

**LAOS**

The Battery  
of Southeast Asia  
(Page 04)

**VIETNAM**

Renewable Energy  
in Harmony with  
Nature  
(Page 14)

# HYDRONEWS

ASIA



## Dear Business Friend,

Hydropower is booming in Southeast Asia. Main driving forces are rapid population growth, increasing demand for energy, focus on clean hydropower and unexploited potential, however, regional differences are essential. The technically feasible potential for hydropower in these countries is enormous and could cover much more than the entire domestic power requirement.

ANDRITZ HYDRO is market leader in many of these countries with locations in Vietnam, Laos, Myanmar, Indonesia, Malaysia, Philippines, India, China, Australia and New Zealand. The first turbines were delivered at the beginning of the 20<sup>th</sup> century. Meanwhile about 2,000 turbines with 85,000 MW have been supplied into this region.

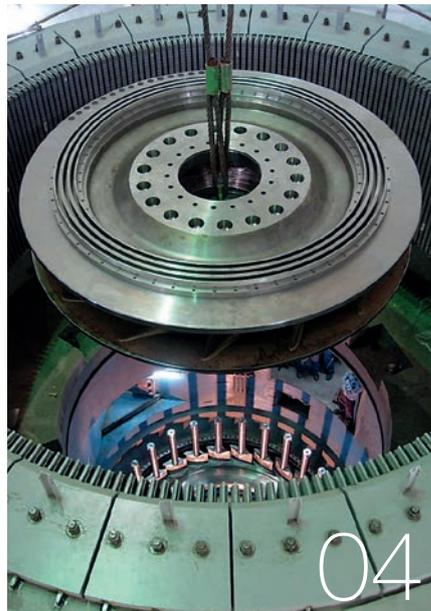
Laos could become the “Battery of Southeast Asia” thanks to the massive hydropower potential offered by the Mekong River and its tributaries. Currently, only 18% have been tapped and offer a huge opportunity to stimulate economic growth and reduce poverty. Large projects inevitably leave



their mark. Managed correctly, they preserve the environment and push the living standard of the local population, the country, and the region. ANDRITZ HYDRO is currently executing the Xayaburi run-of-river hydropower project. The technology offered by ANDRITZ HYDRO provides state-of-the-art know-how combined with newest design for preservation of nature like fish-friendly turbines. So HPP Xayaburi will continue the success stories of HPP Theun-Hinboun, HPP Nam Gnouang, and HPP Nam Theun 2.

ANDRITZ HYDRO is prepared to support all countries in this most booming region of the world on their way to higher economic welfare based on renewable energy out of hydropower.

A handwritten signature in blue ink, appearing to read "A. Plant". The signature is fluid and cursive, with a long, sweeping underline.



# Content

## 02 EDITORIAL

### TOP STORIES

- 04 Laos
- 14 Vietnam

## COUNTRY REPORTS

- 08 Kazakhstan
- 09 Thailand
- 10 Philippines
- 11 Indonesia
- 12 Myanmar
- 13 Malaysia
  
- 18 South Korea
- 19 India
- 20 China
- 22 Bhutan
- 23 Nepal
- 24 Pakistan

## HYDRO BUSINESS

- 25 New Test Bench in India

## 26 EVENTS



› iPad App



› Android App



› Online magazine

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# Lao People's Democratic Republic

## The Battery of Southeast Asia

By Martin Koubek  
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**Laos' growth** has more recently been amongst the fastest in Asia and averaged nearly 8% per year for the past decade. One of the main resources of the country is electricity, mainly generated from hydropower – the share of generation is 99%. For several years, the Lao government has expressed its desire to become the “Battery of Southeast Asia” thanks to the massive hydropower potential of almost 90,000 GWh offered by the Mekong River. Currently, only just over 18% of this potential has been tapped.





› Mekong River

### ANDRITZ HYDRO in Laos

ANDRITZ HYDRO has been active in Laos for more than 50 years and has installed or rehabilitated more than 30 units with a total capacity of about 2,200 MW, which represents a market share of 68%. Large power plants such as HPP Xayaburi or HPP Xekaman, for which ANDRITZ HYDRO has received orders, are currently under construction and show the success of ANDRITZ HYDRO in Laos. Because of the existing projects and the good outlook into the future, ANDRITZ HYDRO is establishing a representative office in the capital of Vientiane in 2016.

Over the last three years, ANDRITZ HYDRO has received three important orders in Laos from Song Da Corporation, the largest civil construction company in Vietnam. Song Da has a long history in power plant construction in Vietnam and Laos, based on a bilateral governmental agreement between Vietnam and Laos for the joint development of hydropower plants. In all these projects, Song Da is the main shareholder and EDL (Electricité du Laos) is the minority shareholder.

**HPP Xekaman 3:** This project was the first large hydropower project of these three and has a capacity of 250 MW with an average annual energy production of 1,000 GWh. It is located on the Nam Pagnou River, a main branch of the Xekaman River, about 10 km from the border with Vietnam. ANDRITZ HYDRO successfully delivered turbines, generators and associated electro-mechanical equipment. HPP Xekaman 3 started its commercial operation in 2013.

**HPP Xekaman 1:** Subsequently to the finalization of the Xekaman 3 project, ANDRITZ HYDRO signed the second contract for the delivery of the complete electro-mechanical equipment for the Xekaman 1 hydropower plant in December 2013.

The scope of supply includes two Francis turbine-generator sets, governing system, automation and protection system, and auxiliary systems, as well as the complete switchyard.

The majority of the generated electricity will be exported to Vietnam. The finalization of HPP Xekaman 1 is planned for 2016.

**HPP Xekaman Sanxay:** The third contract is for the supply of electro-mechanical equipment for the new Xekaman Sanxay hydropower plant and was signed in 2015.

The Xekaman Sanxay hydropower project will be constructed on the Xekaman River, a branch of the SeKong River, about 40 km from the border with Vietnam. Its main objective is the generation of electrical energy and operating as a downstream regulator for HPP Xekaman 1. It will have an installed capacity of 32 MW and will produce about 131.2 GWh of electrical energy annually.

Commissioning is scheduled for the second half of 2017. ▶



► Powerhouse of Theun Hinboun hydropower plant

**HPP Nam Theun 2:** This plant is the largest Laotian hydropower station so far. It comprises four 250 MW Francis and two 40 MW Pelton units, of which 1,000 MW are exported to EGAT in Thailand.

The contract for ANDRITZ HYDRO encompassed the supply of the turbines and generators, as well as the associated auxiliary equipment.

In 2010, HPP Nam Theun 2 started its commercial operation and is now considered a pioneering project in the sustainable construction of hydropower stations.

**HPP Theun Hinboun and HPP Nam Gnouang:** The Theun Hinboun Power Company has awarded ANDRITZ HYDRO a contract for the supply and installation of the complete electro-mechanical equipment for the Theun Hinboun Expansion project.

HPP Theun Hinboun is located in the Bolikamxay Province, in the middle of Laos in a hilly terrain between the rivers Nam Theun and Nam Hai.

ANDRITZ HYDRO's scope of supply comprises the equipment for the new Nam Gnouang hydropower plant, as well as for the 220 MW extension

of the existing Theun Hinboun hydropower station. The delivery includes three Francis turbines, generators, and all necessary auxiliary systems. Start of commercial operation was mid-2012.

With an additional power output of 280 MW after completion, the two hydropower plants deliver a total of more than 3,000 GWh of electrical energy per year.

**HPP Nam Lik 1:** In June 2013, ANDRITZ HYDRO signed a contract with POSCO Engineering and Construction Company Ltd. for the supply, installation and commissioning of the electro-mechanical equipment for the Nam Lik 1 hydropower plant, located 90 km north of the capital of Vientiane.

