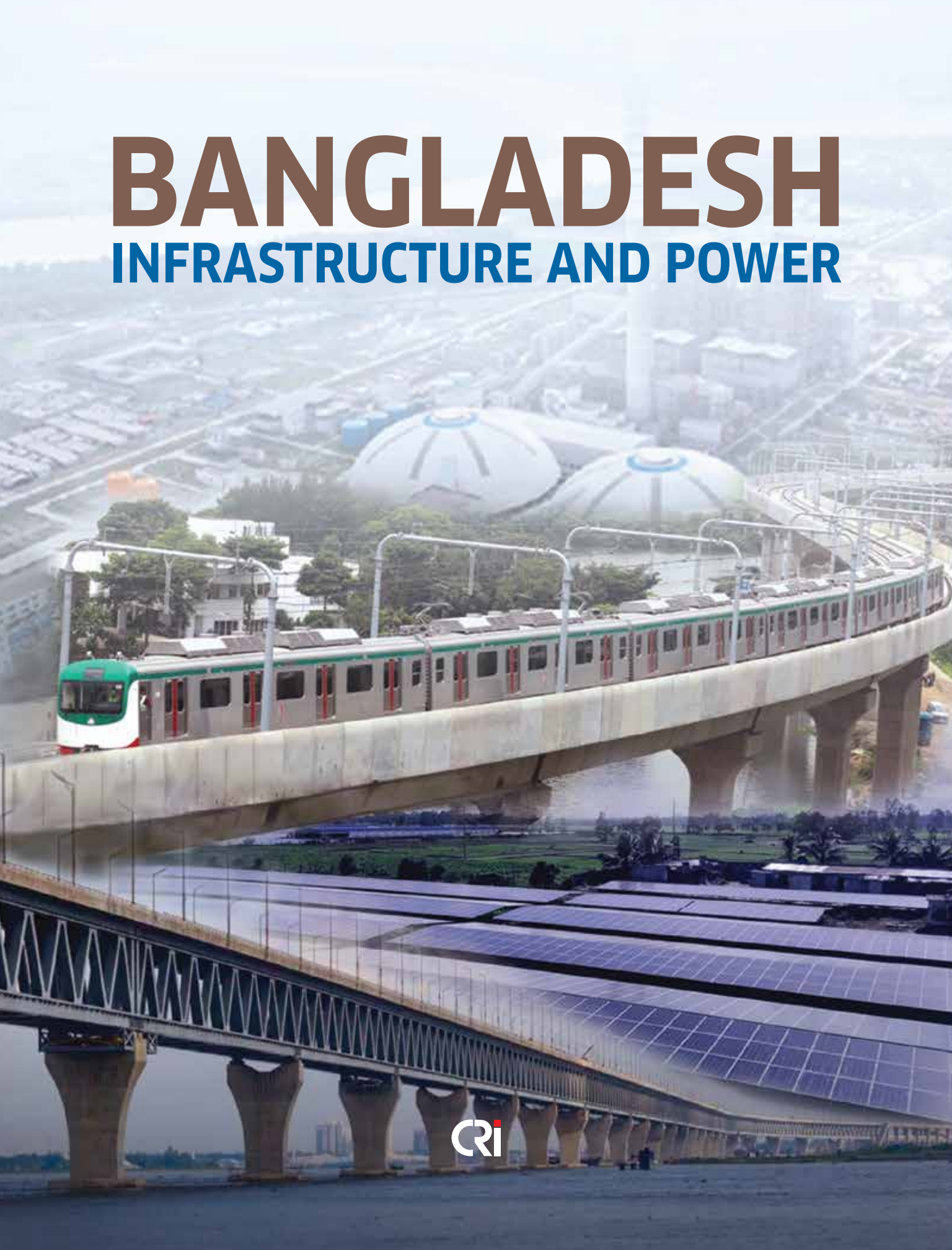
# BANGLADESH
## INFRASTRUCTURE AND POWER



# Bangladesh Infrastructure and Power

Centre for Research and Information

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# Introduction

In today's globalized world, low-cost and efficient transport and connectivity is a major determinant of the competitiveness of a country. A sound energy policy propels competitiveness even more. An efficient transport system has ripple effects on regional development within a country and in raising income-levels. Bangladesh's long-term planning entails these core ideas, which are vital policy determinants for an emerging economy.

Recognizing the role of connectivity, Bangladesh has put top priority to the development of its transport network. Bangladesh witnessed rapid growth of the transport sector since independence in 1971, and the growth has accelerated since 2010. Connectivity is among the top reasons for Bangladesh's economic transformation from rural-agro base to urban-industrial base. More importantly, connectivity has also boosted the service sector of the country.

Bangladesh's remarkable economic progress since 2010 has seen rapid decline in poverty on the heels of rapid economic growth. The phenomenon is propelled by the country's industrialization agenda, which is propelled by the country's energy policies. The energy sector consists of a good mix:  gas, coal, liquid fuel, solar and wind. Bangladesh has adopted a diversified primary energy fuel policy with energy security in mind. With the target of net-zero by 2050, it is now investing in renewables.

Stable supply of electricity at an affordable price for socio-economic development is universally recognized, and Bangladesh is trying to pursue this path. Bangladesh has reached 100% electrification in 2022, which is a true milestone for a rural-riverine country. But challenges remain. Global price shocks, ambitious national development goals, subsidization strategies and efficiency gains are among the challenges for Bangladesh's energy sector in the next 20 years. A more efficient and low-cost power infrastructure along with a competitively functioning transparent and well-regulated primary energy sector could help strengthen the competitiveness of Bangladeshi manufacturing and export products.

Bangladesh's national policy documents, such as the 8th Five Year plan, focuses on power generation capacity expansion and institutional support. The new policies are moving towards efficiency gains through advanced tech and better power distribution. The financing strategy emphasized both public funding as well as financing based on public-private-partnership (PPP). Emphasis was also placed on improving efficiency and service delivery of relevant public agencies of the power sector.

# Chapter 1

## Infrastructure planning

Infrastructure development involves immense planning in a deltaic terrain like Bangladesh. Moreover, the planning process is of critical importance for any country, particularly for developing countries like Bangladesh. Infrastructure building is one of the key components of Bangladesh's development vision in the period since 2009 when the progressive-leaning Awami League party took office. After the formation of the government, Prime Minister Sheikh Hasina unveiled the country's first long-term development strategy 'Perspective Plan 2010-2021 (PP2021). The pledge was to build a middle-income country by 2021.

Later, Sheikh Hasina's government formulated and implemented successive mid-term plans to complement the long-term strategy. The perspective plan considers infrastructure as a key driver of the country's sustainable growth and underpins the need for building the transport infrastructure to attain high GDP growth and poverty reduction. Bangladesh reached the World Bank designated lower middle-income country status in 2015. In 2021, the country fulfilled all three criteria to graduate from the United Nations-designated least developed country (LDC) category to a developing country, for the second time since 2018. The country has advanced a lot in the 2010s. Today Bangladesh is ahead of other developing and regional countries in many economic and social indicators.

