the costs of environmental degradation and impacts on livelihoods, and developing checklists and guidelines for mainstreaming the environment in economic development policy. The capacity development outcome could be measured in terms of the level of mainstreaming achieved, through inclusion of climate and environment in sectoral strategic plans and priorities, and increases in budgeting for environment across various ministries by the Ministry of Finance and Planning.[16] Capacity development tends to be seen as a means to an end, and is most often assessed in terms of "improvements in performance", based on the assumption that if by some measure performance is improving, it means capacity has improved. There are also different ways of assessing capacity development which look not only at performance but other elements of capacity, and tend to be more adaptable and process oriented; both approaches are useful in different contexts (Watson, 2010). Since capacity is meant to result in the ability to "perform functions, solve problems and achieve objectives", looking at whether there are changes in these abilities could also be a way of monitoring progress. But what, specifically, is considered an improvement in a climate-change related ability and should therefore be assessed, tends to be specific to the needs of a particular organisation or system. As such, the ability to monitor this objective is considered "medium" (see Table ES-2), if implemented at a national level.

One challenge for implementation of clear and predictable targets and outcomes is that capacity development generally occurs over long time-frames, making it more difficult to assess both the impacts of capacity-building activities, and the resulting capacity development outcomes (Simister and Smith, 2010). It can also be challenging to secure long-term funding for sustained activities of this kind (Morgan, Dagnet and Tirpak, 2014). For example, addressing barriers to technology

[15] Including Goal 3 on healthy lives and wellbeing (for early warning and risk reduction), Goal 6 on water and sanitation (for related activities and programmes), Goal 8 on sustainable economic growth (for domestic financial institutions), Goal 13 on climate change (for human and institutional capacity), Goal 15 on biodiversity and land degradation (for sustainable livelihood opportunities in local communities), Goal 17 on means of implementation (for domestic revenue collection, implementing sustainable development goals, for data collection and for science, technology and innovation).

[16] This example is drawn from the experience of Rwanda, as outlined in UNDP (2011).

development and transfer includes strengthening enabling environments. This generally includes improving education systems, and impacts may only be visible after years of sustained effort.

If countries set out clear objectives and outcomes related to their capacity needs, this could have a positive effect on securing financial and other resources, on implementing capacity-building activities, and therefore lead to enhanced capacity development. Doing so would be useful at a national level. If the proposal refers to a collective or global capacity-building targets and outcomes, it is less clear how a global target that can be monitored would be useful, unless it is purely financial. Indeed, this section has discussed targets and outcomes for capacity building *activities* and their *outcomes*, but it is not clear *what* target and outcomes the Geneva text refers to. The proposal could be interpreted as a clear and predictable target for financial resources for capacity building; in this case, it could be treated as part of a financial goal. For these reasons, the potential for this proposal to lead to enhanced capacity building is considered "medium", and its likelihood of meeting this objective as "low", because it is unclear how this would be implemented.

4.3 Integrating capacity building into "all elements"

One proposal in paragraph 137 calls for integrating capacity-building activities into mitigation and adaptation programmes, or into all other elements. While reference to "all other elements" is vague, it reflects the practical impossibility of separating capacity building from any other activity under the Convention. This includes technology development and transfer, mobilising non-governmental sources of finance, absorptive capacity for finance and technology, and developing and implementing both adaptation and mitigation policies and programmes. As mentioned above, many of these capacities may not be specific to climate change. Climate change programmes in many developing countries are meant to occur in the context of sustainable development, and do often cover other sustainable development issues (e.g. poverty eradication and food security) (UNFCCC, 2014d). Capacity development activities are also often frequently included with other forms of climate support (UNFCCC, 2012; Bellamy and Hill, 2010; ADB, 2012). In practice, donor countries of the OECD/DAC as well as multilateral donors, integrate capacity building into all funding programmes – whether these are related to climate change or not. This is because not doing so would be ineffective and is not considered to be good development practice (OECD, 2008; UNFCCC, 2013b; Bellamy and Hill, 2010; WBI, 2012). While good practice, this makes capacity building more difficult to "track" and assess independently. For example, the GEF evaluates capacity development indicators as part of broader monitoring and evaluation processes for projects. These are flexible; they include an indication of levels of engagement, management and implementation, and the generation of knowledge, and can be adapted to the circumstances and objectives of a given intervention (Bellamy and Hill, 2010). Knowing how much capacity building is provided is notoriously difficult and information is incomplete (Morgan, Dagnet and Tirpak, 2014). Given the integration of capacity building in the provision of financial support, as well as technological support, it can be difficult to get specific details on the exact composition of capacity building activities and the specific amounts directed towards them.

