19 Accelerating Infrastructure Development

Chapter 19

Accelerating Infrastructure Development

Infrastructure, by definition, undergirds a country's socioeconomic development. The more strategically distributed it is – both sectorally and spatially – the better it is for inclusive growth and sustainable development.

With a growing economy, the Philippines requires more and better selected infrastructure investments, given its archipelagic landscape, expanding population and rapid urbanization. To support a higher growth trajectory and improve the quality of life in both urban and rural communities, infrastructure development will remain among the top priorities of the government over the medium term. Spending on infrastructure has to be intensified while addressing persistent issues and challenges hampering implementation, so that the so-called "Golden Age of Infrastructure" will form part of a solid foundation for reaching the country's Long-Term Vision 2040.

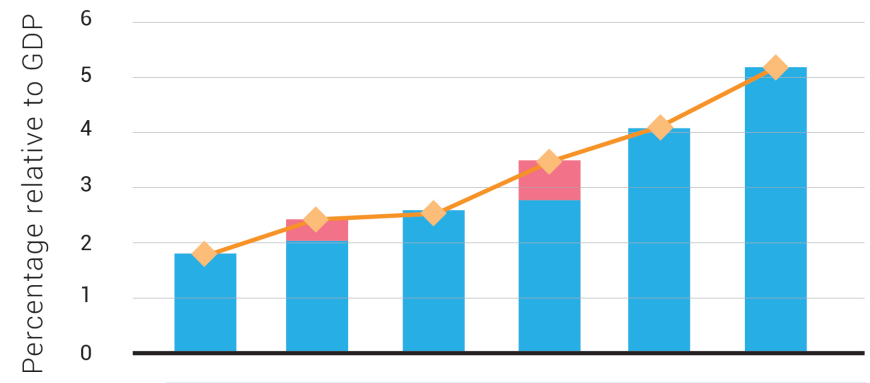
Assessment and Challenges

The significant achievements and critical reforms in infrastructure were not enough to keep up with the rates of population growth and urbanization. Overcoming the bottlenecks facing the sector will require addressing areas where the issues persist.

In terms of global performance and ranking of overall infrastructure quality, the Philippines lagged behind the five pioneer members of the Association of Southeast Asian Nations (ASEAN)[1]. The previous administration targeted to improve quality of the country's infrastructure by increasing the government's budget for infrastructure. However, the actual government spending for infrastructure, particularly in 2012 and 2014, fell short of the target.

[1] The Philippines is the worst among the ASEAN-5, or the original member countries: Indonesia, Malaysia, Philippines, Singapore, and Thailand.

Figure 19.1 Public Spending on Infrastructure[2]



	2011	2012	2013	2014	2015	2016
Gap	0.0%	0.14%	0.0%	0.76%	0.0%	0.0%
Actual	1.81%	2.06%	2.66%	2.74%	4.33%	5.12%
Target	1.60%	2.20%	2.50%	3.50%	4.00%	5.10%

Delays in implementation hampered the government's aggressive Public-Private Partnership (PPP) program. Considering the size of the country's PPP portfolio, further delays in implementation could eventually translate into huge fiscal impacts.

Transport

Despite the improvement and expansion of the transport systems, it is still inadequate vis-à-vis the growing demand. Additional roads and bridges, including drainage, were constructed and upgraded, and new alternative routes were opened in support of major economic sectors. Moreover, initial steps were taken towards developing new railway and other mass transit systems in and outside Metro Manila. Upgrading of the country's gateways were undertaken to ensure the continued viability of inter-island transport and to prepare for the upcoming integration with the rest of the ASEAN Community and Brunei Darussalam-Indonesia-Malaysia-Philippines East ASEAN Growth Area (BIMP-EAGA). However, transport facilities are either operated beyond capacities or are underutilized as envisioned ex-ante.

Road-based transport infrastructure remained a key point of convergence with other productive sectors but the quality remains inadequate. As of 2015, 97.19 percent (31,242 km) of national roads, 61.80 percent (15,377 km) of city roads, and 28.65 percent (31,075 km) of provincial roads were paved and 347,160 lineal meter (lm) bridges along national roads were made permanent along with the opening of new alternative routes. Still, the World Economic Forum-Global Competitiveness Report (WEF-GCR) 2015-2016 ranked the Philippines 97th out of 140 countries in terms of quality of road infrastructure.

[2] DBM and NEDA 2010-2015 data are based on actual outturns; 2016 data are based on the enacted Budget/General Appropriations Act (GAA); excludes infrastructure outlays funded from internally generated funds of LGUs, government-owned and controlled corporations, and private sector counterpart of PPP projects.

The following are the main problems: (a) low-quality public transport; (b) traffic congestion; (c) poor road network quality; and (d) inadequate road safety features. The lack of reliable and convenient public transport, coupled with poor infrastructure provision for non-motorized transport, is a major cause of congestion, especially in urban areas. Commuters continue to shift to private vehicle use, as evidenced by the faster growth in the number of registered motor vehicles, which further strained the already limited road space. Road congestion contributed to inefficiencies in utilization of public transport, airports, and seaports. Traffic management efforts were undertaken but failed to yield significant improvements. Economic losses due to traffic congestion were estimated to be at least ₱2.4 billion per day in Metro Manila alone (as of 2014). Outside urban centers, roads connecting production to commercial centers are typically constrained in terms of safety. Moreover, these remain vulnerable to the adverse impact of natural calamities.

Nevertheless, road-based transport continued to provide support to productive sectors. A total of ₱60.5 billion was invested from 2011 to 2015 for 463 tourism road infrastructure projects, which is more than quadruple of the ₱13.79 billion allocated from 2006 to 2010. On the other hand, connection of farm-to-market roads to the main logistics network was also prioritized to support the agriculture sector. To enhance the agribusiness competitiveness in Mindanao, an intermodal logistics system was put in place to address major constraints, such as high cost of transport and inadequate logistics infrastructure. Under the program for Mindanao Logistics Infrastructure Network, 477 km of the total 2,206 km of national and local roads, including bridges that need to be constructed, widened, and improved have been funded until 2016.

Upgrading and expansion of the country's mass transport network have not kept up with demand, and have not effected the desired shift from private car usage to high-capacity public transport solutions. According to the WEF-GCR 2015-2016, the quality of the Philippine rail infrastructure network ranks 84th out of 140 countries, with only three urban lines spanning 76.9 km in Metro Manila and two commuter lines of the Philippine National Railways (PNR) in Southern Luzon in operation. The development of mass transit systems connecting mainland Luzon and in emerging cities in the Visayas and Mindanao, is still at an early stage. The lack of high-capacity mass transportation options results in more trips using lower-capacity, road-congesting, and environmentally-polluting forms of transport and limited accessibility of business districts, commercial areas, industrial zones, educational institutions, and government centers.

The existing railway systems face problems of inter-operability (due to different gauge and signaling systems), congestion, and poor asset preservation/maintenance. Operation and maintenance of existing assets proved to be difficult, particularly since equipment and facilities require highly specialized parts and components, thus, entailing longer lead times between procurement and delivery. Existing Commission on Audit (COA) regulation, however, only allows a three-month inventory of spare parts.

The country's civil aviation sector met its overall target, but with regional integration, it will need to meet a significantly higher demand. In 2015, the air transport sector exceeded by 25.8 percent its overall target increase of 52.51 million annual international and domestic passenger volume. This may be attributed to, among others, the opening of secondary airports to more international flights, implementation of various airport improvement and operations and maintenance (O&M) projects, upgrading of the Clark International Airport (CRK), and

implementation of the ASEAN Multilateral Agreement in Air Services (which opened air traffic for national and local carriers to fly to and from the capital cities of ASEAN countries).

Nonetheless, air traffic congestion remains an issue among the major airports[3] especially in the urban centers. The lack of night-time flying capabilities in other airports adds to the day-time airport congestion. Majority of passengers, even those from the natural catchment area of CRK preferred to use the NAIA because of the availability of more flights in that airport.

Existing capacities of most of the airports in the country will be unable to meet the expected demand unless new facilities are developed and existing ones are upgraded. A network perspective must be adopted to address congestion, to include not only the airside and landside facilities but also the access roads. For the greater capital region, what is needed is a clear policy direction as to the site for the future international airport in the vicinity of Metro Manila and an optimal operational arrangement with CRK, in accordance with international practices and standards and the regional economic strategies of the country.

The country's port system benefitted from a number of projects but infrastructure quality and operational efficiency still need to be improved. Inter-island water transportation passengers increased from 52.7 million in 2010 to 62.76 million in 2015. Cargo transported through the country's port system also increased from 166.40 million metric tons in 2010 to 223 million metric tons in 2015. A number of improvement projects for the port system including the oad-Roll-on-Roll-off (RoRo) network and conduct of feasibility, masterplan, and engineering studies were undertaken to ensure efficient operations and prepare the country's port system for regional integration with the rest of the ASEAN.

Table 19.1 Traffic in Major Container Ports: 2015[4]

PORT	OPERATOR	CONTAINER TRAFFIC IN TWENTY-FOOT EQUIVALENT UNIT	
		ACTUAL	CAPACITY
Manila International Container terminal	International Container Terminal Services Inc.	1,960,699	2,500,000
Manila North Harbor (domestic)	Manila North Harbor Port Inc.	1,137,455	2,000,000
Manila South Harbor	Asian Terminals Inc.	877,593	1,200,000
Batangas Port	Asian Terminals Inc.	188,077	+350,000
Subic Port	International Container Terminal Services Inc.	123,558	600,000
Cebu International Port	Oriental Port and Allied Services Corporation	312,000	580,000
Davao International	Davao International Container Terminal, Inc.	267,283	705,000
Container Port	Davao International Container Terminal, Inc.	267,283	705,000

[3] For example, the Ninoy Aquino International Airport was preferred by majority of passengers, even those from the natural catchment area of CRK, because of the availability of more flights.
[4] Philippine Ports Authority. Retrieved from http://www.ppa.com.ph/?q=content/statistics-1

Inefficiencies in port operations resulted in congested access roads. For instance, the increasing cargo volumes in the ports of Manila and Cebu caused higher volumes of truck container traffic in access roads. To help decongest the major thoroughfares of Metro Manila, the Pasig River ferry system was rehabilitated but sustaining its operations remains problematic. A major solution was to encourage utilization of the Batangas and Subic ports. But users still preferred the major ports over these alternative ports because of the latter's inadequacy of ancillary services, such as proximity to consolidators; warehouses and availability of carriers, service providers, forwarders and shipping companies; reliability of the shipping schedules; efficient cargo acceptance and release; and affordable rates. Again, this points to the need to adopt a systems approach in infrastructure provision.

