Vol. 2 |No.2 & 3| April-September 2022 ISSN 2583-4878

G20 Digest

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Editorial Board

Editorial Advisory Board

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Vol.2 | No.2 & 3 | April-September 2022

Published in 2022 by:

RIS
Research and Information System for Developing Countries
विकासशील देशों की अनुसंधान एवं सूचना प्रणाली

Core IV–B, Fourth Floor, India Habitat Centre
Lodhi Road, New Delhi–110 003, India
Ph.: +91–11–24682177–80, Fax: +91–11–24682173–74
E–mail: dgoffice@ris.org.in
Website: www.ris.org.in

ISSN 2583-4878

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Vol.2 | No.2 & 3 | April-September 2022

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Climate Action: Toward an Equitable Transition Roadmap

In its 'Call for Action', the Brundtland Commission, about 36 years ago, stressed the need "….to keep options open for future generations, the present generation must begin now, and begin together, nationally and internationally". Since then a lot of efforts have gone into spread awareness about climate change, financing climate adaptation and mitigation, and making climate action a topmost policy priority by the governments around the world. Subsequently, the United Nations Conference on Climate Change (COP) happening since 1995 became an institutional multilateral platform which later led to the Paris Agreement, signed by 196 parties at COP21 in 2015. In addition, national efforts have been envisaged by countries across the world at different points of time at varying pace.

While success in creating wider climate consciousness and prompting national, regional and global campaigns on climate change are observed worldwide; more vigorously in recent years; perhaps time has come to assess the orientation and direction towards which the world is heading on. Indian Presidency of G20 aims to strengthen G20 efforts toward climate adaptation and energy transition along with thrust on accelerating Sustainable Development Goals (SDGs).

In that perspective, this issue of G20 Digest covers three papers capturing diverse reflections on just transition, sustainability and green trade. The attempt is to understand the enablers of just transition and the future roadmap especially through the trade channel. In addition, other papers capture the overall performance of G20 over time particularly in infrastructure and financial sectors. We believe the scholarly debates on the above mentioned areas would promote informed debate and inspire further research and analysis.

Enjoy reading it.

Priyadarshi Dash
Managing Editor

Research Article

G20 Initiatives in Infrastructure Investment & Finance: Progress and Shortfalls

G20 Digest
Vol. 2, No.2&3, pp 3-29,
April-September, ©2022,
Research and Information System for Developing Countries (RIS).

G. A. Tadas*

Abstract: The historical account of deliberations on infrastructure reveals that G20 Presidencies have time again recognized infrastructure as a key driver of economic prosperity. Starting from the Cannes declaration in 2011 adopting a High Level Panel (HLP) recommendations to scale up and diversify sources of financing for infrastructure and the MDBs Action Plan to address bottlenecks, to 'Roadmap to Infrastructure as an Asset Class' and G20 principles for Quality Infrastructure Investment' in the recent G20 Presidencies, several initiatives have been taken to push the agenda of infrastructure investment and development. Further, data gaps and the need for building sound database for infrastructure investment have also been discussed. However, private investment in infrastructure has remained stagnant and lower than it was 10 years ago. The decadal experience shows that country-wise data gaps galore and need priority attention to track infrastructure development and investment in developing countries especially in Africa and Low-income countries. The LCBMs are underdeveloped and asset based financing & blended financing are yet to pick up pace in a significant way towards bridging infrastructure investment gaps. There is need for putting in action oriented plans including capacity building, risk assessment and mitigation techniques, creation of platforms facilitating identification of projects and investors, development of LCBMs, embedding ESG criteria in project formulation.

Introduction

Before discussing infrastructure investment and finance, it is imperative to delve into the genesis of G20 as it sets the agenda and mandate for the G20. The major industrial countries' had formed their groupings such as G5 or subsequently G7 to address most global economic problems among themselves during the 1970s, 1980s and early 1990s. However, the Asian financial crisis that started with Thailand in mid-1997,

* Visiting Fellow, RIS for Developing Countries (formerly Executive Director, IDBI Bank). He is thankful to Dr Sachin Chaturvedi, Director General, RIS; Dr S K Mohanty; Mr P. K. Anand; Mr Krishna Kumar; Dr P. Dash; Dr Sabyasachi Saha and other colleagues at RIS for their valuable comments during a presentation on the paper at RIS. He alone is responsible for the views

intensified and spread in the next two years to other important Asian economies, Russia and Latin America. It had become increasingly difficult for the G7 countries to effectively deal with the global issues as their weight in the global economy had declined due to the rapid growth of emerging economies (G20, 2008). The global economy was also becoming more integrated with increasing cross-border trade facilitated by the General Agreement on Tariffs and Trade, now the World Trade Organization (WTO). The liberalisation of domestic capital markets and the opening of capital accounts in many emerging economies was also contributing to the rapid growth of cross-border capital flows. The increasing interdependence of countries consequent to the expansion of cross-border trade and capital flows, and the rise in the exposure of countries to economic and financial shocks emanating elsewhere, underscored the importance of broadening the scope of international economic and financial cooperation.

The Asian financial crisis of 1997 that was the trigger to broaden for enhancing the G7 forum to G20 covering systemically important emerging economies, thus, set a natural bias in focusing on financial stability and sustainable world growth. Since then G20 reflected on diverse issues such as terrorist financing, development and aid, energy and resource security, affecting the global economy from time to time (G20, 2008). Infrastructure investment as such did not receive any attention at the G20 deliberations during these years.

It is seen that the subsequent G20 Presidencies have shifted focus more towards long-term growth and sustainable development issues (G20, 2015; EPRS, 2015).

Cannes Summit 2011 - Infrastructure Receives Focused Attention

The Summit in 2010 adopted 'Seoul Development Consensus for Shared Growth' and called for prompt implementation of 'Multi-Year Action Plan'. For the first time, the G20 adopted a comprehensive set of actions in nine main areas to remove the obstacles to strong, inclusive and sustainable growth in developing countries : infrastructure, human resource development, trade, private investment and job creation, food security, growth with resilience, financial inclusion, domestic resource mobilisation and knowledge sharing.

The FM & CBG of G20 at their meeting in Paris in 2011 welcomed the Multilateral Development Banks' (MDBs) Infrastructure Action Plan and the High Level Panel (HLP) recommendations for promoting enabling environment, diversifying sources of funding and identifying exemplary infrastructure investment projects (G20 FM & CBG Communique, October 2011). The FM & CBG called on the MDBs to pursue implementation of transformational regional infrastructure projects following the criteria set by the HLP and to prioritize project preparation financing. The Cannes Summit under French Presidency in 2011 for the first time explicitly emphasized on the criticality of investment in infrastructure to accelerate growth, achieving millennium development goals (MDGs) and sustainable development. The Leaders' Declaration adopted at Cannes Summit called for investing in infrastructure in developing countries, especially in Low Income Countries (LICs) and supported efforts to improve capacities and facilitate mobilization of resources for infrastructure projects

initiated by public and private sectors (G20 Summit declaration, 2011). The Summit welcomed both the HLP's report and the MDB Action Plan and specifically supported the following:

- development of local capacities to improve supply and quality of projects and make them bankable and enhance knowledge sharing on skills for employment in low income countries.
- High Level Panel (HLP) fellowship program and MDBs' efforts to develop and strengthen regional public-private partnerships practitioner's networks.
- increase quality of information available to investors, through the establishment of online regional marketplace platforms to better link project sponsors and financiers
- prioritize project preparation financing, and the MDBs to dedicate a greater share of their funds to preparation facilities that can operate on a revolving basis.
- contribute to building an enabling environment for private and public infrastructure financing, especially for regional projects.
- improve access to funding, notably through the strengthening of local intermediaries and financial markets, more effective use of MDBs' capital, including through use of credit enhancement and guarantee instruments.

The Cannes Summit marks a beginning of new approach in looking at development goals by recognizing the importance of infrastructure development as a vital ingredient for achieving higher and sustainable growth in developing countries and LICs in particular. It laid down framework for identification of inter-related aspects of infrastructure development starting from identification of projects, development of local capacities to improving supply and quality of projects, establishment of online platforms for linking project sponsors with financiers and providing quality information, imparting skills for project preparation, creating conducive environment for private and public infrastructure financing, and strengthening local financial markets. The G20 leaders also stressed the importance of follow-up action to track progress in these areas and provide updates.

Focus on Development of LCBMs & Project Preparation Facilities

Since the 2011 Cannes Summit, there is continuity in the infrastructure agenda in the subsequent G20 Summits, which included deliberations on ways and means of raising resources for infrastructure investment. The Mexican Presidency during 2012 focused on three priorities areas viz. food security, infrastructure and inclusive green growth. In Los Cabos Summit of 2012, the Leaders recognized that investment in infrastructure is critical for sustained economic growth, poverty reduction, and job creation (G20 Summit declaration, 2012). The Declaration further states that public financing of infrastructure development projects in developing countries remains essential, which should be complemented by private sector investment. The Summit encouraged MDBs to continue progress under the Action Plan and welcomed the Development Working Group (DWG) Report in perceiving the risks posed, as well as the opportunities offered by long-term infrastructure investment in

low income countries. The Report also laid down 'Best Practices for Urban Mass Transport Infrastructure Projects in Medium and Large Cities in Developing Countries'. The FM & CBG meeting held in 2012, recognized the importance of raising resources domestically and the need to develop local currency market. The FM & CBG noted the progress report prepared by World Bank and other International Organizations' (IOs) on implementation of the G20 action plan to support the development of Local Currency Bond Markets (LCBMs) and called for full implementation of the action plan in 2013 to ensure abroad ownership of the diagnostic tool among potential users (G20 FM & CBG Communique, November 2012). The FM & CBG acknowledged the importance of long term financing, particularly for infrastructure investment, and asked the World Bank, IMF, OECD, FSB, UN and relevant International Organisations to undertake further diagnostic work to assess factors affecting long-term investment financing.

The G20 Russian Presidency in 2013 continued to focus on the need for mobilising long-term finances and for development of local currency capital market. The Leaders' Summit at St Petersburg in 2013 reiterated that well -developed LCBMs play an important role in improving resilience of the domestic economy and financial systems. In this regard, the Leaders welcomed the work of the IMF, World Bank, EBRD, OECD and other international organisations to implement the G20 Action Plan on the Development of LCBMs, including through the creation of a Diagnostic Framework on LCBM and urged the countries and concerned organisations to consider the use of the Diagnostic Framework in identifying and setting reform and capacity building priorities in support of LCBM development (G20 Summit declaration, 2013). The FM & CBG re affirmed the importance of long-term financing for investment to boost growth, create jobs and facilitate development and endorsed the work plan on private sector investment flows (G20 FM & CBG Communique, 2013). They took note of the work underway in the World Bank Group (WBG) and Regional Development Banks (RDBs) to mobilize and catalyze additional financing for infrastructure investment.

Achieving Additional 2 Per Cent Increase in G20 GDP : Global Infrastructure Initiative

The G20 under Australian Presidency in 2014 set an ambitious goal of achieving additional 2 per cent increase in G20's GDP by 2018. Towards this end, the Leaders called for increasing global investment, trade and infrastructure to support development, create jobs and promote inclusive growth. The FM & CBG deliberations held in September 2014 covered various facets of infrastructure development like quality infrastructure investment, developing knowledge sharing platforms, addressing data gaps, improving investment climate for private-public investment (FM & CBG Communique, 2014). The Leaders' declaration recognized that tackling global investment and infrastructure shortfalls is crucial to lifting growth, job creation and productivity (G20 Summit Declaration, 2014). The G20 Leaders endorsed the Global Infrastructure Initiative, a multi-year work programme to lift quality public and private infrastructure investment. The Summit also called for addressing data gaps and improve information on project pipelines to help match investors with projects.

The Leaders also committed to work to facilitate long-term financing from institutional investors and to encourage market sources of finance, and encouraged MDBs and national development banks (NDBs) to optimise use of their balance sheets to provide additional lending. G20 Australian Presidency can thus be considered setting new milestones in taking initiatives for infrastructure development, which translated into action oriented decision to establish a Global Infrastructure Hub (GIH). The GIH was mandated to contribute to developing a knowledge-sharing platform and network between governments, the private sector, development banks and other international organisations and foster collaboration among these groups to improve the functioning and financing of infrastructure markets. Another important initiative was taken by the World Bank Group by launching Global Infrastructure Facility (GIF) to strengthen infrastructure and attract more private sector investment in developing countries.

UN Resolution on Addis Ababa Action Agenda (AAAA)

Under the G20 Turkey Presidency in 2015, there was recognition that even after seven years of global financial crisis, the global economic growth was uneven and continued to fall short of expectations. The Summit Leaders reiterated their commitment to achieving G20 GDP by an additional 2 per cent by 2018 as announced in Brisbane Summit in the preceding year. Continuing the agenda on infrastructure development, the FM & CBG meeting held in September 2015 acknowledged the consolidation of best practices in public private partnership (PPP) models, which can address commonly-encountered challenges and welcomed the World Bank PPP guidelines and the OECD/World Bank PPP Project Checklist which provide guidance on international best practices for preparation and implementation of PPPs (FM & CBG Communique, 2015). The FM & CBG also endorsed the business plan of the GIH, which would address data gaps, lower barriers to investment and move engagement with the private sector. The G20 Summit Leaders called for providing a strong impetus to boost investment, particularly through private sector participation and emphasized on improving investment preparation, prioritization and execution processes (G20 Summit declaration, 2015). The Summit called for continued work to improve the investment ecosystem, promote long-term financing, foster institutional investors' involvement, support the development of alternative capital market instruments and encourage MDBs to mobilize their resources, optimize their balance sheets, and catalyze private sector funding.

G20 Leaders expressed strong commitment to implementing the AAAA to support 2030 Agenda for sustainable development and adopted in 2015 to develop an action plan to further align G20 work towards achieving the 2030 Sustainable Development Goals (SDGs).

Emphasis on Quality Infrastructure Investment and Risk Assessment

G20 under China Presidency in 2016 focused on industry by adopting the 'G20 New Industrial Revolution (NIR) Action Plan' to seize opportunities in manufacturing and related services. In this context, the G20 Summit emphasised new industrial infrastructure to support industrialization (G20 Summit declaration, 2016). The FM & CBG

meeting held earlier in July 2016 had reaffirmed commitment to promote investment in infrastructure in terms of both quantity and quality to support the common growth objectives and the 2030 Agenda for Sustainable Development (FM & CBG Communique, 2016). The FM & CBG had noted that MDBs have a unique role in supporting infrastructure investment and called upon them to take joint actions to support infrastructure investment as well as catalyze private investment. In this regard, the FM & CBG welcomed the commitments made in the "Joint Declaration of Aspirations on Actions to Support Infrastructure Investment" by 11 MDBs which included their announcements of quantitative ambitions for high-quality infrastructure projects within their respective institutional mandates and strengthen project pipelines, strengthen the enabling environment for infrastructure investment in developing countries, as well as catalyze private resources. They welcomed the MDB response to the 'G20 MDB Balance Sheet Optimization Action Plan' and launched the Global Infrastructure Connectivity Alliance to enhance the synergy and co-operation among various infrastructure connectivity programs in a holistic way. The FM & CBG also endorsed the 'G20/ OECD Guidance Note on Diversification of Financial Instruments for Infrastructure and SMEs' and the 'PPP Risk Allocation Matrices' completed by the GIH to help developing countries better assess infrastructure risks.

Focus on Private Capital and Roadmap to Infrastructure as Asset Class

During the German G20 Presidency in 2017, the FM & CBG meeting held in March 2017 noted that the global economic recovery was progressing, but the pace of growth was still weak and downside risks for the global economy remained. They reiterated determination to use all policy tools to achieve the goal of strong, sustainable, balanced and inclusive growth. The focus seemed to be more on strengthening the international financial architecture and sustainable financing. The FM & CBGs urged MDBs to complete their reports on the implementation of the MDBs' Balance Sheet Optimisation Action Plan, the MDBs' Joint Declaration of Aspirations on Actions to support infrastructure investment and an update on the Global Infrastructure Connectivity Alliance by the time of the Leaders Summit in July 2017 (G20 FM & CBG Communique, 2017). Following FM & CBG deliberations, G20 Summit leaders focused on international economic and financial cooperation to further strengthen growth and safeguard against downside risks. The Summit endorsed the Hamburg Action Plan which set out the G20's strategy for achieving strong, sustainable, balanced and inclusive growth (G20 Summit declaration, 2017). The Hamburg Action Plan included new policy actions to tackle challenges, focusing on initiatives that foster inclusive growth, enhance resilience and further efforts to implement structural reforms (G20 Hamburg Action Plan, 2017).

The G20 Argentina Presidency in 2018 focused on the future of work, infrastructure for development, and a gender mainstreaming strategy across the G20 agenda. The FM & CBG welcomed progress on the 'Roadmap to Infrastructure as an Asset Class' and to further boost infrastructure investment, they endorsed the 'G20 Principles for the Infrastructure Project Preparation Phase' which would help deliver a pipeline of well-prepared and bankable projects that are attractive to private investors by improving assessments of project rationale, options appraisal, commercial

viability, long-term affordability, and deliverability (FM & CBG Communique, 2018). They suggested that the Private Sector Advisory Group would continue informing the work on the key challenges in attracting private investment to infrastructure. They agreed to extend the mandate of the Global Infrastructure Hub to 2022. While welcoming the MDB Infrastructure Cooperation Platform under Infrastructure Working Group (IWG), they indicated that advice be provided to improve MDB project preparation, standardisation of guarantees and credit enhancement tools, and data availability. The FM & CBG called on the IWG to study the feasibility of new mechanisms to create portfolios of infrastructure assets, including brownfield infrastructure projects, that can attract institutional investors. The Summit leaders reiterated that the global economic growth was strong, but increasingly less synchronized between countries. The infrastructure is a key driver of economic prosperity, sustainable development and inclusive growth. To address the persistent infrastructure financing gap, G20 leaders reaffirmed commitment to attract more private capital and towards this, they endorsed the 'Roadmap to Infrastructure as an Asset Class and the G20 Principles for the Infrastructure Project Preparation Phase'(G20 Summit declaration, 2018). They affirmed taking actions to achieve greater contractual standardization, address data gaps and improve risk mitigation instruments.

Quality Infrastructure Investment & Infrastructure Maintenance

The FM & CBG meeting during Japan Presidency in 2019 emphasised on quality infrastructure and considered infrastructure as a driver of economic growth and prosperity. The FM & CBG stressed the importance of maximizing the positive impact of infrastructure to achieve sustainable growth and development while preserving the sustainability of public finances, raising economic efficiency in view of life-cycle cost, integrating environmental and social considerations and strengthening infrastructure governance (FM & CBG Communique, 2019). They welcomed inter-thematic collaborations and endorsed the 'G20 Principles for Quality Infrastructure Investment' as a common strategic direction and urged further advancement in developing infrastructure as an asset class. The G20 Summit leaders reiterated FM & CBG statement and emphasized that quality infrastructure is an essential part of the G20's ongoing efforts to close the infrastructure gap, in accordance with the Roadmap to Infrastructure as an Asset Class (G20 Summit declaration, 2019).

Infrastructure during Covid and post-Covid period

The G20 under Saudi Arabia Presidency in 2020 had to grapple with the Covid-19 pandemic and its unprecedented impact in terms of lives lost, livelihoods and economies affected. The leaders determined to support all developing and least developed countries, and the specific challenges in Africa and Small Island Developing States (SIDS). The FM & CBG in their virtual meet in October 2020 expressed commitment to implementing the Debt Service Suspension Initiative (DSSI), allowing DSSI-eligible countries to suspend official bilateral debt service payments through end-2020 and review extension as required (FM & CBG Communique, 2020). Despite pre-occupation with

addressing Covid pandemic situation, the Leaders recognised the importance of infrastructure as a driver of growth and prosperity. They endorsed the 'G20 Riyadh InfraTech Agenda', which promotes the use of technology in infrastructure, with the aim of improving investment decisions, enhancing value for money, and promoting quality infrastructure investments for the delivery of better social, economic and environmental outcomes (G20 Summit declaration, 2020). In line with the G20 Roadmap for Infrastructure as an Asset Class, the Summit welcomed the 'G20/OECD Report on Collaboration with Institutional Investors and Asset Managers on Infrastructure Investment', which reflected investors' view on issues and challenges affecting private investment in infrastructure and presented policy options to address them.

The G20 Italy Presidency in 2021 continued its focus on Covid related global health and economic challenges as the pandemic situation continued through 2021. The FM & CBG expressed the need for continuation of DSSI and further assistance to LDCs (FM & CBG Communique, 2021). The G20 Summit reiterated the concerns arising out of continued Covid pandemic which hindered progress towards the 2030 Agenda for Sustainable Development. The Summit also recognized the critical role of quality infrastructure investments in the recovery phase. It was acknowledged that resilient, properly funded, well maintained and optimally managed systems are essential to preserve infrastructure assets over their life-cycles, minimising loss and disruption, and securing the provision of safe, reliable and high-quality infrastructure services. To this end, the G20 Summit endorsed the 'G20 Policy Agenda on Infrastructure Maintenance'. In line with the G20 Roadmap for Infrastructure as an Asset Class, and building on the G20 Infrastructure Investors Dialogue, G20 leaders committed to develop further the collaboration between the public and private investors to mobilise private capital and to advance the work related to the G20 'Principles for Quality Infrastructure Investment'. The Summit leaders agreed to extend the Global Infrastructure Hub mandate until the end of 2024.

The recently concluded G20 Indonesia Presidency 2022 reiterated the importance of revitalizing infrastructure investment in a sustainable, inclusive, accessible, and affordable way. The Summit leaders endorsed the voluntary and non-binding 'G20/GI Hub Framework on How to Best Leverage Private Sector Participation to Scale-up Sustainable Infrastructure Investment' which will consider country circumstances, and complement investment from other sources, including public investment and finance provided by MDBs (G20 Summit Declaration, 2022). The Summit further endorsed the 'G20-OECD Policy Toolkit on Mobilizing Funding and Financing for Inclusive and Quality Infrastructure Investment in Regions and Cities' and the InfraTracker 2.0 which will enable both the public and private sectors towards transformative infrastructure investment post-Covid. The Leaders also endorsed the 'G20 Compendium of Case Studies on Digital Infrastructure Finance: Issues, Practices and Innovations' and 'Quality Infrastructure Investment (QII) Indicators'.

The foregoing historical account of deliberations on infrastructure reveals that G20 Presidencies have time again recognized infrastructure as a key driver of economic prosperity. Starting from Cannes Summit declaration in 2011 adopting a High Level Panel

(HLP) recommendations to scale-up and diversify sources of financing for infrastructure and the MDBs Action Plan to address bottlenecks, to 'Roadmap to Infrastructure as an Asset Class' and G20 principles for Quality Infrastructure Investment' in the recent G20 Presidencies, several initiatives have been taken to push the agenda of infrastructure investment and development (summary highlights in box 1 below and details of Presidency-wise focus and initiatives on infrastructure development are given at Annexure 1). However, attempts to find concrete ways to mobilize more private capital are yet to yield desired results (also see Julia Tops, 2022). Despite continued efforts by G20 during various Presidencies, there exists a huge gap in financing and investment in infrastructure development. We discuss below the gaps as seen in four main areas of infrastructure investment, development of LCBMs, blended finance and quality infrastructure

Progress in Infrastructure Investment

It is well recognized that inadequate infrastructure acts as a serious bottleneck to economic development. In a virtual meeting of FM & CBGs of G20, the Indian Finance Minister emphasised the need for bridging the infrastructure funding gap and developing innovative financing mechanisms for an inclusive growth in the sector (Economic Times, April 2022). Before the Covid crisis, the OECD estimated that between 2016 and 2030, approximately USD95 trillion in public and private investments would be needed at global level in energy, transport, water and telecommunications infrastructure to sustain growth (OECD, 2017). This equals approximately USD 6.3 trillion per annum, without taking into account the additional climate or social infrastructure needs associated with commitments to achieve the SDGs and the Paris Agreement (OECD, 2021).

Mobilising private capital is key to closing the infrastructure financing gap and has become even more critical as the Covid pandemic has further limited the investment capacity of governments. For the past seven years, private investment in infrastructure has remained stagnant and lower than it was 10 years ago. The USD 156 billion invested in infrastructure projects by private investors in 2020 represents 0.2 per cent of global GDP, far short of the estimated 5 per cent of global GDP that is required to close the infrastructure gap. It is also much smaller in comparison to the USD 3.2 trillion in infrastructure stimulus announced by G20 governments (GI Hub, 2021). The WB report on private participation in infrastructure (PPI) investment puts PPI investment at USD 76 billion in low- and middle-income countries in 2021, representing 0.26 per cent of their GDP. Although this was an increase over the USD 51 billion in 2020, it was still 12 per cent lower than the previous five-year average (World Bank, 2021).

The historical analysis of trends in private participation in infrastructure sectors like transport and energy reveals stark disparities, highly fluctuating and declining private investments across geographical regions and income-groupings of countries. Further, data gaps both over time and across groups of countries restrict any meaningful analysis (Table 1). The data gaps and the need for building sound database for infrastructure investment has been discussed in G20 Presidencies. The decadal experience shows that country-wise data gaps galore and need priority attention to track infrastructure development and investment in

developing countries, especially the African and Low-income countries. Nevertheless, some findings based on WB data reveal that there is generally a declining trend in private investment in transport and energy, especially in South Asia and Lower middle income countries (Table 2).

The historical data from 2000 onwards, which are available for select regional and income groupings, further corroborate this trend (see Figures at Annexure 2). Although data are not available for African region and Low income countries, the trends may not be different or could be worse-off for these groups of countries given the overall global uncertainties in infrastructure investment flows and debt overburden in these regions.

Another set of data by WB based on number of projects and investment commitments reveal that that private participation in infrastructure (PPI) investment in low and middle income countries in 2021 accounted for USD 76.2 billion across 240 projects (WB, 2021). Although this is an increase over 2020 investment of USD 51.0 billion across 251 projects, start of Covid pandemic, the 2021 commitments were lower than the earlier years and significantly less compared to investment commitment of USD 179 billion way back in 2012 (Figure 1 below).