The government launched its second long-term plan – Perspective Plan 2021–2041 (PP2041) – to become an advanced economy by 2041. This time, the target is to achieve upper-middle income country status by 2031 and high-income country status by 2041. This corresponds with

the target to achieve the global development goals, the SDGs, before the deadline of 2030.

Bangladesh's acceleration in growth under PP2041 and the diversification of the export basket will require strong improvements in logistics related to factory to port movements and timely inflow of imports of capital machinery and intermediate imports from ports to factory gate. The other priority will be to address the major institutional constraints that have hampered implementation of transport projects.

Another priority is the reform of the Public-Private Partnership (PPP) strategy with a view to achieving stronger progress under PP2041. The PP2041 has 4 mid-term socio-economic plans integrated within it: 8th, 9th, 10th and 11th Five Year Plan. Infrastructure development lies at the core of all these mid-term plans.

The longest plan that Bangladesh has adopted is the Delta Plan 2100. The government endorsed the Delta Plan in 2018 targeting sustainable economic growth and environmental sustainability through long-term food security and sound water resource management. Issues related to climate change adaptation, water management, and energy security are at the center of this plan. In the first phase of the Delta Plan, 80 projects are included for implementation till 2031.

## Perspective Plan 2010-2021

Bangladesh's first long-term plan - Perspective Plan 2010-2021 (PP2021) - laid the roadmap for accelerated growth. It laid down broad approaches for eradication of poverty, inequality, and human deprivation. Specific strategies and the task of implementation were articulated through two mid-term plans: 6th Five Year Plan (2011-2015) and the 7th Five Year Plan (2016-2020). Sound infrastructure was core to realizing the vision ingrained in the PP2021.

The efficient and safe movement of people and goods need well-built, efficiently operated and maintained infrastructure and transportation systems, along with reliable and affordable supplies of water, electricity and power, telecommunications, postal and waste management services. In addition to well-planned urbanization, attention was given to multi-modal transport, integration of roads and highways, railways, water transport, rural transport and airports.

## Perspective Plan 2021-2041

Perspective Plan of Bangladesh 2021-2041 (PP2041) is a long-term development planning document of Bangladesh. It builds on the consistency of the previous long-term plan Perspective Plan 2010-2021. The PP2041 has charted out Bangladesh's road to two decades of transformation. PP2041 envisions to make Bangladesh a high-income country by 2041 under World Bank classification.

PP2041 is also a comprehensive planning document where the government has articulated the sector-wise development ambitions to be achieved by the year 2041. On the infrastructure development front, one of the strategic goals and milestones of the PP2041 is efficient energy and infrastructure development. This will be an

essential component to facilitate rapid, efficient and sustainable growth.

PP2041 eyes massive increase in infrastructure investment during its implementation period. The aggregate infrastructure investment demand cannot be met completely from domestic resources. Reaching out various multilateral or bilateral sources will be crucial to ensure adequate infrastructure development investment. Moreover, in PP2041, the government strategized to make the private sector a leading growth driver in infrastructure development endeavors. The heavy public investment in infrastructure development undertaken in the 2010s will crowd in private investment. PP2041 identified the key areas of supporting infrastructure and governance reforms to drive private investment.

**The target investment areas are**

1. *Adequate energy supply including electricity and gas*
2. *Infrastructure including roads, railways, bridges, embankments and dykes*
3. *Telecommunications*
4. *Ports*
5. *Legal and administrative systems including property rights issues*
6. *Socioeconomic environment including law and order situation*
7. *Monetary policy and management of public finances*

The PP2041 projects the continuation of investments in rural infrastructure and farm technology. For rural job creation, rural infrastructure development will be a high priority under PP2041. In addition, on the urban decentralization front, PP2041 has a target to establish 8 'regional urban centers namely, Dhaka, Mymensingh, Chattogram, Sylhet, Rajshahi, Rangpur, Barishal and Khulna to strengthen urban infrastructure. In order to bring Bangladesh up to par with its Asian comparators, an estimated $10 billion yearly investment in infrastructure over two decades is a prerequisite. In this regard, PP2041 has conceptualized to locate necessary investments to translate the vision 2041 into reality.

## 8th Five Year Plan (2021-2025)

Bangladesh has adopted its 8th Five-Year Plan (8FYP) to realize the goals to march towards upper middle-income country status and attain the SDGs by 2030. Keeping the covid-19 setback in consideration, a resilient and sustainable development pathway is the major thematic area of the plan. The plan has set an implementation roadmap, resource envelope and M&E frameworks.

The 8FYP objectives, in alignment with PP2041, put emphasis on building the 3R (Rail, Road and River) inter-modal connectivity to link Bangladesh's hinterland with the country's ports, and for construction of sea ports to connect with international maritime transport corridors. The plan intends to put in place robust inter-district connectivity and deepen inter-regional connectivity to establish transport linkages with neighboring countries and the broader Asian region.

## Bangladesh Delta Plan 2100

Bangladesh has formulated Bangladesh Delta Plan 2100, a long-term integrated mega plan which aims to tackle the impacts of climate change. It is one of the most comprehensive climate resilient development planning and strategic documents to address the hazards posed by the country's deltaic formation, as well as natural catastrophes and climate change. The plan will also minimize the damage caused by river erosion during floods. Speedy implementation of the Delta Plan will significantly contribute to reducing climate related vulnerabilities. The first phase of Delta Plan involves 80 projects on land reclamation, construction of embankments and creation of safe navigation channels and require about $38 billion investments by 2030.

### Bangladesh Delta Plan 2100 has six specific goals

1. *Ensure safety from floods and climate change related disasters*
2. *Enhance water security and efficiency of water usages*
3. *Ensure sustainable and integrated river systems and estuaries management*
4. *Conserve wetlands and ecosystems and promote their wise use*
5. *Develop effective institutions and equitable governance for in-country and trans-boundary water resources management*
6. *Achieve optimal and integrated use of land and water resources*

Bangladesh also faces multidimensional challenges from unplanned urbanization resulting in declining land availability, infrastructure shortages, energy supply constraints and so forth. Waterlogging in urban and rural areas is one of the pressing challenges in sustaining the massive infrastructural development gains of the country. Unplanned and ineffective drainage infrastructure, encroachment on wetlands in urban and rural areas and the hampering of tidal flows in the coastal regions are the leading causes among many other challenges. These will lead to permanent inundation of a significant part of dryland in Bangladesh.

To translate the goals, targets and strategies to protect Bangladesh's development gains, infrastructures and economy require a high flood protection standard. Measures that can provide this level of protection include embankments, barriers, erosion control and efficient drainage systems. Most of these measures are already in place and operating at a rudimentary level.