The provision of adequate transport security has been constrained by the limited assets and institutional capacities of concerned agencies. To ensure that standards and protocols are up-to-date, the Office of Transportation Security (OTS) conducted a series of training programs to inform security officers with the latest threats, aviation security incidents, security measures (new technology) and procedures. The OTS, with assistance from the Armed Forces of the Philippines (AFP), Philippine National Police-Aviation Security Group and Maritime Group (PNP-AVSEGROUP), and the Philippine Coast Guard (PCG),) was able to intercept and confiscate various prohibited items in different airports and ports. However, it was not able to vet all the needed security plans and programs in the absence of the Civil Aviation Authority of the Philippines' airport security programs.

Meanwhile, the PCG was only able to respond to 95.98 percent of all the maritime distress calls in 2015. PCG has limited patrol and response, as well as, search and rescue capabilities, especially considering the vast coastline to be manned and guarded. Moreover, majority of its assets are non-operational or poorly-maintained.

Water Resources

Despite the abundance of water resources and the many efforts to utilize and manage these, service remain inadequate. The country has a total of 421 principal and 18 major river basins and renewable water totaling 479 billion cubic meters (bcm)[5] from which water can be drawn for beneficial use[6]. The total volume of water rights granted for consumptive use is 87,000 million cubic meters (mcm), which is 60 percent of the 146,000 mcm potential volume for use. Despite the abundance of the resource and programs and projects, gaps in water services remain. Part of the problem can be traced to the fragmented governance structure of the sector. There is no apex body that would oversee overall planning, programming, and policy formulation based on sound data. This resulted in uncoordinated initiatives leading to inefficient provision of services.

Universal access to water supply, sewerage, and sanitation (WSSS) is yet to be achieved. Of the country's 22.7 million families, 14.5 percent still have no access

[5] Food and Agricultural Organization of the United Nations. 2014. *AquaStat*

[6] Of this, renewable surface water and groundwater totaled 444 bcm and 180 bcm, respectively. Both figures still total 479 bcm when the overlap between the surface water and groundwater (145 bcm) is subtracted.

to safe water supply[7], whereas the target is to reduce this to 13.1 percent by 2015. In fact, in ten regions, the proportion of households with no access to safe water supply is even higher than the national average. In addition, 337 municipalities are still considered waterless, which fell short of the 2015 target of lowering it to 274. These are mostly located in the nation's 10 poorest provinces[8].

As of 2015, 5.9 percent of households did not have access to a basic sanitary toilet facility, although the target was met. Only 4.4 percent of households nationwide are served by sewerage systems[9]. Furthermore, despite the 40 percent subsidy of the national government (NG), under the National Sewerage and Septage Management Program (NSSMP)[10] for service providers to establish sewerage services in the 17 highly urbanized cities outside Metro Manila, no sewerage projects have been implemented. Untreated wastewater exacerbates the non-availability of raw water sources for new development.

Many small water districts (WDs)[11] and utilities operated by local government units (LGUs) have difficulty sustaining operations and generating capital for expansion due to low tariffs and consumers' low willingness to pay.

The improved and equitable delivery of basic WSSS infrastructure is hindered by: inadequate financing; low technical capacities of small service providers; difficulty in acquisition of right-of-way for sewer lines; lack of available land for water supply and wastewater treatment facilities; and institutional challenges such as, among others, lengthy processing of water permit applications and absence of a single, independent and predictable regulatory regime. For water critical areas and the National Capital Region (NCR), there is a need to find alternative water sources to ensure water security.

Irrigation systems and appurtenant drainage facilities expanded marginally in recent years, and performance of irrigation systems was low due to deterioration and climate-related factors, among others. Irrigation service to support agricultural production increased slightly from 56.57 percent of the total potential irrigable area of 3,019,609 hectares (ha)[12] in 2014 to 57.33 percent in 2015, which is below the target of 70.91 percent. However, a total of 360,912 ha[13] of irrigated land have dysfunctional and aging canals. The performance of some national and community irrigation systems remained below par due to typhoons and inefficient water management practices. Irrigation systems performed poorly due to inadequate resources and the lack of capacity of the National Irrigation Administration and irrigators' associations.
Delayed fund releases, peace and order problems, and right-of-way issues hampered the implementation of programs and projects. Degradation of watersheds also reduced the quantity and quality of water for irrigation, and caused flooding during the rainy season and scarcity during the dry season. It resulted in rapid soil erosion that affected the conveyance of irrigation and drainage canals.

While more flood-prone areas have been protected, flood management has become more challenging due to climate change

[7] Safe water supply refers to water accessed through a pipe system into dwellings, yards or plots; through public tap; and through protected wells. (Philippine Statistics Authority. 2014. *Annual Poverty Indicator Survey (APIS)*)
[8] National Anti-Poverty Commission (NAPC), 2015
[9] PSA National Demographic and Health Survey (NDHS), 2013
[10] This program is spearheaded by the Department of Public Works and Highways (DPWH) as mandated by the Clean Water Act of 2004
[11] WDs with less than 3,000 connections.
[12] Source: National Irrigation Administration website
[13] The figure corresponds to 21% of the total Firmed-Up Service Area

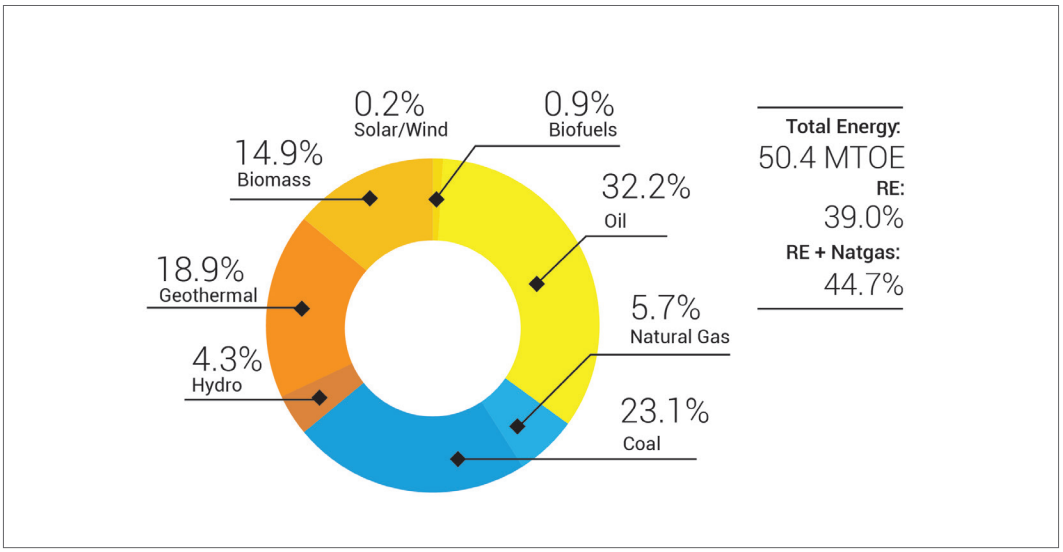
impact and institutional issues. Protected flood-prone area increased from 12.8 percent in 2011 to 18.33 percent or 131,522 ha in 2015[14]. In 2015, it was observed that flood waters in NCR subsided 25 minutes to 1.5 hours after heavy rains.

The major challenge in the sector is the increasing frequency and intensity of flood occurrences due to climate change. Another concern is the unclear delineation of responsibilities of LGUs and NG on the implementation and O&M of flood management and drainage structures. Flood-prone areas in Regions I, II, III, VI, XII, XIII, and ARMM are particularly huge. Specifically, the provinces of Zamboanga Del Sur, Zamboanga Sibugay, Camarines Sur, and Compostela Valley, among others, are also considered highly susceptible to flooding.[15]

Energy

The country's energy self-sufficiency level of 53.5 percent fell short of the 60 percent target in 2015. The country's total primary energy supply was placed at 50.4 metric tons of oil equivalent (MTOE) with local energy comprising 26.9 MTOE of the total. Oil remained the country's major energy source accounting for 32.2 percent of the energy mix. *(See Figure 19.2)*

Figure 19.2 Philippine Energy Supply as of June 2015[16]



[14] Source: DPWH Accomplishments as of 2015 and Completed major flood control studies for 37 major flood control projects and the JICA-assisted Nationwide Flood Risk Assessment Study for 46 priority river basins (covering 416,327 has) completed in 2008; Flood prone areas in the country total 717,524 ha.
[15] Based on the map of flood susceptibility in the Philippines from the Mines and Geosciences Bureau.
[16] Department of Energy (DOE)

The country's total final energy consumption reached 29.8 MTOE with the transportation sector accounting for 10.6 MTOE, and the residential sector for 8.7 MTOE.

Power generation has increased but is still insufficient to meet the growing demand, and the situation is further exacerbated by feedstock security concerns. Policies have been initiated to increase competition in power generation and support development in renewable energy. However, power supply is still insufficient to meet the ever-increasing demand for electricity which, in turn, contributes to the high cost of electricity.

The Philippines' total installed capacity grew by 4.6 percent from 17,944 megawatts (MW) in 2014 to 18,765 MW in 2015. Power generation grew by 6.7 percent with the addition of 5,152 gigawatt-hour (GWh) from 2014 to 2015.

The Luzon grid had thin reserves up until September 2016 while the electricity supply in the Visayas was critical in the second semester of 2016. On the other hand, Mindanao has sufficient reserves until February 2017, with reserve capacity of more than 50 percent. While fiscal and non-fiscal incentives were provided to encourage investments in the sector, the timely entry of the private sector in power generation has been impeded by protracted red tape in the processing of necessary permits.

Despite the passage of the Renewable Energy Law in 2008 and the adoption of the National Renewable Energy Program for 2012-2030, only 7,013.9 MW of renewable energy has been installed out of the potential 14,499.8 MW.

Hydropower plants comprised 19.2 percent of the country's total installed capacity, but extremely hot or dry weather conditions, like the El Niño phenomenon, affected the adequacy and reliability of energy supply.