ANDRITZ HYDRO's contractual supply comprises two 32.25 MW Bulb turbines, horizontal generators, mechanical auxiliaries, electric power systems, gates, and additional equipment.

The electricity generated by HPP Nam Lik 1 will be supplied directly into the national grid for domestic use, meeting the electrical energy demands of about 200,000 people. The plant will be put into operation in 2017. ►

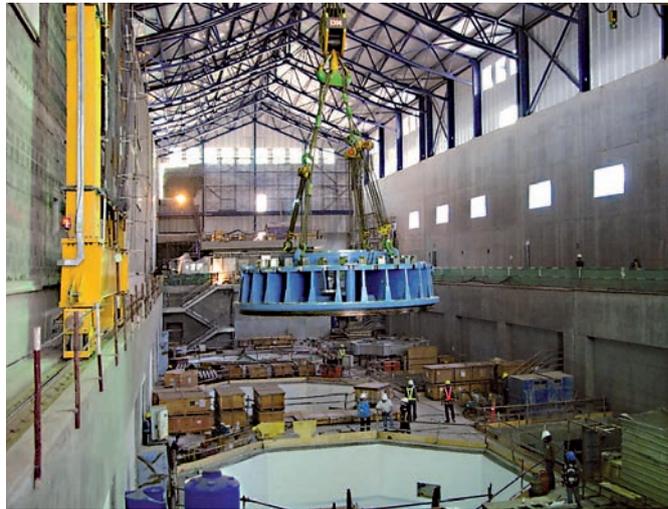
► Draft tube and installation team at HPP Xayaburi



**HPP Xayaburi:** ANDRITZ HYDRO will deliver the entire electro-mechanical equipment for the new run-of-river power station Xayaburi on the Mekong River.

ANDRITZ HYDRO's scope of supply includes the delivery of seven Kaplan turbines, each with an output of 175 MW, and an additional 68.8 MW turbine, as well as generators, governors, the automation, and additional equipment. With a planned capacity of 1,295 MW, HPP Xayaburi will produce electricity for about 1 million households in Thailand. Commissioning is scheduled for 2019.

Laos is one of the emerging countries in Southeast Asia and offers, with its enormous hydropower potential, excellent opportunities for the future. ANDRITZ HYDRO looks forward with confidence to this economic development and stands ready with technological state-of-the-art know-how and profound experience in project execution for the customers in the Laotian market. ■



› Turbine installation at HPP Nam Theun 2

|                   |            |   |
|-------------------|------------|---|
| <b>LAOS FACTS</b> | 6.7 Mio.   | Population                                      |
|                   | 70%        | Access to electricity                           |
|                   | 3,293 MW   | Installed hydro capacity                        |
|                   | 4,800 MW   | Hydro capacity under construction               |
|                   | 99%        | Share of generation from hydropower             |
|                   | 16,000 GWh | Hydro generation                                |
|                   | 87,458 GWh | Technically feasible hydro generation potential |

Hydropower & Dams World Atlas 2015 and The World Bank

› Area near HPP Nam Lik 1





› Area near Issyk 2 hydropower project

# Kazakhstan

Republic of Kazakhstan

## Hydropower for a Huge Country

By Norbert Schwarz  
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› Machine hall of HPP Issyk 2



The supply and distribution of electricity in Kazakhstan can be erratic because of regional dependencies, but the country is moving forward with plans to improve reliability of electricity and gas supply to its population. The government realizes that its economy suffers from an overreliance on oil and extractive industries and the government announced a stimulus package to cope with the economic challenges. As only about 13% of the hydro generation potential of estimated 62,000 GWh is developed so far, there are vast opportunities offered.

### ANDRITZ HYDRO in Kazakhstan

For about 10 years, ANDRITZ HYDRO has been active in the promising hydropower market of Kazakhstan.

For HPP Moinak (3 × 153 MW) ANDRITZ HYDRO delivered two Pelton turbines and a spare runner, for HPP Issyk 2 (1 × 5.26 MW) the complete electro-mechanical equipment was supplied.

**HPP Shardarinskaya:** In December 2013, ANDRITZ HYDRO signed a contract with JSC “Shardarinskaya HPP” to upgrade the electro-mechanical equipment at the Shardarinskaya hydropower plant.

ANDRITZ HYDRO will replace four Kaplan turbines with new runners, new generators, automation, and auxiliary systems. The power output will be increased by about 20% from 26 MW to 31.5 MW per unit. Completion of the refurbishment is scheduled for mid-2017.

**HPP Issyk 1:** At the beginning of 2016, ANDRITZ HYDRO signed a new contract for HPP Issyk 1 (1 × 5.3 MW) for the delivery of the complete electro-mechanical equipment.

These contracts represent ANDRITZ HYDRO's success in a country with great expectations of further business in the near future. ■

#### KAZAKHSTAN FACTS

17.29 Mio.  
100%  
2,375 MW  
177 MW  
9%  
8,236 GWh  
62,000 GWh

Population  
Access to electricity  
Installed hydro capacity  
Hydro capacity under construction  
Share of generation from hydropower  
Hydro generation  
Technically feasible hydro generation potential

# Thailand

Kingdom of Thailand

## A Bright Smile for Hydropower

By Martin Koubek  
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With a well-developed infrastructure, a free-enterprise economy, reforms and generally pro-investment policies Thailand has historically had a strong economy.

The country has a technically feasible potential for hydro generation of about 13,500 GWh, thereof 40% are already developed. Thailand's power generation mix is dominated by oil and natural gas, hydro has a share of only 5%.

### ANDRITZ HYDRO in Thailand

For more than 50 years, ANDRITZ HYDRO has been active in the Thai hydropower market. As of today, ANDRITZ HYDRO has installed or rehabilitated more than 30 units with a total capacity of 1,400 MW, which represents about 40% of the country's installed hydro capacity.



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#### THAILAND FACTS

67.73 Mio.  
100%  
3,499 MW  
532 MW  
5%  
5,400 GWh  
13,564 GWh

Population  
Access to electricity  
Installed hydro capacity  
Hydro capacity under construction  
Share of generation from hydropower  
Hydro generation  
Technically feasible hydro generation potential

Hydropower & Dams World Atlas 2015 and The World Bank

**HPP Srinagarind:** In 2015, ANDRITZ HYDRO received a contract for the renovation of units 1–3 with an output of 120 MW each. In total HPP Srinagarind comprises five generating units with a total capacity of 720 MW.

The scope of supply includes Francis runners, generators, governors, automation system, associated electro-mechanical equipment, and mechanical auxiliaries, as well as transportation, installation, and commissioning. Completion of the project is scheduled for 2019.

**HPP Nam Pung:** In March 2014, Electricity Generating Authority of Thailand (EGAT) awarded a contract to ANDRITZ HYDRO for the modernization of two 3.15 MW Francis units at the Nam Pung hydropower plant.

ANDRITZ HYDRO provides design, manufacturing, delivery, installation, and commissioning of the runner, generator, mechanical auxiliaries, and electrical auxiliary systems.

Commissioning of the last unit is scheduled for April 2017.

Further important orders for ANDRITZ HYDRO were Sirikit 1 (150 MW), Sirikit 2 (150 MW), Sirikit 3 (150 MW), and Bhumibol (192 MW).

In order to increase electricity generation from a sustainable and environmental-friendly resource in the future, the development of small- and medium-scale hydropower plants, as well as the upgrading of existing plants should be encouraged. ANDRITZ HYDRO has the references and experience to support this development. ■

› Powerhouse of Srinagarind hydropower plant and Kwai Yai River



# Philippines

Republic of the Philippines

## Green Energy for a Growing Economy

By Albin Königshofer  
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**The Philippines** will be the most rapidly growing economy in Southeast Asia in 2016, facing an enormous challenge regarding electrical energy supply. Radical changes like government reforms and defined feed-in tariffs (FIT) for hydroelectric power encouraged many private investors and generated market competition. Hydropower is by far the largest renewable energy source with an actual total share of almost 12%. The undeveloped hydropower potential is about 20,000 GWh.

