Digital Development

Sector Note on Applying the World Bank Group Paris Alignment Assessment Methods

THE WORLD BANK
IBRD • IDA | WORLD BANK GROUP

This Sector Note outlines the sector-specific issues for applying the World Bank Group (WBG) Paris Alignment (PA) assessment methods to operations that include digital development sector activities. This note is not a stand-alone document and should instead be used in conjunction with the applicable WBG PA assessment methods[1] for demonstrating alignment. The Note will be updated from time to time to capture the lessons learned incorporate progress, breakthroughs, and developments in technologies, policies, practices, and consumer behavior; and reflect the evolving pipeline of the WBG digital development-related operations. The most relevant activity types for digital development covered by other Sector Notes are (i) Energy efficiency and renewable energy for digital infrastructure covered by the Energy and Extractives Note; (ii) Buildings for digital infrastructure covered by the Urban, Resilience, Disaster Risk Management, and Land Note; (iii) Water supply (sourcing, treatment and pumping) for data centers covered by the Water Note; and (iv) Digital Social Protection Delivery Systems covered by the Social Protection and Jobs Note.

Digital Development-related operations can enable countries to meet the goals of the Paris Agreement by investing in the digital economy in support of green, resilient, and inclusive development. At a macro level, the digital sector can reduce the carbon footprint of economies by helping reduce greenhouse gas (GHG) emissions from carbon-intensive sectors, for example through smart metering in the energy sector. Digital technologies can also help enhance the climate resilience of economies by diversifying away from climate vulnerable sectors towards more knowledge-based economies. Additionally, digital solutions play a crucial role in helping countries cope with climate shocks by enhancing preparedness and facilitating public and private service continuity. However, digital infrastructure is at risk from the climate change impacts and adverse weather, and is energy intensive to build, operate and dispose of. As a result, when designing digital investments, feasible and economically viable opportunities to achieve climate-proof, energy-efficient project design, as well as the possibilities of using renewables for digital infrastructure energy needs should be considered in the specific country circumstances and project context.

1. Investment operations: Main considerations in assessing Paris Alignment of Digital Development sector operations

Mitigation

The exponential growth of the digital economy is linked with extensive connectivity network and data center expansion, as well as the proliferation of digital devices. Today, about 1.5 to 4 percent of global GHG emissions stem from digital infrastructure and applications.[2] By 2040 the direct GHG emissions of the sector could make up as much as 7 percent of global GHG emissions[3]. Globally, in the digital/ICT sector, end-user devices are the main source of GHG emissions (mainly from manufacturing) followed by data centers and connectivity networks. At the country-level, GHG emissions from the sector depends on the level of digitalization, the consumption patterns of digital technologies, and energy sources. Decarbonization options for digital investments vary across the value chain. For example, activities such

[1] WBG PA assessment methods are conceptually consistent with the joint MDB Paris Alignment Approach (MDB PA Approach) and consist of the following: (a) For the **World Bank**, the World Bank Paris Alignment (PA) Methods (WB PA Methods) are applicable to operations under three financing instruments— (i) Investment Project Financing (IPF), including operations using Financial Intermediaries; (ii) Programs for Results (PforR), and (iii) Development Policy Financing (DPF). (b) For **IFC** and **MIGA**, the assessments apply the <MDB PA Methodological Principles> to operations under Direct Investment Operations, Financial Intermediaries, and Corporate General Purpose (CGP) Financing. The MDB PA Methodological Principles for CGP Financing applies only to IFC and MIGA.

[2] https://www.digitaldevelopmentpartnership.org/knowledge.html?ddp=kn-pb-22-t1-10

[3] https://www.digitaldevelopmentpartnership.org/knowledge.html?ddp=kn-pb-22-t1-10

as digital skills development or support for digital safeguards generate little or limited emissions compared to digital infrastructure investments.

The PA assessment includes assessing that the activity being financed is consistent with (does not hinder) the country's Nationally Determined Contribution (NDC), Long-Term Strategy (LTS), or other climate-related strategies and policies, taking into account WBG's own climate analysis (e.g., CCDRs) and checking if the activity is universally aligned or non-aligned according to the respective lists. Digital Development-related activities on the universally aligned list that meet the relevant conditions defined in the WBG PA assessment methods will be considered aligned on mitigation and no further assessment is needed. For operations with activities that are not on the list, the mitigation assessment approach laid out in the WBG PA assessment methods will be followed to assess the operation's alignment with the Paris Agreement's mitigation goals to determine the risk of an operation having a negative impact on the country's low-GHG emissions development pathways, and modify the activity design if needed. The risk assessment takes into account the country and sector context, including that low- and middle-income countries (LMICs) have essential development needs to be addressed, typically have low GHG emission trajectories and historically contributed little to global GHG emissions. As such, the risk assessment should consider the specific country and project/program development context, including economic, institutional, and technical feasibility, and market considerations, as well as the specific private sector considerations. The risk assessment of projects includes consideration of feasible lower-GHG-emissions alternatives[4], carbon lock-in risk and transition risk.[5] The appropriate risk assessment approach and risk mitigation measures will depend on both the nature of the WBG operation and the level of the broader WBG country engagement with the private or public counterparts (e.g., in applying system-wide or asset-level assessment).