Natural gas from Malampaya powers 23 percent of the Luzon dependable capacity. But the depletion of the Malampaya Natural Gas Field, as well as the expiry of the Gas Supply Purchase Agreement between Shell Philippines Exploration and its off-takers, threatens energy security. Continued exploration works in existing petroleum service contracts failed to produce new indigenous natural gas of commercial quantity. Disputes in the West Philippine Sea also contribute to uncertainties in petroleum exploration. The lack of policies and backbone infrastructure hampers the growth of the natural gas industry in the country.

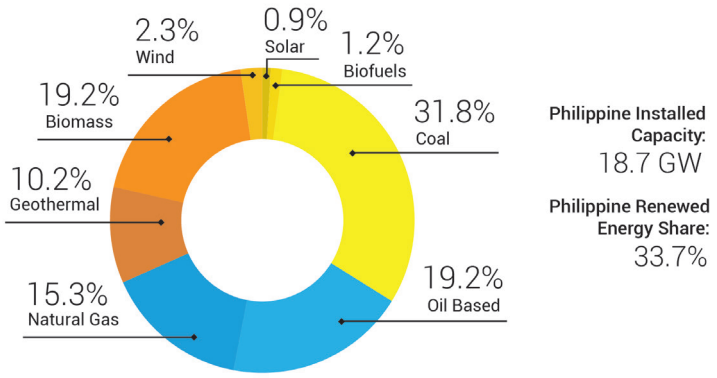
Meanwhile, the private sector continued to invest in coal-fired power plants in view of shorter gestation period and in response to the country's baseload capacity requirement. Indonesia supplies 70 percent of the Philippines' coal import needs, but their moratorium on coal shipments following the risk of kidnappings and piracy in the West Philippine Sea threatened the country's coal supply.

Table 19.2 Installed Capacity (in MW), as of 2015[17]

GRID	INSTALLED	DEPENDABLE	AVAILABLE	NEWLY INSTALLED (1st HALF 2016)
Luzon	13,668	12,179	9,624	662
Visayas	2,683	2,228	2,001	281
Mindanao	2,414	2,025	1,563	328
Total	18,765	16,432	13,188	1,271

[17] DOE

Figure 19.3 Renewable Energy Share in Philippine Installed Capacity: 2015[18]



Development of the transmission network and distribution facilities was hampered by issues on right-of-way, security and resiliency to natural calamities. The lack of interconnection between Mindanao and the Luzon-Visayas grid meant that surplus in the former could not be utilized in the latter, and vice-versa. Likewise, there is still no established structured market in Mindanao similar to the existing wholesale electricity spot market (WESM) in Luzon and Visayas. Aggravating the issue of reliable supply is the concern on resiliency against natural calamities and the safety of energy facilities against such issues as the sabotage of electricity transmission and distribution facilities, especially in Mindanao.

In addition, the difficulty of acquiring right-of-way necessary for the National Grid Corporation of the Philippines to implement transmission line projects is a constant obstacle to grid expansion. This is especially true in urban areas and even in the rural areas with indigenous peoples. Limited island-to-island interconnection is also seen as a hindrance to extending secure and reliable electricity service.

Part of the Philippine commitments to the ASEAN are the ASEAN Power Grid (APG) and the expansion of the Trans-ASEAN Gas Pipeline (TAGP). The Philippines has yet to develop its domestic pipelines prior to connection with other ASEAN countries due to the absence of an enabling legal and regulatory framework that will oversee and regulate the natural gas industry, including incentives to prospective investors[19].

While there has been considerable effort in recent years to pursue nationwide distribution of electricity, gaps in access especially in the rural and off-grid areas remain. The household electrification level has reached 89.61 percent (20.36 million out of 22.72 million households) in July 2016 through the provision of technical and financial support to electric cooperatives and the implementation of missionary electrification programs, including the New Power Provider and Qualified Third Party[20] programs. However, much is still needed to achieve the 7th sustainable development goal of universal energy access by 2030, particularly in Mindanao where household electrification level stands only at 72.38 percent *(see Table 19.3)*.

[18] Source: DOE

[19] *2012-2030 Philippine Energy Plan: Overview and Executive Summary*. Retrieved from https://www.doe.gov.ph/sites/default/files/pdf/pep/2012-2030-pep-executive-summary_revised.pdf

[20] The Qualified Third Party program is designed to attract alternative service providers and private investments in rural electrification. It is also responsible for the generation of power and its effective distribution to the area/community.

Table 19.3 Household (HH) Electrification as of December 2015[21]

ISLAND	TOTAL HH	SERVED HH	UNSERVED HH	ELECTRIFICATION LEVEL (%)
Luzon	13,803,814	13,088,991	714,823	94.82
Visayas	4,076,310	3,767,391	308,919	92.42
Mindanao	4,841,306	3,503,952	1,337,354	72.38
Philippines	22,721,430	20,360,334	2,361,096	89.61

As of June 2016, the total rated capacity of the 285 National Power Corporation-Small Power and Utilities Group power plants used in missionary electrification is 193.72 MW, with a total dependable capacity of 136.75 MW. Most of the power plants operate for limited hours only (i.e., 4, 8, or 12 hours).

Generally, the distribution and provision of electricity has been hampered by the following:

a. High costs of fuel and logistical support for diesel plants and the low capacity to pay and low willingness to pay for the service of households especially in rural areas
b. Low technical and absorptive capacities of some electric cooperatives
c. Increasing number of households and service demands (e.g., request from 8 hours per day to 12 hours per day service)
d. More funds needed for missionary electrification to benefit more marginalized communities in off-grid areas
e. Few private sector participants
f. Various institutional bottlenecks such as compliance requirements of LGUs, right-of-way, and peace and order

Gains in energy efficiency and conservation have been achieved but more work is needed to optimize the benefits of demand-side management. In 2015, the country was able to save energy amounting to 5,199.6 kiloton of oil equivalent through the various programs under the National Energy Efficiency and Conservation Program. Moreover, as of March 2016, DOE has accredited 15 energy service companies (ESCOs)[21] to accelerate the implementation of the government's energy efficiency and conservation (EEC) initiatives[22]. The initiatives will need to be expanded to include the development and promotion of new technologies and programs. This is to encourage the practice of sensible energy habits in government and private establishments, households and transportation to achieve greater energy savings.

Even at full capacity, indigenous supply is still way below the local demand to meet the increasing blending requirements of the local fuel industry. Due to the implementation of Republic Act 9367 (Biofuels Act) in 2009, 249 million liters (ML) and 179 ML of fuel have been displaced in 2015 through the mandated blending for bioethanol and biodiesel, respectively.

[21] DOE. March 2016. *List of DOE Accredited ESCOS as of March 2016*. Retrieved from https://www.doe.gov.ph/list-doe-accredited-energy-service-companies-escos-march-2016

[22] To provide the appropriate policy support for energy efficiency and conservation programs, the DOE has put forth the Energy Efficiency and Conservation Roadmap, which specifies the direction toward an energy-efficient Philippines by 2030. To implement the roadmap, the National Energy Efficiency and Conservation Action Plan for 2016 to 2020 was developed across energy-using sectors.

However, total bioethanol and biodiesel plant capacities in the country stand at 198 ML and 584.9 ML annually, respectively.

The Philippines' electricity rates remain amongst the highest in Asia.[23] Electricity rates in the Philippines are high mainly because there is no state subsidy for the rates of privately-generated, transmitted, and distributed power supply. Users are charged with the feed-in-tariff (FiT)-All, universal charges, value-added taxes (VAT), and system losses in transmission and generation. There were other problems like minimal competition in the energy market, the alleged market manipulation, and other unforeseen disruptions in power supply .

While reducing the cost of electricity is vital to improving the competitiveness of industries and encouraging private sector investments, there should be a balance between the rates, service reliability, and the environmental implications of the different technologies utilized. Too much intermittent renewable energy affects grid reliability, but reliance on cheaper fuels, such as coal, increases greenhouse gas emissions. An optimal energy mix is needed to provide maximum benefits at the most reasonable costs to consumers while safeguarding the sector from external shocks.

Information and Communications Technology Infrastructure

Although the country's information and communications technology (ICT) infrastructure has increased, it has not advanced enough to be at par with other ASEAN countries. Despite the increase in service coverage (i.e., cellular mobile at 99.38 percent and broadband internet at 76.44 percent of cities and municipalities), the Philippine ICT infrastructure is still inadequate and pales in comparison with competing economies in Asia in terms of quality and affordability. The country's broadband download speed is among the slowest at 4.3megabits per second (Mbps) vis-à-vis ASEAN-5 average of 9.6Mbps in 2016[24], while the cost of fixed broadband as a percentage of Gross National Income (GNI) is at 7.53 percent, way above the 5.0 percent affordability threshold.[25]

With the adoption of the Integrated Services Digital Broadcasting-Terrestrial Standard in 2013, the digital terrestrial television broadcasting (DTTB) migration is underway. Through this, the country is expected to benefit from the freeing up of spectrum frequencies that may be reallocated to other wireless ICT applications and services.

Through the e-Government Master Plan 2013-2016, the Integrated Government Philippines Project provided infrastructure, data centers, and other support systems to improve the country's e-government system. The creation of the Department of Information and Communications Technology (DICT), through the enactment of Republic Act 10844 in 2016, is an important milestone to advance the country's national ICT development agenda. This will address the inadequate ICT infrastructure and institute reforms to foster real market competition.

Social Infrastructure

Social infrastructure (i.e., housing, education, health and solid waste management facilities) has increased during the past years but remains inadequate to meet the growing demand for basic social services.

[23] Ibid
[24] Akamai's State of the Internet Report Q3 2014 to Q2 2016 Connectivity Reports.
[25] International Telecommunication Union (ITU). 2016. *Measuring the Information Society Report 2016.*

Through various school building programs and projects, the provision of educational facilities has improved, however, classroom-to-pupil ratios remain low. Infrastructure provision for education reduced classroom-to-pupil ratio from 1:39 in 2010 to 1:34 in 2014 for the primary level, and from 1:54 to 1:48 for the secondary level in in the same period. However, these fell short of the targets at 1:32 and 1:47, for the primary and secondary levels, respectively.

From 2010 to 2016, the total number of classrooms constructed was 118,686[26], which already covered the classroom deficit of 66,800[27] in 2010. Another 66,463 classrooms are under procurement. The implementation of the K to 12 Program added another 34,057 classrooms to the need[28]. Furthermore, 3,819 schools still lack water supply and sanitation facilities.

The Department of Education also failed to utilize more than half its budget for capital outlay during the period 2012 to 2015[29].

