

**UNBUNDLING PLEDGES, ACTIONS OF
INDCs AND MEASURING
STAKEHOLDERS' PERCEPTIONS – A
METHODOLOGICAL STUDY**

The Case of South Asian Countries



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INTRODUCTION

As a part of the United Nations Framework Conventions on Climate Change (UNFCCC) negotiation, all countries were asked to provide a global commitment to reduce carbon emission while the world search and reach an agreement on mitigation and adaptation measures. As a result countries have pledged to reduce their own carbon emission in order to contribute towards meeting the global targets to arrest the process of global warming in future and in particular keeping an average rise of the global temperature within +2°C by 2100. While many would argue that the announced carbon reductions pledged by the countries of the world fell short of its targets, it is still an important first step towards a goal on combating global warming. The South Asian Countries (Bangladesh, India, Maldives, Nepal, Pakistan and Sri Lanka) are among the countries, which have also agreed to reduce their carbon emission voluntarily. This, by itself, is a new dimension in the world.

Already the world has crossed the 400ppm threshold level of carbon emissions and researchers have predicted that it is unlikely that we will be able to bring it down below 400ppm level in our lifetime (Richard A. Betts, Chris D. Jones, Knight, Keeling, & Kennedy, 2016). Their study shows that for the first time in human history, atmospheric carbon level has remained above 400ppm throughout the year. The study, therefore, prints a dim picture of the future world where rising temperature may become too costly for the survival of human race.

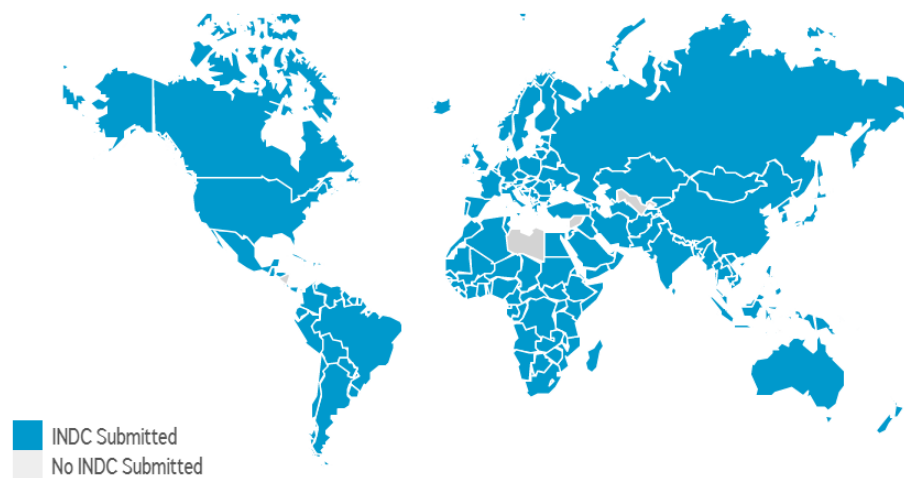
In COP19, the Ad Hoc Working Group (AWG) agreed, “to initiate or intensify domestic preparations for their Intended Nationally Determined Contributions (INDCs) towards achieving the objective of the Convention as set out in its Article 2, without prejudice to the legal nature of the contributions, in the context of adopting a protocol, another legal instrument or an agreed outcome with legal force under the Convention applicable to all Parties.” (UNFCCC, 2016)

The Conference of the Parties (COP), by its decisions 1/CP.19 and 1/CP.20, invited all Parties to communicate their INDCs in advance of COP 21 “*in a manner that facilitates the clarity, transparency and understanding of the INDC*”. Furthermore, it was also noted by the secretariat that “*in order to facilitate clarity, transparency and understanding, the information to be provided by Parties communicating*

their intended nationally determined contributions may include, as appropriate, inter alia, quantifiable information on the reference point (including, as appropriate, a base year), time frames and/or periods for implementation, scope and coverage, planning processes, assumptions and methodological approaches including those for estimating and accounting for anthropogenic greenhouse gas emissions and, as appropriate, removals, and how the Party considers that its intended nationally determined contribution is fair and ambitious, in light of its national circumstances, and how it contributes towards achieving the objective of the Convention as set out in its Article 2.” (UNFCCC, 2016)

So far 190 countries have submitted their pledges under this call and committed to control emissions and undertake mitigation actions to reduce their carbon footprint. These actions were internally developed by each country as their commitment to the global cause.

FIGURE 1: COUNTRIES SUBMITTED INDC



Source: (World Resource Institute, 2017)

Commitment to reduction of carbon footprint are targeted for a long term. Most of the pledges are for 2025 or later years. Based on the targets, governments of these countries have taken elaborate and detailed policy actions to make these commitments achievable within the time frame. There is, however, no mechanism to know whether countries are working towards achieving the targets.

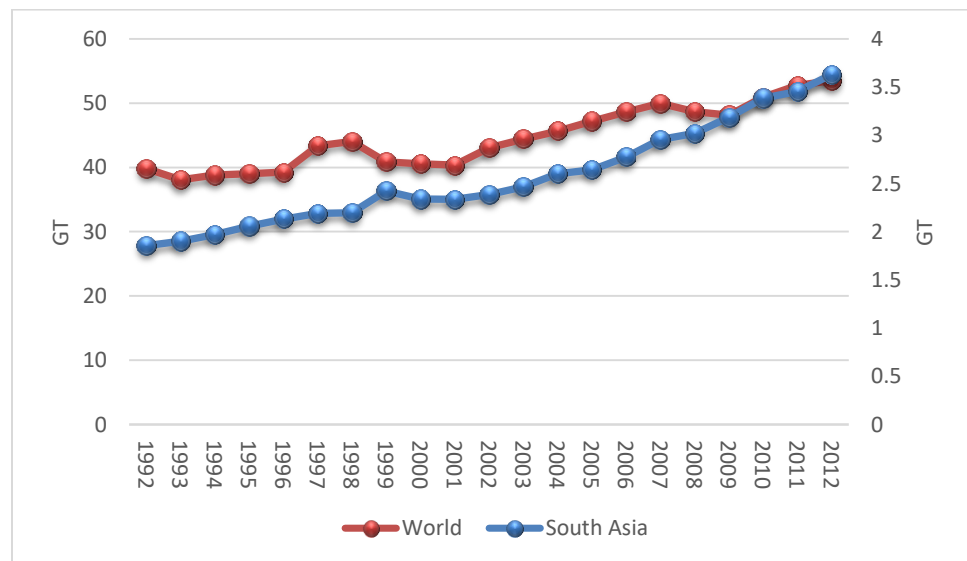
Progress towards the commitment cannot be made by the government alone. In most cases, emissions are the result of production and consumption activities completed in the private sector of the economy.

Governments should therefore work with private players in order to pursue its target of emission reduction. This will require both public and private investments as well as changes in regulations. Therefore, in order to ensure a win-win game, there is a need for developing the right regulatory and investment arrangement in these countries. A strategy towards this is to develop a consensus among the players. It is towards this goal, this study is aligned. The objective of this study, is to assess how different stakeholders perceive the overall targets for GHG reduction in the South Asian countries. Based on their perception, it is possible to develop a coordinated strategy to pursue this goal and under this circumstance the perception index will act as a guide towards achieving the GHG emission reduction targets of these countries.

SOUTH ASIAN EMISSION PATH

South Asia has been one of the regions of world that is enjoying the highest level of economic growth over the past few decades. This is good news for millions of poverty-stricken people of this region and yet at the same time it has been contributing towards enhanced Green House Gas emissions.

FIGURE 2: GROWTH OF GHG EMISSIONS (CO2 EQUIVALENT)



Note: GT – Giga Ton; Source: World Development Indicators (www.databank.worldbank.org/data)

Figure 2 shows that average rate of growth of emission from South Asia is no longer lower than that of the world emissions although in terms of total emissions South Asia’s contribution is still less than 6% of total GHG emission.

STUDY OBJECTIVES

In order to augment their path of GHG emissions, the South Asian countries need to take measures so that while their growth continues they also reduce their GHG emissions – a path often known as green growth path. However, such augmentation of growth path requires active strategies of the government and a popular public support. The commitments made by these countries in the INDC documents will, therefore, be difficult to materialize unless there is public support.

At the same time, public policy interventions often are designed for public investment programs. In designing public investment programs transparency and accountability of governments are of prime importance. Governments may opt for investments that are costly instead of a cheaper or effective alternative if there is lack of transparency and accountability.

Given these, the following questions need to be examined from the perspective of countries which pledged for GHG emission reduction.

- a. Are the governments working towards their intended GHG emission reduction path?
- b. Are the chosen path the best according to public opinion?
- c. What is the perception of people in terms of progress made so far on GHG emission reduction?

Governments of Bangladesh, India, Maldives, Nepal, Pakistan and Sri Lanka pledged to reduce carbon emissions. Some of the their commitments are voluntary in nature meaning that governments on their own will take mitigating steps to reduce growth in emissions while some of this reduction is conditional to receiving support from the global communities. All the commitments are time bound. However, there is no annual reduction targets. While these countries agreed to reduce their emission by a certain percentage in year, there is no mechanism to monitor annual progress in these commitments from both the host countries and the global communities. In this situation, TIB plans to develop a perception index on GHG reduction pledges to trace changes made up to date in terms of progress towards the target.

The GHG Reduction Perception Index (GHGRPI) is constructed in this study and is tested for Bangladesh, India, Nepal, Maldives, Pakistan and Sri Lanka.

This effort by this research team is to (a) summarise the policies pledged by these six countries, (b) understand awareness levels of different stakeholders on these commitments; (c) examine perception on the policies pledged by the national governments; (d) prioritise the list in terms of their importance through stakeholders' lens, and (e) examine alternatives strategies, if any, for GHG reduction.

INDC PLEDGES BY COUNTRIES

BANGLADESH

Bangladesh is one of the most vulnerable countries in the world due to climate change but it is also one of the least emitting nations both in terms of per capita and in terms of total emissions. According to the INDC Document of the Government of Bangladesh, "*its emissions are less than 0.35% of global emissions*" (Ministry of Environment and Forests, 2015). Yet, Bangladesh is one of the few countries which will take a much harder hit from climate change and estimates show that it might lose 2% of its GDP by 2050 and 9.4% by 2100 if climate change cannot be arrested to its target level through stabilizing the world's GHG emissions.

Bangladesh, therefore, committed to reduce 5% of its emissions for its Business As Usual scenario voluntarily while it has agreed to work with its global partners to reduce additional 15% of its emissions by 2030. However, Bangladesh also remained focused on creating resilience in its economy such that the negative impacts of climate events¹ on life and livelihoods of the people can be overcome through socio-economic development. This has been a major challenge for Bangladesh as the warming of the seas is already happening and it has been threatening the economy through successive episodes of climate disasters.

Bangladesh, to align herself, with the global community, presented the INDC aims on mitigation so that it continues to play a role with the global communities "*to limit temperature rise to two degrees or preferably 1.5 degrees above pre-industrial levels.*" (Ministry of Environment and Forests, 2015).

¹ For example, extreme temperatures, erratic rainfall, floods, drought, tropical cyclones, rising sea levels, tidal surges, salinity intrusion and ocean acidification

ANALYSIS

Analysis of the pledges of the Government of Bangladesh suggests the following:

- a. Bangladesh agreed to concentrate on Power, Transport and Industry sectors in terms of its effort on mitigation. Under Business As Usual scenario, GHG emissions from these sectors will be 69% of total emissions by 2030 (excluding land use and land use change and forestry – LULUCF).
- b. Bangladesh predicts that under BAU scenario there will be 264% increase in GHG emissions in 2030 (equal to 234 MtCO_{2e}) from 2011 level (which was 64 MtCO_{2e}). As such, Government of Bangladesh pledges to reduce nearly 12 MtCO_{2e} (equal to 5%) emissions by 2030 in the power, transport and industry sectors on its own and another 36 MtCO_{2e} can be reduced with global financial support.

TABLE 1: PLEDGES ON CARBON REDUCTION BY BANGLADESH

<i>Sector</i>	<i>Base year (2011) (MtCO_{2e})</i>	<i>BAU scenario (2030) (MtCO_{2e})</i>	<i>BAU change from 2011 to 2030</i>	<i>Unconditional contribution scenario (2030) (MtCO_{2e})</i>	<i>Change vs BAU</i>	<i>Conditional contribution scenario (2030) (MtCO_{2e})</i>	<i>Change vs BAU</i>
<i>Power</i>	21	91	336%	86	-5%	75	-18%
<i>Transport</i>	17	37	118%	33	-9%	28	-24%
<i>Industry (energy)</i>	26	106	300%	102	-4%	95	-10%
<i>TOTAL</i>	64	234	264%	222	-5%	198	-15%

ry of Environment and Forests, 2015)

INDIA

India is the fastest-growing major economy in the world. It is the fourth largest greenhouse gas (GHG) emitter. It accounts for 5.8% of global emissions (GHGs). There was a 67% increase in emissions between 1990 and 2012, and by 2030 under a business-as-usual scenario, an 85% increase is projected. India's emissions are expected to peak around 2050 or later (India's Climate and Energy Policies—Centre for Climate and Energy Solutions).