In addition to existing measures, adapted flood-proof buildings are needed for key facilities such as hospitals, power stations, industrial plants and major communication networks between these facilities. Bangladesh Delta Plan 2100 strategizes to address these deltaic and anthropogenic challenges through massive water resource and water infrastructure development.

## Sustainable Development Goals (SDGs)

Bangladesh has been an active participant in formulating the 2030 Global Development Agenda, namely Sustainable Development Goals (SDGs). The country has completed all the preparatory works of SDGs mainstreaming, implementation, formulation of action plan, establishing monitoring and evaluation framework. It has embraced the SDGs through inclusion of the 17 'Global Goals' into its national development plans. The SDGs have been inculcated in the national plans - such as 8th Five Year Plan (8FYP), 7th Five Year Plan (7FYP), 6th Five Year Plan (6FYP), Bangladesh Delta Plan 2100, Perspective Plan 2021 and Perspective Plan 2041. These are important building blocks to achieve the SDGs. A study conducted by the Bangladesh Planning Commission reveals that Bangladesh would need additional investment of $928 billion (or $66 billion on annual basis) to achieve SDGs.

Since Bangladesh is a delta, we'll have to build the country in such a way so that its future generations can lead a decent life.

**Sheikh Hasina**
Bangladesh Prime Minister

**SDG 9: Resilient Infrastructure, Sustainable Industrialization and Innovation** is one of the 17 goals of SDGs relevant to infrastructure and sustainable development. In a bid to achieve the SDG 9, Bangladesh has been prioritizing the building of resilient infrastructure, promoting sustainable industrialization and fostering innovation in its overall policy framework. The road sector policy and planning instruments guide the investments in the sector to protect the value of infrastructure assets, increasing connectivity and improving road safety. The government has also undertaken a number of initiatives to modernize, develop and expand the country's telecommunication infrastructure and system. Bangladesh launched its first satellite 'Bangabandhu Satellite 1' successfully in 2018.

Moreover, Bangladesh is investing heavily in infrastructure due to the critical role of essential infrastructure including transport, energy, information and communication technology (ICT), water supply and sanitation, buildings, embankments, and cyclone shelters in accelerating development. In the 2010s, the country's road density and connectivity saw a rising trend. The country is implementing a wide range of mega-projects in multiple sectors such as power and energy, roads and bridges, railways and ports to overcome the pressing infrastructure bottlenecks. Bangladesh's policies also highlight technological progress as key to finding lasting solutions to both economic and environmental challenges, such as providing new jobs and promoting energy efficiency.

As Bangladesh meticulously integrated the SDGs and targets in its major policies, master plans and action plans, to date, the country is on track to achieve the infrastructure and sustainable development related goals and targets. Bangladesh publishes its Sustainable Development Goals Progress Report annually to track the progress.

Chapter 2

# Integrated infrastructure

Bangladesh is passing through a phase of robust infrastructural development and the expressions of developmental changes have reflected on its economic and social activities. Bangladesh government is bringing a preferred equilibrium through big push and heavy public, private and foreign investment in the infrastructure sector. Once the infrastructure deficit country is now witnessing a massive infrastructure development boom.

Empirical study suggests that, trends in public expenditure for the development of physical infrastructure, construction of roads, bridges, and culverts and public infrastructures, were relatively low and very little emphasis was given on public spending for the soft and hard infrastructure in the 1980s and 1990s. The trend witnessed massive shifts and robust growth in the last two decades.

As of March 2022, Bangladesh is engaged in the construction of some of the biggest development projects in its history. Most of the megaprojects are in the areas of the low-cost housing, public infrastructure, power, energy and communication infrastructures, namely the Padma Multipurpose Bridge, Rooppur Nuclear Power Plant, Bangabandhu Sheikh Mujibur Rahman Tunnel, Matarbari Power Plant, Rampal Power Plant, Payra Power Plant, Dhaka Metro Rail Project, and Payra Sea Port. Another notable project is the Bangabandhu Satellite-1 launched on 11 May, 2018. Of these projects, Bangladesh self-funded the Padma Multipurpose Bridge.

Bangladesh's investment drive in the infrastructure projects have already started showing impacts on the economic growth rate of the country. Heavy public investment in physical infrastructure and

connectivity networks has also supported trade, business, and socio-economic growth. Some analysts attribute the country's successful development transformation to significant investments in infrastructure mainly in roads and bridges which helped to connect the formerly fragmented spatial economy. The new government policies have been directed towards the creation of necessary economic and social infrastructures.

## Bridges

On the communication infrastructure front, Bangladesh witnessed massive public expenditure resulting in building numerous bridges and culverts in the last two decades. The government has implemented a number of rural communication infrastructure development projects and constructed around 321,322 meters of bridges and culverts in the different parts of rural Bangladesh in 2009-2020 period. Under the government's sustainable urban development initiative, about 13,833 meters of bridges and culverts have been constructed in urban areas between the years 2009 and 2020.

**Between 2009 and 2020**

**321,322**

meters of bridges and culverts constructed in rural areas

**13,833**

meters of bridges and culverts constructed in urban areas

## Padma Multipurpose Bridge

On June 25, 2022, Bangladesh inaugurated one of the flagship mega communication infrastructure projects– the Padma Multipurpose Bridge over the Padma river. By some accounts it is the largest bridge in South Asia, and one of the most advanced engineering projects in the world. The project was undertaken through domestic financing. It is the first time Bangladesh, under the Awami League led government, took a decision to self-finance a mega infrastructure.

Padma Multipurpose Bridge is the largest infrastructure project in Bangladesh, a 6.15 km structure with a double-decker bridge. The bridge is expected to boost the country's gross domestic product (GDP) by 1.3%. It will also connect 80 million people in two of the most densely populated yet separated regions of the country. Padma Bridge would connect 21 districts in Bangladesh's south-western region with the country's eastern region and capital, Dhaka.

Furthermore, due to its position on the Asian Highway, this bridge will bring revolutionary changes to the communication system in the South Asian region. The $3.87 billion Padma Bridge is one of the largest projects Bangladesh has ever undertaken and has become a symbol of national pride and dignity. Bangladesh credits its premier Sheikh Hasina for her steadfast leadership in spearheading the dream of making this mega project alive.


P17

*In the year 2020-21,*

*a total of* ***201***

*infrastructure development*

*projects have been*

*initiated under the* ***Annual***

***Development Program,***

*in order to*

*develop an* ***efficient***

***transport and***

***communication system.***

## Dhaka Elevated Expressway

To reduce traffic congestion in Dhaka city 46.7 km-long Dhaka elevated expressway from Hazrat Shah Jalal international airport to Kutubkhali on the Dhaka-Chattogram highway is under construction on Public Private Partnership (PPP) basis. This will act as a major bypass in Dhaka city, connecting an industrial hub with the southern port.

## Dhaka East-West Elevated Expressway

Bangladesh has approved the construction of 39.2 km-long Elevated Expressway from western edges of Dhaka to the southeastern economic corridor between Dhaka and Chattogram city. This expressway will connect National Highways and Asian Highway.

