

ENERGIZING THOUSANDS OF ISLANDS

Indonesia is Southeast Asia's most populous country and the largest economy in Southeast Asia. More than seventeen thousand islands form the world's largest island country. With an electrification ratio of 98.10%, Indonesia still needs to provide power to millions of people living in very isolated areas.

Unit hall Hasang,
North Sumatra, 3 × 13.73 MW



Indonesia's power generation mix is dominated by coal, oil and natural gas, but it has an astounding technically feasible hydropower potential of some 225,000 GWh. So far, only about 8.15% of this potential has been developed. Indonesia has a total installed hydropower capacity of about 5,742 MW, representing about 7.6% of the national total.

In order to tap its vast potential while combating climate change, Indonesia has set a target to increase renewable energy's market share to 23% by 2025. Hydropower is expected to become the

biggest contributor to this target, indicating interesting hydropower project development and investment opportunities.

ANDRITZ HYDRO IN INDONESIA

ANDRITZ has been an active contributor to Indonesia's hydropower development for more than 100 years. The first hydropower plant built by ANDRITZ in Indonesia was Bangoen Purba back in 1910. Malabar and Mendalan followed in 1930.

To date, ANDRITZ has contributed to the development of about 128 units with a





INDONESIA

Lake Toba near Asahan 3, North Sumatra, 2 × 87 MW

Hasang, North Sumatra, 3 × 13.73 MW

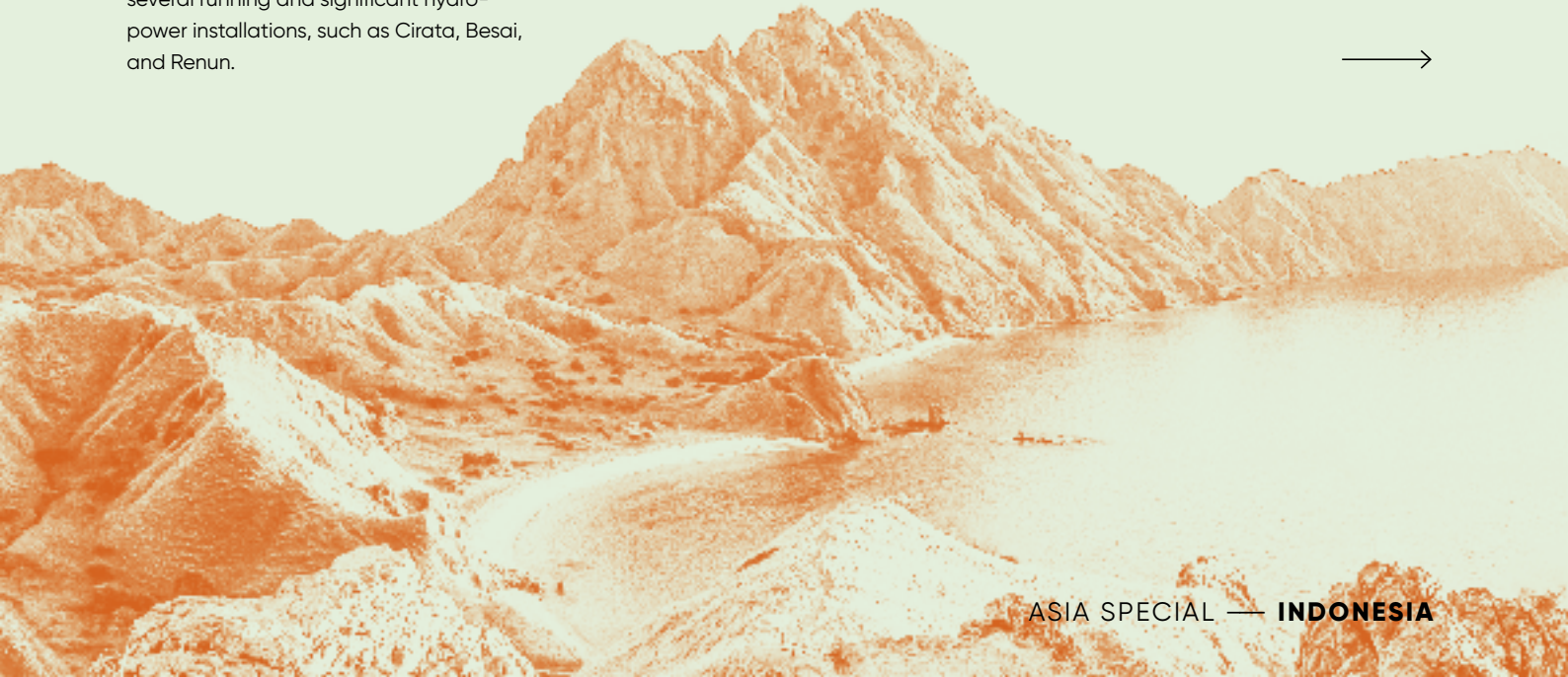
combined capacity of 3,099 MW. This represents a market share of more than 60%. Responding to the positive hydro-market outlook and in readiness to provide client support, ANDRITZ established a local entity, PT ANDRITZ Hydro, back in 1996.