### ANDRITZ HYDRO in the Philippines

Since 2009, ANDRITZ HYDRO operates an office in Manila. Although, ANDRITZ HYDRO has a long history in the Philippines with the first delivery of equipment in 1930. In total ANDRITZ HYDRO installed or rehabilitated more than 40 units with a capacity of over 1,600 MW.

During the past five years, ANDRITZ HYDRO has also focused on small hydro installations.

› Compact Hydro units



› Rice terraces

**Irisan 1:** In 2010, ANDRITZ HYDRO received an order from Hedcor Inc. to deliver the complete electro-mechanical package, including installation and commissioning for HPP Irisan 1.

**Villasiga:** In 2011, ANDRITZ HYDRO signed a contract with Sunwest Water and Electric Co. Inc for two 3.60 MW and one 800 kW Francis turbines for the Villasiga hydropower project.

**Tudaya 1 and 2:** ANDRITZ HYDRO was assigned to deliver the entire electro-mechanical equipment for HPP Tudaya 1 and HPP Tudaya 2 in 2012.

**Sabangan:** In May 2013, another contract was signed with Hedcor Inc. The scope of supply consists of two 7.4 MW Pelton turbines and a complete “from water-to-wire” package.

**Catuiran:** The contract for the supply of the complete electro-mechanical works for the 8 MW hydropower plant Catuiran was signed with Sta. Clara International Corp. in November 2014.

**Manolo Fortich 1 and 2:** In 2015, ANDRITZ HYDRO received contracts for the two cascading plants HPP Manolo Fortich 1 (44.4 MW) and Manolo Fortich 2 (26.1 MW).

Besides these Compact Hydro projects, ANDRITZ HYDRO has received some large rehabilitation orders in the past, such as HPP Pantabangan (output increase from 103 MW to 121 MW), HPP Magat (extensive rehabilitation, 4 × 92 MW), HPP Ambuklao (output increase from 75 MW to 105 MW), HPP Binga (hydraulic steel structures, 140 MW), HPP Agus 1 (E&M equipment, 80 MW), HPP Pulangi IV (E&M equipment, 261 MW), HPP Agus 6 (52 MW), and HPP Kalayaan, the first pumped storage power plant in Southeast Asia, where ANDRITZ HYDRO supplied a 172 MW unit.

ANDRITZ HYDRO is looking forward to being a part of the development of this booming market. ■

### PHILIPPINES FACTS

|            |   |
|------------|---|
| 99 Mio.    | Population                                      |
| 87.5%      | Access to electricity                           |
| 3,543 MW   | Installed hydro capacity                        |
| 115 MW     | Hydro capacity under construction               |
| 12%        | Share of generation from hydropower             |
| 9,137 GWh  | Hydro generation                                |
| 20,334 GWh | Technically feasible hydro generation potential |

INDONESIA FACTS

254.5 Mio.  
96%  
5,258 MW  
1,780 MW  
11%  
25,140 GWh  
401,646 GWh

Population  
Access to electricity  
Installed hydro capacity  
Hydro capacity under construction  
Share of generation from hydropower  
Hydro generation  
Technically feasible hydro generation potential

Hydropower & Dams World Atlas 2015 and The World Bank



› Dam of Cirata hydropower plant

# Indonesia

Republic of Indonesia

## Energizing Thousands of Islands

By Gerhard Enzenhofer  
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**Indonesia is** Southeast Asia's most populous country with a total installed hydro capacity of about 5,258 MW, which means only 6% of the technically feasible hydropower potential is developed so far. As the government intends to increase rural electrification, micro to small hydropower plants will be required in the years to come. Hydropower plants will play a significant role in the country's development schemes.

› Unit hall of Cirata hydropower plant



### ANDRITZ HYDRO in Indonesia

In 1996, ANDRITZ HYDRO established a subsidiary in the capital of Jakarta, but the company has been active in Indonesia for more than 100 years, with its first delivery in 1910 (Bangoen Poerbo). ANDRITZ HYDRO has installed or modernized about 180 units with more than 3,000 MW in Indonesia. This means, more than half of the installed capacity comes from ANDRITZ HYDRO.

**HPP Cirata:** In December 2013, ANDRITZ HYDRO was awarded a contract from PT Pembangunan Jawa-Bali (PT.PJB) for the supply, installation, and commissioning of a new stator for the Cirata hydropower plant. The Cirata underground power station consists of HPP Cirata I and HPP Cirata II, with a total installed capacity of 1,040 MW. All eight turbine-generator units as well as the complete electro-mechanical equipment were originally supplied by ANDRITZ HYDRO.

**Peusangan 1 and 2:** In August 2013, ANDRITZ HYDRO signed a contract with PT.Perusahaan Listrik Negara (PLN) for the design, supply, and installation of electro-mechanical equipment at these run-of-river hydropower plants. The scope of supply consists of turbines, generators, and associated electrical auxiliaries. HPP Peusangan 1 and Peusangan 2 will have an expected annual output of 327 GWh.

**HPP Karebbe:** ANDRITZ HYDRO received several contracts: 2005, the supply and installation of turbines, generators and auxiliaries; 2008, for penstocks and gates; and 2009, for EPS (Electrical Power System).

**HPP Larona:** ANDRITZ HYDRO was assigned the modernization of the Larona hydropower plant in 2008. The scope of supply comprised two generators upgraded from 65 MVA to 85 MVA, replacement of runners and electrical equipment, as well as installation and commissioning services.

**HPP Musi:** In 2004, ANDRITZ HYDRO was awarded a contract for the supply of turbines and auxiliary equipment for the 210 MW Musi hydropower plant.

For the time being several small hydropower plants are currently under construction such as Cianten 1B, 2 and 3, and Cibalapulang 1, 2 and 3.

The high quality and excellent know-how of ANDRITZ HYDRO equipment is demonstrated at HPP Ketenger, for which ANDRITZ HYDRO delivered the original runner in the 1930s. The runner is still in operation to the full satisfaction of the customer.

All these successful orders show the confidence of the customers in ANDRITZ HYDRO's technology know-how and prove once again ANDRITZ HYDRO's leading position in Indonesia's hydropower market. ■



› Myitgne River near Deedoke hydropower plant

# Myanmar

Republic of the Union of Myanmar

## Hydropower for a Moving Country

By Alexander Bihlmayer  
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**During the** past years the government of Myanmar has opened up the country. This has begun to pay dividends as economic growth accelerated and attracted foreign investments in the energy sector, but also in other industries. Myanmar has a promising hydropower potential, which is equivalent to 46.000 MW. Thereof not even 7% have been developed until now.

› Contract signing ceremony for HPP Deedoke



### ANDRITZ HYDRO in Myanmar

ANDRITZ HYDRO has been active in Myanmar since the 1980s, when the company had already delivered electro-mechanical equipment for several small hydropower plants. In 2013, ANDRITZ HYDRO has established a representative office in the city of Yangon and is actively involved in hydropower development with capacity building and training activities, as well as offering its expertise in project development and supply of equipment and services.

In May 2014, the Ministry of Electric Power of Myanmar (MOEP) and the Federal Ministry for Transport, Innovation and Technology of Austria formalized their cooperation in the energy sector by signing a Memorandum of Understanding. This MoU also formed the basis for a closer cooperation between MOEP and ANDRITZ HYDRO on the development of hydropower projects.

**HPP Deedokee:** In 2014, based on this bilateral MoU, the Director General of the Ministry of Electric Power (MOEP) and the Chairman of the Board

of ANDRITZ HYDRO, Mr. Wolfgang Semper, signed a MoU for the development of the 75 MW Deedoke hydropower plant.

