Determining the Needs of Developing Countries related to the implementation of the Climate Change Convention and the Paris Agreement

Background Paper

Working draft[1]

A. Introduction

1. At its twentieth meeting, the Standing Committee on Finance (SCF) requested the secretariat, under the guidance of the co-facilitators, to prepare a background paper on sources of information and the methodologies and approaches prior to SCF 21.[2]

2. The background paper would build on information on sources of information contained in the annex to document SCF /2019/20/5 and draw from outcomes of the work on information gathering for the mapping and analysis of available information on the needs of developing country Parties and the outcomes of the experts meeting on the determination and assessment of the needs of developing country Parties on 10-11 July 2019 in Manila, Philippines.[3]

3. This document provides a brief overview and illustrative examples on sources of information and the methodologies used to determine the needs of developing countries. A more detailed preliminary and non-exhaustive list is available in the annex to this document. This background paper is considered a living document and will be updated on a regular basis.

4. The information contained in this paper is drawn from an initial mapping and desk review, the outcomes of the experts meeting that took place in Manila and from suggestions made by Parties. In addition to the information collected in the annex, individual countries submitted to the secretariat domestic reports that entail information on needs determination. These reports are not reflected in the annex but are made available in a repository on the UNFCCC website.[4]

5. The background paper is structured along the following:

   (a) Data availability and gaps;

   (b) Methodologies and approaches used in assessing needs.

B. Data availability and gaps

6. At the national level, Parties have used various channels to determine and communicate their needs and priorities to the UNFCCC, among others, Nationally Determined Contributions (NDCs), Biennial Update Reports (BURs), National Adaptation Plans (NAPs), Technology Needs Assessments (TNAs), and Long-term Climate Strategies (see Box 1 for illustrative examples). Generally, these are national documents that outline a countries' needs to take climate action in the area of mitigation, adaptation, technology, capacity-building, loss and damage, etc. In cases where associated costs are included, these are often determined by adding up the costs of each of the proposed measures in a specific, pre-determined portfolio of adaptation and mitigation actions. Typically, these actions are national or sub-national in scope and for a specified timeframe.

7. While some countries provide an overall estimate of climate finance needs to implement the actions contained in their **NDCs**, others provide more detailed information in terms of thematic areas (e.g. mitigation, adaptation, technology, capacity-building, loss and damage etc.), sectors (e.g. water, agriculture, health, coastal zones, energy, etc.), the sources of finance (e.g. whether from

[1] This background paper is presents work in progress and will be updated on a regular basis.

[2] SCF/2019/20/9

[3] Further information on the experts meeting is available at: https://unfccc.int/topics/climate-finance/workstreams/determination-of-the-needs-of-developing-country-parties-related-to-implementing-the-convention-and/experts-meeting-on-assessing-and-determining-the-needs-of-developing-countries-biographies-of/experts-meeting-on.

[4] Available at: https://unfccc.int/topics/climate-finance/workstreams/determination-of-the-needs-of-developing-country-parties-related-to-implementing-the-convention-and/repository-of-information-on-the-needs-of-developing-country-parties#eq-2.

domestic or international sources), the channels, or the preferred financial instruments. Several studies have attempted to provide aggregate-level estimate for the implementation of the measures contained in the NDCs. For example, an analysis of all NDCs estimates a range of USD 3.5 trillion to USD 4.4 trillion both from domestic and international sources. This range depends on which factors of conditionality are used.[5][6] However, given that not all measures contained in NDCs have been costed, the different approaches and assumptions used, and that a number of countries have updated their NDCs with the entry into force of the Paris Agreement, these numbers remain indicative.

8. In **BURs,** developing country Parties generally report on support needed and received. Some BURs identify climate finance needs per economic sector, while others focus on financing needs related to capacity and technology or for the purposes of setting up or enhancing their reporting structures. In total, 11 non-Annex I Parties provided quantitative information on total needs of climate finance support, of which six Parties included data at the activity level in tabular format, with a few Parties indicating preferred financial instruments and level of priority for each activity. In general, countries have provided more details on climate finance needs for mitigation activities than for adaptation activities.

9. Adaptation needs and priorities have been communicated in **NAPs.** NAPs stem from a planning process that enables Parties to formulate and implement strategies and programmes that address medium- and long-term adaptation needs. As of September 2019, **13** NAPs have been submitted to the UNFCCC, of which nine contain financial cost estimates. The degree of detail into which countries break down their financial needs, the timeframes of the identified activities and the approach and methodologies taken vary. The secretariat prepares an annual progress report to the COP on the process to formulate and implement NAPs.

10. Parties have determined their technology needs and priorities in **TNAs**. TNAs include, inter alia, information on priority sectors and sub-sectors for mitigation and adaptation. More broadly, the TNA process has three main objectives: a) to identify and prioritize mitigation and adaptation technologies for selected sectors and sub-sectors; b) to identify, analyze and address barriers hindering the deployment and diffusion of the prioritized technologies including enabling the framework for the said technologies; c) to articulate a Technology Action Plan (TAP) with suggested measures/actions presented in terms of project ideas.

11. Climate funds like the Green Climate Fund (GCF) and the Global Environment Facility (GEF) collect information on the types, scale, and nature of needs of developing countries to inform their replenishment processes and strategic programming. Gathering information on countries' climate finance needs and priorities facilitates enhanced understanding of the indicative scale of developing country's needs for Fund's resources for a replenishment period. These exercises mainly draw data from project proposals and concept notes, indicating a total need of USD 16.3 billion from the GCF. This figure is drawn from the current GCF pipeline and covers 82 funding proposals, requesting USD 3.8 billion in GCF funding to support projects and programmes, totalling USD 15.5 billion, and 265 concept notes seeking USD 12.5 billion from GCF. In addition, the funding proposals and concept notes submitted to the GCF are estimated to reduce at least 1.94 GtCO2eq and build the climate resilience of 385 million people, recognizing that anticipated impact is not available for all funding proposals and concept notes that are in the GCF pipeline.[7] A distribution of the estimated amounts per region and per result areas of the GCF is shown in figures 1.

[5] Carbon Brief. 2015: *Analysis: Developing countries need $3.5 trillion to implement climate pledges by 2030". Carbon Brief.* Available at: https://www.carbonbrief.org/analysis-developing-countries-need-3-5-trillion-to-implement-climate-pledges-by-2030.

[6] Weischer L, Warland L, Eckstein D, et al. 2016. *Investing in Ambition: Analysis of the Financial Aspects in (Intended) Nationally Determined Contributions*. Bonn: Germanwatch and Freiburg: Perspectives Climate Group. Available at:https://www.germanwatch.org/sites/germanwatch.org/files/publication/15226.pdf.

[7] GCF_B.23_Inf.09, available at: https://www.greenclimate.fund/documents/20182/1674504/GCF_B.23_Inf.09_-_Strategic_Programming_for_the_Green_Climate_Fund_First_Replenishment.pdf/c47704c5-12ab-a772-7ccb-dee7c950be2c.