The trends in investments in IDA countries (14 IDA countries) reveal that after an increase from USD 2.5 billion in 2018 to USD 8.5 billion in 2019, it declined in the subsequent years to reach a low of USD 3.6 billion in 2021 (Figure 2 below). IDA countries' share in global investments decreased from 12 per cent in 2020 to 4.7 per cent in 2021. It may be noted that committed investments in 2021 at USD 3.6 billion is 4 times lower than it was in 2012 at USD 14.5 billion.

The tracking of infrastructure development indicators is equally important to gauge the impact of initiatives taken over the years through G20 Presidencies. However, data gaps in indicators like road network developed, logistics network to move cargos efficiently, corporates adopting ESG criteria, etc make tracking infrastructure progress difficult. The impact of ESG factors on the financial performance of infrastructure assets is not possible to track due to lack of data (GIH, 2022). From the WB data base, we could collate data on renewable energy production (excluding hydel power), but data are available only upto 2015 for most countries and regions. The trends from 2000 indicate that renewable energy production per capita has not increased significantly for African, South Asian and Latin American regions (Figures 3 & 4 below). The income-wise groupings of the countries shows that except for High income countries (HICs), the growth in respect of other income groups has not been commendable. These patterns make a case for focused efforts in boosting investments in resilient and sustainable infrastructure projects such as green energy, quality roads, bridges, logistics and ports.

As discussed earlier, the shortfall in infrastructure investment has been addressed during deliberations in G20 Presidencies. It was suggested that the governments can complement by increasing public investment in infrastructure by raising more revenues, reorienting spending, and borrowing prudently, as well as adopting innovative approaches such as 'land value capture' (T20 Japan-Sawada, 2019). It was also emphasized that there was a need to increase private financing of infrastructure

Box 1: Some Major Initiatives taken by G20

- Commissioned a High Level Panel (HLP) to identify measures to scale-up and diversify sources of financing for infrastructure.
- MDBs developed a joint action plan (MDB Action Plan) to address bottlenecks.
- MDBs' report on addressing Misperception of Risk and Return in Low Income Countries.
- IMF, the WB Group, OECD and other IOs progress report on 'G20 Action Plan on the Development of LCBMs', including the creation of a 'Diagnostic Framework on LCBM'
- WB, IDB & ADB reports on 'Assessment of Project Preparation Facilities (PPFs)' for Infrastructure in Africa
- 'Global Infrastructure Initiative', a multi-year work programme to lift quality of public and private infrastructure investment.
- Established a Global Infrastructure Hub (GIH) to develop a knowledge-sharing platform and network between governments, the private sector, development banks and other international organisations.
- WB Group launched Global Infrastructure Facility (GIF) to strengthen infrastructure and attract more private sector investment in developing countries.
- WB Group PPP Guidelines and OECD/WB Group PPP Project Checklist to provide guidance on international best practices for preparation and implementation of PPPs.
- Launched the Global Infrastructure Connectivity Alliance to enhance the synergy and cooperation among various infrastructure connectivity programs.
- G20/OECD 'Guidance Note on Diversification of Financial Instruments for Infrastructure and SMEs'
- Annotated Public-Private Partnership (PPP) Risk Allocation Matrices completed by the GIH to help developing countries better assess infrastructure risks.
- 'Roadmap to Infrastructure as an Asset Class' and the G20 Principles for the Infrastructure Project Preparation Phase to facilitate more private investment.
- 'G20 Principles for Quality Infrastructure Investment' emphasizing that quality infrastructure is an essential part of the G20's ongoing efforts to close the infrastructure gap.
- 'G20 Riyadh InfraTech Agenda' to promote the use of technology in infrastructure
- G20/OECD Report on 'Collaboration with Institutional Investors and Asset Managers on Infrastructure Investment', to address challenges affecting private investment in infrastructure and policy options.
- 'G20-OECD Policy Toolkit on Mobilizing Funding and Financing for Inclusive and Quality Infrastructure Investment in Regions and Cities' and the InfraTracker 2.0 which will enable both the public and private sectors towards transformative infrastructure investment post-Covid.
- 'G20 Compendium of Case Studies on Digital Infrastructure Finance: Issues, Practices and Innovations' and 'Quality Infrastructure Investment (QII) Indicators'

Table 1 : Private Participation in Investments : Data Availability from the year 2000 onwards

Country-groupings	Gross fixed capital formation, private sector (% of GDP)	Public private partnerships investment in transport	Investment in transport with private participation	Public private partnerships investment in energy	Investment in energy with private participation
By Geographic Regions					
Sub-Saharan Africa	n.a.	n.a.	n.a.	n.a	n.a
Middle East & North Africa	n.a.	n.a.	n.a.	n.a	n.a
South Asia	Limited period	Limited period	Available	Available	Available
East Asia & Pacific	Available	Discontinuous	n.a.	Available	n.a
Latin America & Caribbean	n.a.	Discontinuous	Discontinuous	Discontinuous	Available
North America	Recent years n.a.	n.a.	n.a.	n.a	n.a
Europe & Central Asia	n.a.	n.a.	n.a.	n.a	n.a
By Income Groupings					
Low income (LICs)	n.a.	n.a.	n.a.	n.a	n.a
Lower middle income (LMICs)	n.a.	Discontinuous	Limited & Discontinuous	Available	Available
Middle income (MICs)	n.a.	Discontinuous	Discontinuous	Available	Available
Upper middle income (UMICs)	Available	Available	Discontinuous	Available	Available
High income (HICs)	n.a.	n.a.	n.a.	n.a	n.a

Source : Based on WB, World Development Indicators Data Base

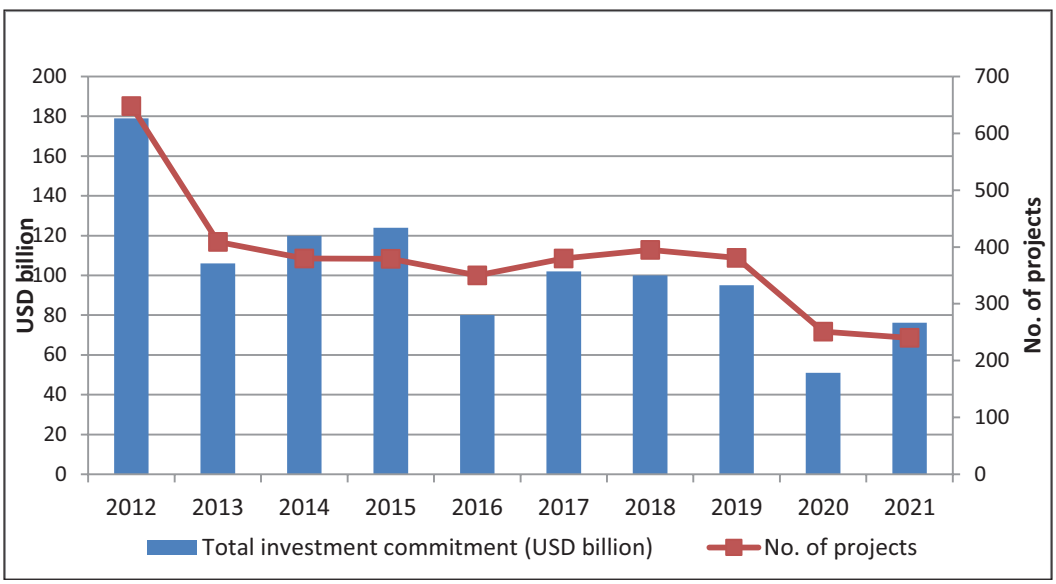
investments, particularly public–private partnership (PPP). It was recognised that the success of the approach depended on governments identifying suitable projects and engaging qualified private partners, and instituting the right process. The WB survey suggests that appropriate and effective regulatory frameworks are crucial for ensuring that investments in infrastructure are done strategically and efficiently (WB, 2020). There is also need for building country-wise central repository in regard to pipeline of projects in infrastructure, green projects, and other critical areas, with feasibility studies and risk assessment reports to

Table 2 : Private Investment in Transport

Country-groupings	Investment in transport with private participation (USD billion)			Investment in energy with private participation (USD billion)		
By Geographic Regions	2000	2010	2020	2000	2010	2021
Sub-Saharan Africa	n.a	n.a	n.a	n.a	n.a	n.a
Middle East & North Africa	n.a	n.a	n.a	n.a	n.a	n.a
South Asia	0.10	17.17	2.72	1.99	35.50	1.87
East Asia & Pacific	n.a	n.a	n.a	n.a	n.a	n.a
Latin America & Caribbean	4.49	7.46	2.36	14.00	16.02	4.24
North America	n.a	n.a	n.a	n.a	n.a	n.a
Europe & Central Asia	n.a	n.a	n.a	n.a	n.a	n.a
By Income Groupings	2000	2011	2021	2001	2010	2021
Low income (LICs)	n.a	n.a	n.a	n.a	n.a	n.a
Lower middle income (LMICs)	n.a	n.a	17.51	3.93	47.52	12.26
Middle income (MICs)	8.09	36.55	42.37	17.23	76.72	20.66
Upper middle income (UMICs)	7.00	17.66	24.86	13.30	29.20	8.40
High income (HICs)	n.a	n.a	n.a	n.a	n.a	n.a

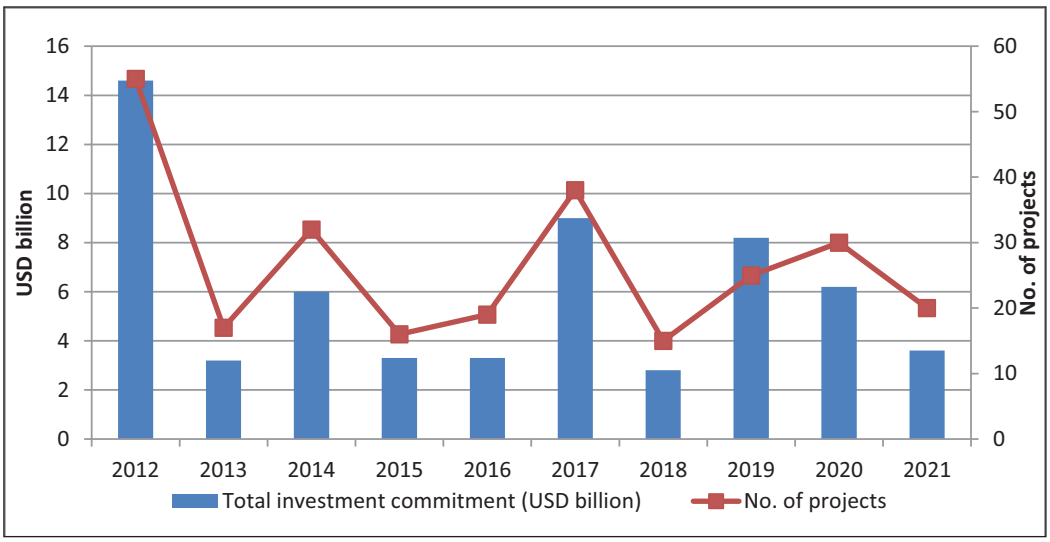
Source: WB, World Development Indicators Database.

Figure 1 : Private Participation in Infrastructure Projects: Low & Middle Income Countries (2012-2021)



Source : WB, Private Participation in Infrastructure, Annual Report 2021

Figure 2 : Private Participation in Infrastructure Projects : IDA Countries (2012-2021



Source : WB, Private Participation in Infrastructure, Annual Report 2021

facilitate private interest in these projects. Some of the issues that hamper investors' confidence in low & middle income countries are as under:

(i) political risks causing uncertainties in policies;

(ii) lack of adequate mechanisms to mitigate financial risks;

(iii) implementation or execution risks associated with projects due to regulatory constraints, land acquisition issues and poor contracts;

(iv) deficiencies in contract enforcement measures;

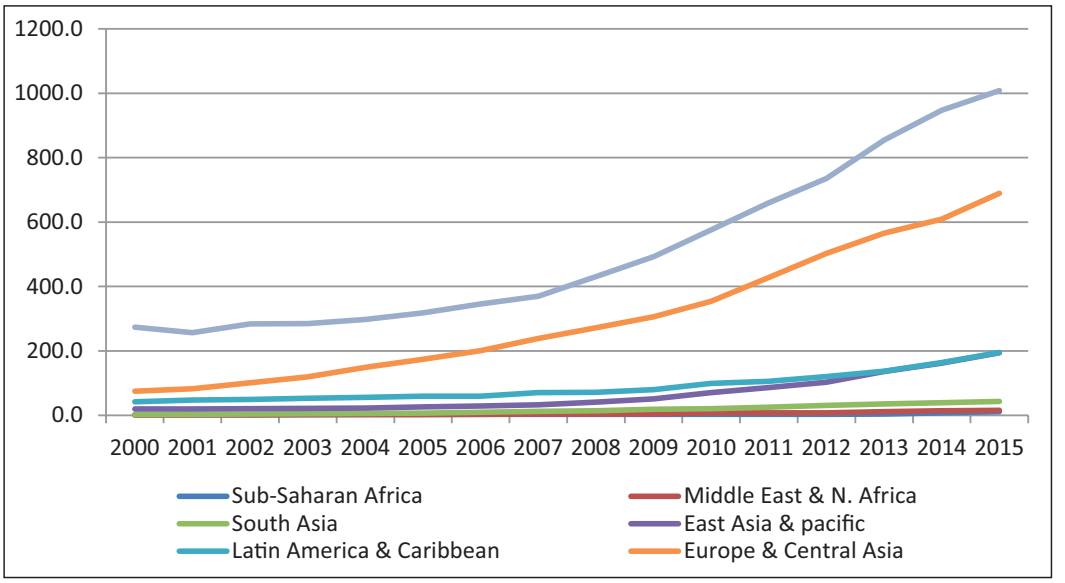
(v) inadequate capacities and skills to identify project opportunities, evaluate projects, prepare feasibility studies;

(vi) lack of resources or avenues to raise required funds due underdeveloped local currency markets.

Local Currency Bond Markets

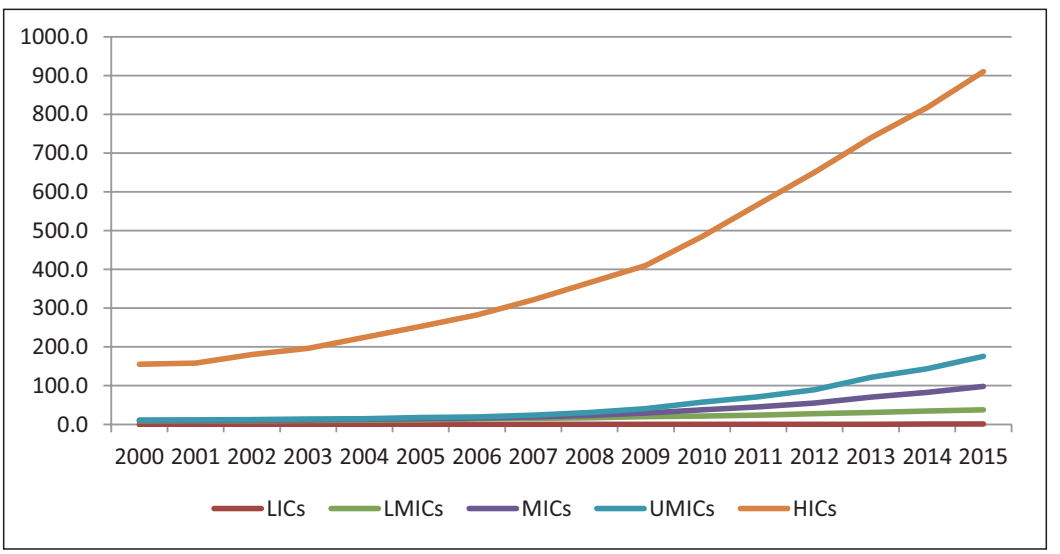
In most developing countries, financial system is dominated by banks and financial institutions, where the financial requirements of corporates are largely met. Thus, it is observed that domestic bond markets or local currency bond markets (LCBM) in developing countries are generally small or not well developed. The well-developed corporate debt market and presence of long-term financing institutions would greatly facilitate deepening of financial markets in developing countries. The importance of the relationship between the development of financial markets and economic growth is well recognized. However, the underdeveloped domestic debt market, the costs associated with raising debt, the requirement of compliance with regulatory disclosures, and rating hinder many corporates from tapping domestic debt market.

Figure 3: Region-wise : Electricity Production from Renewable Sources, exclu Hydro-electric (kWh/person)



Source : Based on WB, World Development Indicators Data Base

Figure 4: Income-wise : Electricity Production from Renewable Sources, exclu Hydro-electric (kWh/person)



Source: Based on WB, World Development Indicators Data Base

Financial investors, particularly institutional investors, have been looked to as potential source of financing for 'gap sectors'. However, investment by institutional investors in gap sectors remains limited in developing countries. Institutional investors have increasingly resorted to investment in alternative asset classes such as private equity, hedge funds, venture capital, real estate, and commodities, indicating a growing allocation to less liquid and longer-term instruments. There is need to promote institutional investors, especially long-term investment funds (LTIFs) like pension funds and insurance companies, to be able to invest in long-term infrastructure projects.

The large gaps in infrastructure financing, manufacturing, energy, climate financing can be addressed effectively by encouraging greater private participation in investment. Private participation requires conducive policies, proper risk assessment project costs and returns, and clear sources of funding.The infrastructure investments gaps being huge, the efforts of private investors need to be complemented by active involvement of local governments by identifying whole-of-life funding sources that can ensure infrastructure will be well operated and maintained so that it can improve access to finance (OECD, 2021).

It is therefore desirable that priority should be given to promoting local currency bond markets (LCBMs) and long-term investment funds (LTIFs). As mentioned earlier, since the Cannes summit in 2011, where the G20 LCBM Action Plan was endorsed, development of LCBM has been emphasized in the subsequent G20 Presidencies as well. However, constraints on both the demand and the supply side continue to affect fund raising capacities of corporates in developing countries. Given the critical need to raise resources to fund infrastructure investment, the governments in developing economies would have to take pro-active measures to develop LCBM, as market forces so far have failed to create vibrant LCBMs. Some of the areas that call for positive intervention by the governments and institutions are :

(i) encourage and enable institutional investors such as pension funds and insurance companies to invest in corporate bond markets;
(ii) enhance investor base to reach retail investors and other institutions which are otherwise constrained by regulatory investment norms;
(iii) create an effective market making mechanism so as to increase liquidity of the bonds;
(iv) strengthen credit rating agencies (CRAs), standards of accounting, auditing and disclosures, institutional infrastructure, prevalence of an environment for enforcement of contracts;
(v) corporate issuers would need to improve upon their governance, transparency and credibility;
(vi) efficient legal systems to facilitate quick resolution of disputes;
(vii) ESG profiling of corporates so as to attract FII flows;
(viii) small and medium-sized companies to be enabled to issue bonds by utilizing tools such as securitization and credit guarantees.

Blended Finance

The 'DFI Working Group on Blended Concessional Finance for Private Sector Projects' defines blended finance as "combining concessional finance from donors or third parties alongside DFIs' normal own-account finance and/or commercial finance from other investors, to develop private sector markets, address the SDGs, and mobilize private

resources" (IFC-DFI Working Group, 2017). Since 2016 blended concessional finance for private sector projects is used as one of the important tools to implement the Addis Ababa Action Agenda (AAAA) for financing SDGs. The total value of financed projects amounted to USD 15 billion over 2014-2016 by various blended finance solutions. A review of quantum of finance mobilised under the blended finance route over the past few years reveals that the total amount of financed projects increased from USD 8.8 billion in 2017 to USD 11.2 billion by the end of 2020 (Figure 5). This is meagre compared to the huge gaps in SDG financing. Further, the major contribution in financing has come from DFIs (from USD 3.3 billion in 2017 to USD 5.3 billion in 2020), while concessional funding increased from USD 1.1 billion in 2017 to USD 1.6 billion in 2020. The private sector funding has dwindled during the period, from USD 3.3 billion in 2017 to USD 3.0 billion in 2020. In terms of concessional finance deployed, the finance/ banking sector showed the highest volume in terms of DFI funds leveraged (USD 4.8 billion) in 2020, followed by infrastructure (USD 3.1 billion).

The slow progress in blended finance will act as hindrance for any major achievement in SDGs by 2030. It may be noted that the pre-Covid-19 annual SDG financing gap was estimated at USD 2.5 trillion (USD 500 billion in LICs and USD 2 trillion in other developing countries).

Post-Covid-19, the annual SDG financing gap is predicted to further increase by USD 1.7 trillion in developing countries due to global economic uncertainty (OECD, 2021). The T20 Indonesia policy brief on blended finance for SDGs suggests that for timely and better outcomes, finance needs to be complemented by technology transfer and capacity-building, which together may be termed as 'blended resources'. It is proposed to set up a 'G20-backed Blended Finance Fund-of-Funds and Holistic Resource Platform' to enable the greater contribution of blended finance towards addressing the SDG financing gap in LICs/LDCs (T20 Indonesia - Peter & Nair, August 2022).

As seen in the earlier section, infrastructure investment requirements are huge and blended finance as a new mechanism to bridge the gaps is yet to pick up pace and size. The data on blended finance reveal that the objective of catalyzing private investment through this method has not yet taken-off.

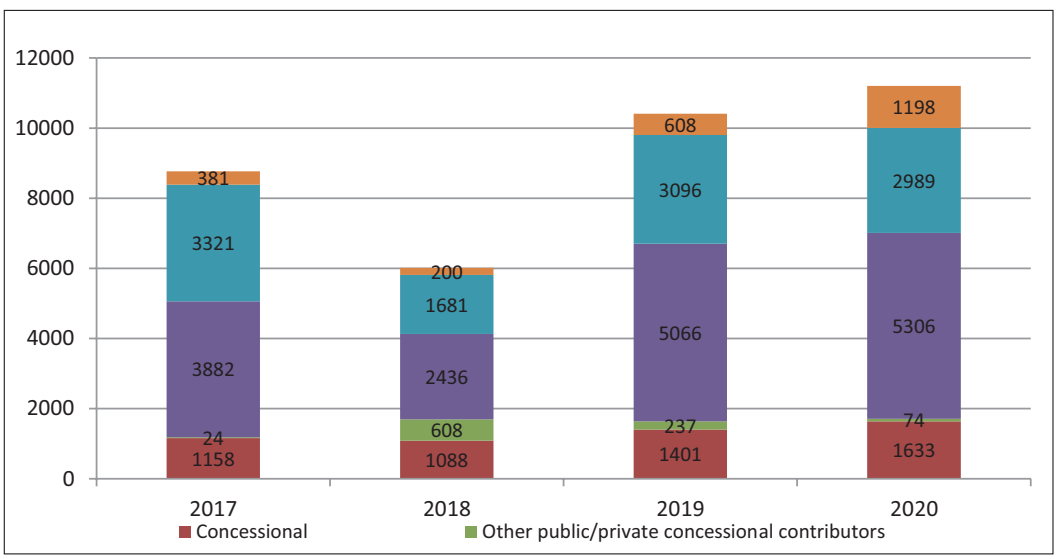
G20 Focus on Quality Infrastructure

The G20 Summit held in Brisbane in 2014 during Australian Presidency for the first time shifted emphasis to quality infrastructure. The quality aspect of infrastructure continued to be subject of deliberation in the subsequent G20 Summits and we find references to this extant consistently in the subsequent G20 Presidencies. The Japan Presidency 2019 adopted 'G20 Principles of Quality Infrastructure Investment', which are voluntary, non-binding reflecting G20 common strategic direction and aspiration for quality infrastructure investment. 'G20 Principles for the Infrastructure Project Preparation Phase' adopted earlier at G20 Argentina Presidency 2018, complement the 'G20 Principles of Quality Infrastructure' by helping deliver a pipeline of well-prepared and bankable projects that are attractive to private investors by improving assessments of project rationale, options appraisal, commercial viability, long-term affordability and deliverability. There is an untapped opportunity to increase private investment in infrastructure by improving project preparation capabilities. The lack of bankable

and investment-ready pipeline of infrastructure projects is often considered one of the major bottlenecks in attracting private capital to infrastructure. Enabling an investment-ready pipeline has consistently featured as a top priority of G20 Presidencies. The bankability of an infrastructure project is mostly determined at the project preparation stage, and in most developing countries, especially low-income countries (LICs), there is a need to improve project preparation capability. The MDBs and IOs have been making efforts to improve project preparation capabilities through the lenses of Project Preparation Facilities (PPFs), which play an important role in developing bankable and investment-ready projects, providing both technical support and funding. Africa, the region with one of lowest infrastructure project preparation scores in the GI Hub InfraCompass, has the highest number of active PPFs (GIH, 2020). More than half of all PPFs are mandated to support the energy, transport, and water sectors, and 80 percent of these support project preparation in the energy sector. ESG factors are embedded criteria for infrastructure investors, and preliminary evidence shows sustainable investments perform better. ESG factors are important for private investors to manage risk and return and are particularly important for infrastructure investment, given that infrastructure requires significant up-front investment in long-term assets (GIH, 2020).

The G20 FM & CBG meeting in Venice in July 2021 during the Italian G20 Presidency added infrastructure maintenance to the quality infrastructure dimension by endorsing 'G20 Policy Agenda on Infrastructure Maintenance' as a priority area for 2021. It was recognized that infrastructure maintenance can boost prosperity. As brought out by the WBG's report 'Well Maintained: Economic Benefits from more Reliable and Resilient Infrastructure', good

Figure 5: Progress in Blended Finance (USD million



Source: IFC-DFI Working Group, 2021

and timely infrastructure maintenance boosts prosperity, enabling growth and well-being of people, firms, and economic systems (WB, May 2021). Estimating the direct costs imposed to firms in low- and middle-income countries, WB study reveals that sales losses due to power outages amounted to USD 82 billion a year; disruptions to the water supply infrastructure cost USD 6 billion annually; and reduced utilization rates of transportation due to disrupted infrastructure cause a loss of USD 107 billion a year. In addition, there are indirect coping costs, loss of competitiveness, and reduced capacity to attract investments.

The quality infrastructure investment (QII) agenda is taken forward by the G20 Indonesian Presidency by preparing a compendium of QII indicators capturing each of the G20 principles of QII. The QII indicators matrix is intended to be a list of metrics that countries could choose from so that countries can document the alignment of their investments with QII principles as appropriate. The stakeholders can select the indicators that best capture the project's intended objectives (G20 Indonesia, IWG, 2022). In the context of emphasis assigned by G20 on quality infrastructure and its maintenance, it is important that there is review of the progress in implementation of these principles and guidelines in the developing countries that lag behind in these areas. There seems to be inadequate information and awareness in regard to progress in moving towards better quality and resilient infrastructure.

