

Toshiba's technology is helping India to realize the best energy mix

- Building on huge potential in hydropower -

While India will long rely on coal to power economic growth, the government is striving to address environmental issues and to promote diversification in the power sector. In fact, India is attempting to do something no other country has ever done before: advance rapid growth to become an industrialized economy, bringing power and light to a nation of 1.3 billion people, without any dramatic increase in CO2 emissions.

As a country that boasts some of the planet's most impressive mountains, where waters tumble off the Himalayas and the Deccan plateau into mighty rivers, India has a great potential in hydropower, the oldest renewable energy source, with over 100 years of history. The Indian government has also identified hydro as one of the best option for helping secure a reliable and sustainable power supply, and estimates a nationwide capacity of over 145GW; current installed capacity represents only one-third of that potential. Recognizing a significant opportunity, the government is now promoting a number of hydropower plant construction projects.

Toshiba stands ready and willing to provide strong support for these plans by leveraging cutting-edge technologies and an extensive product line-up.

Toshiba's contribution to power and energy field in India

Toshiba manufactured Japan's first hydroelectric turbines and generators over 120 years ago, and has since translated experience and expertise into leadership in hydropower installations around the world. That includes an extensive track record of highly successful projects in India. Since supplying our first hydroelectric turbines and generators over 50 years ago, in Meghalaya, we have delivered 24 hydroelectric turbines and 34 generators. All those plants have been operating smoothly for years, some much beyond their life expectancy.



But the fact remains, millions of Indians live without electricity. Lack of power affects rural and urban areas alike, holding back efforts to advance living standards and the industrial sector. Securing universal access to electricity is a huge task, and the many challenges to face include replacing aging infrastructure and extending the power grid to reach every home and business. It's an endeavor that will require huge investments and take a long time.

Toshiba offers an extensive lineup of hydropower systems, ranging from small to large. Our micro-hydropower generating system was initially designed for non-electrified areas, as a compact system that can be installed in rivers, discharge channels, agricultural and industrial waterways to cater to the electricity needs of rural and small communities.

High expectations for a fast-growing India

Toshiba's strengths in technology and number of installations stand out most notably in the development of the adjustable-speed pumped storage system. As its name suggests, unlike fixed-speed pumped storage systems, it allows changes to the rotation speed of the generator-motor and pump-turbine, allowing response to load changes in water flows within seconds. In 1990, Toshiba installed the world's first Adjustable-Speed Pumped Storage System in Japan.

The adjustable-speed pumped storage system works like a rechargeable battery. Water is pumped from a lower to an upper reservoir for storage during times of low power demand, such as night time, and later released to turn the turbines during high demand times. It acts as a utility-scale grid storage system. The key benefit of the system is its support for tuning the electric grid's frequency to secure its stability. This is becoming a more important concern in India, with increasing installations of renewable energy systems that causes frequency fluctuations. Due to its intermittent nature, the sun doesn't always shine and the wind doesn't always blow, so renewables pose significant challenges to grid stability.

Toshiba has cultivated expertise on hydropower systems and solutions for over a century, and is positioned to look at the specifics of individual plants and offer the best solution. Toshiba aims to contribute to clean and sustainable energy, including hydroelectric power generation, for India's growing economy and **FOR THE NEXT INDIA.**



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