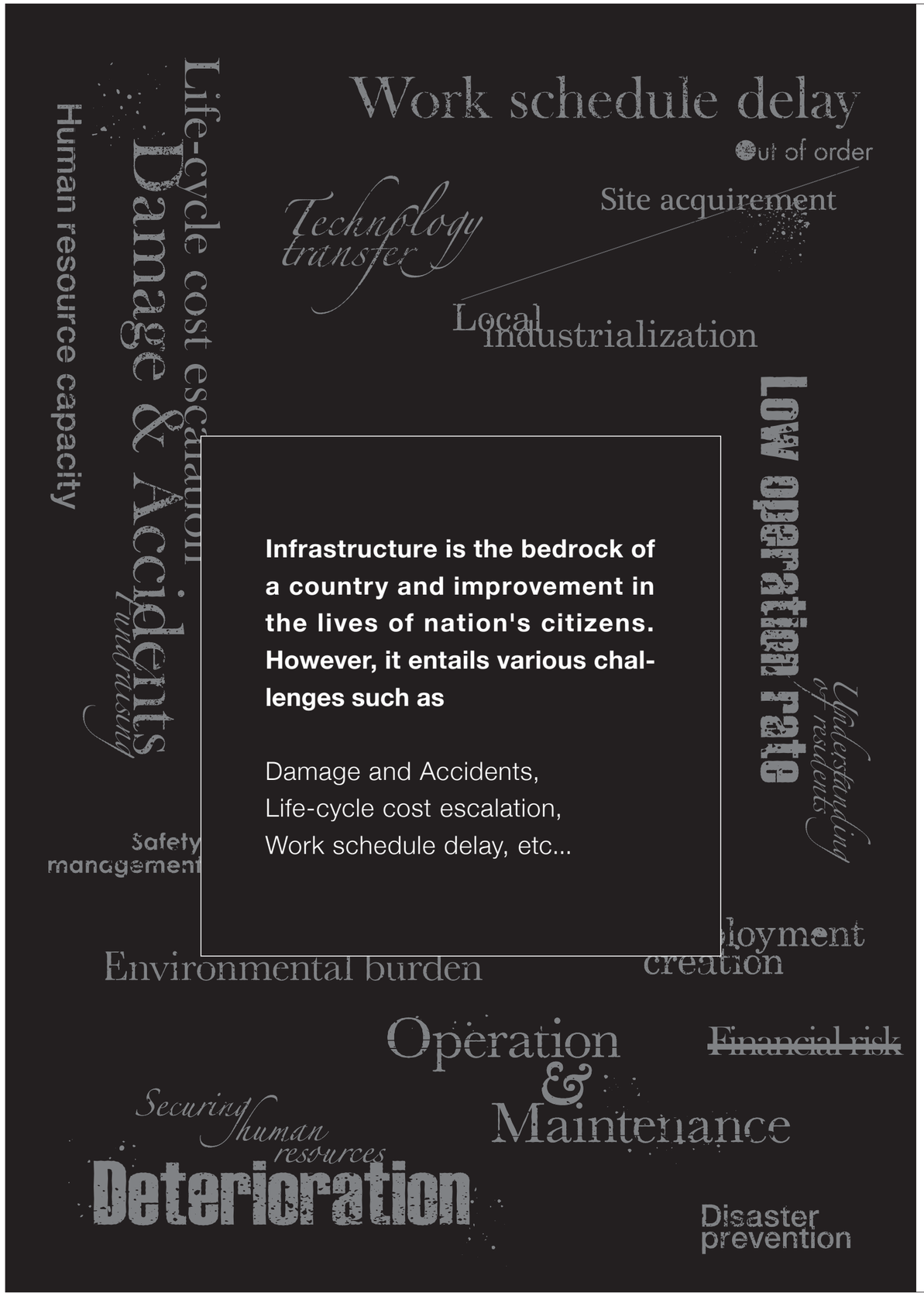
DESIGN TOMORROW

INFRASTRUCTURE with JAPAN



Japan's infrastructure development sector possesses excellent problem-solving skills, honed during years of experience to date.

