Call for Evidence: Information and Data for the Preparation of the 2020 Report of Standing Committee of Finance on the Determination of the Needs of Developing Country Parties

i) Information and data on the needs of developing country Parties;

Pakistan is a country which, owing to its particular geographical circumstances, is highly impacted by any changes in climate making it one of the most vulnerable / affected countries. Yet, it is one of the smallest contributors to the problem of climate change and can, thus, be termed one of the worst victims of "climate injustice". The country is cognizant of its development priorities and is actively seeking both, financial and technological support, to place its undeniable future growth on to a low carbon trajectory.

Government of Pakistan conducted National Economic & Environmental Development Study (NEEDS) (2011) aims to bring out some of the priority areas for possible climate adaptation & mitigation while drawing out the probable future course of Pakistan's growth and the costs associated with moving towards a low carbon development pathway.

Mitigation:

Energy Sector:

Energy sector is not only the single largest source of GHG emissions in Pakistan contributing almost 43% of these emissions but also a sector where a significant future growth in emissions is anticipated owing to the need to fuel the country's development needs. The options for mitigating climate change are vast in the energy sector both on the demand as well as supply side. On the demand side, the options focus on the transport, residence as well as industrial sector and on the supply side they focus on shifts in the fuel mix (renewable energy promotion) and efficiency enchantments.

- Clean coal technologies such as Coal Bed Methane Capture (CBMC), Integrated Coal Gasification Combined Cycle Power Generation (ICG-CCPG), aided by employing innovative CCS or CO2 Capture, and Storage can be one of the primary measures for mitigation GHG emissions. However, their deployment is contingent upon the availability of not only the appropriate technologies but also adequate additional financing.
- Fuel switching from furnace oil to natural gas also remains a viable option but it depends upon the availability of gas. Although domestic reserves are depleting, the possibility of imported gas remains an active one and can be utilised to convert the thermal power plants to gas as most have dual-fuel options.
- The increased utilisation of renewable energy is another area which is promising for mitigating emissions from the energy sector. Alternative Energy Development Board (AEDB) already expects development of wind and solar energy to meet at least 5% of total installed capacity through RE resources by 2030. A very important advantage of renewable energy besides from reduced GHG emissions is that it would decrease Pakistan's reliance upon foreign countries for its energy needs.
- Additionally the increased development of nuclear energy remains a viable option for mitigating future GHG emissions in Pakistan.
- Pakistan also needs to focus on the conservation of energy as well as improvements of energy efficiency and the significant cost as well as emissions savings it provides.

Transport:

- Increased usage of public transport - Orienting away from private vehicles and towards public transport is extremely important for future sustainable development in the country and carries other considerable benefits such as avoiding congestion, pollution, high consumption of fossil fuels, health problems and increased greenhouse gas emissions.
- Increased usage of railways: The motorway road network (From Peshawar to Lahore to Karachi to Gwadar) comprises of only around 4 percent of Pakistan's total road network but carries 80 percent of the country's commercial traffic. Significant up gradation and expansion of the railway system is needed for transportation of cargo in a quick, cheap and greater capacity. This will also lead to lower GHG emissions as railways tend to be more efficient in terms of tonnes moved per energy expended.
- Encouraging efficiency gains in existing modes of transport through proper vehicle maintenance and improved efficiency of engines as well as enforcing improved engine designs through enforcing vehicle emission standards.
- In order to mitigate the negative impacts of automobile sector on environment and giving a boost to the economy, Government of Pakistan has approved its National Electric Vehicle Policy targeting a 30% shift to electric by 2030.