In February 2015, MOEP and the development partnership of ANDRITZ HYDRO, HTCT and K-water conducted a starting ceremony for this first “low-head” project in Myanmar.

**HPP Upper Nam Htum:** In September 2015, ANDRITZ HYDRO signed a contract with MOEP for the supply of the entire electro- and hydro-mechanical equipment for the 3.2 MW Upper Nam Htum hydropower plant.

HPP Upper Nam Htum will provide renewable energy to the city of Putao and its surrounding area in Kachin State. This will be a milestone in strengthening Myanmar’s rural electrification and small hydropower development program.

The promising potential in combination with the enabled market access makes Myanmar a very interesting country for future energy investments in hydropower. ANDRITZ HYDRO is ready to participate actively in this development. ■

|               |            |   |
|---------------|------------|---|
| MYANMAR FACTS | 53.44 Mio. | Population                                      |
|               | 52%        | Access to electricity                           |
|               | 3,151 MW   | Installed hydro capacity                        |
|               | 2,398 MW   | Hydro capacity under construction               |
|               | 69%        | Share of generation from hydropower             |
|               | 8,802 GWh  | Hydro generation                                |
|               | 46,000 MW  | Technically feasible hydro generation potential |
|               |            |   |
|               |            |   |
|               |            |   |

Hydropower & Dams World Atlas 2015 and The World Bank

# Malaysia

## Green Energy Lightning the Future

By Michael Moggie  
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**Malaysia** is an emerging multi-sector economy attractive for investments into high technology industries, biotechnology, and services. The government launched a program to accelerate the country's economic growth and is continuing its efforts to boost domestic demand and reduce the economy's dependence on exports.

Malaysia is well developed, 100% of the population have access to electricity. The share of hydro in the electricity generation mix is about 20%, but only 12% of the technically feasible hydro generation potential is developed.

### ANDRITZ HYDRO in Malaysia

Since 2009, ANDRITZ HYDRO maintains an office in the capital of Kuala Lumpur, but the company has a history back to the early 1960s. ANDRITZ HYDRO has delivered almost 20 units with a total installed capacity of more than 1,000 MW to Malaysia.

**HPP Ulu Jelai:** ANDRITZ HYDRO received an order for the turnkey delivery of the complete electrical and mechanical works for the 382 MW Ulu Jelai hydropower plant from Salini Malaysia Sdn Bhd in July 2011. Tenaga Nasional Berhad (TNB), Malaysia's largest power utility, will own and operate the plant.

ANDRITZ HYDRO delivered and installed two Francis units including synchronous generators, the hydro-mechanical equipment, all the mechanical auxiliaries and the electrical power systems. As a commitment to support local industries, ANDRITZ HYDRO maximized the local content of the project, where about 80% of electrical equipment and steel structures were manufactured locally. Commissioning of the project will occur in 2016.



› Petronas Twin Towers. Malaysia

### MALAYSIA FACTS

29.9 Mio.  
100%  
5,456 MW  
1,250 MW  
20%  
15,000 GWh  
123,000 GWh

Population  
Access to electricity  
Installed hydro capacity  
Hydro capacity under construction  
Share of generation from hydropower  
Hydro generation  
Technically feasible hydro generation potential

Hydropower & Dams World Atlas 2015 and The World Bank

Further important projects currently under execution are the small hydropower plants HPP Hulu Terengganu (2 × 7.85 MW), HPP Bintang (2 × 4.04 MW), and HPP Kampar (2 × 2.27 MW). Among ANDRITZ HYDRO's key references for successfully executed projects special highlights are HPP Chenderoh (3 × 10 MW, refurbishment and modernization), HPP Pergau (4 × 166 MW, mechanical equipment), and HPP Sultan Abu Bakar (4 × 25 MW, mechanical equipment).

› Powerhouse and penstock of HPP Temengor



With the successful execution of these projects ANDRITZ HYDRO emphasizes once more its competence on the Malaysian hydropower market and proves its readiness for future challenges. ■

# Socialist Republic of Vietnam

## Renewable Energy in Harmony with Nature

By Martin Koubek  
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Vietnam has a fast growing population of about 90 million people and an economy which is rapidly developing. Nowadays Vietnam has an electrification rate of 99%. The country is focusing on renewable energy, mainly hydropower, which contributes 33% of the total power generation. The electricity masterplan intends to install more than 20,000 MW in Vietnam and in the border area of Laos in the upcoming years.

› Rice fields on terraced in sunset at Mu Cang Chai, Vietnam



› Contract signing for Thuong Kon Tum hydropower project

#### ANDRITZ HYDRO in Vietnam

With a hydro potential of 120,000 GWh, of which less than half has been developed as of today, Vietnam is one of the most vital and prospective hydropower markets.

For more than 15 years, ANDRITZ HYDRO has run a representative office in the Vietnamese capital of Hanoi. In 2016 ANDRITZ HYDRO is going to establish it as a full legal entity.

ANDRITZ HYDRO has installed or rehabilitated about 50 units with a capacity of about 1,000 MW.

**HPP Thuong Kon Tum:** In 2012, ANDRITZ HYDRO signed a contract for the electro-mechanical works for one of the most prestigious hydropower projects in Vietnam, HPP Thuong Kon Tum, located at the border between Laos and Vietnam, near the city of Kon Tum.

ANDRITZ HYDRO is going to supply turnkey electrical- and mechanical equipment, including two high-head Pelton turbines with speed governors, generators, and auxiliary systems. After completion in 2017, this hydropower plant will have an installed capacity of 220 MW and will generate about 1,000 GWh of electrical energy per year.

**HPP Chi Khe:** At the end of 2013, ANDRITZ HYDRO received an order from AGRIMECO for the Chi Khe hydropower plant on the Ca River, approximately 150 km south of the capital of Hanoi. ANDRITZ HYDRO supplied electro-mechanical equipment including two 20.5 MW Bulb turbines, generators, and associated electrical equipment. Start of commercial operation was end of 2015.

**HPP Sap Viet:** In October 2014, ANDRITZ HYDRO signed a contract with Sap Viet JSC for the delivery of a complete Compact Hydro “from water-to-wire” package including two 10.5 MW horizontal Francis units for the Sap Viet hydropower plant, in the province of Son La.

The customer decided to use the from ANDRITZ HYDRO offered solution of horizontal turbine arrangements, which will bring a significant benefit regarding costs and installation time and will also be of great advantage for subsequent maintenance. ▶



**HPP Nam Tha 3:** ANDRITZ HYDRO has received an order from PHUC KHANH Energy Development and Construction Investment JSC for the 14 MW Nam Tha3 hydropower plant, which is located on the Nam Tha river in the Van Ban district, Lao Cai province.

ANDRITZ HYDRO's scope of supply comprises the complete electro-mechanical equipment including two four-jet Pelton turbines, generators, and mechanical auxiliaries. The project is scheduled to be put into commercial operation in mid-2016.

**HPP Dak Mi 2:** In 2014, after the HPP Chi Khe project, ANDRITZ HYDRO signed a second contract with AGRITA QUANG NAM Energy JS Company (AGRITAM) for the complete electro-mechanical scope for Dak Mi 2 hydropower plant, located on the Dak Mi River, in the province of Quang Nam. It is a multipurpose scheme used for irrigation and hydropower generation.

ANDRITZ HYDRO supplies the complete electro-mechanical equipment, including two vertical 49 MW Francis turbines, governors, and generators. HPP Dak Mi 2 will supply 415 GWh of sustainable and clean electrical energy per year.



› Area near Hoi Xuan hydropower plant

**HPP Chau Thang:** In February 2015, ANDRITZ HYDRO's Compact Hydro business division made a breakthrough in the field of low-head turbines in Vietnam.