Figure 1: Pipeline funding requested per region per result area and total indicated impact per region (adapted from GCF_B.23_Inf.09)

	Result areas (in USD million)									*Impact projections (in million)*	
Region	Energy access & power generation	Low emission transport	Buildings, cities and industries & appliances	Forestry & land use	Most vulnerable people & communities	Health & well-being and food & water security	Infrastructure & built environment	Ecosystem & ecosystem services	Grant Total	Lifetime (CO_2) megatonnes)	Total beneficiaries
Africa	1,025	139	267	750	1,324	1,043	485	693	5,725	845	242.2
Asia-Pacific	968	726	833	540	853	696	445	413	5,473	402.7	104.6
Eastern Europe	37	7	48	20	19	47	5	17	200	34.1	4.7
Latin America and the Caribbean	701	679	374	762	686	442	176	456	4,277	658.1	32.7
Unidentified	116	159	29	41	60	90	13	82	590		
Grand Total	2,846	1,710	1,122	2,112	2,942	2,318	1,124	1,661	16,266	1,940.8	385.3

12. In addition, the GCF estimates country needs based on project ideas contained in country programmes and discussed in structured dialogues, intending to seek around USD 18 billion from the GCF, for a total project funding of about USD 81 billion. These project ideas have not yet been submitted to the GCF and cover a total of 78 countries working on 824 project ideas. Sixty-one per-cent (61 per cent) of projects in country pipelines are expected to have adaption outcomes, and thirty-nine per cent (39 per cent) include mitigation measures.[8]

[8] Ibid.

Box 1: Illustrative examples of information on needs of developing countries provided in national reports

NDCs: Benin determines climate finance needs for mitigation, adaptation, technology and capacity-building needs. Benin further determines the sources of climate finance required to implement the measures identified in its NDC. Similarly, Ghana identifies its needs according to thematic areas for mitigation (USD 9.81 billion) and adaptation (USD 12.79 billion) and provides an estimate of the sources of finance, including by channels. Accordingly, it intends to cover USD 6.3 from domestic sources, of which USD 2.02 will be for mitigation and USD 4.21 billion for adaptation, respectively. Of the USD 6.3 billion from domestic sources, USD 1.4 will be covered from its national budget, USD 1.7 billion from corporate social responsibility and USD 3.2 billion from commercial facilities. With respect to international sources, Ghana stipulates that USD 16.3 billion will be from international sources, of which USD 7.79 billion will be for mitigation measures and USD 8.29 billion for adaptation, respectively. With respect to channels, Ghana identifies USD 5 billion from the Green Climate Fund, USD 1.1 billion by other multilateral funds, USD 2.8 billion from bilateral agreements, USD 3.8 billion from private capital investments and USD 3.6 billion from the international carbon market.

BURs: In its BUR, Chile determines its mitigation needs for the sectors of energy, agriculture, forestry and land use (AFOLU), infrastructure, and industrial processes. Chile distinguishes, where applicable, between financial needs, technology needs and capacity-building needs. For instance, the total estimated needs for mitigation are determined at USD 1.13 billion, of which USD 0.48 billion will be needed for the energy sector, USD 0.65 billion for AFOLU and USD 0.015 USD for capacity-building activities.

TNA: In its TNA, Mongolia determines technology needs for mitigation and adaptation actions and per sector. Accordingly, it determines total technology needs of USD 1.12 billion, of which USD 1.11 billion are for mitigation and USD 0.01 billion for adaptation. For mitigation, Mongolia identifies technology needs for the energy and residential and commercial sectors of USD 1.02 billion and USD 0.09 billion, respectively. For adaptation, the arable farming sector and the husbandry sector have been costed with USD 0.004 billion and USD 0.006 billion, respectively.[9]

13. At the regional level, regional agencies like regional development banks, conduct needs assessments of their member countries to inform their programming priorities.

14. Next to the annual assessment of needs of regional member states through structured dialogue with the respective governments, the African Development Bank (AfDB) conducts studies and analyzes of research and scientific data at project, national, regional and global levels to identify climatic trends and needs for the whole continent, as well as to monitor the comparative progress towards sustainable, low carbon and resilient development. Of the USD 22 billion of the public climate finance supported adaptation efforts in 2017, Africa received less than USD 4 billion.[10]

15. In response to the needs of the African continent, in 2015, AfDB has adopted five long-term strategic priority areas for which climate change is cross-cutting: Light up and power Africa; Feed Africa; Industrialize Africa; Integrate Africa; and Improve the quality of life of the people in Africa. In March 2019, the Bank pledged to double its climate finance commitments in the period 2020-2025 to USD 25 billion. This pledge is in addition to earlier targets, such as allocating 40 per cent of the Bank's funding to climate finance by 2020 and achieving parity between finance for adaptation and mitigation in 2018. The Bank is hosting nine climate change funds, assists African countries with access to other climate change funds, collaborates with donor countries and other

[9] Available at: https://unfccc.int/ttclear/misc_/StaticFiles/gnwoerk_static/TNR_CRE/e9067c6e3b97459989b2196f12155ad5/a04477f73ad14945b1ba32b536e3901d.pdf and https://unfccc.int/ttclear/misc_/StaticFiles/gnwoerk_static/TNR_CRE/e9067c6e3b97459989b2196f12155ad5/606a61fadbf64207b0b7c730c08beb3c.pdf.

[10] Available at: https://www.international-climate-initiative.com/fileadmin/Dokumente/2019/20190225_Understanding-and-Increasing-Finance-for-Climate-Adaptation-in-Developing-Countries.pdf.

MDBs on enhanced access to climate finance for Africa and has launched numerous initiatives to support African countries with developing their endogenous capacity and mobilizing resources to address their NDCs and priorities, and regional challenges. The Bank has also developed various instruments for strengthening and "greening" the key economic sectors in Africa: Water, Transport, Energy and Agriculture.

16. In addition, the **Africa Adaptation Gap Reports** by the United Nations Environment Programme (UNEP) determine adaptation needs and costs for Africa across sectors and sub-regions according to different temperature scenarios in the medium (2050-2070) and longer-term period (by 2100). Accordingly, adaptation costs could rise to about USD 50 billion/year by 2050 for a 2℃ scenario, and double to USD 100 billion/year in a more than 4℃ by 2100. In terms of sectors, the latest report identifies that in Sub-Saharan Africa, the highest adaptation costs are projected to be needed in the water supply, coastal zone protection, infrastructure, and agriculture sectors. For Middle East & North Africa, the focus of adaptation is in infrastructure, coastal zone protection, and adapting to extreme weather events.[11]

17. In the Asia-Pacific region, through participation in the NDC Partnership and its dedicated technical assistance facility, NDC Advance, the Asian Development Bank (ADB) is supporting its developing country members to formulate climate investment plans to implement key parts of their NDCs. This requires more detailed knowledge and information on the underlining needs of countries. In addition, ADB undertook an assessment of the infrastructure needs of its developing countries' member states between 2016 and 2030, where infrastructure needs cover transport, power, telecommunications and water supply and sanitation. The report assesses how much the region needs to invest in infrastructure to continue economic growth, eradicate poverty and respond to climate change and finds that USD 1.7 trillion per year for infrastructure investment are needed. In its assessment, it also offers opportunities for closing the infrastructure investment gap (see box 2).

Box 2: Meeting Asia's Infrastructure Needs (ADB, 2017)[12]

In undertaking the needs assessment, ADB followed developed two sets of scenario estimates; baseline estimates and climate-adjusted estimates, the latter of which adjusts the baseline estimated by adding the costs of mitigation and adaptation.

The baseline estimate is USD 22.6 trillion will be needed for Asian developing countries for infrastructure investments for 2016-2030. This is equivalent 5.1 per cent of projected GDP of the region and amounts to an estimated USD 1.5 trillion per year. In the second scenario, USD 26.2 trillion for investment is required to factor in mitigation and adaptation costs (or 5.9 per cent of projected GDP and USD 1.7 trillion per year).