Within the UNFCCC, Parties have recognised the need to better integrate capacity building with financial and technical resources, improve co-ordination among donors, and integrate capacity building into national development strategies, budgets and plans (Decision 2/CP.10 and Decision 13/CP.17). If capacity building was integrated and emphasised within the provision of all kinds of support, as well as by countries themselves as part of domestic policy processes, this in practice could lead to more resources, more effectively devoted to capacity development. In addition, it may better allow for the longer timeframes and sustained activities needed for effective capacity development. This proposal therefore has "medium" to "high" potential in terms of enhancing the amount of capacity building and development. The likelihood of capacity building being enhanced in practice is assessed only as "medium", partly because of the political importance placed within the UNFCCC on being able to separately monitor the amount of support provided for capacity building. Better integrating capacity building makes this more difficult, and may limit the level of integration within UNFCCC institutions and processes. A dedicated funding stream for capacity building, for example,

would be easier to monitor, but potentially complex to administer if it needed to be effectively integrated into ongoing activities supported by separate sources of climate finance.

4.4 International capacity building mechanism

Paragraph 140 of the Geneva text (UNFCCC, 2015) proposes creating an "international capacity-building mechanism". Some aspects of the proposal suggest it would be structured like the existing technology mechanism. Various proposals refer to a co-ordination centre or a central committee, a consortium or network of institutions and/or regional-capacity building centres, an advisory body, and an evaluation mechanism. The proposals point to the need for better co-ordination and collaboration between various institutions involved in climate-relevant capacity building. They also suggest a desire for more assessment or evaluation of capacity needs and capacity-building activities, along with tools and methodologies for doing so. Capacity-building activities have dedicated processes under the UNFCCC, primarily the Durban Forum on Capacity Building and the Doha Work Programme and Dialogue on Article 6 (on education, training and public awareness). Capacity-building also occurs via the Technology Mechanism (UNFCCC, 2014d, 2012), while capacity building for adaptation and resilience is provided by the Least Developed Countries Expert Group and the Nairobi Work Programme. Various capacity development activities are supported by the Global Environment Facility (GEF) as enabling activities (UNFCCC, 2014e). Many institutions outside of the UNFCCC also provide support for adaptation and resilience capacity development, such as UNDP, FAO, and the UN-REDD programme (Briner et al., 2014).

Capacity development plays a huge role in the success of both financial and technical support. Integrating these components can therefore be beneficial. This also translates into a desire for greater co-ordination and management of all capacity-building activities under the UNFCCC (UNFCCC, 2013c, 2014b). Some of the functions listed for the capacity-building mechanism might be challenging given the integration of capacity-building into other forms of support (e.g. assessing support received for capacity building and its effectiveness). Having a central committee or co-ordination centre that would perform a range of functions (including identifying capacity needs, developing MRV tools and analysing capacity-building gaps) in a manner tailored to each country's unique circumstances would likely be resource intensive, and would take time to establish. Countries may consider the urgency of enhancing capacity building and whether this could be effectively accomplished through existing institutions. If not, the development of a new institution or facility could be a medium-term exercise. There are already many tools that can be used for monitoring and assessing capacity-building activities, their delivery and outcomes (Pearson, 2011; WBI, 2012; Bellamy and Hill, 2010; GEF, 2011), which could potentially be better disseminated. The GEF uses a Scorecard with flexible, qualitative indicators across five different "capacity result" areas. The World Bank Institute (WBI) outlines the use of "programme logic" to trace changes in capacity development, including using indicators for setting objectives and intermediate outcomes. It also provides guidance for methods such as developing and analysing questionnaires. Information-sharing on different experiences with monitoring and evaluation frameworks, for example, could be useful. If parties feel the Durban Forum is not adequately fulfilling this function, they may wish to reconsider its mandate and modalities.