ANDRITZ HYDRO signed a contract with Prime Que Phong JSC for the supply of two vertical Kaplan units for the 14 MW Chau Thang hydropower plant, located on the Quang River in the communes of Chau Thang and Que Son, some 330 km north of Hanoi. The project is scheduled to be put into commercial operation in 2016.

**HPP Xim Vang 2:** In July 2015, ANDRITZ HYDRO received an order from XIM VANG HYDROPOWER JSC for the Xim Vang 2 hydropower plant, located on the Xim Vang River, in Son La province, about 34 km east of the city of Phu Yen. HPP Xim Vang 2 will have a total installed capacity of 18 MW.

ANDRITZ HYDRO's scope of supply comprises electro-mechanical equipment, including two Pelton turbines, generators, and auxiliary systems. The hydropower plant is planned to be put into commercial operation in 2017. ▶

› Powerhouse of Dakpsi hydropower plant



**HPP Hoi Xuan:** ANDRITZ HYDRO won a contract for the supply of electro- and hydro-mechanical equipment for the new 102 MW Hoi Xuan hydropower plant, owned by Hoi Xuan VNECO Investment and Construction JSC. The scope of supply includes design, delivery, installation, and commissioning of three Bulb turbines and generators, as well as automation and the hydraulic equipment. Commissioning of the plant is scheduled for the beginning of 2018. Thereafter more than 425 GWh of renewable energy every year for Vietnamese households and the local industry will be supplied.



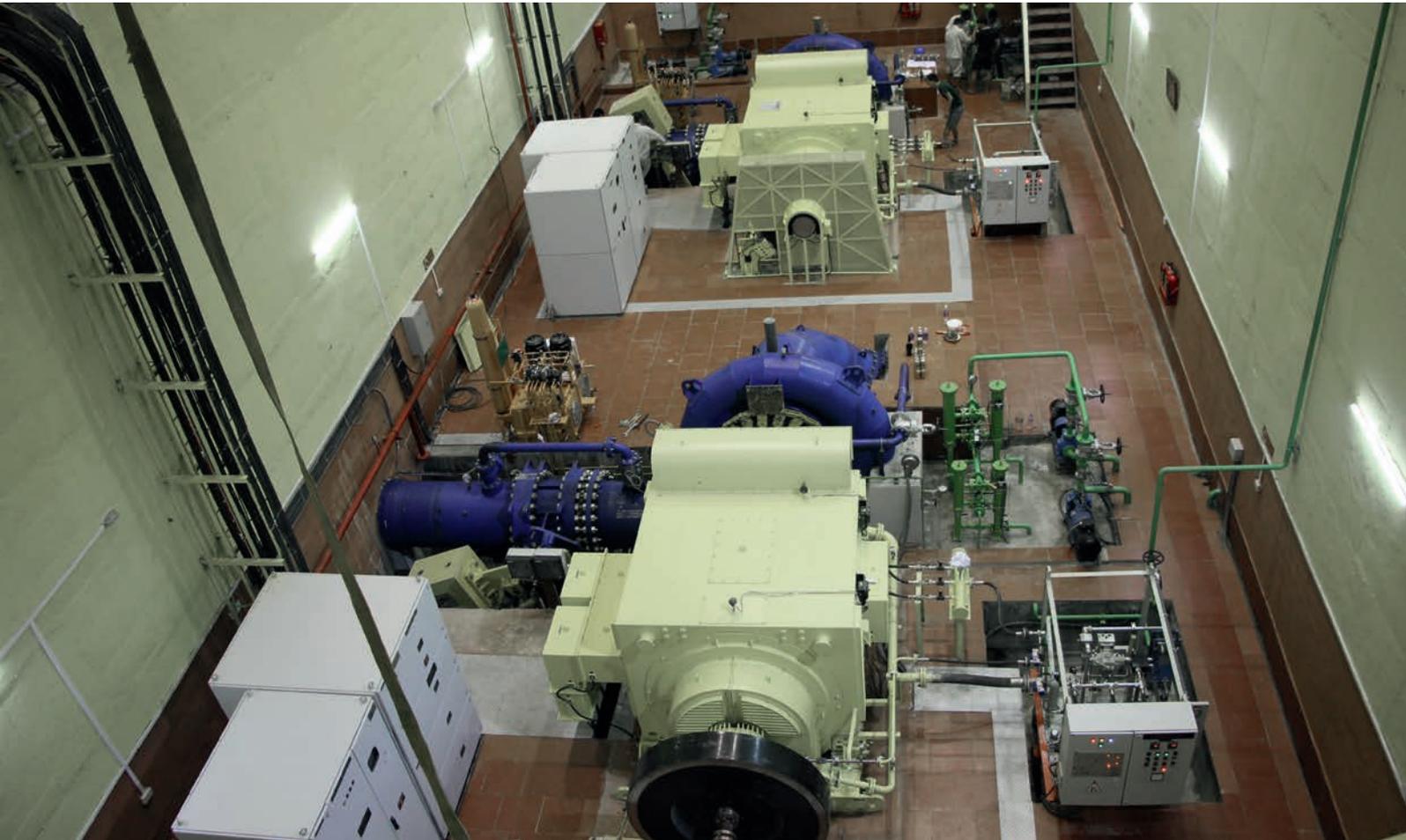
› Installation works at Dakpsi hydropower plant

Vietnam is a rising country with a well developed economy. Due to the large hydropower potential it offers good opportunities for investments in the energy sector. ANDRITZ HYDRO with its long-lasting history in Vietnam is positive for the future and is looking forward to providing tailor-made solutions to its customers. ■

|                      |   |                                     |
|----------------------|---|-------------------------------------|
| <b>VIETNAM FACTS</b> | 90 Mio.   | Population                          |
|                      | 99%   | Access to electricity               |
|                      | 14,000 MW                                       | Installed hydro capacity            |
|                      | 2,500 MW  | Hydro capacity under construction   |
|                      | 33%   | Share of generation from hydropower |
|                      | 47,950 GWh                                      | Hydro generation                    |
| 120,000 GWh          | Technically feasible hydro generation potential |                                     |

Hydropower & Dams World Atlas 2015 and The World Bank

› Machine hall at Nam Chim hydropower plant





► Birdview on Sihwa tidal power plant

# South Korea

Republic of Korea

## Tidal Energy Feeds the Grid

By Fritz Holzinger  
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In an effort to sustain economic growth, the South Korean government has prioritized structural reforms. South Korea is the world's fourth largest oil importer and intends to increase the share of renewable energy. Only 2% of the whole electricity demand is covered by hydropower generation. As the potential for conventional hydropower is almost fully exploited, South Korea is now focusing on its impressive tidal resources.

### ANDRITZ HYDRO in South Korea

First deliveries to South Korea have already taken place in the early 1930s, but ceased afterwards due to the political and economic situation. Since the beginning of this millennium, ANDRITZ HYDRO won some important orders in the South Korean market. In total, ANDRITZ HYDRO has delivered about 40 units with a total installed capac-

ity of more than 1,000 MW to South Korea. The largest projects are HPP Cheonsong (2 × 306 MW) and HPP Imha (2 × 25 MW).

**HPP Andong:** Korea Water Resources has awarded ANDRITZ HYDRO the refurbishment of the Andong hydropower station. Two turbine-generator sets, each with an output of 46.3 MW, are to be modernized by mid-2019.

**HPP Sihwa:** In 2005, ANDRITZ HYDRO received a contract from Daewoo Engineering & Construction Co., Ltd. for the electro-mechanical equipment of the Sihwa Tidal power plant, located at the Sihwa Lake Dam.

ANDRITZ HYDRO's scope of supply comprised the design of ten Bulb turbine-generator units and their ancillaries, delivery of core components for

turbines and generators, the automation system, and supervision of the site installation, as well as commissioning.