## Dhaka-Ashulia Elevated Expressway

The government has approved the construction of a 24 km-long Dhaka-Ashulia Elevated Expressway from Hazrat Shah Jalal (R) International Airport to EPZ through Ashulia. It will act as a northward highway expansion from the capital. The expressway will connect Asian Highway Network and almost all National Highway, reducing traffic congestion in the corridor that connects Dhaka city with 30 other districts.

## Bangabandhu Sheikh Mujibur Rahman Tunnel

Bangladesh is on the verge of completing another mega communication infrastructure project– the Bangabandhu Sheikh Mujibur Rahman Tunnel under the Karnaphuli river, in the port city Chattogram. The tunnel will establish an uninterrupted communication network from Dhaka to all the way to the southern tip of Bangladesh.

The 3.3 kilometer tunnel has 5.35 kilometer connecting road on the west and east ends of the main tunnel. The construction work began in December 2017 and is expected to be completed by December 2022 as the construction work is 87% complete. The China Communication and Construction Company Limited (CCCC) is constructing the Bangladesh-China jointly funded project.

The BDT 103.74 billion project is expected to increase the efficiency between the high-productivity oriented southeastern belt and aims to connect the Asian Highway and build a new road link between Dhaka-Chattogram-Cox's Bazar. Upon completion, the tunnel is expected to open a multidimensional window of industrialization in South Chattogram turning the region into a business hub. The tunnel will also open up the window of opportunities for tourism and the economic transformation in South Chattogram and Cox's Bazar. It will facilitate road communication between the deep seaport under construction at Matarbari, Chattogram and the rest of the country.

## Dhaka Mass Rapid Transit

With a view to create an integrated modern public-transport system around Dhaka city, construction of the first metro rail network (MRT Line-6) is reaching near-completion. Dhaka Mass Rapid Transit (MRT) Line-6 is the first metro-rail in Bangladesh being 20 km long running north-south with 16 stations. The metro rail is capable of carrying 60,000 passengers per hour.

## Railways

Bangladesh railway is one of the most public-friendly modes of communications across the country. Unfortunately, it has been deprioritized as a mode of transport in the first 4 decades since independence. That policy has changed in the last decade. In a bid to improve the services to the commuters, the government has undertaken some prudent policy measures and development initiatives. Bangladesh Railways formulated Railways Master Plan 2016-2045, a policy-planning instrument, in order to overhaul the railway system of Bangladesh.

*Bangladesh formulated Railway Master Plan 2016-2045 to overhaul the railway system.*

*230 projects worth $58.42 billion will be implemented in six phases between July 2016 and June 2045.*

## Achievements of Bangladesh Railway since 2009

| | |
|---|---|
| **142** | new trains introduced |
| **727** | railway bridges renovated |
| **194** | station buildings renovated |
| **439** | railway bridges constructed |
| **462 km** | new rail line constructed |
| **1,210 km** | rail line renovated |
| **100** | new station buildings constructed |
| **56** | locomotives procured |
| **20** | multiple-unit trains procured |
| **793** | goods wagons introduced |
| **980** | passenger coaches introduced |
| **248 km** | rail line converted from meter to dual gauge |
| **130** | stations signal system modernized |

## Waterways

Bangladesh is a riverine and sea-facing country. Waterway is the natural mode of communication systems in Bangladesh. To optimize the utilization of these waterways, the government has been developing and regulating the country's internal water transport infrastructure. The government has undertaken, with adequate funding, a total of 18 development projects in the year 2020-2021 in order to modernize and facilitate river and waterways governance in the country.

## Airways

In a major boost to overhaul the airways, the government has undertaken the construction of the third terminal of Hazrat Shahjalal International Airport (HSIA), Dhaka in the year 2019. It will be the largest airport construction of the country. The soft launch of the much-awaited world-class airport terminal is expected within 2023. Upon completion of the third terminal, it will double the airport's annual passenger and cargo handling capacities. The terminal is being constructed on 542,000 square meters of land and will have a floor space of 230,000 square meters, 115 check-in counters, 64 departure and 64 arrival immigration desks.

## Special Economic Zones

Bangladesh is developing 100 special economic zones (SEZs) or industrial parks in critical economic points across the country. This will tackle the country's scarce 'land for industries' problem. This policy decision is a drive to accelerate employment opportunities. The SEZs are being catered to both foreign and domestic investors. Special emphasis is given to set up new technology-based industries. They are also being curated based on ecologies suitable for specific types of industries or investors. Bangladesh now has 88 SEZs, 59 of which are owned by the government and 29 by private parties; five more will be added by 2030. Within these SEZs, 38 countries have made investments.

Between 2011 and 2021, the Private Sector Development Support Project (PSDSP) facilitated more than $3.9 billion in direct private investment and the creation of over 41,000 jobs. The World Bank funded project supported a regulatory reform process, helped build the Bangladesh Economic Zone Authority (BEZA) and the Bangladesh High-Tech Park Authority (BHTPA), and developed 1,500 acres of land and other critical infrastructures.

## Information and Communication Technology (ICT) infrastructure

In terms of information and communication technological (ICT) advancement, Bangladesh has played an exemplary role in South Asia. Bangladesh has already translated its 'Digital Bangladesh' scheme envisioned in 2009 by the current Awami League led government. The country has gone through a transformative journey across the board digitalization. Bangladesh has transformed its ICT industry through prudent and robust growth of ICT infrastructure development. The country heavily invested in telecommunication infrastructure development. Currently, Bangladesh is connecting its remote parts with high-speed affordable internet connectivity.

## Bangladesh Hi-Tech Park Authority

The government has established Bangladesh Hi-Tech Park Authority (BHTPA) in 2010 under the ICT Division of Ministry of Posts and Telecommunication and Information Technology. BHTPA is the regulatory agency which oversees the ICT establishment such as to the foundation of hi-tech parks, software parks, IT training and incubation centers. The primary goal of forming BHTPA is to channel investments and skills into the ICT sector. BHTPA is currently working to establish 39 Hi-tech parks/Software Technology Parks across the country.

## Since 2009 Bangladesh

- *Brought 18,500 government offices under one integrated network*
- *Invested $300 million public funds in startups*
- *Established 3,544 computer labs*
- *Established 100 smart classrooms*
- *Established cyber centers in 27 colleges and universities*
- *Brought 2,900 unions under high-speed broadband*
- *Established digital forensic lab, cyber range, cyber defense training center*
- *Established 15 critical information infrastructure*
- *Established 254 agricultural information centers*
- *Established 25 telemedicine centers*
- *Established 31 specialized tech-labs in universities*

## Agriculture infrastructure

Bangladesh has been diligently investing in rural infrastructure development, precisely in agricultural infrastructure to attain food security. In the year 2020-2021, the government has implemented 18 irrigation projects and 10 irrigation programs are being implemented. Through projects, canals and drains re-excavation, construction of 300 irrigation infrastructures, 400 km irrigation channels, installation of 250 power pumps, electrification in 407 irrigation schemes, installation of 75 solar powered irrigation pumps have been implemented.