India's energy portfolio in 2011 indicated a large dependence on coal (43.5%) followed by biofuels and waste (24.7%), petroleum (22.1%),

natural gas (6.7%), hydropower (1.5%) and nuclear (1.2%). India voluntarily agreed to reduce its CO₂e intensity (emissions per GDP) between 20 and 25 percent by 2020 compared to its 2005 levels of emissions.

The Paris Agreement supersedes the Kyoto Protocol and is more equitable. It allows for a Common but Differentiated Responsibilities and Respective Capabilities (CBDR-RC), giving nations the benefit of their specific national contexts. This agreement under the United Nations Framework Convention on Climate Change (UNFCCC) provides a roadmap for adoption and mitigation measures to tackle climate change impacts. Before the COP21, India, also announced its Intended Nationally Determined Contribution (INDC) targets.

ANALYSIS

India's pledges have three main components. These are:

- a. To reduce its emissions intensity of its gross domestic product (GDP) by 33-35 per cent by 2030, compared to 2005 levels (the base year).
- b. To accelerate a switch towards non-fossil fuel based power production. It, therefore, expects to achieve at a 40% cumulative installed power production by non-fossil fuel energy resources by 2030.
- c. To develop carbon sink of 2.5-3 billion tons of CO₂e through generation of additional forests and tree cover by 2030.

TABLE 2: MAJOR TARGETS OF INDIA FOR ENERGY EFFICIENCY

Year	Wind	Solar	Biomass	Others
2016		25 Solar parks to increase installed solar capacity.		
		60 solar cities in India		
2017	27.3 GW	4 GW	5 GW	5 GW plus 20% blending of ethanol and bio-diesel as per biofuel legislation
2019		Solar power to every home		
2022	60 GW includes promotion of off-shore wind energy market	100 GW (60 GW utility scale + 40 GW roof-top)		100 smart cities with better transport systems, utilities and energy networks

MALDIVES

Maldives is a small low-lying island nation with the highest estimated point being 1.5 meters above the sea level but it is less than 1 meter for almost 80% of its islands. This makes it one of the most vulnerable country's to bear the burden of climate change. Its total land area is only 300 km² and so it is one of the smallest countries in south Asia. About 99% of its is in the sea (Zahid 2011). The population of the Maldives is 341,256 and they are living sparsely in its 200 islands and so all of its land area is also coastal areas.

The biggest threat against Maldives due to climate change is the sea level rise. Maldives contributes to only 0.001% of the global carbon emissions. (MHAHE 2001) but it is among the most vulnerable countries. Predictions exist that under the worst-case climate change projected scenarios, the entire Maldives go under water.

As a party to the United Nations Framework Conventions on Climate Change (UNFCCC), Maldives has been very vocal in advocating for climate change at the international level since 1987. His Excellency Mr. Maumoon Abdul Gayoom, the former President of the Republic of Maldives, spoke before the forty-second session of the United Nations General Assembly on 9 October 1987, at the Special Debate on Environment and Development', emphasizing that the Maldives can only offer the experiences of an endangered nation "the Maldives Islands are not merely the home of a few thousand people - they are a unique natural phenomenon, as found nowhere else on this earth."² This report will examine the Intended nationally determined contributions (INDC) of the Maldives which was submitted to UNFCCC, and look at the possibilities and risks of achieving these in the future.

In August 2015, the Maldives Climate Change Policy Framework was launched in order to increase adaptation actions and opportunities and to undertake a low emission development. Maldives' high level of fuel imports poses a number of challenges to achieving this objective. The country's energy demand is met from imported fossil fuel. Therefore, it is imperative that the Maldives explore, develop and deploy indigenous, clean and renewable sources to meet energy demand and ensure energy security.

² http://papers.risingsea.net/Maldives/Gayoom_speech.html accessed on the 15 th of sep 2016

Maldives' 2011 energy balance shows that there was approximately 313 kilo tonnes of oil equivalent (ktoe) of energy consumed in the Maldives of which more than 80% is from imported diesel fuel. Energy consumption contributes to about 1.04 million tonnes of CO2 emissions in 2011 which is about 0.003% of global emissions.

Energy consumption in various sectors constitutes a major share of the country's GHG emissions. Although there has been some solar photovoltaic (PV) penetration, this amount is insignificant compared to the country's energy demand.

ANALYSIS

The climate change policy encompasses the following five goals:

- a. Ensure and integrate sustainable financing in climate change adaptation opportunities and low emission development measures;
- b. Strengthen a low emission development future and ensure energy security for the Maldives;
- c. Strengthen adaptation actions and opportunities and build climate resilient infrastructure and communities to address current and future vulnerabilities;
- d. Inculcate national, regional and international climate change advocacy role in leading the international negotiations and awareness in cross-sectorial areas in favour of the most vulnerable and small island developing states.
- e. Foster sustainable development while ensuring security, economic sustainability and sovereignty from the negative consequences of the changing climate.

TABLE 3: MALDIVES' PLEDGE TO UNFCCC

<i>Description</i>	<i>Pledges</i>
<i>Sectoral focus on mitigation</i>	<i>Energy</i> <i>- Electricity generation</i> <i>- Energy Efficiency - domestic consumption</i> <i>- Energy Efficiency - processes and product use</i> <i>Transportation</i> <i>Waste</i>
<i>Voluntary pledge</i>	<i>10% of its Greenhouse Gases (below BAU) for the year 2030</i>
<i>Conditional pledge</i>	<i>24% in a conditional manner, in the context of sustainable development, supported and enabled by availability of financial resources, technology transfer and capacity building.</i>

Source: (Ministry of Environment and Energy, 2015)

NEPAL

Nepal, home to almost 30 million people, is another highly vulnerable countries from climate change due to its geographical position. The country's glaciers are receding annually by 38 sq km and the country lost about 29% of the ice deposits in the Himalayas during 1977 – 2010. This is happening despite the fact that Nepal is one of the low CO₂ (or equivalent) emitting countries in the world with 0.18 t per capita in 2012 (Global rank 136). Its global CO₂ emission share was only 0.02% in 2012 but the annual growth rate was over 8% during 1990-2012.

Figure 1 indicates that fossil fuel consumption has been increasing in Nepal, except a brief reduction during 1996-2006, a period when the country was plunged into violent conflict. After the end of the conflict, the fossil fuel consumption trend has been increasing steadily.

As a party to the United Nations Framework Conventions on Climate Change (UNFCCC), Nepal pleaded to support the efforts to reduce and limit the increase in global temperature below 2 degree C in order to reduce the risk of climate change. In this section, we discuss the Intended Nationally Determined Contributions (INDCs) of Nepal that was submitted to the UNFCCC, and analyse how likely these INDCs are met in future.

ANALYSIS

Nepal has focused on low carbon development strategy and striving to meet her energy needs using renewable and alternative energy sources. Alternative Energy Promotion Center (AEPC) has been working as a focal organization for promoting renewable energy in the country. Despite the fact that the grid electricity is 99.5% renewable, the share of biomass on household energy is very high, and a large fraction of the population is not connected to the grid due to inaccessibility. Nepal intends to provide electricity to the off-grid rural people through mini/micro hydro and reduce the reliance on biomass as source of household energy by promoting alternative energy sources such as biogas and solar home systems.

Given these,

- a. Nepal intends to expand the share of alternative energy to 20% (from current less than 4%) by 2020.

- b. Nepal heavily relies on fossil fuel for transportation, and it is one of the most polluting sector in the country. Therefore, Nepal intends to increase the share of electric vehicle to 20% by 2020.
- c. Nepal also intends to develop its electric rail systems (based on hydroelectricity) for public transportation by 2040.
- d. Nepal intends to develop carbon sink in its national forests and so as a part of its carbon mitigation strategy Nepal intends to preserve 40% of its land area as forest.

Table 4 summarizes Nepal’s major pledges on reducing GHGs emission, focussing mostly on hydropower and alternative energy.

TABLE 4: NEPAL’S MAJOR PLEDGES ON MITIGATION

Technologies	Targets
Mini and Micro Hydropower	25 MW
Solar Home Systems	600,000 systems
Institutional Solar Power Systems (solar PV and solar pumping systems)	1500 systems
Improved Water Mill	4000 numbers
Improved Cooking Stoves	475,000 stoves
Biogas	130,000 household systems, 1000 institutional and 200 community biogas plants

Source: (Ministry of Population and Environment, 2016)

PAKISTAN

According to Global Climate Risk Index 2015 report, Pakistan is among the top ten most affected countries in the world during the period 1994–2013. It is ranked number five among the most financially affected countries in the world (with average annual losses of around 4 billion USD-PPP from climate change) during these two decades (Kreft, Eckstein, Junghans, Kersestan, & Hagen, 2014). Pakistan is among the most severely threatened countries in terms of climate-induced challenges. Individual areas face unique stresses, which can be quite different depending on the geographical location and rate of urbanization of the individual administrative units within Pakistan.

Pakistan's contribution to the global GHG emissions is small. According to the Global Economy rankings, the share of Pakistan in total global GHG emissions is merely 0.8 percent and it is ranked as 135th in the list of global emitters on a per capita basis (Ministry of Climate Change, 2016).

Over the last twenty one years (1994-2015), the overall increase in the GHG emissions in Pakistan has been approximately 123 percent. Its energy (including transportation) and agriculture sectors account for about 90 percent of total emissions. Future projections for the period 2015-30 show an increase in emissions by 300 percent due to the ambitious plans of the government to spark economic activity through large-scale investments in energy, communication and industrial infrastructure (Ministry of Climate Change, 2016).

It would be a challenge to achieve its targeted economic growth rate without overcoming the prevailing energy crisis through an aggressive increase in energy supply in the coming years. The planned addition to the total installed capacity and prescribed energy mix will recognizably have an impact on the projected emissions of the energy sector. Currently, the energy mix of the country shows a predominant share of natural gas. There is promising mitigation potential in the energy sector, which can be realized by making available required funding and technologies (Ministry of Climate Change, 2016).

TABLE 5: SECTOR WISE PROJECTION OF EMISSIONS (MT CO₂-EQUIVALENT)

<i>Sectors</i>	<i>1994</i>	<i>2015</i>	<i>2030</i>
<i>Energy</i>	<i>85.8</i>	<i>185.97</i>	<i>898</i>
<i>Industrial Process</i>	<i>13.29</i>	<i>21.85</i>	<i>130</i>
<i>Agriculture</i>	<i>71.63</i>	<i>174.56</i>	<i>457</i>
<i>Land-Use Change and Forestry</i>	<i>6.52</i>	<i>10.39</i>	<i>29</i>
<i>Waste</i>	<i>4.45</i>	<i>12.29</i>	<i>89</i>
<i>Total</i>	<i>181.7</i>	<i>405.07</i>	<i>1603</i>

Source: Ministry of Climate Change (2016)

In consideration of projected future emissions and potential for mitigation, Pakistan offers different options as part of its INDC for emission reduction, subject to the availability of Finance, Technology Development & Transfer and Capacity Building by the international community.

ANALYSIS

Analysis of the pledges of the Government of Pakistan suggests that Pakistan plans to:

- reduce up to 20% of its 2030 projected GHG emissions subject to availability of international grants to meet the total abatement cost for the indicated 20 percent reduction amounting to about US\$ 40 billion at current prices
- achieve an optimal mix of coal, gas and hydro potentials. The planned addition to the total installed capacity and prescribed energy mix will recognizably have an impact on the projected emissions of the energy sector.

SRI LANKA

Sri Lanka, an island nation in the Indian Ocean with nearly 21 million people, is highly vulnerable to impacts of climate change. Being a relatively small island, the coastal region – where population as well as industry is mostly concentrated is susceptible to changes in sea level. Further, main livelihood activity continues to be the agriculture in Sri Lanka for a foreseeable future is also expected to get affected by climate change impacts.

The country's total GHG emission represents less than 0.1% of global emissions and the per capita emission is 0.6t CO₂e. As a party to United Nations Framework Convention for Climate Change (UNFCCC) Sri Lanka submitted its Intended Nationally Determined Contributions (INDCs) in accordance with Decisions 1/CP.19 and 1/CP.20 of the Conference of Parties of the UNFCCC.

ANALYSIS

Sri Lanka being a developing country, anticipates achieving the development objectives while moving in a low carbon development pathway as highlighted in Sri Lanka Next – Blue Green Era. Mainly five sectors have been identified under the mitigation that greenhouse gas emission could be reduced. They are Energy (electricity generation), Transport, Industry, Forests and Waste sectors. Possible emission reduction actions have been identified in each sector, which are to be implemented during the period of 2020 to 2030.

ACTIONS

To fulfil their commitments, each of these six countries have underlined strategies and actions which they would follow. These actions and strategies vary between countries and in the following, a summary of their actions and strategies are summarized. The objective of the summary is to

underline the major actions towards fulfilling their voluntary and conditional (if any) so that there could be a public pressure on the governments to continue to pursue the path.

BANGLADESH

In order to fulfil its targets under INDC, Bangladesh promised the following action plan which already exists in the country.