1 Technologies for Local Needs

2 Co-Creation

3 Long-term Commitment

4 Lifecycle Economic Efficiency

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1 Technologies for Local Needs

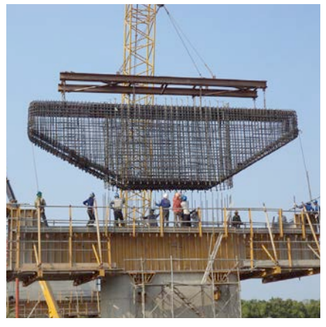
Requirements for Infrastructure development vary by country, or region, depending on the degree of infrastructure development, the kind of infrastructure needed, as well as climate and environmental conditions and so on. Infrastructure could be developed to act as a long-term, deep-rooted foundation for sustainable economic development in such countries by using the most appropriate technologies to meet such different requirements. Japan can contribute to global infrastructure development utilizing the advanced technological and development skills, as well as a wealth of knowledge and know-how which the country has cultivated to date, in a flexible manner with fast construction under restricted construction conditions; proposals tailored to the nature of the resources available in the region; and the provision of technology that corresponds to the environmental risk in the region.

Construction in Restricted Conditions

The Tsubasa Bridge - Opened in April 2015

[Tsubasa Bridge - Cambodia]

In Neak Loeung in Cambodia, the Mekong River was separating the two banks and the only way to cross to the other side was to use the ferry, causing a bottleneck for local transportation and economic activity. Since the level of the Mekong River can vary by 7 meters between the dry and rainy seasons, with a flow rate of up to 5 knots in the rainy season, it would take time to build a bridge. In 2011, Japan started to construct the "Tsubasa Bridge" using methods that would allow us to build it in a short period of time and proceed with construction work during the dry season when water levels were low. The project was completed according to the original plan. Once the bridge opened, it became possible to cross the river in five minutes and it is even used as a route for international traffic, connecting the Mekong Economic Zone.



Prefabrication construction method that allowed short construction period.

●Site of construction:Neak Loeung District, Kandal Province, Kingdom of Cambodia ●Structural Format:Bridge with 4 composite girders and linked PCI sections (5 spans) + PC cable-stayed bridge + bridge with 3 composite girders and linked PCI sections (5 spans) ●Bridge length: 640.0m (155.0+330.0+155.0m) ●Construction period:-January 2011 - March 2015 ●Total project cost:12.1 billion yen ●Traffic volumes:approximately 5,000 vehicles per day (as of April 2015)

Utilizing Local Resources

Seawater Desalination Plant in Shuqaiq

[Seawater Desalination Plant - Saudi Arabia]

Since the 1960s Saudi Arabia has been using the desalination of seawater to cope with the issue of groundwater depletion. In recent years, there has been increasing use of the Reverse Osmosis Membranes Method, which reduces the cost of desalination and has an extremely high level of energy efficiency. However, in seawater desalination plants using the Reverse Osmosis Membranes Method, there have been problems where the reverse osmosis membranes have suddenly deteriorated after starting operations. To determine a cause of the issue, Japan organized an emergency response team and dispatched experts to the local sites. The team determined that the issue has been attributed to heavy metals found in the seawater of the Red Sea, and performance has been improved by developing optimal membranes for the seawater through verification of raw materials and maintenance methods. With the capacity of its advanced research and development, Japan can provide high-quality seawater desalination plants suited to the seawater conditions of each region.

Reverse osmosis membrane elements strong in chlorine germicides.

●Site of construction:Shuqaiq, Saudi Arabia ●Plant capacity:850MW of electricity + 212,000㎥ of drinking water per day ●Configuration of equipment:3 steam turbines (installed capacity 3 x 340MW); 3 boilers (installed capacity 3 x 1,080T/H - crude oil-fired); seawater desalination plant (RO:Level 2) 16 series (installed capacity 16 series x 562.5T/H)

Minimizing Regional Environmental Risk

Gathering a variety of observational data in real time

[ICT for disaster management - Philippines]