Part of the assessment was understanding how much countries have been investing in infrastructure. In doing so, the report adopts a benchmark measure comprised of infrastructure expenditures from government budget documents plus information on private investment in infrastructure from the World Bank's private Participation in Infrastructure Project database. The assessment of actual investments in infrastructure suggests investments of USD 881 billion in infrastructure in 2015 which is below the USD 1.2 trillion and the USD 1.3 trillion annual investment needed for the two scenarios. This suggests an investment gap of USD 22 billion (equivalent to 1.7 per cent of projected GDP) for the baseline scenario, and a USD 459 billion gap (2.4 per cent of projected GDP) for the climate-adjusted scenario.

Finally, the assessment looks at opportunities to address the investment gap, estimating an additional public investment of USD 121 billion and an additional private investment of USD 187 billion. It further identifies fiscal reforms such as tax reforms, spending reorientation, prudent borrowing and non-tax revenues, as well as promoting private participation such as creating conducive investment climate, making greater use of public-private partnerships and deepening capital markets. Furthermore, the role of MDBs in filling the investment gap was highlighted. For ADB, for instance, is scaling up its operations by 50 per cent from USD 14 billion in 2014 to more than USD 20 billion in 2020, with 70 per cent of this amount for sovereign and non-sovereign infrastructure investment.

[11] UNEP. 2013: *Africa's Adaptation Gap. Bridging the Gap – Mobilizing sources.* United Nations Environment Programme (UNEP), Nairobi.

[12] ADB. 2017.Meeting Asia's Infrastructure Needs. Manila.

18. To determine the needs of its member states and translate these into action, the Inter-American Development Bank (IADB) developed the NDC Invest initiative which has four components covering the project cycle. The first component, the NDC programmer, assists countries in mainstreaming their NDC targets into national and sectoral development plans and in identifying a pipeline of project ideas. The NDC Pipeline Accelerator, the second component, provides technical support to countries to turn project ideas into projects and programmes, including by supporting pre-feasibility and other preparatory studies. For this purpose, the NDC Pipeline Accelerator Multi-Donor Trust Fund was established. The third component, the NDC Market Booster aims to facilitate private sector projects by financing pilots of new business and financial models, thus correcting market barriers. The NDC Finance Mobilizer, the fourth component, aims to increase countries' access to concessional sources of finance to reduce costs and manage risks to scale up investments required to meet countries' NDC targets.[13]

19. At the global level, multilateral agencies, research institutes and think tanks generally utilize approaches comprising of national-level cost estimates as identified by countries in their national reports and global-level model estimates in undertaking thematic needs assessments. The focus of such studies and approaches can vary according to thematic area, regional scope or sectoral coverage.

20. According to the special report by the **Intergovernmental Panel on Climate Change** (IPCC) on impacts of global warming of 1.5° C above pre-industrial levels and related global greenhouse gas emission pathways, in the context of strengthening the global response to the threat of climate change, sustainable development, and efforts to eradicate poverty, average annual investments in energy supply range from 1.6 – 3.8 trillion 2010USD globally out to 2050. Average annual investment in low-carbon energy technologies and energy efficiency are upscaled by roughly a factor of six (range of factor of 4 to 10) by 2050 compared to 2015, overtaking fossil investments globally by around 2025 (medium confidence).[14] The report refers to a dedicated multimodel comparison study which provides regional breakdowns of global energy-related investment needs as shown in Table 1.[15] Low carbon supply investments are projected to be largest in developing Asia.

Table 1: Average annual energy-related investment by region in the period 2016-20150 (USD2010 trillion) (McCollum et al 2018)

Region[16]	*Total energy-related investment*	*Of which low carbon investment*	*Total energy-related supply side investment*	*Of which low carbon investment*
OECD 1990+EU	0.7 – 1.2	0.48 – 0.94	0.55 – 1.08	0.34 – 0.83
Asia	0.84 – 2.08	0.53 – 1.63	0.59 – 1.79	0.28 – 1.34
Middle East and Africa	0.28 – 0.75	0.16 – 0.62	0.2 – 0.67	0.08 – 0.54
Latin America and the Caribbean	0.16 – 0.35	0.12 – 0.29	0.13 – 0.31	0.07 – 0.24
Reforming Economies	0.09 – 0.29	0.07 – 0.23	0.07 – 0.23	0.05 – 0.16
World	2.37 – 4.68	1.6 – 3.73	1.59 – 3.81	0.82 – 2.86

21. **The International Energy Agency (IEA) World Energy Model** estimates global energy investment needs under two scenarios, the Sustainable Development Scenario (SDS) and the New Policies Scenario (NPS). The former includes investment projections that address climate change, achieve universal access to energy and improve air quality. In comparison, the NPS incorporates existing energy policies and an assessment of the results likely to stem from the implementation of

[13] For more information see: https://www.ndcinvest.org/.

[14] Available at: https://www.ipcc.ch/site/assets/uploads/sites/2/2019/05/SR15_TS_High_Res.pdf.

[15] McCollum et al (2018): Energy investment needs for fulfilling the Paris Agreement and achieving the Sustainable Development Goals. *Nature Energy*.

[16] Regional classifications are those commonly used in IPCC AR5. Reforming economies refer to countries of the former Soviet Union with economies in transition. OECD 1990+EU refers to OECD member countries in 1990 as well as EU members and candidates.

announced policy intentions such as the NDCs. The scenarios are featured in the IEA's World Energy Outlook and World Energy Investment Report in comparison to current investment trends. According to the SDS, annual average investment in energy supply would need to reach 1.93 trillion 2018USD between 2025 and 2030, compared to 1.85 trillion 2018USD in the NPS. However, the 4.3 per cent difference in aggregate masks changes by segment, where investment in low carbon power is 69 per cent more in the SDS compared to the NPS, and fossil fuel supply is 30 per cent less. By region, the largest need for investment to achieve the SDS compared to current investment trends is in developing countries with South East Asia and Sub-Saharan Africa requiring an increase of 378 per cent in annual renewable investment by 2025-2030, India 184 per cent increase and China 76 per cent.[17]

22. For adaptation, the **2016 UNEP Adaptation Gap report** identifies that the costs of adaptation could range from USD 140 billion to USD 300 billion by 2030, and between USD 280 billion and USD 500 billion by 2050. These figures are likely to raise considering major information gaps, particularly with the omission of adaptation cost estimates for biodiversity and ecosystem services. In addition, cost estimates tend to not include programming and implementation costs of adaptation in their assessments. For international climate finance, additional costs of design and implementation costs typically range between 10-20 per cent of the total costs.[18]

C. Methodologies and approaches used in assessing needs

23. At the multilateral level, under the current measurement, reporting and verification (MRV) system under the Convention developing countries report information on needed and received on a voluntary basis via national communications and BURs. Reporting of information on support needed and received is however not standardized in the current MRV system. Therefore, the coverage, scope and level of detail of information on support needed varies in the BURs that include such information. Using this information, the Biennial Assessment and Overview of Climate Finance Flows (BA), in its assessment chapter, analyzes whether the financial flows meet the needs of developing country Parties. In the absence of complete data from both global needs assessments and information on support needed by developing countries, it is not yet possible to corroborate on the alignment of climate finance flows with the climate finance needs of developing countries. However, it highlights that ongoing improvement of methodologies and a standardized presentation of financial needs in country reports such as NDCs can aid forward movement by ensuring that needs are matched by existing and potential financing support and technical and policy support.[19]

24. At the national level, typically, when submitting information on needs via national communications and biennial update reports, little information is provided on the approaches and processes undertaken. Furthermore, the level of granularity of data and information on needs varies. Many countries that have provided quantified information provide such information according to thematic scope (mitigation, adaptation, technology, capacity-building, etc.), and only some countries provide quantitative information on needs according to sectors or activities. Furthermore, countries have used various approaches to determine their climate finance needs which make comparing and aggregating quantitative information difficult. Even when taking the same reporting channel, needs were defined differently by countries and for different timeframes. To give some examples:

(a) **NDCs**: Approaches used in communicating financial needs in NDCs differ. In many cases, cost values listed were lower bound estimates of potential costs. The amount of detail on methodologies for estimating costs presented in NDCs also varies significantly across NDCs, making these values difficult to compare.