- Efficient energy management system with energy audits for industries with accredited energy auditors
- Labelling of energy efficient gadgets in the market
- Promoting SHS in off-grid areas
- 10% of the total power supply from renewable sources (by 2020)
- Improving kiln efficiency in brick-fields
- Composting of waste
- Waste to biomass based thermal energy generation
- Construction of Combined Cycle Power Plant (CCPP) by the Government of Bangladesh and utilities companies
- Production of 14 MW electricity using roof-top solar panels in government and in private buildings
- Promoting solar irrigation pumps, solar mini grids and nano-grids for off-grid population.

In addition to these, there are also new programs pledged by sectors. Some of the other programs that Bangladesh has already promised in its BCCSAP are listed below showing Bangladesh's pioneering attitude towards mitigation.

TABLE 6: MITIGATION PROGRAMS UNDER BCCSAP

Programme	Objective
Improved energy efficiency in production and consumption of energy	Ensure energy secure and low-carbon development of the economy
Gas exploration and reservoir management	Enhance energy security and ensure low-emission development
Development of coal mines and coal-fired power station(s)	Maximising coal output and managing coal fired power stations in a carbon-neutral way
Renewable energy development	Maximising the use of renewable energy sources to lower GHG emission and ensuring energy security
Lower emissions from agricultural land	Raise productivity of agricultural land and lower emissions of methane
Management of urban waste	Ensure liveable cities while lowering GHG(methane) emissions

Afforestation and reforestation programme	Provide support to scale up afforestation and reforestations
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Source: (Ministry of Environment and Forests, 2015)

Additional programs are:

<i>Sector</i>	<i>Target</i>	<i>Strategy</i>
<i>Power</i>	<ul style="list-style-type: none"> • 100% of new coal based power plants use super-critical technology by 2030 • 400 MW of wind generating capacity by 2030 • 1000 MW of utility-scale solar power plant 	<p>All new coal generation uses super-critical technology. Increased penetration of wind power.</p> <p>Implement grid-connected solar plant to diversify the existing electricity generation mix</p>
<i>Transport</i>	<ul style="list-style-type: none"> • To achieve a shift in passenger traffic from road to rail of up to around 20% by 2030 compared to the business as usual. • 15% improvement in the efficiency of vehicles due to more efficient running 	<p>Modal shift from road to rail, including metro systems and bus rapid transit systems in urban areas. This will also produce additional benefits in terms of reduced congestion, improved air quality and improved traffic safety.</p> <p>Improvement in traffic management through building expressways to relieve congestion and public transport measures.</p>
<i>Energy</i>	<ul style="list-style-type: none"> • 10% energy consumption reduction in the industry sector compared to the business as usual 	<p>Introduce energy audits to incentivize the uptake of energy efficiency and conservation measures in the main industrial sectors</p>

Source: (Ministry of Environment and Forests, 2015).

INDIA

India's policy document that sets the country's Climate Change policy framework is the National Action Plan on Climate Change (GOI 2008). The plan consists of eight National Missions.

These 8 Core Missions are –

- National Solar Mission
- National Mission for Enhanced Energy Efficiency
- National Mission on Sustainable Habitat
- National Water Mission
- National Mission for Sustaining the Himalayan Ecosystem
- National Mission for a “Green India”
- National Mission for Sustainable Agriculture
- National Mission on Strategic Knowledge for Climate Change

Four more Missions that are under discussion are:

Wind energy: Produce 50-60 GW of wind power by 2022. The National Offshore Wind Energy Policy 2015 has been adopted to help in offshore wind energy development. Human health Assess impact of climate change on human health; Build up capacities to respond to these. A National Expert Group on Climate Change and Health has been constituted.

Coastal resources: A National Mission on Coastal Areas (NMCA) for integrated coastal resource management is preparing an integrated coastal resource management plan and vulnerabilities mapping along the entire shoreline.

Waste-to-energy: Crystallise efforts to harnessing energy from waste. This would help lower the dependence on coal, oil, gas. India currently has current 53MW produced from five waste-to-energy projects. About 24 waste-to-energy projects are under construction which will produce 233MW of energy. Five projects of 79MW have already been tendered therefore totalling to 312 MW. These projects will help India's waste-to-energy capacity increase six-fold.

To provide a platform for the global investment community to connect with stakeholders in India the first Renewable Energy Global Investment Meet and Expo (RE-INVEST) was organized in Feb 2015. A second one is scheduled to take place in February, 2017.

MALDIVES

Prior to June 2005, the Maldivian political system was based on the election of individuals, rather than the more common system of election according to party platform. A decentralisation Act was passed in April 2010 and was ratified in May 2010. The purpose of decentralisation according to the Act is to allow the island communities to make their own decisions in a democratic and accountable manner.

Maldives has no significant conventional energy (coal, oil, or gas) resources. Renewable energy could be acquired from solar heat, wind, and biomass; however, utilization of these sources has been very limited. Recent economic growth has resulted in an increase in energy demand. In 2011, the total final energy consumption amounted to 396,000 tons of oil equivalent, which is about 70% higher than the 2005 level. Given this background Maldives has developed the following strategies to fulfil its commitment to INDC.

RENEWABLE ENERGY PROGRAM

To meet the targets of the INDC, Maldives is in the process of scaling up of its Renewable Energy Program (SREP) between 2013 and 2017. The emphasis is on investment to extract energy using solar, wind power. The government plans to install a 40-megawatt (MW) solar photovoltaic system to meet 30 percent of day time demand in all inhabited islands within 5 years. This is expected to reduce its GHG emission by 90,000 tons per year plus saving 36 million litres of diesel annually.

WASTE-TO-ENERGY (THILAFUSHI)

This programme will provide a waste-to-energy power generation facility with a capacity of up to 4 MW to replace the existing diesel-based power generator on the island. However this project has not been initiated as yet.

SUSTAINABLE ENERGY DEVELOPMENT PROJECT

With support from the Asian Development Bank the government has initiated (in 2014) the SEDP to achieve a more sustainable energy sector based on renewable resources. This will encourage a shift toward clean and cost-effective energy sources by 2019. The project has two outputs: (i) renewable-energy-ready grid systems developed for outer islands and greater Male region; and (ii) enhanced capacity of the Ministry of Environment and Energy, and the utility companies, State Electricity Company (STELCO) and FENAKA, to implement renewable energy grid interventions. Project areas cover approximately 160 islands out of the 200 islands. The INDC targets of reducing GHG emissions by 10-24 % are very ambitious plans in the absence of a legal framework, concrete strategies and a viable financial plan.

NEPAL

Being a low income country, Nepal's contribution to global GHGs is low, but the development aspirations of the people has not been met. When the country grows, it will put pressure on its natural resources, especially forest resources since forest resources has been adversely affected whenever there is political turmoil or changes. After a decade long violent conflict, and prolonged transition to federal democratic republic, Nepal has introduced a new federal democratic constitution in September 2015. However, the state structuring has not been done other than promulgating the new constitution. When the country transfers its central power to the provincial level, there will be huge demand for public infrastructure, such

as administrative buildings and roads. As a result, there will be a high pressure on forest and other natural resources.

As the political transition has not been settled for the past one decade, the aspiration of moving towards low energy development path will be overshadowed by other needs including reducing poverty and developing infrastructure. In the past, several hydroelectric projects have been either delayed or cancelled due to political unrest in the country. The business friendly environment has not been created despite repeated commitment by the subsequent governments. A short review of the main sectors identified in INDC are presented and potential risks are discussed below.

HYDRO-ELECTRICITY

Despite a high expectation of hydroelectricity generation and export potential, Nepal generates less than 800 MWs of hydroelectricity, which covers less than 50% of the domestic and industrial demand (as of December 2015). Therefore, the country used to face over 12 hours of power outages every day during wet season and this increases up to 15 hours per day during dry season. In recent months, however, there is some addition to the installed capacity and there is no power outage in Kathmandu valley and other major cities in the winter months of 2017. Despite the immense potential of hydropower generation (some 43,000+ MW is identified as economically feasible), the country imports electricity from neighbouring India in order to avoid the daily power outage. The industrial sector, however, is still facing power outage daily.

Example of slow progress include 6450MW Pancheshwar multipurpose project on the River Mahakali that borders Nepal and India. The project was identified as a joint project between two countries almost two decades ago, but there is no visible progress yet. Given the current situation, it is hard to believe that Nepal will generate 4000MW addition electricity by 2020 (in four years) and another 12,000 MW by 2030 as indicated in the INDCs.

BIOGAS

The government of Nepal started providing subsidy to households for installing biogas plants for household use. Since then, about 350,000 biogas plants have been installed throughout Nepal (terai and mid-hills). The biogas energy is mostly used for cooking, substituting firewood and other biomass. Recently, government has come up with additional policy

measures for incentivizing communities for larger biogas plants but there is not much progress on this.

Since the biogas technology requires few cows/buffalos, and land and labor for daily operation of the plant, poor households are not able to adopt the technology even if it is subsidized as they lack land and animals. Another important issue for biogas plant is abandonment of its use on the ground of technical problem and operational issues, such as unavailability of animal waste and unwillingness of household members to make their hands dirty every day. As the instalment of biogas plants is subsidy driven, any change in subsidy policy will affect the instalment of the biogas plants. After 2012, there is more fluctuations in the instalment of the biogas plants. This may be due to the fact that there is a new initiative called National Rural and Renewable Energy Program (NRREP), 2012 – 2017, a USD 180 million project. This initiative aims to install 130,000 biogas plants across the country during this period.

MICRO-HYDRO

Nepal has made considerable progress on installation of micro-hydro plants in hilly area where there are abundant small rivers and streams. The installation of micro and mini-hydro plants are politically feasible as these are less destructive to the natural environment and the local people see the immediate benefits and provide cooperation for installing these smaller plants. The capacity of the micro-hydro is 10-100kW and suitable for smaller villages that are not connected to the national grids.

SOLAR HOME SYSTEM

Solar home system (SHS) is another alternative energy technology promoted by the Nepal government. This technology is mostly used for lighting purpose and it replaces kerosene based lighting technology in the rural Nepal where grid-electricity or micro-hydro is not available. Government has been providing subsidy to the households for installing the SHS. So far, there has been over 600,000 SHS with the installed capacity of 15 MWp. This technology, however, will not be able to replace the biomass energy from the household as this is used just for lighting.

FOREST CARBON CONSERVATION

Nepal government has been putting emphasis on forest conservation and enhancement of forest carbon through the implementation of REDD+ (Reducing Emission from Deforestation and forest Degradation) program.

The Ministry of Forests and Soil Conservation has established a three-tiered institutional mechanism for implementing REDD+ for reducing GHGs emissions by addressing deforestation and forest degradation. As Nepal has a strong history of reversing deforestation and forest degradation through community based forest management, there is no or very low risk of implementing the REDD+ program in Nepal.

The recent survey of forest resources inventory indicates that there is reversal of deforestation in the mid-hills and the mountain regions. As a result, the forest cover is now 44% of the total area (that includes 4% of the total area with woody biomass). However, challenges remain in the Siwaliks and in the Terai regions where the premium value matured sal trees provide incentives for illegal felling for timber. A recent policy of managing these forests under collaborative forest management is a welcome beginning, where some patches of Terai forests will be managed by the local communities and clearcutting of the mature trees are allowed for timber production, setting aside the forest area for natural regeneration. This arrangement is expected to reverse the deforestation trend in the Terai as more timber will be available in the market through legal channel, and also enhance forest carbon in future when the regenerated forests grows over time as a natural forest.

PAKISTAN

Pakistan's policy document that sets the country's Climate Change policy is the Framework for Implementation of the Climate Change Policy (2014-2030), which outlines the vulnerabilities of various sectors to climate change and identifies appropriate adaptation and mitigation actions. According to Ministry of Climate Change (2016) the following actions have been undertaken by the subnational governments so far:

- Establishment of Directorates of Climate Change and Multilateral Environment Agreement (MEAs)
- Formulation of climate change policies
- Frameworks for implementing climate change policies
- Constitution of climate change policy implementation committees
- Construction of 1,000 MW Quaid-e-Azam solar park in Punjab
- Improvement of urban public transport systems, especially Bus Rapid Transport at Lahore, Rawalpindi-Islamabad and Multan, and urban rail transport (Orange Line) at Lahore

- Green Pakistan Programme of tree plantation across Pakistan
- Large-scale tree plantation programmes in Khyber Pakhtunkhwa
- Conservation of national parks and protected areas
- Natural resource management
- Clean development mechanism
- Green Charter for cities (already signed for Islamabad)

SRI LANKA

Sri Lanka submitted its INDCs in October 2015 for mitigation intends to reduce the GHG emissions against Business-As-Usual (BAU) scenario (taking 2010 as the base year). Subsequently Nationally Determined commitments NDCs were submitted based on the INDCs in September 2016. The targets includes reduce GHG emissions by 20% in energy sector (4% unconditionally and 16% conditionally) and by 10% in other sectors (transport, industry, forests and waste) by 3% unconditionally and 7% conditionally by 2030, through the following programs.