## Rural infrastructure

The rural road network has been expanding in Bangladesh since the 1980s and has accelerated in the 2010s. The rapid expansion has allowed the growth of the rural economy where non-farm activities have taken over farm activities. Currently, the policies on rural communication infrastructure are: upgradation of high-use roads into two lanes, sustainable maintenance of existing roads and making new roads within villages. Moreover, the government has built and rebuilt about 350,396 meters of bridges and culverts across rivers and streams. In the last 10 years, the government has built 2,154 growth centers (village markets), 1,438 Union Parishad (smallest electoral unit) complexes, 346 Upazila (sub-district) complexes and 1,762 cyclone shelter centers. The rural infrastructure interventions have become the key drivers of the rural economy of Bangladesh.

**Between 2009 and 2022, the government has built**

| | |
|---|---|
| **1,762** | Cyclone shelters |
| **346** | Upazila (sub-district) complexes |
| **1,438** | Union Parishad (smallest electoral unit) complexes |
| **2,154** | Growth centers (village markets) |

## Low-cost rural housing

Awami League led government's one of the popular pro-people policies is to reduce homelessness. According to prime minister Sheikh Hasina, among all the inequalities existing in Bangladesh, the greatest is housing. Her government first initiated a low-cost rural housing project called Ashrayan to provide homes to homeless and landless marginalized communities in 1997.

The initiative took momentum in 2020, the centennial year of Bangladesh's founding father Bangabandhu Sheikh Mujibur Rahman's birth. In 2020, the government pledged to build homes for the landless and to provide everyone with an address. Bangladesh's prime minister Sheikh Hasina has so far handed over houses to 150,233 under Ashrayan-2 project. Under the Ashrayan project, a total of 507,244 families have been rehabilitated till March, 2022 from 1997. The houses were constructed in 492 upazilas (sub-districts) across the country. Bede (river-gypsy), climate refugees, transgender, tea worker, leprosy patients, differently abled persons, woman-headed households were brought under the housing project.

The government also has a policy of constructing small flats for urban slum dwellers. These flats can be rented on a daily, weekly, or monthly basis. Special loans are being arranged through a program titled 'Return Home' for dwellers who want to return to rural areas. Those who return to a village will be given a house, six months' free food, and a low-interest loan to help facilitate the new settlers.

# Mega infrastructure projects

# Chapter 3

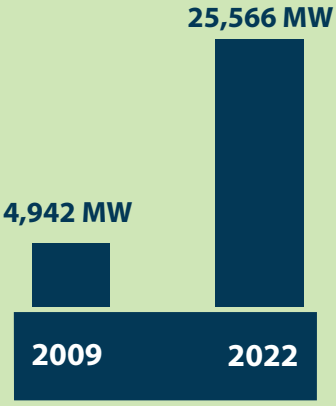
## Power sector

The energy and power sector of Bangladesh has one of the fastest growth in South Asia. The sector is the major driver of the country's economic growth since 2010. The growth was augmented due to prudent policy interventions, increased power generation capacity and massive infrastructure development initiative. Bangladesh has also achieved the milestone of full electrification rate in the year 2022 fulfilling the Prime Minister Sheikh Hasina's pledge to achieve it by 2021, the birth centenary celebration eve of Bangladesh's founding father Bangabandhu Sheikh Mujibur Rahman.

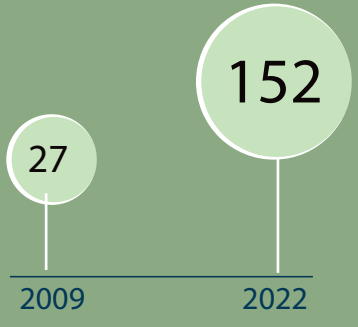
Before 2009, Bangladesh faced a severe energy crisis due to sluggish growth in energy supplies. In response, the country sought to secure a major expansion in the supply of power to sustain high growth while improving efficiency, increasing private participation and diversifying energy sources. Consequently, impressive gains were made in increasing power supply, growing at an average pace of 13.4% per year between 2010 and 2022, when generation capacity quadrupled from about 5,000MW to over 25,000 MW. In 2009, there were only 27 power plants with 4,942 MW capacity. Currently, the power generation capacity is 25,566 MW in 2022 with 152 power plants.

Bangladesh has now shifted its energy priority: affordable and clean electricity. Soon after the power generation expansion, Bangladesh shifted its gear towards energy sustainability. It has significantly improved efficiency in the power sector and reduced the system loss to 8.5% in 2022 from 14.3% in 2009. On the power delivery end, due to a policy of introducing prepaid meters at consumer level, system loss has significantly been reduced. Bangladesh has set a target to bring all large and medium consumers under the prepaid meter coverage.

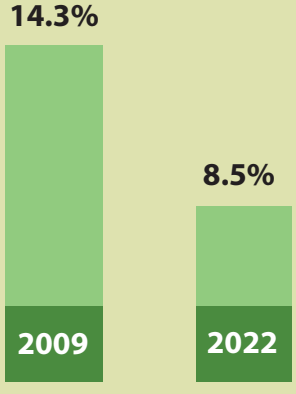
## Power generation capacity



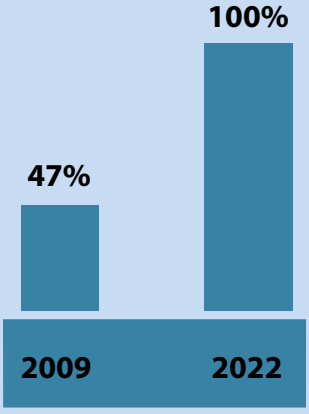

## Power plants




## System loss

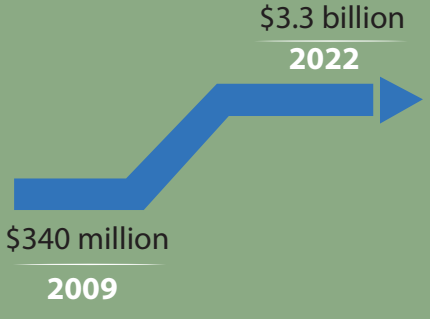



## Access to electricity




Bangladesh has brought its 100% population under electricity coverage, a daunting task for a high-population developing country.