(b) **BURs:** For BURs, no common reporting format exists, and the current guidelines do not require information on underlying assumptions, definitions and methodologies used in generating the information. Additionally, reporting periods follow different approaches, ranging

[17] Available at: https://www.iea.org/wei2019/.

[18] UNEP 2016. The Adaptation Finance Gap Report 2016. United Nations Environment Programme (UNEP), Nairobi.

[19] Standing Committee on Finance. 2018: *2018 Biennial Assessment and Overview of Climate Finance Flows. Technical Report.* Available at: https://unfccc.int/sites/default/files/resource/2018%20BA%20Technical%20Report%20Final%20Feb%202019.pdf.

from annual or biennial timeframes to totals over multiple years. In some BURs, Parties include financial information associated with activity or project duration and/or years of commitment or disbursement. In some cases, Parties do not make a clear distinction between the type of support for thematic areas and sectors. While the majority of developing countries reports on the support received, a limited number of countries also report on their finance needs and compare finance received with the financing needs they had set out.

(c) **NAPs**: While there are guidelines to assist developing countries in undertaking national adaptation plans, there is no common approach by countries in costing the adaptation actions or assessing their adaptation needs in the context of NAPs.

(d) **TNAs**: The TNA process involves, amongst others, understanding of a country's development priorities, discussing climate change implications, identifying priority sectors and sub-sectors for mitigation and priority technologies within them. It further involves preparing a strategy and action plan for prioritized technologies, and synthesizing technology needs assessment in a report. A reporting structure and outline is made available to facilitate comparability among TNAs.

25. The modalities, procedures, and guidelines of the enhanced transparency framework under the Paris Agreement adopted at COP 24 foresee standardized reporting of information on financial support, technology development and transfer and capacity-building support needed by developing countries. Common Tabular Formats and textual format to be developed by the SBSTA in 2019-2020 will facilitate provision of standardized information when the reporting on such information by developing country Parties starts in 2023.[20]

26. Except in certain sectors, data and information on needs of developing countries relating to implementation of the Convention and the Paris Agreement have not been collected systematically at the national, regional and global levels. Consequently, there is no comprehensive overview of what information is available, as well as the gaps and limitations associated with the figures. Gaining a better understanding on the limitations of needs assessments provides the opportunity to enhance existing approaches, and hence gain a better understanding on developing countries' climate finance needs, at the national and multilateral level, including per region, thematic scope and sectors.

27. The approach adopted in the multimodel comparison study referred by the **IPCC Special Report on 1.5° C** analyzes the energy investment needs that would transform the global energy system to achieve limiting global temperature increase to below 2° C and compared to pre-industrial levels over the period 2016-2050. In their assessment, McCollum at al. use six global energy-economic integrated assessment (IAM) models complemented with nationally-focused models for an analysis of power sector investments in the context of achieving the SDGs on energy access, food security, air pollution and quality education. The six models applied have broad coverage of different types of technologies across the global energy system, including resource extraction, power generation, fuel conversion, pipelines/transmission, energy storage and end-use/demand services. The scenarios under consideration include: 1) baseline, i.e. in the absence of any climate action, 2) with the implementation of commitments put forward in NDCs, 3) investments and disinvestments under a 1.5° C scenario and 4) investments and disinvestments under a 2° C scenario. Within the global IAMs used, estimates of energy demand-side investments are more uncertain than the supply side.

28. **The IEA's World Energy Model** is a simulation model covering energy supply, energy transformation and energy demand. Specific costs play an important role in determining the share of technologies in satisfying an energy service demand under different scenarios. This includes investment costs, operating and maintenance costs, fuel costs and in some cases costs for emitting CO_2. The calculation of the investment requirements is based on assessing incremental capacity needs multiplied by unit capital cost estimates compiled for each component in the energy supply chain. The unit costs are adjusted over the time period of the model to account for the potential for technology-driven cost reductions and on country specific factors.

29. **UNEP Adaptation gap report:** The UNEP Adaptation gap reports provide an in-depth review of national-level cost estimates, combined with global-level and sector-specific estimates. The adaptation finance gap is defined as the gap between the costs of meeting a given adaptation target and the amount of finance available. The report highlights that cost estimates vary strongly

[20] Decision 18/CMA.1

with the level of global warming, the methods used to estimate them, the ethical choices made, the economic framework applied, and the assumptions made. As such, it cannot provide a single estimate of the costs of adaptation but rather an indicative range of costs, based on an assessment of the literature.

Annex I

Preliminary and non-exhaustive list of sources of information, types of needs, coverage, purpose and methodologies used in producing information climate-related needs of developing countries.

Country-level reports and studies

Sources	*Type of need*	*Country*	*Purpose of the report*	*Methodology*	*Findings*
Nationally Determined Contributions (NDCs)	Mitigation and Adaptation. Most developing country Party NDCs outline, in varying levels of detail, the estimated financial costs of the emission reduction and climate adaptation scenarios they describe for the period 2015–2030. COP 21 requested Parties whose NDCs contributions contain a time frame up to 2025 to communicate by 2020 a new NDC by 2020.	All Parties are requested to submit the next round of NDCs (new NDCs or updated NDCs) by 2020 and every five years thereafter (e.g. by 2020, 2025, 2030), regardless of their respective implementation time frames.	The Paris Agreement requests each country to outline and communicate their post-2020 climate actions.	Approaches in describing financial needs in the NDCs differ. In many cases, cost values listed were lower bound estimates of potential costs. The amount of detail on methodologies for estimating costs presented in NDCs also varies greatly across submissions, making these values difficult to compare.	An analysis of NDCs show climate finance needs in the range of USD 3.5 trillion to USD 4.4 trillion both from domestic and international sources. This range depends on which factors of conditionality are used.
Biannual Update Reports and National communications	Mitigation and Adaptation. Some BURs identify needs per economic sector, while others focus on financing needs related to capacity and technology. A few countries include detailed analysis of financial needs per activity, with information on preferred financial instrument and priority- level. In general, there are more details on financing needs for mitigation activities than for adaptation activities	Less than 1/3 of 44 BURs include quantitative information on financial needs	Countries voluntarily communicate information in their Biannual Update Reports in accordance with relevant provisions in the reporting guidelines contained in Annex III of decision 2/CP.17. However, there is no common reporting format or specific guidance for reporting needs in the current MRV arrangements.	The BURs do not usually provide detailed information on the methodologies used to estimate financial needs or whether a country needs assessment had recently been conducted. Furthermore, BURs do not typically include sufficient information on how "needs" are defined. Some countries list the overall cost of implementing proposed activities, while others list the gap between current financing and expected programme costs, with specific estimates for international climate finance needs. Countries reporting financial needs either include quantitative values for a set	