- Establishment of energy efficient and environmentally sustainable transport systems by 2030
- Upgrading of Fuel Quality Standards in order to reduce GHG emission
- Reduce unproductive vehicles by 25% in 2025 with unconditionally and this could increase 50% with conditions
- Increase forest cover of Sri Lanka from 29% to 32% by 2030

TABLE 7: SRI LANKA’S PROGRAMS FOR GHG REDUCTION

<i>Sector/technologies</i>	<i>Targets</i>
<i>Energy</i>	
<i>Establishment of large scale wind power farms</i>	<i>514 MW</i>
<i>Broadening the solar power electricity generation</i>	<i>115 MW</i>
<i>Biomass and waste</i>	<i>105 MW</i>
<i>Mini and Micro Hydro Power generation</i>	<i>176 MW</i>
<i>Transport Sector</i>	
<i>Establishment of energy efficient and environmentally sustainable transport systems by 2030</i>	<i>Lunching of Electric Buses as a Pilot Project</i>
	<i>Introduction of BRT system to encourage public transport</i>
	<i>Introduction of ITS (Intelligent Transport System) based bus management system</i>
<i>Upgrading of Fuel Quality Standards in order to reduce GHG emission</i>	
<i>Reducing unproductive transport systems from current usage</i>	<i>Reduce unproductive vehicles by 25% in 2025 with unconditionally and this could increase 50% with</i>

<i>Sector/technologies</i>	<i>Targets</i>
	<i>conditions</i>
	<i>Development of Urban Transport Master Plans (UTMP) to improve transport system in line with Mega-polis Plan that currently being finalized into other main urban areas of the country</i>
<i>Shifting of passengers from private to public transport modes</i>	<i>Introduce Park & Ride system</i>
	<i>Introduce the BRT system for Galle Road Corridor</i>
	<i>Rehabilitation of Kalani valley Railway line</i>
<i>Enhancing the efficiency and quality of public transport and Economic instruments to environment friendly transport modes</i>	<i>Electrify railway from Weyangoda to Panadura</i>
	<i>Purchase new rolling stock for Sri Lanka Railway</i>
<i>Electrification of three - wheelers to reduce emissions</i>	
<i>Introduce electrified boat service using inland water canal for public transportation to reduce the congestion in roads as well as GHG emission</i>	
<i>Encourage and introduce low emission vehicles such as Electric and Hybrid into the system</i>	
<i>Forestry Sector</i>	<i>Increase forest cover of Sri Lanka from 29% to 32% by 2030.</i>

Source: (Ministry of Mahaweli Development and Environment, 2015)

STAKEHOLDERS

Judging from the analysis above it is evident the South Asian Countries (Bangladesh, India, Nepal, Maldives, Pakistan and Sri Lanka) are all set out to reduce their emissions from their business as usual path of development. These countries have prioritized to switch towards energy efficiency, renewable sources of energy and towards developing carbon sinks. Clearly, governments alone cannot achieve such goals. There is a need for developing environment for other stakeholders to participate and contribute towards the mitigation plans of the governments.

Major stakeholders for each country in fulfilling INDC commitments are listed in the following table.

TABLE 8: STAKEHOLDERS IN MITIGATION

Country	Stakeholders
Bangladesh	Government and academics <i>Ministry of Environment and Forests, Ministry of Energy and Power, Ministry of Industries, Ministry of Transportation, Power Distribution Companies, Gas Distribution Companies, Road Transport Authority, Railway authority, Energy Regulatory Authority, Policy Authorities for Management of Traffic. Inland Water Transport Authority.</i>

	<p>City Corporations and Type A municipalities Coal power plants, Private sector and CSOs NGOs and private companies working on wind and solar power generation and distribution, Solar mini-grid companies, Solar Irrigation Pump operators, Infrastructure Investment Companies like IDCOL, Renewable Energy Suppliers Car importers, Fuel suppliers, Car dealers Industrial Zone Authorities, Investors in Economic Zones. Development Partners</p>
India	<p>Government and academics Government line ministries Academics and researchers Private sector and CSOs NGOs and Civil Society groups Political parties</p>
Nepal	<p>Government and academics Government agencies dealing with i) energy, ii) agriculture and livestock, iii) forest, iv) industry, v) human settlement and wastes, vi) transport, and vi) commercial sectors. Private sector and CSOs Private sector Political parties, Development partners.</p>
Maldives	<p>Government and academics Presidents' Office, Ministry of Environment and Energy, Maldives Energy Authority, Ministry of Finance and Treasury, National Disaster Management Authority, Ministry of Economic Development , Ministry of Education, Attorney General's Office, People's Majlis, Local Government Authority. Private sector and CSOs NGOs involved in waste management, Civil Society Activists, Political Leaders Business Organizations including Tour and Resort operators.</p>
Pakistan	<p>Government and academics Federal Ministry of Climate Change Subnational governments Pakistan Metrological Department (PMD) Pakistan Agricultural Research Council (PARC) Federal Flood Commission (FFC) Indus River System Authority (IRSA) Water and Power Development Authority (WAPDA) National Energy Conservation Centre (ENERCON) Alternate Energy Development Board (AEDB) Private sector and CSOs Private sector NGOs and CSOs</p>
Sri Lanka	<p>Government and academics Ministry of Mahaweli Development and Environment Central Environmental Authority Climate Change Secretariat Ministry of Transport and Civil Aviation Ministry of Industries and Commerce Road Development Authority and Sri Lanka Railways Waste Management Authority (Western Province) Private Waste Management companies Ceylon Petroleum Corporation Ceylon Electricity Board Ministry of Power and Energy Sri Lanka Sustainable Energy Authority Academics and Researchers</p>

MEASURING PERCEPTIONS

Clearly, the pledges by the governments to the global community will require a constant monitoring in order to ensure that both the national governments and their development partners (in the international communities) continue to work together towards achieving these targets. Since there is no mechanism to monitor the progress, except reports by the national governments to the COP, there is a possibility that countries will be off-track to fulfil their obligations.

This study has been designed to develop the method for measuring progress in terms of stakeholders’ perception towards the targets. Consequently, a perception survey has been designed in this study from key stakeholders.

Judging from the list of activities pledged by these countries, we can divided the groups into two broad categories. These are: a) Government and Academics – who are broadly decision makers or advisors in the policy framework in a country, and b) Private sector and CSOs (include NGOs) – who either follow the policy and legal environment in their decisions or lobby for policy changes to achieve their targets. Of course, there are academics who falls into both categories – in which case the onus is on them to define them in one of the groups. We use the following approach to develop a perception index (PI) from the opinion surveys conducted in six South Asian Countries:

$$PI_i = w_j \bar{x}_j + w_k \bar{x}_k$$

Where, w_j is the weight for opinion of the government and academic groups, and w_k is the weight on opinion of the private sector and CSO groups in the index. \bar{x} ’s are the mean value of the opinion expressed by participants in the group j or k (j for academic and government, and k for others). PI_i is the Perception Index for the i^{th} country.

The main reason to choose these two broad categories is because responses and actions of government actors is different from non-government actors (Davies 2011; Kohli 2007). While the non-government actors influence public policy, they do not make policy or implement them

in a significant way (see for example the notion of Intermediate regimes in Raj 1973). This classification also allows us to overcome thinness of responses from within some sub-categories. From an analytical point of view it also permits us to present feedback from within and outside the government sector which makes the presentation of the information more efficient.

On the question of determining weights for each of these groups in the index there were few options. One option is to proceed with the weights as they arise the raw responses. This, perhaps, would lead to a bias in the analysis due to: a) selection – as it might not be possible to select exactly the same number of people from each list in each country; and b) response – the number of people who would respond using email may not be same from each group in each country. The literature on statistical analysis advises of the pitfalls of not recognising such problems (Gelman 2007).

In the absence of any distributional information one solution adopted by researchers is to use prior knowledge (Andrews and Herzberg 1985). Similarly, Trejsman and Gaffen (2007) asserted that performance assessment by perception analysis is always a debatable issue especially when conducted anonymously over the internet with no physical exchange due to possibilities of misinterpreting questions as well as differential responses.

The second option is to give equal weights to these broad groups so that there is no in-built biases in the index. We have finally agreed to use equal weights (50:50) for both academic/researcher/government groups and NGO/CSO/Private sector groups. Therefore, in the index a value of 0.5 is used for w's.

There are other issue of sample size and perception analysis and the end outcome of findings. However, according to Anderson and Heywood (2009) “perception analyses do generate useful information and policy-feedback at relatively low costs”

DATA COLLECTION

In order to collect data from the perception index, the research team used the following steps.

Step 1: List names from government and academic agencies who are relevant in terms of either policy making, research, implementation

of government pledges in each country. The list was developed using several databases including that of TIB. For each country there was a nodal point using which the list is developed.

Step 2: List the name of NGOs/CSOs/Entrepreneurs related to mitigation activities or sectors or lobbying for a clean environment in their countries.

Step 3: Electronic letters were sent to each of these persons with a web-link to fill-up a questionnaire designed for researchers from Bangladesh, India, Nepal, Maldives, Pakistan and Sri Lanka. In total 64 letters were sent to various categories of respondents in Bangladesh, it was 80 in Nepal, 61 in Maldives, 58 in India, 63 in Sri Lanka and 50 in Pakistan. The list included respondents from the following minor categories: Government Officer, Civil society activist, Transport operator, Energy producer /distributor/transmitter /regulator /commission, Industry owner/MD, Environmentalist, Climate Specialist, Academic / Researcher, NGO/CSO, Business Organizations, and Others. A total of 140 responses were received and were used in the analysis of the results.

Follow ups were conducted through phone, email and also in person to receive responses. In some cases, hardcopy of the questionnaire was sent to the respondent when requested.

Step 4: Responses were received electronically and analysed using STATA.

Step 5: Data collection were completed between 17 November, 2016 and 13 February, 2017 in Bangladesh, India, Maldives and Nepal. While data collection in Sri Lanka began on 9 February 2017 and in Pakistan began on 16 February 2017. Both Pakistan and Sri Lanka surveys were completed in April 2017. This report is based on data from Bangladesh, India, Maldives, Nepal, Pakistan and Sri Lanka.

QUESTIONNAIRE DESIGN

The questionnaire for the survey was developed using discussion different researchers across the six countries through conference calls between nodal points in each country. The draft questionnaire was pre-tested using

electronic devices. Revisions were made on the questionnaire based on feedbacks received from pre-tests.

The questionnaire had several sections and they are described below.

Section A consisted of a statement of declaration on anonymity by the researchers and identification of groups of the respondents and their country.

Section B collected basic information on the respondents excepting their names.

Section C had a set of question to determine the general awareness on INDC pledges.

Section D had country specific questions related to INDC pledges, actions, and strategies of the governments to fulfil the pledges.

Section E had questions were on ranking importance of the plan of actions of the governments.

Section F had questions of transparency and accountability of the mitigation programs in each country.

Section G on ranking of performance of the countries in terms of their progress made so far as per the pledges.

DATA ANALYSIS

PERCEPTION ON AWARENESS ON INDC COMMITMENTS

Figure 3 shows that the general level of awareness among the stakeholders on INDC related issues in South Asia. It shows that in general, the level of awareness on INDC among the stakeholders are quite high but the level of awareness among the relevant government officers and academics are generally lower than the stakeholders from private sector and from CSOs.

PERCEPTION ON GHG EMISSION REDUCTION TARGETS

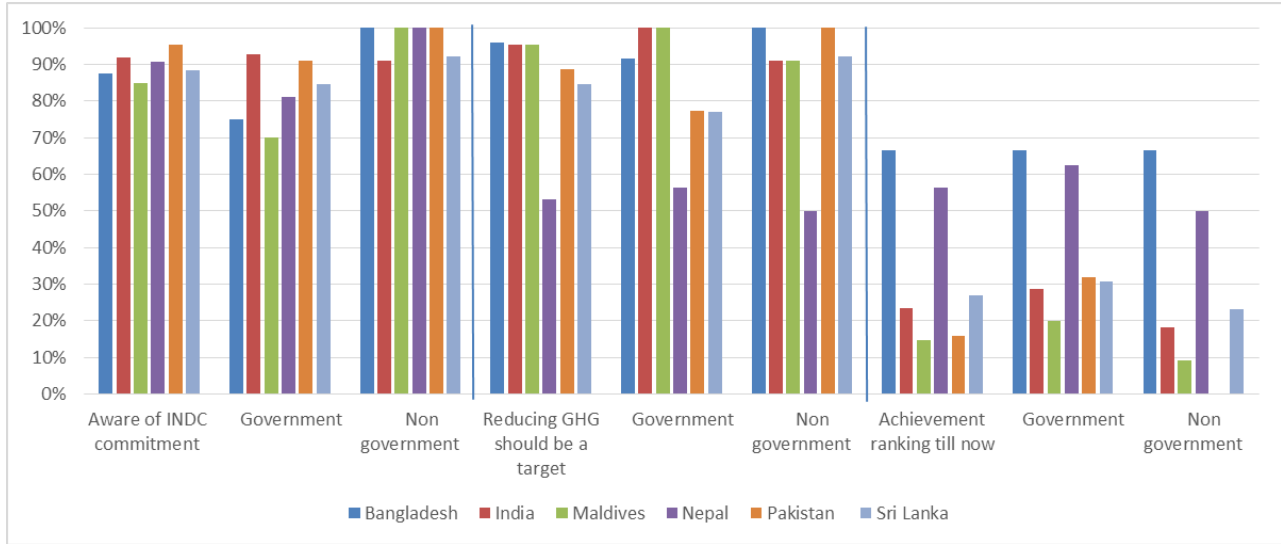
Governments of South Asian countries along with other developing countries generally held an opinion that reducing GHG emissions is a job of the developed or industrialized nations as they are primarily responsible for the current problems of global warming. *Survey among the stakeholders in South Asian countries finds that there is a large degree of consensus among them to reduce GHG emissions by them too.* This is

a pleasant surprise for the governments because their plan to reduce GHG emissions is unlikely to find large-scale opposition from domestic pressure groups. In each country, except Nepal, 90% or more among the stakeholders agree that GHG emission reduction should be a target of the governments (Figure 3). In Nepal, the level of agreement is much less (around 50%). Clearly, they feel that reducing GHG emission is not a reasonable target for Nepal. Given the fact that Nepal has 44% of its land covered with forests and that 100 of its electricity is generated from hydro, Nepalese seem to be content with their current level of engagement in GHG emission reduction. Setting a new target for them, in line with the Paris Agreement, is not a popular approach in Nepal.