The Philippines are located in the Pacific Rim earthquake zone. Because of earthquakes and tsunami virtually every year, there is an enormous amount of economic and human suffering. This has led to an urgent need to improve monitoring capabilities for events of disaster, and to realize an accurate and rapid warning transmission system. In light of this, we have installed seismographs and tidal gages with using observational satellite to gather environmental data in real time, for building a made-to-order system equipped to deal with the full range of disaster risks. This will make it possible to shorten the time it takes to confirm detection of a tsunami's first wave from the half-to-several hours in 2012 to a minute or less by 2018; helping to reduce the number of victims. And we are also working on introducing systems to enable the rapid restoration of the communications infrastructure in the event of a disaster through ICT Disaster Management Unit, which makes it possible to provide a minimum-required ICT environment.

ICT Disaster Management Unit introduced in Pasig city.

●Target areas:All regions in the Philippines ●Seismographs:Installed at approx. 46 locations ●Tidal gages:Installed at approx. 19 locations

2 Co-Creation

Infrastructure is not just a matter of development, it is also crucial that it is used effectively and on an on-going basis. For this reason, Japan in coordination with the partner country, not only develops the infrastructure itself of a project, but also carries out initiatives to train human resources to ensure high-level operation and maintenance of the infrastructure; to transfer technology for self-reliant infrastructure development; and to support the creation of businesses that make use of the infrastructure. Japan both designs and implements a future that leads to autonomous economic growth in coordination with local governments, companies, municipalities, universities and citizens.

Local Transfer of Advanced Operation

Inside Noi Bai International Airport's Passenger Terminal Building No.2

[Noi Bai International Airport - Viet Nam]

Viet Nam needed to quickly build a new dedicated terminal for international services in line with the rapid increase in demand for air travel. During construction, Japanese safety and quality controls were used extensively among a construction workforce that totaled 74,134 people. With zero fatal incidents, the construction period finished ahead of schedule. In addition, specialists in refueling systems and terminal building management were dispatched to the site in Viet Nam; while tours of the facilities in Japan's international airports were arranged for personnel from Viet Nam and other countries. Through the transfer of Japanese technology and know-how in airport operations such as fueling, baggage handling and the development of commercial facilities, the airport was deemed to have made significant improvements in avoiding congestion during the check-in process and other services; indeed it was selected as No.1 for "the most improved airport in the world" in the 2016 edition of "The World's Top 100 Airlines" published by Skytrax - the UK aviation services research company.

Hydrant method that allows safe refueling with a large volume of aviation fuel delivered in a short period of time.

●Site of construction:Suburbs of Hanoi City, Socialist Republic of Viet Nam ●Summary of facilities: Passenger terminal building (Floor 4; Basement Floor 1; RC + S structure on roof) / Total floor area: 152,153㎡ ●Annexed building：Special airport facilities (baggage handling facilities; boarding gang-ways; flight information systems; security facilities; ticketing system); sewerage treatment plant; fuel supply systems and others ●Construction period:February 2012 - December 2014

Human Resource Development for Self-Reliance

Olkaria Geothermal Power Station

[Geothermal Power Generation - Kenya]

Kenya has stated that its objective is to increase the current volume of geothermal power generated ten-fold by 2030. Despite being rich in geothermal resources, the country has not fully developed geothermal projects due to a lack of human resources with the technical skills to survey the geology and conduct exploratory drilling. Japan not only helped with plant construction, but also supported the training of local human resources in order to establish a system whereby all new geothermal development is carried out by local engineers. More than 30 “all-Japan” specialists were dispatched to the local site in Kenya. They offered technical guidance and improved the skills of local engineers to carry out ground surveys and conduct exploratory drilling. In the future, we will accept trainees into more than 35 companies and universities in Japan. Japan contributes further to improving the skills of local engineers.

Technical support for ground surveys and drilling, provided by Japanese specialists.