While the overall number of hospitals and health facilities constructed or upgraded increased, several LGUs were unable to provide the necessary resources to keep such infrastructures functional. As of 2016, the total number of hospitals and healthcare facilities constructed or upgraded has reached 29,018 units, composed of 26,048 barangay health stations (BHSs), 2,626 rural health units (RHUs)/urban health centers, 234 district hospitals/LGU infirmaries, 27 provincial hospitals, 13 city hospitals, and 70 Department of Health (DOH) hospitals. DOH has cited the lack of affordable land as a challenge for the timely construction and expansion of primary healthcare facilities.

A bigger problem is that LGUS are unable to provide adequate financial support, human resources and equipment necessary for the operation and maintenance of local health infrastructure facilities. Thus, these facilities are rendered non-functional or underutilized.

As of 2016, there are 14 DOH treatment and rehabilitation centers in the country with programs to reintegrate recovering drug dependents back into society. With the intensified government effort in curbing the drug problem, there is a need to provide additional infrastructure, i.e., at least one rehabilitation center in each province as mandated under the Dangerous Drugs Act of 2002.

The housing sector continues to provide decent shelter to the underprivileged while striving to keep up with growing housing needs and limited resources allotted to the sector. From 2011 to 2016, the National Housing Authority, Socialized Housing Finance Corporation, and Home Development Mutual Fund provided 730,181 socialized and low-cost housing units. Under Oplan Likas[30], 8,456 informal sector families (ISFs) were resettled in-city and 73,135 off-city, as of September 2016.

However, despite the efforts of key shelter agencies (KSAs), housing needs remains huge. For 2011 to 2016, an estimated 5.55 million households were in need of housing facilities[31]. About 16 percent lived in unacceptable housing[32] while another 8.83 percent were doubled-up households in acceptable housing. This is further expected to increase to 6.8 million during the period 2017 to 2022, which includes increase in inventory losses due to households affected

[26] Secretary of Education Leonor Magtolis Briones. November 2016. Quality, Accessible, Relevant, and Liberating Basic Education for All. *Education Summit 2016*, Pasay City, 03 November 2016. Retrieved from http://www.deped.gov.ph/sites/default/files/page/2016/2016-11-03%20Education%20Summit.pdf

[27] Educational Facilities. Retrieved from http://www.gov.ph/report/educational-facilities/

[28] Department of Education. 2015. *Physical Report of Operation as of 30 September 2015*. Retrieved from http://www.deped.gov.ph/sites/default/files/page/2015/2015%20DEPED%20Physical%20Plan%20BAR%201Part%20 B_2015Q3%20%28as%20of%20September%202015%29.pdf

[29] Statement of Allotment, Obligation and Balances (SAOB) FYs 2012-2015. Retrieved from http://www.dbm.gov.ph/?page_id=1824

[30] A 5-year program for the resettlement of ISFs living in danger areas within Metro Manila

[31] Philippine Statistical Research and Training Institute (PSRTI)

[32] Includes those living in rent-free without the consent of owners, marginal housing, homeless, and those living in dilapidated or condemned housing.

by natural calamities and project-affected families due to expected accelerated infrastructure spending.

The major challenges faced by the housing sector include:

a. Lack of affordable land, which forced government to relocate communities off-city where opportunities are scarce or resort to in-city high-density mass housing. LGUs are also reluctant to accept more ISFs.
b. Limited appropriations for the sector
c. Cumbersome bureaucratic processes
d. Delayed or inadequate provision of basic and other services
e. Institutional limitations of national and local government entities to fulfil their respective roles in providing decent shelter.

LGU compliance with the Ecological Solid Waste Management Act (ESWMA) has been low and majority of local areas are still unserved by solid waste management (SWM) facilities or material recovery facilities (MRF). Increasing population and consumption also increased the generation of wastes, exacerbating the problems of inefficient collection and inadequate solid waste management (SWM) facilities. The country's total solid waste generation is estimated at 40,000 tons per day or 14.6 million tons per year. Despite policy reforms, various financing windows, and legal action against non-complying LGUs, only 37 percent of all LGUs[33] have complied with all aspects of the Republic Act 9003 (Ecological Solid Waste Management Act of 2000). Only 1,350 SWM plans were submitted for approval and review to the National Solid Waste Management Commission and the Department of Environment and Natural Resources (DENR) Environmental Management Bureau. Only 31.28 percent of barangays are covered by SWM facilities and 30.92 percent by materials recovery facilities. These are below the 2016 targets of 67.39 percent and 77.10 percent, respectively.

Nonetheless, the number of illegal disposal sites operating nationwide has decreased from 1,172 in 2010 to 546 in mid-2016. The remaining sites, which should have been phased out in 2006, are composed of 337 open dumpsites and 209 controlled disposal facilities.

The high capital investments associated with the establishment and operation of SWM facilities, the perceived low willingness of LGU constituents to pay for SWM services, and the LGUs' lack of financial and technical capacity continue to hamper the full implementation of RA 9003. In addition, the sector continues to be challenged by:

a. Political factors that render the clustering sanitary landfills infeasible and unsustainable
b. Availability, suitability, and social acceptability problems in site selection for sanitary landfills
c. Technological constraints arising from existing legal issuances
d. Lack of or unconsolidated data on markets for recyclable materials
e. Limited awareness of communities and the general public on waste segregation and on recycling, recovery, and composting technologies

Facilities for managing health care and hazardous wastes remain inadequate and continues to be challenged by the absence of data needed to develop plans, policies, programs and projects to ensure that waste generators properly handle their wastes. Currently, only the waste management of DOH-registered facilities are monitored. Although the Philippine Inventory of Chemicals and Chemical Substances lists 44,600 chemicals for monitoring, as of latest data, only seven poison control centers, 108 DENR-recognized privately-owned hazardous waste treatment facilities, and 265 DENR-accredited hazardous waste transporters exist to cater to about 11,162 hazardous waste generators[34].

The prohibitive cost of available technologies continues to impede the health care waste management sector. For hazardous waste,

[33] Includes municipal, city, and provincial LGUs.
[34] *Philippine National Environmental Health Action Plan 2010-2013 Final Draft.* July 7, 2010

insufficient capacity (technical experts on toxicology, infrastructure support for laboratory and disposal facilities, technical resources to detect hazardous waste, and trans-boundary smuggling) and lack of proper labelling for household chemicals (except for pesticides) inhibit proper management.

Prison facilities are extremely overcrowded and the number of inmates continues to rise. As of 2015, the population in 464 jails of the Bureau of Jail Management and Penology (BJMP) and 474 jails of the Philippine National Police (PNP) has reached a total of 94,320 detainees and prisoners. Meanwhile, as of November 2016, the seven prison facilities under the Bureau of Corrections (BuCor) held 41,400 prisoners. BJMP jails are 398 percent congested (based on the ideal capacity of 4.7 m^2 per inmate). Congestion is worse in Regions IV-A (720 percent), III (676 percent), IX (565 percent), I (549 percent) and XI (531 percent). Examples of overpopulated city and municipal jails include those of Malolos City; San Pedro, Laguna; and Gen. Trias, Cavite. Their congestion rates exceed 2,000 percent. Prison facilities under the BuCor, on the other hand, have an average congestion rate of 159 percent. Prison facilities with the worst rates are the Leyte Regional Prison (333 percent), Davao Prison and Penal Farm (250 percent), and the New Bilibid Prison (182 percent).

Strategic Framework

As shown in the Strategic Framework *(Figure 19.5)*, infrastructure development supports all three pillars and intermediate goals of the plan, as it is vital to enhancing the social fabric, reducing inequality, and increasing the country's growth potential. To this end, the overarching objective for the infrastructure sector in the medium-term is to accelerate infrastructure development and ensure that operations of infrastructure systems and facilities will be sustained.

Targets

Table 19.4 shows the indicators and corresponding targets for the infrastructure sector.