Sources	*Type of need*	*Country*	*Purpose of the report*	*Methodology*	*Findings*
				period or on an annual basis. The time frames for activities and financial needs vary significantly and were often unclear.	
National Adaptation Plans (NAPs)	Adaptation. The objectives of the NAP process are: (a) To reduce vulnerability to the impacts of climate change, by building adaptive capacity and resilience; (b) To facilitate the integration of climate change adaptation, in a coherent manner, into relevant new and existing policies, programmes and activities, in particular development planning processes and strategies, within all relevant sectors and at different levels, as appropriate (decision 5/CP.17, paragraph 1).	NAPs submitted by 13 developing country Parties to date[21].	The NAP process was established under the Cancun Adaptation Framework (CAF). It enables Parties to formulate and implement NAPs as a means of identifying medium- and long-term adaptation needs and developing and implementing strategies and programmes to address those needs. It is a continuous, progressive and iterative process which follows a country-driven, gender-sensitive, participatory and fully transparent approach. The NAP process is an opportunity for countries to address their medium- and long-term adaptation needs,	The NAP process is not prescriptive. Guidelines for the process is to assist LDCs to undertake the steps and activities are outlined in decision 5/CP.17, paragraph 6. Countries decide from the following elements which steps are applicable for their country specific situation, and in what order they should be undertaken. There include: Lay the Ground work and Address Gaps; Preparatory Elements; Implementation Strategies; and Reporting Monitoring	
Technology Needs Assessments (TNAs)	Mitigation and Adaptation. The TNAs include, inter alia, information on priority sectors/sub-sector for mitigation and adaptation. For mitigation, the TNAs include information on sectors and technologies in energy, industrial processes and product use, agriculture, forestry, and other land use, and waste, and other sectorial	Over 85 countries have completed their TNAs[22]	TNAs are undertaken by developing countries to determine their climate technology priorities. More broadly, the TNA process has three main objectives: (a) to identify and priorities mitigation/adaptation technologies for selected sectors /sub-sectors; (b) to identify, analyze and address	Guidance and methodologies have been developed for the processes underpinning the three objectives. The TNA preparation process involves, inter alia, understanding of a country's development priorities, discussing climate change implications, identifying priority sectors (and sub-	

[21] Submitted NAPs are available at: https://www4.unfccc.int/sites/NAPC/News/Pages/national_adaptation_plans.aspx
[22] Submitted TNAs and TAPs are available at: https://unfccc.int/ttclear/tna/ttclear/tna/reports.html

Sources	*Type of need*	*Country*	*Purpose of the report*	*Methodology*	*Findings*
	categories (these follow the 2016 IPCC guidelines on national GHG inventories). With respect to adaptation, TNAs may include information on possible sectors such as health and social systems, agriculture and fisheries, coastal zones, water, and biodiversity and ecosystems.		barriers hindering the deployment and diffusion of the prioritized technologies including enabling the framework for the said technologies; and (c) to articulate, based on the inputs obtained from the two previous steps, a Technology Action Plan (TAP) with suggested measures/actions presented in terms of project ideas.	sectors) for mitigation and adaptation and priority technologies within them, preparing strategy and action plan for prioritized technologies, and synthesizing technology needs assessment in a report. A reporting structure and outline is made available to facilitate comparability among TNAs.	
Long-term Climate Strategies	Mitigation and adaptation The COP, by its decision 1/CP.21, paragraph 35, invited Parties to communicate, by 2020, to the secretariat mid-century, long-term low greenhouse gas emission development strategies.	In accordance with Article 4, paragraph 19, of the Paris Agreement, all Parties should strive to formulate and communicate long-term low greenhouse gas emission development strategies, taking into account their common but differentiated responsibilities and respective capabilities, in the light of different national circumstances.	The Paris Agreement invites each country to outline and communicate their mid-century long-term low greenhouse gas emission development strategies.	Approaches in describing financial needs in the long-term climate strategies differ. The amount of detail on methodologies for estimating costs presented in long-term climate strategies also varies across submissions, making these values difficult to compare.	
GCF country programmes[23]	Mitigation and adaptation	All developing countries eligible to access sources from the GCF are invited to develop and submit country programmes to the GCF	The country programmes aim to assist countries in identifying and communicating their funding priorities to the GCF.	While approaches in developing country programmes differ, countries generally undertake an assessment of national programmes, policies and plans and conduct stakeholder engagements to identify and validate needs and priorities.	The GCF estimates country needs based on project ideas contained in country programmes and discussed in structured dialogues, at around USD 18 billion, for a total project funding of about USD 81 billion. These project ideas have not yet been submitted to the GCF and cover a total of 78 countries working on 824 project ideas. 61 per cent of projects in country pipelines are expected to have adaption outcomes, and 39 per cent include mitigation measures.

[23] Ibid.

Sources	*Type of need*	*Country*	*Purpose of the report*	*Methodology*	*Findings*

Global and regional-level reports and studies

Sources	*Types of needs*	*Organization*	*Purpose of the report*	*Methodology*	*Findings*
IPCC Special report on impacts of global warming of 1.5 degree Celsius above pre-industrial levels and related global greenhouse gas emission pathways, in the context of strengthening the global response to the threat of climate change, sustainable development, and efforts to eradicate poverty	Adaptation and mitigation	IPCC	The report responds to the invitation by COP 21 for the IPCC to provide a Special Report in 2018 on the impacts of global warming of 1.5°C above pre-industrial levels and related global greenhouse gas emission pathways. ased on the assessment of the available scientific, technical and socio-economic literature.	As the IPCC does not conduct its own research but assesses available scientific, technical and socio-economic literature relevant to global warming of 1.5° C. These are compared with pathways of global warming of 1.5°C and 2° C above pre-industrial levels.	The report finds that average annual investments in energy supply range from 1.6 – 3.8 trillion 2010USD globally out to 2050. Average annual investment in low-carbon energy technologies and energy efficiency are upscaled by roughly a factor of six (range of factor of 4 to 10) by 2050 compared to 2015, overtaking fossil investments globally by around 2025 (medium confidence).
World Energy Investment 2019 **The World Energy Outlook 2018 – International Energy Agency (IEA)**	Mitigation. WEO 2018 details global energy trends and what possible impact they will have on supply and demand, carbon emissions, air pollution, and energy access. Its scenario-based analysis outlines different possible futures for the energy system, contrasting the path taken by current and planned policies with those that can meet long-term climate goals under the Paris Agreement, reduce air pollution, and ensure universal energy access.	International Energy Agency (IEA)	The World Energy Outlook 2018 examines future patterns of a changing global energy system at a time of increasing uncertainties and finds that major transformations are underway for the global energy sector, from growing electrification to the expansion of renewables, upheavals in oil production and globalization of natural gas markets. Across all regions and fuels, policy choices made by governments will determine the shape of the energy system of the future.	The methodology consists of a two-tier system comprising the New Policies Scenario (NPS) and the Sustainable Development Scenario (SDS). New Policies Scenario (NPS): Incorporates existing energy policies as well as an assessment of the results likely to stem from the implementation of announced policy intentions. Sustainable Development Scenario (SDS): Outlines an integrated approach to achieving internationally agreed objectives on climate change, air quality and universal access to modern energy.	
UNEP Adaptation Gap Report, 2016 and; 2018[24]**;**	Adaptation	United Nations Environment Program (UNEP)	The focus of the 2018 report is dual: The first part examines the	The methodology used in the report recognizes that the	

[24] UNEP 2018. The Adaptation Gap Report 2018. United Nations Environment Programme (UNEP), Nairobi, Kenya.