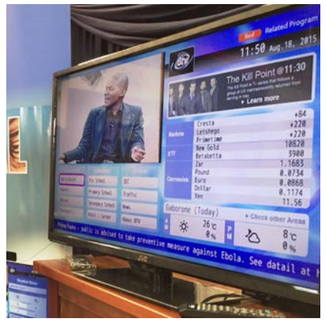
●Volume of Kenya's geothermal resources (estimate):Approx. 7,000MW ●Total target volume of geothermal power generation (by 2030):Approx. 5,000MW

Integrated Cultivation of Industry

Technical guidance for local staff

[Terrestrial Digital Broadcasting - Botswana]

Botswana is the first country in Africa to adopt the Japanese-Brazilian digital terrestrial broadcasting standards. Japan not only supported verification experiments of digital broadcasting, but also is making efforts for the transfer of technology for high-definition television program production. In addition, we are providing training programs for local human resources in the specialized data broadcasting unit of the national television. We support to set up and operate a test center for digital receivers and a call center to answer questions from viewers which arise during the migration to digital television. We also assist the publicity for analog switch off. We create an environment for the fostering of new industries in the local region including e-education, e-medicine, disaster prevention, and e-government services by using digital terrestrial broadcasting.



Transmission of information using data broadcasts.

●Number of Transmitting stations of Botswana Television:45 ●Level of awareness of terrestrial digital broadcasting increased from around 0% (in 2014) to 86% (by 2016)

3 Long-term Commitment

Infrastructure needs to be available for stable use over a long period; as such, in addition to having sufficient initial performance, this performance should be maintained through appropriate operation and maintenance. Japan offers coherent cooperation stretching from infrastructure development planning up to operation and maintenance, as well as support for the construction of long-term infrastructure utilization services; and in addition we also set up operation and maintenance systems to ensure long-term reliability of the infrastructure. Thus, in terms of the development of global infrastructure, Japan, with the joint efforts of the public and private sectors, commits its contribution to the development of its partner countries on a long term, wide-ranging and deep basis.

Responsibility for Reliable Operation

High-speed rail rolling stock made in Japan as it runs through snow-covered fields.

[High-speed Intercity Railways - UK]

The Intercity Express Programme is a project to replace the diesel powered rolling stock on two of the UK rail network's main lines. The stock won a reputation for its high quality, because the voluntary tests conducted from 2007-2008 in the UK proved to be fault-free; and the rolling stock introduced on the link between London and Kent continued to run during the big freeze of 2010. Japan has not only been commissioned to manufacture and deliver a total of 866 vehicles of rolling stocks, but has also signed a long-term maintenance contract for 27.5 years thereby contributing to long-term stability. Full production began in 2016 at the newly opened rolling stock factory and several maintenance centers are being established in the UK. Japan has also contributed to local job creation with plans to employ more than 730 people.

Delivery of rolling stock usable in the expanded electrified sections in the future.

●Target lines:East Coast Main Line & Great Western Main Line ●Class 800/801 - electrified:AC 25 kV; diesel engine generator; maximum operating speed of 201km/h (maximum design speed of 225 km/h)

Designing Services for Society

Delivery staff reliably delivering postal items

[Postal Services - Myanmar]

Myanmar was faced with the challenge of improving the reliability of its postal services. In order to help improve postal services, Japan has been improving the efficiency of operations in Myanmar and developing a HR training system with experts from Japan's postal services creating training programs, all kinds of manuals and other necessary items. We are also working on optimizing delivery efficiency with a review of transport routes. In FY2014, Japanese postal experts provided technical training sessions in 3 of Myanmar's major cities and as a result, regular mail delivery rates rose from 87.8% in 2014 to 99.3% in 2015, while the number of days for mail to be delivered improved from 4-5 days in 2014 to 1.6 days in 2015. Japan intends to offer long-term support to create, among other things, new businesses centered on post offices, including improved efficiency of working practices through the use of IT in areas such as the upgrading of postal remittance services.