## Annual Development Program allocation



## Ongoing power plant construction project (as of June 2022)

| | Power plants | Renewable energy | Capacity (MW) |
|---|---|---|---|
| Public | 9 | 3 | 4,339 |
| Joint venture | 3 | 1 | 3,793 |
| Private | 9 | 10 | 5,225 |
| Total | 21 | 14 | 13,387 |

Source: Power Cell, Bangladesh

## Power System Master Plan

*Bangladesh aims to generate 40,000 MW by 2030 and 60,000 MW by 2041 aligning with the demand from the projected GDP growth.*

*The government has set a target to construct 23,000 circuit km transmission lines across the country by 2023.*

The Power Division, Power Cell and Bangladesh Power Development Board (BPDB) under the Ministry of Power, Energy and Mineral Resources oversee the power sector planning. The main policy document is the Power System Master Plan, which is regularly updated. According to Power System Master Plan (PSMP) 2017-2030, the government has set a target to increase efficient electricity generation as per demand.

PSMP aims to generate 40,000 MW by 2030 and 60,000 MW by 2041, which is matched with the demand from the projected GDP growth. In a major boost to the power sector, Bangladesh government has augmented the power generation capacity, and expanded transmission. The government has set a target to construct 23,000 circuit km transmission lines across the country by 2023.

The government has successfully brought down system loss to 8.5 % in 2022 from 14.3% in 2009. The growth in electrification, as access to electricity, has reached 100% in 2022 from 47% in 2010. In the last 10 years, $6 billion has been provided as subsidy to the power sector. Sustainable strategies have been adopted to ensure energy security and supply systems.

## Power sector legal framework

*Power & Energy Fast Supply Enhancement Act 2021*

*The Electricity Act 2018*

*Bangladesh Energy & Electricity Research Council Act 2015*

*Rural Electrification Board Act 2013*

*Sustainable & Renewable Energy Development Authority Act 2012*

*Power & Energy Fast Supply Enhancement Act 2010*

*Bangladesh Energy Regulatory Commission Act 2003*

## Flagship mega power projects

### Matarbari Power Plant

The Matarbari Power Project is located in the southern district of Cox's Bazar. It is one of Bangladesh's fast-track projects to be implemented by the Coal Power Generation Company Bangladesh Limited (CPGCBL). The implementing agency is set to complete the project by June 2023. The power plant will ensure 42% energy efficiency against an average 34% efficiency in coal power projects.

### Payra Power Plant

The 1,320 MW Payra coal-fired power plant in southern Patuakhali district has been readied for operation. The plant has been set up at $2 billion. After undergoing test runs for about five months, the first unit of the power plant started commercial operation in May 2020. In March 2022, Prime Minister Sheikh Hasina inaugurated the power generation of the second unit.

### Rampal Power Project

Bangladesh-India Friendship Power Company is implementing the fast-track mega power project in Rampal locality in southern Bangladesh. The power plant with 1,320 MW super thermal power capacity is half completed.

## Rooppur Nuclear Power Plant

Bangladesh government has initiated the country's first-ever nuclear power plant on the banks of the mighty Padma river in Pabna district. Rooppur Nuclear Power Plant is going to be a game-changer in the country's socio-economic development journey. The $13.5 billion power plant will meet 9% of the country's electricity requirement. The plant will have 2 units with power generation capacity of 1,200 MW each. The first unit is expected to go into commercial operation by 2023 and the second one by 2024. A third-generation technology is being used in the plant which has a five-layer security system. The construction of the power plant began in 2017. As of 2021, the project has made 45% progress.

## Renewable energy sector at a glance

Renewable energy sector in Bangladesh has enormous potential to be innovative. Bangladesh made a big step forward in the renewable energy sector by formulating Renewable Energy Policy 2008 which became effective in 2009. The objectives of the policy are to harness the potential of renewable energy resources and disseminate it to the people, as well as to enable, encourage and facilitate both public and private sector investment.

Since then, Bangladesh has made steady progress in renewable energy sector development. Bangladesh formed its mandated agency for renewable energy, the Sustainable and Renewable Energy Development Authority (SREDA), in 2012. SREDA has since been facilitating the country's transition to clean energy, with a focus on promoting renewable energy and increasing energy efficiency. SREDA prepares short, medium and long-term plans to meet the targets set by the government through its policy.

Bangladesh's Ministry of Power, Energy and Mineral Resources has prepared the SDGs Action Plan to ensure universal access to affordable, reliable and modern energy services by 2030. The plan has a roadmap to increase substantially the share of renewable energy in the total energy mix by 2030. Bangladesh has a target to produce 10% of total power generation from renewable sources by 2030, and thereby pick up the momentum. It eyes 40% power generation from green energy by 2041.

## Bangladesh's renewable energy sector (as of July 2022)

| Renewable Energy Installed Capacity | | | |
|---|---|---|---|
| Technology | Off-grid (MW) | On-grid (MW) | Total (MW) |
| Solar | 351.82 | 307.73 | 659.55 |
| Wind | 2 | 0.9 | 2.9 |
| Hydro | 0 | 230 | 230 |
| Biogas | 0.69 | 0 | 0.69 |
| Biomass | 0.4 | 0 | 0.4 |
| Total | 354.91 | 538.63 | 893.54 |

Source: SREDA, Bangladesh

## Solar energy innovations

Bangladesh has one of the world's largest solar energy programs. The country is now generating 893 MW electricity from renewable sources of which 556 MW comes from the solar home systems. Scaling-up of solar photovoltaic (PV) systems assisted by the development partners are being implemented through Infrastructure Development Company Limited (IDCOL), Rural Electrification Board (REB), Local Government Engineering Department (LGED), Bangladesh Power Development Board (BPDB), NGOs and Private Organizations implementing solar energy program.

Bangladesh is an example of decentralized solar power systems, which is being studied by energy planners of other countries. It is home to the world's largest and longest running off-grid power program, which began as a rural household pilot in 2003, but peaked in 2016. Currently, there are 6 million solar home systems (SHS) in the country. At present, solar power is changing the lives of 20 million people in rural areas, who can now work, study and go out after dark.

**Bangladesh has a target to generate 10% of total power from renewable sources by 2030, and 40% by 2041.**

*Bangladesh is one of the top six countries with electricity access from off- grid solar solutions. Bangladesh secured 2nd position in providing renewable energy to its people.*

Global Status Report (GSR) 2020 by Renewable Energy Policy Network (REN 21)

*Bangladesh has created around 137,400 jobs in solar home systems. Bangladesh stands 5th among 161 countries in renewable energy jobs.*

Renewable Energy and Jobs: Annual Review 2020 by International Renewable Energy Agency (IRENA)

*At present, Bangladesh is among the top 20 countries with prospective solar farm capacity.*

-Global Energy Monitor 2022

## Bangladesh's renewable energy sector consists of

**893 MW**
generation capacity power plant

**6 million**
Solar Home Systems

**2,300**
solar irrigation pumps

**27**
solar mini-grid projects underway

**10,000**
solar systems in Chattogram hill tracts

**1 MW**
waste to electricity station

**1665 MW**
solar power plant in process

**200 MW**
wind power station in process

## Solar Home Systems and solar mini grids

Currently, there are 6 million solar home systems (SHSs) with 20 million rural beneficiaries. About 70,000 people are directly or indirectly involved in the sector. Moreover, solar photovoltaic (PV) based mini-grids are being installed in remote areas of the country. The program replaces 180,000 tons of kerosene having an estimated value of $225 million per year. The program has been acclaimed as the fastest growing off-grid renewable energy program in the world. So far 27 solar mini-grids have been installed with 5 MW cumulative generation capacity. The mini-grid projects have successfully created access to low-emission electricity for approximately 16,000 beneficiaries in rural Bangladesh.