Industrial Processes:

- Improving energy efficiency – Promoting energy efficiency through replacement of inefficient boilers, replacement of inefficient machinery, improving the efficiency of motors and lighting, fuel switching, combined heat and power, renewable energy sources, more efficient electricity use, more efficient use of materials and materials recycling, and carbon capture and storage.
- Promoting industry specific energy conservation policies - For example, food and paper industries could be targeted for the use of the bio-energy from waste, turbines could be used to recover the energy discharged from pressurized blast furnace gas, exploring cogeneration options especially in the sugar industry.
- Energy recovery techniques need to be encouraged. These can take form of heat (binary), power efficiency and fuel recovery (efficiency of combustion). The potential for recovery of waste heat from process furnaces and liquid effluent streams is largely unused. This is partly due to a scarcity of capital for investment in waste heat recovery systems. In addition, the economies of scale are also not favorable in a number of industries such as steel, glass, and ceramics, where the typical size of an operation is much smaller than the prevailing world standards.
- Use of crop residues as a bioenergy feedstock is considered a potential strategy to mitigate greenhouse gas (GHG) emissions. Pakistan needs to consider crop residue use for bioenergy production.

Waste Management:

- Making effective use of GHG emitted from landfills - Some landfills simply burn the methane gas in a controlled way to get rid of it. But the methane can also be used as an energy source. Landfills can collect the methane gas, treat it, and then sell it as a commercial fuel. It can then be burned to generate steam and electricity.
- Introduction of modern land filling techniques – these techniques include structural membranes and systems to collect gases produced. Collected gas is either flared

to waste by oxidation of the methane to C02 or collected and used for the generation of heat or burned directly to produce electricity.

- Recycling – Recycling should be an integral part of any solid waste/refuse and industrial waste management. In our modern society and more importantly in a developing nation such as Pakistan the recycling and reuse of resources can be a major cost saver. For such programmes to work, it is important that there be a reliable end user of the recycled or product to be recycled. Collecting what might be useful can and had lead to the gathering of materials that can create in some cases greater environmental issues
- Energy from solid wastes - Coupled with a recycling reuse programme to mitigate the generation of more harmful GHG are waste to energy programmes where waste, untreated timber, non-recyclable paper, and other organic, biodegradable material can be burned in a controlled environment. Wastes such as the smaller material from the maintenance of parks and gardens, trees, clippings and organic wastes can be composted to sequester carbon for integration into the soils in and around the metropolises and/or applied to cropping land to increase the fertility.
- Municipal liquid waste management - The contribution of GHGs such as methane and nitrous oxide from the sewer systems of Pakistan and animal feed lots, such as the Karachi cattle lot, seem to be unaccounted for presently. They present significant opportunity for climate mitigation as the methane collected could be utilized for the generation of power for the facilities and exported to the grid for cost recovery.
- Industrial waste water recovery & recycling.

<u>Agriculture & Livestock:</u>

- Cattle feed improvements – Enteric fermentation occurs in livestock when they cannot digest their food properly. Emissions from this source can thus be reduced through a strategy to improve the digestibility of livestock feed. This can be done by introducing a feed supplement such as multi-nutrient feed blocks (MNB). Use of such feed supplements is expected to reduce CH4 emissions by an average of 23 percent per animal. Also, raising confined cattle on concentrated high-protein feed consisting of corn and soybeans can cause range of illnesses, lead cattle to emit 40% more GHGs, and consume 85% more energy than raising cattle organically on grass and other forages. The use of appropriate feedstock mixes and additives can reduce methane production from enteric fermentation/digestion in cattle and needs to be encouraged in an informed manner.
- Cropland management – Carbon dioxide and Nitrous oxide emissions can be reduced through cropland management. This could be done through better soil, water, and fertilizer management. Practices such as improved drainage, restricted grazing, effluent utilization, avoiding compaction, fertilizer management, waste management, erosion control, crop mix change, grassland conversion, reduction or elimination of fallow periods, and agro-forestry can significantly reduce nitrous oxide emissions.
- Reducing methane emissions from rice cultivation – Agriculture sector is the 2nd largest GHG contributor. In order to reduce emissions from crops, there is a need for more efficient irrigation techniques, better management of organic fertilizers, plant residue management and better waste management. There is also a need for development of rice varieties that reduce the production of methane. Dry sowing of rice is another technique to reduce methane emissions.