Conclusion

The G20 has undoubtedly contributed a great deal in catalyzing the cause of infrastructure development by deliberating virtually all aspects of infrastructure development, be it investment, finance, developing local currency bond markets (LCBMs), quality, capacity building, identifying project pipeline, risk assessment and mitigation. The Presidencies have also endorsed the principles and guidelines developed by WB, ADB, OECD & other IOs to address issues relating to project preparation and evaluation, risk assessment, PPP guidelines and checklist. Global Infrastructure Hub (GIH) was set up to develop a knowledge-sharing platform and network between governments, the private sector, development banks and other international organizations. However, there exists a huge gap in financing and investment in infrastructure development despite these initiatives by G20. Private investment in infrastructure has remained stagnant and lower than it was 10 years ago. Private investment in infrastructure projects represents 0.2 percent of global GDP, far short of the estimated 5 percent of global GDP that is required to close the infrastructure gap. The LCBMs are underdeveloped and asset based financing and blended financing are yet to pick up pace and contribute in a significant way towards bridging infrastructure investment gaps.

There is need for putting in place review mechanism to address bottlenecks and facilitate progress on several initiatives taken under G20 forum in the interest of developing countries, especially the LDCs. Thus, as can be seen there is still lot of ground to be covered, but more in terms of action oriented plans including capacity building, risk assessment and mitigation techniques, creation of platforms facilitating identification of projects and investors, development of LCBMs, embedding ESG criteria in project formulation.

Box 2 : Areas Requiring Focused Action	
Policy	**Preparedness**
• Identify bottlenecks in policies to create conducive environment for infrastructure investment • Promote policies to encourage private participation (PPP models) • Devise mechanisms to address policy uncertainties • Address execution risks arising out of regulatory constraints	• Strengthen institutional framework to ensure contract enforcement • Develop local capacities to prepare feasibility reports, assess risks and identify bankable projects • Create information platforms giving details of bankable projects & potential investors • Improving data base on infrastructure indicators for better monitoring
MDBs/Blended Finance/Private Investment	**Sustainable Infrastructure projects**
• Enhance MDBs capacity to increase lending for infrastructure projects • Blended finance to be focused aimed at catalyzing private investment • Scope for asset monetization to raise finance • Development of LCBMs in developing countries • Local governments/ NDBs to be active players in critical infrastructure projects (identification of projects, conducive policy & risk mitigation, roping in private investors, support in fund raising activity)	• Imparting skills on quality aspects of infrastructure investments taking into account life-cycle costs and ESG criteria while identifying projects preparing project feasibility studies • Resilient infrastructure projects to take care of natural disasters and other risks • Training aimed at increased use of G20 principles of quality infrastructure investment

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Annexure 1:

Evolution of Infrastructure Issues in G20 Deliberations

G20-France 2011	• First time reference to Infrastructure investment in the context of achieving Millennium Development Goals and sustainable development. • Commissioned a High Level Panel (HLP) to identify measures to scale-up and diversify sources of financing for infrastructure and requested the MDBs to develop a joint action plan to address bottlenecks. • HLP report and the MDB Action Plan welcomed. HLP criteria to identify bankable projects and to prioritize project preparation financing.
G20-Mexico 2012	• Reviewed progress made under the Multi-Year Action Plan, MDBs' Action Plan and the HLP on Infrastructure. • Welcomed the MDBs' report on addressing Misperception of Risk and Return in Low Income Countries. • WB & IOs progress report on implementation of the G20 action plan to support the development of LCBMs.
G20-Russia 2013	• Reiterated that well developed LCBMs play an important role in improving resilience of domestic economy and financial systems. • Welcomed the work of the IMF, the WB Group, OECD and other IOs to implement the 'G20 Action Plan on the Development of LCBMs', including 'Diagnostic Framework on LCBM' • Noted the completion of the 'Assessment of Project Preparation Facilities (PPFs)' for Infrastructure in Africa; a public-private partnerships (PPP) sourcebook by the World Bank, IDB and ADB, and progress in implementing the recommendations of the HLP on Infrastructure.
G20-Australia 2014	• Endorsed the 'Global Infrastructure Initiative', a multi-year work programme to lift quality of public and private infrastructure investment. • To address data gaps and information on project pipelines, to help match investors with projects. • G20 to continue to work with MDBs and encourage national development banks (NDBs) to optimise use of their balance sheets to provide additional lending. • Establish a Global Infrastructure Hub (GIH) which will contribute to developing a knowledge-sharing platform and network between governments, the private sector, development banks and other international organisations. To strengthen infrastructure and attract more private sector investment in developing countries, welcomed launch of WB Group's Global Infrastructure Facility (GIF).

G20-Turkey 2015	• Welcomed the WB Group PPP Guidelines and the OECD/WB Group PPP Project Checklist which provide guidance on international best practices for preparation and implementation of PPPs. • Considered alternative financing structures, including asset-based financing, securitization. • To continue work to improve the investment ecosystem, promote long-term financing, foster institutional investors' involvement, support development of alternative capital market instruments, encourage MDBs to mobilize resources and optimize their balance sheets, and catalyze private sector funding.
G20-China 2016	• Welcomed the commitments made in the "Joint Declaration of Aspirations on Actions to Support Infrastructure Investment" by 11 MDBs which includes ambitions for high-quality infrastructure projects, strengthen project pipelines, collaborate further among existing and new MDBs, strengthen the enabling environment for infrastructure investment in developing countries, as well as catalyze private resources. • Stressed the importance of quality infrastructure investment, which aims to ensure economic efficiency in view of life-cycle cost, safety, resilience against natural disaster, job creation, capacity building, and transfer of expertise and know-how. • Launched the Global Infrastructure Connectivity Alliance to enhance the synergy and cooperation among various infrastructure connectivity programs in a holistic way. • Endorsed the G20/OECD 'Guidance Note on Diversification of Financial Instruments for Infrastructure and SMEs' • Welcomed the Annotated Public-Private Partnership (PPP) Risk Allocation Matrices completed by the GIH to help developing countries better assess infrastructure risks.
G20-Germany 2017	• Called upon MDBs to finalise Joint Principles and develop 'Ambitions on Crowding-in Private Finance'. • To finalise Joint MDBs' reports on the implementation of the MDBs Balance Sheet Optimisation Action Plan, and the MDBs' Joint Declaration of Aspirations on Actions to support Infrastructure Investment and to update on the Global Infrastructure Connectivity Alliance.
G20-Argentina 2018	• To address the persistent infrastructure financing gap, G20 reaffirmed commitment to attract more private capital to infrastructure investment. Endorsed the 'Roadmap to Infrastructure as an Asset Class and the G20 Principles' for the Infrastructure Project Preparation Phase to facilitate more private investment. • To take actions to achieve greater contractual standardization, address data gaps and improve risk mitigation instruments. • Welcomed MDB Infrastructure Cooperation Platform, which will report to the Infrastructure Working Group (IWG), and advice be provided to improve MDB project preparation, standardisation of guarantees, contracts, credit enhancement tools, risk mitigation instruments and data availability. • Called upon the IWG to study the feasibility of new mechanisms to create portfolios of infrastructure assets, including brownfield infrastructure projects, that can be purchased by institutional investors.

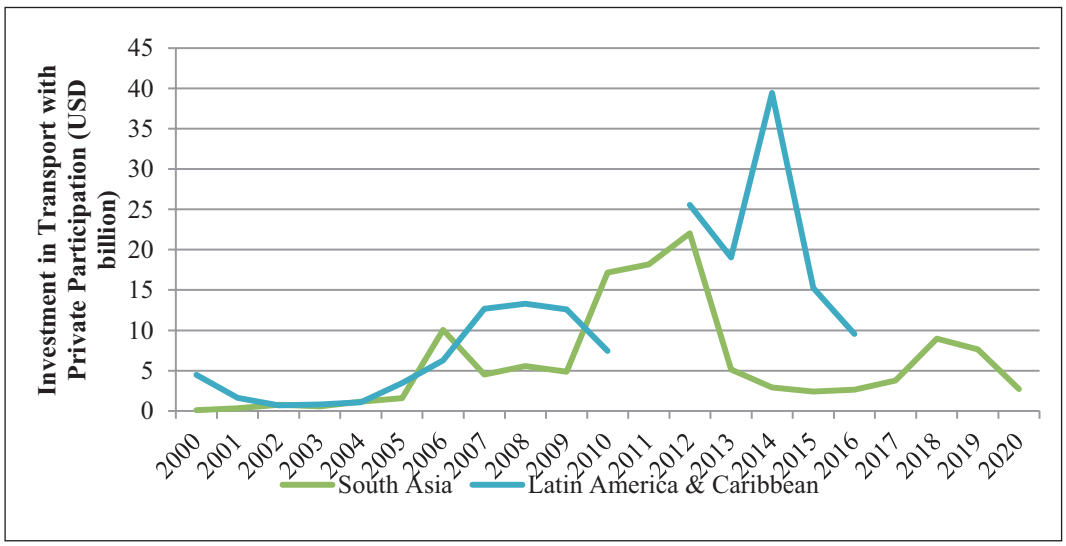
G20-Japan 2019	• Endorsed 'G20 Principles for Quality Infrastructure Investment' emphasizing that quality infrastructure is an essential part of the G20's ongoing efforts to close the infrastructure gap, in accordance with the Roadmap to Infrastructure as an Asset Class. • Stressed the importance of maximizing the positive impact of infrastructure to achieve sustainable growth and development
G20-Saudi Arabia 2020	• Infrastructure is a driver of growth and prosperity and is critical to promoting economic recovery and resilience. Endorsed the 'G20 Riyadh InfraTech Agenda' which promotes the use of technology in infrastructure • Welcomed the G20/OECD Report on 'Collaboration with Institutional Investors and Asset Managers on Infrastructure Investment', which reflects investors' view on issues and challenges affecting private investment in infrastructure and presents policy options.
G20-Italy 2021	• Endorsed 'G20 Policy Agenda on Infrastructure Maintenance' and recognised the critical role of quality infrastructure investments in the recovery phase. Resilient, properly funded, well maintained and optimally managed systems are essential to preserve infrastructure assets over their life-cycles, minimising loss and disruption, and securing the provision of safe, reliable and high-quality infrastructure services. • In line with the G20 Roadmap for Infrastructure as an Asset Class, and building on the G20 Infrastructure Investors Dialogue, to continue to develop further the collaboration between the public and private investors to mobilise private capital.
G20-Indonesia 2022	• Endorsed the 'G20-OECD Policy Toolkit on Mobilizing Funding and Financing for Inclusive and Quality Infrastructure Investment in Regions and Cities' and the InfraTracker 2.0 which will enable both the public and private sectors towards transformative infrastructure investment post-Covid. • Endorsed the 'G20 Compendium of Case Studies on Digital Infrastructure Finance: Issues, Practices and Innovations' and 'Quality Infrastructure Investment (QII) Indicators'.

Source: Compilation.

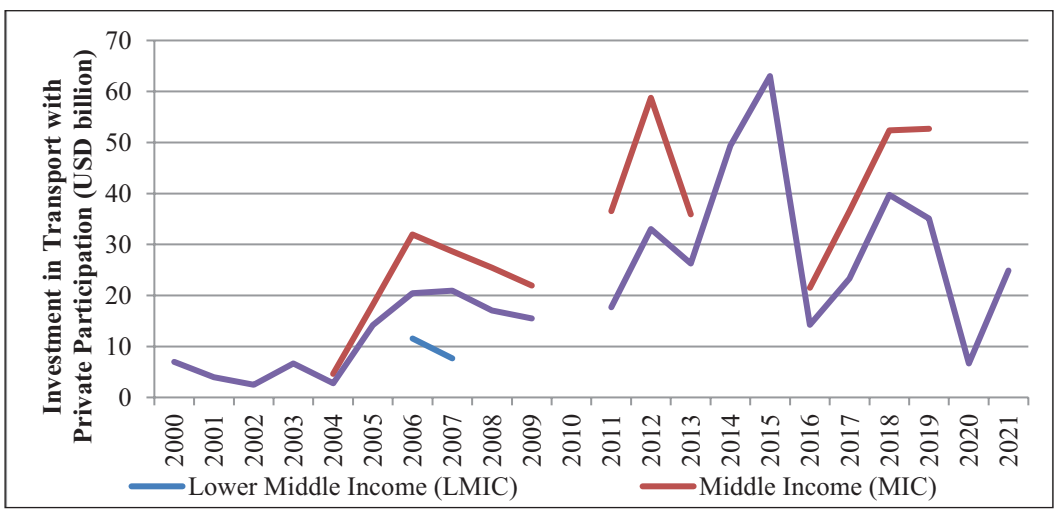
Annexure 2

Trends in Private Investment in Transport & Energy

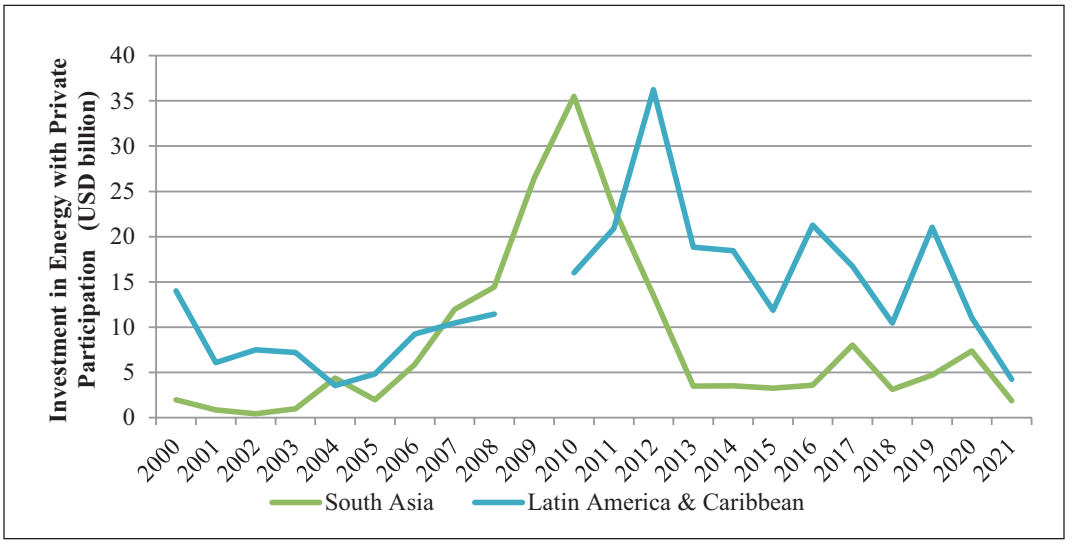
Region-wise :Investment in Transport with Private Participation



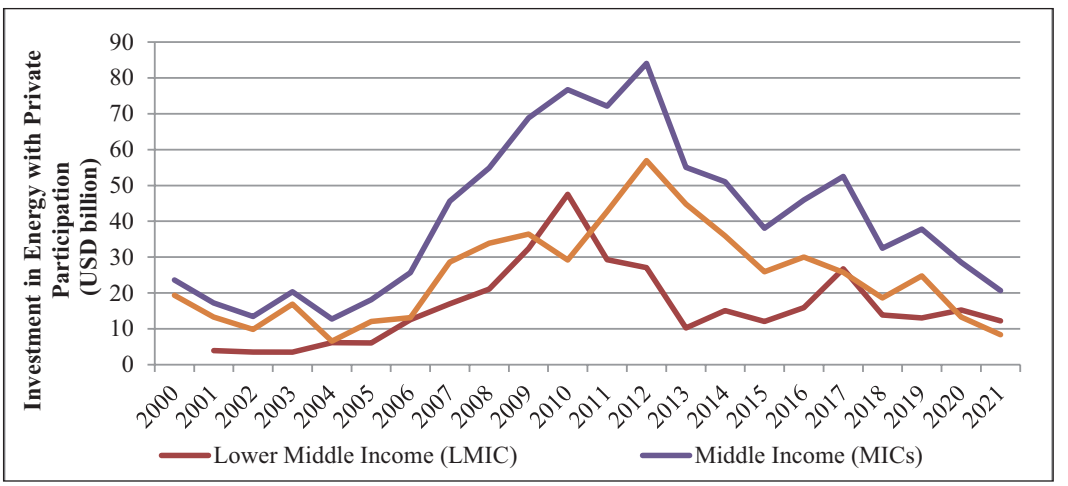
Income-wise:Investment in Transport with Private Participation



Region-wise : Investment in Energy with Private Participation



Income-wise : Investment in Energy with Private Participation



Source: Compilation.

Research Article

Economic Performance of the G20 countries after the 2008 Global Crisis

G20 Digest Vol. 2, No.2&3, pp 31-47, April-September, ©2022, Research and Information System for Developing Countries (RIS).

Manmohan Agarwal[*] and Sushil Kumar[**]

Abstract: This paper examines the performance G20 countries and world economy since the global financial crisis of 2008. We compare performance before the crisis to the post-crisis period. By dividing the G20 countries into developed, developing and oil producers, we examine the effect on four major variables, growth of per capita GDP, gross fixed capital formation, exports of goods and services and the external balance. The exercise aims to see whether the G20 has achieved its stated goal at the Pittsburgh summit of 2009 of creating strong, sustainable and balanced growth. We also examine whether it has fulfilled its goal stated at the Brisbane summit of 2014 to raise growth rates by 2 per cent by 2018. We find that performance in developing countries has generally worsened with lower and more variable growth, regionally imbalanced growth rates, falling share of exports in GDP and a worsening external balance. The maintenance of high levels of investment is a positive development.

Introduction

As an informal international institution, the Group of Twenty (G20) systemically significant countries was established in 1999 by finance ministers and governors of central banks (Kirton 2013). It was formed in response to the Asian-turned-global financial crisis of 1997–1999, which the established multilateral institutions from the 1940s were unable to deal with (Kirton, 2021). G20 was elevated to the leaders' level after the 2008 global financial crisis (GFC).[1] The purpose was to coordinate policy responses by the governments of the major economies in order to prevent the GFC slipping into a worldwide depression. The first summit focused primarily on strengthening financial regulation, with agreement on a 47-point action plan to improve financial regulation over the medium term. At the second summit held in London in April, 2009, former UK Prime Minister Gordon Brown orchestrated a deal in which world leaders agreed on a US$1.1 trillion injection of financial aid into the global economy and in 2012, at Los Cabos, the G20 created the $500 billion "firewall fund" for the IMF.[2] On economics and finance, it responded quickly and

* Adjunct Honorary Senior Fellow, RIS. Email: manmohan44@gmail.com

** Assistant Professor, RIS. Email: sushil.kumar@ris.org.in

successfully to the 2008-2009 American-turned-global financial crisis and averted the 2010-2012 European financial crisis from going global (Kirton 2013; Drezner 2015; Triggs 2018).

At the third summit in Pittsburgh the leaders declared the G20 to be the premier organisation for managing the world economy in order to provide Strong, Sustainable and Balanced Growth (SSBG) of the world economy. Strong and sustained growth meant limiting fluctuations in the rate of growth. Balanced growth implies that different countries and regions including both developed and developing countries participate in this growth. Since the third summit leaders have sought to tackle the structural problems facing the world economy and constrain higher world growth. Some of the problems that the leaders have sought to tackle have included financing provision of better infrastructure, measures to improve the functioning of the international agricultural marketing and trading system. To achieve this, they agreed on a coordinated expansionary monetary and fiscal policy. Later, at the Brisbane, Australia summit in 2014 the leaders pledged to lift the G20's GDP growth by at least an additional two per cent by 2018. In this paper, we concentrate on the success of the G20 in managing growth of the world economy, namely whether the goal of achieving a high and stable rate of growth for all including developed and developing countries has been achieved.

A major achievement of the G20 has been to strengthen the international financial system. Steps taken for this included making the financial stability forum (FSF) established after the Asian crisis more inclusive.[3] The FSF had consisted mainly of major central banks, almost all from developed countries, and international organisations such as the Bank for International Settlements (BIS), the International Monetary Fund (IMF), and the World Bank (WB). The IMF and the WB were to represent the interests of developing countries. The membership of the FSF was expanded to include all the member countries of G20 and it was renamed the Financial Stability Board (FSB).[4] The financial system was strengthened also by implementation of the Basel-III accords on bank capital, regular evaluation of the strength of the financial systems of countries including their ability to manage shocks.[5] But here we do not discuss further the measures for strengthening the financial system and concentrate on its attempts at macro stability and to foster growth.

First, we examine whether the leaders have been able to deliver on their promises of either providing SSBG or to increase their growth rate by 2 per cent. We analyse the economic performance of the world economy in terms of regional development to examine whether there has been SSBG. Further, whether disparities in regional economic performance have decreased or not analysed. In subsequent section, we undertake the same analysis for the G20 countries because although they may not be able to control policy in other countries, they should be able to manage their own economies to achieve the promised goals.

Macro Economic Performance of the World Economy

This section discusses the global and regional economic performance in terms of per capita income, investment, and external balance from 2001 to 2019. The growth of per capita income has declined after the financial crash of 2008. The average growth rate during the period 2011–2019 is lower for all income groups and regions.

Growth of the World Economy

It is observed that the world economy has not achieved SSBG as the growth of per capita GDP has decreased since the GFC (Table 1). Furthermore, GFC resulted in a deterioration of the economic condition in developing countries with lower growth of per capita GDP, a decline in the share of exports of goods and services in GDP, and a worsening of the external balance (Agarwal et al, 2022).

This is also mostly true for the high income, middle income and LDCs. The average growth rate of high-income countries has declined from 1.8 per cent during 2001–2007 to 1.1 percent during 2011–2014. The average growth rate of middle-income countries has declined from 5.0 percent during 2001-2007 to 4.0 per cent during 2011-14. The average growth rate for the less developed countries has similarly declined from 4 percent during 2001–2007 to 2.7 percent during 2011–2014. The declining trend in continue for the middle and LDCs (Table 1).

Further, what is most disquieting is that growth in two of the regions, LAC and SSA has resulted in a decline in their per capita income. This is disquieting as in the decades of the 1980s and 1990s per capita GDP had fallen in SSA while it had increased at merely about one per cent a year in LAC. The two worst performing regions at the end of the last century have been the worst hit by the GFC.[6]

It is important to note that neither the major regions and economies have fully recovered from the 2008 crisis nor have the growth rates been balanced among the different regions and countries (Agarwal, 2020). A recent IMF (2019) study on global economic recovery ten years after the 2008 financial crisis found that output losses after the crisis appear to be persistent, regardless of whether a country experienced a banking crisis in 2007-08. Slow investment was a major

Table 1: Rise in Per Capita Income (Average Annual Growth Rate) (%)

	Average				Standard Deviation	
Region/Category	**2001-07**	**2008-10**	**2011-2014**	**2015-19**	**2001-07**	**2011-19**
EAP	9.2	7.9	6.7	5.7	1.4	0.7
ECA	6.5	0.8	3.4	1.9	1.9	1.6
LAC	2.0	1.8	1.7	-0.3	2.2	1.5
MNA	2.6	2.0	-0.4	0.4	2.3	2.6
SA	4.7	4.5	4.5	5.2	1.8	1.2
SSA	3.0	1.9	1.8	-0.4	1.0	1.3
WLD	2.2	0.3	1.6	1.7	1.1	0.3
High income	1.8	-0.7	1.1	1.5	0.7	0.4
Middle income	5.0	4.0	4.0	3.1	1.9	0.7
LDCs	4.0	3.6	2.7	1.9	1.3	0.8

Source: WDI and Authors' calculations. Note: EAP is East Asia and Pacific, EAP is East Asia and Pacific, LAC is Latin America and the Caribbean, MNA is Middle East and North Africa, SA is South Asia and SSA is Sub-Saharan Africa. The regions and the income categories are as defined in the World Bank, World Development Indicators, World Bank. Washington D.C. LDCs are the least developed countries as defined by the UN.

source of these losses, which were accompanied by long-term capital and total factor productivity deficiencies in comparison to pre-crisis trends.

Furthermore, the standard deviation (SD) of the growth rates for 2001-07 and 2011-19 were calculated. It is found that the only developing region for which the SD decreased was EAP. There were large increases in the SD for SSA from 0.1 to 1.3. The poorest regions show the largest increase in SD variability. While the SD remained the same for the high-income countries, it did decrease for the middle-income countries. However, the variability increased in the least developed countries (LDCs). In addition, the coefficient of variation (CV) of per capita growth in the different regions for the two periods had increased from 0.55 to 1.02. This increase is significant at the one percent level of significance.[7] So growth among the regions has become significantly more unbalanced (see table 1).

Investment in the World Economy

Gross fixed capital formation (GFCF) is important for evaluating potential growth of the economy. The share of GFCF in GDP of middle income countries and LDCs increased steadily from 26.8 to 30.3 per cent and 22.8 to 26.5 per cent respectively over the time period 2001 to 2014 (Table 2). It declined in subsequent years mainly in the middle income countries.

The SD of GFCF, by and large, declined in the second period. The decline was particularly sharp in the middle income and least developed countries. The maintenance of such a high rate of investment raises the hope that at some future time, perhaps with the revival of demand in the world economy, growth in the developing world would also recover. We also calculated the regional CV and found that it had decreased from 0.29 to 0.24. This decrease is insignificant.

Export Performance

The export-to-GDP ratio in high income countries increased from 26.7 per cent in 2001-07 to 31.1 per cent in 2015-2019, while it declined for the middle income countries and LDCs (Table 3). Currently, the ratio is higher for high income countries than the developing countries. It was 22.2 percent for LDCs during 2005-19. During this same period the

Table 2: Gross Fixed Capital Formation (% of GDP)

Region/Category	Average				Standard Deviation	
	2001-07	2008-10	2011-2014	2015-19	2001-07	2011-19
EAP	34.3	38.7	40.5	39.1	2.0	0.8
ECA	21.5	23.8	23.6	23.3	2.0	0.3
LAC	18.3	20.4	20.6	18.2	0.8	1.4
MNA	23.5	27.0	24.5	22.4	0.5	1.5
SA	29.2	31.4	30.0	27.4	2.5	1.7
SSA	21.1	22.1	21.3	21.1	0.3	0.7
WLD	23.7	23.7	23.5	23.5	0.6	0.2
High income	22.5	21.3	20.8	21.4	0.5	0.4
Middle income	26.8	29.9	30.3	28.7	1.4	0.8
LDCs	22.8	24.8	26.5	26.4	0.7	0.3

Source: WDI and Authors' calculations

ratio declined even more sharply for the middle income countries (MICs), from 29.2 per cent to 24.6 per cent.