Data Infrastructure, including Data Centers

Data infrastructure is universally aligned except for data centers, which require further assessment.

Data infrastructure provides foundational services for processing, storing, and securing digital data. It covers both physical elements, such as storage, network devices and intangible elements, such as software. Digital Development-related operations facilitate various types of data infrastructure ranging from small-scale server infrastructure to upgrading or procuring large-scale data infrastructure including data centers, hybrid, and cloud solutions, as well as associated policies.

Data centers are energy intensive and consume considerable amounts of energy in order to run servers, network equipment, lighting, air distribution fans, and cooling systems. Hydrofluorocarbons (HFCs) are also widely used as data center refrigerants, with global warming potential thousands of times greater than CO_2.[6] Currently there is no single, internationally agreed specific standard or certification scheme for green data centers, although several are considered credible in the industry, including LEED and the IFC-developed EDGE Green Building certification, which assess Power Usage Efficiency (PUE). Additionally, there are initiatives to establish minimum energy efficiency requirements for the design and operation of data centers (e.g., ANSI/ASHRAE). Operations that follow good practice guidelines (e.g., EU Code of Conduct on Data Centre Energy Efficiency and the ITU L-series, as well as buildings guidance in the Urban, Resilience, Disaster Risk Management, and Land note*)* for greener data centers, or equivalent, can be

[4] The assessment should focus on feasible lower-GHG emissions alternatives. "Feasible" means "commercially available, technically and financially viable" for IFC and MIGA and "technically feasible and economically viable" for the World Bank.

[5] For World Bank investment operations, the question of the economic viability after accounting for transition risks, is not applicable to Technical Assistance components.

[6] https://www.fluorocarbons.org/applications/data-centres/

considered aligned as they are using lower-carbon good practices. All other data centers would require further assessment.

Opportunities to integrate feasible and economically viable alternatives with lower GHG emissions into project design should be explored considering the country specific circumstances and project context. The main measures to address risks on mitigation include: (i) data center site selection and green building design; (ii) energy efficient equipment and management practices; (iii) extending lifecycle of ICT equipment; (iv) applying low-carbon cooling practices and technologies, including refrigerants with low global warming potential (GWP), such as lower GWP hydrofluorocarbons (HFCs) or blends; (v) use of renewable energy for power or backup; and (vi) reuse of waste heat or wastewater. For procurement of cloud services green procurement practices should be considered covering topics as above.

Additionally, since data center buildings are long-lived assets[7] with demanding energy and cooling needs they may lead to a carbon lock-in risk, depending on their size, energy efficiency and energy sources. In addition, inefficient data centers in certain locations (e.g., warm climates with emissive power grids) would require significant energy use and may be at risk from the low-carbon transition associated with increasing regulation and declining market attractiveness. Therefore, energy efficient data centers based on international good practices and country context should be considered to optimize energy use.

Connectivity networks

Network infrastructure is universally aligned. However, energy is among the highest operating costs for network operators and therefore, the commitment to net zero emissions from governments and industry players combined with the cost of energy has made energy efficiency a strategic priority for many network operators. In addition, the migration to LTE and 5G networks with its exponential growth in traffic makes it critical for energy efficiency measures and strategies to be considered by both governments and network operators. Project teams are encouraged to explore opportunities[8] to integrate low carbon network choices considering the specific country circumstances and project context such as: (i) energy efficient network equipment following international standards or equivalent; (ii) TA on energy efficient network operations; (iii) models or incentives facilitating infrastructure sharing; and (iv) use of renewable energy, including for last-mile off-grid connectivity and backups.

Devices

Purchase and use of digital devices is universally aligned. Many operations include devices to support project activities, for example e-services. GHG emissions from devices stem from manufacturing, consumption and disposal with the largest share being in the manufacturing phase. Investments in the manufacturing of devices and components may be subject to further assessment. Energy used for powering devices is outside the scope of Digital Development-related operations. Based on the scale of device investments and specific country circumstances and project context, project teams are encouraged to consider opportunities[9] to: (i) procure devices that meet durability and energy efficiency standards or labelling; (ii) include measures to repair, reuse, and recycle devices and include adequate e-waste management; and (iii) explore options for renewable energy in off-grid areas to power devices.

e-Services

e-Services are universally aligned. Digitization of services (electronic service delivery or e-Services) can contribute to decarbonization, as well as resilience. For example, digitized services, such as eGovernment services, telework, remote education, etc., reduce the number of in-person visits to access a service or carry out a transaction, which in turn, reduces travel-related GHG emissions. However, e-Services require

[7] ICT and cooling equipment have a relatively short life expectancy.
[8] Not a requirement for being aligned on mitigation.
[9] Not a requirement for being aligned on mitigation.

energy consuming software, hardware and connectivity to collect, store and process data. e-Service projects that require investments in data centers or procure significant data services (e.g. cloud solutions) should be assessed using guidance on 'Data Centers'.