PERCEPTION ON ACHIEVEMENTS SO FAR

Finally, in terms of achievements made so far in each country except Bangladesh and Nepal, most of the respondents (70% or more) considered the performance of their country to fulfil the promises is below expected outcome. In case of Bangladesh, nearly 70% of the respondents agree that government is moving as expected in the INDC promises. This is partly because Bangladesh has started working on several projects like mono-rail, Rapid Bus Transit (RPT) projects which were also promised in the INDC projects. In case of Nepal, the high degree of respondents' satisfaction in achieving the INDC targets is a bit surprising. It may be the case that there is no clear target of reducing GHG emission by the government of Nepal except that the government is planning to increase the generation of clean energy (hydropower, mini and micro hydro, biogas solar energy and use of improved cook-stoves). As there has been some progress in these indicators and there is now better political consensus in investing in hydropower generation and transportation, the respondents seemed to be satisfied with these performances.

FIGURE 3: INDC AWARENESS AND ACHIEVEMENTS SO FAR



Source: NDC Perception Survey, ACD 2017.

COUNTRY PERSPECTIVES

Each of the South Asian countries developed their independent strategies to fulfil the commitments on reducing GHG emissions. These were described in the sections above. Given the differences in their approach, the following sections examines perceptions by stakeholders in each of these countries.

BANGLADESH

PERCEPTION ON STRATEGIES TO FULFIL INDC PROMISES

The Government of Bangladesh developed several strategies in order to fulfil its pledges to reduce emission. Perception on these strategies by stakeholder groups are presented in Table 9.

TABLE 9: PERCEPTION ON STRATEGIES TO ACHIEVE INDC PROMISES IN BANGLADESH

<i>Strategies to fulfil INDC promises</i>	<i>Government and Academics</i>	<i>Private sector and CSOs</i>	<i>Average</i>
<i>Interest subsidy for EE investments</i>	100	88.9	94.45
<i>Energy audits for improving energy efficiency</i>	91.6	88.9	90.25
<i>Waste to fertilizer in urban areas</i>	91.7	88.8	90.25
<i>Pricing energy to promote renewable energy use</i>	100	77.7	88.85
<i>Developing urban transport system for EE cities</i>	100	77.7	88.85
<i>Rewards to make firms energy efficient</i>	83.3	88.9	86.1
<i>Net metering for promoting solar energy in urban areas</i>	83.3	77.7	80.5
<i>Biogas to reduce emission in poultry and dairy</i>	91.7	66.6	79.15

<i>Tax free Import of energy efficient gadgets</i>	83.3	66.6	74.95
<i>Standardizing gadgets</i>	50	55.5	52.75
<i>Energy audits using accredited auditors</i>	25	66.7	45.85

Source: INDC Perception Survey, ACD 2017

The degree of divergence among the two groups of stakeholders on the strategies being pursued by the government is evident in Table 9. For example, the best four strategies preferred by Government and Academic groups are: a) Interest subsidy on energy efficient investments, b) no compromise on economic growth, c) pricing energy to promote renewable energy, and d) promoting waste to fertilizer and in all countries stakeholders asserted that there is no scope for compromising economic growth of these countries. On the other hand, NGO/CSO/Entrepreneur group wanted a) Energy audit for improving energy efficiency, b) rewards for energy efficient firms, c) interest subsidy for energy efficient investment and d) waste to fertilizer in urban energy. Both groups, however, seem to agree that Bangladesh should not compromise on its targets of economic growth while pursuing the policy of reducing GHG emissions.

PERCEPTION ON ENERGY EFFICIENT TECHNOLOGIES

To reduce GHG emissions there is a need to switch towards energy efficient technologies. Table 10 presents the general perception on various energy efficient technologies. It also shows a degree of variation in the perception of among the two stakeholder groups. Most of them agree on the followings: a) awareness on energy efficient lights already exists, b) no energy efficient building code has been developed in Bangladesh yet, and c) use of solar as an alternative energy source for industries. Interestingly while academic and government groups feel that there is already an emphasis on rail and river transport system in Bangladesh, the private sector and CSOs groups do not agree on this perception. On the other hand, while government and academic groups think that energy efficient fans are not available in the market, the private and CSO groups think that it is available in the market. On wind energy option, both group agree that it is not a good option for industries in Bangladesh, perhaps due to high uncertainty with regard to consistency of wind velocity.

TABLE 10: PERCEPTION ON ENERGY EFFICIENT TECHNOLOGIES IN BANGLADESH

<i>Level of awareness on energy efficiency</i>	<i>Government and Academics</i>	<i>Private sector and CSOs</i>	<i>Average</i>
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<i>Energy efficient building code does not exist</i>	100.00	77.70	88.85
<i>Awareness on energy efficient lights</i>	83.40	88.90	86.15
<i>Use of solar lights for industries</i>	83.30	88.90	86.10
<i>Availability of energy efficient motors</i>	100.00	66.70	83.35
<i>Emphasis on river transport system is there</i>	91.70	55.60	73.65
<i>Emphasis on rail transport system is there</i>	91.70	55.60	73.65
<i>Energy efficient fans are not available</i>	100.00	33.30	66.65
<i>Wind based power for industries</i>	41.70	44.40	43.05

Source: INDC Perception Survey, ACD 2017

PERCEPTION ON GOVERNMENT STEPS TO REDUCE GHG EMISSIONS

Table 11 shows perception of the two groups of stakeholders on the actions already adopted by the Government of Bangladesh to reduce growth of carbon emissions. It appears that while all the private sector and CSO groups in the survey think that government has already taken steps on rooftop solar panels in buildings, only 83.3% of the government and academic groups think so. The level of awareness of government plan to promote combined cycle power plants in Bangladesh is the least. Similarly, a well-conceived strategy like introducing new technologies in brick kilns are not known to most of the respondents.

TABLE 11: LEVEL OF AWARENESS ON GHG EMISSION REDUCING ACTIONS OF THE BANGLADESH GOVERNMENT

<i>Awareness on government actions</i>	<i>Government and Academics</i>	<i>Private sector and CSOs</i>	<i>Average</i>
<i>Promoting Rooftop Solar in Buildings</i>	83.3	100	91.65
<i>Promoting Solar Irrigation Projects</i>	91.7	88.9	90.3
<i>Solar Home System in off-grid areas</i>	83.3	77.8	80.55
<i>Promoting waste to energy projects</i>	75	77.8	76.4
<i>To reduce energy intake in brick kilns by 10%</i>	41.7	66.7	54.2
<i>Promoting Combined Cycle Power (CCP) plants</i>	41.7	44.4	43.05

Source: INDC Perception Survey, ACD 2017

PRIORITIZING MITIGATION STRATEGIES

There were several specific strategies suggested to reduce GHG emissions in Bangladesh. The list was exhaustive but it did not prioritize them. In the stakeholder survey, they gave their perception on the strategies. This is shown in

Table 12. It shows that the top 10 strategies are: 1) reducing traffic jams, 2) upgrading urban bus services, 3) improving traffic management, 4) energy efficient power production, 5) fuel switching for brick kilns, 6) modernization of power plants (to make them energy efficient), 7) promotion of waste to energy projects in cities, 8) standardizing energy efficient gadgets, 9) Promoting improve cooking stoves in rural areas an 10) energy audits in factories.

TABLE 12: PRIORITIZING GHG EMISSION REDUCTION STRATEGIES IN BANGLADESH

<i>Strategies and actions</i>	<i>Government and Academics</i>	<i>NGO/CSO/Entrepreneurs</i>	<i>Average</i>
<i>Reducing traffic jams</i>	91.6	100	95.8
<i>Upgrading of urban bus services</i>	91.6	100	95.8
<i>Improving traffic management</i>	91.6	100	95.8
<i>Energy efficient power production</i>	91.6	100	95.8
<i>Fuel switching for brick kilns</i>	91.6	100	95.8
<i>Modernization of power plants</i>	91.6	100	95.8
<i>Promotion of waste to energy in municipalities</i>	91.6	100	95.8
<i>Standardizing energy efficient gadgets</i>	91.6	99.9	95.8
<i>Promotion of improved cooking stoves in rural areas</i>	83.3	100	91.6
<i>Energy audits in factories</i>	91.6	88.8	90.2
<i>Establishment of metro in Dhaka</i>	91.6	88.8	90.2
<i>Promotion of solar irrigation pumps</i>	91.6	88.8	90.2
<i>Promotion of rooftop electricity production in cities</i>	91.6	88.8	90.2
<i>Promotion of SHS in remote and off-grid areas</i>	83.3	88.8	86.1
<i>Promotion of solar mini-grids</i>	83.3	88.8	86.1
<i>Developing of express roads (light free)</i>	66.6	88.8	77.7
<i>Promotion of wind energy</i>	83.3	66.6	74.9

Source: INDC Perception Survey, ACD 2017

PREFERENCE ON STRATEGIES TO REDUCE CARBON FOOTPRINT

The stakeholders were asked to select the best four options to reduce carbon footprints, and here was an interesting mix of responses. While Government and academics selected better city traffic management, smart homes and urban planning as the most efficient ways to reduce carbon footprint, for the NGO employees, smart homes and move towards solar energy were considered as more efficient. Conversely, move towards solar energy was the least popular strategy among the Government and Academics.

TABLE 13: PERCEPTION ON STRATEGIES TO REDUCE CARBON FOOTPRINT IN BANGLADESH

<i>Strategies to reduce carbon footprints</i>	<i>Government and Academics</i>	<i>Private sector and CSOs</i>	<i>Average</i>
<i>Smart homes (energy efficient homes)</i>	75.0	77.8	76.4
<i>Better city traffic management</i>	91.7	44.4	68.1
<i>Incentivizing energy efficient gadgets at factory</i>	41.7	44.4	43.1
<i>Better urban planning</i>	50.0	33.3	41.7
<i>Moving towards wind energy</i>	33.3	44.4	38.9
<i>Moving towards solar energy</i>	16.7	55.6	36.1

<i>Incentivizing EE gadgets at home</i>	25.0	33.3	29.2
<i>Moving towards hydro energy</i>	25.0	22.2	23.6
<i>Improving rail services</i>	25.0	22.2	23.6
<i>Waste management in cities</i>	16.7	22.2	19.4

Source: INDC Perception Survey, ACD 2017

INDIA

STRATEGIES TO REACH INDC TARGETS

The Government of India has planned several strategies in accordance with their INDC pledges. Table 14 shows that in India, both Government and NGO groups consider energy audits and urban transport system to be the most efficient strategies. The NGO and others group of respondents consider a) using rewards to make firms energy efficient, b) energy pricing to promote renewable energy, c) interest subsidy for energy efficient investments, d) tax free import of energy efficient gadgets to be important strategies. The Government and Academics group also have shown the same preference except regarding tax free import of gadgets. Both Government and NGO groups consider standardizing gadgets to be the least important followed by economic growth remaining a priority.

TABLE 14: STRATEGIES TO FULFIL INDC PROMISES IN INDIA

<i>Strategies to fulfill INDC Promises</i>	<i>Government and Academics</i>	<i>Private sector and CSOs</i>	<i>Average</i>
<i>Energy audits are required for improving energy efficiency</i>	100	100	100
<i>Urban transport system for energy efficient cities</i>	100	100	100
<i>Using rewards to make firms energy efficient</i>	85.8	100	92.9
<i>Energy pricing to promote renewable energy use</i>	85.8	91	88.4
<i>Interest subsidy for EE investments</i>	85.7	90.9	88.3
<i>Tax free import of EE gadgets</i>	42.8	90.9	66.8
<i>Economic growth remains a priority</i>	64.3	63.7	64
<i>Standardizing gadgets</i>	35.7	36.4	36

Source: INDC Perception Survey, ACD 2017

PERCEPTION OF ENERGY EFFICIENT TECHNOLOGIES

Regarding the general perception on energy efficient technologies in the market, it appears that in India both government and non-government respondents have sufficient information on presence of solar lights and wind based energy as energy efficient technologies in the country. On the other hand, while nearly 91% of entrepreneurs and NGO think that people have information on energy efficient lights in the market only 57% of the Government and Academic group think the same way.