Further the standard deviation (SD) of the export ratio decreased for EAP, LAC and SA. SD also decreased for the high Income countries (HICs), MICs and LDCs. The decrease in the SD in 2008 for MICs and LDCs together with the fall in the share implied that the lower share may have become ingrained into the economies and it may be difficult for the countries to raise the share in the future (Table 3). Likewise, regional CV has decreased from 0.28 to 0.18. This decrease was significant at the 1 per cent level.

External Balance

The South Asia region has consistently run larger deficits on the external balance of goods and services as a per cent of GDP larger than have the other developing regions (Table 4).

External balance has worsened for all the regions and for developing countries while the balance has improved for high income countries. Furthermore the SD has decreased suggesting that the worsened extreme balance may persist. Regional CV has increased from 1.08 to 2.36. This difference is significant at the one percent level.

In brief, the performance of developing countries has deteriorated. Growth rates have fallen; its variability among the regions has increased, and future prospects are mixed. The maintenance of a high GFCF suggests that growth may increase in the future. However, the worsening export performance and external balance suggest that low growth will persist. The variability of GFCF, XGS and EB has fallen suggesting that high investment but worse external performance are likely to persist.

Performance of the G20 Countries

The GFC led to an almost unprecedented disruptions in financial markets and systems, as well as significant negative effects on the real economy, including a significant drop in output and falls in international trade.[8] In this context this section examines the economic performance of G20 countries from 2001

Table 3: Exports of Goods and Services (% of GDP)

Region/Category	Average				Standard Deviation	
	2001-07	2008-10	2011-214	2015-19	2001-07	2011-19
EAP	34.6	32.3	29.5	24.8	5.0	2.7
ECA	33.3	30.7	30.8	32.0	1.2	1.7
LAC	20.0	19.4	19.8	21.0	1.6	1.1
MNA	35.3	33.9	31.2	27.7	3.6	3.7
SA	17.2	21.0	22.8	18.1	2.8	2.5
SSA	30.4	31.5	30.1	24.0	1.5	3.7
WLD	27.4	28.7	30.4	29.3	2.1	0.7
High income	26.7	29.0	31.8	31.3	1.9	0.5
Middle income	29.2	28.1	27.1	24.6	2.7	1.5
LDC	23.8	27.4	25.7	22.2	2.5	2.1

Source: WDI and Authors' calculations.

to 2019 in terms of per capita income growth, Gross Fixed Capital Formation (GFCF), and exports of goods and services. G20 can recommend policies for other countries but cannot ensure that appropriate policies for SSBG are adopted by them. They have greater control of the policies that may be adopted. Also, one of the features of the G20 meetings is an examination of whether countries have fulfilled the promises they had made. So it would be important to analyse whether the members of the G20 have been able to fulfil their commitments, particularly the commitment to generate SSBG and the commitment made at Brisbane in 2014 to increase growth by 2 per cent by 2018. As G20 accounts for 80 per cent of global output and trade, its performance and policies would have substantial effects on the global economy (RIS, 2021).

As Table 5 demonstrates that the G20 countries have not seen growth rates of 2 per cent. The average yearly growth rate of per capita income for the G20-DC, G20-Dev, and oil exporting countries between 2015 and 2019 was 1.3 per cent, 2 per cent, and 0.2 per cent, respectively. This is significantly less than the commitment the G20 countries made in 2014. IMF also estimates that since 2014, committed actions have raised the G20's collective GDP by 1.23 per cent (by 2018), rather than the expected 2 per cent over the baseline (Bery et al 2019).

Volatility as measured by SD has fallen in both the developed and developing country members of the G20 (Table 5). But the volatility of both these groups in the G20 is greater than the volatility of high income countries and of MICs and LDCs in general, as seen in Table 1. So the members of the G20 have not adopted policies that could have helped them to reduce volatility or reduce the gap between the developed and developing countries.

CV for the G20 countries for two periods, 2001-07 and 2011-19 show mixed results. It is found that CV for Italy is very high in the second period (see Table A1 in appendix). The average for the G20 Developed Countries (G20-DC) without Italy is constant between the two periods though for five developed countries the CV has increased and decreased

Table 4: External Balance on Goods and Services (% of GDP)

Region/Category	Average				Standard Deviation	
	2001-07	2008-10	2011-2014	2015-19	2001-07	2011-19
EAP	4.5	4.8	2.2	1.8	2.2	0.7
ECA	4.0	2.4	1.7	2.6	1.3	1.2
LAC	0.5	-1.0	-1.6	-1.3	1.3	0.6
MNA	3.1	1.6	-0.7	-4.9	3.0	3.6
SA	-2.5	-5.7	-5.4	-3.8	1.5	1.5
SSA	1.2	0.0	-0.6	-3.1	1.4	2.1
WLD	1.0	0.7	0.7	0.8	0.2	0.1
High income	0.3	0.3	0.9	1.2	0.1	0.2
Middle income	2.7	1.7	0.3	0.0	0.9	0.3
LDC	-4.2	-4.3	-6.3	-7.2	2.1	1.7

Source: WDI and Authors' calculations.

for only three. Despite more countries experiencing an increased CV the overall CV was constant because the CV for US decreased considerably. Among the G20 Developing Countries (G20-Dev) the CV increased for only two and decreased for four. It, however, increased very substantially for Argentina and particularly Brazil, and for both it was negative as per capita income decreased in the second period. The fall in CV was however statistically significant only for the oil producers, which suffered a fall in per capita GDP, falling from 1.15 to 0.45. For the G20-Dev CV increased from 0.72 to 1.1 while for the G20-DC it fell from 0.61 to 0.54. It suggests that difference in variability has increased but the changes

Table 5: Rise in Per Capita Income (Average Annual Growth Rate) of G20 Countries (%)

Country	Average				Standard Deviation	
	2001-07	2008-10	2011-2014	2015-19	2001-07	2011-19
Developed Countries						
Australia	2.0	0.7	1.3	0.9	0.9	0.5
Canada	3.1	-0.7	1.5	0.6	1.7	0.8
France	1.2	-0.7	0.5	1.3	0.7	0.7
Germany	1.3	0.0	2.0	1.1	1.7	1.8
Italy	0.7	-2.0	-1.6	1.3	0.8	1.9
Japan	1.2	-0.8	1.1	1.1	0.8	0.8
Korea, Rep.	4.7	2.9	2.5	2.4	1.4	0.4
United Kingdom	2.1	-1.5	1.2	1.0	0.4	0.5
United States	1.6	-0.9	1.3	1.8	1.0	0.6
Average G20-DC	2.0	-0.3	1.1	1.3	1.1	0.9
Developing Countries						
Brazil	2.3	3.2	1.4	-1.3	2.0	2.5
China	10.2	9.3	7.6	6.2	2.1	1.0
Argentina	3.0	1.8	0.1	-1.3	8.2	3.1
India	5.2	5.0	4.8	5.6	1.8	1.4
Indonesia	3.7	4.2	4.3	3.8	0.9	0.4
Mexico	0.6	-1.1	1.5	0.9	1.8	1.1
South Africa	3.0	0.2	0.9	-0.6	1.2	0.9
Turkey	3.9	0.2	5.6	2.6	5.1	3.0
Average G20-Dev	4.0	2.8	3.3	2.0	2.9	1.7
Oil Exporting Countries						
Saudi Arabia	0.7	0.2	2.3	-0.5	4.7	2.7
Russian Federation	7.2	0.6	2.1	0.9	1.4	2.2
Average oil exporting countries	4.0	0.4	2.2	0.2	3.1	2.3

Source: Authors' calculations from data in the World Development Indicators.

in CV for G20-DC and G2--Dev were statistically insignificant.

Gross Fixed Capital Formation

Developing countries in the G20-Dev have done better in maintaining their levels of investment. While GFCF, or investment, declined slightly as a per cent of GDP in the developed members of G20 (G20-DC), it increased in the G20-Dev (Table 6). Maintaining GFCF while growth of GDP is declining implies either that the structure of the economy is changing in the sense that more funds are invested in sectors with a higher capital output ratio or there is considerable excess capacity waiting to come into production when conditions improve (Agarwal et al, 2022).

Table 6: Gross Fixed Capital Formation of G20 Countries (% of GDP) (Average)

Country	Average				Standard Deviation	
	2001-07	2008-10	2011-214	2015-19	2001-07	2011-19
Developed Countries						
Australia	26.1	27.7	27.1	24.6	1.7	1.6
Canada	21.3	23.1	24.1	22.8	1.4	0.9
France	21.8	22.6	22.2	22.5	0.8	0.6
Germany	19.9	19.7	20.2	20.7	0.9	0.6
Italy	21.2	20.5	18.0	17.5	0.4	0.9
Japan	24.8	22.6	22.9	23.9	0.8	0.8
Korea, Rep.	30.7	30.7	29.4	30.1	0.4	0.8
United Kingdom	17.6	16.5	16.0	17.8	0.3	1.0
United States	22.3	19.5	19.6	20.5	0.6	0.6
Average GDC	22.8	22.5	22.2	22.3	0.8	0.9
Developing Countries						
Brazil	17.5	19.7	20.5	15.7	0.6	2.7
China	37.5	42.3	44.1	42.2	2.3	1.1
Argentina	16.1	17.1	16.3	14.6	2.6	1.1
India	31.4	34.0	32.3	28.6	2.8	2.3
Indonesia	22.0	29.9	32.1	32.4	2.4	0.5
Mexico	20.5	22.3	21.8	22.0	1.0	0.8
South Africa	17.1	21.4	19.8	18.9	2.0	0.9
Turkey	23.7	24.5	28.0	28.8	4.3	1.3
Average GLDC	23.2	26.4	26.9	25.4	2.25	1.4
Oil Exporting Countries						
Saudi Arabia	19.6	24.3	23.4	24.7	2.0	2.7
Russian Federation	18.7	22.0	21.6	21.3	1.1	0.5
Average oil exporting countries	19.1	23.2	21.3	23.0	1.53	2.4

Source: Authors' calculations on data from World Bank World Development Indicators.

It is important to note that the investment share was higher during post-crisis period compared to the pre-crisis period for G20-Dev.

Another issue is fiscal strain, which is exacerbated by non-reforms (SDRs). $375 billion of the $675 billion additional SDR allocation goes to OECD countries and $21 billion to low-income countries. G20 has a huge responsibility to bridge this gap, address the growing inequity, and ensure access and equity to global financial markets (Chaturvedi, 2021).[9]

Furthermore, volatility of investment decreased in the G20-Dev whereas it increased slightly in the G20-DC as the SD decreased for the G20-Dev even though it increased for the G20-DC. While the decrease in investment volatility in the G20-Dev was in line with the decreased

Table 7: Exports of Goods and Services of G20 Countries (% of GDP)

Country	Average				Standard Deviation	
	2001-07	2008-10	2011-214	2015-19	2001-07	2011-19
Developed Countries						
Australia	19.7	21.0	21.0	21.3	1.7	1.4
Canada	37.5	30.7	30.8	31.8	2.7	0.7
France	27.3	26.6	29.2	31.1	0.8	1.2
Germany	36.5	41.5	45.6	46.9	4.6	0.8
Italy	25.1	24.8	28.2	30.6	1.4	1.5
Japan	13.3	15.0	15.7	17.5	2.7	1.4
Korea, Rep.	34.0	46.6	51.6	41.1	3.0	5.9
United Kingdom	25.0	27.2	29.7	29.5	1.2	1.4
United States	10.0	11.9	13.5	12.1	0.9	0.8
Average, GDC	25.4	27.3	29.5	29.1	2.1	1.7
Developing Countries						
Brazil	14.5	11.8	11.6	13.3	1.4	1.2
China	29.5	28.2	25.0	19.6	6.3	3.0
Argentina	22.7	20.2	15.9	13.3	5.3	2.6
India	17.3	22.3	24.4	19.2	3.4	2.8
Indonesia	32.7	26.1	24.6	20.0	3.2	2.7
Mexico	25.2	28.2	31.6	37.5	2.1	3.4
South Africa	28.6	30.7	30.7	30.0	2.4	0.6
Turkey	23.6	22.7	24.1	27.5	1.9	3.5
Average GLDC	25.4	46.1	46.7	38.9	3.3	3.6
Oil Exporting Countries						
Saudi Arabia	50.6	52.9	52.3	35.1	8.7	9.7
Russian Federation	34.4	29.5	27.0	28.0	2.1	1.6
Average, Oil exporting countries	42.5	41.2	52.3	31.5	5.4	5.6

Source: Authors' calculations on data from World Development Indicators.

volatility for developing countries in general (Table 6), the increased volatility among the G20-DC contrasts with the decreased volatility among developed countries generally.

The CV for GFCF has usually decreased for most of the G20 (see Table A2). Major exceptions are the UK among the G20-DC and Turkey among the G20-Dev. This relative constancy implied that the change in CV between the two periods was statistically insignificant for the G20-DC and the G20-Dev.

Table 8: External Balance on Goods and Services of G20 Countries (% of GDP)

	Average				Standard deviation	
	2001-07	2008-10	2011-214	2015-19	2001-07	2011-19
Developed Countries						
Australia	-1.6	-1.1	-0.3	-0.1	1.2	1.5
Canada	3.9	-0.5	-1.4	-2.1	1.2	0.5
France	0.7	-1.1	-1.4	-0.9	1.0	0.4
Germany	4.6	5.4	5.8	6.8	1.6	0.9
Italy	0.3	-1.1	1.2	3.0	0.7	1.5
Japan	1.5	0.8	-1.7	0.4	0.4	1.3
Korea, Rep.	1.6	2.3	3.4	5.1	1.0	1.9
United Kingdom	-2.3	-1.9	-1.3	-1.4	0.2	0.2
United States	-4.7	-3.7	-3.3	-2.9	0.8	0.3
Average GDC	0.4	-0.1		0.9	0.9	0.9
Developing Countries						
Brazil	1.7	-0.5	-1.8	0.0	2.0	1.2
China	4.4	5.2	2.4	1.8	2.8	0.8
Argentina	7.2	3.9	1.0	-0.9	4.5	1.8
India	-2.1	-5.0	-4.8	-2.7	1.3	1.8
Indonesia	5.7	1.9	0.1	0.1	1.6	1.1
Mexico	-1.6	-1.8	-1.2	-1.6	0.2	0.6
South Africa	0.9	0.0	-1.1	0.3	2.4	1.3
Turkey	-0.8	-2.6	-4.9	-1.0	3.2	2.9
Average GLDC	1.9	0.1	-1.3	-0.5	2.3	1.4
Oil Exporting Countries						
Saudi Arabia	24.1	18.0	21.5	4.7	6.1	10.8
Russian Federation	11.7	8.3	6.6	7.2	1.7	1.6
Average oil exporting countries	17.9	13.1	14.0	5.9	3.9	6.2

Source: Authors' calculations from data in the World Bank World Development Indicators, World Bank, Washington D.C.

Exports of Goods and Services

Trade has been a G20 priority since 2008's first summit. Recent data from the World Trade Organization shows that 77.5 per cent of all goods and services exported around the world came from a G20 member, and 76.5 per cent of all goods and services imported were destined for the G20.

Volatility of export earnings decreased in both the G20-DC and the G20-Dev (Table 7). However, exports as a percentage of GDP increased in the G20-DC whereas decreased for the G20-Dev. This decrease could be because of slower growth in developing countries as more of the exports of developing countries are destined for developing countries (Agarwal, 2013). But the decrease in volatility in both the G20-DC and the G20-Dev was less for developed and developing countries in general (Table 7). The increase in exports by the G20-DC was less than for developed countries in general (Table 7). It is an important to note that the share of exports of goods and services to GDP in all G20 developing countries, with the exception of Brazil, Mexico, and Turkey, has declined since the 2008 financial crisis. The share of G20-Dev in the G20 has declined from 46.1 per cent in 2008-2010 to 38.9 per cent in 2015-2019 and during the same time period, G20-DC's share rose from 27.3 per cent to 29.1 per cent. (see table 9). Share of exports of goods and services in GDP increased for the developed countries and for the developing countries as a whole it decreased (Agarwal, 2020). As Blanchard et al. (2010) pointed out that external shocks predominantly hit developing markets through two channels: a decrease in exports and terms of trade, and a decline in capital flows.

The CV for export ratio decreased for the G20-DC and so did the average for the group (Table A3). CV for five of the developing countries increased and so did the CV for the group. It also increased for the oil exporters, particularly Russia.

External balance improved in the G20-DC while they worsened in the G20-Dev (Table 8). This reflected the performance of developed and developing countries in general (Table 4). Developing countries were particularly hard hit by the recession following the 2008 crisis, as the external balance (EB) of all developing regions and income groups deteriorated (Agarwal, 2020). Volatility of the EB decreased in the G20-Dev in contrast to that in the G20-DC.

In brief, the G20-DC has done better than the G20-Dev. The decline in their growth rate has been less, and export performance and external balance were better. The only area where G20-Dev has done better was in maintaining investment. The other significant feature was that the G20-DC and the G20-Dev performed worse than the developed and developing countries in general. CV for external balance for the G20-DC has increased despite five of them having lower CV because of very substantial increase in the CV for Australia and Japan (Table A4). The CV for the developing countries has increased barring three of them, China, India and Turkey, experiencing a lower CV. The CV for the oil producers was larger.

In brief, the G20-DC has done better than the G20-Dev. The decline in their growth rate has been less but with relatively good performance in exports and external balance. The only area where G20-Dev has done better was in maintaining investment. The other significant feature is that the G20-DC and the G20-Dev performed worse than the developed and developing countries in general.

Conclusion

The paper finds that economic performance of G20 countries has suffered since the financial crisis 2008 and the G20 countries did not achieve one of the goals set at the Brisbane Summit in 2014, which was to add an additional 2 per cent to the growth of the global GDP by 2018. Growth has decreased for all the developing regions, mostly in LAC and SSA which had performed very poorly in the last two decades of the last century. Differences in the growth rates between the regions have increased so that regional growth has become significantly unbalanced. The share of investment in GDP has increased for developing countries and the share has become more stable. The share of exports in GDP increased in LAC and SA, the two regions with relatively low shares, while they decreased in the other regions. The export-to-GDP ratio increased in high income countries while it declined for developing countries so that currently, the ratio is higher in high income countries. External balance has worsened for all the regions and for developing countries while it has improved for the high income countries. Performance in developing countries has generally worsened with lower and more variable and regionally imbalanced growth rates and worsening external performance. However, the maintenance of high levels of investment was a positive development.

Growth has not recovered in the member countries of G20. Volatility has declined in both the developed and developing country members of the G20. But the volatility of both these groups in the G20 is greater than the volatility of countries not part of the G20, high income countries and of MICs and LDCs in general. Developing countries in the G20 (G20-Dev) have done better on the investment front whereas it declined slightly in the developed country members of the G20. Furthermore, volatility of investment decreased in the G20-Dev whereas it increased slightly in the G20-DC.

Volatility of export earnings decreased in both the G20-DC and the G20-Dev. However, exports as a per cent of GDP increased in the G20-DC as it decreased for G20-Dev. This decrease could be attributed to slower growth in developing countries as more of the exports of developing countries are destined for developing countries. The increase in exports by the GDC was less than for developed countries generally. External balance improved in the G20-DC while they worsened in the G20-Dev. This reflected the performance of developed and developing countries in general.

Appendies

Table A1: Coefficient of Variation in Income (Per Capita GDP Growth)

Country	CV	
	2001-07	2011-19
Australia	0.43	0.45
Canada	0.55	0.85
France	0.63	0.79
Germany	1.27	1.18
Italy	1.04	118.12
Japan	0.71	0.76
Korea, Rep.	0.29	0.16
United Kingdom	0.22	0.48
United States	0.66	0.35
Average GDC	0.64	13.68
Brazil	0.87	-48.32
China	0.21	0.14
Argentina	2.74	-4.60
India	0.35	0.26
Indonesia	0.24	0.10
Mexico	3.14	0.97
South Africa	0.40	31.10
Turkey	1.32	0.78
Average GLDC	1.16	-2.45
Saudi Arabia	6.47	3.58
Russian Federation	0.19	1.50
Average oil exporting countries	3.33	2.54

Source: Authors' calculations on data from World Development Indicators.

Table A2: Coefficient of Variation for GFCF

Country	2001-07	2011-19
Australia	0.07	0.06
Canada	0.07	0.04
France	0.04	0.03
Germany	0.05	0.03
Italy	0.02	0.05
Japan	0.03	0.03
Korea, Rep.	0.01	0.03
United Kingdom	0.02	0.11
United States	0.03	0.03
Average GDC	0.04	0.05
Brazil	0.04	0.15
China	0.06	0.03
Argentina	0.16	0.07
India	0.09	0.08
Indonesia	0.11	0.01
Mexico	0.05	0.04
South Africa	0.12	0.06
Turkey	0.18	0.05
Average GLDC	0.10	0.06
Saudi Arabia	0.10	0.17
Russian Federation	0.06	0.04
Average oil exporting countries	0.08	0.11

Source: Authors' calculations on data from World Development Indicators.

Table A3: Coefficient of Variation for Exports Ratio

	2001-07	2011-19
Australia	0.08	0.07
Canada	0.07	0.02
France	0.03	0.04
Germany	0.12	0.02
Italy	0.06	0.05
Japan	0.20	0.08
Korea, Rep.	0.09	0.13
United Kingdom	0.05	0.05
United States	0.09	0.06
Average GDC	0.09	0.06
Argentina	0.23	0.18

Brazil	0.09	0.50
China	0.21	0.45
India	0.20	0.13
Indonesia	0.10	0.12
Mexico	0.08	0.10
South Africa	0.08	0.02
Turkey	0.08	0.14
Average GLDC	0.14	0.21
Russian Federation	0.06	0.52
Saudi Arabia	0.17	0.23
Average, Oil exporting countries	0.12	0.37

Table A4: CV for External Balance

Country	**2001-07**	**2011-19**
Australia	-0.75	-9.92
Canada	0.30	-0.30
France	1.39	-0.38
Germany	0.35	0.14
Italy	2.77	0.68
Japan	0.30	-2.35
Korea, Rep.	0.60	0.43
United Kingdom	-0.10	-0.18
United States	-0.17	-0.11
Average GDC	0.52	-1.33
Brazil	1.17	-1.55
China	0.63	0.37
Argentina	0.63	-31.67
India	-0.64	-0.49
Indonesia	0.28	9.77
Mexico	-0.10	-0.40
South Africa	2.51	-3.74
Turkey	-4.07	-1.05
Average GLDC	0.05	-3.60
Saudi Arabia	0.26	0.89
Russia	0.14	0.23
Average, Oil exporting countries	0.20	0.56

Source: Authors' calculations on data from World Development Indicators.

Endnotes

1. The G20 at the level of finance ministers and central bank governors was set up in 1999 after the Asian crisis of 1997.
2. http://www.g20.utoronto.ca/analysis/201118-kirton-odi.html
3. Since there is no clear definition of stability in the literature it is difficult to judge whether this goal has been achieved. What can be observed is that the sort of crises that were frequent in the 90s and early 2000s are no longer occurring.
4. Other membership of other bodies dealing with financial standards such as of auditing, stock markets etc were expanded to include developing countries.
5. Such measures had been initiated earlier, the Financial stability assessment program of the IMFG and the World Bank. But countries such as the United States had stayed outside its ambit contending the problem of financial stability was a problem of developing countries. The 2008 crisis had blown apart this view.
6. This suggests that LAC countries are caught in a middle income trap. At the same time the SSA countries are caught in a low income trap.
7. The test statistic in our case since the sample size is the same is (V(1)-V(2)}/{V^2(V^2+.5)/n-1)}^ .5} where V is the average of the CV for the two periods. This statistic is distributed as the standard normal distribution with mean 0 and SD of 1.
8. https://www.rba.gov.au/publications/bulletin/2019/jun/a-decade-of-post-crisis-g20-financial-sector-reforms.html
9. https://www.ris.org.in/sites/default/files/Publication/g20%20report%20final%20%282%29.pdf

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Research Article

Enabling Sustainability and Just Transition for Better Future: Role of G20

G20 Digest
Vol. 2, No.2&3, pp 49-64,
April-September, ©2022,
Research and Information System for Developing Countries (RIS).

Anshuman Gupta*

Abstract: Since efforts to mitigate climate change involves externality problem, there is a tendency of free-riding, requiring global close cooperation. It also involves questions of fairness and justice, as least-developed and developing countries, housing the maximum chunk of poor people, have to meet their developmental aspirations. One-fit-for-all principle would not work. The developed countries would do better to further transition to knowledge-based economy, besides increasing the share of renewable energy in energy mix, having robust carbon emission market and immediately phasing-out subsidies on fossil fuels. The developing countries, having prominent industrial and manufacturing sector, should acquire energy efficiency. They have infrastructural and technological lock-in problems; they should replace retiring old thermal plans with renewable ones, besides introducing the carbon price and phasing-out subsidies on fossil fuels. The least-developed countries would do better to increase their agriculture productivity to halt deforestation. The developed countries should help them technically and financially acquire energy efficiency and shift to clean energy. Remaining carbon space should be allocated progressively. Developed countries should vacate some space by targeting net-negative emission. Indian Presidency, with developing countries' Troika, is important for deliberations on these important issues.

Introduction

Sustainability is not a new concept. In economics, it is used as sustainable development or sustainable growth, signifying development with taking due care of ecology. Sustainable development has been defined in simple words in Brundtland Report of UN in 1987 as 'development that meets the needs of the present generation without compromising the ability of future generations to meet their own needs'(UN, 1987). The 1992 Rio Earth Summit consolidated the Brundtland argument that sustainable development must comprise three pillars, including economic, environment and social. There should be economic development with preserving environment and social harmony with inclusive growth.