Part of the concern with capacity-building efforts to date is that these are not sustained in-line with the long lead-time capacity development requires (Morgan, Dagnet and Tirpak, 2014). In this case, discussions on providing more predictability and stability for these activities could be held within broader action on development co-operation effectiveness (see OECD, 2014b). The GCF may need to consider the long-term nature of investments required for capacity development as part of ensuring "adequate resources for capacity-building" as per its governing instrument (GCF, 2014b).

Any new mechanism would need to be focused on capacity building directly relevant to products or processes required by the Convention (e.g. inventories, national communications, projections, etc.). Otherwise, it would risk being dwarfed by the wide range of capacity development issues faced by countries in developing and implementing climate policies. Delimiting the scope of its activities could

be challenging. Given the length of time and political complexity involved whenever a new institution or process is set up within the UNFCCC, it is not clear that creating a new and separate mechanism would lead to better results. The kind of co-ordination and information sharing needed could potentially be achieved more rapidly by strengthening the remit, mandates and resources of existing processes that aim to build capacity for achieving the objective of the Convention. It is also not clear if creating a separate mechanism would facilitate the integration of capacity building across "all elements" of the Convention or the new agreement. Given the uncertainty surrounding this proposal, it is difficult to assess whether it could potentially enhance capacity building, do so effectively, and whether it would increase ease of monitoring for capacity building.

5. Conclusions

Climate support in the form of finance, technology and capacity building is an important enabler of enhanced climate action in developing countries. A key factor for the 2015 agreement will be how to include the issue of climate support in the body of the agreement, and which elements may more usefully be placed in a COP decision or a work programme under the UNFCCC. The 2015 agreement may frame overarching objectives and a certain "direction of travel" towards these objectives, for both mitigation and adaptation. If the provision of support is to be responsive to countries' needs regarding these objectives, including in the 2015 agreement specific language on the types and amounts of support, or specific institutional arrangements for their provision, could be risky. It may result in an agreement that lacks flexibility, is overly prescriptive and not sufficiently responsive to country needs, and therefore of limited durability. Climate support is, after all, a means to an end rather than end in itself. While the 2015 agreement may provide a vision for a certain end point, the routes to get there will be different for different countries and change over time.

Climate finance

Current proposals regarding climate finance in the Geneva text differ substantially. They differ in terms of the amount of climate finance they could be expected to mobilise, the sources of such finance, whether increased finance would fill gaps that are currently not addressed within the UNFCCC, the ease of implementation of the proposal, and the ease of monitoring the results.

For example, amounts of total resources generated by different proposals could range from millions of dollars via a levy on market-based mechanisms to potentially billions of dollars via fossil fuel subsidy reform. Similarly, climate finance mobilisation and impact on GHG emissions from phasing down or phasing out high-carbon investments is likely to be much greater than using export credit agencies to manage risk. The use of green bonds could potentially mobilise significant resources for climate mitigation and adaptation; limiting the proposal to renewable energy and energy efficiency bonds seems unnecessarily restrictive. Other proposals could also have strong positive impacts on the mobilisation of climate finance. This includes enhancing domestic enabling environments – although the impact of such enhancement will depend on how attractive current enabling environments are. The development and use of financial risk management instruments to facilitate climate change adaptation financing could have a significantly positive impact under the UNFCCC, especially for the LDCs - although it is uncertain to what level this could mobilise climate finance. It is pivotal that the fiduciary responsibility of investors to seek investments with optimal risk-adjusted returns is recognised. The development of strong and stable policy frameworks is a key way to help climate change adaptation financing pass this requirement.