HPP Sihwa has a total output of 260 MW and is therefore the largest tidal power plant in the world, having an annual power generation of 543 GWh.

In August 2011, the opening ceremony of the power plant was celebrated in the presence of the president of Korea. By end of 2011, the project was completed and the power plant was put into full operation.

With the successful execution of the Sihwa tidal project and with almost 20% of the total installed capacity delivered by ANDRITZ HYDRO, the company takes an important position in the realization of South Korea's plans to develop its renewable energy sources. ■

### SOUTH KOREA FACTS

50.42 Mio.  
100%  
6,727 MW  
2%  
7,820 GWh

Population  
Access to electricity  
Installed hydro capacity (incl. tidal)  
Share of generation from hydropower  
Hydro generation

Hydropower & Dams World Atlas 2015 and The World Bank

# India

Republic of India

## Accepting Challenges for a Better Life

By Sandeep Shrivastav  
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**The outlook** for India's long-term economic growth is moderately positive due to a young population and corresponding low dependency ratio, healthy savings and investment rates, and increasing integration into the global economy.

As of today only about 19% of the technically feasible hydropower potential is developed and only 12% of the electricity generation comes from this renewable energy resource. This shows that India has still a very large potential for the development of hydropower projects and is therefore offering interesting investment opportunities.

### ANDRITZ HYDRO in India

ANDRITZ HYDRO has been active in the Indian market for more than 100 years. The first delivery was for HPP Shivasamudram in 1903. Mid 1970s, ANDRITZ HYDRO opened an office in the city of Mandideep, whereas the



› Challenging transportation

company headquarters have been in New Delhi since 1996. In Prithla, in the district of Palwal, ANDRITZ HYDRO operates very successfully a manufacturing workshop. Almost 600 units with a total capacity of about 16,700 MW were installed or rehabilitated by ANDRITZ HYDRO, which represents about 40% of the country's total installed capacity.

The largest executed projects were HPPNathpaJhakri with  $4 \times 336$  MW, HPP Karcham Wangtoo with  $4 \times 250$  MW, HPP Teesta Urja II with  $6 \times 200$  MW, HPP Baglihar with  $3 \times 150$  MW, and HPP Bhira with  $1 \times 164$  MW.

Selected large orders for generators were HPP Teesta 3 with  $6 \times 222$  MVA, HPP Chamera I with  $3 \times 200$  MVA, and HPP Nagjhari with  $3 \times 166$  MVA.

**HPP Shongtong Karcham:** In March 2015, ANDRITZ HYDRO received an order from Himachal Pradesh Power Corporation Ltd. (HPPCL) to supply the complete electro-mechanical equipment for the new 450 MW Shongtong Karcham run-of-river hydropower plant in Himachal Pradesh.

Himachal Pradesh is one of the most important hydropower regions in India, representing roughly one quarter of India's total hydropower potential.

This order is the third large project from HPPCL for ANDRITZ HYDRO. It follows the projects HPP Sawra Kuddu and HPP Kashang, which are currently under execution by ANDRITZ HYDRO.

Today ANDRITZ HYDRO holds a leading position in India's hydropower sector. The company is developing more than 20 large projects, service and rehabilitation projects, and compact projects in the Indian market. The two state-of-the-art manufacturing workshops are mainly responsible for manufacturing and supplying to the projects to India, its neighbouring countries and entire Southeast Asia. ■

› Powerhouse of HPP Teesta III



### INDIA FACTS

|             |   |
|-------------|---|
| 1,295 Mio.  | Population                                      |
| 78.7%       | Access to electricity                           |
| 43,300 MW   | Installed hydro capacity                        |
| 12,372 MW   | Hydro capacity under construction               |
| 12%         | Share of generation from hydropower             |
| 125,000 GWh | Hydro generation                                |
| 660,000 GWh | Technically feasible hydro generation potential |



› A village near Lalashan hydropower plant

# China

People's Republic of China PRC

## Hydropower Connects History with Future

By Frank Mette  
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**China implemented** several economic reforms in order to cut its carbon dioxide emissions in the future. The government is seeking to add energy production capacity from sources other than coal and oil, focusing on nuclear and renewable energy development. Recent annual hydro generation is about 40% of the technically feasible potential of 2,720,000 GWh, which means there is a huge potential waiting to be developed.

### ANDRITZ HYDRO in China

ANDRITZ HYDRO had first established a representative office in China in 1984. The current legal entity in China was founded in 2002, with branch offices presently located in Beijing, Shanghai, Chengdu, Hangzhou, and manufacturing centers in Chancheng and Sanshui.

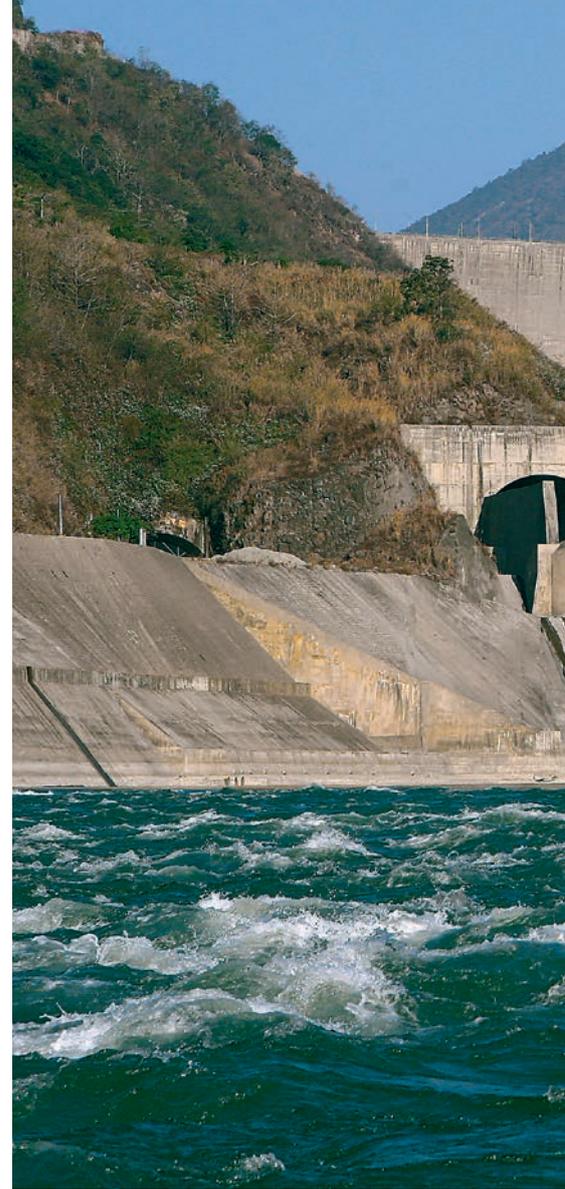
ANDRITZ HYDRO has a long history in China, with first turbine deliveries back in the 1930s (HPP Fang Man).

Through the years, ANDRITZ HYDRO could record some large contracts such as HPP Sanxia (6 × 710 MW), HPP Pubugou (3 × 611 MW), HPP Er Tan (6 × 582 MW), HPP Lijiaxia (5 × 408 MW), HPP Guang-zhou (4 × 326 MW), HPP Tongbai (4 × 322 MW), and HPP Tianhuanping (6 × 306 MW).

ANDRITZ HYDRO has delivered more than 550 units with a total capacity of almost 43,000 MW.

**HPP Da A Guo:** For the hydropower plant Da A Guo, ANDRITZ HYDRO was awarded a contract by Yajiang JinTong Hydroelectric Development Co Ltd. for the supply, installation, and commissioning of two 130 MW Pelton units. The first unit will be handed over to the customer for commercial operation in mid-2017.