Nobel laureate Robert Solow defines sustainability as making sure that next

* Consultant, RIS. Email: anshuman.gupta@ris.org.in

generation is as well off as the current generation for all times (Kolstad, 2012). He used the concept of weak sustainability and regarded the man-made capital, like machines, and knowledge are close substitutes to natural resources. As per his view, once we deplete the energy or other natural resources, new man-made machines and technologies would replace them, and we would use less of these natural resources as a result of energy or resource efficiency. However, there exits another view which believes in strong sustainability, as there exits weak or no substitutability between man-made capital and natural capital.

The neo-classical framework, under which the world has seen the unprecedented growth for the last few decades, is majorly premised on weak sustainability. The neo-classical framework, based on utilitarianism, individualism and unbounded rationality, has exploited everything which has the capacity of satisfying the insatiable demand of humans. In pursuit of this end, it has created the inequality among nations and within nations (comparable to glided age) and destroyed the ecology. It placed humans at the centre of ecological system rather than as one part of it and exploited it unsustainably, a great deal. Its adverse manifestations are visible in many forms (Nordhaus, 2013), including the frequency of zoonotic deadly diseases (COVID19 being latest), global warming, extreme weather events, desertification, loss of terrestrial and marine bio-diversity, etc.

However, world leaders, having experienced the fury of nature in one form or another, have realized that something is wrong with this path of development and started taking environment seriously. It was also reinforced by the Intergovernmental Panel on Climate Change (IPCC)'s sixth assessment report, which indicates impending grim situations and calls for drastic actions on the part of comity of nations. They have now started believing in science of global warming and climate change, which is on account of anthropogenic activities. They have promised to cut their emissions under the Paris Agreement under the ambit of United Nation Framework Convention on Climate Change (UNFCCC). They have made their commitments for mitigating climate change in Intended Nationally Determined Contributions (INDCs) under the Paris Agreement. They have also announced their respective years for going net-zero emission, which is year 2050 in case of developed countries. India also announced its intention for securing net-zero by 2070.

Transitioning to green economies to combating climate change, which each country needs to undertake, involves the issue of justice and fairness to developing and least-developed countries, which houses the maximum chunk of poor people of the world, the main target group of UN-launched SDGs. All international agreements relating to climate change or biodiversity are also based on the principle of 'common but differentiated responsibility and respective capabilities'. However, the available carbon space is very limited, which will be spent, with the current rate of emission, in less than 10 and 25 years for limiting the temperature increase to 1.5 and 2 degree Celsius respectively. It should be allocated more judiciously, besides applying other environmental laws, initiated by developed countries and having trans-border implications, progressively. Efforts should be expedited by developed countries to help poor and developing economies

financially and technologically in meeting their obligations for mitigating climate change and adaptation.

Its importance increases manifolds in the backdrop of mostly dysfunctional multilateral institutions, which are dominated by developed countries. The climate change and environmental issues are getting increasing traction in G 20 Presidencies of late. Though G20 is not a forum for negotiating the binding commitments, it is consensus-seeking platform on significant issues that the world is confronting. The consensus on issues of importance steer further negotiations for binding or more firmed up commitments in respective specific multilateral forums.

Following introduction in section 1, the section 2 identifies and analyses enablers of attaining the environmental sustainability along with taking care of developmental needs of developing and least-developed countries. More importantly it deals with just transition to green economies to combat the climate change, spelling out different strategies for broadly developed, developing and least- developed countries. Section 3 critically studies the issues G20 Presidencies have flagged and the initiatives taken on them. Finally, section 4 spells out the way forward and how Indian Presidency (with Troika having all three developing countries) can be watershed in bringing in and securing consensus on the issues related to climate change and environment which are favourable to developing and least-developed countries, with taking care of their developmental aspirations.

Enablers for Sustainability

The economists have deliberated on sustainability and suggested different strategies to deal with local and global pollutants. All types of pollutions involve externality problem, promoting the tendency of free-riding on the part of economic agents. The local pollutants, like sulphur dioxide or nitrogen dioxide, can be dealt with administrative and legislative measures at the local level on the principle of 'polluters must pay full price' including economic and environmental cost (Bhagwati, 2002). However, tackling the global pollution, like Greenhouse Gases (GHGs), is an uphill task. The global warming and climate change are the result of such global pollutants. They involve externality at global level along with temporal externality, involving future generations (Frankel, 2008). So the temptation of free-riding is stronger here. They need global solutions with cooperation from all countries. The Paris Agreement and earlier Kyoto Protocol under UNFCCC are global agreements dealing with global warming and climate change. However, in spite of best intention evinced by world leaders to contain the temperature increase less than 2/1.5 degree Celsius to pre-industrial level, the actions on ground are not commensurate with targets. It is manifested by measures taken by the EU in the wake of Russia-Ukraine conflict to secure energy. It has increased investment on fossil fuels. The US greenhouse gas emission has also increased last year. India, in this regard, is ahead of schedule to meeting its commitments by 2030. It rather upgraded its commitments in COP26 in Glasgow. However, each country needs to do its bit to achieve the desired results. In fact, it involves the transition of the economies from fossil fuels to green economies based on renewable energy or low carbon activities. It should be a just transition, involving the issue of justice and fairness to developing and poor countries, which

have to meet their developmental needs, as they house the maximum poor people of the world. The following steps may be suggested in this regard.

Electrification of All Sectors and Generating Electricity from Renewable Sources

It is generally a two-pronged strategy. Firstly of involves the electrification of all sectors of the economy, including broadly agriculture, industry and services. Electrifying services is relatively easy as most of modern services, including banking, internet-based services, are run on electricity. The work is going on to make the electrical vehicles (EVs) competitive and efficient to internal combustion engines (ICEs). Many countries, especially developed ones, are showing good results in replacing ICE-based vehicles, mainly in the new sales of vehicles. Global EV sales continue strong, with total of 4.3 million sales of new BEVs and PHEVs during the first half of 2022, which is 62 per cent growth compared to last year H1. China is accounting the highest sales (2452), followed by Europe (1161), North America (483) and others (217) (Shahan, 2022). In transportation, aviation, shipping and road freight are regarded hard-to-abate sectors. India has adopted the Fast Adoption and Manufacturing of Electrical Vehicles in India Phase II (FAME India, phase II) . It is a demand-driven scheme, in which, the subsidy is given to consumers in terms of reduced upfront price of EVs, which is eventually reimbursed to original equipment manufacturers. It is Rs. 10,000 crore scheme. As a result of it, India has seen the spike of EV sales. The sale of EVs has increased from 48179 units in 2020-21 to 237811 in 2021-22, which further scaled up to 442901 in 2022-23 (till 9th December), . However, electrification of manufacturing is pretty difficult, especially in hard-to-abate sectors. Hardest-to-decarbonise industries include heavy, energy-intensive industries, such as steel, cement, fertilizers, chemicals, etc. In agriculture, eco-friendly farming practices can ensure sustainability. These practices include organic farming, crop rotation and poly-culture, use of renewable energy sources for powering agriculture processes, agro-forestry, cover crops and mulching, precision farming, etc.

The second part of the strategy is transforming the electric generation to renewable sources. It also involves its challenges in terms of cost competitiveness, grid stability, lack of storage facility, etc. Large scale work is going on in research and development in all segments of value chain of renewable energy sources. Though some of the sources, especially solar power, have seen the drastic reduction in cost of generation, comparable to fossil fuels-based generation, the work needs to go a long way in all segments, especially storage facilities, to do a meaningful and substantial transitioning to renewable sources. Green hydrogen might be the future source of energy; however, it is at very nascent stage.

Setting Appropriate Carbon Price to Build Favourable Ecosystem to Green Activities

There is a need to build the new ecosystem favouring the green activities and discouraging the fossil fuels-based activities. There is a need to charge the right price of fossil fuels including the economic and environmental cost. Setting the appropriate carbon price is the first step. The Kyoto Protocol

envisaged the global level emission trading system. However, it could not be achieved because of varying capabilities and capacities across countries. The EU-Emission Trading System (EU-ETS) has been most successful in this regard. There is a need to increase the capabilities and capacities of developing counties to design the effective carbon price scheme.

Phasing Out Subsidies on Fossil Fuels and Introducing Them on Green Businesses

The fiscal and monetary support, like subsidies at exploration, production or price level, should be done away with immediately in developed centres, followed by emerging countries and LDCs. It would discourage their production and consumption. Simultaneously, the green businesses, including renewable energy, should be provided subsidies, both at production and consumption fronts. These subsidies can be continued unless the whole ecosystem favouring the green businesses comes into being.

Setting the right price of carbon and doing away with subsidies to fossil fuels-based activities, being the initial steps to transition, would help in promoting the entrepreneurs and financial market favouring the green activities rather than fossil fuels-based activities. Since fossil fuels-based activities would be more costly now, the producers would find it more profitable to invest in green products and services. The financial sector would also give funds, in terms of loans and equity, to them on more favourable terms. Credit rating agencies would also accord them better ratings in comparison to fossil fuels-based businesses. All research and development in financial sector would gear to provide better products to suit the demand of renewable energy and other green businesses. It will also promote research and development in green technologies. This is how the whole new ecosystem would develop to create a new world based on renewable energy and green businesses.

Ensuring Justice and Fairness to Developing and Poor Countries

Since the transition of economies also involves the issue of justice and fairness and all global environmental agreements are based on the principle of 'Common but Differentiated responsibilities and respective capabilities', there is a need to take care of developmental needs of poor countries. It should be especially considered at the time of taking environmental measures at country level, which have trans border consequences and adversely impact the development of poor countries. The Carbon Border Adjustment Measure (CBAM), initiated by EU as part of 'Fit for 55 Strategy' can be cited in this regard. It has adverse developmental implications for poor countries, as it will be applied equally to developing and least-developed countries (Brandi, 2021). It violates the 'Common but Differentiated Responsibilities Principle' of the Paris Agreement. It is also against the WTO's progressive arrangement, which mostly exempts the LDCs and accords special and differentiated treatment to developing countries in their obligations under various agreements. CBAM should be revisited to make certain changes to accommodate developmental concerns of poor countries. The capacities and capabilities of developing countries should be augmented to help them design effective carbon trading schemes at regional and country levels.

Investing in New Green Technologies

The developed countries should invest in the research and development in whole

range of new technologies meant for decarbonisation. They include renewable energy technologies, storage batteries, carbon capture and storage technologies, etc. They should be used as public goods and made available for usage to developing and poor countries.

Breaking Path Dependencies

There is always a problem of path dependency coming in the way of initiating something new. It can arise at all levels- political, research and development, finance, entrepreneurs, infrastructure and consumers. At the political level, the political class is always close to businesses in a democratic set up, since they need donation money to finance their elections. Businesses also seek some favours in return, at least favourable policy regimes. Breaking this nexus is a difficult task, which will always come in the way of announcing new set of policies and regulations favouring the green activity-based businesses. Same way, the investors would keep on focussing in research and development of old technologies-based products to make them more efficient in terms of energy consumption and other functionalities rather than risking their efforts and money in new set of technologies. It is more rewarding for them, besides inertia.

Financial sector would also prefer to give loans to fossil fuels-based activities rather than new green economic activities. The rating agencies would also give better ratings to fossil fuels-based activities, as they are tested businesses, rather than new activities. Entrepreneurs would also fear to go in new activities for their being risky and untested. The green businesses require the new set of infrastructure. For example, even if the electrical vehicles are produced by some entrepreneurs, the lack of electric charging facilities would discourage even willing consumers to buy it. So it would simultaneously discourage both producers and consumers. Thus it is extremely difficult to break all these path dependencies unless there is very strong will-power at the top policy decision-making level to start with favourable policy regime for green businesses. Fortunately, the nature has pushed each country to the edge, as they have experienced anger of nature in one form or another. Now the leaders of countries of world have started according serious heeds to environmental issues. Electorates themselves have been increasingly giving more importance to climate and other environmental issues. These changes are manifested in many instances like Australian Prime Ministerial election manifesto or America rejoining the Paris agreement under Joe Biden administration. The G20 has started giving more importance to environmental issues. These all development bode well for breaking these path dependencies.

Giving Financial and Technical Help to Developing and Least-Developed Countries

The promised financial help (annual $100 by 2020) by developed countries for mitigation of climate change and adaptation is largely unfulfilled. The developed countries, including G7 countries, have continuously over-reported their climate finance. They diverted funds meant for meeting other SDG goals, including health, education, gender equality and poverty alleviation, to climate finance. They should meet their promise in true spirit. They should also make provisions for loss and damage to compensate the poor countries suffered most as a result of climate change. This loss and damage issue again surfaced in recently concluded COP27 summit. Though members have decided to set

up a loss and damage fund, it should be satisfactorily implemented, with clear-cut objectives, principles and operational modalities, and finance should be linked to the transition of economies of recipient countries.

Judicious Allocation of Available Carbon Space

Carbon space is going to be the rarest of the rare inputs in future, as very limited carbon space is left. It is barely sufficient, with the current rate of emission, for less than 10 years and 25 years for limiting the temperature increase to 1.5 and 2 degrees Celsius to pre-industrial level, respectively. It should be used fairly to accommodate the developmental concerns of developing and poor countries, as maximum poor people of world reside there. If fact, it is advisable that developed countries should advance their net zero emission years to 2035, and target net negative emission by 2050. It would create extra carbon space, which can be used by developing and least-developed countries in a progressive manner. It would be helpful to achieve the SDGs.

Promoting Circular Economy

The circular economy, based on 3 Rs (Reduce, reuse and Recycle), should be promoted to increase the efficiency in usage of materials. For it to succeed there is a need to change the whole industrial ecosystem and supply chain (ranging from the product design to establishing new supply chain, including waste management to recycle facilities).

Promoting Sustainable Urbanization Based on Smart City

The urbanization is going to increase as economies of the world develop, especially in developing and least developed countries. The idea of a smart city, which is productive, equipped with advanced technologies, environment-friendly and socially inclusive, should be promoted. The urban population is going to increase by 2.5 billion in next three decades, which is going to burden the resources of cities. Thus our cities should be ready to cope with these changes for ensuring economic, environmental and social sustainability. The concept of smart cities can do it successfully by integrating the migrant workers productively, connecting the urban centres with peripheries, giving services to all (rich or poor) and managing utilities, like power plants, water supply networks, garbage disposal, school, hospitals, etc. For these, there is a need to empower the Urban Local Bodies (ULBs) to raise adequate funds to undertake all these changes. There is also a need to increase the capacity of urban local bodies and make them accountable.

Preserving and Protecting Forests and Oceans

Our forests and oceans are natural carbon sinks, as they are capable of absorbing 50 per cent of the carbon emitted into the atmosphere. They are also natural habitats for bio-diversity. They should be preserved and protected well. The local communities should be involved in their governance and management. For this purpose, the CBD parties should implement the post-2020 Global Biodiversity Framework (GBF), concluded in COP15, in an effective way. Actions should be strengthened to halt and reverse biodiversity loss by 2030. The COP 15, which concluded on December 19, 2022, has set the goal of ensuring that by 2030 at least 30 per cent of the terrestrial, inland waters and oceans globally will be managed as protected areas. However, it is not yet clear how the targets would be split among member countries and

how high seas lying outside the national jurisdiction be covered. Another targets include reduction of emission from chemical fertilizers by half and use of toxic pesticides by two-third by 2030, which might have repercussion for food security at global level, especially for the poor and developing countries. Another target of totally eliminating plastic waste by 2030 also seems very ambitious, especially in the absence of clear-cut indication of financial support by developed countries to developing countries. There is a reference of increasing financial sources from all sources to at least $ 200 billion per year, including new financial resources (Sharan, 2022). It also has reference of at least $20 billion per year international financial flow from developed countries to developing countries, especially least-developed countries, small island developing countries and countries with economies in transition by 2025, and annual $30 billion by 2030. $20 or 30 billion would be a meagre amount, given the task at hand. Another source of finance of $500 billion, raised through phasing out many harmful subsidies to biodiversity, has also been mentioned. It applies to all countries. It seems that finance has to be majorly raised by all countries, which is against the common but differentiated responsibility and respective capabilities principle.

One of the important objectives of Convention on Biological Diversity (CBD) is access and benefit-sharing of using genetic resources with local communities. To implement this objective, CBD in 2010 introduced the Nagoya Protocol mandating the potential users of genetic resources to secure the prior informed consent from local communities protecting these resources and mutually agreed terms for their utilization. However, on ground, the application of these measures leaves much to be desired. In COP 15, there has been an agreement to strengthen the mechanism of access and benefit-sharing of commercial use of genetic resources. A multilateral fund has been agreed to be set up for this purpose by 2024 COP 16 in Turkey. The developed countries have been constantly insisting for the stronger patent regime; however, they barely share the benefits with local communities harbouring the genetic resources, foundation of their drugs and other products.

Adopting Different Approaches for Transition to Green Economies

Each country has to contribute its bit in the fight against climate change triggered by GHGs build-up over the years on account of anthropogenic activities. There has to be concerted, well-coordinated approach at the world level. The developed countries, developing countries and least-developed countries, being at different stages of economic development, will need to adopt different approaches. The developed countries, whose services sector dominates their GDP (70 percent on an average), would do better to transition to knowledge-based economy. The World Bank has made the knowledge economy index (KEI). The KEI is made of various indicators of four pillars including economic and institutional regime, education and skill, information and communication infrastructure and innovation system (World Bank, 2008). The KEI and GDP per capita are found to be highly correlated. The UNDP also prepared cross- country Global knowledge Index with the help of seven indictors including pre-university education, technical and vocational education & training, higher education, research development and innovation, information and communication technology, economy, and general

enabling environment. All developed countries have done already excellent in all the pillars. They need to further accelerate the process with securing the increasing greater share of renewable energy. They should have robust carbon emission market and phase out subsidies on fossil fuels at all levels.

The developing countries (lower middle income countries plus upper middle income countries), whose industry and manufacturing sector is prominent, need to shift to clean energy and acquire energy efficiency. They cannot immediately shift to clean energy owing to lack of resources, and infrastructural and technological lock-in problems, which would come in their way to transitioning to clean energy completely. However, they should retire the old thermal plants and replace them with renewable sources. They should introduce the carbon price and phase out the inefficient subsidies on fossil fuels. They should promote green activities through doling out the fiscal incentive at all levels, including innovation, consumption and production levels.

The low income countries' economic structures are prominently dominated by very low level of economic activities dominated by primary sectors (agriculture and mining). They use mainly the fossil fuels, majorly wooden inputs. The productivity of their agriculture sector is very low, and they have the population explosion on account of their demographic evolution, with the low death and high birth rates. These all forced them for extensive farming with claiming new lands from forests, which is creating the problem of large-scale deforestation in these economies. These countries are generally rich with fossils fuels, which are generally untapped assets for them. They are engaged in low value of services. The level of electrification is very low. Their per capita energy consumption and concomitant per capita emission are also very low. They have the advantage that they do not have the infrastructural lock-in problem, as they have yet to create one. However, they do not have financial and technological resources. The best strategy for them would be to increase the productivity in agriculture to feed their increasing population. Here developed and developing countries should supply them better tools and methods suitable to their conditions (socio-economic and environmental). It would halt deforestation in these economies. The developed countries should provide them help in financial and technical terms to acquire energy efficiency in industrial and agriculture production. These countries should also, on their part, establish a vibrant financial sector, modern property laws and other components of conducive business environment to encourage people to take up entrepreneurial activities. They

Table 1: Sector-Wise Break-up of GDP of Country Groupings in 2020(%)

Country Groups	Agriculture	Industry	Manufacturing	Services
Low Income Countries	27.6	25.6	10.9	38.4
Lower Income Countries	16.4	27.7	14.8	49.2
Upper Middle Income Countries	6.9	33.9	22.0	56.0
High Income Countries	1.2	22.6	13.4	70.0

Source: World Bank (2021).

should be exempted from environmental measures, initiated by other developed and developing countries and having transborder implications, like carbon tax or CBAM discussed earlier. They should be provided the certified emission credits for maintaining their forests and other natural sinks to encourage them for doing so in an efficient and effective way.

Table 2 : Global Knowledge Index- Top Ten countries and BRICs(Brazil, Russia,China& India)

Country	GKI Rank	Score
Switzerland	1	73.6
USA	2	71.1
Finland	3	70.8
Sweden	4	70.6
Netherland	5	69.7
Luxembourg	6	69.5
Singapore	7	69.2
Denmark	8	68.3
United Kingdom	9	68.1
Hong Long	10	66.8
BRICs		
Russia	45	50.6
Brazil	68	45.4
China	31	57.4
India	75	44.4

Source: Global Knowledge Index , UNDP, 2020.

Making LiFE (Life for Environment) a Mass Movement at Global Level

There is a need to bring the change at the individual level by nudging them for changing to responsible lifestyle, which is friendly to environment. In this regard, Indian Prime Minister introduced the concept of LiFE-Lifestyle for Environment- at COP26 in Glasgow, calling on the global community of individuals and institutions to drive LiFE as an international mass movement towards 'mindful and deliberate utilization, instead of mindless and destructive consumption' to protect the environment. The individuals are encouraged to adopt pro-environment lifestyle and they are recognized as Pro-Planet People. The Indian G20 presidency also promotes LiFE by adopting theme "Vasudhaiva Kutumbakam" or One Earth, One family, One Future. It values all life and their connectedness on planet Earth and in wider universe.

G20 Initiatives for Enabling Sustainability

The Climate issues are getting increasing attention year after year in G20 forum. Emphasis, in general, has been laid on all three ways to fight climate change problem, including mitigation, adaptation and sequestration. Seeing the pressing problem of climate change, during the German Presidency, the B20, C20 and T20 each decided to set up dedicated climate and energy taskforce to better target their recommendations towards the G20. The following issues have been flagged during various G20 presidencies.

Protection and Preservation of Marine Ecology

The issue of marine protection emerged initially from accidents related to oil and gas exploration and development in seas. Later on, full-fledged marine protection and preservation came from the environmental perspective as a natural sink. Osaka Blue Ocean Vision (Japan), Coral Reef R&D Accelerator Platform(Saudi Arabia) , Circular Carbon

Economy Platform to reduce the plastic use and banning SUP, increasing Marine Protected Areas (MPAs) (Rome), banning illegal, unreported and unregulated (IUU) fishing are some initiatives in this regard in various Presidencies.

Phasing out Subsidies on Fossil Fuels

Phasing out fossil fuel subsidies has emerged an important issue in all the presidencies' declarations, as it leads to excessive uses of fossil fuels. However, the fossil fuel subsidies are still bigger than environmentally harmful agriculture or water subsidies owing to reasons relating to political economy. The fossil fuel subsidies include any government support at production, exploration or consumption level. These are explicit subsidies. If one includes the unpaid negative externalities, it would be much larger. In 2021, the global fossil fuel consumption subsidies alone were estimated at $ 440 billion dollars. Encouraging low carbon development strategies was emphasised. Leaders also pledged to promoting effective policies to develop clean energy and energy efficiency technologies in various G20 Presidencies.

Helping Poor Countries in Mitigation and Adaptation Measures

Helping poor and low income countries in their adaptation and mitigation programmes, including Green Climate Fund, has been emphasised. Support for inclusive green growth in developing and poor countries through institutions and mechanisms that can facilitate knowledge sharing, resource mobilization, and building technical and institutional capacity to design inclusive green growth strategies and policies were given due attention. The financial pledge of annual $ 100 billion by developed countries to developing and poor countries by 2020 was also mentioned in all Presidencies. However, it is still unfulfilled and reported financial help is distorted and misrepresented, as they have been diverted from other headings meant for meeting other SDGs, like, health, education, etc.

Collaboration to Build Well-Functioning, Robust Energy Market

In line with the G20 Principles on Energy Collaboration, leaders reaffirmed commitment to building well-functioning, open, competitive, efficient, stable and transparent energy markets, fostering more effective and inclusive global energy architecture to better reflect the changing realities of the world's energy landscape. Natural gas has been acknowledged as intermittent fuel in the fight against climate change. The pledge to eradicate energy poverty was also reaffirmed through promoting universal energy access, cooperating to provide displaced people and disaster-impacted and remote areas with access to energy, and enhanced implementation of G20 regional plans.

Protecting Terrestrial and Marine Biodiversity

G20 Presidencies reaffirmed commitment to Convention on Biological Diversity (CBD). The Rome presidency committed to strengthen actions to halt and reverse biodiversity loss by 2030 and called on CBD Parties to adopt a robust and transformative post-2020 Global Biodiversity Framework at COP15. It also welcomed the launch of the UN Decade on Ecosystem Restoration 2021-2030, reaffirmed the shared ambition to achieve a 50 per cent reduction of degraded land by 2040 on a voluntary

basis, and pledged to strive to achieve Land Degradation Neutrality by 2030. It promised to build on the G20 Global Initiative on Reducing Land Degradation and Enhancing Conservation of Terrestrial Habitats launched under the Saudi Presidency and look forward to its upcoming Implementation Strategy. Leaders appealed to scale up and encourage the implementation of Nature-based Solutions or Ecosystem-based Approaches as valuable tools to provide economic, social, climate and environmental benefits, including in and around cities, in an inclusive manner and through the participation of local communities and Indigenous Peoples. They also promised the implementation of 'One Health Approach' in relevant policies and decision-making processes to take care of health of the whole ecology. They highlighted the importance of parties to United Nations Convention on The Law of the Sea (UNCLOS) to make progress as soon as possible in the ongoing negotiations for an ambitious and balanced international legally binding instrument under UNCLOS on the conservation and sustainable use of marine biodiversity of areas beyond national jurisdiction. They supported and encouraged further progress to implement the long-standing commitment of the Commission for the Conservation of Antarctic Marine Living Resources (CCAMLR), recognizing Marine Protected Areas (MPAs) can serve as a powerful tool for protecting sensitive ecosystems representative of the Convention Area, in particular in East Antarctica, the Weddell Sea and in the Antarctic Peninsula.

Encouraging Sustainable Urbanization

G20 presidency supported intermediary cities in adopting integrated and inclusive urban planning; accelerating their transition towards clean and sustainable energy and sustainable mobility for all; improving waste management; fostering empowerment and decent work for women, youth, migrants and refugees; assisting disabled and elderly persons; enhancing food systems sustainability; and enabling more equitable access to digital innovations. Partnerships like the Coalition for Disaster Resilience Infrastructure could act as a vehicle to accelerate this agenda.