## Solar rooftop panels and net metering

The government is encouraging the use of rooftops of industries and government agencies to generate about 300MW of clean electricity through solar PV. It has introduced the Net Metering Guideline in 2018 to encourage the use of vacant spaces and rooftops in solar power generation. Net-metering system is a system where the owners get their regular electricity bills adjusted by feeding solar electrical energy to the national grid.

When solar power is not used by the residential, government, industrial and commercial consumers during holidays, the solar electricity can still be sold to the national grid. The bill is

adjusted at the close of each month based on the electricity added to the national grid produced from solar.

The industrial areas have been the early adopters of the efficient net metering initiative. Moreover, Bangladesh is opening new solar parks in addition to expanding the use of solar home systems. Four independent power producer (IPP) projects – of some 80MW – are currently in operation, and more are in the pipeline.

## Wind power

Currently, Bangladesh generates only 3 MW electricity from three wind power projects of which only one has been connected to the grid. Moreover, two wind power projects are under implementation phase. Bangladesh has formulated guidelines for installation of onshore wind power plants as the country attempts to shift towards clean energy policy.

## Hydropower

The total hydropower potential of the country was reported as 1,500 MkWh/year at southeastern hilly areas of Kaptai. The first hydropower generator was installed in Bangladesh in 1962, which inundated 40% of the agricultural land of the Chittagong Hill Tract area. In 2013, the total generation capacity of five hydropower units installed at Kaptai was 230 MW and electricity generated was 893.9 MkWh. Implementing the Sangu and Matamuhuri Hydro projects, which have the potential to generate 500 MW of electricity, is a much-debated issue among experts. Due to the heavy toll on the environment and ecology, Bangladesh is no more pursuing dam-based hydropower.

## Renewable energy policy and institutional framework

- Renewable Energy Policy 2008
- Power System Master Plan 2010
- Power System Master Plan 2016
- Energy Audit Regulation 2018
- SDG Implementation Action Plan (up to 2030)
- Country Action Plan for Clean Cook Stove 2013
- National Solar Energy Action Plan (2021-2041)
- National Solar Energy Roadmap, 2021-2041 (draft)
- Energy Efficiency and Conservation Rules 2016 and 2018
- Energy Efficiency and Conservation Master Plan up to 2030
- Energy Efficiency and Conservation Action Plan up to 2030
- Sustainable and Renewable Energy Development Authority Act 2012
- Guidelines for the Implementation of Solar Power Development Program
- Preparation of Energy Efficiency and Conservation Master Plan (up to 2030)

Chapter 4

# Financing strategy

Since 2010, rapid economic growth has increased the demand for energy, transportation, and urban infrastructure development. Infrastructure is also important for job creation, as construction tends to have a large employment multiplier effect and provides jobs for the poor. However, in terms of infrastructure development, the country is still behind most of the developed and developing countries. The current government has put topmost priority on infrastructure development and mobilizing resources from domestic and external sources. It recognizes that public investment should play critical roles in reducing the infrastructure constraints. Efforts have been made to ensure that public investment is mobilized to foster an economic environment more conducive to private sector production, investment, consumption and savings.

## Public investment under Annual Development Program

Annual Development Program (ADP), under fiscal budget, formulates the annual investment programs of the Bangladesh government which details the different projects being undertaken together with costs, projected expenditure and sources of financing. A major part of the ADP is financed from domestic sources comprising saving instruments and borrowing from the domestic banking and nonbank sources. The public investment projects in the ADP are categorized into 17 sectors. Each project in the ADP is formulated by departments, divisions or implementing agencies under the guidance of ministries.

## Sectoral allocation under ADP 2021-2022

| Sector | Projects in ADP | Share (%) ADP |
|---|---|---|
| Transport and communication | 290 | 27.4 |
| Energy | 83 | 20.4 |
| Housing | 188 | 10.5 |
| Education | 117 | 10.3 |
| Health | 65 | 7.7 |

Source: Bangladesh National Budget 2021-2022

In the past, difficulties in ADP implementation prevented the government from investing in critical areas such as infrastructure. Since the 7th Five Year Plan, which started in 2011, the Bangladesh government has been successful in reversing the declining trend in public sector investment.

The size of public spending as a share of GDP has grown significantly during the 7FYP period. Consistent with the growing demand for infrastructure to support accelerated growth, most emphasis was given to transport and energy under the 7FYP through ADPs. Public investment relative to GDP increased from 5% in 2000-2010 to 6.5% in 2021-2022. The 8th Five Year Plan will build on the gains made so far with a view to allocating $187 billion public investment, accounting for 25% of total investment in the economy.

The size of ADP in the national budget for 2022-2023 is $27.7 billion (5.7% higher than the ADP for 2021-2022). Of this, a large share is earmarked for implementing infrastructure projects including the 10 mega projects which have been prioritized by the government. Transport and Communication sector once again received the highest 27% of total allocation. Energy and Power sector received a 10.0% share of the ADP. Public investment-GDP ratio in 2021-2022 has been assumed to be 7.62%.

## Bangladesh Infrastructure Development Fund (BIDF)

In 2021, the government launched the Bangladesh Infrastructure Development Fund to use a part of the country's foreign exchange reserve for bankrolling development projects. The Bangladesh Bank put in an initial amount of $2 billion in the BIDF. The central bank has lent the money to the Sonali Bank (a state-owned commercial bank) which operates the fund, at an interest rate of 1%. The fund is being used to finance a dredging project at the Payra Port, the third largest in the country, which Dhaka will turn into a global trade hub.