The actual impact on climate finance mobilisation of several proposals examined in this paper will depend on how they are implemented at national level. This applies to subsidy reform, shifting high-carbon investments, enhancing enabling environments, using export credit agencies and other risk management instruments. It may also be beyond the reach of an international agreement, for example, to earmark sources of funds from certain proposals, such as reducing fossil fuel subsidies or taxing oil for climate-specific purposes. This makes the impact of proposals difficult to assess and quantify.

Any assessment of mobilised climate finance will face challenges with monitoring and tracking. This difficulty is likely to remain, even if there is political agreement on what "should" count towards climate finance. There are data gaps which are difficult to fill, and any results of quantifying climate finance will be very sensitive to the methodological choices made, which means that there is inherent uncertainty in any quantified estimates. For example, as climate finance flows through multiple intermediaries, some of which may have joint ownership, it is not straightforward to determine where to draw the line between public and private or sometimes even between developed and developing country sources (Caruso and Jachnik, 2014). Different methodological choices in this regard can significantly influence whether the finance is "counted" as coming from developed or developing countries, and whether it is public or private.

This uncertainty in quantifying flows is important to keep in mind when proposing legally-binding quantified commitments measured in these terms. On the other hand, progress with a generic or aspirational goal for increasing and mobilising climate finance is also difficult to measure. Balance is needed between these two extremes.

In order for progress to be measured, some quantification is needed. While accepting a certain level of uncertainty, the international community could usefully explore whether a goal for climate finance would be in terms of outflows from developed countries, or alternatively in terms of inflows, outcomes or impacts of such finance in developing countries.

Technology and capacity building

The proposals on enhancing technology development and transfer, and on capacity building, are highly sensitive to national circumstances and implementation, making it difficult to assess the potential global impact of these proposals. To be actionable, proposals for global goals will need to be taken forward in specific ways at the national level. Several proposals could have a positive impact on technology development and transfer, including increasing RD&D collaboration, setting specific national technology-related objectives as part of overarching goals, and addressing barriers (which can also be related to capacity development). However, many barriers to technology development and transfer relate to issues that fall outside the scope of the UNFCCC, such as trade, investment, legal institutions, capacities, skills and innovation abilities. As such, the on-the-ground effectiveness of proposals within a global climate change agreement is unclear.

It is not clear how the proposals as articulated would apply to individual countries. Global technology assessments could be used to set global goals, but would not address country-specific technology needs, barriers, and the particular capacities needed to overcome these barriers. For example, monitoring climate-relevant technology transfer is only straightforward for a restricted number of climate-specific technologies (e.g. renewable energy, CCS). Many technologies that will help countries meet their climate objectives are more difficult to identify, especially for adaptation. For this reason, examples and ways of assessing progress with technology goals currently exist mostly for energy-related mitigation technologies. It may be fruitful to place technology discussions within, or link these to, broader examination within the UN system of the development and transfer of environmentally-sound technologies.

Disentangling capacity building from other aspects relating to implementation of the Convention is a challenge. It is also difficult to separate climate-relevant capacity needs from broader socio-economic development capacity needs. Strengthening the capacity-building aspect in the provision of all kinds of support might help simultaneous implementation of longer-term capacity development activities with shorter to medium-term actions to implement the Convention. Concrete targets and outcomes for capacity development at the national level, which would then guide capacity building, could be helpful.

The functions of a proposed new capacity-building mechanism suggest a need for better co-ordination of capacity-building activities. Several of these functions could potentially be carried out by the

different bodies already working on capacity building under the Convention, as well as its existing subsidiary bodies. Experience both within and outside the UNFCCC suggests that creating new institutions is time and resource-intensive, and that once created it can be difficult for institutions to be flexible and adaptable. As such, proposals for new mechanisms and institutions should be carefully considered. The mandates and work programmes of existing institutions and arrangements could be modified to ensure they meet current needs. Establishing a new institution for co-ordinating activities may not be more efficient than reassigning this task to an existing institution.

Capacity building and capacity development could be monitored in various ways, though such monitoring and evaluation tends to be context specific, and more difficult to do globally. Tracking financial support specifically for capacity building is also somewhat difficult, as this is generally integrated into overall projects and broader support flows.