Table 19.4 PDP Targets to Accelerate Infrastructure Development

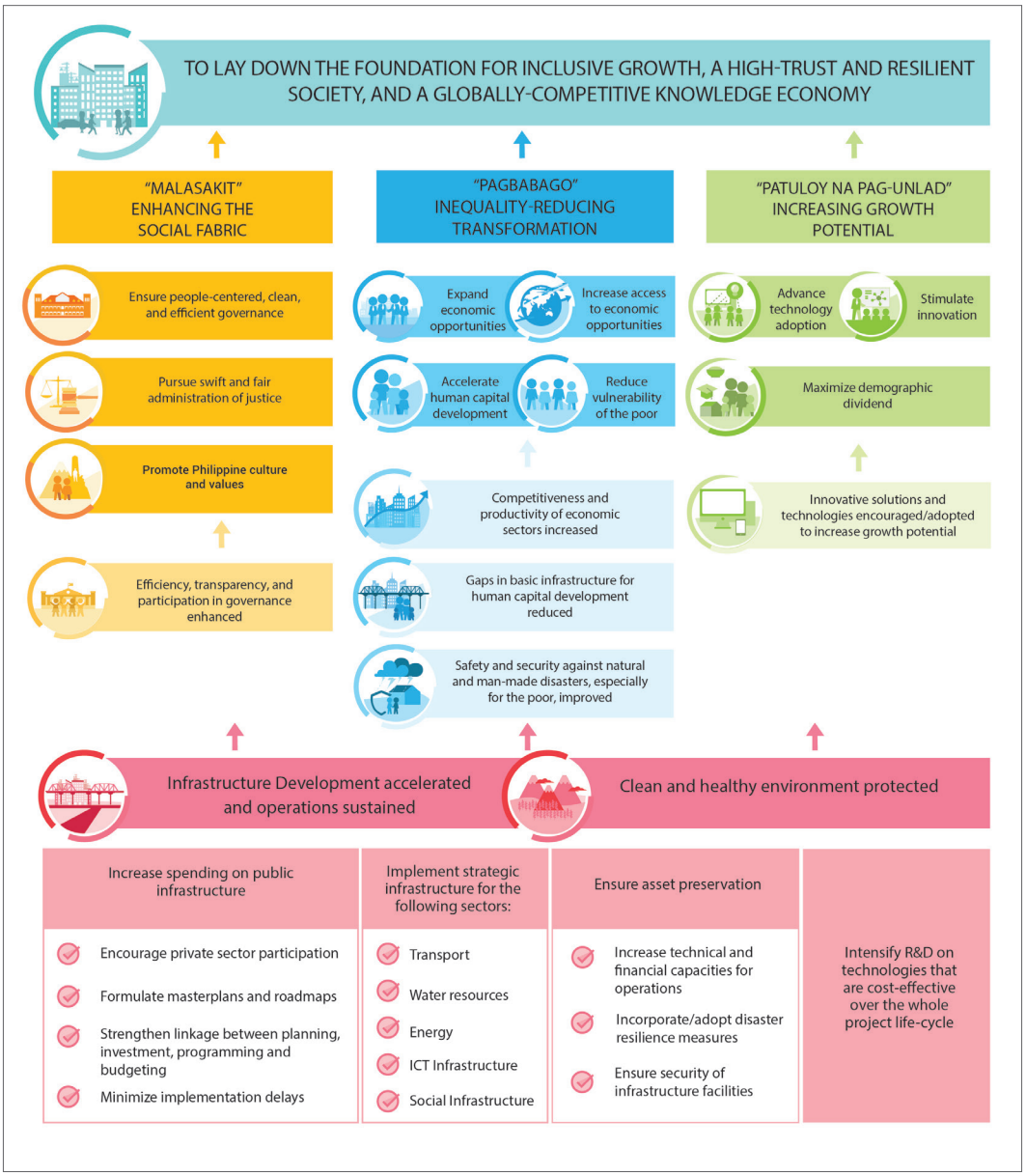
INDICATORS	BASELINE		END OF PLAN TARGET
	YEAR	VALUE	
Societal goal: Foundation for inclusive growth, a high-trust society and a globally competitive knowledge economy created	2015	223,672,070	312,887,025
Public infrastructure spending increased, in % GDP	2016	5.1	7.4
TRANSPORT INFRASTRUCTURE			
Road Transport			
International Road Roughness Index in national primary roads achieved	2015	4.62	3.0
Rail Transport			
Optimal capacity in train systems achieved, in passengers per square meter (sq.m.)	2015	5-8	4-8
Philippine National Railways			
(optimal capacity = 6 passengers per sq. m.)	2015	6	6
Light Rail Transit Line 2			
(optimal capacity = 4 - 5 passengers per sq. m.)	2015	5	4-5
Air Transport			
Air passenger traffic increased, (international and domestic), in number of passengers	2015	57,487,886	73,976,695
Air cargo traffic increased, (international and domestic), in MT	2015	805,977,094	989,820,159
Number of round-trip international flights increased	2015	210,813	278,690
Number of round-trip domestic flights increased	2015	508,661	596,476
Water Transport			
No. of shipcalls increased	2015	395,095	408,848
No. of passengers transported via sea increased	2015	62,762,732	84,564,305
Cargo shipped increased (international and domestic), in MT	2015	223,672,070	312,887,025
Container traffic increased, in twenty-foot equivalent unit (TEU)	2015	5,861,830.00	9,006,318
No. of vehicles carried by RORO vessels increased	2015	4,693,276.00	8,491,763
WATER RESOURCES			
Water and Sanitation			
Percentage of HHs with access to safe water supply increased	2014	85.50	95.16
Percentage of HHs with access to basic sanitation increased	2014	94.10	97.46
Irrigation			
Ratio of actual irrigated area and area required for agricultural development increased	2015	57.33	65.07
Cropping intensity increased, in percent	2015	National Irrigation Systems (162)	
Communal Irrigation Systems (121)	156.16		

INDICATORS	BASELINE		END OF PLAN TARGET
	YEAR	VALUE	
POWER/ENERGY			
Power requirements met, maintained above 100 percent = available capacity/(total peak demand + required reserve)	June 2016	107.2	113.0
Luzon	June 2016	107.6	120.0
Visayas	June 2016	109.3	96.0
Mindanao	June 2016	102.0	121.0
Available capacity supply increased, in megawatt (MW)	June 2016	16,791	24,248
Luzon	June 2016	12,394	17,272
Visayas	June 2016	2,383	3,105
Mindanao	June 2016	2,014	3,871
HHs with electricity increased, in percent	July 2016	89.61	100.00
Energy intensity (primary energy) reduced, in tons of oil equivalent per ₱ million	2016	6.32	5.36
Amount of displaced gasoline increased, in ML (for bioethanol)	2016	524	713
Amount of displaced diesel increased, in ML (for biodiesel)	2016	182	572
Conserved annual amount of electricity and fuel increased, in kilotons oil equivalent	2016	302.64	372.36
SOCIAL INFRASTRUCTURE			
Classroom to pupil ratio improved			
Kindergarten	-	-	1:25
Primary			
Total Number of Primary Schools (2015) = 38,657			
Grades 1-3	-	-	1:30
Grades 4-6	-	-	1:40
Junior High School			
Total Number of Secondary Schools (2015) = 8,082	-	-	1:40
Senior High School	-	-	1:40
Access to health services improved			
Number of Barangay Health Stations established	2016	26,048	42,036
Rural Health Unit/Urban Health Center established	2016	2,626	5,050
Number of socialized housing units provided	2016	332,987	1,522,721
National Housing Authority	2016	326,211	982,441
Socialized Housing Finance Corporation	2016	453	385,977
Home Development Mutual Fund	2016	6,323	154,303
Percentage of barangays with access to Sanitary Land Fills	2016	21.83	29.26
Number of barangays with access to Sanitary Land Fills	2016	9,178	12,299

Strategies

Based on the strategic framework, there are four major strategies for the infrastructure sector: (a) increase spending on public infrastructure; (b) implement strategic infrastructure for the various infrastructure subsectors; (c) ensure asset preservation; and (d) intensify R&D on technologies that are cost-effective over the whole project life-cycle. These strategies are vital towards achieving the overall sectoral objective for the infrastructure sector and the corresponding targets set over the medium-term.

Figure 19.4 Strategic Framework to Accelerate Infrastructure Development



Subsector Outcome 1: Spending on public infrastructure increased

Undertake strategic measures to ensure that the annual public spending on infrastructure will be further increased to at least 5.3 percent of GDP in 2017 and possibly to 7.4 percent of GDP in 2022. To achieve this, strategic measures will be undertaken:

Enhance the linkage of the planning, programming, and budgeting processes of the government. Agencies and other instrumentalities of government will identify priority infrastructure programs/activities/projects (PAPs) that are responsive to the objectives of the Philippine Development Plan (PDP). Appropriate policies will be introduced, including among others, integrated provincial level plans and regulatory reforms.

An investment program based on an optimal mix of government financing, official development assistance, and private capital will be undertaken. The investment program will carefully consider the application of new construction methodologies.

The Three-Year Rolling Infrastructure Program (TRIP) will be adopted to optimize utilization of agency budget allocations for the implementation of priority PAPs. Given a forward-looking infrastructure program, agencies can then undertake preparatory activities, including ensuring the availability of right-of-way, ahead of the project start. This will address the problems of underspending, expenditure realignments and cost overruns.

Encourage private sector participation. Cognizant of the private sector's efficiency and innovativeness, the government will improve its PPP Program as a vehicle for private sector participation in financing where appropriate, the construction, operation and maintenance of infrastructure projects. Government will address the bottlenecks in PPP planning and implementation, and pursue reforms to enhance the business environment that can further encourage private sector participation anchored on promoting transparency and competition.

Formulate and update master plans and roadmaps. Master plans are necessary to ensure that the implementation of programs and projects are harmonized and well-coordinated. This entails providing assistance in financing potential infrastructure investment initiatives under established master plans and roadmaps. Relatedly, infrastructure development plans must be compatible with local land use and development plans to promote synergy and maximize strategic impact among efforts across all levels of government. Appropriate policies, including integrated provincial level plans and regulatory reforms will also be developed and implemented.

Improve government administrative systems and procedures on project implementation. With the intended increase in spending for infrastructure, the capacities of implementing agencies will also be increased with respect to project development and preparation. This will ensure quality-at-entry of proposals at appraisal and approval stage. Government administrative systems and procedures will also be improved, in addition to ensure the timely release of sufficient funds to implement projects.

To ensure the quality of contractors, the guidelines on contractors' performance and compliance with the Contractor's License Law will be strictly enforced. For major infrastructure projects, a round-the-clock work schedule will be implemented.

Subsector Outcome 2: Strategic infrastructure implemented

Transport

The efficiency of the transport sector will be enhanced to sustain economic growth and increase competitiveness by providing adequate, accessible, reliable, and safe access for people and goods across the country, neighboring regions, and the world.

There is a need to enact a National Transport Policy and to create independent regulatory bodies for the railways, airports and seaports, among others, to establish a more streamlined transport sector that is able to efficiently and effectively carry out the identified development strategies.

Roadmaps and evidenced-based studies should guide the rational development of an intermodal transport infrastructure network, taking into consideration compatibility, economic feasibility, comparative advantages, and linkages of desired transportation modes. The consolidation of baseline data and information relative to the national transport network is deemed critical in this plan of action.

With emphasis on improved connectivity and enhanced mobility, multi-modal transport terminals will be established, complete with ancillary facilities to provide smooth transition for passengers and freight from one mode to another. The fare collection systems will be integrated and stored value cards or similar electronic media will be used to ensure maximum convenience for passengers and enable easy transfer between modes.

To ensure that the transport sector is able to support economic development, the physical state of existing infrastructure will be maintained at a level that generates the optimal economic outcomes while the transport network is being expanded to reach the rest of the country and the world. Projects that are implemented, especially those identified as flagship projects, will be closely monitored to ensure the quality and timely delivery of output.

New economic centers as identified in the NSS will be supported with transport infrastructure and services in accordance with land use and urban planning methodologies (e.g., transit-oriented development, township approach, high density residential development) and other sustainable construction technologies that have been proven effective in livable cities. Department of Public Works and Highways (DPWH) Design Guidelines, Criteria and Standards 2015, which incorporates resilient design, will be maximized to address the impact of climate change on all transport infrastructure. Also, the Green Building Code, which will help protect the environment, will be strictly followed by promoting resource use efficiency and environmentally friendly designs/ technologies.

Transport agencies will continue to forge convergence programs with concerned agencies to ensure that economic sectors are provided with adequate transport infrastructure support and services. A convergence program with the industry and trade sector in underdeveloped rural areas will be rolled out. Agricultural areas will continue to be supported through the provision of farm-to-market and farm-to-mill roads, according to the standards set for both design and construction.

To support development in Mindanao, road projects under the Mindanao Logistics Infrastructure Network will be pursued along with the implementation of the Improving National Roads for Inclusive Growth in Mindanao Projects in Western Mindanao. The capacity of the BIMP-EAGA road network will also be increased.