- Increasing productivity - Milk is one of most important commodities from the livestock. Pakistan is one of the largest milk producers in the world yet its milk productivity tends to be a third of that of leading countries such as New Zealand. By focusing on areas such as genetics, technology, animal health services, and nutrition, milk productivity could be increased while reliance would be placed upon fewer ruminants for milk.
- Identifying new technologies and practices that can improve crop productivity to meet the needs food.
- Reducing food waste.
- Integrated crop management and crop pest management.
- Efficiency enhancements: Energy efficiency enhancement in running agricultural tube wells, through audit and retrofits, infrastructure development, capacity building, use of alternates energy technologies and standardization. The uses of locally made laser land levelers will help reduce agriculture water consumption by as much as a third.

LULUCF:

- Afforestation and reforestation - There is considerable potential in the forestry sector for carbon sequestration which can offset the national emissions in other sectors. Moreover, the sequestered carbon can now be capitalized through the carbon market mechanisms such as the CDM. The cost of various options for afforestation varies with agro-forestry as the most economical and irrigated or riverine forestation demanding more life cycle costs.
- Along with natural forests, steps should be taken for promotion of public-private and farm forestry initiatives along with urban greening.
- Education and awareness raising amongst stakeholders about the national and globally important value of forests and related ecosystem services.
- Engagement in the REDD+ regime to recognize the carbon value of the forests in Pakistan and gain benefit for avoiding deforestation.

Costing Mitigation Options in Pakistan:

- Significant financial needs are required for Pakistan to try to de-link its economic growth from, a corresponding, growth in emissions. The low carbon development scenarios projected for the country estimate “additional” investment costs of mitigation ranging between $8 billion to $17 billion to 2050, as progressively cleaner coal and a higher percentage of renewable energy technologies are employed.
- It is possible to reduce emissions by 40% from the BAU scenario by employing cleaner technologies.
- The mitigation costs of U$ 17 billion will result in significant carbon reductions which, if priced at a reasonable value of carbon (U$ 25/tC) provides an estimate of U$ 27.3 bn (which can be potentially capitalized through the carbon market) indicating a positive cost-benefit ratio.
- The country requires an upfront investment of U$ 10 billion if it wants to meet its current energy gap of 5000 MW through incremental renewable (as compared to meeting it through incremental coal). The current national budgetary spending does not allow this investment “need” figure to be met through own resources.

- Kindly note that this analysis has been carried out only for the energy sector which represents the majority of GHG emissions in Pakistan. The other GHG producing sectors of agriculture, livestock and forestry have not been considered due to paucity of reliable data at this point. The mitigation needs would be considerably enhanced by addition of the remaining GHG emitting sectors to this analysis.

Adaptation:

Water:

- Highest priority needs to be to enhance water security through construction of large dams and employing all available water storage capacity in the country. This will ensure capacity for water regulation, hydropower production as well as irrigation and flood control in the country.
- Employing water conservation strategies such as canal water lining, reduction in irrigation system losses and use of water efficient irrigation techniques to help save water
- Ensure the most efficient water management practices such as recycling waste water, protection of catchment areas, ensure rational groundwater usage, protect against sea water intrusion in the Indus delta
- Appropriate institutional and legislative support should be extended to ensuring water storage, conservation and efficient management in the country.
- Employ the latest early warning systems to monitor weather as well as water patterns and provide advance warnings about potential flooding.
- Flood plain management along the flood corridor to ensure minimum damage to human lives and infrastructure during floods and promote biodiversity.
- Climate proofing of future infrastructure investments to cater to the threats of climate induced disasters such as floods.

Agriculture & Livestock:

- Establish an enabling institutional capacity to respond to the climate change such as setting up climate change Cells in Ministry of Agriculture to devise adaptive strategies for project impacts on agriculture and with extension arms at the local level to timely transmit the information to farmers.
- Develop / use digital simulation models to assess climate change impacts on physical, chemical, biological and financial aspects of agriculture production systems in all agro ecological zones of the country. These should be synced in with advanced and reliable predictions of climatic parameters and water flows.
- Develop new crop varieties which have stronger resilience to heat stress, water shortage, heavy rains and which are more drought tolerant.
- Develop better indigenous breeds of livestock with higher milk productivity and less prone to heat stress and drought tolerant.
- Efforts to increase unit area productivity and increased crop diversification.
- Use feed conservation techniques and fodder banks to respond to stress periods
- An effective mechanism to transmit information about expected changes in crop growth cycles, new crop varieties and other adaptation techniques to the farmers at the ground level should be established.
- Develop a risk management system to safe guard against crop failure and extreme event (i.e. floods, droughts). Introducing an extensive crop insurance schemes can be one such effective technique.