Sources	*Types of needs*	*Organization*	*Purpose of the report*	*Methodology*	*Findings*
Regional Adaptation Gap reports	The report focuses on indicators of adaptive capacity, along with indicators of exposure and sensitivity, are central to assessing reduced vulnerability and enhanced resilience. Focusing on adaptive capacity, the report examines existing frameworks and indices of vulnerability and distilled common indicators of adaptive capacity across them for which sufficient data are available.		gaps that exist in a number of areas that are central to taking stock and assessing progress on adaptation, namely the enabling environment as expressed through laws and policies, key development aspects of adaptive capacity, and the costs of and finance needed for adaptation. The second part of the report focuses on the adaptation gap in one particular sector, namely health. Based on the available scientific evidence on climate impacts and health outcomes, the second part provides an overview of the global adaptation gap in health, followed by a specific focus on three key areas of climate-related health risks: heat and extreme events, climate-sensitive infectious diseases, and food and nutritional security.	measures of progress in adaptive capacity have much in common with measures of progress in development more generally and are likely to yield benefits irrespective of future climate regimes while addressing aspects relevant to increased exposure to climate hazards. The emphasis has also been on selecting indicators relevant to health, as this is the focus of the second part of the report.	
Fiscal Policy and Development: Spending needs for achieving selected SDGs	Mitigation and Adaptation related needs. This focuses primarily on the needs of countries in achieving: education, health care, and infrastructure (roads, electricity, and water and sanitation). The IMF has estimated the additional spending that is needed in health care, education and selected areas of infrastructure for reaching the Sustainable Development Goals	International Monetary Fund (IMF)	The purpose of the report is to answer the question: how much additional annual spending is necessary to reach the SDGs in education, health care, and infrastructure (roads, electricity, and water and sanitation) by 2030? These investment-type sectors are key to improving social, human, and physical capital. Governments typically play a decisive role in these sectors: on average, about one-third of public budgets is	The IMF uses a three-step methodological approach: 1.Identify main cost drivers 2.Derive reference values for cost drivers consistent with high SDG sector performance 3.Estimate 2030 spending levels given reference values.	

Sources	*Types of needs*	*Organization*	*Purpose of the report*	*Methodology*	*Findings*
	(SDGs). Findings are based on a new methodology applied to 155 countries—including advanced (34), emerging markets (72) and low-income and developing countries (49). Five country studies (Rwanda, Benin, Guatemala, Indonesia and Vietnam) were conducted to deepen the analysis.		devoted to these sectors. Furthermore, these sectors are synergetic across many SDGs, including with potential spillovers on poverty and inequality. In this sense, they are critical in generating inclusive and sustainable growth.		
UNEP Emissions Gap Report 2018	Mitigation Assessment of current policies and needs of members to meet Cancun pledges for 2020 and NDC targets for 2030 – and to peak their emissions.	UNEP	Assesses the latest scientific studies on current and estimated future greenhouse gas emissions and compares these with the emission levels permissible for the world to progress on a least-cost pathway to achieve the goals of the Paris Agreement. This difference between "where we are likely to be and where we need to be" is known as the 'emissions gap'. As in previous years, the report explores some of the most important options available for countries to bridge the gap. This year's report presents the newest assessment of the emissions gap in 2030 between emission levels under full implementation of the unconditional and conditional NDCs and those consistent with least-cost pathways to stay below 2°C and 1.5°C respectively.	The assessment adopts a new methodology, which groups pathways under three temperature scenarios based on their cumulative CO2 emissions. These updates result in target emission levels for 2030 that differ from the ranges assessed in the 2017 report. One limitation of this methodology is that it takes countries' commitments at face value by assuming they will be achieved by the target date, without considering whether targets will be underachieved or overachieved.	

Sources	*Types of needs*	*Organization*	*Purpose of the report*	*Methodology*	*Findings*
Financing Climate Futures – Rethinking Infrastructures: OECD, UN Environment, World Bank Group 2018	Adaptation related The initiative explores what public and private actors should do to trigger the radical transformation needed to align financial flows in infrastructure for a low-emission, resilient development.	OECD, UNEP, World Bank	This report lays out the agenda for a low-emission, resilient transformation that requires action across six key transformative areas, which should be articulated with respect to country contexts, and resource endowments and capacities: planning, budgeting, innovation, finance, development and cities. The Shifting the Lens report is a contribution to the Financing Climate Futures initiative and explores how foresight methodologies and scenario development can better inform infrastructure investment decisions today to align financial flows with a low-emission, resilient future.	The report uses a Foresight Methodology which provides a complementary perspective by constructing multiple plausible futures to inform decision-making under uncertainty. Shifting the Lens has used a simple analytic framework to identify a number of critical uncertainties that affect future infrastructure demand and supply. The report points to critical uncertainties that influence the selection, design, procurement, deployment and related financing decisions regarding low-emission, resilient infrastructure. The report uses a four tier analytical framework that asses factors affecting infrastructure demand – which include assessing the potential socio-economic circumstances of the future and factors affecting infrastructure supply – which focuses on assessing what the future of infrastructure will look like, what the implications of this will be to future business models and what are the new financing approaches to meet these needs as well as addressing the potential impacts to the financial economy.	

Sources	*Types of needs*	*Organization*	*Purpose of the report*	*Methodology*	*Findings*
Climate Investment Opportunities in Emerging Markets – An IFC Analysis[25]	Mitigation	**IFC**	The report estimated the investment opportunities in 21 selected countries in Africa, Asia, Eastern Europe, Latin America based on the national climate-change commitments put forward in their NDCs and underlying policies**.** It further identifies sectors in each region where the potential for investment is greatest.	The study quantifies the potential for low-carbon investment in 21 selected countries where IFC operates. Firstly, the report identified and assessed the targets put forward by the 21 countries in their NDCs and supplemented the data with sector-specific policies. It estimated the climate-smart investment potential for the power, transport, buildings, waste and industry sectors by assessing how their NDC targets would affect the market size over the time period of implementing the NDCs. Finally, investment or capital costs ($/MW) were used to derive the final investment potential estimates. To improve accuracy, these were complemented with individual project-level data, publicly available data, or private subscription-based references.	The reports estimates an initial investment opportunity of USD 23 trillion from 2016 to 2030 in key sectors
G20 Brown to Green Report: Transition to a low carbon economy 2018	Mitigation and Adaptation related needs This report assesses how far the G20 countries have progressed in their transition from a "brown" economy based on fossil fuels to a "green" low-carbon and climate-resilient economy.	Climate Analytics, Centro Clima, ERC, Energy Research Institute, FARN, German Watchm, Clima, Institute for Essential Services Reform, IGES, Clima, IDDRI, Humboldt Viadrina Climate Platform, New Climate Institute, ODI, TERI, Climate Works Foundation, World Bank Group, BMZ,	The report attempts to present a comprehensive stocktake on G20 climate action by addressing the following four questions: The Gap: Are G20 countries on track to stay below the Paris Agreement temperature limit, Recent developments: What has happened in the G20 countries since the Paris Conference, Brown and Green Performers:	The report used the ND-GAIN country index to determine adaptation needs. The ND-GAIN Country Index, a project of the University of Notre Dame Global Adaptation Initiative (ND-GAIN), summarize a country's vulnerability to climate change and other global challenges in	