Prime Minister Abe visiting the redesigned Yangon General Post Office, and he granted words of encouragement to the postal staffs.（2014）

●No.of post offices:1,381（in FY2013）●Manuals created:Manual for Delivery Operations; Manual on the Handling of Goods; Manual related to Optimizing Transport Routes ●Dispatch of postal experts/study trips to Japan for staff：Training sessions for 536 staff from Myanmar's postal service held a total of 7 times, over a total of 259 man-days

Total Solutions from Conception

Administrative regional development plan selected in an international competition for invitees

[Development of New Provincial Capital - India]

In the state of Andhra Pradesh, located in southeast India, the state government has actively engaged in a new state capital in Amaravati, in anticipation of the transfer from the old capital in 2024. Leveraging the "conceptual abilities" and "execution skills" that contributed to the successful, rapid development of infrastructure in the capital area, Japan has submitted a comprehensive suggestion that includes the development of infrastructure and the construction of public facilities, and initiatives to attract industry to the area. Japan has also been building a support system for the large-scale development with a joint "all-Japan" framework consisting of both the government and private sectors; which holds the Japan-AP Public-Private Joint Meeting headed by cabinet-level officials, as well as corporate seminars.

Signing Ceremony for Memorandum of Cooperation.

●Area New state capital - greater zone:8，603㎢, New state capital - urban area:217㎢, New state capital - central area:17㎢ ●Population (for the new state capital urban area) 2015:380,000 people→2025:800,000 people→2050:2,490,000 people

4 Lifecycle Economic Efficiency

As infrastructure is an asset that will be used over a long period of time, it is important to consider cost effectiveness over the entire life cycle of a project, not just the initial (or "early")cost. For example at the development stage a project can incur losses due to delays in the construction period; while costs can spiral during the operational phase due to problems with breakdowns and the frequency of maintenance schedules. In addition, recently there have been demands to lower the social cost by introducing infrastructure that is more environmentally friendly. Japan offers the best proposals for economic efficiency in terms of costs over the entire life cycle of a project, with the know-how and cutting-edge technology that realizes reductions in maintenance and management costs through observance of construction schedules; high operation rates; low break-down rates; long operation lives; low environmental impact; and high scalability.

On-time Delivery

The Purple Line - connecting the capital with the suburbs（opened August 6, 2016)

[The Purple Line - Thailand]

Japan supplied rolling stock and a railway system for the new urban rail construction project in the Bangkok metropolitan area, as well as collaborating in civil engineering and track development. Thanks to Japan's experience and construction management, the difficult work of building a new route in an urban area was completed on time, avoiding any increase in construction costs. The rolling stock used all-stainless steel to provide light weight, energy saving stock that is robust and resistant to corrosion. In addition, we also signed a 10-year maintenance management contract. Taking advantage of Japan's maintenance know-how, we built a maintenance system in Bangkok in order to ensure stable operations.

All-stainless steel stock that is robust, light-weight and resistant to corrosion.

●Project region:Kingdom of Thailand - Bangkok Metropolitan Area ●Total length:Approx.23km ●No.of stations:16 ●Maximum operating speed:80km/h / Maximum design speed 100km/h ●Rolling stock width 3160mm /Rolling stock height 3920mm

High Performance, Low Deterioration

Linkou Thermal Power Station - Taiwan

[Ultra-supercritical Thermal Power Generation - Taiwan]

With increasing global demand for electricity, there are growing expectations for coal-fired power generation which is low cost and can rely on resources that are widely distributed. In recent years there have been concerns about the high environmental impact of coal-fired power generation, but Japan has promoted ultra super critical(USC) technology for a coal-fired power plant that achieves the world's highest level of generating efficiency, as well as exerting a very low impact on the environment; this contributes to stable supplies of economical electricity, reducing environmental impact. Moreover, by optimizing equipment and operational methods in line with the quality and grade of coal, Japan is able to maintain high thermal efficiencies through minimizing deterioration, making it possible to improve economic efficiency over the entire life cycle of the plant.

Steam turbine that can withstand high temperature and pressurized steam conditions.

●Site of construction:Linkou District, New Taipei City, Taiwan ●Total output:2.4M kilowatts (3 bases)

Let's build a brighter future through quality infrastructure

■Homepage of Japanese government —— http://www.japan.go.jp/
■About Japanese Infrastructure —— http://www.japan.go.jp/infrastructure/
■Japanese Quality Infrastructure(video) —— https://www.youtube.com/watch?v=KnrHHOSJ7kU