Commitment to full implementation of Paris Agreement

G20 has reaffirmed its commitments to fully implementing Paris Agreement' commitments with complying the principle of Common But Differentiated Responsibility (CBDR). They recognized that G20 members can significantly contribute to the reduction of global greenhouse gas emissions and so, in line with the latest scientific developments and with national circumstances, they promised to take further action to enhance their 2030 NDCs. They committed to formulate long-term strategies for clear and predictable pathways consistent with the achievement of a balance between anthropogenic emissions and removal by sinks by or around mid-century. While making such strategies, they will take into account different approaches, including the Circular Carbon Economy, socio-economic, economic, technological, and market developments, and promotion of the most efficient solutions. They appealed to governments for national recovery and resilience plans that allocate, according to national circumstances, an ambitious share of the financial resources to mitigating and adapting to climate change and avoid harm to the climate

and environment. They promised to speed up efforts to phase out methane and took note of specific initiatives on methane, including the establishment of the International Methane Emissions Observatory (IMEO).

Promoting the Green Finance

The G20 leaders committed to mobilize international public and private finance to support green, inclusive and sustainable energy development and putting an end to the provision of international public finance for new unabated coal power generation by the end of 2021. They welcomed the agreement by Finance Ministers and Central Bank Governors to coordinate their efforts to tackle global challenges such as climate change and environmental protection, and to promote transition towards green, more prosperous and inclusive economies. However, they did not talk about the adoption of appropriate carbon price eloquently and explicitly. The lack of standardized taxonomy for green projects at global level and accurate risk-related data about green projects are not conducive to establishing a vibrant green financial market.

Way Forward

The world has seen the impressive and unprecedented economic growth during recent decades under majorly neo-classical framework, which is premised on utilitarianism, individualism and unbounded rationality. Aspiring to pursue the hyper-globalization, where goods and international finance (both long-and short-terms) were envisaged to cross borders, was also one of significant components of neo-classical framework. Though there have been many achievements to its credit, like bringing out millions of people out of abject poverty, unprecedented creation of wealth, unleashing innovations across sectors, etc., it has left the world extremely unequal comparable to glided age and destroyed the ecology to a great extent. The inequality has increased not only among countries but also within economies. As far as the dismal state of ecology is concerned, as per the Living Panel Report 2022 of the worldwide fund for Nature, nearly 34,000 plant and 5,200 animal species, comprising almost one-eight bird species, face the threat of extinction. Overall, the wildlife population has seen a drastic reduction by 69 per cent since 1970. The anthropogenic activities have been mainly responsible for them. They included mindless pursuit of economic growth at the cost of ecology, leading to over-exploitation of natural resources, deforestation and destruction of natural habitats, loss of biodiversity, air and water pollution, and climate change.

The fossil fuels-based development has resulted into the build-up of GHGs in atmosphere, which is causing the global warming and climate change. were often regards man-made capital and knowledge as close substitutes to natural capital to remain at same level of utility or welfare in the face of decreasing natural capital, Solow. However, it turns out to be untrue. There is a weak or no substitutability between the two. The humans are part of the ecology, rather than at center of it. If ecology is destroyed, it would have adverse consequences for the humans as well, which are already evidenced immensely in many forms, including increased heat-waves and extreme weather events, frequent occurrence of zoonotic diseases, desertification and sea rising. The temperature has already increased by over 1 degree Celsius to pre-industrial level. The Paris agreement kept the limit of temperature increase

at 2 degree Celsius by 2100, which was upgraded to 1.5 degree Celsius at COP26 in Glasgow. The countries have made commitments to undertake measures to cut GHGs (especially CO2) emission in their intended nationally determined contributions (INDCs) under the Paris agreement. They have announced their respective years for becoming net-zero emission.

Enablers of sustainability include broadly bringing all sectors of the economies on electricity and generating electricity from renewable sources; creating the new ecosystem favouring the green activities and discouraging the fossil fuels-based activities with charging the right price of carbon; phasing out the subsidies on fossil fuels at all levels and, in their place, introducing subsidies for green businesses and renewable energy; creating a vibrant green financial market; and according due emphasis to fairness and justice (based on common but differentiated responsibilities principle) to accommodate the developmental aspirations of poor countries while making environmental laws at country level having trans-border developmental implications for the developing and poor countries. Others enablers are investing, especially by developed countries, in R&D in whole range of new technologies meant for decarbonisation and making them public goods for free accessibility by poor countries; meeting already promised financial help ($100 billion annually) by developed countries to developing countries for mitigation and adaptation measures to climate change and increasing it further to meet their actual requirements for the purpose; promoting the concept of smart city well-equipped with pursuing sustainable development; involving local community in governance and management of preserving and protecting forests and oceans; and encouraging global community to adopt LiFE (Lifestyle for Environment) as mass movement to avoid mindless and destructive consumption and adopt responsible consumption.

There are always path dependencies at all levels, including political, research and development, finance, entrepreneur, infrastructure and consumer levels. It requires a lot of will power at the top decision-making level to break these path dependencies and introduce a new set of policy measures conducive to promoting green businesses. Having experienced the anger of nature in one form or another for some time, the world leaders have now started taking the environmental issues seriously. It augurs well for breaking these path dependencies and unveiling the new rules conducive to green activities.

The carbon space is going to be the rarest input in the coming time, as it has been estimated by scientific community that the remaining carbon space is barely enough, with the current emission rate, for less than 10 years and 25 years to limit the temperature increase to 1.5 and 2 degree Celsius respectively. So it is imperative that the developed countries advance their date for going net-zero emission to 2035(at least) and aim for negative net-zero by 2050. It would create more carbon space, which should be used by developing and poor countries for development to bring out their major chunk of citizens out poverty and securing decent life for them. It would also help meet the UN-sponsored SDGs.

The developed, developing and least developed countries would have to pursue different approaches to transitioning to green economies. The developed countries would do better to aggressively embrace knowledge-based economies, as they are already the top rankers in knowledge Economy Index

(KEI), prepared by the World Bank and UNDP. They should increase the share of renewable energy substantially in their energy mix. They should have robust emission markets at regional and domestic levels, and phase out subsidies on fossil fuels at all levels.

The developing countries, whose industry and manufacturing sector is prominent, are advised to shift to clean energy and acquire energy efficiency. They cannot shift to clean energy immediately owing to lack of resources and infrastructure lock-in problem. They should be allowed to transition gradually, with replacing retiring old thermal plants with renewable ones. They should also introduce the appropriate carbon price and phase out the subsidies on fossil fuels. They should instead provide subsidies on green businesses.

The LDCs are having mainly low level economic activities, dominated by primary sector. Their services sector is of low value and industries are largely energy-intensive. They are experiencing population explosion, forcing them to adopt extensive farming leading to large scale of deforestation. The developed countries should help these economies increase productivity in agriculture by providing them with better technologies and tools suitable to their conditions. It would help preserve forest there, which are part of larger ecology. They should also be provided technical and financial help to acquire energy efficiency in agriculture and industrial sectors. These countries should also, on their part, establish vibrant financial sector, effective modern property law and other constituents of conducive business environment to encourage the local people to take up business activities. They should be exempted from environmental laws (like CBAM) having transborder implications and provided certified emission credits for maintaining forests and other natural sinks in an effective way.

During Germany Presidency, B20, C20 and T20 each decided to have separate taskforce on environment and climate Change to give dedicated recommendations to G20. G20 has lot of weight to steer the change issues to be negotiated in Conference of Parties (COP) under UNFCCC. They include protection of marine ecology, phasing out subsidies on fossil fuels, promotion of low carbon development strategies, helping poor countries (financially and technically) in their mitigation and adaptation initiatives to climate change, promoting collaboration to build well-functioning and robust energy market to end energy poverty, promotion of research and development in green technologies, protecting terrestrial and marine biodiversity, encouraging sustainable urbanization, promoting circular economy for material efficiency, commitment to full implementation of Paris agreement and promoting green finance.

Since the transition to green economies involves issues relating to justice and fairness to developing and poor countries, these issues should be taken more seriously and aggressively during the Indian Presidency. India Presidency has the advantage of having Troika of developing countries, including Indonesia, India and Brazil. It might turn out to be watershed Presidency emphasising issues favourable to developing and least developed countries. Two important issues from the developing and poor counties' perspectives, which have not yet received space in Leaders' declarations, are available carbon space and its judicious allocation, and application

of environmental laws having trans-border implications to least-developed and developing countries. As available carbon space is very limited, it is going to be the rarest and costliest input in the coming time. Its judicious allocation is very important. The developed countries should vacate carbon space by targeting net negative emission instead of net-zero emission by 2050. The available carbon space should be allocated in a progressive manner, giving maximum space to least developed countries, followed by developing countries. It would help achieve SDGs.

Secondly, environmental laws, initiated by developed countries, might have developmental implications for the poor and developing countries. The least-developed counties should be exempted from such laws and developing countries be accorded special and differentiated treatment. Besides, an attempt should be made to secure the pledge from developed countries for the enhanced financial and technical support, which have been majorly unfulfilled even in case of promised $100 billion annual help by 2020, for the transition of developing and poor countries to green economies and adaptation.

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Research Article

Greening Global Trade: Enhanced Synergies between Climate and Trade Policies for Decarbonization

G20 Digest
Vol. 2, No.2&3, pp 65-74,
April-September, ©2022,
Research and Information
System for Developing
Countries (RIS).

S. K. Mohanty[*], Pankhuri Gaur[**], Chandni Dawani[***]
Rizki N. Siregar[#], Novia Xu[##], Giulia Cretti[###], Pierfrancesco Mattiolo[^],
Paolo Mazzotti[^]

Abstract: Since the early 1990s, the intertwined nature of trade and environment has been debated in the global forums. Trade-distorting measures, including carbon leakage, fragmentation of markets due to differentiated environmental standards, and the lack of consensus in the Committee on Trade and Environment in Special Session (CTESS) have been some of the causes for increasing pressure on climate change. G20 members should explore policy guidelines of coordinating carbon pricing and border adjustment initiatives with an overarching spirit of inclusivity and transparency. The G20 should act as a facilitator for providing the transfer of Environmentally Sound Technologies (ESTs) to developing countries and LDCs for the greening of global trade.

Contemporary Global Challenges

International trade plays a substantial role in global warming; it has been estimated that 25 per cent of the total carbon emissions could be associated with the expansive cross-border production process and distribution (WTO, 2021). Meanwhile, "greening" trade would provide an impetus to sustainable production and restrain carbon emissions. Studies such as Grossman et al. (2021) and Hsiao (2021) have emphasized the importance

*Professor, RIS, New Delhi
**Assistant Professor, RIS, New Delhi
***Former Research Assistant, RIS, New Delhi
#University of Mainz, Germany
Centre for Strategic and International Studies, Indonesia
###Giulia Cretti (Clingendael Institute, Netherlands)
^Pierfrancesco Mattiolo (Italy-ASEAN Association, Italy)
^^Max Planck Institute for Comparative Public Law and International Law, Germany
[The paper appeared as policy brief of Task Force-1 of T20 Indonesia]

of commitment and coordination, while Maggi and Ossa (2021) argued that building deep trade agreements have been challenging despite wide interest to go beyond tariff reduction. Since the international frameworks for environment and trade are deeply intertwined, impediments to green trade should be addressed through technical solutions with the rationalization of cost.

Open, fair, transparent multilateral trade policies as well as collective and effective climate policies can act as global public goods that benefit all countries. Naturally, this would happen if all countries collectively acted to lower trade barriers and greenhouse gas emissions (Barrett, 2007). International communities are beginning to realize that trade and the environment can work in a similar framework. Countries (especially developed ones) and multinational corporations are rising to seize the opportunity in future demand for cheaper and environmentally-friendly goods through international trade. And thus, climate-related trade measures are introduced to govern this trend. However, this opens for argument that the rising trend of climate-related trade measures may undermine the progress of trade liberalization made so far. Vice versa, international climate policy may be undermined by trade liberalists who reject climate-related trade arguments to uphold open trade measures. These two sides of the argument stem from the fact that trade and the environment have been working in different pillars. A balanced connection is therefore highly needed to reach consensus for not using protectionist arguments to weaken climate mitigation policies.

Differences in climate policies are believed to cause carbon leakage, a phenomenon where productions associated with carbon-intensive operations are shifted away from strongly regulated countries to relatively relaxed ones, leading to building up pressure on global warming. Carbon pricing systems have proven to be effective in reducing emissions domestically, but their purpose risks being defeated by carbon leakage if not combined with border adjustment mechanisms (World Bank, 2021; Best et al., 2020; Eden et al., 2018). The risk of trade tensions persists due to the lack of coordination between different systems and disadvantages for developing countries to access Environmentally Sound Technology (ESTs) in order to pursue environmentally linked measures, including carbon-cutting policies. The use of international trade policies along with measures to mitigate the impact of climate change has become more prevalent.

These policies may distort international trade by introducing various environmentally linked constraints, including tariff and non-tariff barriers in the form of standards and regulations, among others. This is often coming in the way of the transformation of developing countries to environmentally compatible economies. Harmonization of environmental standards is another important issue for developing countries, as fragmentation of markets based on environmental standards may create splinter markets and compliance with different standards for each market is not cost-effective for them. In this regard, the limited pull exercised by the WTO on the integration of regulatory standards, coupled with enduring disagreement between members on fundamental issues concerning environmental policies, has thus far proved insufficient to bring about a genuine integration of international markets.

Both developed and developing countries are natural producers and

consumers of goods that are often environmentally sensitive. International trade with emphasis on transition to a green economy can allow trading of pollutant-free environmental goods through the production of such goods using ESTs. The shift to a greener economy provides new avenues and creates opportunities for trade, production, and consumption in different technology-intensive sectors. However, it has also been observed that while developing countries have production capabilities to produce Environmentally Sensitive Goods (ESGs) (Mohanty, 2014), they are also major consumers of such products, where access to ESTs is limited because they are mostly in the domain of developed economies (RIS, 2021). An international mediation may be called for to make a cost effective transfer of technology by respecting intellectual property rights and other international norms without distorting production, consumption, and trade of clean product.

Towards Greener Trade: Some Policy Options

To explore policy guidelines with an overarching spirit of inclusivity and transparency to promote green trade while managing climate-related issues, through harmonization of different environmental standards, coordinated carbon policy and border adjustment initiatives, transfer of technology with capacity building, this policy brief calls for active participation from G20 members. A balanced dialogue between developed and developing economies is essential to move toward a global approach to climate-related trade measures. To ensure inclusive climate- related trade measures, dialogue between consuming and producing countries should be facilitated, continuously, by multilateral institutions such as WTO and UNFCCC, where the G20 can provide building blocks for global efforts, as maintaining such dialogue at the G20 level may be relatively restricted due to the rolling annual presidency. The G20 can develop comprehensive and regular carbon and environmental impact assessments to have effective and well-designed climate-related trade measures. Some recommendations proposed in this regard are briefly done below.

Carbon Pricing: Common Principles for Fostering Green Trade

Carbon pricing is recognized under the Paris Agreement implicitly by Article 6 and explicitly by Decision CP21/1 para. 136.[1] The UNFCCC is currently promoting international cooperation in this field through the Collaborative Instruments for Ambitious Climate Action (CI-ACA) Initiative (UNFCCC, 2019). Additionally, in their Communiqué of July 9–10 2021, the G20 Finance Ministers and Central Bank Governors endorsed "the use of carbon pricing mechanisms and incentives while providing targeted support for the poorest and the most vulnerable". Several countries have already developed explicit carbon pricing (i.e., policies that determine a specific price per tonne of CO2 produced). "Cap-and-trade" systems, such as the EU's Emissions Trading Systems (ETS), are emerging as the prevalent model to deliver carbon-pricing—they have been implemented, or are in the process of being established, nationally and sub-nationally, in the EU, Canada, China, Japan, New Zealand, South Korea, Switzerland, and the United States (World Bank, 2021). Countries have also resorted to other mitigation policies that impose an implicit carbon price, raising production costs for carbon-intensive

companies through mechanisms other than targeted financial burdens, such as efficiency standards or by imposing specific low- carbon technologies. Yet, the impact of these solutions is harder to measure.

While the climate impact of carbon pricing appears to be globally positive, policy makers need to carefully consider its effects on global trade. If carbon pricing policies are implemented unilaterally, they may encourage carbon leakage in countries with less stringent regulations. Indeed, lack of coordination may put a dent in carbon pricing's positive climate effects. In other words, emissions would not be reduced, but just "transferred" to other jurisdictions and negatively affect the industrial competitiveness of countries with more ambitious climate policies. If policy makers want to use carbon pricing more effectively and with stronger commitment—which is needed to meet the Paris Agreement goals—they need to address its trade effects first (Parry et al., 2021).

Several G20 members (the EU, Canada, and Japan) are considering carbon border adjustment mechanisms (CBAMs) to complement their existing carbon pricing tools. These policies can be effective in addressing carbon leakage by reducing the benefit of being the "last mover" toward stricter environmental regulations. They can also encourage trade partners to price their own carbon intensive industries, as governments may prefer that a carbon tax be levied at home (thus generating revenues), rather than it be paid to a third country (thus only amounting to a burden on domestic companies, without generating any corresponding gain for the government). On the other hand, if designed poorly, border adjustment tools could increase prices for basic products and administrative costs for both the implementing country and its trading partners (Pauw et al., 2022). Even worse, they may spur international trade conflicts and political tensions between partners, ultimately undermining the multilateral rules-based trading system and making global cooperation in climate action more difficult (Cernicky, 2021). G20 countries should ensure that carbon pricing and linked border adjustment tools are developed and coordinated to foster green trade. At the same time, it is important to consider that, in some countries, governments may lack the capacity needed to establish carbon pricing and, hence, access to EST for companies should be facilitated. In the end, international cooperation on carbon pricing presents several advantages both economically (e.g., lower mitigation costs for international carbon markets, reduced energy prices) and environmentally (stronger impacts by existing tools, reduced air pollution) (Nachtigall et al., 2021).

To coordinate carbon pricing and border adjustment initiatives, the G20 should promote, alongside relevant multilateral institutions, a set of core principles. This would simplify the design of new schemes in countries that currently do not have carbon pricing and facilitate the flow of goods to countries that have implemented border adjustment mechanisms. These core principles could be:

- Border adjustments mechanisms should be WTO-compliant. This would ensure that such tools are not used to unlawfully limit trade flows or disguise protectionism with environmental policy (Cernicky, 2021). More particularly, border adjustment should not discriminate against imports and adhere strictly

to the relevant WTO rules. If an adjustment is due, it should thus mirror precisely the carbon price imposed on domestic products (national treatment principle). Further, it should not discriminate against certain imports relative to goods coming from other countries (most-favored nation treatment principle) (Pauwelyn, 2012);

- Carbon pricing schemes and CBAMs should be coordinated multilaterally to ensure their consistency and fairness. For instance, border adjustment should be imposed while taking account of the carbon price already paid in the country of origin. Multilateral coordination would thus be needed to facilitate the determination and reporting of such prices. This would help ensure that CBAMs only target goods after assessing their emissions and carbon price already paid in practice rather than countries, based on an abstract assessment of their climate policies. Carbon pricing, on its part, should preferentially be designed at a multilateral level, thereby mitigating carbon leakage risks.
- When carbon pricing schemes and CBAMs are implemented unilaterally, they should be designed in an open and inclusive manner. For instance, when cap-and-trade systems are established, third countries should be enabled to "link" their own emissions market thereto, creating a broader, more effective, and more transparent carbon market (which would also help counter the carbon leakage risk).
- Carbon pricing should display a level of ambition commensurate with the seriousness of the climate crisis the world is facing at present. For instance, the scope of carbon pricing policies needs to be expanded gradually to cover the emissions produced by the whole supply chain, without letting exemptions for strategic industries permanently hamper the cohesiveness of climate policy.
- Rulemaking in this area must be combined with capacity-building initiatives and support for developing countries. Effectiveness should not sacrifice the principles of common but differentiated responsibilities and respective capabilities enshrined in Art. 3.1 of the UNFCCC and Art. 2.2 Of the Paris Agreement. Some concessions could be extended to address the vulnerability and exposure of developing countries, for example, compensation for decarbonizing their industries and support in the design of carbon policies and the setting up of their cap-and-trade arrangements.
- Some examples of multilateral cooperation on carbon pricing include the International Carbon Action Partnership (ICAP), a forum to facilitate international exchange and sharing experience among countries and regions that have implemented or are planning to implement a cap-and- trade system, and the Partnership for Market Readiness (PMR), which supports capacity building and promotes good practice at the technical level on carbon pricing (World Bank and ICAP, 2021).
- Eventually, revenues raised from carbon pricing tools should be used for further domestic and multilateral climate action (World Bank, 2019). They could be pooled in an independent global fund and transferred to finance climate

mitigation and adaptation with special regard to developing countries. In fact, carbon pricing needs to be combined with other policies to tackle climate change and market failures effectively (World Bank, 2021). An example of such policies is the provision of EST to developing countries which could be financed through this fund.

Evolving a Transfer Mechanism of EST to Developing Countries with a Sound and Acceptable Pricing System

In the absence of a comprehensive mechanism for the International Transfer of Technology (ITT) to developing countries, a delicate balance has to be maintained between exporters and importers of technology. The technology transfer mechanism has to be in the form of a differentiated policy framework, separately for middle income and low-income countries, including LDCs, with the provision of Special and Differential Treatment (S&DT) since they are in different stages of development and technological advancement. For a country adopting a closed trade policy regime, the expected advantages emanating from the adoption of technology may not be adequately reflected in their international trade and is likely to be bereaved of specific advantages like intra-industry trade (Hoekman et al., 2005). For low-income countries, the ITT scheme can be further buttressed by financial assistance arrangements, allowing such countries to access ESTs which are currently in the public domain already, but cannot be actually exploited by those countries due to capacity constraints. For other middle-income countries, access to technology may be put in a framework with the provision of a license to transfer technology with high adoption capacity. A sound pricing policy for the transfer of technology may be negotiated for tangible results, taking into account the development needs of developing countries.

Negotiations for Reducing Different Layers of Environmental Standards to Limit Market Fragmentation

The global market for Environmental Goods (EGs) is impeded due to the fragmentation of markets on account of the adoption of differentiated standards between countries at different stages of development, where developed countries typically adopt standards more demanding than those prevailing in several developing countries and LDCs. A comprehensive approach needs to be adopted to address the issue of differences in standards leading to escalation of compliance and adjustment costs, on one hand, and migration of "dirty industries" to "pollution havens", on the other. These impending challenges have their cascading effects on climate change, and solutions to these issues can only be found through the negotiations at the multilateral, plurilateral, regional, or bilateral levels (UK Board of Trade, 2021). A global debate may be initiated to thresh out all outstanding issues concerning harmonization of markets through consolidation of standards in developed nations and minimisation of lax policies in developing countries to prevent the upcoming of "pollution havens" in developing countries (Lottici et al., 2014). Some elements of the problem can be addressed by considering the reduction of different layers of environmental standards to limit market fragmentation. Alternative measures similar to carbon

footprint labeling standards may be considered based on credible scientific evidence, without being trade-distorting in nature (Fiorini et al., 2017). Adequate participation from developing countries and LDCs should be there in all standard-setting bodies to take part in various decisions on standards which would emerge on the basis of consensus among participants. This is important for the sustainability of the global green trade.

Completion of CTE Negotiations at the WTO

Transfer of technology is essential for the transformation of the EGs in view of combating challenges emanating from climate change. The WTO's Committee on Trade and Environment in Special Session (CTESS) undertook the challenge of getting through the Environmental Goods Agreement (EGA), but talks among a set of WTO Member countries failed in 2016 to yield any tangible outcome on various counts. Though several international organizations tried to articulate a definition of the EGs, no consensus has been reached. Moreover, critical elements such as services and non-trade barriers were kept outside the purview of the mandate of the EGs. New proposals in 2016 brought new challenges to the EGA (Reinsch et al., 2021). To deal with these challenges, a new framework can be evolved for a lasting solution. Empirical evidence demonstrates that global trade in EGs doubled between 2003 and 2016, reaching 8.1 per cent of the world's trade in 2016 (OECD, 2019). To maintain the momentum of the existing global trade, greenhouse gas emissions have to be restrained by some countries to accommodate the rise in production and trade of some other countries, to arrive at "net zero". To this end, several countries in the middle-income group have pursued eco-friendly environmental trade policies to promote production and trade in EGs. The efficacy of environment-related tax options may be experimented with to put a check on carbon emissions (Kang and Lee, 2021). Various options available with the negotiating group may be used to make an early conclusion for EGA.

G2G and G2B Cooperation in the Realm of PPP Framework

To address the issue of international transfer of technology, government-to-government (G2G) and government-to-business (G2B) cooperation is required in the realm of public-private partnership. The cornerstone of cooperation between developed and developing countries was the Bali Action Plan, which focused on the need for technology development to address climate change through action on mitigation and adaptation with the transfer of technology. Effective partnership between developed and developing countries in scientific cooperation can be beneficial for evolving transfer of ESTs to meet the challenges of climate change. In this regard, the sharing of responsibility between developed and developing countries could be meaningful in the transfer of technology for greening trade and contributing to the goal of "net zero". Developed countries should take the challenge of incentivising private sector creation for and suitably transfer ESTs to developing countries under reasonable terms. To accelerate this process, various fiscal instruments, including tax relief and R&D funds, among others, may be invoked.

Developing countries may enhance their capabilities to generate and manage ESTs for which they should undertake

comprehensive reforms including market, legal and other sectors. They should also make deliberate efforts to eliminate obstacles to ITT. Both developed and developing countries should create a business-enabling environment for private sector engagement in the transfer of ESTs by arousing supply and demand conditions globally. Persistent dialogue between governments of developed and developing countries with the private sector is required to facilitate the process of technology transfer through appropriate institutional mechanisms. In this regard, appropriate changes in the trade policies and activities by export credit agencies may be geared up to promote green trade. Both developed and developing countries should come to an understanding that mitigation of the adverse effects of climate change would benefit both—and therefore, the burden of this initiative should be shared between them. The ITT for climate change may not be equated with the ordinary transfer of technology. For the limited purpose of addressing the issue of climate change, reforms in developing countries and engagement of developed countries may be needed to expedite the process of greening the trade across the globe through ITT of ESTs. In this context, capacity building and technical assistance to the developing countries and LDCs may be considered on a priority basis.