Adaptation and resilience

Assessment of Risk from Climate Hazards consists of assessing the operation's level of exposure to current and future climate hazards and the vulnerability to such hazards, including relevant adaptive capacities of human and natural systems. Digital infrastructure can be severely impacted by climate hazards, such as extreme temperature and precipitation, flooding, droughts, desertification, sea level rise and storm surge. For example, hurricanes and cyclones can damage network connectivity infrastructure, and flooding and sea level rise could inundate devices, server rooms or data centers. Additionally, power outages due to extreme weather events could impede network connectivity and disrupt services.

Assessment of risk from climate hazards and their subsequent impact on Digital Development operations is highly location- and development- context driven. Country and location-specific climate information should be used, such as from the World Bank's Climate Change Knowledge Portal, along with other available resources and expert judgment should be used to determine the climate hazards relevant to the operation. Exposure from relevant climate hazards should be assessed under various climate change scenarios over suitable time frames, based on the nature and lifetime of activities and assets being created or services being provided by the project.[10] For example, the exposure of network connectivity infrastructure being undertaken in a hurricane-prone area needs to consider relevant climate scenarios over the lifetime of the assets.

An operation's exposure to relevant climate hazards is based on two main factors: (i) whether the operation is in a location and setting where (directly or indirectly) the relevant climate hazards are expected to occur, and (ii) whether the assets, systems, beneficiaries, and/or vulnerable groups might be exposed to these hazards. Certain locations and investments could be highly exposed to climate change; for example, data centers located in low-lying areas could be susceptible to flooding. Once an operation's exposure to relevant climate hazards is known, their impact on activities financed by the operation must be assessed considering the level of exposure and sensitivity, and the operation's vulnerability to these impacts should be determined based on its adaptive capacity.

Risk reduction measures should be proportionate to the nature and scale of the potential impact(s) of risks identified on the operation. Climate vulnerability can be addressed through a combination of hard and soft measures that are appropriate for the project's development context. The risk assessment should be used to prioritize climate hazards that need to be addressed by classifying the hazards that pose the highest potential risk to the operation's success based on their nature and scale of impact on the operation. The below provides a non-exhaustive list of illustrative examples of risk reduction and adaptation measures that can be used across various stages of the project's life cycle.

- **System-Level Planning:** Measures implemented at a system-level ensure investments are climate resilient, for example completing climate risk screening during site selection for network connectivity and data infrastructure; developing regulations and standards to design climate resilient digital infrastructure and ensure business continuity in case of emergencies, considering access to necessary resources factoring climate risks (data centers, for example; require water for cooling which can be a challenge in water scarce areas, or during droughts).

[10] Climate change scenario selection is an important aspect of determining an operation's climate hazard exposure and it is good practice to select at least two climate scenarios, such as a best-case low-GHG emissions scenario and high-GHG emissions scenario.

- **Engineering and Design:** Apply design standards that factor in climate risks, and retrofit existing assets to account for projected increases in flooding, sea level rise, storms, and other hazards; plan for back-up power; plan for cloud usage and data storage backup; ensure geographical redundancy and minimize the number of single points of failure across network connectivity and data infrastructure.
- **Operations and Maintenance:** Plan for flexibility in project implementation or management to adapt to changing climate hazards in case of emergencies; account for maintenance activities in budget preparation; reduce the chance of network connectivity failure through frequent monitoring (of both network equipment and climate hazards); conduct maintenance checks for data storage, backup power, and backup systems.
- **Contingency Planning:** Develop early warning systems and establish emergency protocols to respond and prepare for climate-related disasters; establish a contingency budget to address unexpected disruptions and fund investments to restore network connectivity and digital services; ensure back-ups.
- **Institutional Capacity and Coordination:** Measures which can enhance the capacity of digital stakeholders to plan for and cope with impacts of climate hazards, for example training on climate risk assessment or emergency response planning, technical assistance and advisory services on climate risk assessment and resilient design, etc.

2. Development Policy Financing: Main considerations in assessing Paris Alignment of Digital Development sector operations

Digital development and digital economy related prior actions in Development Policy Financing (DPFs) broadly comprise policy and regulation (e.g., on connectivity access, competition, spectrum management, infrastructure sharing), establishment of institutions and implementation of e-services.

Mitigation

Most reform areas cited above do not increase GHG emissions and do not introduce or reinforce persistent barriers to the country's ability to pursue a low-emissions development pathway, and hence are considered aligned. Prior actions that support aligned activities discussed in Section I are also aligned. However, reforms that could result in the creation of physical assets or expansion of energy-intensive digital infrastructure call for more scrutiny and should be assessed using the guidance for relevant infrastructure (e.g., data centers).

Adaptation and resilience

While risk from climate hazards is not expected to have an adverse effect on most Digital Development reform areas, policy actions whose outcomes or intended results create an enabling environment for asset creation or sustained or enhanced connectivity (e.g., reforms seeking to expand coverage of digital services, improve access or attract private sector participation) could be affected by such risks. The impact of climate hazards on such policies should be assessed using the guidance for relevant physical assets (e.g., data centers, network connectivity infrastructure).