[25] https://www.ifc.org/wps/wcm/connect/59260145-ec2e-40de-97e6-3aa78b82b3c9/3503-IFC-Climate_Investment_Opportunity-Report-Dec-FINAL.pdf?MOD=AJPERES&CVID=lBLd6Xq

Sources	*Types of needs*	*Organization*	*Purpose of the report*	*Methodology*	*Findings*
		Agora, Climate Action Tracker, CCPI, Enerdata.	Who are the leaders and laggards among the G20 countries, Fairness: What are the G20 countries doing to make the transition just?	combination with its readiness to improve resilience. The vulnerability index consists of six sectoral indicators which are again composed by six sub indicators, measuring exposure, sensitivity, and adaptive capacity to climate impacts. The Brown to Green Report only shows the exposure sub-indicators. These sub-indicators show the extent to which human society and its supporting sectors are stressed by the future changing climate conditions based on an approximately 2°C scenario. Notre Dame Global Adaptation Index 2016. Retrieved from: https://gain.nd.edu/our-work/country-index	
The New Climate Economy: The 2018 report of the global commission on the Economy and the Climate.	Mitigation and Adaptation needs. To capture the net economic benefits of US$26 trillion through to 2030 and shift the world economy onto a more stable climate pathway, the Global Commission calls upon economic decision-makers in the public and private sectors to take decisive action so that the needs for this transition can effectively be met through harnessing the resources of the private sector, investing in sustainable infrastructure and adopting a people-centered	New Climate Economy	This report is a roadmap for how to accelerate action to turn better growth and a better climate into reality. The report finds that taking ambitious climate action could generate over 65 million new low-carbon jobs in 2030, as well as avoid over 700,000 premature deaths from air pollution compared with business as-usual.	Given the limitations of modelling exercises, it is likely that the benefits of a climate-compatible transition are much greater than even these estimates suggest. Such modelling exercises generally cannot capture the magnitude and dynamism of the economic and financial opportunities of climate action, or to adequately reflect the risks of climate change in baseline growth scenarios.	

Sources	*Types of needs*	*Organization*	*Purpose of the report*	*Methodology*	*Findings*
	approach to ensure equitable growth and a just transition – a central driver of the new growth approach.				
Climate Finance Readiness for Low Carbon Green Development - Regional Assessment for Selected Asia-Pacific Countries – ESCAP (2017)[26]	Mitigation and adaptation	UNESCAP	The report aims to identify and support the development of financial instruments that can leverage domestic investments in four countries (Indonesia, Sri Lanka, Pakistan, Philippines) to to implement multilateral agreements such as the Convention and the Paris Agreement and bridge financing gaps for low-carbon climate resilient development.	The report develops national fact sheets based on scoping studies and case studies of best practices in four countries as well as national stakeholder engagement.	The report provides a good overview of the landscape of the national climate finance architecture and financial institutions in the four countries and identifies priority areas for interventions, including technical assistance and capacity-building needs to leverage domestic investments.
GIZ: (1) Climate Finance Readiness Analysis[1], (2) Smart National Adaptation Planning Tool (SNAP)[2], (3) Support for technology needs assessments under the UNFCCC.[3]	Mitigation and Adaptation needs: (1) Uses and focuses on planning and policies of governments, input from expert institutions, access to and engagement with ministries, spending and implementation, private sector engagement. (2) Uses and focuses on quality of climate information, human resources and institutions, long term vision and mandate, implementation, mainstreaming, participation, monitoring and evaluation.	GIZ	(1) GIZ has been piloting scoping studies of climate finance related readiness needs in Asian countries including Indonesia, Vietnam, Laos and Mongolia, Philippines, as well as in Southern Africa (Namibia, Zambia, and Tanzania). (2) GIZ has developed a tool to provide a snapshot of capacities and goals for successful national adaptation planning within countries, and to monitor the planning process. The tool builds on UNFCCC technical guidelines as well as GIZ's own work supporting adaptation planning, and draws on econometrics methods for analyzing multidimensional	Each tool uses its own uniquely adapted methodology. GIZ has developed a methodology that considers both political and economic considerations in order to develop capacity development strategies tailored to the partner country context. The approach supports a systematic diagnostic of relative strengths, weaknesses, opportunities and threats in existing systems, complemented by prioritization and decision-making tools. The methodology has been applied in 22 cases in Africa, as well as in Myanmar, Jordan and Armenia.	

[26] UNESCAP (2017): Climate Finance Readiness for Low Carbon Green Development. Regional Assessment for Selected Asia-Pacific Countries.

Sources	*Types of needs*	*Organization*	*Purpose of the report*	*Methodology*	*Findings*
	(3) Informed by TNA guidance from the UNFCCC. A TNA handbook was only published in 2010. Encompassed energy, transport, industry, forestry, agriculture, oceans, and waste		issues. SNAP allows for visualization of assessment results, to make key messages clear. (3) GIZ supported the government of Indonesia to conduct a comprehensive technology needs assessment to analyze diverse technology needs in various economic sectors in 2007. Conducted over two years, the process helped to draw attention to the various barriers to clean technology deployment in the economy.	Capacity assessment methodology[4]: This includes and focuses on defining the objective, context analysis, identifying strengths, weaknesses and opportunities, developing and assessing strategic options and formulating a strategy.	
IRENA, NREL, GIZ: Capacity needs assessments for renewable energy (CaDRE)[5]	Mitigation Includes and focuses on systematic guidance on how to structure processes for scoping, diagnosing key needs, and making recommendations.	IRENA, NREL, GIZ	(IRENA), the National Renewable Energy Laboratory (NREL) and IDAE elaborated the Capacity Needs Diagnostics for Renewable Energies (CaDRE) focus on wind and solar sectors. CaDRE describes the first phase of a process that engages individuals, organizations, networks, and systems to develop renewable energy. The gaps and needs that this analysis exposes will identify the areas which need to be addressed to support the further deployment of renewable energy.	A scientifically developed standard methodology was used. It included a toolbox of 25 templates and matrices, including a set of 25 key questions related to wind and solar energy development.	
ODI: National Climate Finance Analysis	Mitigation and Adaptation needs	ODI	The objective of the ODI report was to point out the distinction between high, medium and low relevance expenditures, which provide an insight into the	The gaps in this methodology identified by ODI include the risk of the analysis not taking into account climate change - relevant activities that may have	