It is important to secure broad-based support for the infrastructure program. There should be general recognition that infrastructure support is a crucial input to achieving the PDP targets, but that there is bound to be some public inconvenience while the project is being implemented. Efficient coordination mechanisms among the different transport agencies and those representing the interests of other economic sectors, as well as stakeholders and the general public, will be put in place. For instance, concerning road projects, there will be greater coordination among DPWH, telecommunications companies, WDs, electric cooperatives or distribution companies on projects, particularly on road widening that requires the transfer of affected utility lines. Such coordination will extend to all LGUs to ensure that local plans and programs are aligned with the national agenda. LGUs and metropolitan agencies will also need to take on more responsibility and accountability for traffic and public transport outcomes.

Access and other support facilities for marginalized sectors (senior citizens, persons with disabilities, women, etc.) will be integrated in the design of transport infrastructure projects.

In the short term, road-based transport will be improved by addressing traffic congestion through "engineering, enforcement, and education"; while in the long-run, the road network will be upgraded and expanded to the highest quality standards.

Appropriate traffic management measures will be enforced and updated to remain responsive to prevailing situations. Traffic engineering solutions, such as the use of intelligent transport systems (e.g., signalized intersections, advanced detection systems, incident detection), will be installed, particularly in urban areas.

The coverage of the high-standard highway operations will extend from 200 km to 300 km radius from the National Capital Region and eventually stretch across Visayas and Mindanao. Inter-island bridges and bridges across smaller bodies of water will form part of the road network when deemed viable. Where necessary and appropriate, bypasses, diversion roads, flyovers, interchanges and underpasses will be constructed (e.g., using tunnel technologies) and existing roads will be improved and widened. Anti-overloading measures including penalties and putting up additional weighbridges and portable weighing devices should be strictly enforced and strengthened to prevent the rapid deterioration of roads. To ensure compliance with international standards on vehicle safety and environmental impact, the Motor Vehicle Type Approval System and Motor Vehicle Inspection System will be implemented.

For a more efficient use of road infrastructure, the movement of people and goods will be prioritized over private vehicles. High quality public transport modes will be pursued so that commuters will prefer public over private vehicles. Non-motorized transport (e.g., bicycle and pedestrian infrastructure) will be improved and expanded to increase mobility, accessibility and safety and to encourage more walking and cycling trips.

Road-based transport initiatives, such as travel demand management, public transport reform and fleet modernization, route rationalization, environmentally sustainable urban transport systems, and bus rapid transit will be implemented, ensuring interconnectivity among different modes and landuses.

To highlight that mobility is a basic need requiring service and quality standards, a commuters' charter or bill of rights will be developed.

The desired shift from private to public transport, with emphasis on mass transport, will be encouraged by ensuring the accessibility, availability, affordability, adequacy, convenience, and reliability of rail transport and bus rapid transit (BRT) systems. The rail network will be expanded by developing new lines in the major island regions. Development planning for the rail sector will take into consideration the plans for road-based transport infrastructure, especially in cases where projects will utilize the same right-of-way. Consistent with the objective of moving more people and cargo rather than vehicles, priority on the right-of-way will be accorded to rail-based transport over road-based transport.

To address the concern and to avoid future problems of connectivity and interoperability of railway systems, common rail standards, such as the policy of using standard gauge (1,435 mm) for projects in the pipeline and for all rail projects, will be implemented.

The policies and guidelines on the procurement activities in the railway sector will be customized to ensure the availability of highly-specialized spare parts and supplies.

The government will exhaust all possible means to improve the operational efficiency of airports and to address constraints to optimal capacity utilization. In particular, strategies will focus on decongesting air traffic serving the greater capital region, such as building a new international airport, guided by an optimal airport strategy. . In the interim, movements in both the land and air facilities at the Ninoy Aquino International Airport will be optimized (e.g., by transferring general aviation to other airports and constructing a rapid exit taxiway). Development plans for CRK will be fast tracked including the establishment of a fast and direct access to Manila (e.g., rail system providing non-stop and commuter services).

To serve the increasing passenger demand, the ongoing and planned improvements of regional airports will be fast tracked. Regional airports will be installed with night landing capabilities to help diffuse air traffic over a longer period of the day.

To improve the efficiency of airports, procedural measures which involve airspace management and adopting collaborative decision making among the air traffic control, airlines, and ground handlers will be implemented. Runway capacity will be optimized by cutting aircrafts' occupancy times. Available airspace will be maximized by reducing restrictions and making procedural improvements to tighten intervals between aircraft movements. Unimpeded traffic flow of passengers and freight will be ensured through adequate and conducive access to all airports. All these will be undertaken through the procurement of the state-of-the-art technology and services such as ground radar movement and collaborative decision making software.

Port facilities will be improved to ensure that inter-island shipping, including a stronger RORO network, will remain a viable option for transporting people and cargo. Breakwater facilities will be developed for wave protection and to prevent ports from deteriorating. International standards will be followed in the expansion of port facilities. In addition, navigation channels to accommodate larger vessels will be developed to ensure the sustainability and efficiency of ports. These approaches will yield economic gains through lower transport cost, increased lifespan of products, and more profits and job opportunities, especially for fishing communities.

The government commits to optimize the utilization of existing ports. A more direct connection between Manila and Batangas ports will be explored and co-loading (modified cabotage) will be implemented to encourage shipment between domestic ports. Existing dry ports will be improved and new ones will be built to provide support to manufacturers, importers, and exporters. These will be done by reducing vehicle turnaround time, thus, accelerating trade movement. Logistics hubs will be developed where applicable to connect industrial and manufacturing zones as well as agro-industrial areas, to the major port areas.

Further, the BIMP-EAGA Transit Transport Route in Mindanao will be improved in terms of capacity to facilitate swift intra-EAGA transport.

Safety and security of the public transport system will be improved by adopting a security structure that is universally accepted to eradicate activities that may cause injury, death, loss, or damage to property. To this end, an independent body that will investigate transport accidents and provide transport safety recommendations will be created. In the interim, the Office of Transportation Security will continue to ensure public safety through inspections and evaluation of security plans of public transport terminals while concerned agencies will ensure that projects are designed with appropriate safety standards. Procurement and installation of advanced security systems for land-based terminals, airports and seaports will be pursued.

PCG, on the other hand, will continue to pursue its capability building programs to ensure presence and control over the country's vast maritime domain. New floating and air assets will be procured and a sufficient well-trained personnel complement will be provided. To serve the growing tourism and maritime industry, new bases or stations will be developed in strategic locations.

Water Resources

The primary strategy for the water resources sector is to address its fragmented structure through the creation of an apex body and the formulation of masterplans that will foster coordinated efforts across the country. Such apex body will institutionalize a science-based river basin approach that integrates the principles of integrated water resource management.

The National Water Resources Board and the National Economic and Development Authority (NEDA) will strengthen coordination and linkages with partner institutions (i.e., LGUs, national government agencies, government-owned and controlled corporations, nongovernment organizations, private investors, and academe) in all aspects across the different subsectors toward achieving adequate access and sustainable water resources management. The government will enhance the capacities of concerned entities in developing and managing water-related projects. Local or regional agents will be deputized and capacitated to expedite the processing of water permits. Existing laws and regulations on water resources will be reviewed and strengthened.

Surface water source development for water-critical areas will be prioritized. Groundwater recharge system in the development of the surface water source for critical areas will be incorporated wherever possible in accordance with prescribed standards. Use of eco-efficient water infrastructure to address water demand and supply mismatch will continue to be promoted. Measures to promote efficient water utilization will be explored.

Institutional reforms will be pursued to encourage and guide investments in WSSS. The creation of an independent economic regulatory body for the WSSS subsector will be pursued for a more transparent and consistent regulation. A unified financing framework with a definite scope and streamlined process will be established to consolidate and make more accessible all available financial resources to support the WSSS projects of all water service providers. Further, a WSSS master plan will be prepared to guide the concerned implementing agencies to attain universal access in the sector. To improve the response from LGUs and WDs, plans to broaden the scope of the NSSMP[35] will be supported. The government will assist WDs in expanding the coverage of reliable water service at affordable rates and reducing NRW while ensuring economically-viable operations.

To ensure water security in water-critical areas and in Metro Manila, new water sources will be developed, watersheds critical to existing and potential water sources will be protected, technologies in water supply will be explored, and sewerage and sanitation infrastructure[36] will be expanded. For Metro Manila, Angat Dam and all its accessory structures will be maximized and maintained.

An irrigation master plan to set the direction for irrigation development and a framework for capital and O&M financing of irrigation projects will be formulated. The overall plan and framework will aim to: (a) institutionalize a policy providing government subsidy for capital investment and O&M of irrigation facilities; (b) strengthen the capacity of personnel; (c) strengthen the implementation of the Irrigation Management Transfer Program; (d) review and rationalize irrigation service fees; (e) establish and rehabilitate small-scale and community-based irrigation projects in areas not served by national irrigation systems (f) prioritize small over large irrigation projects and rehabilitation over construction of facilities; and (g) conduct complete technical work and site validation in the project planning stage to eliminate the causes of delays in project implementation.

Flood management initiatives will continue to be undertaken. These include: (a) upgrading of engineering standards for the design and O&M of flood control works; (b) establishment of a database on river information and updating of baseline data on delineation of flood-prone areas; (c) completion and updating of flood control and drainage master plans and development plans for the 18 major river basins and other critical principal river basins, and (d) strengthening of the flood management capabilities of and coordination among concerned agencies (e.g., DPWH, LGUs).

Energy

The government will support the required massive investments and fast track the implementation of infrastructure projects to improve power generation. In particular, it will:

a. Accelerate and streamline the business processes for energy projects
b. Revisit roles, particularly of government, in the power industry
c. Expedite the implementation of remaining policy mechanisms under the Renewable Energy Act of 2008 (e.g., renewable energy market, renewable portfolio standards) to further encourage development
d. Declare energy projects as projects of national significance to expedite the timely completion of energy projects

35 For example, to include septage projects, expand eligibility to less urbanized cities and municipalities, and allow WDs to directly apply for the grant.