- Mainstream climate change considerations in national and provincial agriculture policies including concept of Climate Smart Agriculture

Forestry and Biodiversity

- Promote research on the climate impacts on forests including any predicted biome shifts as well as composition of species within biomes.
- Research and establish gene banks and seed banks to conserve the biological diversity of valuable species of flora and fauna residing in the country's forests
- Remove barriers to accommodate the "natural" migration of forests due to climate change.
- Promotion of compensatory farm forestry based upon developed climate resilient tree species.
- Reduction of forest fires through timely warning systems, creating fire lines and involvement of local communities.
- Biological control of forest pests by maintaining viable population of predatory birds and insects

Energy and Industry:

- Changes in Infrastructure/household design to make it more energy efficient
- Promotion of renewable energy options such as wind, solar and small hydro as an alternate source of energy
- Life style changes to inculcate energy conservation e.g. car pooling

Adaptation costing for Pakistan:

- The actual "forced" adaptation costs that Pakistan has had to bear in 2010 owing to the climate triggered floods is U$ 9.7 ++. The total adaptation would be more than this figure as it is just related to the flood damage costs and does not factor in the costs of other climate related impacts that the country has been faced with such as the early drought and glacial lake outburst.
- The calculations which derived adaptation costs as a percent of future GDP projections indicate an annual average adaptation cost of U$ 10.71 over the 2010-2050 time horizon.
- The per-capita based approach was used to inject a new approach into the ongoing debate over estimating adaptation costs and has derived figures of annual adaptation costs for Pakistan at U$ 6 (in 2010) to U$ 14 billion (in 2050) if a per capita figure of U$ 40 is used.
- The disaster based model was developed in light of the high probability of floods for Pakistan in the medium term horizon and has resulted in providing adaptation cost figures ranging between U$ 2 to U$ 3.76 billion over the 2010-2050 time horizon dependent upon the frequency and intensity of future floods. This "flood" adaptation value derived from the disaster model is multiplied by a factor of three to provide figures of U$ 6 to 11.28 billion. This is done for comparative purposes with the other methodologies which are costing total adaptation - which accounts for the costs associated with other impacted sectors such as coastal zones, energy, agriculture, forestry, health and other climate induced disasters such as droughts and cyclones - while this is "only" factoring in the adaptation to "floods" disaster.

- Overall it can be deduced that, for Pakistan, adaptation to climate change is going to be a high value figure running into billions of dollars in the future ranging from between U$ 7 to U$ 14 billion/annum.
- Also, this figure will rise over time, in cumulative terms. The reason for this is that initial adaptation will probably be quite feasible but will get increasingly expensive as it deals with impacts which require high costs or are “unavoidable” and need to be borne by the country and its economy.
- In future, a more detailed exercise will need to ascertain how much the country would be willing to pay to avoid future climate induced damages and which adaptation measures are cost effective and financially feasible within the constraints of available climate finance.
- Finally, it should be noted that the exercise has been a top-down analysis based on contemporary research done on this nascent subject and is aimed at providing a reasonable first approximation that can be refined over time as relevant and reliable local data becomes available to draw conclusions from a “bottoms up” approach to adaptation costing.

ii) Processes and approaches utilized for the determination of needs of developing country Parties;

- NEEDS identified prioritized sectors and its associated costs utilizing three diverse modeling methodologies – using GDP projections, per-capita figures and “flood” disaster modeling.
- Technology Needs Assessment (TNA) on mitigation and adaptation.
- Framework for implementation of National Climate Change Policy
- Nationally Determined Contributions (NDCs) 2016
- National Communication (2019)

iii) Underlying assumptions and methodologies; and

NEEDS applied economic and emissions modelling i.e. BAU or business-as-usual emissions scenario and clean development scenarios.

iv) Challenges, gaps and opportunities.