TABLE 15: PERCEPTION ON ENERGY EFFICIENT TECHNOLOGIES IN INDIA

<i>Strategies</i>	<i>Government and Academics</i>	<i>Private sector and CSOs</i>	<i>Average</i>
<i>Solar lights are efficient option for alternate power</i>	71.5	81.8	76.7
<i>Wind based power is an efficient option for alternate power</i>	71.5	81.8	76.7
<i>People are aware of energy efficient lights</i>	57.1	90.9	74
<i>There is emphasis on better rail transport system</i>	64.3	72.7	68.5
<i>Energy efficient consumer durables are not available</i>	57.1	54.6	55.9
<i>EE building codes not developed yet</i>	57.1	54.6	55.9
<i>There is emphasis on better river transport system</i>	35.7	45.5	40.6
<i>EE fans are not in market</i>	21.4	45.5	33.5

Source: INDC Perception Survey, ACD 2017

PERCEPTION ON GHG EMISSION REDUCTION STRATEGIES

In terms of knowledge on the government actions to reduce emission, Table 16 shows nearly 92% of the respondents are aware about this government strategy. This is 80% for solar home systems and 71% for solar irrigation projects. Very few had idea about the government plan to introduce super critical technology as mandatory for ultra mega power projects in India. On waste to energy projects of the government, non-government group have far less awareness than that of government and academic group.

TABLE 16: LEVEL OF AWARENESS ON GHG EMISSION REDUCTION STRATEGIES OF THE INDIAN GOVERNMENT

<i>Emission Reduction Strategies</i>	<i>Government and Academics</i>	<i>Private sector and CSOs</i>	<i>Average</i>
<i>Promoting electricity using roof top solar in buildings</i>	92.9	90.9	91.9
<i>Promoting SHS</i>	85.7	72.7	79.2
<i>Promoting solar irrigation projects</i>	78.6	63.6	71.1
<i>Promoting waste to energy</i>	85.7	54.5	70.1
<i>Super critical technology as mandatory for Ultra Mega Power Projects</i>	35.7	27.3	31.5

Source: INDC Perception Survey, ACD 2017

PRIORITIZING EMISSION REDUCTION STRATEGIES

On prioritization of emission reduction strategies, Table 17 shows that 83% in India think that improved cooking stove should be a priority to reduce GHG emission and it is followed by solar mini grid technology, and energy audits in factories. Rooftop solar, solar home system in off-

grid areas, wind energy are liked mostly by government and academic group but not as much by the non-government groups.

TABLE 17: PRIORITIZING GHG EMISSION REDUCTION STRATEGIES IN INDIA

Strategies	Government and Academics	Private sector and CSOs	Average
<i>Promotion of improved cooking stoves in rural areas</i>	92.8	72.7	82.7
<i>Promotion of solar mini grids</i>	85.7	63.6	74.6
<i>Energy audits in factories</i>	78.5	63.6	71.1
<i>Promotion of roof top electricity in cities</i>	85.7	54.5	70.1
<i>Promotion of SHS in off grid area</i>	85.7	54.5	70.1
<i>Promotion of wind energy</i>	85.7	54.5	70.1
<i>EE power production</i>	85.7	54.5	70.1
<i>modernization of power plants</i>	85.7	54.5	70.1
<i>Promotion of solar irrigation projects</i>	71.4	63.6	67.5
<i>Standardizing energy efficient gadgets</i>	71.4	63.6	67.5
<i>Promotion of waste to energy projects for municipalities</i>	57.1	63.6	60.3

Source: INDC Perception Survey, ACD 2017

MISSIONS DIRECTED TO REDUCE EMISSIONS

In order to reach the energy reduction target in India, the Government outlined eight core missions covering protection of environment from degradation, better capacity building of institutions and sustainable approach towards economic growth. Questions on the level of awareness on these missions to find the three most preferred missions reveals that only 45% of the non-government players are aware of these missions. However, preferred three missions area a) National solar mission, b) National mission for sustainable agriculture, and c) National mission on Strategy knowledge for climate change (see Table 18).

TABLE 18: PERCEPTION ON NATIONAL MISSIONS TO REDUCE GHG EMISSIONS

<i>National Missions to reduce GHG emissions</i>	Government and Academics	Private sector and CSOs	Average
<i>Awareness of core missions</i>	78.6	45.5	62.0
<i>National Solar Mission</i>	50.0	54.6	52.3
<i>National Mission for Sustainable Agriculture</i>	42.9	54.6	48.7
<i>National Mission on Strategy Knowledge for Climate Change</i>	42.9	45.5	44.2
<i>National Mission for Enhanced Energy Efficiency</i>	50.0	36.4	43.2
<i>National Mission on Sustainable Habitat</i>	28.6	45.5	37.0

<i>National Missions to reduce GHG emissions</i>	<i>Government and Academics</i>	<i>Private sector and CSOs</i>	<i>Average</i>
<i>National Mission for Green India</i>	21.4	36.4	28.9
<i>National Water Mission</i>	35.7	18.2	26.9
<i>National Mission for Sustaining Himalayan Ecosystem</i>	28.6	9.1	18.8

Source: INDC Perception Survey, ACD 2017

Furthermore, besides the eight mentioned missions, four other missions with clearly specified targets were also mentioned in the Government of India report. Over half of the respondents from both groups of respondents were aware of integrated coastal resource management. Interestingly, while government and academicians were aware of the target to generate 50-60GW wind power by 2022, only 27% of the NGO respondents answered the same. Both groups were comparatively less aware of the five waste to energy projects planned, to reduce additional capacity of 312MW.

MALDIVES

STRATEGIES FOR INDC PROMISES

TABLE 19: PERCEPTION ON AWARENESS ON STRATEGIES FOR INDC PROMISES IN MALDIVES

<i>Strategies</i>	<i>Government and Academics</i>	<i>Private sector and CSOs</i>	<i>Average</i>
<i>Principle of rewards for efficient transport sector</i>	100	100	100
<i>Tax free energy efficient gadgets</i>	100	90.9	95.5
<i>Energy pricing to promote renewable energy use</i>	100	90.9	95.5
<i>Awareness is important to make customers energy efficient</i>	90	100	95
<i>Economic growth remains a priority</i>	100	81.9	91
<i>Interest subsidy for energy efficient investments</i>	90	90.9	90.5
<i>Urban transport system for energy efficient cities</i>	90	81.8	85.9
<i>Standardizing gadgets</i>	60	63.7	61.9
<i>Awareness program to increase energy efficiency in daily life</i>	40	18.2	29.1

Source: INDC Perception Survey, ACD 2017

As the table above shows, respondents of the two groups from Maldives were well aware and supportive of an introduction of principle of rewards for efficient transport sector. The most favoured strategies were also energy pricing to promote renewable energy use, awareness to make customers more energy efficient, tax free energy efficient gadgets and energy pricing to promote renewable energy use. The least preferred

strategy by both group was creating awareness program to increase energy efficiency.

PERCEPTION ON ENERGY EFFICIENT TECHNOLOGIES

Respondents of both groups considered solar based lighting as an efficient option for industries, while wind based power had divided supporters with only 18% of NGO and CSO respondents supporting it while 70% of government and academics supported this. It was widely agreed that energy efficient building codes were not developed yet and that people were aware of energy efficient lights. A very small percentage of both groups agreed that there was now an emphasis on better sea transport system than before, which perhaps meant this emphasis must be increased.

TABLE 20: PERCEPTION ON ENERGY EFFICIENT TECHNOLOGIES AVAILABLE IN MALDIVES

<i>Energy efficient technologies</i>	<i>Government and Academics</i>	<i>Private sector and CSOs</i>	<i>Average</i>
<i>Solar based lighting an efficient option for industries</i>	100	90.9	95.45
<i>People are already aware of energy efficient lights</i>	90	90.9	90.45
<i>Energy efficient building code is not developed yet</i>	80	90.9	85.45
<i>Energy efficient motors are still not available in the market</i>	70	54.6	62.3
<i>Energy efficient fans are not available in the market</i>	60	36.4	48.2
<i>Wind based power is an efficient option for industries</i>	70	18.2	44.1
<i>There is emphasis on better rail transport system</i>	50	36.4	43.2
<i>There is emphasis on better sea transport system</i>	40	36.4	38.2

Source: INDC Perception Survey, ACD 2017

PERCEPTION ON GOVERNMENT STEPS TO REDUCE GHG EMISSIONS

Among the actions undertaken by the Government of Maldives to reduce GHG emissions respondents were least aware of planned acceleration of sustainable private investment in renewable energy. Promotion of waste to energy projects were also not a recognized step among the respondents. Promotion of solar based grid system, however, was the most known action taken by government to fulfil INDC pledges.

TABLE 21: PERCEPTION ON GOVERNMENT ACTIONS TOWARD INDC PLEDGES BY MALDIVES

<i>Government Actions</i>	<i>Government and Academics</i>	<i>Private sector and CSOs</i>	<i>Average</i>
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<i>Promote solar based grid system in Maldives</i>	70	72.7	71.4
<i>Promoting electricity using rooftop solar panels in Government and in private building</i>	70	45.5	57.8
<i>Promoting waste to energy projects</i>	60	27.3	43.7
<i>Planned acceleration of Sustainable Private investment in renewable energy</i>	20	63.6	41.8

Source: INDC Perception Survey, ACD 2017

PRIORITIZING MITIGATION STRATEGIES

Promotion of waste to energy in municipalities, and environment management plan for Hulhumale, were the top two most favoured mitigation strategies by respondents. Apart from these two, Government and academics respondents also considered, undertaking awareness workshops on energy efficiency as an important strategy. On the other hand, respondents from NGO and entrepreneurs group were supportive of standardizing energy efficient gadgets, reducing traffic jams, improving traffic management, energy efficient power production, promotion of roof top electricity, and undertaking of awareness workshop as priority policies to be implemented.

TABLE 22: RANKING MITIGATION STRATEGIES IN MALDIVES

<i>Mitigation Strategies</i>	<i>Government and Academics</i>	<i>Private sector and CSOs</i>	<i>Average</i>
<i>Promotion of waste to energy in municipalities</i>	90	100	95
<i>Environment management plan for Hulhumale</i>	90	100	95
<i>Undertaking awareness on EE through workshop</i>	90	90.9	90.5
<i>Standardizing energy efficient Gadgets</i>	80	90.9	85.5
<i>Reducing traffic jams (in Male)</i>	80	90.9	85.5
<i>Improving traffic management</i>	80	90.9	85.5
<i>Promotion of rooftop electricity in cities</i>	80	90.9	85.5
<i>Promotion of SHS in remote and off-grid areas</i>	80	81.8	80.9
<i>Energy efficient power production</i>	70	90.9	80.5
<i>Promotion of Solar mini grids</i>	70	81.8	75.9
<i>Promotion of Solar irrigation pumps</i>	70	81.8	75.9
<i>Promotion of wind energy</i>	80	63.6	71.8

Source: INDC Perception Survey, ACD 2017

PREFERENCE ON STRATEGIES TO REDUCE CARBON FOOTPRINT

Among the options of strategies given to respondents to reduce carbon footprint, most preferred strategies were roof top solar for grid and for home connections but solar mini grids system didn't receive as much support as the other two. Urban transportation and waste to energy

projects received more support from NGOs and entrepreneurs than government and academic respondents as preferred strategies for Maldives for a lower carbon footprint economy.

TABLE 23: SELECTING STRATEGIES TO REDUCE CARBON FOOTPRINT

<i>Carbon footprint reducing strategies</i>	<i>Government and Academics</i>	<i>NGO/CSO/ Entrepreneurs</i>	<i>Maldives</i>
<i>Roof top solar for grid connection</i>	90	72.7	81.4
<i>Roof top solar for home connection</i>	90	72.7	81.4
<i>Urban transportation</i>	50	72.7	61.4
<i>Waste to energy</i>	50	63.6	56.8
<i>Awareness building programs</i>	50	54.6	52.3
<i>Efficient building construction code</i>	60	36.4	48.2
<i>Expansion of rail transport network</i>	20	63.6	41.8
<i>City waste management</i>	40	27.3	33.6
<i>Development of traffic management</i>	30	27.3	28.6
<i>Solar mini grids</i>	20	9.1	14.5

Source: INDC Perception Survey, ACD 2017

NEPAL

STRATEGIES FOR INDC PLEDGES

Nepal government had outlined its strategies to fulfil its target of emission reduction in INDC document. Table 24 reveals a general agreement developing an urban transport system to build energy efficient cities in Nepal to reduce carbon emission. This is followed by promoting energy efficient investment using low interest loans, giving rewards to companies using energy efficient technology, and also introducing net-metering to use rooftop as the solar power generation. Government and academic group also think that energy pricing should be used in industries as an incentive to reduce carbon emission.