**Bangladesh has set aside $2 billion to create the Bangladesh Infrastructure Development Fund from its foreign exchange reserves.**

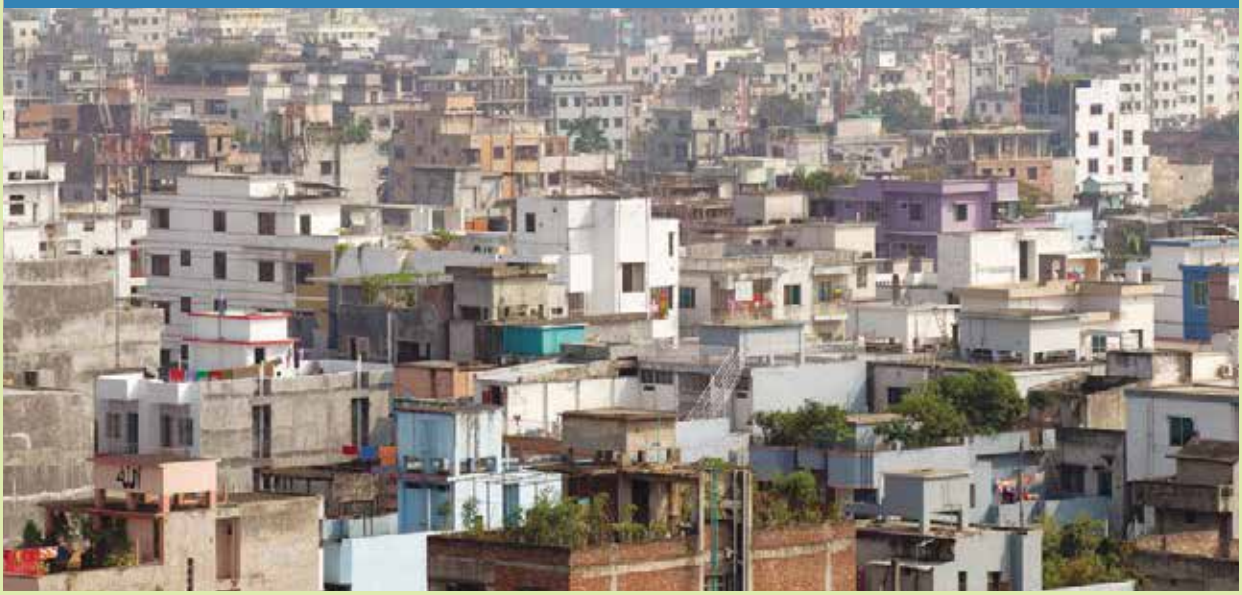
## Public Private Partnership (PPP)

Recognizing the enormous potential of Public Private Partnership (PPP), Bangladesh government has mainstreamed the policy in the development planning process. The PPP initiative is a part of the government's long-term strategy in developing transport, energy, urban, water, information and communication technology sectors. As of February 2020, the PPP authority had a pipeline of 72 projects with an estimated investment value of $22.7 billion at different stages of development. Most of the PPP projects are in the transport, energy, and social infrastructure sectors, which includes health care, economic zones, and tourism. Despite the strides made, PPP has yet to deliver on its full potential. The government expects PPP investment will gain momentum, particularly in transport, as the PPP office under the Prime Minister's Office (PMO) is putting effort to build up a larger pipeline for PPP projects.

## Assistance from development partners

Bangladesh, to some extent, seeks foreign assistance to accomplish the investment needs in the transportation and physical infrastructure. Commitments received from 2016-2017 to 2020-2021 amounts to $62 billion, which is an average of $12.4 billion per fiscal year. At the same time, the disbursement of foreign assistance amounts to $31.6 billion which is an average of $6.3 billion per fiscal year. The amounts of commitment and disbursement of foreign assistance in the 2020-2021 were $9.3 billion and $7.2 billion (provisional) respectively.

# The challenges



## Sustainable financing of infrastructure

For long-term economic benefits, infrastructure development will become a key driver in boosting aggregate demand and accelerating the revival of economic activity. The massive infrastructure expansion target set by Bangladesh's Perspective Plan 2041 (PP41) will require a huge volume of funding. Such large investments cannot be done by public scheme while the economy continues to face many like covid-19 setbacks, climate change and international price shocks. Economic growth drivers, such as domestic consumption and exports, are expected to remain weak for an extended period.

The Bangladesh government recognized this and identified PPP initiatives as an important source of infrastructure financing in the immediate future. To achieve sustainable financing of large infrastructure projects, the PP41 will seek to sharply strengthen the PPP initiative with capable manpower and address required legal and incentive issues to draw international financing from best sources.

## Priority setting

For Bangladesh, the targets of infrastructure development are large. These involve huge financial resources and strong implementation capacity. So, careful priority settings are critical elements of the strategy. Bangladesh has experience in developing long-term infrastructure planning. The Perspective Plan 2041 will focus on the major infrastructure investments for Bangladesh for the 2021-2041 periods, provide a picture of the optimal amount, and identify priorities and a phased approach to their development.

## Improving implementation capacity

Implementation constraints slowed down many large projects causing cost overruns and delays in project completion. Owing to implementation capacity constraints, funding was often not fully used in the past. The issue of good governance in project implementation has emerged as a key concern in Bangladesh. Lack of good governance in implementation weakens the efficacy of infrastructure and impacts the returns on investment.

Bangladesh government has put top priority on timely completion of all ongoing projects. To strengthen governance, the government will have to closely monitor completion of all large projects, ensure timely release of funds, improve procurement policies, streamline project design, and strengthen capacities of government agencies. The plan is to enhance training and also onboard experts from the private sector. The government realizes that at the core of all projects are the people working on them.

## Reducing cost of construction

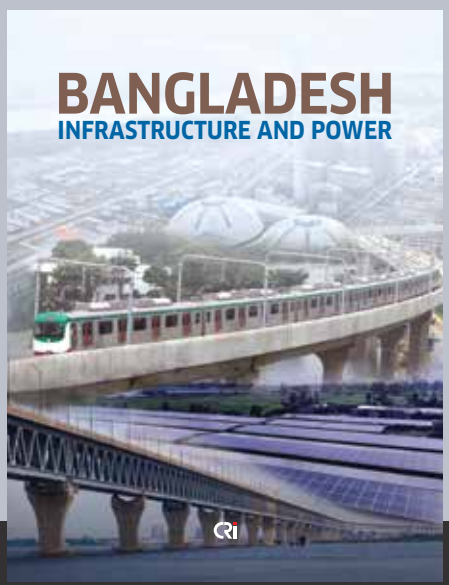
The cost of construction is higher in Bangladesh compared to some of the other developing countries. High cost of land acquisition, lack of competitive bidding, riverine and soil condition, design fault, frequent changes in projects, time overrun - all these lead to high cost of infrastructure building in Bangladesh. These issues remain to be addressed through concrete institutional measures.

## Ensuring quality and timeliness

Bangladesh's global ranking reflects rather poorly on the quality of infrastructure in the country. Several constraints relating to inadequacy of monitoring, lack of service standards, weak safety standards and inadequate environmental standards, reduce quality of infrastructure. The Perspective Plan 2041 and the Delta Plan 20100 place a strong emphasis on improving the quality of infrastructure for transport services and seeks to adopt a number of policies to make the infrastructure sustainable

## Strengthening maintenance capabilities

Managing public infrastructure efficiently, throughout its life cycle, is expected to pay high dividends to the economy. Bangladesh has already taken a number of policy initiatives to improve the maintenance of the road system. The proper maintenance of infrastructure will require substantial institutional reforms across sectors. A particular challenge is to build quality human resource with special strategic and technical skills. Several measures are underway to strengthen human resource including better recruitment, incentives and performance evaluation.

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