Conclusion

The G20 should:

- Promote the use of carbon pricing worldwide, while making efforts to ensure multilateral coordination in their design and implementation (particularly as regards CBAMs), so to limit trade distortions and bolster carbon pricing's overall consistency, transparency, and fairness;
- Evolve an appropriate mechanism for the transfer of EST to developing countries and LDCs with a suitable pricing and financial mechanism;
- Work towards harmonization of standards and minimize variations in domestic regulations on environmental norms;
- Mediate to end the deadlock in the CTESS negotiations and encourage members to reach an early conclusion of the EGA through the WTO process;
- Bring together technology providers, developed and developing countries to work on a few models for transfer of technology to developing countries and LDCs;
- Consider suitable mechanisms to impart capacity building programmes and technical assistance to foster green trade.

Endnote

1. Decision CP21/1 para. 136 states "Also recognizes the important role of providing incentives for emission reduction activities, including tools such as domestic policies and carbon prici

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Research Article

'Just Transition' Initiatives by G20

G20 Digest
Vol. 2, No.2&3, pp 75-90,
April-September, ©2022,
Research and Information System for Developing Countries (RIS).

Rahul Ranjan*

Abstract: To achieve the SE4All targets, the share of renewable energy has to be increased in the world's energy mix from 18 per cent to 36 per cent between 2010 and 2030. This calls for an annual rise of nearly one per cent in the proportion of renewable energy in the world's energy mix. For that, the G20 nations expressed their desire to promote the deployment of clean, affordable energy resources to developing countries and committed to sharing best practices and raising the fund for scaling up the Renewable Energy Program. In this regard, the G20 launched various initiatives, especially during Turkey and Indonesia Presidency. Despite these efforts, many countries still have a lower share of renewable energy in their energy mix. Besides that, another conundrum facing by a country is whether to go for energy transition or just transition. Just transition is extremely context-dependent and complicated and it requires a lot of preparedness and a comprehensive framework. Therefore, the G20 nations need to increase policy connectedness and coordination between energy and the rest of the economy. India is closer to its targets of energy transition than ever before. India could showcase its energy transition success story and expand its Green Hydrogen Mission during its G20 Presidency.

Introduction

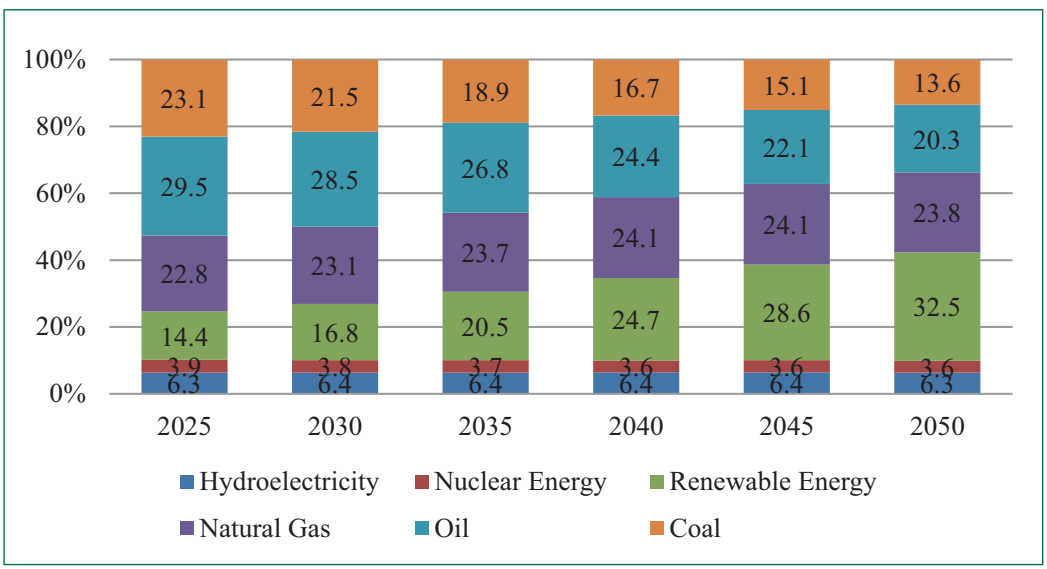
Global energy consumption has been rising continuously along with population and economic expansion. It is imperative to provide access to clean, affordable, and safe sources of energy to maintain global economic growth and the environment at a sustainable level (Kumar & Majid, 2020). Therefore, it is a challenge for a country to ensure sufficient, reliable, and environmental friendly supplies of energy at an affordable price (Papathanasiou, 2022; Ahuja et al, 2009). Studies show that the use of energy mix has been rising and the renewable energy usage has increased recently, and it is anticipated that it will keep increasing further (Gielen et al, 2019). To save the environment and combat the threat of climate change, it is vital to enhance the supply of clean and renewable energy. The UN Secretary-General has stated that one of the three objectives of the SE4All project is to increase the proportion of renewable energy in the world's energy mix from

* Consultant, RIS. Email: rahul.ranjan@ris.org.in

18 per cent to 36 per cent between 2010 and 2030. This calls for an annual rise of nearly one per cent in the proportion of renewable energy in the world's energy mix (IRENA, 2013 & 2014; World Bank, 2015).

Renewable energy consumption was 42 exajoules in 2000, contributing around 10 per cent of the global energy consumption. This consumption figure reached 74 exajoules in 2019 with an average growth of 3 per cent, contributing 12 per cent of the global energy consumption. It is projected that renewable energy consumption would reach 247 exajoules by 2050, contributing about 33 per cent to global energy consumption (Figure 1). More than half of the increase in the world's electricity supply in 2021 has come from renewable sources. This is the highest year-over-year rise in renewable power generation since the 1970s. Two-thirds of the global growth in renewable is projected to come from solar PV and wind (IRENA, 2022). China generated about half of the growth in renewable electricity generated globally in 2021, followed by the US, the EU, and India. This increase in the usage of renewable energy could be a sharp decline in installation costs. Between 2010 and 2020, the global weighted average costs of solar photovoltaic (PV) plants decreased by 85 per cent. Concentrated solar power (CSP) saw cost reductions of 68 per cent, onshore wind of 56 per cent, and offshore wind of 48 per cent (IRENA, 2022). Despite the reduction in the installation costs of renewable energy, still many nations have a lower share of renewable energy in their energy mix. Over the next five years, it is projected that the majority of G20 countries would achieve double-digit shares of variable renewable energy (VRE) in their power supplies, with system integration

Figure-1: Projected Renewable Energy Share (%) in Global Energy Consumption



Source: BP Energy (2022)

standing in the way of the continuous deployment of solar and wind power. However, a lot of work still has to be done to meet the renewable energy targets by 2030. To prevent climate change and keep global temperatures less than 1.5° of pre-industrial levels, the energy transition must be successful by the second part of this century. To do this, the worldwide energy sector must switch from fossil fuels to zero-carbon sources. To speed up the global energy transition and fulfill both national and regional commitments, the decarbonization of the energy sector necessitates immediate global action. To facilitate the deployment, enabling policies and rules must be implemented. Policymakers need to give more attention to end-use sector decarbonization. Energy transition cannot happen successfully unless energy policy is linked with the demand side of renewable energy. For that, it is required to increase policy connectedness and coordination between energy and the rest of the economy. Such policies must prioritise efficient planning, and the adoption of renewable energy, as well as the reformation of the wider institutional structure, to encourage people to use renewable energy.

Against this backdrop, the paper examines the challenges of energy transition and the debate around just transition. In addition, the paper discusses the initiatives launched by the G20 toward energy transition. The paper is structured as follows. Section 2 outlines the challenges for the energy transition. Section 3 examines the concept of just transition and its implications. Section 4 covers the discussion on energy transition by the G20 countries. Sections 5 and 6 discuss India's take aways and future roadmap for the energy transition. Section 7 outlines the main concludes.

Challenges for Energy Transition

Energy transition does not happen abruptly. It happens after long It takes time to manifest and could lead to greater market diversity for energy. This is an ongoing process that gradually changes the composition of the materials required to generate heat, motion, and light. So far, the energy transition is gone through three phases. The first phase of the energy transition is from wood to coal, followed by coal to petroleum products, and the third phase is from fossil fuels to renewable sources (Jaeger & Machry, 2014). The third phase of the energy transition refers to the shift from fossil fuels to renewable energy sources like wind, solar, etc. The third phase of transition is only made possible by technological developments and a collective desire for sustainability (Kabeyi & Olanrewaju, 2022). But there are many challenges associated with the third phase of transition. These challenges are the following:

Energy Storage

The key component of the entire energy transition is renewable energy storage. There is a mismatch between renewable energy production and electricity demand that causes periods of over generation and periods of under generation (Schill, 2020; Hargreaves & Jones, 2020). This will further create the scenario of energy deficit periods. Energy deficit could last for a few hours, or a few days, a entire season, or even a few years. Electricity is only generated when the sun shines or the wind blows. This does not always correspond to the demand cycle. On the other hand, adding renewable energy sources to the electrical grid also creates the problem of power quality. Power

quality is, therefore, a crucial component of renewable energy delivery systems. Voltage and power frequency changes as well as harmonic frequencies provide the biggest problems for power quality. Voltage and power frequency oscillations on the power grid are exacerbated by the variability of renewable energy sources. The integration of renewable energy systems and energy deficit problems can be resolved by energy storage systems. India is the world's third largest producer of renewable energy, with non-fossil fuel sources accounting for nearly 40 per cent of installed capacity. This green push resulted in a 24 per cent reduction in GDP emission intensity between 2005 and 2016, but it also created challenges with a grid that is increasingly powered by renewable (Kalair et al, 2021). Policymakers believe that India must work quickly to develop viable energy storage options. Thus, energy storage can be used to address production issues that many renewable energy systems face. As costs decrease, renewable energy storage has the potential to be utilized extensively at a larger scale (Shaqsi et al, 2020). Therefore, there is a need for investments in energy infrastructure and building up short-term and long-term storage facilities.

Regulatory Frameworks

The global regulatory frameworks are yet another important issue associated with renewable energy and the overall energy shift, and it has been somewhat uneven across the nations (Denholm et al, 2010). Europe has taken the lead in sponsoring research on how to reach a carbon-neutral economy by setting the EU's net-zero greenhouse gas emissions target for 2050. Many EU countries have been transparent about their objectives for energy and electrification by making their plans public (EU, 2020). Emerging economies are also trying to figure out ways to increase energy availability, maintain development, and move to greener energy sources, and China appears to be at the forefront of this effort (Chiu, 2017). About 131 nations have made commitments to considerably reduce greenhouse gas emissions to curb global warming, but these accords have not all been carried out equally. Despite vows to further decarbonization, some nations have continued to raise their emissions, reflecting unequal regulation and commitment across the world economy (IRENA, 2022).

Boosting Technology Adoption

The G20 agreed to increase cooperation on enhanced country-driven capacity building and technology development and transfer on mutually agreed terms, including through key global initiatives and joint or bilateral projects on the most efficient energy transition solutions since the G20 UK Presidency (2009). The G20 also pushed for the development and implementation of Clean Energy Education and Empowerment (C3E). The new technology can help to improve energy efficiency in the industrial, commercial, and residential sectors, lowering overall demand, while the digital revolution is creating new sources of flexible energy to help balance the overall system and further optimise energy consumption. For example, the adoption of clean cookstoves can also promote gender and social equity. The majority of the day in some regions of the world is spent by women and girls looking for wood to light conventional cookstoves, which produce pollutants. An enhanced cookstove, which is more energy-efficient and burns cleaner, can provide significant health and environmental benefits to users. In this context, MLICs lag behind developed countries, which is the main impediment to energy transition.

Finance & Investment

Another key component of the energy transition is investment. Under the 1.5° c scenario, the IEA estimates that investments in clean energy in MLICs excluding China would be around $ 900 billion per year. Currently, total energy investments are approximately $150 billion per year in MLICs. China needs to invest an additional $ 300 billion per year in its energy system by 2040 to achieve its 2060 carbon neutrality goal. The investment requirements differ greatly between countries. For example, it is estimated that India requires an average annual investment of $ 27.9 billion from 2022 to 2030 to meet its commitment to install renewable energy. Indonesia requires an average of $ 13.7 billion by 2060 (IEA, 2022). But energy transition investments continue to be mostly confined to a small number of nations and regions. In 2021, over half of all investments made worldwide were in the Asia-Pacific region. China is the top investment destination in the world, leading the area with $ 251 billion. Less than eight per cent of global investments were attracted to the rest of the Asia-Pacific region, which includes all of Southeast Asia. Around 28 per cent of worldwide investments went to Europe, and more than half of that money flowed to just a few nations such as Germany, the United Kingdom, Ireland, France, and Spain. The USA drew about 5 per cent of all investments worldwide, with the USA alone accounting for more than $ 105 billion, making it the second most popular investment location. These patterns unequivocally demonstrate persistent inequalities in the capacity of nations to draw investments. In contrast to many nations with lower public spending, China, Europe, the United States, Japan, and India together received almost 84 per cent of all global investments (IRENA, 2022). To achieve a just and inclusive global energy transition, international cooperation and the flow of public financing will be more important than ever.

An estimation by International Renewable Energy Agency (IRENA) shows that the overall worldwide cost to achieve the energy transition goals by 2030 would be $ 131 trillion. So, the necessary question arises where does this money come from? The obvious answer is that money would be generated through multilateral institutions, blended finance, or fintech. This would require greater levels of both public and private investment, as well as political will, and extensive and comprehensive policy frameworks that address a wide range of challenges. Despite having reached record levels, investments in energy transition technologies remain low and are concentrated in a few numbers of nations. If the energy transition is to happen globally, investment opportunities must be considerably expanded.

Just Transition Concept and Associated its Nuances

The concept of 'Just Transition' has origins in the labour market. Since the early 1970s, activists, labour unions, and related organisations have advocated for the idea of a just transition (Newell & Mulvaney, 2012; Stevis & Felli, 2015; Wang & Lo, 2021). In the 1990s, it was made obvious by the work of two unions in the American and Canadian chemical sectors. In 1995, the Oil, Chemical, and Atomic Workers Union president unveiled the just transition proposal, and by 1997, several US and Canadian unions had formally endorsed it (ILO, 2022). The International Trade Union Confederation (ITUC) and the International Labor Organization (ILO)

have taken the forefront in advocating for a variety of objectives in support of a just transition. It has integrated itself into the global union's environmental agenda over the past 15 years (Stevis & Felli, 2015). In the environmental context, it was first expressly acknowledged in the Cancun Agreement (2010) by the United Nations Framework Convention on Climate Change (UNFCCC) that efforts to combat climate change should ensure a just transition of the workforce. As stated in the agreement "Climate change requires a paradigm shift towards building a low-carbon society that offers substantial opportunities and ensures continued high growth and sustainable development, based on innovative technologies and more sustainable production and consumption & lifestyles while ensuring a just transition of the workforce that creates decent work and quality jobs".

Additionally, during COP21 in Paris in 2015[1], the idea was incorporated into the preamble. The historic global agreement on reducing emissions that came out of the summit specified a just and balanced energy transition that leaves no one behind. Through the formal "Declaration" that was drafted at the 2018 Katowice Conference, a stronger foundation for just transition was established. The "Solidarity and Just Transition Silesia Declaration" was drafted and presented during the Conference by the Polish president of the COP with the assistance of around 52 nations (iFOREST, 2021). The document stated that "Just transition of the workforce and the creation of decent work and quality jobs are crucial to ensure an effective and inclusive transition to low greenhouse gas emission and climate-resilient development". More than 30 nations signed the Glasgow Just Transition Declaration in 2021 at COP26, reinforcing the need of making ensuring that no worker or community is left behind in the transition to net zero emission, especially those employed in sectors, cities, and regions dependent on carbon-intensive industries and production. The declaration is in line with the ILO's 2015 Guidelines for a Just Transition, which outline the measures that must be done to realize well-managed, environmentally sustainable economies and communities, decent work for all, social inclusion, and the eradication of poverty (ILO, 2022). The nations are devoted to upholding their commitments made in the declaration. The following commitments are made; (a) assist those who are most at risk from the effects of the shift away from carbon-intensive economies, including workers, communities, and geographic areas, (b) encourage social involvement and conversation between governments, representatives of employers and employees, and other groups impacted by the shift to green transition, (c) implement economic policies that promote the use of renewable energy, encourage resource-efficient economic expansion, provide income and decent employment opportunities, and lessen poverty and inequality, (d) in addition to retraining and social assistance for those in need, create excellent jobs for individuals in their communities, and (d) ensure that all parties, particularly the most disadvantaged, have access to decent employment through both new and existing supply chains that uphold human rights.

COP23 emphasized the current promise to mobilize $ 100 billion per year under climate finance. At the national, sectoral, and regional levels, stakeholders must also make sure that funds are devoted towards financing just transition initiatives. The challenge of raising funds and resources remains quite high due to generally uneven development levels in developing countries, the

Table-1: Commitment to Just Transition in various COP conferences

COP Conference	Commitments	Documents/Para No
COP21: 2015	The necessity of a just transfer of the workforce and the creation of respectable employment and high-quality jobs is in line with the country's development priority.	Paris Agreement, para-10.
COP22: 2016	Economic diversification is a crucial step in the direction of a just transition, which focuses on a workforce transformation that is fair and the creation of good work and high-quality jobs.	
COP23: 2017	The government pledges to stop supporting and developing fossil fuels subsidies and to fund a just transition to a sustainable energy economy.	Bluegreen Alliance
COP24: 2018	A strategy to protect the jobs and way of life of those who live in unsustainable production economies must be taken into account to ensure a "just transition" to sustainable low-carbon economic practices.	Silesia Declaration
COP25: 2019	Emphasizes the importance of pursuing all climate measures in close coordination with civil society and social partners and in accordance with the idea of a just transition.	Madrid Declaration
COP26: 2021	Recognizes the necessity of ensuring just transitions that support sustainable development, the eradication of poverty, the establishment of respectable work and high-quality jobs, and all of the aforementioned. Providing specialized assistance to the poorest and most vulnerable under local conditions and recognizing the need for assistance in the direction of a just transition.	Glasgow Climate Pact, para-20 & 52.
COP27: 2022	Just, equitable and inclusive transitions are to be in line with the principles and objectives of the Convention, the Kyoto Protocol, the Paris Agreement, and the Glasgow Climate Pact.	Sharm el-Sheikh Implementation Plan, para-6.

Source: Author's compilation from various documents of COP conference.

higher dependency of employee on the coal sector, limited capabilities of local governments, limited coverage of existing unemployment benefits and social security schemes which would eventually create much difficultly to implement just transition in the developing countries. Considering the situation, the Just Transition Mechanism (JTM) was established to ensure that the transition to a climate-neutral economy occurs fairly and without leaving no-one behind to minimize the socio-economic effects of the transition. It also offers targeted assistance to help mobilize almost €65-75 billion during the years 2021-2027 in the most affected regions.

The Just Transition Mechanism, a component of the European Green Deal, offers resources for overcoming the difficulty of the transition towards the European Union's 2030 climate target and the goal of carbon neutrality in the Union by 2050 (Dutta, 2021). The JTM has three pillars of financing; (a) the Just Transition Fund (JTF), (b) dedicated just transition schemes under Invest EU, and (c) the Public Sector Loan Facility and the European Investment Bank (EIB) support all three pillars. To be eligible for grants from the JTF, each Member State will be expected to submit Territorial Just Transition Plans to the Commission, outlining which regions it would like support for and a detailed timeline for the transition. One of the criteria used to establish eligibility is the proportion of production in the region that is based on fossil fuel-intensive industries. On the other hand, JTM mainly focuses on energy production. This not only conceals a sizable portion of the work necessary to carry out a just transition, but it may also heighten perceptions of injustice if countries believe that the JTF transfers money between countries that have already started the decarbonization process and those that have not to "reward" carbon-intensive energy producers. Developing countries must take all of these factors into account before joining JTM.

Recently, India's Power Ministry[2] expressed opposition to the G7's energy transition plans for India. The G7 nations plan to persuade India to begin negotiations on the Just Energy Transition Partnership (JETP), a rich-country initiative to accelerate the phase-out of coal power plants. So far, the Power Ministry has refused to give its consent to the negotiations, arguing that coal cannot be singled out as a polluting fuel and that energy transition talks must take place on equal footing. The reason for not reaching an agreement is that a critical clause of the agreement will require the gradual closure of our coal mines and a reduction in the number of coal-burning power plants currently under construction (Sen & Kala, 2022; Sharma, 2022). In contrast with this, Indonesia joined this group to mobilize $ 20 billion over the next three to five years to accelerate a just energy transition.

The JTF has recently come under criticism, raising the question of whether the fund can address injustices in the most impacted areas. The just transition to renewable energy will require significant financial support. This issue has gotten worse due to the global epidemic. The nations make an effort to prevent escalating the socio-economic obligations of their citizens. The pandemic's effects should be well-mitigated to prevent harm to vulnerable populations and the general public. The energy transition just requires making sure that the costs and advantages of a society powered by renewable are allocated fairly. As a result, it "must create alternatives to people and regions trapped in fossil fuel dynamics through

new economic opportunity, education and skills training, and adequate social safety systems" (Blackmon, 2022).

Without social safety net programmes or appropriate mechanisms to reallocate labour and create decent and skilled jobs, a just energy transition is challenging. To implement the just energy transition framework a country should be clear on whether there is a need for energy transition or just transition. The notion has been the subject of multidisciplinary discussion, which has produced a variety of ambiguous definitions. Just transitions do not have a standard definition or conceptual foundation. The idea of just transition has grown so unclear and has taken on so many diverse interpretations that it is now challenging to communicate and have a meaningful discussion. It is vitally necessary to review and compile the academic literature on a just transition to better understand the various views and how they relate to one another (Wang & Lo, 2021; Henry et al, 2020). Thus, just energy transition is extremely context-dependent and complicated and it requires a lot of preparedness and a comprehensive framework.

India's Take Aways

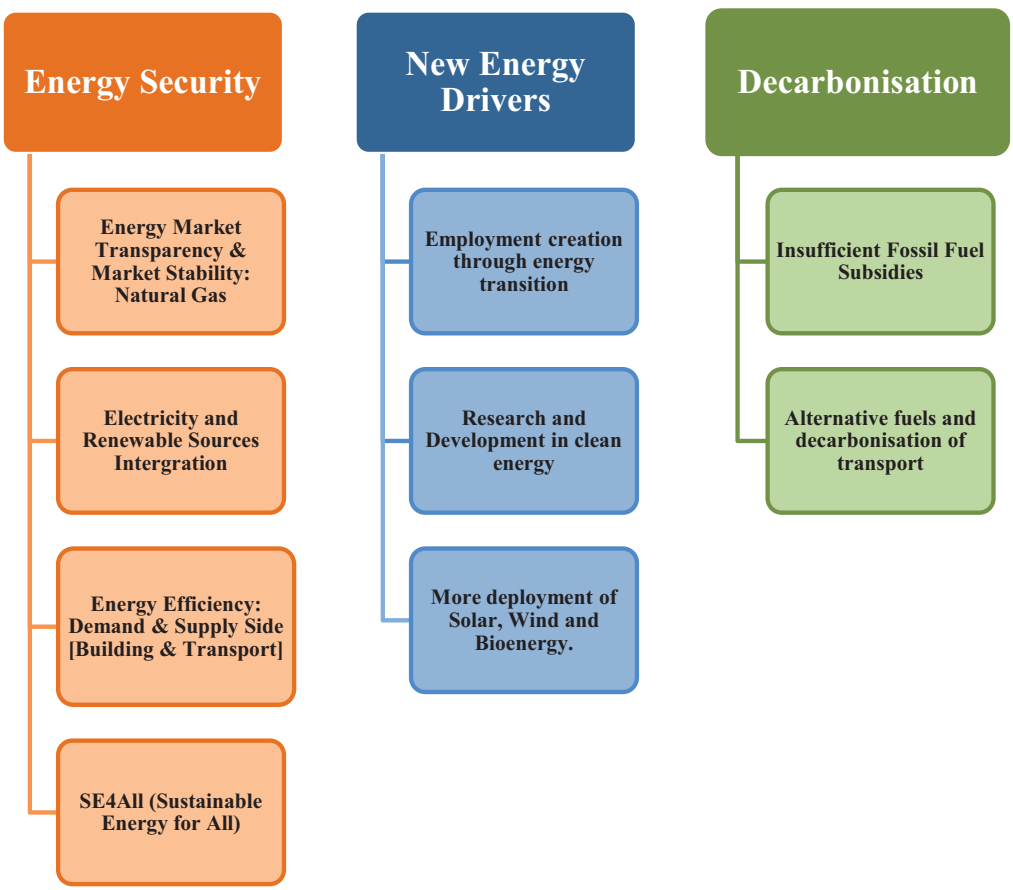
As India embarks on energy mix, focus on solar, wind, and other renewable energy sources continue to remain the topmost priority; perhaps necessary to set high budgetary allocation. In line with India's commitments to climate change actions, the Union Budget 2022-23 pushed energy transition by encouraging domestic production of solar power equipment. The government of India allocated Rs. 19.50 billion to boost domestic manufacturing of solar photovoltaic (PV) modules under the government's flagship Production Linked Incentive (PLI) scheme. India stands fourth globally in Renewable Energy Installed Capacity and set a target to achieve a capacity of 175 GW of renewable energy by the end of 2022, expanding to 500 Giga Watts (GW) by 2030, comprising 280 GW of solar energy and 140 GW of wind energy. India's installed renewable energy capacity has increased by 396 per cent in the last 8.5 years and stands at more than 159.95 GW (including large Hydro) as of 31st March 2022[3].

Achieving net zero is not about lowering greenhouse gas emissions but it also benefits its citizens through the energy transition. India has always shown its willingness to take the lead in combating climate change. The country's vision is to achieve Net Zero Emissions by 2070, in addition to meeting short-term targets such as obtaining 50 per cent of energy from renewable sources. Although the concept of just transitions was not widely used in India until recently, approaches such as environmental and social justice, as well as climate sustainability, have provided important direction to India's development agenda. In India, it is difficult to adopt the principles of just transition without any proper framework/exercise because of 90 per cent[4] workers are informal and only 25 per cent of people come under the coverage of social security benefits[5]. For example, Badarpur Thermal Power Station in New Delhi was permanently shut down on 15th October 2018. The formal workers were shifted to the Tughlaqabad sub-station while contractual workers were not re-employed. Furthermore, no negotiated transition plan was put in place to protect contractual workers, leaving them worse off and vulnerable (CIF, 2021). Therefore, deliberate policy discussions on coal phase-outs are required at the national, state, and local levels. However, at present, no convening body has either the mandate or institutional structure to support a socially inclusive dialogue on

a just transition in India. The country is closer to its targets of energy transition than ever before, yet a proper framework is required to facilitate 'Just Transition' which should be based on a human-centric approach. In addition, India could showcase its energy transition success story and expand its Green Hydrogen Mission during its G20 Presidency. India's experience would be useful to other developing countries for implementing their climate pledges and energy transition to a more sustainable way.