TABLE 24: STRATEGIES TO FULFIL INDC PROMISES IN NEPAL

<i>Strategies</i>	<i>Government and Academics</i>	<i>Private sector and CSOs</i>	<i>Average</i>
<i>Urban transport system to build EE cities</i>	100	100	100
<i>Low interest loan for EE investment</i>	93.8	100	96.9
<i>Rewards to promote energy efficient technology</i>	87.5	100	93.7
<i>Net metering to promote solar energy</i>	81.3	100	90.6
<i>Tax free import of EE gadgets</i>	68.8	75	71.9
<i>Energy pricing in industries</i>	93.8	50	71.9
<i>Standardizing gadgets</i>	75.1	50	62.5

Source: INDC Perception Survey, ACD 2017

PERCEPTION ON ACCESS TO ENERGY EFFICIENT TECHNOLOGIES

The results of the survey further reveals that majority of the respondents agree that energy efficient building codes do not exist in Nepal. Most of the private players also think that energy efficient motors also do not exist in the market. Opinion among private players are divided on whether solar lights are an efficient option for industries. At the same time, while nearly 75% of them think that people are aware of energy efficient lights, it is not thought so among the government and academic respondents.

TABLE 25: OPINION ON ENERGY EFFICIENT TECHNOLOGIES IN NEPAL

Energy Efficient Technologies	Government and Academics	NGO/CSO/ Entrepreneurs	Average
Energy efficient building codes not developed yet	87.5	75.0	81.3
Energy efficient motors not in market	56.3	75.0	65.7
People are aware of energy efficient lights	50.1	75.0	62.6
Solar lights are efficient option for industries	62.6	50.0	56.3
Energy efficient fans are not in market	56.3	50.0	53.2
There is emphasis on better electric transport system	68.8	25.0	46.9
There is emphasis on better rail transport system	62.6	25.0	43.8
Wind based power is an efficient option	37.5	50.0	43.8

Source: INDC Perception Survey, ACD 2017

PERCEPTION ON GOVERNMENT STEPS TO REDUCE GHG EMISSIONS

Regarding the actions of the Government of Nepal to reduce GHG emission, there is very low level of awareness on the strategy of reducing energy intake at the Brick Kiln and on solar irrigation pumps. The highest level of awareness exists on the government action on waste to energy projects and on rooftop solar projects (see Table 26).

TABLE 26: PERCEPTION ON GOVERNMENT ACTIONS IN NEPAL

Government Actions	Government and Academics	Private sector and CSOs	Average
Promote waste to energy projects	93.8	100	96.9
Promote electricity through roof top solar systems in building	93.8	100	96.9
Solar Home Systems in off grid areas	75	100	87.5
Promote biogas and improved cook stoves	100	75	87.5
Reduce energy intake in brick kilns by EET	37.5	75	56.2
Promote solar water irrigation pumps	62.5	50	56.2

Source: INDC Perception Survey, ACD 2017

PRIORITIZING MITIGATION STRATEGIES

Table 27 shows ranking of various government policies on a scale of their importance to implement. Both groups considered a) reducing traffic jams in cities, b) upgrading urban bus services, c) promotion of mini and micro hydro power in off grid areas, d) promotion of bio gas, and e) promotion of climate friendly agriculture to be the most important strategies of all with 100% of all respondents from NGO/CSO and over 95% of Government and Academics respondents agreeing to it. Promotion of wind energy in aggregate was the least preferred strategy. Interesting contradiction was noticeable regarding promotion of solar home systems in off grid areas, with this option getting the least preference from the Government and academics, while over 90% of NGO/CSO respondents preferred this.

TABLE 27: PERCEPTION ON MITIGATION STRATEGIES

	<i>Government and Academics</i>	<i>Private sector and CSOs</i>	<i>Average</i>
Reducing traffic jams in cities	93.8	100	96.9
Upgrading Urban bus services	93.8	100	96.9
Promotion of mini and micro hydro in off-grid areas	93.8	100	96.9
Development of fast track roads	87.5	100	93.8
Energy audits in factories	87.5	100	93.8
Promotion of improved cooking stoves in rural areas	87.5	100	93.8
Promotion of solar irrigation projects	81.3	100	90.6
Fuel switching for brick kilns	75	100	87.5
Promotion of waste to energy projects in municipalities	93.8	75	84.4
Promotion of solar mini grids	87.5	75	81.3
Promotion of roof top electricity in cities	81.3	75	78.1
Establishing metro in Kathmandu	75	75	75
Standardizing energy efficient gadgets	87.5	50	68.8
Implementation of REDD+ programs	56.3	75	65.6
Promotion of SHS in off-grid areas	34	93.8	63.9
Promotion of wind energy	43.8	75	59.4

Source: INDC Perception Survey, ACD 2017

DISCERNING THE ABILITY TO FULFIL TARGETS

Questions were asked with the targets of INDC stated, aimed towards finding how likely people considered the government to be capable of reaching the targets. Table 28 shows that respondents from NGO and entrepreneurs group, in general had more faith in government reaching the targets than respondents from government and academics group. Over

90% of respondents considered Government to be very likely at improving cooking stoves in rural areas. While NGO group respondents considered maintaining 40% of total area of Nepal as forest area to be an achievable target, the Government respondents did not wholeheartedly agree. Increasing share of biogas in rural and reducing air pollution by 2020 were considered most likely to be achieved according to Government and Academics.

TABLE 28: PERCEPTION ON PROGRESS MADE SO FAR IN NEPAL

<i>Actions of the Government of Nepal</i>	<i>Government and Academics</i>	<i>Private sector and CSOs</i>	<i>Average</i>
<i>Improved cooking stoves at every rural household</i>	81.3	100	90.7
<i>Maintaining 40% of total area as forests</i>	75.1	100	87.6
<i>80% electrification from 1% currently through renewable energy by 2050</i>	68.8	75	71.9
<i>Generation of 12000MW from 800 MW currently from hydroelectricity by 2030</i>	68.8	75	71.9
<i>Increasing share of biogas in rural areas to 10%</i>	87.5	50	68.8
<i>Reduce air pollution by 2025</i>	87.5	50	68.8
<i>Generation of 2100MW of solar energy by 2030</i>	37.5	75	56.3
<i>Generating 4000MW from 800 MW currently from hydroelectricity by 2020</i>	37.5	50	43.8
<i>Develop electric rail system by 2040</i>	62.6	25	43.8

Source: INDC Perception Survey, ACD 2017

PREFERENCE ON STRATEGIES TO REDUCE CARBON FOOTPRINT

In response to strategies regarding the reduction of carbon footprint, much divergence could be seen, both within the groups and among them. Mini and micro hydroelectricity was the most favoured strategy by NGO and entrepreneurs, followed by development of efficient traffic management, city waste management for energy and mega hydroelectricity projects. For government and academics, waste to energy projects and urban transportation improvement projects were the top most preferred strategy, followed by mega hydroelectricity projects, roof top solar for grid and development of efficient traffic management.

TABLE 29: STRATEGIES TO REDUCE CARBON FOOTPRINT IN NEPAL

<i>Strategies</i>	<i>Government and Academics</i>	<i>Private sector and CSOs</i>	<i>Average</i>
<i>Mini and micro hydroelectricity</i>	25	75	50
<i>Mega hydroelectricity projects</i>	43.8	50	46.9
<i>Development of efficient traffic management</i>	37.5	50	43.8
<i>Waste to energy projects</i>	50	25	37.5
<i>Urban transportation improvement projects</i>	50	25	37.5
<i>Roof top solar for grid</i>	37.5	25	31.3
<i>City waste management for energy/compost</i>	6.3	50	28.1
<i>Rail and electric networks for transportation</i>	31.3	25	28.1
<i>Increase forest cover</i>	31.3	25	28.1
<i>Improved cooking stoves for rural households</i>	25	25	25
<i>Roof top solar for home</i>	31.3	0	15.6
<i>Efficient building construction</i>	6.3	25	15.6
<i>Solar mini grid/solar irrigation pumps</i>	25	0	12.5

Source: INDC Perception Survey, ACD 2017

PAKISTAN

STRATEGIES FOR INDC PLEDGES

There were several major strategies explained in the INDC document of Pakistan. Table 30 shows that of the strategies set by the Government of Pakistan, the two groups of stakeholders do agree on most of the strategies. Both groups like the idea of using rewards to make firms energy efficient. Government and academic groups also have a strong preference for using energy pricing to promote renewable energy use in Pakistan. (see Table 30).

TABLE 30: PERCEPTION ON INDC PROMISES OF PAKISTAN

<i>Strategies to fulfil INDC promises</i>	<i>Government and Academics</i>	<i>NGO/CSO/ Entrepreneurs and others</i>	<i>Average</i>
<i>Principle reward to make firms energy efficient</i>	95.5	100.0	97.8
<i>Energy pricing to promote renewable energy use</i>	91.0	80.0	85.5
<i>Energy Standards and Labelling is required for energy efficient industries</i>	86.4	80.0	83.2
<i>Subsidized loans for energy efficient investments</i>	86.3	80.0	83.2
<i>Economics growth should remain a priority</i>	81.8	60.0	70.9
<i>Tax free import of energy efficient gadgets</i>	77.3	60.0	68.7

Source: INDC Perception Survey, ACD 2017

PERCEPTION ON ACCESS TO ENERGY EFFICIENT TECHNOLOGIES

Switching to energy efficient technologies (EETs) is an important first step for developing countries to reduce its growth of GHG emissions while not compromising the economic growth strategies of these countries. Most of the actions on these are led by private sectors. Table 31 presents the perception of stakeholders on various EETs. It shows that most people are aware that solar lighting is an energy efficient technology. Level of awareness on energy efficient consumer durables is low.

TABLE 31: PERCEPTION ON AWARENESS ON ENERGY EFFICIENT TECHNOLOGIES IN PAKISTAN

<i>Level of awareness on energy efficiency</i>	<i>Government and Academics</i>	<i>Private sector and CSOs</i>	<i>Average</i>
<i>Solar based lighting is efficient for industries</i>	90.9	100	95.5
<i>EE building codes haven't been developed yet</i>	81.8	80	80.9
<i>Awareness on energy efficient lights</i>	81.8	60	70.9
<i>Wind based power is efficient for industries</i>	50	60	55
<i>Energy efficient fans availability in the market</i>	45.4	60	52.7
<i>Energy efficient consumer durables are not available in the market</i>	63.7	40	51.9
<i>Emphasis on better rail transport system development</i>	45.4	40	42.7

Source: INDC Perception Survey, ACD 2017

PERCEPTION ON GOVERNMENT STEPS TO REDUCE GHG EMISSIONS

Table 32 presents perception of stakeholders on government actions to reduce GHG emissions. It shows that private sector and CSOs are least aware on use of solar irrigation, solar based desalinization and solar water heater to reduce emissions, whereas they are aware of using waste to energy projects, clean coal technology and biogas technologies proposed by the Government of Pakistan.

TABLE 32: PERCEPTION ON GOVERNMENT ACTIONS OF PAKISTAN

<i>Awareness on Government Actions</i>	<i>Government and Academics</i>	<i>Private sector and CSOs</i>	<i>Average</i>
<i>Solar irrigation projects</i>	90.9	60.0	75.5
<i>Promotion of waste to energy projects</i>	77.3	60.0	68.7
<i>Promotion of clean coal technologies</i>	72.7	60.0	66.4
<i>Promotion of Biogas and manures digester for methane reduction and energy production</i>	59.1	60.0	59.6
<i>Roof top solar panels in buildings</i>	77.3	40.0	58.7
<i>Solar water heater in commercial and public buildings</i>	63.6	20.0	41.8

PRIORITIZING MITIGATION STRATEGIES

There are many mitigation strategies proposed in the Pakistan's INDC document. Top 5 mitigation strategies preferred in Pakistan are: a) establishment of metro, b) reducing traffic jams, c) upgrading bus services, d) promotion of rooftop solar panels in cities, and e) modernization of power plants.

TABLE 33: PRIORITIZING MITIGATION STRATEGIES IN PAKISTAN

<i>Important Policies</i>	<i>Government and Academics</i>	<i>Private sector and CSOs</i>	<i>Average</i>
<i>Promotion of roof top solar panels in cities</i>	70.0	60.0	65.0
<i>Establishment of metro</i>	57.1	60.0	58.6
<i>Energy audits in factories</i>	52.6	60.0	56.3
<i>Promotion of solar irrigation projects</i>	52.4	60.0	56.2
<i>Reducing traffic jams</i>	61.9	50.0	56.0
<i>Standardizing gadgets</i>	50.0	60.0	55.0
<i>Modernization of power plants</i>	59.1	50.0	54.6
<i>Upgrading the bus services</i>	59.1	50.0	54.5
<i>Undertaking awareness campaign</i>	54.6	50.0	52.3
<i>Promotion of waste to energy projects</i>	52.4	50.0	51.2
<i>Promotion of climate friendly agriculture</i>	40.9	60.0	50.5
<i>Promotion of wind energy</i>	50.0	50.0	50.0
<i>Development of express roads</i>	23.8	60.0	41.9

Source: INDC Perception Survey, ACD 2017

SRI LANKA

STRATEGIES FOR INDC PLEDGES

Sri Lankan government in their pledges mostly emphasised the energy sector to reduce GHG emissions. Table 34 suggests that solar powered electricity among the top choices by the stakeholders. The private and CSO groups preferred support for mini and micro hydroelectricity projects over waste to energy and demand management strategies which is supported by government and academic groups.