Sources	*Types of needs*	*Organization*	*Purpose of the report*	*Methodology*	*Findings*
	The ODI undertook a national climate finance analyses for Ethiopia, Ghana, Uganda and the United Republic of Tanzania building on the same methodology it helped developed with the UNDP – the CPEIR. The ODI however used four-year averages to avoid the misinterpretation of annual fluctuations and trends.		funding needs of countries to implement climate change actions. This split shows the recognition of climate change as a public spending priority within certain countries and its mainstreaming within cross sector public spending.	been undertaken in sectors not relevant to climate change (for e.g., defense). Additionally, the classification of relevance is subjective as there is no objectively "correct" percentage of spending that can be attributed to climate change expenditure. This approach is therefore still only a best estimate. Capturing international funds (either ex-ante in the budget appropriation or ex-post in reporting varies according to the type of aid received as well as the channel of funding – whether funds disbursed to governmental financial channels which are usually captured in the budget, funds disbursed to sector ministries which are usually captured in the budget of the sector ministries, or funds disbursed directly to projects and programs that operate outside the government structure, making it very difficult to capture.	
The Group of 20 (G20) Green Finance Study Group and The IFC Climate Policy Team: **Green Finance: A bottom up approach**	Mitigation and Adaptation related finance needs The approach developed by the IFC consists of first defining green finance depending on the financed project. This is followed by an estimate of the green share of finance, wherever necessary.	IFC and G20	The report pointed out the following conclusions: The multiplicity of stakeholders in the private green finance landscape has allowed for a significant amount of analysis and has significantly incentivized the measuring of green finance needs.	The methodology used highlighted the following gaps: The classification of "green finance" as a "use of proceeds" in financial data sets can only be identified as "entirely green" in some cases, with disparities arising between project finance and clean energy indicators. This leads to missing	

Sources	*Types of needs*	*Organization*	*Purpose of the report*	*Methodology*	*Findings*
	Subsequently an aggregation of the green share of all projects financed through a certain financial instrument per sector or per country is then compiled. This data is then used to conduct a comparative analysis of the existing green finance supply across industry, sector and country and the amounts needed to reach policy targets.		The definitions of green finance as well as the needs assessment of this is the most advanced in the bonds market. However, in the banking sector, existing tracking processes on green loans need to be improved and institutional; investors need to develop clear approaches in their decision making in order to make the transition from awareness to implementation.	information due to the lack of a clear and consistent definition. Moreover, industry classifications of "use of proceeds" vary across different data sets, resulting in a lack of consistency that further complicates the approach when combining data sets. The disparity of data across the borrower's location, the financiers location results in significant inaccuracies in the process of combining the data sets. The use of different identifiers across data sets and geographies results in a lack of consistency which complicates the linking of different sources, making it difficult to aggregate the data on different levels. The supply and demand estimates remain only rough estimates due to the challenges associated with the collection, categorization and interpretation of the data. The majority of IFC clients who provide climate/ green finance do not have the tools required to measure the impacts such as carbon emissions or energy savings; which makes it harder for them to track green investments.[6]	
IAEA: Climate Change and Nuclear Power 2018	**Adaptation and Mitigation needs:**	IAEA	This report examines existing needs and challenges for nuclear energy such as radioactive	A standard scientific methodology was used. The major observation from the	

Sources	*Types of needs*	*Organization*	*Purpose of the report*	*Methodology*	*Findings*
	This publication summarizes the latest knowledge of anthropogenic climate change, its impacts and efforts to mitigate it. The role of the energy sector in climate change and the possible contribution of nuclear energy to reducing GHG emissions are discussed in detail. Selected issues pertaining to the challenges and development potential of nuclear energy are also presented.		waste, off-site effects and high capital costs, and how these are addressed by innovations by the nuclear industry. It demonstrates that developing accident tolerant fuel and reactors with passive and inherent safety characteristics will further improve the protection of NPPs from accident risks in the future. Costs and economic aspects are considered from three angles: comparing plant level generation costs and grid level system costs of various power generation technologies, macroeconomic effects of nuclear power investments and operation, and the emergence of new reactors implying new types of cost models. The report also assesses the impacts and adaptation options in NPPs to gradual climate change and shifting patterns of extreme weather events.	graph is that when a standardized methodology is used, GHG emissions from nuclear energy vary in a very limited range.	
UNEP– Integrated environmental assessment (IEA)	**Mitigation and Adaptation needs:** The UN Environment methodology for integrated environmental assessments typically assesses five environmental themes: (1) atmosphere; (2) land; (3) water;	UNEP	IEA undertakes a critical, objective evaluation and analysis of data and information designed to support decision-making. It applies expert judgment to existing knowledge to provide scientifically credible answers to policy-relevant questions, indicating, where possible, the level of confidence. IEA provides a	GEO-1, GEO-2000 and GEO-3, UNEP's IEA was carried out using the DPSIR (drivers, pressures, state, impacts, response) framework. GEO-4 considers four plausible futures looking out to the year 2050: Markets First, Policy First, Security First and Sustainability First. These	

Sources	*Types of needs*	*Organization*	*Purpose of the report*	*Methodology*	*Findings*
	(4) biodiversity; and (5) chemicals and waste		participatory, structured approach to linking knowledge and action. Over time, The Global Environment Outlook (GEO) process has developed an increasingly integrated approach to environmental assessment and reporting. Additionally, the socio-economic aspects of the environment, listed below, are all included within the scope of these integrated environmental assessments: • the relationship between the environment and human health; • the link between gender and the environment; • environmental governance and regulation; • the use of energy and mineral resources; • public perception of the environment and; • the impact of natural disasters on the human system. The scope of these assessments matches very closely with the environment-relevant statistical priorities set out in the core set of the Framework for the Development of Environment Statistics (FDES 2013)	scenarios explore how current social, economic and environmental trends may unfold and the implications for the environment and human well-being. The scenarios are defined by different policy approaches and societal choices. In Markets First, the private sector, with active government support, pursues maximum economic growth as the best path to improve the environment and human well-being. Policy First assumes government, with active private and civic sector support, initiates and implements strong policies to improve the environment and human well-being, while still emphasizing economic development. In Security First, government and the private sector compete for control in efforts to improve, or at least maintain, human well-being for mainly the rich and powerful in society. Sustainability First presumes that government, civil society and the private sector work collaboratively to improve the environment and human well-being, with a strong emphasis on equity.	

Sources	*Types of needs*	*Organization*	*Purpose of the report*	*Methodology*	*Findings*
Framework for the Development of Environment Statistics (FDES 2013)	**Mitigation and Adaptation needs:** The FDES 2013, including the Basic Set of Environment Statistics, was endorsed by UN Member States through the intergovernmental United Nations Statistical Commission in 2013 (United Nations 2013)	U.N Statistical Commission	The Basic Set includes three tiers and covers a broad spectrum of environmental issues that have been agreed to be fundamental for policy analysis and decision-making. The three tiers of the Basic Set are: • Tier 1 (aka. the Core Set of Environment Statistics): 100 statistics of high priority and relevance to most countries and that have a sound methodological foundation. • Tier 2: 200 environment statistics which are of priority and relevance to most countries but require greater investment of time, resources or methodological development. • Tier 3: 158 environment statistics which either are of lower priority or require significant methodological Development.	A standardized statistical methodology was used	

[1] Available at https://www.giz.de/fachexpertise/downloads/giz2013-en-climate-finance-readiness-needs-assessment.pdf2
[2] Available at https://www.giz.de/fachexpertise/downloads/giz2013-en-climate-finance-readiness-needs-assessment.pdf
[3] Available at https://www.giz.de/fachexpertise/downloads/giz2013-en-climate-finance-readiness-needs-assessment.pdf
[4] Available at https://www.giz.de/fachexpertise/downloads/giz2013-en-climate-finance-readiness-needs-assessment.pdf
[5] Available at https://www.giz.de/fachexpertise/downloads/giz2013-en-climate-finance-readiness-needs-assessment.pdf
[6] Available at https://www.ifc.org/wps/wcm/connect/70725d70-b14a-4ffd-8360-cb020258d40a/Green+Finance_Bottom+up+approach_ConsultDraft.pdf?MOD=AJPERES