Pakistan is a developing country bracing for significant economic growth and development in the future. In this regards, the country is poised to shift towards an increased reliance upon its indigenous coal reserves to fuel its development in the 2010-2050 time frame. Although this will significantly raise its projected greenhouse gas emissions, NEEDS has identified numerous measures which can be taken to shift this future development pathway on to a lower carbon and more climate friendly trajectory. The country, however, requires this shift to be supported through the access and transfer of appropriate technologies and finance.

Initiatives of Government of Pakistan:

Being a responsible member of the global community, Pakistan has responded a well-articulated climate change agenda which consists of following flagship initiatives:

10 Billion Tree Tsunami Project

- 10BTT Project is built on highly successful initiative of KPK's Billion Trees Afforestation Project (BTAP). The outcomes of BTAP have been duly acknowledged by World Economic Forum, United Nations Environment Programme, Bonn Challenge and other international bodies and fora. Following the success and confirmation by the independent monitors, Government of Pakistan decided to set a goal of 10 Billion Tree Plantation across the country. This wider project is expected to deliver dividend in preserving atmospheric health, reducing greenhouse gas effects, lowering cases of random floods, lowering rains, droughts and enhancing other biodiversity supportive actions. The government will spend approx. USD 1 billion on 10BTT Project.

Green Economic Stimulus (Green Jobs):

- Based on the priorities of the Government of Pakistan for creating greater job opportunities during and post COVID 19; Green Economic Stimulus initiative is being implemented. For 2019-20; the 10BTTP has generated a minimum of 65,000 jobs which are planned to be scaled- up to 200,000 by December 2020. Green Stimulus is helping Pakistan to build back green while creating value chains and providing many jobs for spurring economy in post pandemic down turn.

Eco-system Restoration Initiative

- Government of Pakistan has launched the Eco-system Restoration Initiative (ESRI) for (i) facilitating transition towards environmentally resilient Pakistan by main streaming adaptation and mitigation through ecologically targeted initiatives covering afforestation, biodiversity conservation, enabling and enhancing policy environment consistent with the objectives outlined in Pakistan's Nationally Determined Contribution (NDC); and (ii) attaining Land Degradation Neutrality (LDN) by restoring at least 30% of degraded forest, 5% of degraded cropland, 6% of degraded grassland (rangeland) and 10% of degraded wetlands in Pakistan by 2030 to generate eco-system services and provide additional support to mitigation of GHG in Pakistan. The initiative also seeks to establish an independent, transparent and comprehensive financial mechanism in Pakistan called "Eco-system Restoration Fund (ESRF)" to finance the projects and programmes under the initiative.

Recharge Pakistan

- Pakistan is a country without a choice on climate adaptation as it is facing up to the impacts at ground "zero". Our climate adaptation needs are between $7 to $14 billion per annum and this is all forced adaptation. This, subsequently, makes climate compatible development an inevitable direction to take and building resilience of our vulnerable communities as well as our infrastructure, an undeniable option. Pakistan is launching this new initiative titled; "Recharge Pakistan through Integrated Flood Risk Management and Building Resilience to Climate Change through Ecosystem-based Adaptation".

National Electric Vehicle Policy

- In order to mitigate the negative impacts of automobile sector on environment and giving a boost to the economy, Government of Pakistan has approved its National Electric Vehicle Policy targeting a 30% shift to electric by 2030. In addition, world's first "zero emissions" metro line project has been launched in the city of Karachi.

- Most recently, Government of Pakistan has announced shifting to Euro-V petrol from 1st September 2020.

Clean Green Pakistan Movement

- "Clean Green Pakistan Movement" has been launched with a vision to drive a nationwide movement by the people of Pakistan for the clean and green environment for all citizens of the country. A "Clean-Green Cities Index" has been initiated in more than 50 cities to trigger a shift towards improved waste management and sanitation. Concurrently, Pakistan has decided to get out of its plastic addiction by banning the single use plastic bags – which is now being enforced across the country.
- Recently, Prime Minister of Pakistan launched "Protected Area Initiative" to develop 15 model Protected Areas across country to conserve over 7295.549 Sq km of land area as well as Green Stimulus creation of over 5,500 jobs.

Keeping in view the above, NEED Study needs to be updated.

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