Way forward

The goals and objectives of climate support will need to be tailored to different country circumstances. If countries want to measure progress with objectives, these will need to be articulated in a more specific manner at the national level. In many cases, measuring progress towards objectives relating to mobilisation or receipt of climate support is possible but subject to considerable uncertainty. This uncertainty will need to be taken into account as countries determine the shape climate support provisions will take the 2015 agreement. The aspirational nature of objectives in the agreement itself will somehow also need to be specified and monitored on a short- or medium-term basis. Balancing global objectives with national implementation, and the need to manage uncertainties, will contribute to the durability and flexibility of the 2015 agreement.

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Glossary

ADB	Asian Development Bank
ADP	Ad hoc Working Group on the Durban Platform for Enhanced Action
AF	Adaptation Fund
AfDB	African Development Bank
APEC	Asia-Pacific Economic Cooperation
ARC	African Risk Capacity
BR	Biennial Report
BUR	Biennial Update Report
CAF	Cancun Adaptation Framework
CB	Capacity Building
CBI	Climate Bonds Initiative
CCXG	Climate Change Expert Group
CCS	Carbon Capture and Storage
CDM	Clean Development Mechanism
CDP	Carbon Disclosure Project
CEM	Clean Energy Ministerial
CER	Certified Emission Reduction
CGIAR	Consultative Group on International Agricultural Research
CHP	Combined Heat and Power
CMP	Conference of the Parties serving as the Meeting of the Parties to the Kyoto Protocol
COP	Conference of the Parties to the UNFCCC
CPI	Climate Policy Initiative
CTCN	Climate Technology Centre and Network
CTI	Carbon Tracker Initiative
DAC	Development Co-operation Directorate (OECD)
EBRD	European Bank for Reconstruction and Development
EC	European Commission
ECA	Export Credit Agency
EIB	European Investment Bank
FAO	Food and Agriculture Organisation of the United Nations
FM	Financial Mechanism
FSF	Fast Start Finance
GCEC	Global Commission on the Economy and Climate
GCF	Green Climate Fund
GDP	Gross Domestic Product
GEF	Global Environmental Facility
GHG	Greenhouse Gas
GNI	Gross National Income
GW	Gigawatt
G20	Group of Twenty
ICT	Information and Communications Technology
IEA	International Energy Agency
IGES	Institute for Global Environmental Strategies
INDC	Intended Nationally-determined Contributions
IPCC	Intergovernmental Panel on Climate Change
IPR	Intellectual Property Rights
IRENA	International Renewable Energy Agency
KP	Kyoto Protocol
LCCR	Low-carbon climate-resilient
LCR	Local-content requirements
LDC	Least Developed Country
LDCF	Least Developed Countries Fund
LEG	Least Developed Countries Expert Group
MDB	Multilateral Development Bank
MRV	Measurable, Reportable and Verifiable
NAMA	Nationally Appropriate Mitigation Actions
NAPA	National Adaptation Programme of Action

NAP	National Adaptation Plan
NGO	Non-Governmental Organisation
NWP	Nairobi Work Programme
ODI	Overseas Development Institute
OECD	Organisation for Economic Co-operation and Development
PSF	Private Sector Facility
PV	Photovoltaic
RD&D	Research, Development and Deployment
SBI	Subsidiary Body for Implementation
SBSTA	Subsidiary Body for Scientific and Technological Advice
SDSN	Sustainable Development Solutions Network
SCF	Standing Committee on Finance
SDG	Sustainable Development Goal
SIDS	Small Island Development States
STI	Science, Technology and Innovation
TAP	Technology Action Plan
TEC	Technology Executive Committee
TM	Technological Mechanism
TNA	Technology Needs Assessment
TT	Technology Transfer
UN	United Nations
UNDESA	United Nations Department of Economics and Social Affairs
UNDP	United Nations Development Programme
UNEP	United Nations Environment Programme
UNESCAP	United Nations Economic and Social Commission for Asia and the Pacific
UNFCCC	United Nations Framework Convention on Climate Change
UN-REDD	United Nations collaborative initiative on Reducing Emissions from Deforestation and forest Degradation (REDD) in developing
WRI	World Resource Institute

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