TABLE 34: PERCEPTION ON INDC PLEDGES IN SRI LANKA

<i>Strategies to fulfil INDC promises</i>	<i>Government and Academics</i>	<i>Private sector and CSOs</i>	<i>Average</i>
<i>Solar powered electricity generation</i>	92.4	77.0	84.7
<i>Support for mini and micro hydro power generation</i>	77.0	76.9	77.0

<i>Biomass and waste to energy projects</i>	84.6	61.5	73.1
<i>Demand management type of intervention</i>	84.7	53.9	69.3
<i>Conversion of fuel oil plant to LNG operated</i>	69.2	69.2	69.2
<i>Promotion of large scale wind power</i>	53.9	69.3	61.6
<i>Increase in share of hydro power</i>	76.9	23.1	50.0

Source: INDC Perception Survey, ACD 2017

PERCEPTION ON ACCESS TO ENERGY EFFICIENT TECHNOLOGIES

Adoption of energy efficient technologies at home, offices and industries are important for reducing emissions. Table 35 shows that establishment of an energy friendly transport system is preferred by both groups of stakeholders. This is followed by encouraging park and ride system for commuters, rehabilitating railway systems, and upgradation of fuel standards. Private sector and CSOs also revealed more liking towards introducing bus rapid transit system then others as an energy efficient mechanism of transportation.

TABLE 35: PERCEPTION ON ENERGY EFFICIENT TECHNOLOGIES IN SRI LANKA

<i>Level of awareness on energy efficiency</i>	<i>Government and Academics</i>	<i>Private sector and CSOs</i>	<i>Average</i>
<i>Establishment of energy efficient and environmentally sustainable transport system</i>	100.0	84.7	92.4
<i>Introducing 'park and ride' system</i>	92.3	84.7	88.5
<i>Rehabilitating Kelani valley railway line</i>	84.6	92.3	88.5
<i>Upgrading fuel standard to reduce GHG emissions</i>	92.3	77.0	84.7
<i>Introduction of BRT system</i>	92.3	76.9	84.6
<i>Encouraging low emission vehicles</i>	92.3	76.9	84.6
<i>Introducing BRT in Galle road</i>	69.3	92.3	80.8
<i>Reducing unproductive vehicles</i>	84.6	77.0	80.8
<i>Introduction of electric buses</i>	69.3	69.3	69.3
<i>Electrifying three wheelers to reduce emissions</i>	77.0	53.9	65.5
<i>Introducing electrified boat service for inland water canals</i>	53.9	53.9	53.9

Source: INDC Perception Survey, ACD 2017

PERCEPTION ON GOVERNMENT STEPS TO REDUCE GHG EMISSIONS

On the steps taken by the Sri Lankan government to reduce GHG emissions, our stakeholders' survey suggest that promoting investment for environmental conservation projects by companies, establishment of forest monitoring system, restoring degraded forests and/or forestations are most preferred compared to the government's policy of expanding solar and micro hydro projects in Sri Lanka.

TABLE 36: PERCEPTION ON GHG REDUCTION STRATEGIES OF SRI LANKA

<i>Proposed government actions</i>	<i>Government and Academics</i>	<i>Private sector and CSOs</i>	<i>Average</i>
<i>Promote investment for environmental conservation projects by companies</i>	92.4	92.3	92.4
<i>Increase river basin management from major rivers</i>	100.0	84.6	92.3
<i>Establish a functional national forest monitoring system</i>	92.3	92.3	92.3
<i>Improve quality of growing stock of natural forests</i>	92.3	84.7	88.5
<i>Restoring degraded forests and hilltops</i>	92.3	84.6	88.5
<i>Forestation of underutilized private lands and marginal tea lands</i>	92.4	77.0	84.7
<i>Urban forestry(roadside planting)</i>	84.7	84.6	84.7

Source: INDC Perception Survey, ACD 2017

PREFERENCE ON STRATEGIES TO REDUCE CARBON FOOTPRINT

To reduce carbon footprint of Sri Lanka the choices in Sri Lanka vary significantly from that of embedded in the INDC pledges. In the INDC document, Sri Lankan government mostly promised to promote solar energy and mini or micro hydro projects to reduce their carbon footprint. However, Table 37 suggests that most preferred options are: a) solar grid connection using rooftop solar panels, b) improving traffic management, c) improving urban transportation services, d) solar home systems, e) wind energy based power plants, f) waste to energy projects and so on.

TABLE 37: PERCEPTION ON REDUCING CARBON FOOTPRINT IN SRI LANKA

<i>Strategies to reduce carbon footprint</i>	<i>Government and Academics</i>	<i>Private sector and CSOs</i>	<i>Average</i>
<i>Rooftop solar for grid connection</i>	76.9	61.5	69.2
<i>Development of efficient traffic management</i>	53.9	53.9	53.9
<i>Urban transportation improvement projects</i>	61.5	46.2	53.8
<i>Rooftop solar for home connection</i>	46.2	38.5	42.3
<i>Large scale wind power plants</i>	30.8	46.2	38.5
<i>Waste to energy projects</i>	30.8	46.2	38.5
<i>Efficient building construction</i>	38.5	23.1	30.8
<i>Solar mini grid</i>	15.4	30.8	23.1
<i>City waste management for energy or compost</i>	15.4	23.1	19.2
<i>Electrification of rail</i>	15.4	15.4	15.4
<i>Mini and micro hydro power plants</i>	7.7	7.7	7.7
<i>Improved cooking stove</i>	0.0	7.7	3.8
<i>Promote in-land canals waterways</i>	7.7	0.0	3.8

Source: INDC Perception Survey, ACD 2017

GENERAL CONCLUSIONS

Countries in South Asia share a very similar ecosystem and a very similar heritage and history. The quality of governance in these countries are also similar. Under the Paris Agreement, the global communities agreed to share responsibilities in reducing emissions to prevent aggravating consequences in terms of increase in earth's surface temperature.

Consequently, all the South Asian countries pledged to reduce their GHG emissions over the next decades. The global communities on the other hand, also agreed to provide financial and technical assistance to these economies. An efficiency argument, in this regard, is to find the least costly solution for reducing carbon emissions and for this, reducing GHG emissions in energy-inefficient economies is the best set of options.

Reducing emissions, however, requires investment in energy efficient technologies as well as developing efficient energy markets. In all of these countries, energy is a highly regulated sector with government controls at different levels. As such, effort by these countries to reduce GHG emissions will require significant investment by the government institutions. All the South Asian countries are rated poorly in the Corruption Perception Index of Transparency International. For example, CPI 2016 suggests that CPI for Bangladesh, India, Maldives, Nepal, Pakistan and Sri Lanka are 26, 40, 36, 29, 32, and 36 respectively. According to TI, any score below 43 (the average value of the index) implies that the countries are likely to be infested with a high degree of corruption in the public sector of these countries.

Therefore, this diagnostic study is an attempt to see how the strategies for reducing GHG emissions in these countries fare with stakeholders' perception. GHG emissions are directly linked with production and consumption pattern in an economy. In general, there are two classic strategies to improve efficiency in production and consumption: a) regulating the production and consumption using command-and-control strategies, and b) incentivising the private sectors for amending their consumption and production behaviour towards energy efficiency so that more production/consumption may continue with reduced GHG emissions. Furthermore, there are two distinct approaches in developing incentives for private sector. First, increasing availability of public goods that are complementary to private production and consumption through efficient energy production, and second, creating financial incentives to

promote energy substitutions or energy efficiency in the private sector for both consumption and production.

It has been commonly argued that developing countries lack in resources and so energy efficiency can be achieved through investments in such a way that provisioning of public goods can be increased. This includes provisioning for alternative energy, energy switching, investment in urban infrastructure including transportation, energy production, etc. All the six South Asian countries have developed strategies like these so that large scale investments are required. All of these countries have also requested for access to global resources to ensure that these investments are made and that countries can reduce their GHG emissions.

The stakeholder's survey, in this study, provided an alternative to these. It shows that while there is not much opposition to the pledges made by their governments, the choice of instruments differs between government pledges in the INDC and stakeholders' perceptions.

TABLE 38: STAKEHOLDERS’ PERCEPTIONS ON GHG MITIGATION STRATEGIES IN SOUTH ASIA

<i>Bangladesh</i>	<i>India</i>	<i>Maldives</i>	<i>Nepal</i>	<i>Pakistan</i>	<i>Sri Lanka</i>
<i>Interest subsidy for Energy Efficient Gadgets/ Investments</i>	<i>Energy audits for improving energy efficiency in industries</i>	<i>Appropriate pricing to improve energy efficiency in transport sector</i>	<i>Investment in urban transport system for cities</i>	<i>Incentives to firms to invest in energy efficient gadgets</i>	<i>Solar powered electricity generation</i>
<i>Energy audits for improving energy efficiency in industries</i>	<i>Investment in urban transport system for cities</i>	<i>Tax free import of energy efficient gadgets</i>	<i>Interest subsidy for Energy Efficient Gadgets/ Investments</i>	<i>Appropriate pricing for improving energy efficiency in transport sector</i>	<i>Support for mini and micro hydro power generation</i>
<i>Waste to fertilizer in urban areas</i>	<i>Using rewards to make firms energy efficient</i>	<i>Energy pricing to promote renewable energy use</i>	<i>Rewards to promote energy efficient technology</i>	<i>Energy Standards and Labeling is needed</i>	<i>Biomass and waste to energy projects</i>

Table 38 shows that out of the 18 best choices picked up by the stakeholders, 10 of the strategies involved providing economic incentives to private and public sector to make them energy efficient and also reduce their GHG emission footprint. Five of the suggested strategies involve direct investments to reduce GHG footprint, and three are linked to regulating the industries to make them energy efficient.

In terms of direct investment, Bangladeshi stakeholders’ best choice is to promote urban waste to fertilizer production in urban areas to reduce GHG emissions. Indian and Nepalese stakeholders’ choice is to invest in urban transport system to make it energy efficient, and Sri Lankan perception is to invest in renewable energy production. Clearly, these strategies are less costly compared to many of the investment strategies suggested in the INDC documents of these countries.

Providing direct subsidy, reducing taxes or custom duties on energy efficient gadgets is another major alternative through which these countries can reduce their GHG footprint and these policies came out very strongly by stakeholders in all of the six countries. There is less appetite in the governments of these countries to do so since these do not involve

public procurements! However, stakeholders in all the countries suggest that these policies should be implemented to reduce GHG emissions.

Finally, Indian and Bangladeshi stakeholders also wanted to introduce regulatory incentives using energy audits to promote energy efficient production in industries. This is a great policy and will reduce GHG footprint.

Table 39 decomposes the choices from the point of view of private sector and CSO (including NGO) groups. It shows that out of 18 best policies suggested by them 11 of them are related to promoting GHG reduction using market based incentives, 1 of them is related to regulatory incentives, 1 of them is related to developing awareness and the other 5 are linked to investments. Interestingly, however, in most of the investments private sectors play a major role.

Clearly, this study provides an alternative approach to mitigation strategies for governments in South Asia. Given the level of corruption that persists in these countries, a more prudent policy alternative is to use economic incentives to promote energy efficient production and consumption.

TABLE 39: PRIVATE SECTOR AND CSO’S PERCEPTION ON REDUCING GHG FOOTPRINTS IN SOUTH ASIA

<i>Bangladesh</i>	<i>India</i>	<i>Maldives</i>	<i>Nepal</i>	<i>Pakistan</i>	<i>Sri Lanka</i>
<i>Interest subsidy for Energy Efficient Gadgets/ Investments</i>	<i>Energy audits for improving energy efficiency in industries</i>	<i>Making consumers aware on energy efficiency in production and consumption</i>	<i>Net metering to promote solar energy in grids</i>	<i>Incentives to firms to invest in energy efficient gadgets</i>	<i>Investment in renewable energy production</i>
<i>Incentives to make firms energy efficient</i>	<i>Incentives to make firms energy efficient</i>	<i>Appropriate pricing to improve energy efficiency in transport sector</i>	<i>Incentives to make firms energy efficient</i>	<i>Appropriate pricing for improving energy efficiency in transport sector</i>	<i>Incentives for renewable energy production using mini and micro hydro power projects</i>
<i>Waste to fertilizer in urban areas</i>	<i>Urban transport system for cities</i>	<i>Urban transport system for energy efficient cities</i>	<i>Interest subsidy for Energy Efficient Gadgets/ Investments</i>	<i>Subsidized loans for energy efficient gadgets</i>	<i>Conversion of fuel from petroleum products to LNG</i>

The study therefore, concludes the followings:

- GHG emission reduction policies suggested by the governments in South Asia require a thorough scrutiny in the light of stakeholders' perception and reprioritize their action plan for GHG reduction.
- Incentive based policies to promote energy efficient production and consumption should be prioritized to reduce GHG emissions in these countries.
- Development partners should provide assistance to these countries to examine their public policies in terms of tax, subsidy and other regulations to create incentives for firms to become energy efficient and thus contribute to reduce GHG emission.

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