36 For example, detention ponds for control of discharges

e. Strictly monitor compliance to the DOE Department Circular DC2015-07-014, "Guidelines for Maintaining the Share of Renewable Energy in the Country" and Department Circular DC2015-03-0001, "Promulgating the Framework for the Implementation of Must Dispatch and Priority Dispatch of Renewable Energy Resources in the WESM" to address the intermittence of renewable energy
f. Harmonize the transmission development plan with renewable energy targets, and address potential grid reliability concerns with the scaling of variable renewable energy resources
g. Support smart grid development
h. Conduct technical audit of power plants in collaboration with professional engineering associations
i. Establish the commercial operations of the WESM in Mindanao

An optimal energy mix will be studied based on appropriate allocation of capacities (i.e., baseload, intermediate, peaking) and technologies (i.e., renewable energy, nuclear, coal, oil, gas, etc.). The study will propose a fuel mix policy for power generation that takes into consideration the resulting electricity cost, externalities, and technical limitations. Said optimal mix is expected to address the challenge of securing greater system stability and security of supply to meet power systems demand, as well as to increase the country's system reserve requirement to 25 percent of peak demand (from the current 17 percent).

Competition will be encouraged to drive down electricity costs. Thus, the government will:

a. Accelerate the evaluation of retail electricity supplier license application to broaden the list of suppliers in the market
b. Accelerate the privatization of the power plant assets of the Power Sector Assets and Liabilities Management Corporation, which include the contracted capacity of generating plants and independent power producer plants
c. Strictly monitor compliance to or refinement of the following resolutions of the Energy Regulatory Commission:
   - Resolution No. 17, s. 2013 adopting and approving the rules and procedures to govern the monitoring of reliability performance of generating units and the transmission system
   - Resolution No. 20, s. 2014 adopting and establishing a pre-emptive mitigation measure in the WESM
   - Resolution No. 04, s. 2015 adopting the procedure in the reporting by generation companies of outage events affecting their generating facilities

Table 19.5 Committed and Indicative Capacity per Grid, as of July 2016

GRID	INSTALLED CAPACITY* (MW)	COMMITTED PROJECTS 2016-2020 (MW)	INDICATIVE PROJECTS 2016-2020 (MW)
Luzon	14,348.00	3,883.40	9,668.60
Visayas	2,965.00	606.60	2,590.30
Mindanao	2,742.00	1,687.90	2,566.80
Philippines	**20,055.00**	**6,177.90**	**14,825.70**

** Capacity mix as of June 30, 2016 sourced from DOE*
** Based on committed and indicative projects as of July 2016*

- Joint Resolution No. 03, s. 2015 setting the offer price cap and offer floor price in the WESM

d. Rationalize charges and taxes for electricity consumption

The government will also explore the expanded utilization of the Malampaya funds to cover universal charges for stranded contract cost and stranded debts, rehabilitation of government energy infrastructure, aside from financing the energy resource development programs and projects of the government.

The government will pursue the development of the natural gas industry. The creation of an enabling legal and regulatory framework for the natural gas industry will be prioritized to set the directions for the formulation of a natural gas development plan to guide investments in the sector. In pursuit of the APG and TAGP, the 121 km Batangas-to-Manila gas pipeline project is proposed to be the first natural gas pipeline in the country. It is expected to supply natural gas to targeted market areas situated in the high growth areas of Batangas, Laguna, Cavite, and Metro Manila. Moreover, liquefied natural gas terminals will be constructed in Quezon, Batangas, and Bataan. New oil and gas fields to replace the depleting Malampaya natural gas reservoir will be explored.

The government will ensure that the needed transmission facilities are implemented on time to efficiently transmit electricity to various load centers and interconnect the entire grid. For Luzon, the transmission network will be improved to support power generation capacity additions in the Quezon, Bataan, and Zambales areas. They will complement the establishment of a transmission loop with additional drawdown substations within Metro Manila. Furthermore, the power grid in the island of Mindoro will be interconnected to the Luzon grid through Batangas. For Visayas, the three-stage implementation of transmission backbone from Cebu to Panay Island will ensure full dispatch of both conventional and renewable energy-based power plants. In addition, the interconnection of the Cebu-Bohol grids will increase the transmission capacity as well as improve the reliability of supply to Bohol Island. For Mindanao, the 230 kilovolt Mindanao backbone from Lanao del Sur in the north to Davao del Sur in the south will be fasttracked. The Visayas-Mindanao interconnection will be prioritized to increase the reliability of the Mindanao power systems and harness and enable capacity sharing of reserves and exchange or delivery of energy during periods of shortfall or surplus in power supply between grids.

The government will prioritize the provision of electricity services to the remaining unelectrified off-grid, island, remote, and last-mile communities to achieve total household electrification by 2022. To achieve universal access to electricity, the government will endeavor to:

a. Ensure the appropriateness, feasibility, and sustainability of projects involving new or emerging technologies for missionary electrification
b. Tap electric cooperative regional technical evaluators to complement the manpower of the National Electrification Administration (NEA) in facilitating the evaluation of electrification projects
c. Provide technical and financial support to NEA and electric cooperatives in total electrification

To reduce electricity rates, the government will:

a. Strengthen the competitive selection process in securing bilateral power supply contracts
b. Remove VAT on system loss charges

c. Revisit the rules and regulations on cross-ownership between retail electricity suppliers and generation companies or distribution utilities to foster transparency and promote fair competition in the implementation of the retail competition and open access
d. Restudy Section 43(f) of Republic Act 9136 (Electric Power Industry Reform Act) on the pricing methodology
e. Encourage renewable energy development in missionary areas to shift away from expensive diesel fuel and reduce universal charge for missionary electrification
f. Foster a more conducive business and regulatory environment to allow the entry of more power generation investors
g. Revisit government's role in the sector, particularly in the provision of reserves

To improve energy efficiency, the government will continue the implementation of the EEC program that is aimed to support economic growth and environment protection. To achieve this, the government needs to do the following:

a. Push for the enactment of the EEC bill to promote demand-side management and incentivize energy efficiency projects
b. Impose minimum energy performance standards for energy-intensive industries and energy-consuming products
c. Implement policy allowing government agencies to engage the services of ESCOsxx
d. Implement the 2016-2020 EEC Action Plan and the Alternative Fuels Roadmap to provide incentives for the implementation of energy efficiency projects

The mandated biofuels blending will be reviewed with due consideration to the impact on prices, farmer incomes and environmental protection. Several undertakings under the Alternative Fuels Program, (such as the Auto-LPG Program and the Natural Gas Vehicle Program for Public Transport), will also be continued.

ICT Infrastructure

With the stronger recognition of ICT as a vital tool for nation-building and good governance, the government will ensure that the country's ICT infrastructure and services are available, accessible, reliable, trusted and affordable. The government will be guided by the following priority strategies:

Expand the deployment of ICT infrastructure and address the gaps in digital connectivity. To create economic opportunities, the government will facilitate the faster and strategic roll-out of ICT infrastructure in order to meet the growing demand for structures and services, particularly in underserved areas. Specifically, it will:

a. Work with the LGUs to streamline and harmonize government requirements and processes on permits, clearances, and fees issuances. This will be done by establishing a one-stop shop offline and online facilities that will encourage infrastructure investments and facilitate faster roll-out.
b. Facilitate and encourage infrastructure sharing and co-use by leveraging existing government infrastructure assets and forging partnerships with utility operators, and hence, potentially reducing associated costs in infrastructure deployment
c. Ensure the efficient utilization and management of the radio frequency spectrum to support the growth of various wireless ICT applications and services

d. Leverage the use of emerging technologies capable of establishing connection to the countryside and isolated islands

e. Explore the feasibility of creating a universal access fund (UAF), which may be used for the development of ICT infrastructure in the unserved/ underserved areas
f. Formulate necessary master plans, such as the DTTB migration plan, national broadband plan, national cybersecurity plan, and other successor ICT master plans to provide the overall policy direction and guide all infrastructure roll-out and development interventions.

Continue to enhance the country's e-government system as a vital tool for good governance. The government will harmonize and coordinate all ICT initiatives to optimize all government ICT resources, encourage information and resource-sharing and database-building, and ensure the development and protection of an integrated government ICT infrastructure and networks.

Institute reforms in the policy and regulatory frameworks. With the rapid advancements and convergence of technologies, the government will pursue significant reforms in the existing policy and regulatory frameworks, including strengthening the roles of DICT and the National Telecommunications Commission (NTC) in upholding competition in the ICT market, and promoting the innovative use of ICT, such as in education and human capital development.

Social Infrastructure

The effective implementation of social infrastructure projects provides conducive access to basic social services necessary for human capital development.

Address the existing infrastructure deficit in the education sector to make the classroom environment more conducive to learning. The Basic Education Facilities Funds (BEFF) will be expanded, especially in areas where they are most needed. School buildings will be provided with complementary facilities such as power, ICT, water and sanitation facilities.

An open and comprehensive database of education infrastructure statistics will be developed and updated regularly by DepEd to aid in monitoring and evaluation activities. This will enhance planning, programming, and budgeting for basic educational facilities.

The reconstituted Joint DepEd-DPWH Technical Working Group on Basic Education Facilities will target the prompt construction of school buildings, starting with 47,492 new classrooms in 2017.

Existing plans and programs on the implementation of health facilities (e.g., Philippine Hospital Development Plan, Health Facilities Enhancement Program [HFEP]) will be expanded in the Philippine Health Facility Development Plan (PHFDP) to ensure the continued provision of health services, which would include the following, among others:

a. Upgrade and expand DOH hospitals and medical centers, provincial, district and municipal hospitals, and other national government agency hospitals and health facilities
b. Upgrade, expand, and construct rural health units, barangay health units, blood service facilities, psychiatric facilities, reference laboratories, quarantine stations
c. Construct emerging and re-emerging disease reference centers, vaccine production facilities, biosafety laboratories
d. Expand and construct treatment and rehabilitation centers
e. Upgrade and expand sanitaria facilities

The PHFDP will give LGUs the primary responsibility of identifying lands best suited for the construction and expansion of health facilities. Further, policy reforms that will allow income retention of health facilities for the operation and maintenance of all government health facilities will be pursued.