To increase renewable electricity generation, India introduced several policy measures such as PLI Scheme for Solar, National Solar Mission, Green Hydrogen Mission, Pradhan Mantri Kisan Urja Surakshaevam Utthaan Mahabhiyan Yojana (PM KUSUM), Solar Park, and Green Grids Initiative-One Sun One World One Grid. These initiatives could progress faster to achieve renewable energy targets by 2030 but lack of proper coordination and limited financial tools available for the many schemes could pose a hurdle to this progress. For that there is a need for policy alignment between the centre and the states, and more integrated planning should thus be established, with medium term targets at the state level to provide a better sense of direction of existing

Chart 1: The G20 Commitments/Actions on Energy Transition



policies. It is also crucial to support and build on the responsibility of single states' policy-makers and their capacity for designing and enforcing policies.

G20 Commitment/Actions for Energy and Just Transition

The energy transition is one of the key themes for discussion in the G20. The G20 nations committed to stimulating investment in clean and renewable energy and to facilitating the diffusion or transfer of clean energy technology including by conducting joint research and building capacity since the UK presidency (2009). Around 40 per cent of global electricity production is based on coal[6]. Thus, renewable energy can play a much larger role in the global economy. The G20 nations hold 75 per cent of the total global deployment potential and a similar share of the total global investment potential for renewable energy[7]. The G20 nations expressed their desire to promote the deployment of clean, affordable energy resources to the developing world. The G20 also committed to sharing best practices and raising the fund for scaling up the Renewable Energy Program and the Energy for the Poor Initiative for developing countries voluntarily. For that, G20 leaders adopted nine principles for energy collaboration in the 2014 Turkey presidency, and of these principles; three are closely connected to renewable energy. The G20 also developed a roadmap of energy transition during the G20 Indonesia presidency in 2022 called the 'Bali Energy Transition Roadmap'. The G20 agreed to work on three pillars of energy i.e. Energy Security, New Energy Drivers, and Decarbonisation (Chart-1).

The G20 nations agreed to fund scaling up renewable energy programs in developing nations to improve access to energy. To achieve green growth and ensure sustainable development in G20 nations and beyond G20, the G20 committed to promoting low-carbon development policies. The G20 agreed to support effective policies that promote innovation and the use of clean and renewable energy technology. The G20 praised the "Sustainable Energy for All" proposal launched by the UN Secretary-General during Germany's G20 presidency. The G20 encouraged the creation and application of C3E technologies, or clean energy and energy efficiency. The G20 applauded the assessment of each nation's present state of deployment of these technologies as well as the ongoing exchange of best practices as a foundation for better policymaking. The G20 also welcomed the work of Finance and Energy Ministers in delivering implementation strategies and timeframes, based on national circumstances during the Seoul summit.

The G20 applauded initiatives that support energy security, renewable energy technologies, and inclusive green growth for the long-term prosperity and well-being of the current and future generations during the Russian presidency (2013). The G20 will carry out work on related policy options and technological developments voluntarily and will continue working with international organizations to share national experiences and case studies regarding sustainable development, and clean energy as well as their development, deployment, and wider application. The G20 recognised the importance of sustainable and responsible bioenergy production and use, as well as the role of the Global Bioenergy Partnership (GBEP), and took note of the recent World Bank report 'Toward a Sustainable Energy

Future for All', which aims to improve developing-country access to reliable and affordable energy.

To support future global growth and development, significant investments in energy infrastructure will be required in the G20 and other nations. It is in everyone's best interest to evaluate current barriers and find ways to encourage more investment in smart and low-carbon energy infrastructure, especially in clean and sustainable energy infrastructure. In this regard, G20 urges the private sector and multilateral development banks to work more closely with the G20 Energy Sustainability Working Group (ESWG). The G20 also call for a dialogue to be initiated on the ESWG's foundation in 2014 that will bring together the interested public sector, market participants, and international organizations to discuss the barriers to energy investment, including in clean and energy-efficient technologies, and possible measures needed to promote sustainability. In addition to other policy levers, the G20 encourage interested regulators to continue their communication and asks the ESWG to take notice of this dialogue as part of the efforts to promote investment in energy infrastructure, particularly in clean, affordable, and sustainable energy, and to involve all interested stakeholders.

The G20 nations are aware of how crucial it is for both the public and commercial sectors to invest in research and development of the technologies and best practices required to increase productivity, efficiency, and sustainable development. Additionally, the G20 is in favor of continuing to fund the research, testing, and use of cutting-edge energy technology for a variety of energy sources, including clean energy technologies and improved global collaboration for research and development in sustainable energy. Such efforts can enable larger levels of energy access, assist economic growth, create jobs and commercial possibilities, and benefit the environment.

The energy transition is the result of numerous markets, technological, and policy factors that vary from nation to nation. Through innovation, risk management, and the implementation of supportive policy frameworks, investment in renewable energy can spare nations from the effects of greenhouse gas (GHG) emission-intensive economic growth and help the world move toward a more environmentally and economically sustainable development path. During the Turkey presidency (2014), the G20 nations adopted nine guiding principles for cooperation in the energy sector, of these principles; three are closely connected to renewable energy. These three principles are following; (a) make sure that everyone has access to reliable, cheap energy; (b) encourage sustainable growth and development that is consistent with our efforts and pledges to combat climate change, especially by encouraging clean, renewable, and cost-effective energy sources; and (c) promote and ease the creation, advancement, public display, and wide-scale use of cutting-edge energy technology, particularly clean energy technologies.

Further, the G20 emphasized the importance of renewable energy sources and their potential for long-term growth during Turkey's presidency (2014). The G20 agreed that increasing investments in renewable energy through risk management, innovation, and the implementation of supportive policy frameworks, in accordance with national priorities, can help to steer the development of energy transition. Further, G20 adopted the G20 Toolkit of Voluntary Alternatives on Renewable Energy Deployment, which lays out

helpful options for further work. With an understanding of the current unique national circumstances, to emphasize the significance of innovation, technologies, and knowledge sharing to promote the increased uptake of renewable energy sources in the energy mix, as well as the crucial roles played by system integration and stable national policy and regulatory frameworks. This initiative was further supported by China's presidency and reiterated the significance of energy cooperation toward a cleaner energy future and sustainable energy security.

The G20 recognized the benefits of greater investment in clean energy technologies, infrastructure, and sustainable energy sources for innovation, sustainable growth, competitiveness, and job creation during Germany (2017) and Argentina (2018) presidencies. The G20 also supported financing from multilateral development banks to encourage universal access to affordable, dependable, sustainable, and clean energy. They also welcomed international cooperation on the development, deployment, and commercialization of sustainable and clean energy technology. The G20 acknowledged the importance of energy transitions that realize the "3E+S" (Energy Security, Economic Efficiency, and Environment + Safety) to transform our energy systems into affordable, reliable, and sustainable ones to achieve SE4All goals during the Japanese presidency (2019). During this presidency, the G20 Research and Development ("RD20") for Clean Energy Technologies project was launched. The G20 acknowledged the importance of global cooperation on a variety of energy-related challenges, such as energy access, affordability, and efficiency, as well as energy storage. To achieve the "3E+S", the G20 Saudi Arabia presidency (2020) recognized the significance of utilizing the broadest range of fuels and technical possibilities, depending on the country's context.

G20 will work together to accelerate the development and deployment of the most efficient and effective solutions and aid them in rapidly achieving cost parity and commercial viability to fully utilise the potential of zero, low-emission, innovative, modern, and clean solutions. This includes ensuring that everyone has access to clean energy, especially in developing nations. The G20 committed to scaling up public Research, Development, and Deployment and increasing the cooperation on enhanced country-driven capacity building and technology development and transfer on mutually agreed terms, including through key global initiatives and joint or bilateral projects on the most efficient solutions in all sectors of the economy. The G20 Italy (2021) presidency committed to ensuring energy security while addressing climate change and ensuring just and orderly transitions of our energy systems in accordance with the 2030 Agenda for Sustainable Development and the Paris Agreement. The G20 Italy presidency also committed to mobilizing international public and private finance to support green, inclusive, sustainable energy development, and just energy transition. The first time word 'Just Energy Transition' was introduced during the Italian presidency.

To speed up the energy transition, the G20 Indonesia presidency (2022) introduced the Bali Energy Transition Roadmap initiative and underlined the need for support towards just transitions. The Bali Energy Transitions Roadmap's objective outlines a course for discussions of climate, finance, and related G20 tracks on clean energy transition actions that will, systematically, reflect national circumstances, needs, and priorities

of G20 members in their low emission development pathways toward net zero emissions. The Roadmap's main objectives are to Advance Clean Energy Financing, Scale-up Smart and Clean Energy Technologies, and Secure Energy Accessibility. For enhancing finance and investment, developed countries are urged by the G20 to provide expanded support, including financial resources to help developing nations under the UNFCCC's commitment. This can help leverage the billions of dollars in clean energy investments that are needed. To determine the G20's top priorities, the G20 will adopt fundamental principles and guidelines for equitable and inclusive energy transitions during Indonesia's presidency of the G20 in 2022.

Conclusion

Energy transition as a process necessitates the coordination of various policy and governance measures, which could face significant implementation challenges. Some of the challenges that a country's energy transition efforts may face include the role of pressure groups, policy hurdles, a lack of a strong institutional structure, and perceptions of the economic feasibility of shifting away from older fuel mixes, and so on. There is no specific framework that provides exclusive legal direction for the energy transition. Various policy acts and regulations pertaining to the energy sector promote and positively contribute to the future transition to a low-carbon energy mix. The G20 commitments give a special emphasis on energy supply and demand options, the role of new and renewable energy in the global energy mix, the critical linkages between energy and the environment, and necessary policy options. However, in terms of the energy transition, the policy document suggests that existing institutional structures in the energy sector be considered when developing long-term transition strategies. Because of the continued importance placed on the existing energy sector, which is dominated by conventional fossil fuels, policies for 'demand side management' have evolved to be a key component of energy transition strategies. Thus, it is time to revisit the G20 Turkey Presidency's 'Toolkit of Voluntary Options for Renewable Energy Deployment' and the G20 Indonesia Presidency's 'The Bali Energy Transitions Roadmap' initiatives. Furthermore, the G20 nations could look into other renewable energy sources and explore them through proper policy framework and coordination among the G20 nations.

Adopting renewable energy does not have a one-size-fits-all answer. It also needs to focus on the demand side. Countries must have a toolkit at their disposal to create their own unique renewable energy policies that are tailored to local conditions and priority areas for sustainable development. The creation and promotion of such a toolkit by the G20 might result in a wider application of best practises in policy design, innovations that expand the pool of renewable resources and their technological applicability, and lower finance costs for renewable energy projects. The prospects for renewable energy solutions over a longer time horizon will largely depend on how economically competitive they are compared to fossil fuel alternatives and how willing nations are to maintain policy assistance during an extended era of low fossil fuel costs. The G20 committed to promoting the deployment of clean, affordable energy resources to the developing world and agreed to share best practices and raise the fund for scaling up the Renewable Energy Program and the Energy for the Poor Initiative for developing countries voluntarily. On the

other hand, the idea of just transition has termed to be ambiguous with multiple interpretations, so that it is even now challenging to have a comprehensive and meaningful discussion. It is extremely context-dependent and complicated and it requires a lot of preparedness and a comprehensive framework. To implement the just energy transition framework a country should be clear on whether there is a need for energy transition or just transition. Therefore, the G20 nations need to increase policy connectedness and coordination between energy and the rest of the economy. Such policies must prioritise efficient urban planning, and the adoption of renewable energy, as well as the reformation of the wider institutional structure, to encourage people to use renewable energy.

Endnotes

1. The details of commitment on Just Transition in various COP conferences are presented in table-1.
2. It was during G7 Germany Presidency 2022.
3. https://www.investindia.gov.in/sector/renewable-energy#:~:text=The%20installed%20power%20capacity%20in,the%20total%20installed%20electricity%20capacity
4. Raveendran & Vanek (2020) estimate show that 90 percent workers are informal in India.
5. https://www.wiego.org/sites/default/files/publications/file/WIEGO_Statistical_Brief_N24_India.pdf
6. The figure is estimated from NSS 75th round of Health Expenditure 2017-18.
7. According to IEA estimates, coal generated 38.03% of the electricity in 1987 and 35.99% of the electricity in 2021. In the G20 countries, the share of coal in the electricity generation has declined from 44.34% to 39.77% in the period 2009 to 2021.
8. According to 'Report on G20 Deployment of Renewable Energy' of G20 Turkey (2015) presidency.

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Perspective

India's G20 Presidency Redesigning Global Financial Architecture and Development Strategy

G20 Digest
Vol. 2, No.2&3, pp 91-92,
April-September, ©2022,
Research and Information System for Developing Countries (RIS).

Sachin Chaturvedi*

The Bali Declaration has highlighted several key challenges. The challenges that come on a worldwide scale include climate change, the Covid-19 pandemic, and the developments in Ukraine. These caused havoc in the world and disrupted global supply chains. The current shortage of fertilisers in terms of food security is also a huge crisis. Today's fertiliser shortage is tomorrow's food crisis, for which the world will not have a solution.

As Indian stage is getting set for hosting of the G20 presidency, several issues are coming on table for possible push from Indian side. However, consolidated attention on finance would be of great relevance for several member countries and also for the global economy. As Prime Minister Narendra Modi said at the Bali Summit, we need new efforts for issues hitherto being dealt by the UN and other multilateral institutions.

In the realm of finance, two tracks are important. First, to address the huge global debt crisis we are heading for. Debt relief by official creditors was made available through the G20 Debt Service Suspension Initiative (DSSI), which the IMF, together with the World Bank, helped to support. The initiative took effect in May 2020 and delivered $12.9 billion in debt relief to 48 countries before it expired in December 2021. However, within last few months more than 55 developing and least developed countries have knocked at the door of the IMF for support. The IMF would have to consider surcharge reduction for next 2-3 years and extend the access limits for another two years after 2023 and rechannelling of SDRs to call for more pledges than what has been seen so far. This would also require an urgent attention on further capitalisation of regional development banks.

The second track is to avoid fragmentation of financial markets, keeping financial stability perspective upfront. At various sessions at the CoP27, it emerged how adverse impact fragmentation of finance has created for several developing countries. The growing cost of accessing funds has posed a major challenge for the global South. The Bank for International

* Director General, RIS. Email: sachin@ris.org.in

Settlement (BIS) has reported that rising fragmentation creates natural barriers and friction across financial systems, disrupts financial cycles and post challenges for regulation and supervision.

In the climate finance, with shrinkage of ODA, it is a challenge to access finance for adoptation and not just for mitigation. Most of the non-concessional private finance for climate change is available only for mitigation projects like for electricity transmission upgrade and agriculture. It is a pity that out of nearly $325 billion annual funding of renewable energy is being undertaken through private equity and though market rate debt. It is only in the African region, and that also only to a limit of 13 per cent, that some concessional financing has come for supporting renewable energy production. There are several proposals on the table to extend concessional financing under climate finance to middle income countries. The IMF would have to take a lead to make climate finance more incentive-compatible and allow more lending-into-arrears.

The Bali Summit Declaration and the outcome documents from various engagement groups during the Indonesian G20 presidency, as in the past, have highlighted the need for redesigning of the global financial architecture. The Declaration has rightly called for "protecting macroeconomic and financial stability and remain committed to using all available tools to mitigate downside risks, noting the steps taken since the global financial crisis to strengthen financial resilience and promote sustainable finance and capital flows."

Indian G20 presidency should also facilitate discussion on smooth and irreversible transition of LDCs to the category of developing countries. In our own neighbourhood, Bangladesh, Bhutan and Nepal would be undergoing this transition in 2026. They would need financial support and handholding. Sri Lanka and Pakistan are grim reminders of irresponsible debt creation. In March 2022, the UN also recognised 15 more countries for the next decade. The UN Committee for Development Policy, which establishes the category of least developed countries (LDCs) since 1971, has evolved multivariate criteria for graduation.

With the conclusion of the Bali Summit and taking over of the presidency by India, a new opportunity has come up for Indonesia, Brazil and South Africa to work together to take global economy forward. With wide ranging fears over runaway inflation, financial instability, disruption in supply chains affecting, in particular, access to food and energy security, the world should take note of what PM Modi has advised to overcome disagreements over the war. Peace and development, in an inclusive framework, provide financial resilience and institutional coherence. We would undermine it to our own peril.

Addressing Global Economic Challenges

The G20 Finance Ministers and Central Bank Governors have finished their second meeting under the Indonesia-Presidency with continued discussion on global economy and its risks, global health issues, international financial architecture and sustainable finance. In addition, G20 countries are being urged by a group of renowned economists to use the crackdown on oligarchs' wealth amid Ukraine sanctions as a spur to tackle tax havens once and for all. Its 14 signatories – all commissioners of anti-tax avoidance group, the Independent Commission for the Reform of International Corporate Taxation (ICRICT) – include the economists Gabriel Zucman, Joseph Stiglitz and Thomas Piketty, as well as the French investigative judge Eva Joly. The commissioners urge G20 leaders to convene an urgent international summit to implement such a system and discuss offshore wealth and tax havens.

Source: http://www.g20.utoronto.ca/2022/220420-finance.html
https://www.theguardian.com/world/2022/apr/19/g20-ministers-urged-to-use-oligarch-crackdown-to-tackle-tax-havens

US, UK and Canada walk out of G20 Meeting over war in Ukraine

The UK, US and Canada have staged a coordinated walkout of a G20 meeting in protest against Russia's invasion of Ukraine, amid growing risks of division between leading nations hitting the world economy. Representatives from the three countries left the session as Russian delegates spoke at the meeting in Washington. The walkout at the session, which was taking place on the sidelines of the International Monetary Fund's spring meetings, came amid growing fears that a breakdown in international relations would severely undermine the global economy's recovery from the pandemic and add to soaring inflation, pushing millions more people into poverty worldwide.

Source: https://www.theguardian.com/world/2022/apr/20/us-uk-and-canada-walk-out-g20-meeting-war-in-ukraine-russia

Sitharaman Calls for Proactive Collective Efforts towards Protecting Economies

Global growth momentum is dampened by prolonged inflation, supply chain disruption, volatility in energy markets and investor uncertainty, Finance Minister Nirmala Sitharaman has said as she attended the G20 Finance Ministers and Central Bank Governors (FMCBG) meeting here. "Finance Minister Smt. sitharaman said G20 is well placed to catalyse international policy coordination to deal with macroeconomic consequences and called for proactive collective efforts towards protecting economies," it said. "FM Smt. sitharaman noted that global growth momentum is dampened by prolonged inflation, supply chain disruption, volatility in energy markets and investor uncertainty," The Ministry of Finance said in a tweet.

Source: https://www.telegraphindia.com/business/sitharaman-calls-for-proactive-collective-efforts-towards-protecting-economies-at-g20-fmcbg-meet-in-us/cid/1861597

Jaishankar to Visit Indonesia on July 7 to attend G20 Foreign Ministers' meet

External Affairs Minister is expected to attend the G20 foreign ministers meeting in Bali this week along with Chinese FM Wang Yi, US Secretary of State Antony Blinken, Russian Foreign Minister Sergey Lavrov as Ministers of the world's largest economies are hosted by Indonesian Foreign Minister Retno Marsudi. Mr. Jaishankar's visit to Bali would "strengthen India's engagement with G20 member states", given India is slated to take over the G20 Presidency in December this year, and host the G20 summit in November 2023 in Delhi. "We are currently extending steadfast support to the Indonesian Presidency, and will be taking forward discussions on contemporary global challenges, with a view to achieving meaningful outcomes, during our Presidency," an MEA statement on Tuesday said, adding that "strengthening multilateralism and current global challenges including food and energy security" were on the agenda in an indication of the prevailing global situation post-Ukraine war.

Source: https://www.thehindu.com/news/national/eam-jaishankar-to-visit-indonesia-on-july-7-to-attend-g20-foreign-ministers-meet/article65603263.ece

Women Empowerment

The second G20 Ministerial Conference on Women Empowerment (G20 MCWE) 2022 held in Bali, Indonesia, on 24–25 August 2022 focused on the following issues: Care Economy Post Covid-19: The Missing Opportunity in the Labour Market, Closing Digital Gender Gap: Women's Participation in the Digital Economy and Future Work, and Women's Entrepreneurship: Accelerating Equality and Recovery. Union Minister for Women & Child Development Smriti Irani participated in the G20 Ministerial Conference on Women Empowerment – 'Closing Digital Gender Gap: Women's Participation in the Digital Economy and Future Work' held on 24th August. She highlighted the giant strides that India has taken towards enhancing the socio-economic status of women and putting them at the centre stage of policy making.

Source: https://www.eria.org/news-and-views/women-empowerment-closing-gender-gap-reaffirmed-in-g20-ministerial-conference/
https://newsonair.com/2022/08/25/union-minister-smriti-irani-participated-in-g20-ministerial-conf-on-women-empowerment-in-bali/

Union Minister Dharmendra Pradhan to Participate in G20 Education Ministers' Meeting in Bali

Union Education Minister Dharmendra Pradhan will be participating in the G20 4th Education Working Group Meeting & Education Ministers' Meeting in Bali from 31 August-1 September. The Union Minister tweeted and said that he will be sharing India's best practices for using education to create a future that is more resilient, inclusive, equitable, and sustainable. He will also outline the main issues and will present the priority themes identified by India for the next G20 Education Working Group Meeting, which will be held under India's presidency. Earlier on August 20, Union Education Minister Dharmendra Pradhan had embarked on a four-day visit to Australia during which he held talks to broaden engagement between the two countries in areas of learning, skilling, research, innovation, and entrepreneurship.

Source: https://newsonair.com/2022/08/30/union-minister-dharmendra-pradhan-to-participate-in-g20-education-ministers-meeting-in-bali/

Ministry of Finance Participates in G20 Finance Track's Fourth Infrastructure Working Group (IWG) meeting

The Ministry of Finance (MoF) participated in G20 Finance Track's fourth and last Infrastructure Working Group (IWG) meeting for 2022 on 15 and 16 September 2022. IWG members deliberated the progress made on scaling up sustainable infrastructure investments and means of promoting private sector investment in sustainable infrastructure. They also presented the final list of G20 case studies for financing digital infrastructure. At the end of the meeting, the participating IWG members and international organisations agreed to present the final version of deliverables for endorsement during the upcoming G20 Finance Ministers and Central Bank Governors (FMCBG) meeting in October 2022.

Source: https://mof.gov.ae/ministry-of-finance-participates-in-g20-finance-tracks-fourth-infrastructure-working-group-iwg-meeting/

Promoting Agriculture

The 2022 G20 Agriculture Ministers Meeting was held in Bali, Indonesia, on September 28, 2022. Tang Renjian, Minister of Agriculture and Rural Affairs of China suggested that G20 members should focus on the common development of all countries, implement the Global Development Initiative, and work together to propel the sustainable transformation of the food system, so as to provide strong support for building a community with a shared future for mankind. Union Minister of Agriculture and Farmers Welfare, Mr. Narendra Singh Tomar, presenting India's point of view said that Government of India is addressing the sustainability challenges facing agriculture and food systems and several important initiatives have been taken to address these issues. He said that the Government of India is committed to the benefit of small and marginal farmers and many important schemes are being run for their welfare.

Source: http://english.moa.gov.cn/news_522/202209/t20220930_300984.html
https://www.en.krishakjagat.org/india-region/government-of-india-committed-to-the-benefit-of-small-and-marginal-farmers-union-agriculture-minister-at-g20/

About G20 Digest

G20 has emerged as an important global forum over the years, and G20 Leaders' Summits are watched worldwide with interest and suspicion. Successive presidencies of G20 have encapsulated a vast array of issues beyond the financial sector; each having potential impact on trade & investment, global governance and social sector. Each presidency has contributed to the summit process by adding new issues along with the routine ones resulting in a wider and diverse G20 Agenda. In view of the diversity of issues and complex challenges the world is grappling with, the expectations from G20 has multiplied. It is imperative to comprehend and assess the rise of G20, and its role and function in shaping the future global order. In order to motivate and stimulate fresh ideas on G20 and its implications for global economy, RIS brings out the quarterly journal, G20 Digest, as a platform to compare, contrast and create new knowledge that matter for the people in the G20 countries and in the world, including the developing and less developed countries.

Guidelines for Submissions

- *G20 Digest* is a peer-reviewed journal dedicated to the issues and subject matters relating to G20 and its broader linkages to global governance, functioning of multilateral institutions, role of emerging markets, and larger development interests of the people.
- Scholarly articles on various topics of interest to G20 are invited from academics, policy makers, diplomats, practitioners and students. The articles may cover the whole range of issues including role and effectiveness of G20, functioning of G20, coverage of sectors, G20 and global governance, G20 and global financial stability, and similar topics.
- Original manuscripts not exceeding 5000 words prepared in MS Word using double space with a 100 word abstract and three key words may be sent to pdash@ris.org.in.
- The submitted articles must follow APA referencing style.
- All numbers below 10 should be spelt out in words such as 'five' 'eight', etc.
- Percentage should be marked as 'per cent', not '%'.
- For numeric expressions, use international units such as 'thousands', 'millions', 'billions', not 'lakh' and 'crore'.
- For time periods, use the format '2000-2008', not '2000-08'.
- Mere submission of an article does not guarantee its publication in the journal.

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Core IV-B, Fourth Floor, India Habitat Centre
Lodhi Road, New Delhi-110 003, India., Ph. 91-11-24682177-80
Fax: 91-11-24682173-74, Email: dgoffice@ris.org.in
Website: www.ris.org.in

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/risindia @RIS_NewDelhi /RISNewDelhi