**HPP Shen Zhen:** In January 2014, Shen Zhen pumped storage Co., Ltd. awarded a contract to ANDRITZ HYDRO for design, manufacturing, installation, and commissioning of four spherical valves and its accessories. The valves have a diameter of 2,300 mm and a head of 720 m – the second highest water head in ANDRITZ HYDRO's valve reference list. The plant will be put into commercial operation in 2017.



› Downstream of Er Tan Dam

**HPP Sanchahe:** In February 2014, ANDRITZ HYDRO received a contract from Yunnan Baoshan Binlangjiang Hydro Power Development Co. Ltd for the supply of three turbine-generator units for the 75 MW Sanchahe hydropower plant. The scope of supply included design, manufacturing, and transportation, as well as site supervision and commissioning. Commercial operation of unit #1 started in December 2015. ▶



**HPP Lalashan:** In 2010, ANDRITZ HYDRO received a contract from Huaneng Hydropower Company for the supply of electro-mechanical equipment including design, manufacturing, transportation, installation supervision, and commissioning of two 48 MW Francis turbines, generators and valves for the Lalashan hydropower plant. In October 2015, the plant was handed over to the customer for commercial operation.

**HPP Gong Ge Er:** In 2010, ANDRITZ HYDRO signed a contract with Kunming Electrical Machinery Co., Ltd (E&M contractor) for the supply, design, manufacturing, supervision, and commissioning of three 67 MW vertical, six-jet Pelton turbines for HPP Gong Ge Er. In September 2014, the units were handed over to the customer for commercial operation.

This order was the first Pelton turbine project for ANDRITZ HYDRO in China.

ANDRITZ HYDRO is devoted to supply state-of-the-art technology and tailor-made solutions to provide first-class products and services to the customer. ■

**CHINA FACTS**

|               |   |
|---------------|---|
| 1,364 Mio.    | Population                                      |
| 100%          | Access to electricity                           |
| 301,800 MW    | Installed hydro capacity                        |
| 50,000 MW     | Hydro capacity under construction               |
| 17%           | Share of generation from hydropower             |
| 1,066,000 GWh | Hydro generation                                |
| 2,720,000 GWh | Technically feasible hydro generation potential |



› Bridge in Dagachhu

# Bhutan

Kingdom of Bhutan

## Clean Energy from the Thunder Dragon Country

By Sandeep Shrivastav  
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**Bhutan's economy**, small and less developed, is based largely on hydropower, agriculture, and forestry. Bhutan's largest export – hydropower to India – could stimulate sustainable growth in the coming years. Bhutan currently taps only 6% of its hydropower potential of 118,260 GWh and is in building 12 new hydropower dams with a combined capacity of 10,000 MW by 2020, as agreed with India in 2008.

### ANDRITZ HYDRO in Bhutan

Almost 20 years ago, ANDRITZ HYDRO delivered its first equipment to Bhutan, for the Basochhu Upper Stage hydropower plant. Since then, ANDRITZ HYDRO has supplied 14 units with a total capacity of more than 1,500 MW, which is equivalent to 88% of the total country's installed capacity.

**HPP Dagachhu:** Dagachhu Hydro Power Corporation (DHPC) and ANDRITZ HYDRO signed a contract for the delivery and installation of hydro-mechanical equipment for the Dagachhu hydropower plant in July 2009.

The Dagachhu hydropower plant is a run-of-river power plant and consists of an underground powerhouse, underground waterways of approximately 8 km length and three large desilting chambers, located downstream of the intake.

The scope of delivery included two Pelton turbines, two governors, the bifurcator, penstocks, main inlet valves, cranes, and the complete hydraulic steel structure equipment for the intake and the desilter.

**HPP Tala:** In December 2011, ANDRITZ HYDRO won an important contract from Druk Green Power Corporation (DGPC) for the supply of MicroGuss™ hard coated Pelton runners for the Tala hydropower plant, the largest hydropower plant in Bhutan, housing six 173 MW units.

ANDRITZ HYDRO has been developing high-quality coatings since 1986 – initiated by projects in the Swiss Alps with hydro-abrasive problems related to glacial silt. After experiencing proven protection in the Indian Himalayan region's silty water, the customer selected the SXH70™ coating.

Further projects for ANDRITZ HYDRO were HPP Chhukha (4 × 84 MW), HPP Basochhu Lower Stage (1 × 21 MW), and HPP Basochhu Upper Stage (1 × 12 MW). The scope under these references covers either complete packages or critical items for the plants.

Winning all these contracts has further consolidated ANDRITZ HYDRO's position in Bhutan, which has emerged with a very promising hydro potential for the coming years, and underlines the important role of ANDRITZ HYDRO in the development of the Bhutanese hydropower market. ■

#### BHUTAN FACTS

|             |   |
|-------------|---|
| 765,000     | Population                                      |
| 75.6%       | Access to electricity                           |
| 1,738 MW    | Installed hydro capacity                        |
| 3,534 MW    | Hydro capacity under construction               |
| 100%        | Share of generation from hydropower             |
| 7,147 GWh   | Hydro generation                                |
| 118,260 GWh | Technically feasible hydro generation potential |

# Nepal

Federal Democratic Republic of Nepal

## High Mountains Strengthen the Grid

By Sandeep Shrivastav  
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**Nepal** is among the poorest and least developed countries in the world. Nepal has an estimated technically feasible hydro potential of 367,920 GWh, whereof not even 1% are tapped. This offers considerable opportunities for investments and development. Political uncertainty and a difficult market have slowed foreign investment. Additional challenges to Nepal's growth include its geographic location, power shortages, and underdeveloped infrastructure. Nepal and India signed trade and investment agreements in 2014 that should increase Nepal's hydropower generation.

### ANDRITZ HYDRO in Nepal

For more than 20 years, ANDRITZ HYDRO has been present in the Nepalese hydropower market and supplied 17 units with a total capacity of 117 MW. From the 718 MW hydro capacity currently under construction 692 MW are contracted with ANDRITZ HYDRO.



**Middle Bhotekoshi:** In 2014, ANDRITZ HYDRO signed a contract with Madhya Bhotekoshi Jalavidhyut Company Ltd to deliver electro-mechanical equipment for the 102 MW run-of-river Middle Bhotekoshi hydropower plant.

ANDRITZ HYDRO will supply three 35 MW Francis turbines, generators with static excitation systems, automation, and electrical and mechanical auxiliary systems. The project is scheduled to be completed by the end of 2016.

**Upper Tamakoshi:** In February 2012, ANDRITZ HYDRO signed a contract with Upper Tamakoshi Hydro Power Limited for the 456 MW Upper Tamakoshi hydropower plant, the largest hydroelectric project in Nepal.

ANDRITZ HYDRO's scope of supply comprised the design, manufacturing, supply, installation, testing, and commissioning of the complete electro-mechanical equipment, including a 220 kV GIS and the mechanical balance of plant equipment.

Further contracts were HPP Khani Khola (2 × 15 MW), HPP Khimti (5 × 12 MW) and HPP Chilime (2 × 11 MW), amongst others.

ANDRITZ HYDRO proves to be a reliable partner in developing the Nepalese hydropower potential with its state-of-the-art technology and extensive experience in order execution. ■

› Spherical valve for Upper Tamakoshi hydropower plant



### NEPAL FACTS

|             |   |
|-------------|---|
| 28.17 Mio.  | Population                                      |
| 76.3%       | Access to electricity                           |
| 734 MW      | Installed hydro capacity                        |
| 718 MW      | Hydro capacity under construction               |
| 100%        | Share of generation from hydropower             |
| 3,635 GWh   | Hydro generation                                |
| 367,920 GWh | Technically feasible hydro generation potential |



# Pakistan

Islamic Republic of Pakistan

## Teamwork for Impressive Hydropower Results

By Fritz Holzinger  
fritz.holzinger@andritz.com

**Pakistan suffered** a slow economic growth and has implemented a low cost power generation plan to harness its hydropower resources. Pakistan has an astounding annual hydropower potential of about 200,000 GWh, which is only explored by about 16%, but more than 30% of the electricity demand is covered by hydropower generation.