Secure tenure in affordable, safe and disaster-resilient housing will be provided to underprivileged and homeless families. The following strategies will be pursued by the Housing and Urban Development Coordinating Council (HUDCC), together with KSAs and LGUs, to ensure the timely provision of decent shelter to the underserved:

a. Strengthen sectoral governance. The creation of a strong and well-resourced Department of Housing and Urban Development that will rationalize the structure and functions of each housing and urban development agencies will be pursued.
b. Reduce processing time to improve rate of housing construction. To hasten the issuance of necessary permits, certifications, and licenses on housing and land development, the processing time across the KSAs and other concerned agencies will be reduced.
c. Promotion of housing and building technology. Innovative, cost-efficient and indigenous technology (e.g., pre-fabricated housing components, concrete interlocking blocks) shall be promoted to fasttrack housing construction and reduce cost. Current innovations in green technology will be considered in the structural design of housing units.
d. Enhance the coordination for the implementation of infrastructure programs and projects. For faster implementation of infrastructure projects, coordination among infrastructure implementing agencies and KSAs will be enhanced, where HUDCC and KSAs are informed of the need for relocation sites for affected ISFs even at the planning stage of the proposed infrastructure projects. A national resettlement policy framework will be adopted to serve as basis of resettlement action plans for proposed infrastructure projects. In addition, HUDCC will be consulted as regards the completeness of resettlement action plans before submitting a project for NEDA Board approval.
e. Prioritize on-site and in-city relocation. To emphasize the principle of maximum retention and minimum dislocation of beneficiaries who will be permitted access to opportunities and services (e.g., livelihood, schools, hospitals, etc.), off-city relocation will be considered as a last resort when moving ISFs living in danger areas or those affected by infrastructure projects. To this end, high-density mass housing and vertical developments for socialized housing will be promoted.
f. Provide for the needs of the vulnerable. Cultural aspects, gender-responsiveness, and accessibility will be considered when providing housing for different groups. Furthermore, housing designs will be gender-responsive, elderly- and persons with disability-friendly.

LGUs will be provided assistance in complying with the requirements under the ESWMA. There will also be public awareness programs to promote proper waste management; investments in relevant technologies will be undertaken to improve solid waste management throughout the country. The DENR-Environmental Management Bureau, in coordination with National Solid Waste Management Commission and relevant stakeholders, will implement strategies in support of RA 9003.

a. Promote clustering of LGUs for Common SWM facilities and services to take advantage of economies of scale
b. Revisit the provisions of RA 9003, and make necessary amendments, for the creation of SWM units and appointment of environment and natural resource persons in each LGU

c. Fully utilize the national ecology centers and regional ecology centers as possible venues for trainings or education in integrated SWM
d. Provide an incentive mechanism to local recycling industries to encourage their continued participation in the local SWM system
e. Adopt alternative technologies, including waste-to-energy, as SWM solution, considering institutional, legal, and technical limits
f. Intensify the promotion of segregation-at-source by engaging local communities to participate in "learning by doing" programs, information and education campaigns and social marketing programs on SWM
g. Operationalize SWM fund and assess the reinstitutionalization of the NG-LGU cost sharing scheme for SWM

Enhance the capacities of relevant agencies in order to better monitor and manage health care and hazardous wastes. To address the challenges in the health care sector, the following will be pursued:

a. Establish a database of health care and hazardous waste facilities
b. Promote information exchange on available low-cost technologies for health care and hazardous waste management
c. Expand and accelerate assessment of chemical risks
d. Harmonize and improve labelling of chemicals
e. Strengthen national capabilities and capacities for management of toxic chemicals and substances
f. Strengthen the capacity to prevent illegal entry of toxic and dangerous products

Improve the deteriorating living conditions of inmates by addressing overcrowding in prison and jail facilities as well as the insufficient provision of basic services (e.g., potable water and proper sanitation facilities). Toward this end, the government will endeavor to undertake the following:

a. Construct new prison facilities in underserved regions to decongest prison population in existing facilities
b. Reduce congestion by the upgrading, expanding, and building of district, city and municipal jails and female dormitories
c. Improve living conditions for detainees and prisoners by providing basic infrastructure services such as: adequate and clean water supply; hygienic sanitation facilities; and, hospital or infirmaries on prison grounds.

Subsector Outcome 3: Asset preservation ensured

Infrastructure investment, sustainability, safety, and resilience are components of an integrated response to the improved performance of the infrastructure sector. The government will continue to strengthen its role in coordinating infrastructure management and place greater emphasis on sustainability, safety, and resilience. In particular, this plan highlights a range of specific measures that the government will undertake to achieve better outcomes:

Increase technical and financial capabilities for operations. Improved infrastructure relies on having effective public policies, institutions, and legislation. Within the objective of improved governance and strengthening of finances of authorities, the government will: strengthen the technical, management and financial capabilities of government agencies; rationalize national and local level planning; and improve accounting, compliance mechanisms, and reporting systems.

To maintain the emphasis on technical, management, and financial capacity building as an integral part of development

assistance projects, government will strengthen regulatory oversight and personnel capacities in various departments for infrastructure planning, management, and operation. Value engineering and value analysis principles at various stages of project development will be mainstreamed to optimize the use of funds allocated for infrastructure development. To further reduce the occurrence of cost overruns, the government will formulate, use and mainstream technical manuals or guides, such as the DPWH Standard Cost Estimation Manuals in estimating project cost. Also, a Philippine Railway Institute will be established to serve as the country's center for skills training, safety management, certification or licensing, and technology innovation.

To further develop regional areas, the national government will spearhead efforts to improve the allocation of infrastructure budget and the spatial location of infrastructure projects. Various infrastructure information databases will be developed to aid government entities in formulating, updating, and implementing infrastructure plans and programs.

Incorporate climate change adaptation and disaster resilience measures. Considering that the Philippines is highly vulnerable to disasters and effects of climate variability, the operational life of infrastructure will be secured. Disaster risk reduction and climate change adaptation strategies will be considered to ensure resilient infrastructure facilities. For instance, disaster-resilient safety network of feeder ports that will safeguard secured and smooth logistics in times of disaster will be established on top of its rehabilitation and improvement. Moreover, the government will formulate and implement a national master plan for flood and drainage, which will outline concrete projects for the different flood-prone and affected areas in the country.

Ensure the security of infrastructure facilities. In response to risks that threaten essential infrastructure services, the government will enhance the security of the country's infrastructure through proactive and coordinated efforts among government agencies. For instance, global navigation satellite system technologies, e.g., global positioning system, will be promoted and adopted in achieving seamless and green inter-modal transportation. These will enhance safety, security, and sustainability; improve supply chain connectivity; and strengthen capabilities for disaster-preparedness and emergency response. xx

Sector Outcome 4: Intensify infrastructure-related research and development (R&D) intensified

To improve the infrastructure sector, it is imperative that R&D expertise is institutionalize. The government will pursue programs to develop R&D on, among others, renewable energy and technologies to meet the growing need for clean and affordable energy; cost-efficient technologies for wastewater and solid, hazardous, and health care wastes management for the protection of public health and the environment; new transportation technologies; climate change- and disaster resilient infrastructure designs; emerging ICT applications or platforms; and new methodologies for gathering and managing science-based data. In addition, establishment of R&D facilities will be supported.

Legislative Agenda

The following set of priority legislative and policy interventions are deemed critical in realigning substantial impact on the overall performance of the infrastructure sector, such as, among others, improvements in the existing institutional and implementation capacities of the various agencies involved in infrastructure development planning and policy formulation.

Table 19.6 Legislative Agenda to Accelerate Infrastructure Development

PROPOSED LEGISLATION	PURPOSE
Cross-cutting	
Amendments to the Build-Operate-Transfer Law and its IRR	Introduce reforms to address bottlenecks in PPP project implementation, further encourage private sector participation, and keep the policies attuned to the changing business environment.
Transport	
Enactment of a National Transport Policy	Aims to help achieve a safe, secure, efficient, competitive, dependable, integrated, environmentally sustainable and people-oriented Philippine transportation system by setting forth policies that will serve as boundary conditions to guide all entities involved in the transportation sector in the exercise of their functions. This policy will provide the parameters for planning at the agency level, e.g., the formulation of the "Philippine Transport System Master Plan".
Enactment of a Law Creating Independent Regulatory Bodies for Railway and Maritime Transport Sectors	Addresses the weak and fragmented institutional setup of concerned transport agencies by creating respective independent regulatory bodies for the railway sector and maritime transport sector, consistent with the National Transport Policy. The existing dual roles of some agencies acting as both operator and regulator of transport facilities will be effectively eliminated.
Enactment of a Law Creating an Independent Body for Transport Safety and Security	Places all transport safety and security matters under a single independent body that will, among others, investigate transport accidents and provide transport safety recommendations, thereby eliminating conflicting and overlapping functions of existing agencies or entities.
Water Resources	
Enactment of a Law Creating an Apex Body for the Water Resources Sub-sector	Aims to address the weak and fragmented institutional set-up of the water resources sub-sector with the creation of an Apex Body that will act as the single lead agency to oversee/coordinate overall policy and project/program implementation.

PROPOSED LEGISLATION	PURPOSE
Enactment of a Law Creating an Independent Economic or Financial Regulator for Water Supply and Sanitation	Harmonizes the regulatory practices, processes, fees and standards on water supply and sanitation while addressing the overlapping functions or jurisdictions of existing regulatory entities.
Energy	
Amendments to RA 9136, the Electric Power Industry Reform Act	Aims to improve the implementation of the law's provisions and enhance its effectiveness to address high cost of electricity, alleged market collusion, and insufficient power supply.
Enactment of an Enabling Law for the Natural Gas Industry	Provides an enabling legal and regulatory framework for the natural gas industry to guide investments in the sector.
Enactment of a Law Declaring Energy Projects as Projects of National Significance	Expedites the timely completion of energy projects to help cushion the impact of high power rates
Enactment of a Law on Energy Efficiency and Conservation	Promotes demand-side management and incentivizes energy efficiency projects.
Enactment of an Enabling Law to Utilize Malampaya Funds, otherwise known as the Energy Resource Funds	Provides an enabling legal and regulatory framework to expand the utilization of Malampaya funds to cover universal charges for stranded contract cost/ stranded debt, and rehabilitation of government energy infrastructure.
ICT Infrastructure	
Amendments to the Public Telecommunications Policy Act of the Philippines	Makes the law more responsive to technology advancements and changes in the market landscape, considering convergence of technologies; and also strengthens the roles of DICT and NTC in fostering and upholding competition in the market.
Social Infrastructure	
Amendments to RA 9003, the Ecological Solid Waste Management Act	Addresses the weak administrative, organizational and institutional dynamics of LGUs in implementing SWM programs or projects. The proposed amendments may include, among others, the mandatory creation of a local Environment and Natural Resources offices and identification of dedicated focal SWM units with corresponding organization structure, powers and functions.