Large hydropower plants owned by Indonesia's state-owned utility PT Perusahaan Listrik Negara (PLN) Persero that are currently under construction, such as Peusangan 1 & 2 and Asahan 3, illustrate ANDRITZ's success in Indonesia. Its strong national presence is also revealed by the comprehensive assessment, rehabilitation, implementation and upgrade projects at several running and significant hydro-power installations, such as Cirata, Besai, and Renun.

With more than 10 decades of experience in the execution of hydropower projects in Indonesia, ANDRITZ is continuously capturing opportunities for further improvement. PT ANDRITZ Hydro has successfully established a dedicated engineering team for the design and supervision of the installation and commissioning of automation products, electrical power systems, penstocks and gates. ANDRITZ's Indonesian team also provides services for projects both locally and in more than 35 other countries.

Cikaengan 2: In December 2016, ANDRITZ was awarded a contract from PT Cikaengan Tirta Energi, a subsidiary of Nippon Koei Co. Ltd., Japan, for the design, supply, and installation of generating equipment, gates and penstock works. Cikaengan 2 is the first hydropower plant ever built by Nippon Koei Co. Ltd.

Hasang: In December 2016, ANDRITZ signed a contract with Posco Engineering Co., Ltd., Korea, and PT. Pen Indonesia for offshore equipment supply and construction services with a capacity of 3 × 13.73 MW.



Population: **267.6 million**
 Access to electricity: **98,10%**
 Installed hydro capacity: **5,742 MW**
 Hydropower under construction: **1,059 MW**
 Share of generation from hydropower: **7.6%**
 Hydro generation per year: **21,637 GWh**
 Technically feasible hydro generation potential per year: **225,000 GWh**

ANDRITZ Hydro:

Total installed / rehabilitated units: **128**
 Total installed / rehabilitated capacity: **3,099 MW**
 Location: **Jakarta**
 E-Mail: **contact-hydro.id@andritz.com**



Penstock Cikaengan 2, West Jawa, 2 × 3.65 MW



Cikaengan 2, West Jawa, 2 × 3.65 MW

Cikandang: In January 2019, ANDRITZ signed another contract with PT. Republika Mandiri Energi for the design, manufacture, supply and supervision of installation and commissioning of electro-mechanical equipment with a capacity of 3 × 2 MW.

Asahan 3: In September 2019, ANDRITZ signed a contract with PT PLN (Persero) for metal works for Asahan 3, located at Asahan Regency in North Sumatra, with a capacity of 2 × 87 MW. This project is jointly financed by the Japan International Corporation Agency (JICA) and the Government of Indonesia.

Furthermore, ANDRITZ has received some large rehabilitation orders in the recent past, such as Cirata (8 × 125 MW), Musi (3 × 74 MW), Asahan-1 (2 × 90 MW), Besai (3 × 38 MW), Renun (2 × 42 MW), Wampu

(3 × 15 MW), Kedung Ombo (2 × 22.5 MW), and an operation and maintenance contract for Cianten (2 × 1.0 MW) and Cianten 1B (2 × 3.35 MW).

Cirata: In September 2018, PT Pembangunan Jawa Bali (PJB) awarded ANDRITZ the fourth stator refurbishment contract for Cirata, located in West Java. Engineered success and dedication on the previous refurbishment works encouraged PJB to contract ANDRITZ Hydro for execution of the universal stator concept.

ANDRITZ designed and implemented the concept that allows the refurbished stators to be interchangeable between all eight units of the hydropower plant. This cuts service outages and significantly increases plant availability. The works and installation of the new stator were completed in September 2019.

In an October 2018 awards ceremony, PLN honored PJB for Cirata unit #7 (refurbished and commissioned by ANDRITZ in 2015) and Cirata unit #8 (commissioned by ANDRITZ in 1998) with awards for best "Equivalent Forced Outage Rate (EFOR)" and best "Equivalent Availability Factor (EAF)", respectively.

Cirata is situated on the Citarum River in West Java, 100 km southeast of Jakarta and comprises Cirata I (1988) and Cirata II (1998) with a total installed capacity of 8 × 126 MW. It plays an important role in stabilizing the grid in the Java-Bali interconnected system, operating with frequent starts-stops and acting as a fluctuating top load bearer.

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Cirata, West Java, 8 × 126 MW

ANDRITZ HYDRO INDONESIA TAKES HOME TWO CUSTOMER SATISFACTION AWARDS IN 2018

ANDRITZ's success in Indonesia was recognized by PT. Pembangkitan Jawa-Bali (PJB) and Mrica Plant Unit (UP Mrica) of PT. Indonesia Power (IP) with the awards of "Best Equipment Supplier" and "Best Vendor for Electrical Control", respectively.

PJB and IP are subsidiaries of PLN, operating all PLN-owned hydropower plants in Java with a total generating capacity of over 2.5 GW.

ANDRITZ executed the third refurbishment contract for the PJB-owned Cirata hydropower plant's universal stator

concept, which was successfully commissioned in September 2018.

In August 2018, ANDRITZ also designed, manufactured, installed and commissioned a new excitation HIPASE-E system for Kedungombo, which is operated by IP under UP Mrica.

It is also noteworthy that PJB Cirata Unit received two of PLN's most valued awards: "Best Equivalent Forced Outage Rate (EFOR)" for Cirata HPP Unit #7, which was refurbished under the universal stator concept by ANDRITZ in 2015, and "Best Equivalent Availability Factor (EAF)" for Cirata HPP Unit 8, commissioned by ANDRITZ in 1998.