### ANDRITZ HYDRO in Pakistan

ANDRITZ HYDRO has already executed equipment deliveries to Pakistan back in the 1940s (HPP Rasul). Through the years, ANDRITZ HYDRO installed or modernized more than 50 units with a total capacity of about 4.000 MW, which is more than half of the country's total capacity.

**HPP Tarbela Dam:** In 1978, ANDRITZ HYDRO received a contract from Pakistan's Water and Power Development Authority (WAPDA) for the supply of turbines and generators for the 3,478 MW Tarbela Power Station. Ten years later, ANDRITZ HYDRO delivered mechanical equipment, penstocks – the world largest penstocks listed in the Guinness Book of World Records – and gates for further units. 2009 ANDRITZ HYDRO was assigned to modernize governors of four units. Since 2014, ANDRITZ HYDRO refurbished the static excitation systems of eight units (out of 14), which will be commissioned sequentially, starting in 2016.

**HPP Allai Khwar:** ANDRITZ HYDRO supplied to WAPDA the complete electro-mechanical equipment and services for two 60.5 MW Pelton turbines, including generators and auxiliary systems. In March 2013, the hydropower station was officially inaugurated.

**HPP Duber Khwar:** ANDRITZ HYDRO's scope of supply included two 65 MW Pelton turbines, generators and auxiliary systems. In March 2014, the plant was successfully handed over to WAPDA.

**Golen Gol:** In 2014, WAPDA awarded a contract to ANDRITZ HYDRO for the manufacturing and installation of three Pelton turbine-generator units and the electro-mechanical equipment for the Golen Gol hydropower plant. The start of commercial operation is scheduled for 2016.

These projects underline the excellent position of ANDRITZ HYDRO in Pakistan. ■

› Manufacturing of Pelton runner for HPP Duber Khwar



### NEPAL FACTS

185 Mio.  
93.6%  
7,250 MW  
2,837 MW  
34%  
32,350 GWh  
240,000 GWh

Population  
Access to electricity  
Installed hydro capacity  
Hydro capacity under construction  
Share of generation from hydropower  
Hydro generation  
Technically feasible hydro generation potential

Hydropower & Dams World Atlas 2015 and The World Bank

# New Test Bench in India

## First vertical generator test set-up completed

By AJ Nakhate  
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**ANDRITZ HYDRO** India has successfully completed its first vertical generator running test at its new workshop test bench.

In mid-2014, ANDRITZ HYDRO India started expanding its vertical test bench with the aim of fulfilling all testing requirements within the committed delivery time. The test bench was designed by ANDRITZ HYDRO engineers and established on time to meet the first generator testing schedule.

One of the key features of the new test bench was the possibility to perform over-speed tests up to 1,400 rpm. ANDRITZ HYDRO India is now fully equipped to perform running tests up to 35 MVA for generators with both horizontal or vertical shaft orientations.



The first vertical generator order for ANDRITZ HYDRO India was for the Kal hydropower plant, owned by TPSC (India) Private Limited. The contract comprised the supply of one synchronous generator unit.

The generator is designed with all necessary instrumentation including a brushless excitation system and an automatic voltage regulator (THYNE™ 1) to meet the customer specification and IEEE standards.

The testing of the generator for HPP Kal included heat run tests at rated speed, a sudden three-phase short circuit test, and an applied voltage test with the rotor locked in direct and quadrature axis. This generator was also specially tested for damper measurement due to its hybrid pole construction.

ANDRITZ HYDRO India has proven its competence by testing this first vertical generator with all stringent requirements as per standards and is looking forward to new challenges to prove its new workshop test bench. ■



|       |           |   |
|-------|-----------|---|
| FACTS | 16.67 kVA | Output<br>Voltage<br>Frequency<br>Speed |
|       | 11 kV     |   |
|       | 50Hz      |   |
|       | 375rpm    |   |



EVENT FORECAST

**REWA 2016:** ANDRITZ HYDRO is looking forward to participate at the Renewable Energy World Asia (REWA) with a booth (E62) and presentations.

20.-22. September 2016  
Seoul, South Korea  
[www.renewableenergyworld-asia.com](http://www.renewableenergyworld-asia.com)

## Customer Day Vietnam

Hanoi, Vietnam

By Martin Koubek  
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In October 2015, more than 130 customers and partners participated at the ANDRITZ HYDRO Customer Day Vietnam. The event was officially opened by His Excellency, the Austrian Federal Minister for Transport, Innovation and Technology, Mr. Alois Stöger.

This year, the focus was concentrating on technical solutions for environmental-friendly hydropower plants (e. g. oil-free hubs for Kaplan and Bulb turbines), and the benefits of HIPASE (the new platform and engineering tool for protection and excitation) as well as the ANDRITZ Pumps product portfolio.

As a special highlight, the General Director of Song Da Corporation, Vietnam's largest construction company, expressed his thanks to ANDRITZ HYDRO for the cooperation in ten projects, including Na Loi, Thac Trang, Ry Ninh, Ea Krongrou, Tra Xom, and Nam He. ■



## Supplier and Service Provider of the year

Jakarta, Indonesia

By Thomas Locher  
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During the annual supplier gathering of PT. Pembangkitan Jawa-Bali (PJB) in May 2015, ANDRITZ HYDRO Indonesia was awarded first place in the category "Supplier and Service Provider" for the year 2014.

PJB is a subsidiary of PT. PLN (Persero), the state-owned electricity utility of Indonesia, operating plants such as HPP Cirata (1,008 MW), HPP Tulungagung (36 MW), and HPP Sengguruh (32 MW). The annual gathering aims to strengthen the relationship between PJB and its suppliers. ANDRITZ HYDRO Indonesia has always been among the top 10 suppliers and service providers.

This time the excellent performance and compliant handling of the contracts, as well as the dedicated work of the project team during 2014, convinced PJB to award ANDRITZ HYDRO first place out of a field of more than 80 suppliers and service providers assessed for the prize.

This award is an outstanding achievement and ANDRITZ HYDRO Indonesia will strive to continue providing excellent services to all of its customers for the benefit of the people of Indonesia. ■



## Power Trends 2015

Pasay City, Philippines

By Albin Königshofer  
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The 10th biennial edition of the Power Trends 2015 conference, held in September 2015, was an impressive success. The conference started with a significant keynote speech from Senator Loren Legarda about the untapped renewable energy in the Philippines and how its deployment will help avert climate change.

ANDRITZ HYDRO attended the conference as a gold sponsor and had a booth, which was visited inter alia by SN Aboitiz Power, San Miguel Power Corp and clients for Compact Hydro business such as Alternergy, Oriental Energy, United Holdings Power Corporation (UHPC), Repower Energy Development Corp. and Renesons Energy Corp.

As part of the technical sessions ANDRITZ HYDRO presented a technical paper on its expertise regarding the development of pumped storage hydropower plants.

ANDRITZ HYDRO is looking forward to participating at the 2016 event. ■



# Hydropower in Laos

## Leading position of ANDRITZ HYDRO



**ANDRITZ HYDRO is a global supplier of electro-mechanical equipment and services (“from water-to-wire”) for hydropower plants.** With the first project of the hydropower plant Selabam in 1967, Laos starts the development of renewable energy. ANDRITZ HYDRO supplied 68% of all installed hydropower turbine capacity in Laos and

is currently executing four projects with 17 units and total capacity of about 1,900 MW. HPP Xayaburi and HPP Xekaman 1 are presently the largest hydropower projects under construction in Lao PDR.

**We focus on the best solution – “from water-to-wire”.**

